# The Role of Internal Control in Firm's Sustainable Growth: Evidence from China

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*The study examines whether internal control indeed plays a role in firm's sustainable growth, particularly conditional on different institutional environments. Using a large sample of the listed firms in China, we find that effective internal control positively contributes to firm's sustainable growth, and the effect is manifested in well-developed institutional environments. These results are robust to a battery of sensitivity tests, including control for Endogeneity, and alternative proxies for sustainable growth, internal control, and institutional environment. This study extends the literature by providing empirical evidence on the governance role of internal control in firm's sustainable growth.*

*Keywords: Internal Control, Sustainable Growth, Institutional Environments*

## INTRODUCTION

In the current era of globalization with increasing competition and uncertainty, how to manage risk through conduction of good governance to achieve sustainable growth is a great challenge for firms specially in the emerging markets. While a large body of literatures has investigated the factors on firm's sustainable growth, e.g. intellectual capital (Xu and Wang, 2018), financial capabilities (Ye and Kulathunga, 2019), technology (Lyver and Lu, 2018), social responsibility (Hong and Chao, 2018), there is little attention paid to the role of internal control in firm's sustainable growth.

As Committee of Sponsoring Organization of the Treadway Commission (COSO, 2017) states, internal control is required to make contributions to the sustainable growth of a firm. Recently, more studies are called for to explore the role of internal control in promoting the sustainable growth. To fill the void in the literature and respond to the claims, the purpose of this study is to examine the role of internal control in the sustainable growth of a firm, particularly among institutional environments.

Internal control is a process effected by a firm to provide reasonable assurance regarding the achievement of objectives (COSO, 2013). Prior studies discuss the governance role of internal control (e.g., Jensen, 1993; Bushman and Smith, 2001), and provide the evidence of its effects on accruals quality

(Doyle, et.al., 2007a), insider trading (Skaife, et.al., 2013), value of cash holdings and capital expenditures (Gao and Jia, 2016; Qi, et.al., 2017) , executive compensation (Hoitash, et.al., 2012; Paletta and Alimehmeti, 2018), stock price crash risk (Chen, et.al., 2017; Kim, et.al., 2019). This study predicts that effective internal control as a governance mechanism can enhance the sustainable growth of a firm for the following reasons.

First, effective internal control signals higher management ability. The design and implementation of internal control is a primary management responsibility. The management ability necessarily affects the effectiveness of internal control (Li, et.al., 2010; Wang, 2010). Also, the management ability plays a great role in promoting sustainable growth of a firm (Xu and Wang, 2018; Ying, et.al., 2019). Therefore, a firm with effective internal control usually has greater capable management and sustainable growth.

Second, effective internal control leads to more efficiency of investment and operation. The optimal decision making in investment and operation is based on the information quality provided and assured by internal control. Effective internal control reduces wrong decisions and behaviors of a firm, and hence improves the efficiency of operation and investment by providing high-quality information (Cheng, et.al., 2013; Cheng, et.al., 2018). Internal control is not only linked to the efficiency of investment and operation in a firm, but also correlated with the resource allocation efficiency (D'Mello, et.al., 2017), thereby they jointly influences the firm's sustainable growth.

Third, effective internal control is associated with lower capital cost. Effective internal control can reduce corporate risk and protect the interests of investors through a series of procedures and activities, thus decrease a firm's cost of capital (Ashbaugh-Skaife, et.al., 2009; Dhaliwal, et.al., 2011). Firms with low capital cost have a comparative advantage in resource allocation to create value and competitiveness, which in turn is helpful to promote sustainable growth of the firms.

Moreover, the impact of internal control on a firm's sustainable growth is assumed to be different across the institutional environments. The quality of firm's internal control is affected by its institutional environment (Doyle, et.al., 2007b). In a well-developed institutional environment, there is a high degree of marketization and investor protection. Therefore, for aligning the performance and investor protection with the mission and strategy of the organization, a firm in the well-developed institutional environment is more likely to depend on and strengthen its internal control to promote sustainable growth. Conversely, in the weak institutional environment, there is a low degree of marketization and investor protection, and government intervention is pervasive. Firms in the weak institutional environment are less likely to rely on internal control to promote sustainable growth. This study argues that the governance role of internal control in sustainable growth is manifested in the well-developed institutional environment.

