Effects of Financial and Business Cycles and CEO Characteristics on Firm Risk and Performance

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Abstract

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Using a sample of Chinese A share firms from 1991 to 2019, this thesis extends the literature on how business cycles and financial cycle wavelets relate to firm risks and performance after accounting for CEO demographic characteristics. The thesis documents that higher (lower) firm risks are associated economically and statistically with increases (decreases) during business or financial expansions (recessions). These associations also are more pronounced for business recession periods and financial expansion periods. The findings suggest that firms headed by female CEOs are less risk seeking throughout cycle wavelets compared to firms headed by their male counterparts. However, firm risk is higher for firms headed by a female CEO that has obtained a postgraduate degree. The relation between firm risk and performance during changing macro events is less conclusive. These findings potentially provide important implications for understanding business cycles and financial cycles and their effects on the corporate sector in China.

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1. INTRODUCTION

Finance cycles and economic cycles were correlated during the past two decades (Calderón and Fuentes, 2014). Taking the 2008 financial crisis as an example, the asset bubble in the housing market began in 2006 when banks began bundling bad home loans with good ones to be sold as mortgage-backed securities. The resulting credit crunch contributed to the collapse of global stock markets. In association with the crisis, the analysis of financial cycles and their interaction with the macro-economy has become a key issue in the design of macro-prudential policy. Thus, it is important to understand the interactions between these two types of cycles and their effects on the corporate sector.

Research focused on the business cycle can be divided into short, medium and long cycles. One well-known short cycle is the Kitchin cycle, which is a 40-months cycle relating to demand and supply. The medium cycle proposed by Juglar in 1862 is a fixed investment cycle of 7 to 11 years. This cycle is measured by national income, unemployment, and fluctuations in production, profits and prices in most of the economic sectors. The Kondratieff wave is an example of a long cycle. It has a duration ranging from forty to sixty years (Alvarez-Ramirez et al., 2020; Isaic et al., 2019; Knell, 2015; Morineau, 1984; Polak and Tinbergen, 2004). The Kondratieff wave consists of four wavelets: prosperity, recession, depression, and rebound. Based on the Kondratieff theory, long-term price fluctuations are the result of economic growth that comes in long waves and is determined by technological innovations. According to the Kondratieff cycle, five main business cycles have occurred since the 18th century. The most recent cycle was based on information technology and began in 1970. Some economists argue that the sixth cycle will be from 2010 to 2050, and that it may be driven by human capital (Grinin

et al., 2017; Wilenius, 2014).

Burns and Mitchell (1946) define business cycles as fluctuations which can be found in the aggregate economic activity of nations. The business cycle also known as economic cycle consists of expansions and recessions. Fluctuations typically involve shifts over time between periods of relatively rapid economic growth and periods of relative stagnation or decline. According to previous research on business cycles, Gross Domestic Product (GDP) is the most widely used measure for business cycles since it measures the total market value of all final goods and services produced in a country in a given year. In this thesis, we also use the Chinese business index (Shen, Ren et al., 2018), whose main function is to provide economic and social monitoring research and information, as a robustness check.

An extension of non-neutral currency in finance advocated by Keynes can be regarded as a theory of financial cycles and financial instability (Knell, 2015). While business cycles focus mainly on the real economy, financial cycles relate more to changes in credit and real estate. According to the procyclicality of the financial system (Borio et al., 2001), the fluctuations of financial variables can change with a trend during different economic cycles.

Financial cycles also can be defined as the fluctuations found in the aggregate financial conditions of nations, which relates to the financial activities in both the financial and non-financial sectors that result in costly booms and busts. The measurements for financial cycles are generally from three distinct but interdependent market segments: credit, housing, and equities, because they constitute the core of financial intermediation.

Studies find that financial cycles generally have time-varying amplitudes and slopes, and longer durations than business cycles. Examples include Borio (2012) for seven countries (Australia, Germany, Japan, Norway, Sweden, the UK and the US), Schularick and Taylor (2012) for 14 countries (US, Canada, Australia, Denmark, France, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, and the UK), and Shen et al. (2018) for China. Claessens et al. (2012) report that the amplitudes of financial cycles are more likely to be sharper than those for business cycles. Shen, Ren et al. (2018) find that financial cycles comprise expansions and contractions of financial conditions rather than of the real side of the economy, and that the synchronicity of both business cycles and financial cycles is low in China. In contrast, Claessens et al. (2012) argue that the interactions between business and financial cycles are especially important in shaping recessions and recoveries. When house and equity prices are used to track financial cycles, recessions associated with financial disruption episodes tend to be longer and deeper than other recessions, and pronounced financial and business cycles are more likely and frequent in emerging compared to more advanced countries.

Mayers (1973) was an early pioneer in examining the importance of human capital as a non-marketable claim on hedging risk. Both marketable and non-marketable assets can affect investors risk aversion behaviors, which help to determine the fluctuations in market prices. However, other factors associated with Bottazzi et al. (1996) imply a negative relationship between human capital and stock market returns. May (1995) finds a negative relation between human-capital diversification and risk bearing which is consistent with the human capital diversification hypothesis. Since firm risk-taking and strategies of its managers are related mostly to firm performance and

self-interest, firm-specific risks may matter more to managers than to shareholders.

Managers should choose investment projects with positive net present values (NPVs) to maximize firm value under perfect capital markets but the role of managerial preferences and characteristics may drive some value destroying investments supported by agency theory. The agency theory proposed by Jensen and Meckling (1976) relates management ownership to firm performance, although the results for this relation in later research are mixed. Morck et al. (1988) summarize specific hypotheses into two streams: convergence-of-interests hypothesis, which states a positive relationship between corporate performance and management ownership, and the entrenchment hypothesis which predicts that beyond some point managers only have effective controls over the firm but not over cash flows so that increasing management ownership decreases firm performance.

Given that the current literature tends to study business/financial cycles and CEO decisions on firm risks and performance separately, the primary objective of this thesis is to examine the changing risks of Chinese firms through different business and financial cycles. A secondary objective is to assess the influence of CEO characteristics such as age, gender, education, tenure and power to explain the effects of shifts in behaviors and decisions of CEOs via measures of firm risk through different cycles.

My major findings can be summarized as follows: Using the BBQ method for tracking turning points in markets, I find that wavelets in either business or financial cycles tend to affect firm risks significantly and firms tend to bear more risks during expansion versus recession periods; Financial cycles are more pronounced during recessions (as in Claessens et al., 2012), with longer durations, and larger amplitudes

compared to their counterparts in business cycles; Finally, the relation between recession periods and firm risk has more economic significance for business cycles compared to that for financial cycles, and for financial expansions compared to business expansions.

I find that CEO gender and educational background tend to be significantly associated with firm risk even when the cycle indicators are considered in the model. Firms headed by female CEOs are less risky than firms headed by male CEOs but for those female CEOs with postgraduate degrees, they would add more risks to firms. The gender and educational background of a firm's CEO is not associated significantly with firm performance when business and financial cycles are included in the model. This is consistent with the conclusions of previous studies (Adams and Funk, 2012; Smith et al., 2006) that the design of models can influence the significance power of CEO demographic characteristics when assessing their relationship with firm performance.

The results of my thesis contribute to the literature in several ways. First, this is the first paper to study how business and financial cycles relate to the risks and performance posture of Chinese firms. While current research focuses on the interactions between financial and business cycles, generally it only focuses on comparing the differences of the main characteristics of cyclical phases, such as duration, amplitude and slope. With the exception of Shen et al. (2018) and Claessens et al. (2012), these studies do not examine empirically how the differences affect the real economy or financial activities. Although the 6th Kondratieff cycle is still an unsupported prediction, considering the impact on human capital is quite novel. The examination of how firm risk (not) conditioned on CEO characteristics changes along with the fluctuations in the cycles is an unexplored element in the design of macro-prudential policy.

Second, the use of the current methodology to track business or finance cycles by using up-to-date data which include both before and also after the financial crisis of 2007–2008 is important. As indicated by the procyclicality of the financial system, the period during and after the financial crises is useful for detecting fluctuations in the cycles. Furthermore, the association between the characteristics of CEOs and firm risk are more likely to differ by individual or idiosyncratic risk preferences around and during crises.

Finally, the methodology and the robustness tests regarding the measurements of dependent variables are reasonably comprehensive based on previous research. This should increase the robustness of the empirical findings reported in this thesis. Moreover, endogeneity and reverse causality are main concerns that are addressed to some extent in this thesis.

The remainder of this thesis is organized as follows. In the next section, a critical review of the academic literature and real economy or financial situations on fluctuations in cycles and CEO risk-taking incentives leading to the development of the main hypotheses is presented. Section 3 mainly focuses on defining both Chinese business and financial cycles. The methodology and data are first described, and then followed by the results of identifying turning points in both types of cycles. Section 4 describes the model and major variables, and reports the summary statistics. Section 5 conducts and discusses the empirical analyses. Section 6 presents robustness checks of the baseline tests. Section 7 concludes this thesis.

2. DEVELOPMENT OF THE HYPOTHESES

The procyclicality theory of the financial system supports the notion that

fluctuations of financial variables can change around a trend during economic cycles, calling for improvements in risk measurement and policy making to maintain the stability of both the economy and the financial system (Adrian and Shin, 2010; Borio et al., 2001). During a period of economic growth, banks can increase credit supply for firms that have used the value of their appreciated capital assets to gain access to external finance. However, loans issued during better economic conditions have an increased probability of being converted into non-performing ones, especially during economic downturns. When economic conditions are depressed, the deterioration of the financial situation of borrowers, the decline in collateral values and the exposure to loan losses cause banks to become stringent in issuing loans. This includes improved guarantee and credit review requirements, and higher provision coverage. The lagged growth of bank loans and decrease in loan size during a downturn can increase the severity and length of the downturn.

The common determinant behind financial crises in the past century is cheap capital cost coupled with the lessening of financial regulations which led to an investment boom, which in turn increased stock market and real estate prices. For example, the bubbles in stock and real estate markets during the Scandinavian banking crisis in the 1990s has been attributed to a large increase in lending to the private sector which accelerated the rapid growth of private consumption and capital investment. A successive increase in interest rates from 1987 to 1992 led to an economic recession and a sharp drop in asset prices that seriously affected financial system stability and private consumption. Financial institutions who mainly take part in housing finance faced rising costs of capital because they had to borrow short-term at floating interest rates while

lending at fixed interest rates. Falling asset prices also caused huge losses for banks that also held a lot of real estate mortgage loans. Asset price bubbles caused by easy monetary policies in the commercial real estate markets also were a leading cause of the Japanese banking crisis (1990-2003) and Global crisis (2007-2009). Interest rate cuts by the central banks caused deflation and a sharp rise in the proportion of non-performing debt.

These examples led to concerns about increased procyclicality in the financial systems and to the relation of fluctuations with broader amplitudes with the real economy. Borio et al. (2001) provide two explanations for the procyclicality of financial systems. The first explanation is information asymmetries between borrowers and lenders. Mishkin (1990) supports this observation by stating that lower quality borrowers are less likely to gain the same information as higher quality ones, and that moral hazard problems can affect efficiency in financial markets as borrowers may cheat on the real quality of financial projects proposed to lenders. Agency and adverse-selection problems provide a link between financial crises and the aggregate economy if the net worth of borrowers or the discounted future profits of firms decrease. The second explanation is the possibility that financial market participants respond inappropriately to time-varying risk caused by estimation error. This can affect the estimation of absolute versus relative risk, and exogenous versus endogenous risk. Furthermore, market participants may not act properly even if the estimates are correct. Due to the herding phenomenon, individuals may make decisions as a group instead of individually, which will have amplification effects even under rational conditions. In addition, Bernanke and Kuttner (2005) and Bekaert et al. (2013) find that easier monetary policy can lower risk premiums, which can lead to excessive risk-taking behaviors in financial markets.

Jensen and Meckling (1976) argue that firm insiders such as decision makers and controlling shareholders may pursue their own interests and not firm-value maximization by exploiting their informational advantage. Corporate governance research has examined the role of investor protection in minimizing managerial agency issues (e.g. La Porta et al., 2000). This research arrives at no consensus about the relation between investor protection and corporate investment choices. Burkart et al. (2003) assume that the appearance of dominant directors with less protected investors can limit the power of insiders to make investment decisions. Amihud and Lev (1981), Claessens et al. (2000) and John et al. (2008) state that higher levels of investor protection can lead to more risky investment choices. The level of management ownership is believed to be positively related to firm performance by Berle and Gardner (1934) while Demsetz (1983) argues that the increase of management ownership can destroy firm performance when managerial control passes beyond some point. Morck et al. (1988) estimate a nonlinear relationship between management ownership and performance. Hence, the association of CEOs with different characteristics in different business and financial cycles on firm performance still needs to be examined.

The upper echelons theory (UET) posits that organizational outcomes (specifically strategic choices and performance levels) are partially predicted by the managerial characteristics of the top-level management team (Hambrick and Mason, 1984). However, the ongoing debate in the literature regarding the effect of CEO characteristics on corporate risk-taking proxies and performance measurements has still not reached a consensus. Since demographic characteristics (such as gender, age, tenure, occupation, and education) are closely related to a managers' cognitive abilities or

changes (Hambrick, 2007), they are expected to be valuable for estimating executive behaviors driven by real psychological and social processes. Furthermore, the economic value of a worker's experience and skills can also determine strategic decision-making processes of executives and the corresponding performances of firms. CEO characteristics have also been identified in the link between personal risk preferences and firm-risk attributes (May, 1995). Hambrick and Mason (1984) find that older executives tend to take more conservative decisions, and are more likely to be risk averse (MacCrimmon et al., 1986). Similarly, Barker and Mueller (2002) argue for a negative relation between firm R&D expenses and CEO age as younger CEOs are more risk-tolerant compared to older CEOs. Serfling (2014) arrives at the same conclusion based on the finding that firms managed by older CEOs usually have lower stock return volatility. Taylor (1975) finds that firm performance declines with CEO age.

The relation of CEO gender with firm risk or firm performance is mixed. Females are more risk averse than males (Barber and Odean, 2001). Faccio et al. (2016) state that firms run by female CEOs tend to have lower leverage, less earnings volatility, lower involvement in risky projects and a higher likelihood of survival compared to firms managed by males. However, Adams and Funk (2012) using survey data from Sweden conclude that female directors have a lower need for security but higher demands for challenges compared to males, which gives the female directors certain incentives to take less risk-averse investing decisions. Some studies argue that firms with female CEOs tend to perform better than those managed by male CEOs (Gondhalekar and Dalmia, 2007; Khan and Vieito, 2013) while others by Du Rietz and Henrekson (2000) find that the existence of female members on the board can lead to under-performance when the

test does not control for firm size. Smith et al. (2006) find no significant relation between CEO gender and firm performance after adding unobserved firm-specific variables but these authors note that the discrepancies in conclusions may be related to the measure chosen for firm performance.

The impacts of CEO tenure and education levels on firm performance and risk-taking choices are also inconclusive. Chen and Zheng (2014) use tenure as an indicator of managerial power, and find that the choice of control variables in models, especially CEO tenure, age and a lagged dependent variable, can explain the differences in the conclusions for previous tests. Berger et al. (1997) argue that CEOs with longer tenures are more likely to be entrenched and are less likely to seek risks while Simsek (2007) states that CEOs with longer tenures are more likely to have better skills and understandings of firm developments compared to those with less working experiences. This provides CEOs with longer tenures certain incentives to choose riskier projects. The importance of CEO education background has been widely discussed with little agreement of their effect. CEOs with higher degrees can lead to risk-tolerance decisions (Barker and Mueller, 2002; Li and Tang, 2010; Orens and Reheul, 2013). Barker and Mueller (2002) argue that CEOs with an advanced science degree are more likely to invest in firm research and development but Daellenbach et al. (1999) find that the relationship is not significant. Daily and Jonathan (1997) find a negative relation between CEO education level and firm performance. Agrawal and Mandelker (1987) conjecture that CEOs who own significant stock and option holdings are less likely to be risk averse and prefer to undertake riskier investment decisions as measured by firm leverage and volatility-increasing acquisitions.

The importance of financing choices on the risk-taking behaviors of CEOs has some agreement. The strategic role of boards,[1] including making decisions on firm development, is found to be an important consideration for firm values (Kosnik, 1987). According to Adams et al. (2010) and Sudha et al. (2016), the decision-making function of a board can be affected by board characteristics such as board size, and whether the CEO is the board chair. The monitoring role of a board is an important factor for measuring firm risks according to Brick and Chidambaran (2008), as there is the possibility that firm managers take actions in their self-interest and not that of the firm. More diversified boards are more likely to lead to lower volatility, better performance, greater R&D investment and more efficient innovation processes (Bernile et al., 2017).

According to Keynes, liquidity preference can play a role in explaining an individual's risk-taking behavior. The precautionary motive hypothesis states that individuals are more likely to delay consumption and save given the possibility of unexpected problems or rising costs due to the lack of completeness of insurance markets (Zeng and Wang, 2015). Thus, cash-holding levels are expected to vary in different economic states due to the precautionary role of cash and the opportunity cost of cash.

The above lead to the following hypotheses:

H1: Firm risk changes through the wavelets in both business and financial cycles based on the procyclicality of financial systems and changes in investor behaviors. Firms are less likely to take riskier choices during recession periods compared to expansion periods in either cycle.

H2: Given the differences in the characteristics of business and financial cycles and their

[1] Stiles and Taylor (2002) characterize the role of boards as being strategic, monitoring and institutional.

effects on firm decision makers, the risk of firms led by CEOs with different characteristics vary with changes in both business and financial cycles.

H3: Characteristics such as gender, age, tenure and the power of CEOs are associated with firm risk and these associations differ with shifts in business and financial cycles.

H4: Firm risk changes with changes in the cycle wavelets have different effects on firm performance.

3. IDENTIFICATION OF BUSINESS AND FINANCIAL CYCLES IN CHINA

3.1Methodology

There are two main methods used to date business cycles. The non-parametric BB algorithm developed by Bry and Boschan (1971) searches for maxima and minima in the monthly series of the employment and unemployment rate over a given period of time to identify the turning points. The parametric Markov switching (MS) approach depends on the validity of the statistical estimating model. Harding and Pagan (2002) argue that the most important difference relates to robustness and that the MS model is less transparent than the BB algorithm. My thesis uses the new quarterly version of the BB algorithm (BBQ) used by Harding and Pagan (2002) to date business and financial cycles and to identify the turning points in the log-level of a series.

The way to define maximum and minimum is important for the turning points in a series to be able to track a cycle. According to the BBQ method, the peak in a series occurs at a time T if the variable X is greater than its two past consecutive periods and also the two future consecutive periods. In contrast, if the variable X is less than both of these periods, it is regarded as a trough at time T (Harding and Pagan, 2002; Shen et al.,

2017; Claessens et al., 2012). More formally:

$\{[(f_T - f_{T-2} > 0, f_T - f_{T-1} > 0)]\ and\ [(f_T - f_{T+2} > 0, f_T - f_{T+1} > 0)]\}$ for a peak; and

$\{[(f_T - f_{T-2} < 0, f_T - f_{T-1} < 0)]\ and\ [(f_T - f_{T+2} < 0, f_T - f_{T+1} < 0)]\}$ for a trough.