The above issues are investigated by using a large sample of the listed firms in the largest emerging economy of China from 2011 through 2015. Internal control (IC) is measured as an indicator variable that is equal to one if the firm has effective internal controls in a particular fiscal year, and zero otherwise. Sustainable growth rate (SGR) is estimated by adopting the Higgins' model (Higgins, 1977). Institutional environment is captured by the marketization index constructed by Wang et al. (2017). Consistent with our prediction, the regression results document that firms with effective internal control have higher sustainable growth rate. The positive impact of internal control on sustainable growth is dominated for firms in the provinces with well-developed institutional environment. These findings are robust to a battery of sensitivity tests, including control for Endogeneity, and alternative proxies for sustainable growth, internal control, and institutional environment.

This study contributes to the literature in several ways. First, our study adds to the emerging literature on the determinants of sustainable growth by examining the governance role of internal control in sustainable growth. Previous studies focus on the role of intellectual capital (Xu and Wang, 2018), financial capabilities (Ye and Kulathunga, 2019), technology (Lyver and Lu, 2018), and social responsibility (Hong and Chao, 2018) in firm's sustainable growth. This study provides additional evidence on the understanding of internal control as a contributor of sustainable growth.

Second, this study extends the stream of research on the economic consequences of internal controls. Our findings corroborate the claims proposed by COSO (2017) and directly link effective internal control to sustainable growth as evidenced by using a large sample of the listed firms in the largest emerging

economy of China. Extant literatures primarily examine the role of internal control in accounting quality (Doyle, et.al., 2007a), operational efficiency (Cheng, et.al., 2018), investment efficiency (Cheng, et.al., 2013), and capital costs (Ashbaugh-Skaife, et.al., 2009; Dhaliwal et.al., 2011). Our study highlights the governance role of internal control in sustainable growth and provides additional evidence on its economic consequences.

Third, this study investigates the impact of the institutional environment on the association between internal control and firm's sustainable growth. Our findings present that the governance role of internal control in firm's sustainable growth is manifested in the well-developed institutional environment, suggesting that the institutional environment is an important gear for its governance role of internal control in sustainable growth.

The remainder of this paper proceeds as follows. Section 2 develops hypotheses. Section 3 describes the data and research methodology. Section 4 presents the empirical results. Discussion is stated in Section 5 and conclusion is offered in Section 6.

## HYPOTHESIS DEVELOPMENT

### Internal Control and Sustainable Growth

In the current wave of globalization, increasing market competition and uncertainties bring more risks to firms. Responding to the challenges, firms have a strong desire to manage risks through having effective internal control for sustainable growth.

As COSO (2013) defines, Internal control is a process effected by a firm to provide reasonable assurance regarding the achievement of its objectives. Managers play an important role in the design and implementation of an internal control system. The capability of managers affects the effectiveness of internal control while the effectiveness of internal control also indicates the capability of managers. Li et al. (2010) and Wang (2010) find that firms with ineffective internal control have less qualified CFOs and are more likely to change CFO. Hiring new better qualified CFOs after turnover is associated with subsequent improvement in internal control effectiveness. In addition, the capability of managers has an impact on firm's sustainable growth. Extant literatures (e.g., Xu and Wang, 2018; Ying, et.al., 2019) document the capability of managers is a major determinant of the sustainable growth of a firm. Therefore, firms with effective internal control have more capable managers and higher sustainable growth.

Internal control can reduce firms' wrong decision-making, and improve the efficiency of operation and investment. Feng et al. (2009) argue that ineffective internal control leads to poor-quality information, and hence managerial decision making based on the low-quality information is less accurate and efficient. Cheng et al. (2013) find that ineffective internal control decreases the efficiency of investment. Caplan et al. (2018) provide additional evidence that ineffective internal control induces low quality of management decisions in mergers and acquisitions. Cheng et al. (2018) document that operation efficiency is significantly lower among firms with ineffective internal controls. More importantly, internal control is not only directly related to the efficiency of the firm's operation and investment, but also is inherently associated with internal capital allocation (D'Mello, et.al., 2017), and they jointly spur the sustainable growth. Thus, effective internal control can enhance efficiency of operation and investment, and lead to greater sustainable growth.