The Chinese Business Index is used to identify the turning points for business cycles, as perceptions and expectations of entrepreneurs are based on not only external market economic environments and macro policies but also on the internal operations and production status, which are the two main indicators of the index. All three versions of this business index will be used to enhance the rigor of the tests since all three versions focus on different economic aspects. The Concurrent Business Index reflects the basic trend of the current economy while the Leading and Lagging Business Indexes are related to the Concurrent Business Index. The Concurrent Business Index mainly focuses on four important economic aspects: industrial production, employment, social demand (investment, consumption, foreign trade), and social income (national tax, corporate profits, and resident income). The Leading Business Index is based on a group of indicators that lead the Concurrent Business Index and can be used to predict the future trend of an economy. The Lagging Business Index is based on a group of indicators that lag the Concurrent Business Index and can be used to identify previous peaks and troughs in economic cycles.

Financial cycles focus on three traditional financial market segments: credit, housing, and equities. Credit is the aggregate claims on the private sector by deposit money banks (Mendoza and Terrones, 2008; Claessens et al., 2012). I use the sales prices

of Chinese residential houses to track housing cycles, and the share price indexes weighted by the market value of outstanding shares to identify equity cycles.

A complete business cycle consists of both a recession and an expansion period. A recession is indicated by the turning points (from a peak to a trough) in either a business or financial cycle according to the identification results of using GDP, Business Index, Residential Housing Prices, Credit: Claims on Private Sectors, and Equity Prices. While an expansion period starts from a trough and lasts to the next peak in cycles.

3.2 Data

The time period used in the empirical work reported in this thesis is dictated by the absence of quarterly business or financial data before 1986, and that the coincidence period for these variables begins in 1991. Seasonally-adjusted quarterly data are used for GDP, Business Index (lagging, concurrent and leading), Residential Housing Prices, Credit: Claims on Private Sectors, and Equity Prices. Except for the indexes, all other variables are seasonally adjusted and transformed to the log-level. These variables are defined in the Appendix and summary statistics for their characteristics are reported in Table 1.

GDP growth is exponentially from 1991 to 2020, with a max of 253,459.18 Billion Yuan for 2019Q4 and a standard deviation of 73,664.89 Billion Yuan. The volatility of the Leading Business Index (2.53) is the smallest compared to the other two business indexes. The maximum and minimum of the concurrent and leading business indexes occur during the same period (1993Q2 and 2020Q1, respectively). The maximum and minimum values of the Lagging Business Index occur during 1994Q1 and 2009Q2, respectively. The sale prices of residential buildings also show an exponential trend

during the whole sample period with a maximum of 8,684.82 Yuan/square meters for 2019Q4 and a minimum of 640.60 Yuan/ square meters for 1991Q3. Credit: Claims on Private Sector soared over the sample period, increasing from 1,614,214.92 Billion Yuan for 1991Q1 to 168,420,950.7 Billion Yuan for 2020Q1, with a standard deviation of 46,432,591.44 Billion Yuan. The mean of Daily stock prices weighted by market capitalization is 33.80. This stock-price measure has the largest skewness (4.34), which is mainly related to the development of the A share market. As the A share market began in 1990 with only 10 listed stocks, the proportional weights for each of these sample stocks at the beginning calendar years are quite material.

3.3 Turning-point Results

I now present the results using the BBQ method to identify turning points in business and financial cycles in Table 2 and Figure 1 to Figure 7. Both Figure 1 and Panel A in Table 2 show an exponential trend in the growth of China GDP from 1991 to 2020 with only one peak during 2019Q4. In contrast, there are 28 turning points using the Concurrent Business Index (15 peaks and 13 troughs), 28 using the Leading Business Index (14 peaks and 14 troughs), and 25 using the Lagging Business Index (12 peaks and 13 troughs). As expected the turning-point dates for each index differ somewhat.

With regard to financial cycles in Panel B of Table 2, there are 14 peaks and 13 troughs identified by using Residential Housing Prices, which have an upward trend during the full sample period. The turning points tracked by Residential housing prices are often concurrent with those identified by the Business Indexes. There is an exponential trend with no identified turning points in the growth of Credits: Claims on Private Sectors during my research period, which probably reflects the growth in the real

economy in China over the sample period. From the early 20th century, both the system and policy have been promoting the surge in credits. Another indicator for tracking financial cycles is equity prices indexes weighted by market capitalization of outstanding shares which defines 23 turning points (12 peaks and 11 troughs) over the whole sample period from 1991 to 2020. Although the frequency of the turning points identified by equity prices are lower compared to those identified by the other indicators, except for GDP and Credit, the data volatility of the first three sample years for equity prices is the highest. The reason can be attributed to the development of the Chinese stock market. The Shanghai Stock Exchange officially opened on December 19, 1990 while the Shenzhen Stock Exchange opened on July 3, 1991. The number of stocks issued and both the transactions and shares traded were quite small during the early 1990s. The first peak in the financial cycles is identified by equity prices on 1992Q1 which coincides with the Shanghai Stock Exchange starting to fully deregulate stock prices. In addition, a bear stock market was followed by the tightening of controls by the government, which was then followed by an overheated Chinese economy from 1993 to 1994. My financial cycle results also discover a trough on 1994Q2, which provides some support for the efficacy of the methodology used to identify turning points.

Financial cycles are more pronounced than business cycles as widely proposed by many earlier studies (Claessens et al., 2012), especially in recessions compared to expansions. Thus, my research results also show similar conclusions indicated by amplitude and slope. Although no specific turning points can be tracked by using GDP and Credits as cycle indicators, the trend of these two variables are quite obvious from Figure 1 and Figure 7. Further support for my conclusions about tracking business and

financial cycles are provided by GDP being one of the most important component of the Concurrent Business Indexes in China and due to the procyclicality relation between credit and real estate.[2]

I now compare the durations, amplitudes, and slopes of the phases in both business and financial cycles. Duration is the total number of quarters from peak to trough or trough to peak, amplitude measures the changes in GDP, Business Index, Residential Housing Prices, Credit and Equity Prices between a peak and trough, and slope is the ratio of amplitude to duration. In summary, I find as in the previous literature that financial cycles occur less frequently but tend to have longer durations and larger amplitudes compared to business cycles.

The results reported in Tables 3 and 4 reflect that there is one less expansion than recession in the financial cycles and the same number of expansions and recessions for business cycles. The maximum number of business cycles of 13 expansions and 13 recessions are for the Leading Business Index and the maximum number of eleven for financial cycles is for Residential Housing Price. Expansions and recessions have an average duration of about 4 quarters for business cycles and about 5 and 4.5 quarters, respectively, for financial cycles. This is consistent with the finding of Borio (2012) and Shen, Ren et al. (2018) that the durations of financial cycles are longer than those for business cycles.

I use the coefficient of variation (CV) to compare differences between business and financial cycles for amplitudes and slopes. Based on the results reported in Table 5, cycles tracked by equity prices have the greatest level of dispersion around their means in

[2] The reasons are that real estate is the most common collateral for credit and the real estate bubble is closely related to excessive credit expansion.

both expansions and recessions compared to the other indicators. Financial cycles tracked by equities have the steepest slopes in both expansions and recessions, and particularly in recessions. The slope of an expansion in a financial cycle indicated by Residential Housing Prices is less discrete than that in a business expansion cycle, but the slopes in recessions are quite different between financial and business cycles. Greater dispersion can be found in business cycle variables. Amplitudes for indicators of business cycles are more centralized in an expansion compared to those in financial cycles tracked by Residential Housing Prices (CV 88.15%).

A possible reason for these differences in cycle amplitudes and slopes is that the development of an economy is driven by the interaction between aggregate demand and aggregate supply which enhances the prominence and role of the currency system in economic activities. During the downturn of a financial cycle, financial sectors tend to respond more promptly. Stock, bond and futures markets have the fastest response followed by asset pricing systems in other fields, such as the spot prices of bulk commodities and real estate.

4. IMPACT OF BUSINESS AND FINANCIAL CYCLES ON FIRM RISK

4.1 Sample and Data

The initial sample for examining the firm risk in different cycles consists of 3699 firms. All companies listed on both the SSE A share and SZSE A share are included except for those in the financial and utility industries. In addition, ChiNext firms and those listed on the SSE Star Market (according to the 2012 CSRC Industry Codes) also are included. The trading volumes of these firms are calculated using the total trading volumes on the Shanghai Stock Exchange and Shenzhen Stock Exchange. Due to the

annual disclosure of CEO related information, the CSMAR database is used to collect accounting, market and CEO characteristics data from 1991Q1 to 2019Q4.

4.2 Measures of the Dependent Variables

The first dependent variable in my model is designed to capture firm risk. Following previous studies (Coles et al., 2006; John et al., 2008; Low, 2009; Faccio et al., 2011; Cain et al., 2016; Faccio et al., 2016), my primary dependent variable is a measure of a firm's total risk (SP_VOL). SP_VOL is computed as the logarithm of the standard deviation of daily stock returns over the calendar year which is annualized by multiplying the daily estimate by the square root of the approximate number (250) of trading days in a year. To control for the greater bid-ask bounce associated with lower price stocks, daily stock prices less than five dollars are deleted when computing the values for this variable. The rationale for this measure is that CEOs are able to influence their exposure to both systematic and idiosyncratic risks through their firm policy and investment decisions. The expectation is that riskier firms are more likely to have higher stock return volatility (Cain et al., 2016). The second metric for capturing firm risk taking is research and development (R&D) expenditures. Although R&D expenses play an important role in predicting firm outputs, such as innovative ability and patents productivity (Mansfield, 1980), these expenses do not always create value and better performance for the firm (Artz et al., 2010). Accordingly, Coles et al. (2006) and Cain et al. (2016) argue that higher R&D expenditures increase the riskiness of firms. Further, Low (2009) finds that managers are able to affect firm risk by changing R&D expenditures. My R&D proxy is *RAD* which is equal to Research and Development expenditures scaled by assets.

The predicted *Beta* is also used as an alternate measure of firm risk-taking

preference. Asset pricing theory predicts that higher levels of systematic risk should be associated with higher expected returns. Furthermore, Rouwenhorst (1999) finds that stocks with higher betas are more volatile compared to those with lower betas. Unlike stock return volatility, beta compares the changes of stock prices against the rest of the market. Beta is obtained from SRFR (Return Forecasting Research) Database in CMSAR and calculated by using 48 months of data.

I also use another alternative risk-taking proxy, the likelihood of firm survival. Firms with higher risks are less likely to survive over time, particularly during recessions. Faccio et al. (2016) find that the probability of firm survival is higher for firms led by women than by men. My measure of survival likelihood is the one used by Faccio et al. (2011) and Faccio et al. (2016). Specifically, if a firm has both accounting and CEO demographic data for at least one year in the first five sample years (from 1991 to 1997), the dummy variable *Survive* equals 1 and is zero otherwise. The belief is that using survival likelihood as a risk measure is less likely to be affected by accounting manipulation and survivorship bias.

To measure the impact of firm risk on firm performance, the first proxy for firm performance is return on assets (*ROA*), which is defined as net income over total assets at the end of the calendar year (Firth et al., 2006; Bhagat and Bolton, 2008). Higher ROAs indicate better firm performance. The second proxy for firm value is Tobin's q (*TobinQ*) which is given by the ratio of a firm's market value to the replacement cost of its physical assets (Coles et al., 2006; Bhagat and Bolton, 2008). Although *TobinQ* is a noisy measure of firm performance, the argument is that firms with higher *TobinQ* have better performance than firms with lower Q values.

For robustness, I also use the return on equity (*ROE*) and the Market to Book ratio (*M_B*) as alternatives to my baseline specifications for the performance dependent variable. *ROE* measures how effectively management is in using a company's assets to create profits, which is calculated as net income divided by shareholders' equity (Bennouri et al., 2018). Market to Book ratio is calculated as the market value of assets to book value of assets (Maury, 2016). Increases in both measures indicate better firm performance.

4.3 Independent Variable of Primary Interest

This research focuses on two channels that are expected to affect firm risk. The first channel is business or financial cycles (macro events) and the second channel includes the demographic characteristics of CEOs such as gender, age, power, tenure and education level. To estimate cycle effects on firm risk, the number of months that are in expansion or in recession in the previous calendar year is employed (as in Friedman and Schwartz, 1965). To deal with the count data nature using the number of months, I take the percentage of expansion (*EX*) or recession months (*RE*) over the total number of months in a year as my primary independent variable. My expectation is that general managers (CEOs) have incentives to increase (decrease) their firm's risk in the year following expansions (recessions) in either a business or financial cycle.

CEO gender, age, tenure, power and education degrees are used to capture the effects of the CEO-characteristics channel on firm risk takings. Empirical evidence supports both the precautionary motive hypothesis and the upper echelons theory (UET) (Hambrick and Mason, 1984). The empirical evidence suggests that the demographic profiles of executives are highly related to firm strategy and performance outcomes

(Boeker, 1997; Hambrick, 2007). As discussed in Section 2, there is conflicting evidence about the influences of gender, tenure and education on CEO risk-taking preferences in many markets. Nevertheless, Farag and Mallin (2018) find significant relations between CEO demographic characteristics and corporate risk taking for Chinese IPO firms. CEOs with postgraduate degrees and CEOs who are female are more likely to take riskier investment decisions. Older CEOs and those with greater tenure are more likely to take less risky investment decisions. Thus, my expectation is that female CEOs are more risk-averse in making investment decisions resulting in lower involvement in risky projects and less earnings volatility. The dummy variable *Gender* equals one if the CEO (general manager) is a female and zero otherwise. Considering the small proportion (6.5%) of female CEOs in the sample, I use the interaction of gender and education level to better investigate the effects of CEO gender and degrees held. If the highest degree obtained by a female CEO is less than postgraduate, then the dummy variable *Firstedu* is equal to one and zero otherwise. If a female CEO has a postgraduate degree, the dummy variable *Secedu* is equal to one and zero otherwise. Since education background can represent CEO experience and affect CEOs professionally, a positive coefficient is expected for *Secedu*. Finkelstein (1992) finds that CEOs who are board chairs are more likely to have a greater impact on decision making and executing plans which are more beneficial to their own interest.[3] I interact tenure and CEO power (*Ten*Po*) in the empirical model. *Ten*Po* is the natural log of the total number of months that the CEO has been CEO and board chair. Higher values of *Ten*Po* indicate more powerful general managers that can make more self-interested decisions that decrease firm value. Thus, a positive relation is expected between *Ten*Po* and *risk*. The variable *Age* is the natural log

[3] Zheng (2014) uses tenure as an indicator of managerial power.

of the CEO's current age. Taylor (1975) argues that younger CEOs are more likely to take risks so my expectation is that the age of the CEO is negatively related to firm risk taking.

To analyze the association of CEO characteristics and firm risk through business or financial wavelets with firm performance, the leading independent variable is the interaction term of firm risk with expansion or recession indicators. While Bushee and Noe (2000) find a positive relation between firm risk measured by stock return volatility and firm market value, Artz et al. (2010) do not find a positive impact of R&D expenses on ROA. Hirschey and Connolly (2005) argue that the increase of R&D expenditures can increase firm performance as measured by a higher Tobin's Q. Thus, the impact of firm risk on firm performance may vary with different measures of risks. The relation between *Risk*Cycle* and firm performance is of primary interest in these tests.

4.4 Measures of Control Variables

Various firm characteristics are found to have an effect on risk-taking behaviors. All controls are from previous studies which are found to be related to firm risk taking (Kini and Williams, 2012; Flannery and Rangan, 2008; Sudha et al., 2016; Zeng and Wang, 2015; John et al., 2008). Firm size is used to control for the size effect and is proxied by the natural logarithm of total assets. Asset tangibility (*Fixed*) is calculated as the ratio of fixed to total assets. Lower tangible assets can limit a firm's borrowing capacity and investment opportunities. Sales growth (*Sales*) is the growth in net sales from one fiscal period to another to control for the differences in management quality (Faccio et al., 2011; Faccio et al., 2016). *Cashhold* measured by the ratio of cash and cash equivalents to net assets reflects a precautionary opportunity cost role that is expected to

vary in different economic states and to affect firm risk taking (Zeng and Wang, 2015). *Firmage* is the natural log of the month that a firm has been listed on either the SSE A share or SZSE A share Market. Risk-tolerance is expected to be inversely related to firm age. Trading frequency (*Trading*) and previous M&A events (*MA*) are included because these types of previous business activities indicate the risk preferences of firms and CEO risk decisions. The definition of *Trading* is the average daily trading volume of shares in a year divided by the number of total shares outstanding at the beginning of each fiscal year as in Pathan (2009). *MA* is a type of representative project which embodies a CEO's self-interest (Cain et al., 2016), as more risk-taking CEOs are more likely to engage in greater M&A activity. The dummy variable *MA* is equal to one and zero otherwise if a firm has engaged in an M&A during the previous fiscal year. The dummy variable *DV* is equal to one and otherwise equal to zero if a firm pays cash dividends. Since dividend payout is an important component of a CEO's compensation, the belief is that a CEO is more likely to take riskier decisions if the firm has a higher dividend payout ratio (Chatjuthamard et al., 2019).

Chaganti et al. (1985) suggest that increasing the number of board members can raise the level of expertise and knowledge of the board. Also, larger boards can monitor firm management better (Yermack, 1996). Cheng (2008) argues that firms with smaller boards in size are more likely to have higher firm risks. Thus, I include *Boardsize*, which is defined as the natural logarithm of the total number of directors on the firm's board. Shleifer and Vishny (1997) propose that a more concentrated ownership structure can work well for corporate governance. In addition, the importance of corporate ownership structure on risk and firm performance is examined in many studies (Boubakri et al.,

2015; John et al., 2008). State ownership represents a high proportion of ownership in many publicly listed Chinese firms. Thus, *STATE%* computed as the state-owned shares scaled by total shares is included as a control variable for corporate ownership structure. Higher values of *STATE%* are expected to be associated with more conservative investment decisions (Boubakri et al., 2015) and poorer firm performance (Boubakri et al., 2015; John et al., 2008). *EXE%* which is management-owned shares scaled by total shares is included as a control variable. However, its relations with firm risk taking and performance depend on the effects of managerial self-interest and entrenchment (Morck et al., 1988). The dummy variable *Turnover* which equals one if a CEO turnover occurred during that year and equals zero otherwise, is included as a control. Detailed definitions of all variables are listed in the Appendix.

4.5 Empirical Models and Estimation Methods

The following linear regression with multiple levels of fixed effects (Equation 1) is formulated to test empirically the first main hypothesis (H1) which is used to examine the relation between business cycles or financial cycles separately with firm risk:

$$(FirmRisk)_{it} = \beta_0 + \beta_1(EX\ or\ RE)_{it-1} + \beta_2(Risk)_{it-1} + \beta_3(Sales)_{it} + \beta_4(Fixed)_{it} + \beta_5(Size)_{it} + \beta_6(Cashhold)_{it} + \beta_7(Trading)_{it} + \beta_8(MA)_{it-1} + \beta_9(DV)_{it} + \beta_{10}(Firmage)_{it} + \beta_{11}(STATE\%)_{it} + \beta_{12}(EXE\%)_{it} + \beta_{13}(Boardsize)_{it} + FirmDummy + YearDummy + \varepsilon_{it} \quad (1)$$

where *i* and *t* denote one of the 3699 firms and a year from 1991 to 2019, respectively. *EX* and *RE* refer to expansions and recessions indicated by the different business cycle indicators discussed in Section 3. The indicators for business cycles are the Lagging Business Index (*LAEX* and *LARE*), Concurrent Business Index (*CE*X and *CRE*) and Leading Business Index (*LEEX* and *LERE*). The indicators for financial cycles are Stock Price (*SPEX* and *SPRE*) and Housing Price (*HEX* and *HRE*). Firm risk in the baseline

regression is either *SP_VOL* or *RAD* or *Survive*. All independent variables are for *t-1* to help alleviate reverse causality. To further deal with endogeneity concerns, firm risk-taking measurements when lagged are included as control variables. This should help to address the possibility that changes in CEO risk preferences for their firms and not cycle effects change their firms' risks. Both firm and year fixed effects are included to address bias from time-invariant omitted variables. Firm standard errors are clustered by firm. To test the robustness of the results, *Beta* is used as alternative firm level risk-preferences measure.

To analyze the effect of CEO characteristics (age, gender, education level, CEO power and tenure) on firm risk through wavelets in either business or financial cycles as a test of the second and third hypotheses (H2 and H3), I use Equation (2):

$$FirmRisk_{it} = \beta_0 + \beta_1(EX\ or\ RE)_{it-1} + \beta_2(Gender)_{it-1} + \beta_3(Age)_{it-1} +$$
$$\beta_4(Ten * Po)_{it-1} + \beta_5(Firstedu)_{it-1} + \beta_6(Secedu)_{it-1} + \beta_7(Risk)_{it-1} +$$
$$\beta_8(Sales)_{it} + \beta_9(Fixed)_{it} + \beta_{10}(Size)_{it} + \beta_{11}(Cashhold)_{it} +$$
$$\beta_{12}(Trading)_{it} + \beta_{13}(MA)_{it-1} + \beta_{14}(DV)_{it} + \beta_{15}(Firmage)_{it} +$$
$$\beta_{16}(STATE\%)_{it} + \beta_{17}(EXE\%)_{it} + \beta_{18}(Boardsize)_{it} + \beta_{19}(Turnover)_{it} +$$
$$FirmDummy + YearDummy + \varepsilon_{it} \quad (2)$$

To test the last hypothesis (H4) that deals with the effects of firm risks and the characteristics of CEOs during expansions and recessions on firm performance, I use the following regression formulation:

$$(Performance)_{it} = \beta_0 + \beta_1(EX\ or\ RE)_{it-1} + \beta_2[(Risk)_{it-1} *$$
$$(EX\ or\ RE)_{it-1}] + \beta_3(Risk)_{it-1} + \beta_4(Gender)_{it-1} + \beta_5(Age)_{it-1} + \beta_6(Ten *$$
$$Po)_{it-1} + \beta_7(Firstedu)_{it-1} + \beta_8(Secedu)_{it-1} + \beta_9(Sales)_{it} +$$
$$\beta_{10}(Fixed)_{it} + \beta_{11}(Size)_{it} + \beta_{12}(Cashhold)_{it} + \beta_{13}(Trading)_{it} +$$
$$\beta_{14}(MA)_{it-1} + \beta_{15}(DV)_{it} + \beta_{16}(Firmage)_{it} + \beta_{17}(STATE\%)_{it} +$$
$$\beta_{18}(EXE\%)_{it} + \beta_{19}(Boardsize)_{it} + \beta_{20}(Turnover)_{it} + FirmDummy +$$

$$YearDummy + \varepsilon_{it} \quad (3)$$

where *Performance* in the baseline regression is measured by *TobinQ* or *ROA* as mentioned in Section 4.2. To test the robustness of these results, the alternative measures of firm performance *M_B* and *ROE* also are used in Eq. (3).

4.6 Descriptive Statistics and Correlation Matrix

Table 6 reports summary statistics for all continuous variables used in the empirical tests (include the robustness variables). The number of observations varies due to missing values. All accounting data are winsorized at their 1% and 99% values to reduce the impact of outliers. Panel A provides summary statistics for all continuous dependent variables dealing with firm risk and firm performance. Stock returns volatility (*SP_VOL*) shows a higher mean (0.175) and median (0.158) than research and development expenses (*RAD*) (mean = 0.00265; median = 0.000). The *RAD* data is more centralized around its mean than stock return volatility indicated by their Skewness of 3.976 and 2.816, respectively. The average predicted sensitivity to market returns (*Beta*) is 0.735, with a standard deviation of 0.430. The means for *ROA* and *TobinQ* are respectively 0.0381 and 2.176 while the standard deviation for *ROA* and *TobinQ* are 0.0637 and 1.399. The distributions are similar to *ROA* for *ROE* (mean of 0.0593 and standard deviation of 0.0714). Market to Book ratio (*M_B*) has a mean of 1.983 and a standard deviation of 1.584. The sub-sample to measure firm survival probability only includes 384 firms which are listed between 1991 and 1997, and a total of 3681 firm-year observations. Only 143 of these firms (3.88%) survived from 1991 to 1997. The likelihood of survival for firms with female CEOs is 10.5% and that for firms with male CEOs is 89.5%.

Panel B in Table 6 provides summary statistics for both cycle indicators and CEO characteristics. Among the three indicators of business cycles, Lagging Business Index (*LAEX*) has the smallest mean (0.0312) and standard deviation (0.0288) while the expansions periods tracked by the Concurrent Business Index (*CEX*) and Leading Business Index (*LEEX*) report similar data distributions. Comparing business expansions (*LAEX*, *CEX* and *LEEX*) to financial expansions (*SP*EX and *HEX*), *SPEX* shows the highest mean (0.0425) and standard deviation (0.0244) while *HEX* has the smallest mean (0.0286) and standard deviation (0.0164). Thus, there are more expansions in business cycles on average. But the recession periods in financial cycles occur more frequently and fluctuate more compared to recessions in business cycles. Residential Housing Prices presents the most recession periods denoted by a mean of 0.0671 (median of 0.0435), which is followed by Equity Prices (*SPRE*) and Lagging Business Index (*LARE*) that each have the same mean and median. The Concurrent Business Index (*CRE*) and Leading Business Index (*LERE*) report different distributions in defining business recessions where more recessions are found using the Concurrent Business Index (*CRE*). The summary of periods of expansions and recessions in either business or financial cycles is still consistent with previous conclusions that financial cycles are more sensitive to finding recession periods.

With regard to CEO characteristics, the average age of CEOs in the sample is 3.867 and on average a general manger is board chair for 2.85 months. The mean and median for CEOs with a postgraduate degree is 0.010 and 0, and with at least a postgraduate degree is 0.046 and 0, respectively. There are only 1530 female CEOs in the sample which accounts for only 6.18% of the gender observations. About 76.2% of the

female CEOs have obtained a postgraduate degree while 16.9% of the female CEOs have a lower education background.

Table 7 presents the Pearson's pair-wise correlation matrix between all continuous independent variables and control variables. The correlations are for the relationships between the business and financial cycles to firm, board and CEO-level characteristics. Business expansion or recession periods are highly correlated with financial expansions or recessions, which is consistent with the findings of previous studies (Shen et al., 2018; Claessens et al., 2012; Borio, 2012). Trading frequency (*Trading*) shows the most significant correlation with cycles denoted by the correlation coefficient of about 0.2 on average. Following Pathan (2009), trading frequency is an indicator of how fast new information is reflected in stock prices, and Gopinath et al. (2012) argue that price adjustments are more obvious during crises. Multicollinearity among the regressors should not be a concern since all of the correlation coefficients between independent variables and the control variables are less than 0.3. Furthermore, the highest VIF in all the estimations is 1.59 for firm age.

5. EMPIRICAL RESULTS

5.1 Cycle effects on firm risk

To investigate the relation between business cycles or financial cycles with firm risks, I start by regressing two ex-post measures of risks (total firm risk or *SP_VOL* and research and development expenditures or *RAD*) on the business or financial cycle indicators. The results for panel OLS regressions with firm and year fixed effects and standard errors clustered at the firm level are presented in Table 8. Lagged risk measurements are significantly related to current firm risk for all the models. Table 8 (A)

presents results regressing *SP_VOL* on expansion and recession periods in either business or financial cycles. Except for the Concurrent Business Index, all independent variables have statistically significant power for explaining firm risk at the 0.1 level or better. These results are consistent with previous predictions that expansion periods in either business or financial cycles are positively related to firm risk while recession periods are negatively related to firm risk measurements. Thus, the average firm has more risk during expansions but less risk during recessions (H1). To evaluate the economic significance of the test results, I calculate the cycle effect on risk of a one standard deviation change in the explanatory variable. Expansions defined by stock prices have the most economically significant power to explain cycle effects on risk-taking choices as a one standard deviation increase in SPEX (*LEEX*) is associated with a 0.0052 (0.0021) standard deviation change in *SP_VOL* from *SP_VOL*'s mean of 0.175. The relation between *LERE* and firm stock return volatility is more pronounced than for the other indicators in recessions. A one standard deviation increase in *LERE* is related with a 0.011 standard deviation change in *SP_VOL* from *SP_VOL*'s mean of 0.175. Another business cycle indicator *LARE* also shows more economic power in impacting firm risks compared to the financial business indicators. Thus, the economic significance of the association of business cycles with firm total risks is more (less) significant during recessions (expansions) compared to that for financial cycles. However, expansions/recessions tracked by the Concurrent Business Index are not related to firm risk. This can be partially attributed to the nature of the business cycle indicators used in this thesis. Coincident indicators occur in real-time and help to clarify the current state of the economy but firms are not able to change their plans or investments immediately. In

contrast, the Leading Business Index can help policymakers and firms take actions before events occur depending on the forward-looking accuracy of these indicators while the Lagging Business Index can be an useful indicator for economists to review, gauge trends of economy, and assess outputs and past performance. Returns in the stock market are regarded as leading indicators of economic activity (e.g. Fischer and Merton, 1984). The stock market tends to decline before the economy as a whole declines, and tends to improve before the general economy moves from a slump.

Table 8 (B) summarizes the results of regressing firm research and development expenses (*RAD*) on business/financial cycles. Although the statistically significant level for all explanatory variables is now lower, the main conclusions are still consistent with the previous results in that firms tend to be more 'risk-tolerant' in expansions but more 'risk-averse' in depressions. Consistent with my expectations, the impact of financial cycles on firm R&D expenses are especially important during recessions. Both *SPRE* and *HRE* report both statistically and economically significant estimates for firm risk. A one standard deviation increase in *SPRE* and *HRE* is associated with a 0.086% and 0.071% standard deviation decrease, respectively, in firm spending on research and development from *RAD*'s mean of 0.00265. Business expansion periods exhibit more power in explaining R&D expenditures. *LAEX* shows the most significant positive relation with *RAD*. Although these results differ from my expectations, firms may spend more on research and development during business recession periods rather than during financial recessions due to government fiscal expenditures that tend to occur during business recessions. Guellec and Van Pottelsberghe (2003) provide empirical support for the conjecture that firm expenses for R&D are positively associated with the increased need

for higher economic efficiency and the availability of stronger government supports during business than financial recessions. This is consistent with previous findings that expansions or recessions tracked by the Concurrent Business Index are not associated with a firm's R&D expenses (*RAD*).

In the final test of this section, I use *Beta* as the dependent variable. The resulting test results are reported in Table 8 (C). All cycle indicators are found to be statistically significant at the 5% level or better. Along with previous findings, these new results support the conjecture that waves in business and financial cycles can critically influence firm risk. Firms have higher market risk especially during business expansions. Interestingly, expansion periods tracked by the Concurrent Business Index (*CEX*) become the most economically significant variable in explaining firm betas. A one standard deviation increase in CEX is associated with a 0.44 standard deviation increase in Beta from Beta's mean of 0.735. Consistent with the results from regressing R&D expenses on the cycle indicators, financial recessions tracked by stock return volatility (*SPRE*) has the most economic significance in affecting firm risk measured by *Beta*. A one standard deviation increase in *SPRE* relates to a 0.0447 standard deviation decrease in *Beta* from its mean of 0.735.

Thus, the results reported in this section of the thesis support Hypotheses 1, that firms have greater risk during expansion compared to recession periods. Financial recessions can significantly decrease firm risks measured by R&D expenses and *Beta*. However, business recessions (expansions) gain more (less) economic significance in affecting stock return volatility compared to financial recessions (expansions).

5.2 The impact of CEO characteristics

In this section, I investigate the role of CEO characteristics in the level of firm risk through business and financial wavelets. Thus, CEO demographic characteristics, such as gender, age, education level and power, are added to model (1) to get model (2). Firm fixed effects and year fixed effects are added to the regression with standard errors cluster at the firm level.

The results, which are reported in Table 9, show that the cycles still have significant associations with *SP_VOL* and *RAD*. Consistent with the results reported in Section 5.1, the new results are consistent with both H1 and H2. The lagged firm-risk measures are significantly related to current risk for all the estimated models.

In both Table 9 (A) and (B), *Gender* is negatively and significant associated with firm risk measured by annualized daily stock return volatility (*SP_VOL*) and research and development expenditures (*RAD*) although the negative associations do not vary through different cycle phases. Thus, firms headed by female CEOs have less risk which could be value-destroying. When CEOs are females, firm risk is lower by 0.025 and 0.002, respectively. Additionally, all measures of the education background of female CEOs (*Firstedu* and *Secedu*) are positive and significantly related to firm risk at the 5% level or better and are relatively stable across different cycle wavelets. Firms led by female CEOs with postgraduate degrees are associated with higher firm risks measured by stock return volatility (0.027 for *SP_VOL*) and R&D expenditures (0.030 for *RAD*). The association of the education background of female CEOs with firm risks, however, depends on the measure of firm risk. Furthermore, the association of CEO age (*Age*) and power (*Ten*Po*) with firm risk is not significant when business and financial cycles are considered.

As an additional test, I examine the association of CEO characteristics with firm

risk when measured using survival likelihood. If firms have a lower probability to survive through tough times, firms led by CEOs that are more likely to be risk seeking should be less likely to survive. The results of estimating a logit model controlling for year and industry fixed effects are presented in Table 9 (C). Although expansions show a negative relation with firm risks, only business expansions tracked by the Lagging Business Index (*LAEX*) is statistically significant at the 5% level. A one standard deviation increase in *LAEX* is associated with a 0.798 standard deviation decrease in a firm's survival probability from its mean of 0.0388. Estimates for both business and financial recessions show an insignificant relation with the likelihood of firm survival. Gender is positive and significant at the 1% level for each of the cycles indicators. Thus, firms led by female CEOs have a greater survival likelihood (9.491 higher), possibly because female CEOs are less risk-taking compared to their male counterparts. Coefficient estimates for *Secedu* are negative and significant at the 1% level, which implies that firms are less likely to survive when female CEOs have a postgraduate degree. Thus, a higher education level for female CEOs is not associated with lower firm risk which is consistent with the other findings in Table 9. However, female CEOs with degrees below a postgraduate degree are not related to a firm's survival probability.

To conclude, only gender and education levels are significantly related to firm risk throughout business or financial cycles. There are no significant relations between age or CEO power with firm risks, especially when macro events are considered. Firms managed by female CEOs with no postgraduate degrees are associated with lower risks compared to those controlled by their male counterparts.

5.3 Relation of cycles and CEO characteristics with firm performance

In this section, I test the relation between business/financial cycles and CEO characteristics with firm performance as measured by *TobinQ* and *ROA*. Test results are reported for linear regression models including firm and year fixed effects and standard errors clustered at the firm level.

I first run a regression of the firm performance on the cycle indicators and firm risks separately. When only the cycle measures are included to analyze firm performance, CEO characteristics do not have a significant relation with firm market value [see Table 10 (A)] and *ROA* [see Table 10 (B)]. However, two of the five measures of expansions during business and financial cycles in Table 10 (A) are significantly associated with firm market values. They are negative for the Leading Business Index (*LEEX*) in column (5) and positive for the Residential Housing Price (*HEX*) in column (9). Cycle wavelets tracked by the Concurrent Business Index are not related to firm performance in both Table 10 (A) and Table 10 (B). The results are consistent with those reported in Section 5.1 where neither *CEX* nor *CRE* are found to be associated with firm risks measured by stock return volatility and R&D expenses.

The results reported in Table 10 (C) also are consistent with those reported in previous studies that find that the association of firm risks with firm performance is inconclusive (see Section 2 of this thesis). Annualized daily stock return volatility (*SP_VOL*) is positively and significantly related to *TobinQ* and *ROA* at the 1% level, which is consistent with Bushee and Noe (2000). However, research and development expenses (*RAD*) have a significantly negative relation with firm performance [see column (4)] which differs from the finding of Chauvin and Hirschey (1993). The finding is consistent with the findings and explanations of Artz et al. (2010) and Arora et al. (2008)

if, for example, patents generated from R&D investments are not primarily to create earnings but to increase patent productivity for strategic purposes. None of the CEO demographic characteristics has significant power in explaining the two measures of firm value.

Table 11 presents the summary results for Equation (3) with different measures of firm risk and performance including interaction terms of firm risk with the various cycle measures. When an interaction term of risk with cycles is included, the marginal cycle effects of considering risk on firm performance is the main focus. The associations of the firm risk measures with firm performance are generally consistent with those presented in Table 10 (C). Both *SP_VOL* and *RAD* are positively related to *TobinQ* during expansions, and increases in *SP_VOL* (*RAD*) are positively (negatively) related with *ROA*. Only R&D expenses are negatively and significantly associated with *ROA* during recessions.

Coefficients for the cycle indicators themselves are related to the measures of performance as indicated in Table 10 (A) and Table 10 (B). When firm risk is estimated by R&D expenses (*RAD*), business recessions (*LARE*) in column (2) are negatively associated with *ROA*. A larger percentage of expansion months tracked using stock prices (residential housing prices) is significantly and positively associated with firm profitability.

The marginal effects of cycles on firm performance reported in Table 11 show more conclusive results. The interaction terms of business/financial recession (expansion) periods with stock return volatility have positive (negative) and significant (1% level) associations with *TobinQ* and *ROA* [see Table 11 (A) and Table 11 (C)]. This implies that

the effects of business/financial recession (expansion) periods on firm performance is expected to be more (less) pronounced for firm with higher total return risks. In addition, the financial recession indicator tracked by stock prices (*SPRE*) has the most economically significant relation with firm performance. A one standard deviation increase in *SPRE* is related with a 0.135 standard deviation increase in *TobinQ* and in *ROA* from their means of 2.176 and 0.0381, respectively. All of the estimated relations between CEO gender, education, age and power with firm performance are insignificant.

6. ROBUSTNESS CHECK

6.1 Alternative measures

Alternatives measures for dependent variables can add power to the inferences drawn from the tests results. When I use the market to book ratio (*M_B*) and return on equity (*ROE*) as alternative measures for firm performance, the inferences from these untabulated results are consistent with those obtained from regressing *TobinQ* or *ROA* on cycles and firm risks. Business and financial cycles effects on firm performance depend upon the measure of firm risk. The association of business or financial expansion (recession) periods with firm performance is less (more) pronounced with increasing volatility in stock returns.