Internal control can have dedication to the decline of firm's risk, and decline the cost of capital. Ineffective internal control generally indicates that there are higher agency costs in the firm, such as large perk or tunneling, which bring greater risk to investors. In response to the greater risk, investors demand higher returns as risk compensation and let the cost of capital rise up. Ashbaugh-Skaife et al. (2009) find that firms with internal control deficiencies have higher cost of equity capital. Similarly, Dhaliwal et al. (2011) show that firms with internal control weakness pay significantly higher loan rates than those without internal control weakness. Moreover, lower capital costs can give firms a resource advantage in increasing value and competitiveness, which is conductive to sustainable growth of firms. Thereby, firms with effective internal control have lower cost of capital and better sustainable growth.

In sum, internal control can perform a governance role in the sustainable growth of firms by enhancing management capability, improving efficiency of operation and investment and lowering cost of capital. The first hypothesis is thus proposed as follows:

***Hypothesis 1:*** *Firms with effective internal control have higher sustainable growth.*

**Internal Control, Institutional Environment, and Sustainable Growth**

Institutional environments affect the quality of internal control of a firm (Doyle, et.al., 2007b). La Porta et al. (2002) posit that countries with well-developed institutional environments supply the investors with better legal protection, and have higher corporate valuation. On the one hand, in the well-developed institutional environment, constraints imposed by the law is stricter and illegal costs is bigger for firms, hence internal control is more eagerly demanded and used to enhance the compliance with the laws and regulations for lowering the relevant risk. Leuz et al. (2003) provide evidences that where investors are well protected, earnings management is relatively low. Liu et al. (2012) and Hooghiematra et al. (2015) document that institutional environment is positively associated with the quality of internal control. On the other hand, where the institutional environment is well developed, marketization is better progressed and induces more heavily competitions, and internal control is more required and exerted by firms to reduce the poor decision-making and misconducts, resulting in improving the competitiveness and sustainable growth.

Overall, the more the institutional environment is developed, the more internal control is demanded to promote firms' sustainable growth. Conversely, in the weak institutional environment, marketization is less progressed with little competition, and the firm's sustainable growth is less linked to internal control. In other words, the governance role of internal control in sustainable growth is manifested in the well-developed institutional environment. This leads to the second hypothesis:

***Hypothesis 2:*** *The positive impact of effective internal control on the sustainable growth is manifested in the well-developed institutional environment*.

## METHODOLOGY

**Sample Selection**

The sample selection procedure is presented in panel A of Table 1. Our sample consists of China's A-share listed firms from 2011 to 2015. After excluding 312 observations from financial industry and 184 observations with missing data, our final sample contains 12,285 firm-year observations. The data used in our study is from China Stock Market and Accounting Research (CSMAR) database.

Panel B of Table 1 presents the distribution of our final sample by year and ineffective internal control. The samples with ineffective control defects account for 22.05% of total samples. The lowest proportion was 7.60% in 2011, and the highest proportion was 32.51% in 2015. Sample size increases steadily due to the expansion of China's capital markets in the sample period.

**TABLE 1**
**SAMPLE SELECTION AND DISTRIBUTION**

| **Panel A: Sample Selection** | |
|---|---|
| Total firm-year observations available from 2011-2015 | 12,781 |
| Deduct: Observations in the financial industry | (312) |
| Observations with missing data | (184) |
| Final sample | 12,285 |

| **Panel B: Sample distribution by year and ineffective internal control** | | | |
|---|---|---|---|
| Year | Total number of firms | Number of firms with ineffective internal control | Percentage |
| 2011 | 2,236 | 170 | 7.60 |
| 2012 | 2,404 | 588 | 24.46 |
| 2013 | 2,403 | 507 | 21.10 |
| 2014 | 2,523 | 560 | 22.20 |
| 2015 | 2,719 | 884 | 32.51 |
| Total | 12,285 | 2,709 | 22.05 |

*Note:* Percentage is the proportion of samples with ineffective internal control to the total samples in that year.

**Measures of Key Variables**

*Sustainable Growth Rate*

Sustainable growth rate (SGR) is achieved by companies using their own funds without external financing from banks or financial markets (Higgins, 1977). Sustainable growth rate is computed based on the model of Higgins (Higgins, 1977):

$$SGR = \frac{p(1-d)(1+L)}{t - p(1-d)(1+L)} \quad (1)$$

where p is the net profit margin on sales, d is the dividend payout ratio, L is the debt to equity ratio, and t presents the asset turnover ratio measured by total assets to sales.

*Internal Control*

Following prior studies (Doyle, et.al., 2007a; Cheng, et.al., 2018), Internal control (IC) is measured as an indicator variable which equals one if the firm has effective internal controls in that year, and zero otherwise.

**Regression Model**

To test the role of internal control in promoting sustainable growth, we estimate the following regression model:

$$SGR_{it} = \alpha + \beta_1 IC_{it} + \beta_2 Soe_{it} + \beta_3 Boardsize_{it} + \beta_4 Dual_{it} + \beta_5 Age_{it} + \beta_6 lev_{it} + \beta_7 Roa_{it} + \beta_8 Size_{it} + Industry\ effects + Year\ effects + \varepsilon_{it} \quad (2)$$

where SGR refers to the measure of sustainable growth rate for firm i in year t, IC is an indicator variable that equals one if firm i has effective internal controls in year t, and zero otherwise. Hypothesis 1 predicts that the coefficient on IC is positive.

To control for other factors affecting sustainable growth rate, an array of control variables is included in the regression model following the research of Xu and Wang (2018). SOE is an indicator of state-owned enterprises, which takes the value of one if the firm is state-owned, and zero otherwise. Boardsize is a proxy for size of the board of directors measured as its natural logarithm. Dual captures the duality of chairman of the board and CEO that is coded one if the two positions are combined, and zero otherwise. Age presents the lifetime of the firm measured as its natural log. LEV is a leverage variable indicated by the ratio of debt to total assets. ROA is the measure of firm's accounting performance captured by the return on assets. Size is the size of firm measured as its natural logarithm. In addition, we control for industry and year effects. The definition of the variables in model (2) is detailed in Table 2.

**TABLE 2**
**DEFINITIONS OF THE VARIABLES**

| Variables | Definitions |
|---|---|
| SGR | Sustainable growth rate is achieved by companies using their own funds without external financing from banks or financial markets, which is estimated based on Higgins' model (Higgins, 1977). |
| IC | Internal control is measured as an indicator variable which equals one if the firm has effective internal controls in that year, and zero otherwise. |
| SOE | State-owned enterprise is set to one if a firm is state-owned, and zero otherwise. |
| Boardsize | The size of board of directors is measured as the natural logarithm of director number on the board. |
| Dual | A dummy variable is coded one if the board chair also serves as CEO at that year, and zero otherwise. |
| Age | The lifetime of the firm is measured as its natural log. |
| LEV | Financial leverage is computed as the ratio of debt to total assets. |
| ROA | Return on assets. |
| Size | The natural logarithm of total assets of a firm. |

To mitigate the influence of outliers, all continuous variables in the regression model are winsorized at the 1 percent and 99 percent levels.

## EMPIRICAL RESULTS

### Descriptive Statistics

Table 3 shows the descriptive statistics separately for samples with ineffective internal control (IC=0) and samples with effective internal control samples (IC=1). The mean value of SGR is 0.028 in samples with ineffective internal control, which is significantly lower than the mean value of 0.049 in samples with effective internal control. This initially indicates that internal control is positively correlated with sustainable growth rate. Among the control variables, there are significant differences between the samples with and without ineffective internal control in the terms of state-owned enterprises (Soe), board size（Boardsize）, the duality of board chairman and CEO (Dual), firm age (Age), leverage ratio (Lev), accounting performance (Roa), firm size (Size).

**TABLE 3**
**DESCRIPTIVE STATISTICS**

| | IC=0 (n=2709) | | IC=1 (n=9576) | | Difference | |
|---|---|---|---|---|---|---|
| Variable | Mean | Median | Mean | Median | t | z |
| SGR | 0.028 | 0.042 | 0.049 | 0.05 | -7.09*** | -6.75*** |
| Soe | 0.573 | 1 | 0.322 | 0 | 23.55*** | 23.75*** |
| Boardsize | 2.175 | 2.197 | 2.142 | 2.197 | 7.39*** | 6.51*** |
| Dual | 0.168 | 0 | 0.279 | 0 | -12.97*** | -11.67*** |
| Age | 2.74 | 2.773 | 2.576 | 2.639 | 19.15*** | 18.66*** |
| Lev | 0.507 | 0.511 | 0.417 | 0.4 | 18.51*** | 18.41*** |
| Roa | 0.025 | 0.025 | 0.041 | 0.039 | -11.89*** | -14.73*** |
| Size | 22.363 | 22.209 | 21.796 | 21.635 | 19.29*** | 20.58*** |

Notes: SGR is the measure of sustainable growth rate estimated using Higgins' model (Higgins, 1977). IC is an indicator variable that equals one if the firm has effective internal controls in that year, and zero otherwise. The difference between the samples with and without ineffective internal control are tested using t-test and Wilcoxon rank-sum test. ***, **, and * indicate two-tailed significant difference at the 1%, 5%, and 10% level, respectively.