6.2 Endogeneity concerns

Tests results may be biased by endogeneity, and in this thesis there are two main sources of potential endogeneity, namely omitted variables and reverse causality. With regard to omitted variables, I have addressed the concern of Borio (2012) that monetary policy, especially during the bust phrase of financial cycles, needs to be included when examining the determinants of firm risk and firm performance. I have also addressed

endogeneity from omitted variable bias by including the lagged dependent variable as an independent variable based on the expectation that the current dependent variable is dependent on its previous value. By estimating all the panel data models using linear regressions with year and firm fixed effects, I have dealt with the effects of time-invariant missing variables. Of course, the list of potential influential variables is huge. For example, other studies suggest that other macro-economic variables, such as the risk-free rate and financial policies, could be important. Other firm characteristics like corporate culture (Kotter and Heskett, 1992), firm policies and reputations also may be influential variables that are important. These are left to be examined in future studies.

Topics focusing on CEO characteristics raise the possibility of endogeneity concerns in the form of reverse causality (Bhagat and Bolton, 2008; Faccio et al., 2016). For example, firms with higher risks may be more likely to choose CEOs with higher risk-tolerance or CEOs with higher education levels. I partially alleviate such reverse causality concerns by lagging all independent variables by one period.

7. CONCLUSIONS

The primary objective of this thesis is to test the relations of business/financial cycles and CEO demographic characteristics on firm risks and performances. Tests results that addressed this objective provide some support for the relation between business/financial expansions or recessions, CEO gender, and CEO education background on firm risks but not for firm performance. Higher (lower) firm risks tend to be associated with expansion (recession) periods and firms led by male (female) CEOs when their educational attainment is not considered. Firms led by female CEOs with postgraduate degrees tend to have higher risk. The results from using the BBQ method to

track business and financial turning points are consistent with previous findings in the literature that financial cycles occur less frequently but tend to have longer durations and larger amplitudes compared to business cycles.

The relation between firm risks and firm performance are less conclusive and vary with model design as argued in previous studies by Hirschey and Connolly (2005) and Artz et al. (2010). Thus, the choice of measures for firm risk and performance should matter. The association of cycles with firm performance would be less (more) pronounced during expansions (recessions) with increasing firm risk. Furthermore, the relation between expansion (recession) periods with firm performance is more prominent in business (financial) cycles. Differences in CEO demographic characteristics (age, gender, education level and CEO power) do not affect firm performance within cycle wavelets.

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Appendix: Variables Definitions

Age: CEO's age at the calendar year and log transformed.

Beta: Predicted Beta obtained from 48 months regression calculation of data in CMSAR. Regression equation: return rate of a stock with cash dividend reinvestment = return rate of market with cash dividend reinvestment.

Boardsize: The natural log of total number of board members.

Cashhold: The ratio of cash and cash equivalents to net assets.

CEX: Expansions defined by Concurrent Business Index. The proportion of months in the previous year that are expansion months.

Chinese Business Index: An indicator that reflects entrepreneurs' exceptions and confidence in the macroeconomic environment and predicts trends of economic development. Data are collected from National Bureau of Statistics.

CRE: Recessions defined by Concurrent Business Index. The proportion of months in the previous year that are recession months.

Credit: Claims on Private Sector: Aggregate claims on the private sector by deposit money banks from CMSAR.

EXE%: Percentage of shares held by executives in a firm.

Expansion: The percentage of total number of months in previous year covered from a trough to a following peak in either business or financial cycle.

Equity prices: Share prices indexes weighted by their outstanding shares market values. The Shanghai Composite Stock Index to calculate the equity prices is from CMSAR.

Firmage: Natural log of the number of months that firm has been listed on the market.

Firstedu: Dummy variables equals to 1 when a female CEO whose highest education

background is less than postgraduate.

Fixed: The ratio of fixed assets to total assets.

GDP: Gross domestic product (GDP) is the total monetary or market value of all the finished goods and services produced within a country's borders in a specific time period. National Bureau of Statistics is the data source for China GDP data.

Gender: If CEO is a female then dummy gender equals to 1 otherwise 0.

HEX: Expansions defined by Residential Housing Prices. The proportion of months in the previous year that are expansion months.

HRE: Recessions defined by Residential Housing Prices. The proportion of months in the previous year that are recession months.

LAEX: Expansions defined by Lagging Business Index. The proportion of months in the previous year that are expansion months.

LARE: Recessions defined by Concurrent Business Index. The proportion of months in the previous year that are recession months.

LEEX: Expansions defined by Leading Business Index. The proportion of months in the previous year that are expansion months.

LERE: Recessions defined by Leading Business Index. The proportion of months in the previous year that are recession months.

MA: Dummy variable about whether there is merger and acquisition events happened in previous calendar year.

M_B: Calculated as market capitalization to book value.

Peak: A point when the indicator of financial or business cycle is larger than that for a [t-2,t+2] window.

RAD: Research and development expenses reported on firm balance sheet for the calendar year and scaled by total assets.

Recession: The percentage of total number of months in previous year covered from an peak to a following trough in either business or financial cycle.

Residential Housing Prices: Sale prices of residential housing data from Choice Data set.

ROA: The ratio of earnings before interest and taxes to total assets for the calendar year.

ROE: Net income over shareholder equity. Net income is the amount of income, net of expense, and taxes that a company generates for the calendar year.

Sales: The annual growth rate in net sales.

Secedu: Dummy variables equals to 1 when a female CEO whose highest education background is at least postgraduate.

Size: The neutral logarithm of firm's total assets.

SPEX: Expansions defined by Equity Prices. The proportion of months in the previous year that are expansion months.

SPRE: Recessions defined by Equity Prices. The proportion of months in the previous year that are recession months.

SP_VOL: Volatility of asset return risk which is measured as the standard deviation of daily stock returns, which is the log of daily ending price to the ending price for previously trading date, weighted by market value of equity to market value of asset.

STATE%: Percentage of shares held by state.

Ten*Po: Total number of months, CEO has worked as general manager and chair of board in the firm and neutral logarithm formatted.

TobinQ: The ratio between a physical asset's market value and its replacement value.

Measured by market value to total assets minus net tangible assets and net goodwill.

Trading: The ratio of average daily trading volumes in a year to the total number of outstanding shares at the beginning of calendar year.

Trough: A point when the indicator of financial or business cycle is smaller than that for a [t-2,t+2] window.

Turnover: Dummy variable equals to one if a CEO turnover happens on that year, otherwise zero.

Table 1. Cycle Variable Summary

Variable	Mean	Median	Max.	Min.	Std. Dev	Skew.	N
Panel A: Business cycle indicators							
GDP	81230.57	47464.46	253459.18	4553.40	73664.89	0.82	117
Lagging Business Index	97.85	97.27	113.01	90.07	4.76	0.89	117
Concurrent Business Index	99.72	99.84	113.41	79.63	4.31	-0.31	117
Leading Business Index	101.38	100.88	110.48	93.80	2.53	0.87	117
Panel B: Financial cycle indicators							
Residential Housing Price	3464.35	2699.20	8684.82	640.60	2272.64	0.69	117
Credit: Claims on Private Sector	4.32×10^7	2.06×10^7	1.68×10^8	1.61×10^6	4.64×10^7	1.15	117
Equity Prices	33.80	15.96	463.98	6.06	65.85	4.34	117

Notes: Table 1 presents the distribution of business and financial cycle indicators by showing the mean (Mean), median (Median), maximum value (Max.), minimum value (Min.), standard deviation (Std. Dev) and number of observations (N) for each variable. Panel A provides information about business cycles. Panel B presents summary results for financial cycle indicators. Values for GDP and Credit: Claims on Private Sector are in Billions Yuan (B) and values for Residential Housing Price are for Yuan. All data are collected at a quarterly basis and adjusted for seasonality. Contentious data are log-level transformed. Detailed variable definitions are provided in the Appendix: Variables definitions.

Table 2. Summary of turning points from BBQ methods

	Total turning points	Number of peaks	Number of troughs
Panel A: Business Cycle			
GDP	1	1	0
Lagging Business Index	25	12	13
Concurrent Business Index	28	15	13
Leading Business Index	28	14	14
Panel B: Financial Cycle			
Residential Housing Price	27	14	13
Credit: Claims on Private Sector	0	0	0
Equity Prices	23	12	11

Notes: Table 2 presents the distribution of turning points defined by BBQ methods by reporting the total number of turning points (Total turning points), the total number of peaks (Number of peaks) and the total number of troughs (Number of troughs). Panel A provides information about turning points in business cycles. Panel B presents information for turning points in financial cycles. Detailed variable definitions are provided in the Appendix: Variables definitions.

Table 3. Business Cycles: Basic Features Summary

	N	Amplitude	Duration	Slope
Expansion				
Lagging Business Index	10	5.94	5.6	1.04
		[4.35]^{c}	[5.15]^{c}	[1.22]^{c}
Concurrent Business Index	12	3.66	3.42	1.11
		[4.07]^{c}	[5.11]^{c}	[5.77]^{c}
Leading Business Index	13	2.80	3.16	0.86
		[4.41]^{c}	[6.79]^{c}	[6.06]^{c}
Recession				
Lagging Business Index	10	-5.73	3.90	-1.36
		[− 3.13]^{c}	[6.65]^{c}	[− 4.58]^{c}
Concurrent Business Index	12	-4.24	4.25	-1.06
		[− 4.38]^{c}	[6.63]^{c}	[− 4.45]^{c}
Leading Business Index	13	-3.27	4.38	-0.67
		[− 3.51]^{c}	[6.41]^{c}	[− 5.77]^{c}

Notes: Table 3 summaries basic features of Business cycles by showing number of observations (N), amplitudes (Amplitude), durations (Duration) and slope (Slope). Amplitude is calculated based on the increase (decline) in each respective variable during a change from a peak to a following trough (a trough to a following peak) in output. Duration is the number of quarters between a peak and a following trough (a trough and a following peak). Slope is calculated as the amplitude from a peak (trough) to a following trough (peak) divided by the duration. Panel A presents characteristics of business expansion periods and Panel B presents information about business recession periods. All statistics correspond to sample means from Univariate tests. T-values are reported in the parentheses. Detailed variable definitions are provided in the Appendix: Variables definitions.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 4. Financial Cycles: Basic Features Summary

	N	Amplitude	Duration	Slope
Expansion				
Residential Housing Price	11	699.62	5.36	153.02
		[3.76]^{c}	[2.77]^{b}	[6.13]^{c}
Equity Price	9	9.56	5	1.73
		[3.08]^{b}	[5.22]^{c}	[4.18]^{c}
Recession				
Residential Housing Price	11	-198.65	2.82	-98.38
		[−4.86]^{c}	[6.35]^{c}	[−3.81]^{c}
Equity Price	10	-48.93	6.2	-6.25
		[−1.17]	[3.11]^{b}	[−1.42]

Notes: Table 4 summaries basic features of financial cycles by showing number of observations (N), amplitudes (Amplitude), durations (Duration) and slope (Slope). Amplitude is calculated based on the increase (decline) in each respective variable during a change from a peak to a following trough (a trough to a following peak) in output. Duration is the number of quarters between a peak and a following trough (a trough and a following peak). Slope is calculated as the amplitude from a peak (trough) to a following trough (peak) divided by the duration. Panel A presents characteristics of financial expansion periods and Panel B presents information about financial recession periods. All statistics correspond to sample means from univariate tests. T-values are reported in the parentheses. Detailed variable definitions are provided in the Appendix: Variables definitions.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 5. Coefficient of Variation for Amplitude and Slope

	Amplitude	Slope
Business Cycle: Expansion		
Lagging Business Index	0.73	0.60
Concurrent Business Index	0.85	0.60
Leading Business Index	0.82	0.59
Financial Cycle: Expansion		
Residential Housing Price	0.88	0.54
Equity Price	0.97	0.72
Business Cycle: Recession		
Lagging Business Index	-1.01	-0.69
Concurrent Business Index	-0.79	-0.78
Leading Business Index	-1.03	-0.63
Financial Cycle: Recession		
Residential Housing Price	-0.68	-0.87
Equity Price	-2.70	-2.23

Notes: Table 5 reports the coefficient of variation ratio (CV) of amplitude and slope for all business or financial expansion and recession periods. CV is calculated as the ratio of the standard deviation to the mean in Table 3.

Table 6. Descriptive Variables

Variable	N	Mean	SD	Median	Skew.
Panel A: Dependent Variables					
SP_VOL	23808	0.175	0.115	0.158	2.816
RAD	14717	0.00265	0.00751	0	3.976
Beta	16659	0.735	0.430	0.987	0.112
Survive	3681	0.0388	0.193	0	4.773
TobinQ	24739	2.176	1.399	1.712	2.618
MB	24739	1.983	1.212	1.584	2.623
ROA	24701	0.0381	0.0637	0.0394	-1.832
ROE	24522	0.0593	0.140	0.0714	-3.767
Panel B: Independent Variables					
LAEX	21481	0.0312	0.0288	0.0179	0.377
LARE	21481	0.0407	0.0429	0.0263	0.424
CEX	21481	0.0415	0.0384	0.0238	0.378
CRE	21481	0.0351	0.0370	0.0227	0.424
LEEX	21481	0.0415	0.0384	0.0238	0.377
LERE	21481	0.0276	0.0291	0.0179	0.424
SPEX	21481	0.0425	0.0393	0.0244	0.378
SPRE	21481	0.0407	0.0429	0.0263	0.424
HEX	21481	0.0286	0.0264	0.0164	0.377
HRE	21481	0.0671	0.0708	0.0435	0.425
Gender	21481	0.061	0.239	0	3.667
Age	22665	3.867	0.140	3.871	-0.395
Ten*Po	20530	1.049	2.356	0	2.638
Firstedu	258	0.010	0.101	0	9.683
Secedu	1166	0.046	0.209	0	4.322
Panel C: Control Variables					
Sales	21475	1.233	0.562	1.132	4.112
Fixed	24700	0.223	0.159	0.194	0.835
Size	24739	21.81	1.213	21.66	0.791
Cashhold	24739	0.349	0.250	0.291	1.627
Trading	24739	0.0173	0.0139	0.0133	1.578
Firmage	24739	4.113	1.109	4.360	-1.079
STATE%	24739	0.0897	0.186	0	2.034
EXE%	24739	0.103	0.176	0.0001	1.675
Boardsize	24739	8.725	1.749	9	0.670

Notes: Table 6 presents the distribution of each variable by showing the number of observations (N),

mean (Mean), standard deviation (SD), median (Median) and skewness (Skew.), Panel A reports summary statistics for dependent variables and Panel B reports information about independent variables. Statistics for continuous control variables are reported in Panel C. Detailed variable definitions are provided in the Appendix: Variables definitions.

Table 7. Pearson Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
(1) LAEX	1																				
(2) LARE	-0.716[c]	1																			
(3) CEX	0.999[c]	-0.715[c]	1																		
(4) CRE	-0.715[c]	0.999[c]	-0.716[c]	1																	
(5) LEEX	0.999[c]	-0.715[c]	0.999[c]	-0.715[c]	1																
(6) LERE	-0.715[c]	0.999[c]	-0.715[c]	0.999[c]	-0.716[c]	1															
(7) SPEX	0.999[c]	-0.715[c]	0.999[c]	-0.715[c]	0.999[c]	-0.715[c]	1														
(8) SPRE	-0.715[c]	0.999[c]	-0.715[c]	0.999[c]	-0.715[c]	0.999[c]	-0.715[c]	1													
(9) HEX	0.999[c]	-0.715[c]	0.999[c]	-0.715[c]	0.999[c]	-0.715[c]	0.999[c]	-0.715[c]	1												
(10) HRE	-0.715[c]	0.999[c]	-0.715[c]	0.999[c]	-0.715[c]	0.999[c]	-0.715[c]	0.999[c]	-0.715[c]	1											
(11) Age	0.003	-0.066[c]	0.004	-0.066[c]	0.004	-0.066[c]	0.004	-0.066[c]	0.003	-0.066[c]	1										
(12) Ten*Po	-0.008	-0.056[c]	-0.007	-0.056[c]	-0.008	-0.056[c]	-0.007	-0.056[c]	-0.007	-0.056[c]	0.205[c]	1									
(13) Sales	0.091[c]	-0.042[c]	0.090[c]	-0.042[c]	0.090[c]	-0.042[c]	0.090[c]	-0.042[c]	0.091[c]	-0.042[c]	-0.043[c]	0.002	1								
(14) Fixed	-0.017[a]	0.053[c]	-0.017[a]	0.053[c]	-0.017[a]	0.053[c]	-0.016[a]	0.053[c]	-0.017[a]	0.054[c]	0.021[c]	-0.09[c]	-0.075[c]	1							
(15) Size	0.019[b]	-0.052[c]	0.018[b]	-0.051[c]	0.018[b]	-0.051[c]	0.018[b]	-0.052[c]	0.018[b]	-0.053[c]	0.147[c]	0.005	0.049[c]	-0.006	1						
(16) Cashhold	-0.039[c]	0.068[c]	-0.039[c]	0.068[c]	-0.039[c]	0.068[c]	-0.039[c]	0.068[c]	-0.040[c]	0.068[c]	-0.025[c]	-0.017[b]	0.043[c]	0.281[c]	0.144[c]	1					
(17) Trading	-0.203[c]	0.214[c]	-0.203[c]	0.214[c]	-0.203[c]	0.214[c]	-0.203[c]	0.214[c]	-0.203[c]	0.214[c]	-0.013[a]	0.065[c]	0.002	-0.055[c]	-0.198[c]	-0.019[c]	1				
(18) Firmage	0.036[c]	-0.030[c]	0.036[c]	-0.030[c]	0.036[c]	-0.029[c]	0.036[c]	-0.030[c]	0.036[c]	-0.030[c]	0.063[c]	-0.008	-0.033[c]	0.054[c]	0.357[c]	0.028[c]	0.015[c]	1			
(19) STATE%	0.072[a]	0.026[a]	0.072[a]	0.026[a]	0.072[a]	0.026[a]	0.072[a]	0.026[a]	0.072[a]	0.026[a]	-0.054[a]	-0.155[a]	0.037[a]	0.179[a]	0.000	0.015[a]	-0.173[a]	-0.006	1		
(20) EXE%	-0.040[a]	-0.037[a]	-0.039[a]	-0.037[a]	-0.040[a]	-0.037[a]	-0.039[a]	-0.037[a]	-0.040[a]	-0.037[a]	0.003	0.157[a]	0.019[a]	-0.175[a]	-0.214[a]	-0.043[a]	0.075[a]	-0.47[a]	-0.247[a]	1	
(21) Boardsize	0.001	0.048[a]	0.000	0.048[a]	0.000	0.049[a]	0.000	0.049[a]	0.001	0.048[a]	-0.001	-0.143[a]	-0.002	0.157[a]	0.194[a]	0.065[a]	-0.104[a]	0.097[a]	0.205[a]	-0.211[a]	1

Notes: Table 7 presents the Pearson pairwise correlation coefficients between all continuous independent variables and control variables in the models. Detailed variable definitions are provided in the Appendix: Variables definitions.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 8 (A). Stock return volatility (SP_VOL) through cycles