### Regression Results

Table 4 presents the regression results of hypothesis testing. In the regression results of full sample, the coefficient on IC is positive and significant at the 1% level. The result indicates that sustainable growth rate is higher in firms with effective internal control, consistent with Hypothesis 1.

To test the second hypothesis, the subsample regression is estimated. Following the study of Liu et al. (2012), we adopt the marketization index to measure the institutional environment. The marketization index developed by Wang et al. (2017) measures the degree of marketization at the 31 provinces of China. A higher marketization index indicates a better institutional environment for the province. Thus, the full sample is divided into two subsamples based on whether a firm is located in a province with the

marketization index higher than the sample median. In the results of the subsample with low marketization index（MKT=0）, the coefficient on IC is positive but not statistically significant. In the subsample with high marketization index（MKT=1）, the coefficient on IC is positive and statistically significant at the 1% level. The subsample regression results demonstrate that the positive impact of internal control on sustainable growth is manifested in the well-developed institutional environment, supporting Hypothesis 2.

The results for the control variables suggest that sustainable growth is higher for firms with smaller board of director, older firms, firms with greater leverage ratio, firms with more profit, and larger firms.

**TABLE 4**
**INTERNAL CONTROL AND SUSTAINABLE GROWTH**

| | Dependent variable=SGR | | |
|---|---|---|---|
| | Full Sample | MKT=0 | MKT=1 |
| IC | 0.006*** | 0.004 | 0.009*** |
| | (2.68) | (1.19) | (2.90) |
| Soe | 0.000 | -0.001 | 0.004 |
| | (0.20) | (-0.40) | (1.32) |
| Boardsize | -0.014*** | -0.013 | -0.015*** |
| | (-2.91) | (-1.51) | (-2.97) |
| Dual | -0.001 | -0.001 | 0.001 |
| | (-0.51) | (-0.28) | (0.25) |
| Age | 0.006*** | 0.009** | 0.003 |
| | (3.01) | (2.57) | (1.23) |
| Lev | 0.033** | 0.023 | 0.042* |
| | (2.17) | (1.10) | (1.95) |
| Roa | 1.484*** | 1.549*** | 1.403*** |
| | (26.39) | (17.95) | (20.28) |
| Size | 0.009*** | 0.008*** | 0.010*** |
| | (4.60) | (2.78) | (3.69) |
| Constant | -0.210*** | -0.188*** | -0.215*** |
| | (-5.45) | (-3.37) | (-4.17) |
| Industry effects | Yes | Yes | Yes |
| Year effects | Yes | Yes | Yes |
| *N* | 12285 | 5952 | 6333 |
| Adj. $R^2$ | 0.473 | 0.459 | 0.499 |
| F | 57.730*** | 30.065*** | 51.580*** |

Notes: SGR is the measure of sustainable growth rate estimated using Higgins' model (Higgins, 1977). IC is an indicator variable that equals one if the firm has effective internal controls in that year, and zero otherwise. MKT equals one if the firm is located in a province with market development index above the sample median, and zero otherwise. All t-statistics in parentheses are computed using the standard errors adjusted for firm-level clustering. ***, **, and * indicate significant difference at the 1%, 5%, and 10% level, respectively.

**Robustness Tests**

We assess the credibility of our findings by conducting the following analyses. Our results are robust to these sensitivity tests.

*Endogeneity Issue*

Our empirical tests could suffer from endogeneity problems. Endogeneity can arise because of unobservable heterogeneity when unobservable firm-specific factors influence both internal control and sustainable growth. To control for the endogeneity, we employ the Heckman's two-stage procedure (Heckman, 1979) following Cheng et al. (2018). In the first stage, we estimate the following probit regression of the likelihood of having an effective internal control including its determinants.