Variables	(1) LAEX SP_VOL	(2) LARE SP_VOL	(3) CEX SP_VOL	(4) CRE SP_VOL	(5) LEEX SP_VOL	(6) LERE SP_VOL	(7) SPEX SP_VOL	(8) SPRE SP_VOL	(9) HEX SP_VOL	(10) HRE SP_VOL
LAEX	0.152[a]									
	(0.075)									
LARE		-0.118[a]								
		(0.067)								
CEX			-							
CRE				-						
LEEX					0.056[b]					
					(0.048)					
LERE						-0.382[c]				
						(0.000)				
SPEX							0.132[c]			
							(0.002)			
SPRE								-0.060[a]		
								(0.083)		
HEX									0.152[a]	
									(0.000)	
HRE										-0.044[c]
										(0.010)
LAG_Risk	0.533[c]	0.533[c]	0.533[c]	0.533[c]	0.533[c]	0.533[c]	0.533[c]	0.533[c]	0.533[c]	0.533[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sales	0.004[c]	0.004[c]	0.004[c]	0.004[c]	0.004[c]	0.004[c]	0.004[c]	0.004[c]	0.004[c]	0.004[c]
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Fixed	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
	(0.581)	(0.580)	(0.579)	(0.579)	(0.579)	(0.581)	(0.580)	(0.581)	(0.581)	(0.579)
Size	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cashhold	0.005[a]	0.005[a]	0.005[a]	0.005[a]	0.005[a]	0.005[a]	0.005[a]	0.005[a]	0.005[a]	0.005[a]
	(0.084)	(0.084)	(0.084)	(0.084)	(0.085)	(0.084)	(0.084)	(0.085)	(0.083)	(0.084)
Trading	0.575[c]	0.575[c]	0.575[c]	0.575[c]	0.575[c]	0.575[c]	0.575[c]	0.575[c]	0.575[c]	0.575[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MA	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.744)	(0.744)	(0.743)	(0.743)	(0.741)	(0.747)	(0.742)	(0.742)	(0.744)	(0.745)
DV	0.005[c]	0.005[c]	0.005[c]	0.005[c]	0.005[c]	0.005[c]	0.005[c]	0.005[c]	0.005[c]	0.005[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firmage	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
STATE%	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
	(0.257)	(0.258)	(0.258)	(0.258)	(0.258)	(0.257)	(0.257)	(0.258)	(0.257)	(0.258)
EXE%	0.024[c]	0.024[c]	0.024[c]	0.024[c]	0.024[c]	0.024[c]	0.024[c]	0.024[c]	0.024[c]	0.024[c]
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Boardsize	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.366)	(0.365)	(0.367)	(0.367)	(0.367)	(0.367)	(0.368)	(0.369)	(0.367)	(0.366)
Observations	19,098	19,098	19,098	19,098	19,098	19,098	19,098	19,098	19,098	19,098
R-square	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723

Notes: Table 8 (A) reports the OLS results of regressing firm annualized daily stock return volatility (SP_VOL) on different business and financial cycles. Columns 1 to 6 show results of the effects of business expansions (Lagging Business Index: LAEX; Concurrent Business Index: CEX; Leading Business Index: LEEX) and recessions (Lagging Business Index: LARE; Concurrent Business Index: CRE; Leading Business Index: LERE) on firm risk. Columns 7 to 10 show results for the effects of financial expansions (Equity Price: SPEX; Residential Housing Price: HEX) and recessions (Equity Price: SPRE; Residential Housing Price: HRE). All independent variables are lagged one period to control for reverse causality and firm risk is lagged one period to alleviate endogenous concerns. Detailed variable definitions are provided in the Appendix: Variables definitions. Both firm fixed effects and year fixed effects are controlled for in all the regressions. Standard errors are clustered by firm. Robust p-values are reported in the parentheses.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 8 (B). Research and development expenses (RAD) through cycles

Variables	(1) LAEX RAD	(2) LARE RAD	(3) CEX RAD	(4) CRE RAD	(5) LEEX RAD	(6) LERE RAD	(7) SPEX RAD	(8) SPRE RAD	(9) HEX RAD	(10) HRE RAD
LAEX	0.012[b]									
	(0.044)									
LARE		-0.001								
		(0.441)								
CEX			-							
CRE				-						
LEEX					0.003[b]					
					(0.044)					
LERE						-0.002[a]				
						(0.097)				
SPEX							0.001			
							(0.443)			
SPRE								-0.002[c]		
								(0.074)		
HEX									0.002	
									(0.200)	
HRE										-0.001[a]
										(0.083)
LAG_Risk	0.571[c]	0.571[c]	0.571[c]	0.571[c]	0.571[c]	0.571[c]	0.571[c]	0.571[c]	0.571[c]	0.571[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sales	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.100)	(0.100)	(0.100)	(0.100)	(0.100)	(0.100)	(0.100)	(0.100)	(0.100)	(0.100)
Fixed	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.496)	(0.496)	(0.496)	(0.496)	(0.496)	(0.496)	(0.496)	(0.496)	(0.496)	(0.496)
Size	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.830)	(0.830)	(0.830)	(0.830)	(0.830)	(0.830)	(0.830)	(0.830)	(0.830)	(0.830)
Cashhold	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)
Trading	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)
MA	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.185)	(0.185)	(0.185)	(0.185)	(0.185)	(0.185)	(0.185)	(0.185)	(0.185)	(0.185)
DV	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.254)	(0.254)	(0.254)	(0.254)	(0.254)	(0.254)	(0.254)	(0.254)	(0.254)	(0.254)
Firmage	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.841)	(0.841)	(0.841)	(0.841)	(0.841)	(0.841)	(0.841)	(0.841)	(0.841)	(0.841)
STATE%	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.806)	(0.806)	(0.806)	(0.806)	(0.806)	(0.806)	(0.806)	(0.806)	(0.806)	(0.806)
EXE%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.891)	(0.891)	(0.891)	(0.891)	(0.891)	(0.891)	(0.891)	(0.891)	(0.891)	(0.891)
Boardsize	0.000[a]	0.000[a]	0.000[a]	0.000[a]	0.000[a]	0.000[a]	0.000[a]	0.000[a]	0.000[a]	0.000[a]
	(0.060)	(0.060)	(0.060)	(0.060)	(0.060)	(0.060)	(0.060)	(0.060)	(0.060)	(0.060)
Observations	11,390	11,390	11,390	11,390	11,390	11,390	11,390	11,390	11,390	11,390
R-square	0.841	0.841	0.841	0.841	0.841	0.841	0.841	0.841	0.841	0.841

Notes: Table 8 (B) reports the OLS results of regressing firm research and development expenditures (RAD) on different business and financial cycles. Columns 1 to 6 show results of the effects of business expansions (Lagging Business Index: LAEX; Concurrent Business Index: CEX; Leading Business Index: LEEX) and recessions (Lagging Business Index: LARE; Concurrent Business Index: CRE; Leading Business Index: LERE) on firm risk. Columns 7 to 10 show results for the effects of financial expansions (Equity Price: SPEX; Residential Housing Price: HEX) and recessions (Equity Price: SPRE; Residential Housing Price: HRE). All independent variables are lagged one period to control for reverse causality and firm risk is lagged one period to alleviate endogenous concerns. Detailed variable definitions are provided in the Appendix: Variables definitions. Both firm fixed effects and year fixed effects are controlled for in all the regressions. Standard errors are clustered by firm. Robust p-values are reported in the parentheses.
[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 8 (C). Predicted beta (Beta) through cycles

Variable	(1) LAEX Beta	(2) LARE Beta	(3) CEX Beta	(4) CRE Beta	(5) LEEX Beta	(6) LERE Beta	(7) SPEX Beta	(8) SPRE Beta	(9) HEX Beta	(10) HRE Beta
LAEX	1.510[b]									
	(0.025)									
LARE		-1.1015[c]								
		(0.005)								
CEX			1.14[b]							
			(0.026)							
CRE				-1.203[a]						
				(0.005)						
LEEX					1.130[b]					
					(0.025)					
LERE						-1.510[c]				
						(0.005)				
SPEX							1.084[b]			
							(0.028)			
SPRE								-1.042[c]		
								(0.004)		
HEX									1.576[a]	
									(0.030)	
HRE										-0.613[c]
										(0.005)
LAG_Risk	0.491[c]	0.491[c]	0.491[c]	0.491[c]	0.491[c]	0.491[c]	0.491[c]	0.491[c]	0.491[c]	0.491[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sales	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008
	(0.186)	(0.194)	(0.186)	(0.195)	(0.186)	(0.195)	(0.185)	(0.195)	(0.186)	(0.195)
Fixed	-0.083[b]	-0.083[b]	-0.083[b]	-0.083[b]	-0.083[b]	-0.083[b]	-0.083[b]	-0.083[b]	-0.083[b]	-0.083[b]
	(0.044)	(0.045)	(0.044)	(0.045)	(0.044)	(0.045)	(0.044)	(0.045)	(0.045)	(0.045)
Size	-0.009	-0.010	-0.009	-0.010	-0.009	-0.010	-0.010	-0.010	-0.009	-0.010
	(0.209)	(0.180)	(0.210)	(0.185)	(0.211)	(0.183)	(0.203)	(0.182)	(0.209)	(0.181)
Cashhold	0.002	0.003	0.002	0.003	0.002	0.003	0.002	0.003	0.002	0.003
	(0.890)	(0.848)	(0.893)	(0.849)	(0.888)	(0.849)	(0.891)	(0.843)	(0.883)	(0.845)
Trading	1.246[c]	1.231[c]	1.246[c]	1.230[c]	1.247[c]	1.231[c]	1.248[c]	1.231[c]	1.244[c]	1.231[c]
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
MA	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009
	(0.116)	(0.111)	(0.116)	(0.111)	(0.114)	(0.110)	(0.115)	(0.110)	(0.116)	(0.109)
DV	-0.015[b]	-0.015[b]	-0.015[b]	-0.015[b]	-0.015[b]	-0.015[b]	-0.015[b]	-0.015[b]	-0.015[b]	-0.015[b]
	(0.036)	(0.034)	(0.036)	(0.034)	(0.036)	(0.034)	(0.036)	(0.033)	(0.036)	(0.034)
Firmage	0.133[c]	0.132[c]	0.133[c]	0.132[c]	0.133[c]	0.132[c]	0.134[c]	0.132[c]	0.133[c]	0.132[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
STATE%	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
	(0.305)	(0.297)	(0.307)	(0.299)	(0.306)	(0.297)	(0.308)	(0.300)	(0.302)	(0.298)
EXE%	-0.223[b]	-0.221[b]	-0.223[b]	-0.221[b]	-0.223[b]	-0.221[b]	-0.223[b]	-0.221[b]	-0.223[b]	-0.221[b]
	(0.019)	(0.020)	(0.019)	(0.020)	(0.019)	(0.020)	(0.019)	(0.020)	(0.018)	(0.020)
Boardsize	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.506)	(0.509)	(0.508)	(0.515)	(0.507)	(0.515)	(0.507)	(0.512)	(0.509)	(0.513)
Observations	14,020	14,020	14,020	14,020	14,020	14,020	14,020	14,020	14,020	14,020
R-square	0.686	0.686	0.686	0.686	0.686	0.686	0.686	0.686	0.686	0.686

Notes: Table 8 (C) reports the OLS results of regressing firm risk (Beta) on different business and financial cycles. Columns 1 to 6 show results of the effects of business expansions (Lagging Business Index: LAEX; Concurrent Business Index: CEX; Leading Business Index: LEEX) and recessions (Lagging Business Index: LARE; Concurrent Business Index: CRE; Leading Business Index: LERE) on firm risk. Columns 7 to 10 show results for the effects of financial expansions (Equity Price: SPEX; Residential Housing Price: HEX) and recessions (Equity Price: SPRE; Residential Housing Price: HRE). All independent variables are lagged one period to control for reverse causality and firm risk is lagged one period to alleviate endogenous concerns. Detailed variable definitions are provided in the Appendix: Variables definitions. Both firm fixed effects and year fixed effects are controlled for in all the regressions. Standard errors are clustered by firm. Robust p-values are reported in the parentheses.
[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 9 (A). CEO characteristics effects on stock return volatility (SP_VOL) through cycles

Variables	(1) LEEX SP_VOL	(2) LERE SP_VOL	(3) CEX SP_VOL	(4) CRE SP_VOL	(5) LEEX SP_VOL	(6) LERE SP_VOL	(7) SPEX SP_VOL	(8) SPRE SP_VOL	(9) HEX SP_VOL	(10) HRE SP_VOL
LAEX	0.193[b]									
	(0.012)									
LARE		-0.128[b]								
		(0.031)								
CEX			-							
CRE				-						
LEEX					0.039					
					(0.186)					
LERE						-0.401[c]				
						(0.000)				
SPEX							0.113[c]			
							(0.002)			
SPRE								-0.062[a]		
								(0.091)		
HEX									0.157[c]	
									(0.000)	
HRE										-0.045[c]
										(0.007)
LAG_Risk	0.533[c]	0.533[c]	0.533[c]	0.533[c]	0.533[c]	0.533[c]	0.533[c]	0.533[c]	0.533[c]	0.533[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender	-0.025[b]	-0.025[b]	-0.025[b]	-0.025[b]	-0.025[b]	-0.025[b]	-0.025[b]	-0.025[b]	-0.025[b]	-0.025[b]
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Age	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009
	(0.167)	(0.168)	(0.168)	(0.168)	(0.168)	(0.168)	(0.167)	(0.167)	(0.167)	(0.168)
Ten*Po	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.110)	(0.110)	(0.112)	(0.112)	(0.112)	(0.110)	(0.112)	(0.112)	(0.112)	(0.112)
Firstedu	0.054[c]	0.054[c]	0.054[c]	0.054[c]	0.054[c]	0.054[c]	0.054[c]	0.054[c]	0.054[c]	0.054[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Secedu	0.027[b]	0.027[b]	0.027[b]	0.027[b]	0.027[b]	0.027[b]	0.027[b]	0.027[b]	0.027[b]	0.027[b]
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Fixed	0.004[c]	0.004[c]	0.004[c]	0.004[c]	0.004[c]	0.004[c]	0.004[c]	0.004[c]	0.004[c]	0.004[c]
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Size	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
	(0.556)	(0.554)	(0.554)	(0.554)	(0.554)	(0.556)	(0.555)	(0.556)	(0.555)	(0.554)
Cashhold	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trading	0.005[a]	0.005[a]	0.005[a]	0.005[a]	0.005[a]	0.005[a]	0.005[a]	0.005[a]	0.005[a]	0.005[a]
	(0.084)	(0.085)	(0.085)	(0.085)	(0.085)	(0.085)	(0.085)	(0.086)	(0.084)	(0.085)
MA	0.569[c]	0.569[c]	0.569[c]	0.569[c]	0.569[c]	0.569[c]	0.569[c]	0.569[c]	0.569[c]	0.569[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DV	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.736)	(0.736)	(0.735)	(0.735)	(0.734)	(0.739)	(0.734)	(0.734)	(0.736)	(0.737)
Firmage	0.005[c]	0.005[c]	0.005[c]	0.005[c]	0.005[c]	0.005[c]	0.005[c]	0.005[c]	0.005[c]	0.005[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

STATE%	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EXE%	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
	(0.322)	(0.323)	(0.322)	(0.322)	(0.322)	(0.322)	(0.322)	(0.322)	(0.321)	(0.322)
Boardsize	0.024[c]	0.024[c]	0.024[c]	0.024[c]	0.024[c]	0.024[c]	0.024[c]	0.024[c]	0.024[c]	0.024[c]
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Turnover	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.918)	(0.920)	(0.916)	(0.916)	(0.916)	(0.917)	(0.916)	(0.915)	(0.921)	(0.918)
Observations	19,098	19,098	19,098	19,098	19,098	19,098	19,098	19,098	19,098	19,098
R-square	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723	0.723

Notes: Table 9 (A) reports the OLS results of regressing firm annualized daily stock return volatility (SP_VOL) on CEO characteristics different business and financial cycles. Columns 1 to 6 show results of the effects of business expansions (Lagging Business Index: LAEX; Concurrent Business Index: CEX; Leading Business Index: LEEX) and recessions (Lagging Business Index: LARE; Concurrent Business Index: CRE; Leading Business Index: LERE) on firm risk. Columns 7 to 10 show results for the effects of financial expansions (Equity Price: SPEX; Residential Housing Price: HEX) and recessions (Equity Price: SPRE; Residential Housing Price: HRE). All independent variables are lagged one period to control for reverse causality and firm risk is lagged one period to alleviate endogenous concerns. Detailed variable definitions are provided in the Appendix: Variables definitions. Both firm fixed effects and year fixed effects are controlled for in all the regressions. Standard errors are clustered by firm. Robust p-values are reported in the parentheses.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 9 (B). CEO characteristics on R&D expenses (RAD) through cycles

Variables	(1) LAEX RAD	(2) LARE RAD	(3) CEX RAD	(4) CRE RAD	(5) LEEX RAD	(6) LERE RAD	(7) SPEX RAD	(8) SPRE RAD	(9) HEX RAD	(10) HRE RAD
LAEX	0.012[b]									
	(0.035)									
LARE		-0.001								
		(0.421)								
CEX			-							
CRE				-						
LEEX					0.003[b]					
					(0.035)					
LERE						-0.002[a]				
						(0.082)				
SPEX							0.002			
							(0.423)			
SPRE								-0.002[a]		
								(0.062)		
HEX									0.002	
									(0.183)	
HRE										-0001[a]
										(0.070)
LAG_Risk	0.571[c]	0.571[c]	0.571[c]	0.571[c]	0.571[c]	0.571[c]	0.571[c]	0.571[c]	0.571[c]	0.571[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender	-0.002[c]	-0.002[c]	-0.002[c]	-0.002[c]	-0.002[c]	-0.002[c]	-0.002[c]	-0.002[c]	-0.002[c]	-0.002[c]
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Age	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.459)	(0.459)	(0.459)	(0.459)	(0.459)	(0.459)	(0.459)	(0.459)	(0.459)	(0.459)
Ten*Po	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.967)	(0.967)	(0.967)	(0.967)	(0.967)	(0.967)	(0.967)	(0.967)	(0.967)	(0.967)
Firstedu	0.002[b]	0.002[b]	0.002[b]	0.002[b]	0.002[b]	0.002[b]	0.002[b]	0.002[b]	0.002[b]	0.002[b]
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Secedu	0.030[c]	0.030[c]	0.030[c]	0.030[c]	0.030[c]	0.030[c]	0.030[c]	0.030[c]	0.030[c]	0.030[c]
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Size	-0.000[a]	-0.000[a]	-0.000[a]	-0.000[a]	-0.000[a]	-0.000[a]	-0.000[a]	-0.000[a]	-0.000[a]	-0.000[a]
	(0.084)	(0.084)	(0.084)	(0.084)	(0.084)	(0.084)	(0.084)	(0.084)	(0.084)	(0.084)
Cashhold	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.501)	(0.501)	(0.501)	(0.501)	(0.501)	(0.501)	(0.501)	(0.501)	(0.501)	(0.501)
Trading	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.833)	(0.833)	(0.833)	(0.833)	(0.833)	(0.833)	(0.833)	(0.833)	(0.833)	(0.833)
MA	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.149)	(0.149)	(0.149)	(0.149)	(0.149)	(0.149)	(0.149)	(0.149)	(0.149)	(0.149)
DV	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)	(0.136)
Firmage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.170)	(0.171)	(0.171)	(0.171)	(0.170)	(0.171)	(0.171)	(0.170)	(0.170)	(0.171)
STATE%	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.260)	(0.260)	(0.260)	(0.260)	(0.260)	(0.260)	(0.260)	(0.260)	(0.260)	(0.260)
EXE%	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.823)	(0.823)	(0.823)	(0.823)	(0.823)	(0.823)	(0.823)	(0.823)	(0.823)	(0.823)
Boardsize	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.805)	(0.805)	(0.805)	(0.805)	(0.805)	(0.805)	(0.805)	(0.805)	(0.805)	(0.805)
Turnover	-0.000[b]	-0.000[b]	-0.000[b]	-0.000[b]	-0.000[b]	-0.000[b]	-0.000[b]	-0.000[b]	-0.000[b]	-0.000[b]
	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)
Observations	11,390	11,390	11,390	11,390	11,390	11,390	11,390	11,390	11,390	11,390

R-square	0.841	0.841	0.841	0.841	0.841	0.841	0.841	0.841	0.841	0.841

Notes: Table 9 (B) reports the OLS results of regressing firm research and development expenditures (RAD) on CEO characteristics different business and financial cycles. Columns 1 to 6 show results of the effects of business expansions (Lagging Business Index: LAEX; Concurrent Business Index: CEX; Leading Business Index: LEEX) and recessions (Lagging Business Index: LARE; Concurrent Business Index: CRE; Leading Business Index: LERE) on firm risk. Columns 7 to 10 show results for the effects of financial expansions (Equity Price: SPEX; Residential Housing Price: HEX) and recessions (Equity Price: SPRE; Residential Housing Price: HRE). All independent variables are lagged one period to control for reverse causality and firm risk is lagged one period to alleviate endogenous concerns. Detailed variable definitions are provided in the Appendix: Variables definitions. Both firm fixed effects and year fixed effects are controlled for in all the regressions. Standard errors are clustered by firm. Robust p-values are reported in the parentheses.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 9 (C). CEO characteristics on firm likelihood of survive through cycles

Variables	(1) LAEX Survive	(2) LARE Survive	(3) CEX Survive	(4) CRE Survive	(5) LEEX Survive	(6) LERE Survive	(7) SPEX Survive	(8) SPRE Survive	(9) HEX Survive	(10) HRE Survive
LAEX	-44.623[b]									
	(0.011)									
LARE		-5.796								
		(0.521)								
CEX			-0.970							
			(0.761)							
CRE				-7.555						
				(0.483)						
LEEX					-3.014					
					(0.570)					
LERE						-3.693				
						(0.804)				
SPEX							-1.360			
							(0.805)			
SPRE								7.555		
								(0.156)		
HEX									-4.109	
									(0.751)	
HRE										-9.364
										(0.266)
Gender	9.471[c]	9.463[c]	9.471[c]	9.471[c]	9.472[c]	9.471[c]	9.471[c]	9.469[c]	9.473[c]	9.076[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age	0.330	0.349	0.357	0.357	0.356	0.357	0.356	0.357	0.357	0.333
	(0.856)	(0.847)	(0.844)	(0.844)	(0.845)	(0.844)	(0.844)	(0.844)	(0.844)	(0.855)
Ten*Po	0.040	0.046	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.047
	(0.603)	(0.547)	(0.555)	(0.555)	(0.556)	(0.553)	(0.554)	(0.556)	(0.555)	(0.541)
Firstedu	-	-	-	-	-	-	-	-	-	-
Secedu	-10.74[c]	-10.71[c]	-10.72[c]	-10.72[c]	-10.72[c]	-10.72[c]	-10.72[c]	-10.71[c]	-10.72[c]	-10.33[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sales	0.009	0.007	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.007
	(0.876)	(0.905)	(0.897)	(0.897)	(0.896)	(0.899)	(0.898)	(0.895)	(0.895)	(0.912)
Fixed	-0.112	-0.096	-0.097	-0.097	-0.097	-0.097	-0.097	-0.099	-0.098	-0.088
	(0.944)	(0.952)	(0.951)	(0.951)	(0.951)	(0.951)	(0.951)	(0.951)	(0.951)	(0.956)
Size	0.251	0.256	0.257	0.257	0.257	0.258	0.257	0.258	0.258	0.248
	(0.594)	(0.584)	(0.581)	(0.581)	(0.582)	(0.581)	(0.581)	(0.581)	(0.581)	(0.597)
Cashhold	-1.332	-1.368	-1.356	-1.356	-1.355	-1.358	-1.356	-1.361	-1.356	-1.373
	(0.254)	(0.254)	(0.254)	(0.254)	(0.254)	(0.254)	(0.254)	(0.254)	(0.253)	(0.252)
Trading	-15.760	-15.237	-15.344	-15.344	-15.365	-15.316	-15.313	-15.346	-15.343	-15.454
	(0.572)	(0.585)	(0.582)	(0.582)	(0.581)	(0.582)	(0.582)	(0.581)	(0.582)	(0.579)
MA	0.541	0.544	0.545	0.545	0.544	0.546	0.545	0.544	0.545	0.546*
	(0.106)	(0.101)	(0.101)	(0.101)	(0.103)	(0.101)	(0.102)	(0.103)	(0.101)	(0.098)
DV	-0.274	-0.277	-0.281	-0.281	-0.281	-0.281	-0.281	-0.280	-0.282	-0.271
	(0.540)	(0.537)	(0.527)	(0.527)	(0.527)	(0.528)	(0.527)	(0.529)	(0.527)	(0.545)
Firmage	1.577	1.568	1.610	1.610	1.613	1.610	1.611	1.616	1.617	1.493
	(0.302)	(0.309)	(0.287)	(0.287)	(0.288)	(0.287)	(0.287)	(0.285)	(0.289)	(0.326)
STATE%	0.000	-0.008	-0.022	-0.022	-0.022	-0.022	-0.022	-0.023	-0.024	0.020
	(1.000)	(0.997)	(0.991)	(0.991)	(0.991)	(0.991)	(0.991)	(0.991)	(0.990)	(0.992)
EXE%	24.220[b]	23.985[b]	23.957[b]	23.957[b]	23.963[b]	23.950[b]	23.949[b]	23.989[b]	23.948[b]	23.167[b]
	(0.027)	(0.027)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.027)	(0.028)	(0.026)

Boardsize	0.002	0.001	0.004	0.004	0.004	0.004	0.004	0.004	0.004	-0.005
	(0.992)	(0.997)	(0.982)	(0.982)	(0.981)	(0.982)	(0.982)	(0.981)	(0.980)	(0.976)
Turnover	-0.093	-0.057	-0.064	-0.064	-0.064	-0.063	-0.064	-0.063	-0.065	-0.054
	(0.795)	(0.876)	(0.859)	(0.859)	(0.858)	(0.861)	(0.859)	(0.860)	(0.858)	(0.882)
Observations	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483	2,483

Notes: Table 9 (C) reports the Logit model results of regressing firm survival likelihood (Survive) on CEO characteristics different business and financial cycles. Columns 1 to 6 show results of the effects of business expansions (Lagging Business Index: LAEX; Concurrent Business Index: CEX; Leading Business Index: LEEX) and recessions (Lagging Business Index: LARE; Concurrent Business Index: CRE; Leading Business Index: LERE) on firm risk. Columns 7 to 10 show results for the effects of financial expansions (Equity Price: SPEX; Residential Housing Price: HEX) and recessions (Equity Price: SPRE; Residential Housing Price: HRE). All independent variables are lagged one period to control for reverse causality and firm risk is lagged one period to alleviate endogenous concerns. Detailed variable definitions are provided in the Appendix: Variables definitions. Both year fixed effects and industry fixed effects are controlled for in all the regressions for cross-sectional data. Robust p-values are reported in the parentheses.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 10 (A). Effects of CEO characteristics and cycle and firm performance: TobinQ

Variable	(1) LAEX TobinQ	(2) LARE TobinQ	(3) CEX TobinQ	(4) CRE TobinQ	(5) LEEX TobinQ	(6) LERE TobinQ	(7) SPEX TobinQ	(8) SPRE TobinQ	(9) HEX TobinQ	(10) HRE TobinQ
LAEX	-1.201									
	(0.595)									
LARE		1.477								
		(0.148)								
CEX			-							
CRE				-						
LEEX					-4.450[b]					
					(0.012)					
LERE						1.235				
						(0.181)				
SPEX							-0.573			
							(0.574)			
SPRE								0.748		
								(0.599)		
HEX									4.75[c]	
									(0.000)	
HRE										-0.256
										(0.621)
Gender	-0.439	-0.439	-0.439	-0.439	-0.439	-0.439	-0.439	-0.439	-0.440	-0.439
	(0.334)	(0.334)	(0.334)	(0.334)	(0.334)	(0.334)	(0.334)	(0.334)	(0.334)	(0.334)
Age	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082
	(0.449)	(0.448)	(0.449)	(0.449)	(0.449)	(0.449)	(0.449)	(0.449)	(0.447)	(0.449)
Ten*Po	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001
	(0.930)	(0.932)	(0.927)	(0.927)	(0.940)	(0.928)	(0.927)	(0.927)	(0.927)	(0.926)
Firstedu	0.637	0.637	0.637	0.637	0.637	0.637	0.637	0.637	0.637	0.637
	(0.181)	(0.181)	(0.181)	(0.181)	(0.181)	(0.181)	(0.181)	(0.181)	(0.181)	(0.181)
Secedu	0.527	0.527	0.527	0.527	0.527	0.527	0.527	0.527	0.527	0.527
	(0.245)	(0.245)	(0.245)	(0.245)	(0.245)	(0.245)	(0.245)	(0.245)	(0.245)	(0.245)
Sales	0.114[c]	0.114[c]	0.114[c]	0.114[c]	0.114[c]	0.114[c]	0.114[c]	0.114[c]	0.113[c]	0.114[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fixed	-0.854[c]	-0.854[c]	-0.854[c]	-0.854[c]	-0.854[c]	-0.854[c]	-0.854[c]	-0.854[c]	-0.854[c]	-0.854[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.774[c]	-0.774[c]	-0.774[c]	-0.774[c]	-0.774[c]	-0.774[c]	-0.774[c]	-0.774[c]	-0.774[c]	-0.774[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cashhold	-0.140[b]	-0.140[b]	-0.140[b]	-0.140[b]	-0.140[b]	-0.140[b]	-0.140[b]	-0.140[b]	-0.140[b]	-0.140[b]
	(0.041)	(0.041)	(0.041)	(0.041)	(0.040)	(0.041)	(0.041)	(0.041)	(0.042)	(0.041)
Trading	9.782[c]	9.781[c]	9.782[c]	9.782[c]	9.780[c]	9.782[c]	9.781[c]	9.781[c]	9.780[c]	9.782[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MA	0.136[c]	0.136[c]	0.136[c]	0.136[c]	0.136[c]	0.136[c]	0.136[c]	0.136[c]	0.136[c]	0.136[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DV	0.089[c]	0.089[c]	0.089[c]	0.089[c]	0.089[c]	0.089[c]	0.089[c]	0.089[c]	0.089[c]	0.089[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firmage	0.601[c]	0.601[c]	0.601[c]	0.601[c]	0.601[c]	0.601[c]	0.601[c]	0.601[c]	0.601[c]	0.601[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
STATE%	-0.271[c]	-0.271[c]	-0.271[c]	-0.271[c]	-0.271[c]	-0.271[c]	-0.271[c]	-0.271[c]	-0.271[c]	-0.271[c]
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)

EXE%	-0.909[c]	-0.909[c]	-0.909[c]	-0.909[c]	-0.909[c]	-0.909[c]	-0.909[c]	-0.909[c]	-0.909[c]	-0.909[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Boardsize	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
	(0.320)	(0.319)	(0.320)	(0.320)	(0.320)	(0.320)	(0.320)	(0.320)	(0.321)	(0.321)
Turnover	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.879)	(0.877)	(0.879)	(0.879)	(0.878)	(0.879)	(0.879)	(0.879)	(0.887)	(0.880)
Observations	20,239	20,239	20,239	20,239	20,239	20,239	20,239	20,239	20,239	20,239
R-square	0.681	0.681	0.681	0.681	0.681	0.681	0.681	0.681	0.681	0.681

Notes: Table 10 (A) reports the results of cycle effects on firm performance measured by Tobin's Q (TobinQ). Columns 1 to 6 show results for the effects of business expansions (Lagging Business Index: LAEX; Concurrent Business Index: CEX; Leading Business Index: LEEX) and recessions (Lagging Business Index: LARE; Concurrent Business Index: CRE; Leading Business Index: LERE) on firm performance. Columns 7 to 10 show results for the effects of financial expansions (Equity Price: SPEX; Residential Housing Price: HEX) and recessions (Equity Price: SPRE; Residential Housing Price: HRE) on firm performance. All independent variables are lagged one period to control for reverse causality and firm risk is lagged one period to alleviate endogenous concerns. Detailed variable definitions are provided in the Appendix: Variables definitions. Both firm fixed effects and year fixed effects are controlled for in all the regressions. Standard errors are clustered by firm. Robust p-values are reported in the parentheses.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 10 (B). Effects of CEO characteristics and cycle and firm performance: ROA

Variable	(1) LAEX ROA	(2) LARE ROA	(3) CEX ROA	(4) CRE ROA	(5) LEEX ROA	(6) LERE ROA	(7) SPEX ROA	(8) SPRE ROA	(9) HEX ROA	(10) HRE ROA
LAEX	0.561									
	(0.295)									
LARE		-0.075								
		(0.601)								
CEX			-							
CRE				-						
LEEX					0.266					
					(0.347)					
LERE						-0.236				
						(0.354)				
SPEX							0.075			
							(0.695)			
SPRE								0.021		
								(0.860)		
HEX									0.467	
									(0.148)	
HRE										-0.063
										(0.507)
Gender	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016
	(0.114)	(0.114)	(0.114)	(0.114)	(0.114)	(0.114)	(0.114)	(0.114)	(0.115)	(0.114)
Age	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
	(0.473)	(0.469)	(0.469)	(0.469)	(0.469)	(0.469)	(0.468)	(0.469)	(0.472)	(0.468)
Ten*Po	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.147)	(0.155)	(0.156)	(0.156)	(0.151)	(0.154)	(0.156)	(0.156)	(0.156)	(0.156)
Firstedu	-0.015	-0.015	-0.015	-0.015	-0.015	-0.015	-0.015	-0.015	-0.015	-0.015
	(0.253)	(0.253)	(0.253)	(0.253)	(0.253)	(0.253)	(0.253)	(0.253)	(0.253)	(0.253)
Secedu	-0.012	-0.012	-0.012	-0.012	-0.012	-0.012	-0.012	-0.012	-0.012	-0.012
	(0.228)	(0.228)	(0.228)	(0.228)	(0.228)	(0.228)	(0.228)	(0.228)	(0.228)	(0.228)
Sales	0.023[c]	0.023[c]	0.023[c]	0.023[c]	0.023[c]	0.023[c]	0.023[c]	0.023[c]	0.023[c]	0.023[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fixed	-0.065[c]	-0.065[c]	-0.065[c]	-0.065[c]	-0.065[c]	-0.065[c]	-0.065[c]	-0.065[c]	-0.065[c]	-0.065[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.675)	(0.674)	(0.675)	(0.675)	(0.676)	(0.674)	(0.673)	(0.676)	(0.675)	(0.672)
Cashhold	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.370)	(0.367)	(0.367)	(0.367)	(0.370)	(0.367)	(0.368)	(0.367)	(0.375)	(0.368)
Trading	-0.077[a]	-0.077[a]	-0.077[a]	-0.077[a]	-0.077[a]	-0.077[a]	-0.077[a]	-0.077[a]	-0.077[a]	-0.077[a]
	(0.082)	(0.083)	(0.083)	(0.083)	(0.083)	(0.083)	(0.083)	(0.083)	(0.082)	(0.083)
MA	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.128)	(0.127)	(0.127)	(0.127)	(0.130)	(0.127)	(0.127)	(0.126)	(0.127)	(0.128)
DV	0.042[c]	0.042[c]	0.042[c]	0.042[c]	0.042[c]	0.042[c]	0.042[c]	0.042[c]	0.042[c]	0.042[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firmage	-0.01[c]	-0.01[c]	-0.01[c]	-0.01[c]	-0.01[c]	-0.01[c]	-0.01[c]	-0.01[c]	-0.01[c]	-0.01[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
STATE%	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.835)	(0.837)	(0.836)	(0.836)	(0.836)	(0.836)	(0.838)	(0.836)	(0.831)	(0.836)
EXE%	0.018[c]	0.018[c]	0.018[c]	0.018[c]	0.018[c]	0.018[c]	0.018[c]	0.018[c]	0.018[c]	0.018[c]

	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Boardsize	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.281)	(0.280)	(0.279)	(0.279)	(0.279)	(0.279)	(0.279)	(0.279)	(0.280)	(0.280)
Turnover	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	20,239	20,239	20,239	20,239	20,239	20,239	20,239	20,239	20,239	20,239
R-square	0.534	0.534	0.534	0.534	0.534	0.534	0.534	0.534	0.534	0.534

Notes: Table 10 (B) reports the results of cycle effects on firm performance measured by ROA (ROA). Columns 1 to 6 show results for the effects of business expansions (Lagging Business Index: LAEX; Concurrent Business Index: CEX; Leading Business Index: LEEX) and recessions (Lagging Business Index: LARE; Concurrent Business Index: CRE; Leading Business Index: LERE) on firm performance. Columns 7 to 10 show results for the effects of financial expansions (Equity Price: SPEX; Residential Housing Price: HEX) and recessions (Equity Price: SPRE; Residential Housing Price: HRE) on firm performance. All independent variables are lagged one period to control for reverse causality and firm risk is lagged one period to alleviate endogenous concerns. Detailed variable definitions are provided in the Appendix: Variables definitions. Both firm fixed effects and year fixed effects are controlled for in all the regressions. Standard errors are clustered by firm. Robust p-values are reported in the parentheses.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 10 (C). Effects of CEO characteristics and firm risks on firm performance

Variables	(1) TobinQ	(2) TobinQ	(3) ROA	(4) ROA
LAG_SPVOL	0.411[c]		0.023[c]	
	(0.002)		(0.002)	
LAG_RAD		3.630		-0.455[c]
		(0.461)		(0.000)
Gender	-0.432	-0.478	0.017	0.018
	(0.343)	(0.366)	(0.101)	(0.211)
Age	0.076	-0.014	-0.004	-0.006
	(0.487)	(0.929)	(0.545)	(0.421)
Ten*Po	0.000	0.001	0.000	0.000
	(0.981)	(0.930)	(0.210)	(0.431)
Firstedu	0.612	0.392	-0.017	-0.018
	(0.203)	(0.495)	(0.204)	(0.281)
Secedu	0.512	0.495	-0.012	-0.012
	(0.260)	(0.335)	(0.224)	(0.408)
Sales	0.120[c]	0.141[c]	0.022[c]	0.021[c]
	(0.000)	(0.000)	(0.000)	(0.000)
Fixed	-0.905[c]	-1.346[c]	-0.064[c]	-0.073[c]
	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.776[c]	-0.880[c]	-0.001	-0.001
	(0.000)	(0.000)	(0.406)	(0.558)
Cashhold	-0.162[b]	-0.401[c]	-0.002	-0.007
	(0.016)	(0.000)	(0.521)	(0.119)
Trading	9.411[c]	11.518[c]	-0.106[b]	-0.073
	(0.000)	(0.000)	(0.016)	(0.116)
MA	0.136[c]	0.133[c]	-0.001	-0.001
	(0.000)	(0.000)	(0.294)	(0.324)
DV	0.092[c]	0.082[c]	0.043[c]	0.036[c]
	(0.000)	(0.002)	(0.000)	(0.000)
Firmage	0.616[c]	0.865[c]	-0.009[c]	-0.007[c]
	(0.000)	(0.000)	(0.000)	(0.004)
STATE%	-0.314[c]	-0.506[c]	-0.001	0.002
	(0.000)	(0.000)	(0.890)	(0.638)
EXE%	-0.906[c]	-0.585[c]	0.017[b]	0.014[a]
	(0.000)	(0.002)	(0.014)	(0.077)
Boardsize	0.011	-0.003	0.001	0.000
	(0.302)	(0.852)	(0.268)	(0.720)
Turnover	0.001	0.021	-0.006[c]	-0.004[b]
	(0.970)	(0.379)	(0.000)	(0.001)
Observations	19,569	12,778	19,569	12,778
R-square	0.681	0.727	0.543	0.601