$$IC_{i,t} = \alpha + \beta_1 FSale_{i,t} + \beta_2 Age_{i,t} + \beta_3 Segments_{i,t} + \beta_4 MA_{i,t} + \beta_5 Loss_{i,t} + \beta_6 Roa_{i,t} + \beta_7 Size_{i,t} + Industry\ effects + Year\ effects + \varepsilon_{i,t} \quad (3)$$

where IC is indicator for observations that have effective internal controls in year t. The determinants include foreign sales (FSale), firm age (Age), number of business segments (Segments), merges and acquisitions or restructuring (MA), an indicator for loss (Loss), return on assets (Roa), firm size (Size). In the second stage, we put the inverse Mills ration (IMR) calculated from the first-stage regression using equation (3) into equation (2) to mitigate the endogeneity problems. As shown in Table 5, after including the inverse Mills ration, the results are similar to those in Table 4. The coefficient of IC is statistically stronger for SGR in the regression results of full sample and subsample with well-developed institutional environment (MKT=1).

**TABLE 5**
**HECKMAN TWO-STAGE REGRESSION RESULTS**

| Panel A: First-stage regression results | | |
|---|---|---|
| | Dependent variable=IC | |
| | Coefficient | Z-statistic |
| FSale | -0.138 | -0.72 |
| Age | -0.363*** | -10.24 |
| Segments | -0.041 | -1.21 |
| MA | -0.013 | -0.39 |
| Loss | -0.198*** | -4.64 |
| Roa | 1.479*** | 5.09 |
| Size | -0.171*** | -15.43 |
| Constant | 6.103*** | 22.06 |
| Industry effects | Yes | |
| Year effects | Yes | |
| *N* | 12285 | |
| Pseudo $R^2$ | 0.092 | |
| LR Chi2 | 1202.34*** | |

Panel B: Second-stage regression results

| | Dependent variable=SGR | | |
|---|---|---|---|
| | Full Sample | MKT=0 | MKT=1 |
| IC | 0.006*** | 0.003 | 0.009*** |
| | (2.63) | (1.05) | (2.92) |
| Soe | 0.001 | -0.000 | 0.005 |
| | (0.53) | (-0.00) | (1.38) |
| Boardsize | -0.015*** | -0.012 | -0.016*** |
| | (-3.00) | (-1.43) | (-3.15) |
| Dual | -0.002 | -0.002 | -0.000 |
| | (-0.86) | (-0.42) | (-0.02) |
| Age | 0.049*** | 0.072*** | 0.030*** |
| | (5.69) | (5.98) | (2.77) |
| Lev | 0.039*** | 0.032 | 0.046** |
| | (2.70) | (1.60) | (2.19) |
| Roa | 1.232*** | 1.183*** | 1.245*** |
| | (13.62) | (8.55) | (11.26) |
| Size | 0.029*** | 0.036*** | 0.023*** |
| | (5.98) | (5.27) | (3.61) |
| IMR | 0.168*** | 0.244*** | 0.105*** |
| | (5.17) | (5.31) | (2.61) |
| Constant | -1.049*** | -1.396*** | -0.743*** |
| | (-5.89) | (-5.58) | (-3.29) |
| Industry effects | Yes | Yes | Yes |
| Year effects | Yes | Yes | Yes |
| *N* | 12285 | 5952 | 6333 |
| Adj. $R^2$ | 0.477 | 0.467 | 0.501 |
| F | 68.318*** | 45.823*** | 55.456*** |

Notes: SGR is the measure of sustainable growth rate estimated using Higgins' model (Higgins, 1977). IC is an indicator variable that equals one if the firm has effective internal controls in that year, and zero otherwise. IMR is calculated from first-stage regression using equation (3). MKT equals one if the firm is located in a province with market development index above the sample median, and zero otherwise. All t-statistics in parentheses in Panel B are computed using the standard errors adjusted for firm-level clustering. ***, **, and * indicate significant difference at the 1%, 5%, and 10% level, respectively.

*Inflation-adjusted SGR*

The firm's sustainable growth is affected by the inflation at the current year (Higgins, 1977). The sustainable growth rate under inflation estimated using equation (2) is nominal rate, but not real rate. To mitigate this concern, we use inflation-adjusted SGR as the real sustainable growth rate to retest our results. The inflation-adjusted SGR is measured using the following equation.

$$Inflation\text{-}adjusted\ SGR = \frac{Nominal\ SGR + 1}{1 + R} - 1 \quad (4)$$

where the nominal SGR is estimated using equation (2). R is the inflation rate at that year. As reported in Table 6, the positive association between IC and inflation-adjusted SGR in the regression results of full-sample and subsample with well-developed institutional environment (MKT=1) still holds after controlling for other variables.

**TABLE6**
**INTERNAL CONTROL AND INFLATION-ADJUSTED SGR**

| | Dependent variable= Inflation-adjusted SGR | | |
|---|---|---|---|
| | Full Sample | MKT=0 | MKT=1 |
| IC | 0.006*** | 0.004 | 0.009*** |
| | (2.73) | (1.24) | (2.92) |
| Soe | 0.000 | -0.001 | 0.004 |
| | (0.18) | (-0.40) | (1.27) |
| Boardsize | -0.014*** | -0.012 | -0.014*** |
| | (-2.90) | (-1.49) | (-2.97) |
| Dual | -0.001 | -0.001 | 0.001 |
| | (-0.50) | (-0.28) | (0.26) |
| Age | 0.006*** | 0.009*** | 0.002 |
| | (3.02) | (2.58) | (1.24) |
| Lev | 0.032** | 0.023 | 0.041* |
| | (2.18) | (1.11) | (1.96) |
| Roa | 1.446*** | 1.508*** | 1.368*** |
| | (26.50) | (18.01) | (20.37) |
| Size | 0.009*** | 0.008*** | 0.010*** |
| | (4.57) | (2.75) | (3.68) |
| Constant | -0.256*** | -0.234*** | -0.262*** |
| | (-6.83) | (-4.32) | (-5.22) |
| Industry effects | Yes | Yes | Yes |
| Year effects | Yes | Yes | Yes |
| *N* | 12285 | 5952 | 6333 |
| Adj. $R^2$ | 0.472 | 0.455 | 0.502 |
| F | 55.115*** | 25.651*** | 58.606*** |

*Notes:* Inflation-adjusted SGR is estimated using equation (4). IC is an indicator variable that equals one if the firm has effective internal controls in that year, and zero otherwise. MKT equals one if the firm is located in a province with market development index above the sample median, and zero otherwise. All t-statistics in parentheses are computed using the standard errors adjusted for firm-level clustering. ***, **, and * indicate significant difference at the 1%, 5%, and 10% level, respectively.

*An Alternative Measure of Internal Control*

The above test power is possibly subject to a binary "effective" or "ineffective" indicator for internal control. We use a continuous measure of internal control to test the robustness of the main results. Our continuous measure of internal control is the internal control index (ICindex) developed by Chen et al. (2017) for all public firms in China. The values of ICindex range from 0 to 1. A higher value of ICindex corresponds to stronger internal control. As presented in Table 7, ICindex is positively associated with SGR in the results of full-sample and subsample with well-developed institutional environment (MKT=1), consistent with our main results.

**TABLE 7**
**INTERNAL CONTROL INDEX AND SUSTAINABLE GROWTH**

| | Dependent variable=SGR | | |
|---|---|---|---|
| | Full Sample | MKT=0 | MKT=1 |
| ICindex | 0.036** | 0.022 | 0.053*** |
| | (2.44) | (0.97) | (3.03) |
| Soe | -0.001 | -0.002 | 0.002 |
| | (-0.46) | (-0.67) | (0.57) |
| Boardsize | -0.015*** | -0.013 | -0.015*** |
| | (-3.00) | (-1.58) | (-2.98) |
| Dual | -0.001 | -0.001 | 0.001 |
| | (-0.41) | (-0.22) | (0.32) |
| Age | 0.006*** | 0.009*** | 0.002 |
| | (3.12) | (2.70) | (1.17) |
| Lev | 0.034** | 0.024 | 0.044** |
| | (2.31) | (1.18) | (2.05) |
| Roa | 1.485*** | 1.549*** | 1.406*** |
| | (26.36) | (17.88) | (20.37) |
| Size | 0.008*** | 0.007*** | 0.009*** |
| | (4.21) | (2.63) | (3.28) |
| Constant | -0.202*** | -0.183*** | -0.206*** |
| | (-5.29) | (-3.29) | (-4.06) |
| Industry effects | Yes | Yes | Yes |
| Year effects | Yes | Yes | Yes |
| *N* | 12285 | 5952 | 6333 |
| Adj. $R^2$ | 0.473 | 0.459 | 0.499 |
| F | 56.588*** | 30.716*** | 49.056*** |

*Notes:* SGR is the measure of sustainable growth rate estimated using Higgins' model (Higgins, 1977). ICindex is developed by Chen et al. (2017) for all public firms in China. MKT equals one if the firm is located in a province with market development index above the sample median, and zero otherwise. All t-statistics in parentheses are computed using the standard errors adjusted for firm-level clustering. ***, **, and * indicate significant difference at the 1%, 5%, and 10% level, respectively.