Notes: Table 10 (C) reports the OLS results of CEO characteristics and firm risks on firm performance. Columns 1 and 2 show results of using Tobin's q (TobinQ) as the measure of firm performance. Columns 3 and 4 show results of using ROA (ROA) as the measure of firm performance. LAG_SPVOL and LAG_RAD are lagged measurements of firm risks: annualized daily stock return volatility (SP_VOL) and research and development expenses (RAD) separately. Detailed variable definitions are provided in the Appendix: Variables definitions. Firm fixed effects and year fixed effects are controlled for in all the regressions. Standard errors are clustered by firm. Robust p-values are reported in the parentheses.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 11 (A). Effects of cycles and firm risk (SP_VOL) on firm performance (TobinQ)

Variables	(1) TobinQ	(2) TobinQ	(3) TobinQ	(4) TobinQ	(5) TobinQ	(6) TobinQ	(7) TobinQ	(8) TobinQ	(9) TobinQ	(10) TobinQ
LAEX	0.043									
	(0.985)									
LAEX*Risk	-10.56[c]									
	(0.000)									
LARE		-0.389								
		(0.635)								
LARE*Risk		12.753[c]								
		(0.000)								
CEX			-							
CEX&Risk			-7.89[c]							
			(0.000)							
CRE				-						
CRE*Risk				14.818						
				(0.000)						
LEEX					-3.376[a]					
					(0.054)					
LEEX*Risk					-7.887[c]					
					(0.000)					
LERE						-1.274				
						(0.172)				
LERE*Risk						18.799[c]				
						(0.000)				
SPEX							0.778			
							(0.438)			
SPEX*Risk							-7.635[c]			
							(0.000)			
SPRE								-1.483		
								(0.299)		
SPRE*Risk								12.811[c]		
								(0.000)		
HEX									6.166[c]	
									(0.000)	
HEX*Risk									-11.477[c]	
									(0.000)	
HRE										-1.56[c]
										(0.004)
HRE*Risk										7.713
										(0.000)
LAG_Risk	0.716[c]	-0.062	0.760[c]	-0.064	0.760[c]	-0.062	0.757[c]	-0.064	0.760[c]	-0.062
	(0.000)	(0.634)	(0.000)	(0.627)	(0.000)	(0.635)	(0.000)	(0.625)	(0.000)	(0.639)
Gender	-0.429	-0.432	-0.429	-0.432	-0.429	-0.432	-0.429	-0.432	-0.429	-0.432
	(0.346)	(0.344)	(0.346)	(0.344)	(0.346)	(0.344)	(0.346)	(0.344)	(0.346)	(0.344)
Age	0.075	0.080	0.075	0.080	0.075	0.080	0.075	0.080	0.075	0.080
	(0.497)	(0.466)	(0.496)	(0.466)	(0.496)	(0.466)	(0.495)	(0.466)	(0.495)	(0.467)
Ten*Po	-0.000	0.000	-0.000	0.000	-0.000	0.000	-0.000	0.000	-0.000	0.000

	(0.992)	(0.983)	(0.993)	(0.981)	(0.982)	(0.981)	(0.993)	(0.981)	(0.993)	(0.981)
Firstedu	0.607	0.607	0.607	0.607	0.607	0.607	0.607	0.607	0.607	0.607
	(0.206)	(0.207)	(0.206)	(0.207)	(0.206)	(0.207)	(0.206)	(0.207)	(0.206)	(0.207)
Secedu	0.508	0.511	0.508	0.511	0.508	0.511	0.508	0.511	0.508	0.511
	(0.263)	(0.262)	(0.263)	(0.262)	(0.263)	(0.262)	(0.263)	(0.262)	(0.263)	(0.262)
Sales	0.119[c]	0.119[c]	0.119[c]	0.119[c]	0.119[c]	0.119[c]	0.119[c]	0.119[c]	0.119[c]	0.119[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fixed	-0.910[c]	-0.899[c]	-0.910[c]	-0.899[c]	-0.910[c]	-0.899[c]	-0.910[c]	-0.899[c]	-0.909[c]	-0.899[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.774[c]	-0.776[c]	-0.774[c]	-0.776[c]	-0.774[c]	-0.776[c]	-0.774[c]	-0.776[c]	-0.774[c]	-0.776[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cashhold	-0.162[b]	-0.158[b]	-0.162[b]	-0.158[b]	-0.163[b]	-0.158[b]	-0.162[b]	-0.158[b]	-0.162[b]	-0.158[b]
	(0.016)	(0.018)	(0.016)	(0.018)	(0.015)	(0.018)	(0.016)	(0.018)	(0.016)	(0.018)
Trading	9.312[c]	9.013[c]	9.311[c]	9.010[c]	9.310[c]	9.011[c]	9.312[c]	9.010[c]	9.310[c]	9.014[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MA	0.136[c]	0.136[c]	0.136[c]	0.136[c]	0.136[c]	0.136[c]	0.136[c]	0.136[c]	0.136[c]	0.136[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DV	0.090[c]	0.087[c]	0.090[c]	0.087[c]	0.090[c]	0.087[c]	0.090[c]	0.087[c]	0.090[c]	0.087[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firmage	0.621[c]	0.629[c]	0.621[c]	0.629[c]	0.622[c]	0.629[c]	0.621[c]	0.629[c]	0.621[c]	0.629[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
STATE%	-0.314[c]	-0.309[c]	-0.314[c]	-0.309[c]	-0.314[c]	-0.309[c]	-0.314[c]	-0.309[c]	-0.314[c]	-0.309[c]
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
EXE%	-0.917[c]	-0.912[c]	-0.917[c]	-0.912[c]	-0.917[c]	-0.912[c]	-0.917[c]	-0.912[c]	-0.917[c]	-0.912[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Boardsize	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011	0.011
	(0.291)	(0.290)	(0.291)	(0.291)	(0.290)	(0.291)	(0.291)	(0.291)	(0.292)	(0.292)
Turnover	0.001	-0.000	0.001	-0.000	0.001	-0.000	0.001	-0.000	0.001	-0.000
	(0.978)	(0.993)	(0.978)	(0.994)	(0.979)	(0.993)	(0.978)	(0.994)	(0.969)	(0.996)
Observations	19,569	19,569	19,569	19,569	19,569	19,569	19,569	19,569	19,569	19,569
R-square	0.681	0.682	0.681	0.682	0.681	0.682	0.681	0.682	0.681	0.682

Notes: Table 11 (A) reports the OLS results of relations between firm risks and firm performance during business/financial cycles. Columns 1 to 6 show effects of firm risks during business expansions and recessions with interaction terms [LAEX*LAG_SPVOL; LARE*LAG_SPVOL; CEX*LAG_SPVOL; CRE*LAG_SPVOL; LEEX*LAG_SPVOL and LERE*LAG_SPVOL] on Tobin's Q (TobinQ) as the measure of firm performance. Columns 7 to 10 show the effects of firm risks during financial expansions and recessions with interaction terms [SPEX*LAG_SPVOL; SPRE*LAG_SPVOL; HEX*LAG_SPVOL and HRE*LAG_SPVOL] on Tobin's Q (TobinQ) as the measure of firm performance. Lagged annualized daily stock return volatility (LAG_SPVOL) measure firm risks. Detailed variable definitions are provided in the Appendix: Variables definitions. Firm fixed effects and year fixed effects are controlled for in all the regressions. Standard errors are clustered by firm. Robust p-values are reported in the parentheses.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 11 (B). Effects of cycles and firm risk (RAD) on firm performance (TobinQ)

Variables	(1) TobinQ	(2) TobinQ	(3) TobinQ	(4) TobinQ	(5) TobinQ	(6) TobinQ	(7) TobinQ	(8) TobinQ	(9) TobinQ	(10) TobinQ
LAEX	0.872									
	(0.380)									
LAEX*Risk	-87.415									
	(0.165)									
LARE		8.007[c]								
		(0.000)								
LARE*Risk		8.571								
		(0.834)								
CEX			-							
CEX&Risk			-65.563							
			(0.165)							
CRE				-						
CRE*Risk				10.087						
				(0.832)						
LEEX					-5.426[c]					
					(0.000)					
LEEX*Risk					-65.546					
					(0.165)					
LERE						7.512[c]				
						(0.000)				
LERE*Risk						12.691				
						(0.833)				
SPEX							-9.516[c]			
							(0.000)			
SPEX*Risk							-63.987			
							(0.165)			
SPRE								5.226[c]		
								(0.000)		
SPRE*Risk								8.658		
								(0.833)		
HEX									9.655[c]	
									(0.000)	
HEX*Risk									-95.251	
									(0.165)	
HRE										2.477[c]
										(0.000)
HRE*Risk										5.217
										(0.833)
LAG_Risk	5.872	3.282	5.872	3.277	5.872	3.281	5.871	3.279	5.873	3.281
	(0.229)	(0.511)	(0.229)	(0.512)	(0.229)	(0.511)	(0.229)	(0.512)	(0.229)	(0.511)
Gender	-0.480	-0.478	-0.480	-0.478	-0.480	-0.478	-0.480	-0.478	-0.480	-0.478
	(0.364)	(0.366)	(0.364)	(0.366)	(0.364)	(0.366)	(0.364)	(0.366)	(0.364)	(0.366)
Age	-0.015	-0.013	-0.015	-0.014	-0.015	-0.014	-0.015	-0.014	-0.015	-0.014
	(0.921)	(0.930)	(0.921)	(0.929)	(0.921)	(0.929)	(0.921)	(0.928)	(0.922)	(0.929)
Ten*Po	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.913)	(0.928)	(0.913)	(0.927)	(0.913)	(0.928)	(0.913)	(0.927)	(0.913)	(0.928)
Firstedu	0.393	0.392	0.393	0.392	0.393	0.392	0.393	0.392	0.393	0.392
	(0.493)	(0.495)	(0.493)	(0.495)	(0.493)	(0.495)	(0.493)	(0.495)	(0.493)	(0.495)

Secedu	0.499	0.495	0.499	0.495	0.499	0.495	0.499	0.495	0.499	0.495
	(0.331)	(0.335)	(0.331)	(0.334)	(0.331)	(0.334)	(0.331)	(0.334)	(0.331)	(0.334)
Sales	0.141[c]	0.141[c]	0.141[c]	0.141[c]	0.141[c]	0.141[c]	0.141[c]	0.141[c]	0.141[c]	0.141[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fixed	-1.344[c]	-1.346[c]	-1.344[c]	-1.346[c]	-1.344[c]	-1.346[c]	-1.344[c]	-1.346[c]	-1.344[c]	-1.346[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.880[c]	-0.880[c]	-0.880[c]	-0.880[c]	-0.880[c]	-0.880[c]	-0.880[c]	-0.880[c]	-0.880[c]	-0.880[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cashhold	-0.402[c]	-0.402[c]	-0.402[c]	-0.402[c]	-0.402[c]	-0.402[c]	-0.402[c]	-0.402[c]	-0.402[c]	-0.402[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Trading	11.509[c]	11.516[c]	11.509[c]	11.520[c]	11.508[c]	11.518[c]	11.505[c]	11.518[c]	11.509[c]	11.518[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
MA	0.132[c]	0.133[c]	0.132[c]	0.133[c]	0.132[c]	0.132[c]	0.133[c]	0.132[c]	0.133[c]	0.132[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DV	0.081[c]	0.082[c]	0.081[c]	0.082[c]	0.081[c]	0.082[c]	0.082[c]	0.082[c]	0.082[c]	0.082[c]
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Firmage	0.864[c]	0.865[c]	0.864[c]	0.865[c]	0.864[c]	0.865[c]	0.864[c]	0.865[c]	0.864[c]	0.865[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
STATE%	-0.561[c]	-0.560[c]	-0.561[c]	-0.560[c]	-0.561[c]	-0.560[c]	-0.561[c]	-0.560[c]	-0.561[c]	-0.560[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EXE%	-0.588[c]	-0.585[c]	-0.588[c]	-0.585[c]	-0.588[c]	-0.585[c]	-0.587[c]	-0.585[c]	-0.587[c]	-0.585[c]
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Boardsize	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.856)	(0.852)	(0.856)	(0.852)	(0.856)	(0.852)	(0.856)	(0.852)	(0.856)	(0.852)
Turnover	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021
	(0.379)	(0.378)	(0.379)	(0.378)	(0.379)	(0.378)	(0.379)	(0.378)	(0.379)	(0.378)
Observations	12,778	12,778	12,778	12,778	12,778	12,778	12,778	12,778	12,778	12,778
R-square	0.727	0.727	0.727	0.727	0.727	0.727	0.727	0.727	0.727	0.727

Notes: Table 11 (B) reports the OLS results of relations between firm risks and firm performance during business/financial cycles. Columns 1 to 6 show effects of firm risks during business expansions and recessions with interaction terms [LAEX*LAG_SPVOL; LARE*LAG_SPVOL; CEX*LAG_SPVOL; CRE*LAG_SPVOL; LEEX*LAG_SPVOL and LERE*LAG_SPVOL] on Tobin's Q (TobinQ) as the measure of firm performance. Columns 7 to 10 show the effects of firm risks during financial expansions and recessions with interaction terms [SPEX*LAG_SPVOL; SPRE*LAG_SPVOL; HEX*LAG_SPVOL and HRE*LAG_SPVOL] on Tobin's Q (TobinQ) as the measure of firm performance. Lagged R&D expenses (LAG_RAD) measure firm risk. Detailed variable definitions are provided in the Appendix: Variables definitions. Firm fixed effects and year fixed effects are controlled for in all the regressions. Standard errors are clustered by firm. Robust p-values are reported in the parentheses.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 11 (C). Effects of cycles and firm risk (SP_VOL) on firm performance (ROA)

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA	(10) ROA
LAEX	0.649									
	(0.222)									
LAEX*Risk	-0.673[c]									
	(0.000)									
LARE		-0.128								
		(0.342)								
LARE*Risk		0.315[c]								
		(0.004)								
CEX			-							
CEX&Risk			-0.502[c]							
			(0.000)							
CRE				-						
CRE*Risk				0.361[c]						
				(0.005)						
LEEX					0.342					
					(0.222)					
LEEX*Risk					-0.503[c]					
					(0.000)					
LERE						-0.291				
						(0.249)				
LERE*Risk						0.461[c]				
						(0.005)				
SPEX							0.170			
							(0.358)			
SPEX*Risk							-0.49[c]			
							(0.000)			
SPRE								-0.047		
								(0.698)		
SPRE*Risk								0.311[c]		
								(0.005)		
HEX									0.562[a]	
									(0.084)	
HEX*Risk									-0.731[c]	
									(0.000)	
HRE										-0.098
										(0.301)
HRE*Risk										0.189[c]
										(0.005)
LAG_Risk	0.045[c]	0.011	0.045[c]	0.011	0.045[c]	0.011	0.045[c]	0.011	0.045[c]	0.011
	(0.000)	(0.179)	(0.000)	(0.175)	(0.000)	(0.179)	(0.000)	(0.174)	(0.000)	(0.176)
Gender	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017
	(0.101)	(0.105)	(0.101)	(0.105)	(0.101)	(0.105)	(0.101)	(0.105)	(0.101)	(0.105)
Age	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
	(0.538)	(0.554)	(0.534)	(0.554)	(0.534)	(0.554)	(0.533)	(0.554)	(0.537)	(0.553)
Ten*Po	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.210)	(0.206)	(0.222)	(0.209)	(0.214)	(0.206)	(0.222)	(0.209)	(0.222)	(0.208)

Firstedu	-0.017	-0.017	-0.017	-0.017	-0.017	-0.017	-0.017	-0.017	-0.017	-0.017
	(0.196)	(0.202)	(0.196)	(0.202)	(0.196)	(0.202)	(0.196)	(0.202)	(0.197)	(0.202)
Secedu	-0.013	-0.012	-0.013	-0.012	-0.013	-0.012	-0.013	-0.012	-0.013	-0.012
	(0.219)	(0.228)	(0.219)	(0.228)	(0.219)	(0.228)	(0.219)	(0.228)	(0.219)	(0.228)
Sales	0.022[c]	0.022[c]	0.022[c]	0.022[c]	0.022[c]	0.022[c]	0.022[c]	0.022[c]	0.022[c]	0.022[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fixed	-0.064[c]	-0.064[c]	-0.064[c]	-0.064[c]	-0.064[c]	-0.064[c]	-0.064[c]	-0.064[c]	-0.064[c]	-0.064[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.460)	(0.410)	(0.461)	(0.411)	(0.461)	(0.410)	(0.459)	(0.411)	(0.460)	(0.409)
Cashhold	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.517)	(0.537)	(0.514)	(0.537)	(0.518)	(0.537)	(0.515)	(0.537)	(0.523)	(0.538)
Trading	-0.112[c]	-0.116[c]	-0.112[c]	-0.116[c]	-0.112[c]	-0.116[c]	-0.112[c]	-0.116[c]	-0.112[c]	-0.116[c]
	(0.011)	(0.009)	(0.011)	(0.009)	(0.011)	(0.009)	(0.011)	(0.009)	(0.011)	(0.009)
MA	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.298)	(0.300)	(0.295)	(0.299)	(0.301)	(0.301)	(0.295)	(0.299)	(0.296)	(0.302)
DV	0.043[c]	0.043[c]	0.043[c]	0.043[c]	0.043[c]	0.043[c]	0.043[c]	0.043[c]	0.043[c]	0.043[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firmage	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]	-0.009[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
STATE%	-0.001	-0.000	-0.001	-0.000	-0.001	-0.000	-0.001	-0.000	-0.001	-0.000
	(0.894)	(0.913)	(0.893)	(0.913)	(0.893)	(0.914)	(0.892)	(0.913)	(0.899)	(0.913)
EXE%	0.016[b]	0.016[b]	0.016[b]	0.016[b]	0.016[b]	0.016[b]	0.016[b]	0.016[b]	0.016[b]	0.016[b]
	(0.019)	(0.015)	(0.019)	(0.015)	(0.019)	(0.015)	(0.019)	(0.015)	(0.019)	(0.015)
Boardsize	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.258)	(0.266)	(0.255)	(0.264)	(0.256)	(0.264)	(0.255)	(0.264)	(0.256)	(0.265)
Turnover	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]	-0.006[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	19,569	19,569	19,569	19,569	19,569	19,569	19,569	19,569	19,569	19,569
R-square	0.544	0.544	0.544	0.544	0.544	0.544	0.544	0.544	0.544	0.544

Notes: Table 11 (C) reports the OLS results for the relations between firm risks and firm performance during business/financial cycles. Columns 1 to 6 show the effects of firm risks during business expansions and recessions with interaction terms [LAEX*LAG_SPVOL; LARE*LAG_SPVOL; CEX*LAG_SPVOL; CRE*LAG_SPVOL; LEEX*LAG_SPVOL and LERE*LAG_SPVOL] on Return on Assets (ROA) as the measure of firm performance. Columns 7 to 10 show the effects of firm risks during financial expansions and recessions with interaction terms [SPEX*LAG_SPVOL; SPRE*LAG_SPVOL; HEX*LAG_SPVOL and HRE*LAG_SPVOL] on Return on Assets (ROA) as the measure of firm performance. Lagged R&D expenses (LAG_RAD) is the measure of firm risk. Detailed variable definitions are provided in the Appendix: Variables definitions. Firm fixed effects and year fixed effects are controlled for in all the regressions. Standard errors are clustered by firm. Robust p-values are reported in the parentheses.