*An Alternative Measure of Institutional Environment*

We replace market development index with legal environment index as an alternative measure of institutional environment to test the sensitivity of our findings, following Ariff et al. (2014) approach. Legal environment index constructed by Wang et al. (2017), measures the degree of legal environment development in each province of China. Higher index means more legal environment development. The full sample is divided into two subsamples based on whether a firm is located in a province with a legal environment index higher than the sample median. As reported in Table 8, the coefficient of IC is significantly positive in the subsample with high legal environment index (Legal=1), but not in the subsample with low legal environment index (Legal=0), consistent with our main results.

**TABLE 8**
**AN ALTERNATIVE MEASURE OF INSTITUTIONAL ENVIRONMENT**

| | Dependent variable=SGR | |
|---|---|---|
| | Legal=0 | Legal=1 |
| IC | 0.004 | 0.009*** |
| | (1.25) | (2.86) |
| Soe | -0.001 | 0.004 |
| | (-0.39) | (1.29) |
| Boardsize | -0.013 | -0.015*** |
| | (-1.55) | (-2.92) |
| Dual | -0.001 | 0.001 |
| | (-0.32) | (0.27) |
| Age | 0.009** | 0.003 |
| | (2.52) | (1.29) |
| Lev | 0.024 | 0.041* |
| | (1.15) | (1.88) |
| Roa | 1.551*** | 1.398*** |
| | (18.19) | (19.96) |
| Size | 0.008*** | 0.010*** |
| | (2.81) | (3.65) |
| Constant | -0.187*** | -0.217*** |
| | (-3.39) | (-4.14) |
| Industry effects | Yes | Yes |
| Year effects | Yes | Yes |
| *N* | 6033 | 6252 |
| Adj. $R^2$ | 0.461 | 0.495 |
| F | 30.623*** | 50.648*** |

*Notes:* SGR is the measure of sustainable growth rate estimated using Higgins' model (Higgins, 1977). IC is an indicator variable that equals one if the firm has effective internal controls in that year, and zero otherwise. Legal equals one if the firm is located in a province with legal environment index above the sample median, and zero otherwise. All t-statistics in parentheses are computed using the standard errors adjusted for firm-level clustering. ***, **, and * indicate significant difference at the 1%, 5%, and 10% level, respectively.

## DISCUSSION

This study examines the governance role of internal control in sustainable growth in a developing economy of China with varied institutional environments. The findings indicate that internal control significantly positively contributes to sustainable growth, supporting H1. This provides the empirical evidence for the claim of COSO (2017) that one of goals of internal control aims to keep and improve sustainable growth.

Moreover, the governance role of internal control in sustainable growth varies across institutional environments. Liu et al. (2012) and Hooghiemstra et at. (2015) contend that the high-quality internal control is more demanded by the firms in more developed institutions. We extend the line of the research and document that the governance role of internal control in sustainable growth is pronounced for firms in well-developed institutional environments, which particularly supports Hypothesis 2.

## CONCLUSION

The purpose of internal control to promote sustainable growth of a firm is underlined in the report issued by COSO (2017). However, there is little empirical evidence on the governance role of internal control in sustainable growth of a firm, especially among different institutional environments. We test the issue whether effective internal control perform a governance role in firm's sustainable growth among different institutional environments using a large sample of Chinese listed firms from 2011 through 2015. Consistent with our prediction, we find that sustainable growth is significantly higher for the firms with effective internal control in well-developed institutional environment, but not in weak institutional environment. The result is robust to a battery of sensitivity tests, including correction for Endogeneity using Heckman two-stage procedure, and alternative proxies for sustainable growth, internal control, and institutional environment.

Our findings suggest that effective internal control not only helps firms improve investment and operation efficiency, as documented in prior studies, but also exercises a governance role in sustainable growth. This finding extends the line of the research by providing the evidence from the largest emerging economy of China, that has different institutional environments across its provinces. The implication of our study is for managers and policy makers in China and other emerging economies to give enough attention to the effectiveness of internal control to enhance sustainable growth.

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