[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Table 11 (D). Effects of cycles and firm risk (RAD) on firm performance (ROA)

Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA	(7) ROA	(8) ROA	(9) ROA	(10) ROA
LAEX	-0.053									
	(0.278)									
LAEX*Risk	-1.313									
	(0.543)									
LARE		-0.024[b]								
		(0.046)								
LARE*Risk		0.021								
		(0.987)								
CEX			-							
CEX&Risk			-0.985							
			(0.543)							
CRE				-						
CRE*Risk				0.024						
				(0.987)						
LEEX					-0.020					
					(0.273)					
LEEX*Risk					-0.985					
					(0.543)					
LERE						-0.001				
						(0.931)				
LERE*Risk						0.030				
						(0.987)				
SPEX							0.105[c]			
							(0.000)			
SPEX*Risk							-0.962			
							(0.543)			
SPRE								-0.015		
								(0.305)		
SPRE*Risk								0.021		
								(0.987)		
HEX									-0.061[b]	
									(0.013)	
HEX*Risk									-1.430	
									(0.543)	
HRE										0.001
										(0.828)
HRE*Risk										0.012
										(0.987)
LAG_Risk	-0.421[c]	-0.456[c]	-0.421[c]	-0.456[c]	-0.421[c]	-0.456[c]	-0.421[c]	-0.456[c]	-0.421[c]	-0.456[c]
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Gender	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
	(0.212)	(0.211)	(0.212)	(0.211)	(0.212)	(0.211)	(0.212)	(0.211)	(0.212)	(0.211)
Age	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006
	(0.420)	(0.421)	(0.420)	(0.421)	(0.420)	(0.421)	(0.420)	(0.421)	(0.419)	(0.421)
Ten*Po	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.427)	(0.431)	(0.427)	(0.431)	(0.427)	(0.431)	(0.427)	(0.431)	(0.427)	(0.431)
Firstedu	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018
	(0.282)	(0.281)	(0.282)	(0.281)	(0.282)	(0.281)	(0.282)	(0.281)	(0.282)	(0.281)

Secedu	-0.011	-0.012	-0.011	-0.012	-0.011	-0.012	-0.011	-0.012	-0.011	-0.012
	(0.410)	(0.408)	(0.410)	(0.408)	(0.410)	(0.408)	(0.410)	(0.408)	(0.410)	(0.408)
Sales	0.021[c]	0.021[c]	0.021[c]	0.021[c]	0.021[c]	0.021[c]	0.021[c]	0.021[c]	0.021[c]	0.021[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fixed	-0.073[c]	-0.073[c]	-0.073[c]	-0.073[c]	-0.073[c]	-0.073[c]	-0.073[c]	-0.073[c]	-0.073[c]	-0.073[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Size	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.558)	(0.558)	(0.558)	(0.558)	(0.558)	(0.558)	(0.558)	(0.558)	(0.558)	(0.558)
Cashhold	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007	-0.007
	(0.119)	(0.119)	(0.118)	(0.119)	(0.118)	(0.119)	(0.118)	(0.119)	(0.118)	(0.119)
Trading	-0.073	-0.073	-0.073	-0.073	-0.073	-0.073	-0.073	-0.073	-0.073	-0.073
	(0.115)	(0.116)	(0.115)	(0.116)	(0.115)	(0.116)	(0.115)	(0.116)	(0.115)	(0.116)
MA	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.323)	(0.323)	(0.322)	(0.323)	(0.322)	(0.323)	(0.322)	(0.323)	(0.322)	(0.323)
DV	0.036[c]	0.036[c]	0.036[c]	0.036[c]	0.036[c]	0.036[c]	0.036[c]	0.036[c]	0.036[c]	0.036[c]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Firmage	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]	-0.007[c]
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
STATE%	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
	(0.640)	(0.638)	(0.640)	(0.638)	(0.640)	(0.638)	(0.640)	(0.638)	(0.640)	(0.638)
EXE%	0.014[a]	0.014[a]	0.014[a]	0.014[a]	0.014[a]	0.014[a]	0.014[a]	0.014[a]	0.014[a]	0.014[a]
	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)	(0.077)
Boardsize	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.719)	(0.720)	(0.719)	(0.720)	(0.719)	(0.720)	(0.719)	(0.720)	(0.719)	(0.720)
Turnover	-0.004[c]	-0.004[c]	-0.004[c]	-0.004[c]	-0.004[c]	-0.004[c]	-0.004[c]	-0.004[c]	-0.004[c]	-0.004[c]
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	12,778	12,778	12,778	12,778	12,778	12,778	12,778	12,778	12,778	12,778
R-square	0.601	0.601	0.601	0.601	0.601	0.601	0.601	0.601	0.601	0.601

Notes: Table 11 (D) reports the OLS results for the relations between firm risks and firm performance during business/financial cycles. Columns 1 to 6 show the effects of firm risks during business expansions and recessions with interaction terms [LAEX*LAG_RAD; LARE*LAG_RAD; CEX*LAG_RAD; CRE*LAG_RAD; LEEX*LAG_RAD and LERE*LAG_RAD] on Return on Assets (ROA) as the measure of firm performance. Columns 7 to 10 show the effects of firm risks during financial expansions and recessions with interaction terms [SPEX*LAG_RAD; SPRE*LAG_RAD; HEX*LAG_RAD and HRE*LAG_RAD] on Return on Assets (ROA) as the measure of firm performance. Lagged R&D expenses (LAG_RAD) is the measure of firm risk. Detailed variable definitions are provided in the Appendix: Variables definitions. Firm fixed effects and year fixed effects are controlled for in all the regressions. Standard errors are clustered by firm. Robust p-values are reported in the parentheses.
[a] Implies significance at the 10% level. [b] Implies significance at the 5% level. [c] Implies significance at the 1% level.

Figure 1. Turning Points –– GDP

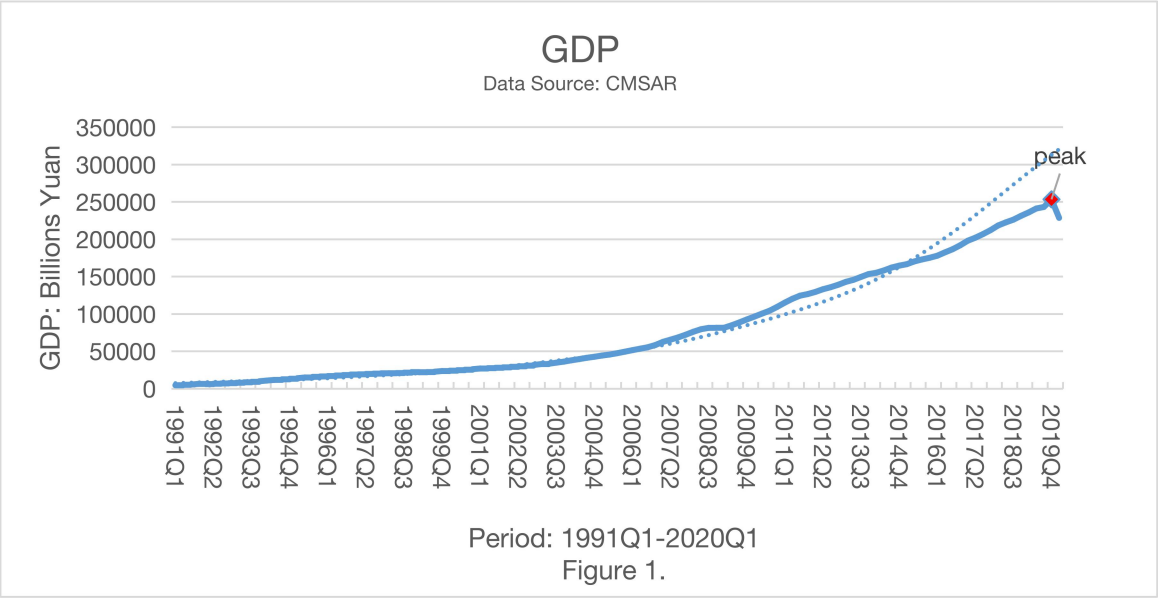


Figure 1.

Figure 2. Turning Points –– Concurrent Business Index

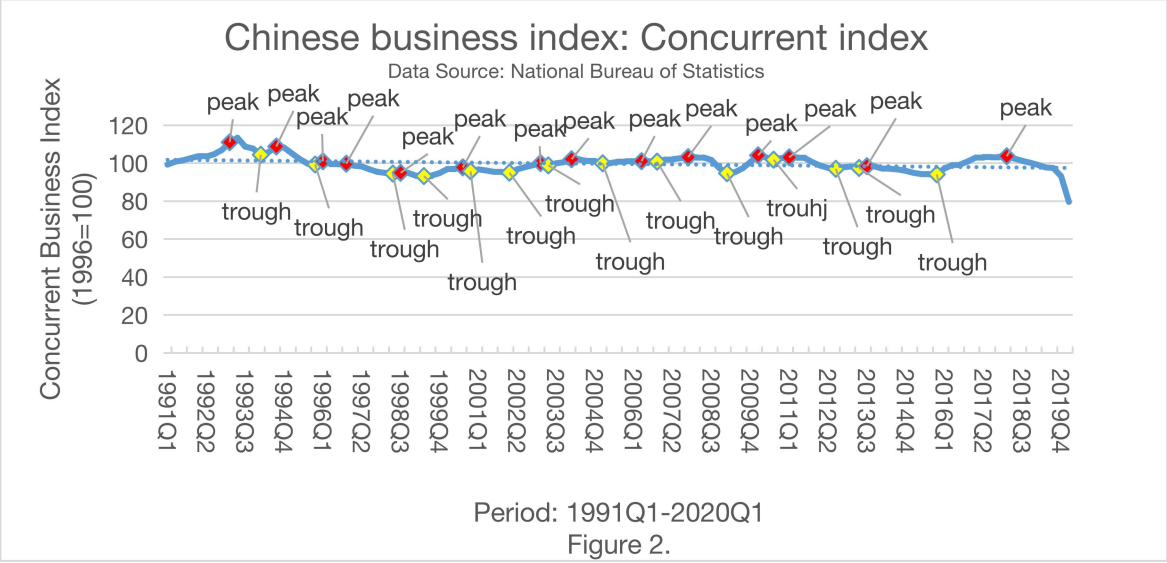


Figure 2.

Figure 3. Turning Points –– Lagging Business Index

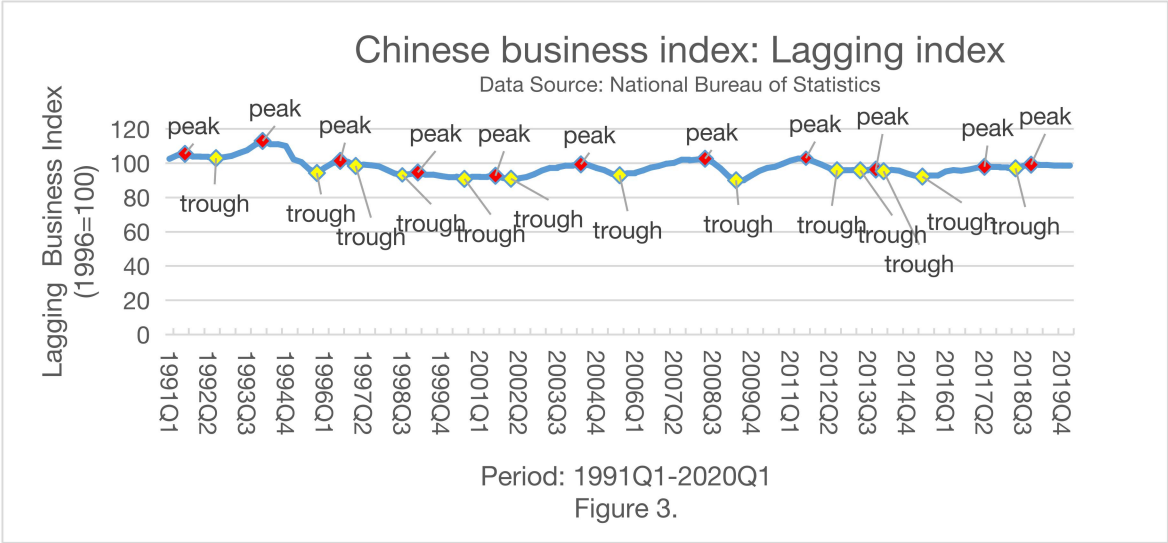


Figure 4. Turning Points –– Leading Business Index

Figure 5. Turning Points –– Equity Price

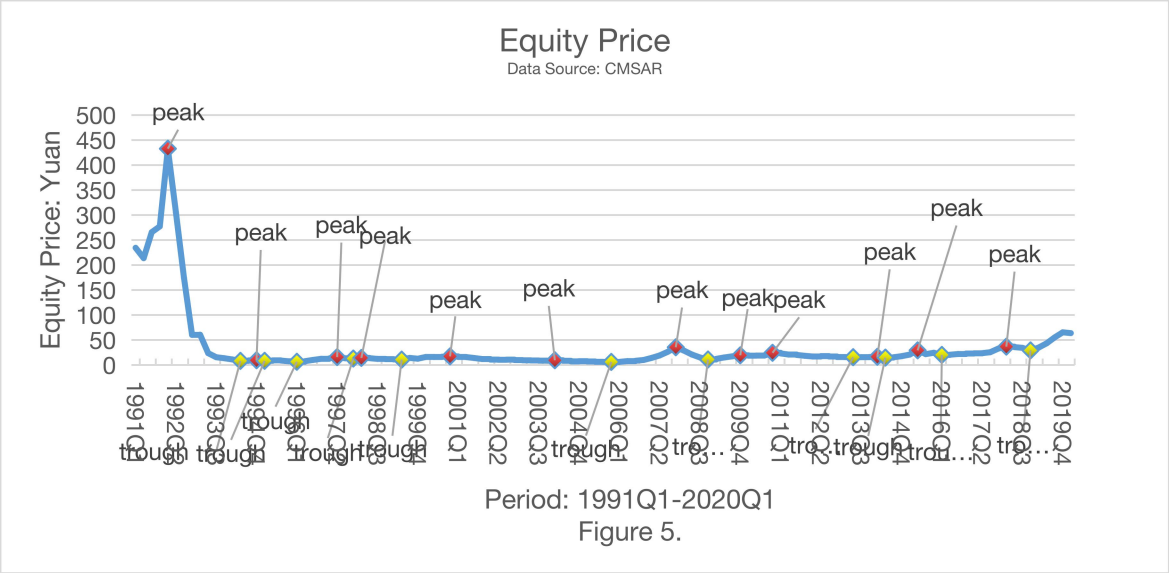


Figure 6. Turning Points –– Residential Housing Sale Price

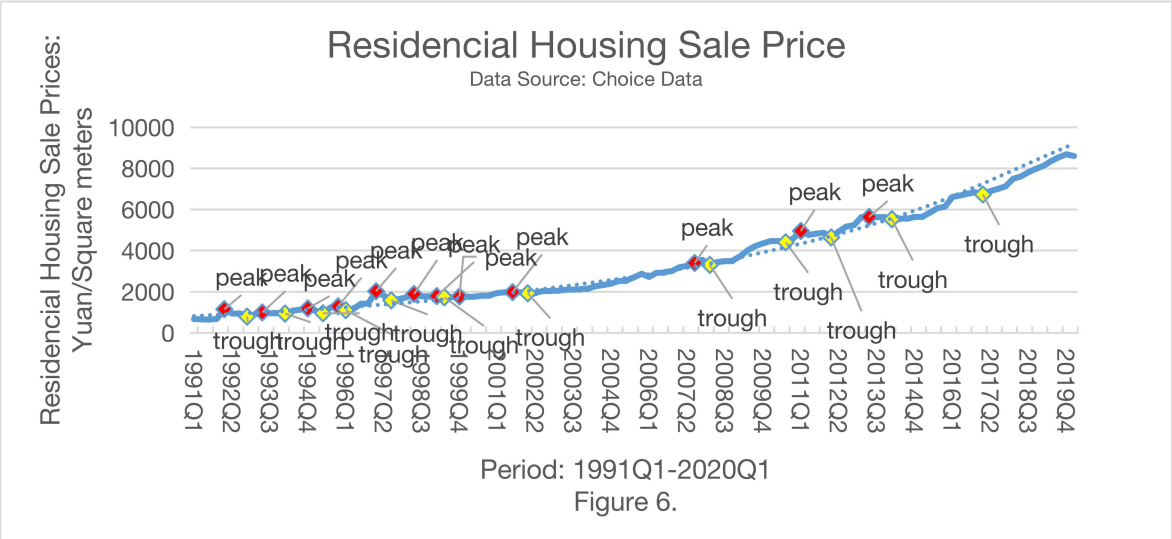
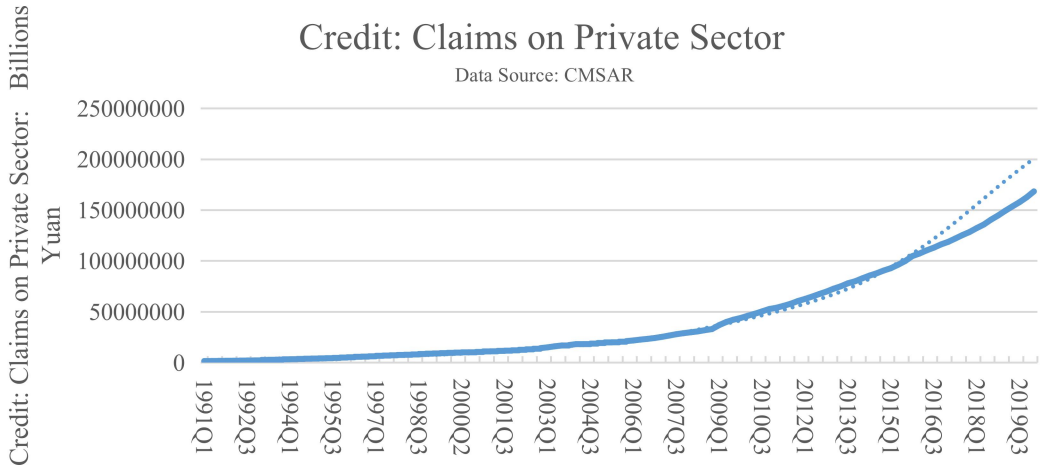


Figure 7. Turning Points –– Credit: Claims on Private Sector



Period: 1991Q1-2020Q1
Figure 7.