




# Are initial public offerings significant to firm performance in an emerging stock market? Evidence from China

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**Purpose:** This study investigates firm performance after going public and explores whether Initial Public Offerings (IPOs) contribute to it.

**Design/methodology/approach:** This study employs comprehensive regression models to examine IPO significance to both operating performance and market performance.

**Findings/results:** It suggests that IPO firms retain their growth over the first 3 years after going public, but the growth does not sustain after the third year in terms of profit-related indicators, which is distinguishing from prior research. IPOs may contribute to firms' market performance only, they are insignificant to firms' operating performance in general, whilst industry-adjusted evidence suggests that IPOs are negatively associated with operating performance in terms of return on assets, return on sales and debt to assets.

**Practical implications:** The practical implication for managers is to spend more IPO capitals on business operations to maximise firm value.

**Originality/value:** Market value is taken into account, whilst operating performance is considered only by prior research, and it presents some different findings from prior studies based on developed stock markets.

**Keywords:** IPOs; firm performance; post-IPO performance; emerging stock markets; Chinese entrepreneurship.

## Introduction

An IPO, which provides firms with access to fund-raising for future growth, is viewed as one of the most significant milestones in a firm's life cycle (Latham & Braun, 2010). Ragozzino, Shafi and Blevins (2017) state that an IPO is a highly sought-after objective for American entrepreneurial firms because capital is critical to firm growth. Pagano, Panetta and Zingales (1998) document that Italian IPOs are able to finance the future growth of firms. Rajan (1992) documents that IPOs may enhance issuers' financial capability and their bargaining power with bankers and consequently increase their financial credits. Therefore, IPO firms have more access to outside resources and a variety of chances to raise capital, such as new share issuances, bank loans, etc., which all potentially contribute to management performance.

However, some studies have suggested that IPO firms underperform after going public (Mikkelsen, Partch, & Shah, 1997; Pastusiak, Bolek, Malaczewski, & Kacprzyk, 2016a). Based on data from the Warsaw Stock Exchange during 1991–2000, Pastusiak et al. (2016a) suggest that the profitability ratios of post-IPO firms decrease partially because of equity dilution. Mikkelsen et al. (1997), using IPO samples from 1980 to 1983, show the short-term underperformance of return on assets (ROA) from the last pre-IPO years to the first post-IPO year. This finding is consistent with Jain and Kini (1994), who show post-IPO declines in the market-to-book ratio, price/earnings ratio and earnings per share. Therefore, post-IPO firm management performance and sustainability vary across global stock markets.

Unfortunately, little of the existing research sheds light on the management performance of IPO firms from emerging stock markets. This article addresses this research question based on the Growth Enterprise Market of China (GEMC), which is China's so-called Nasdaq market for entrepreneurial enterprises; there have been increasingly more Chinese entrepreneurial firms going public in this market. Moreover, many studies have shown the phenomenon that IPO firms underperform, but they have not examined whether these types of underperformance were

**Note:** JEL codes: G11, G30.

consequently incurred by IPOs. We empirically examine the relationship from two perspectives, namely operating performance and market performance.

The purpose of this study is to investigate post-IPO management performance in the years after going public and further examine the importance of an IPO to firm performance from industry-adjusted perspectives. By sampling both panel and time-series data from 204 IPO firms on the GEMC and employing six performance proxies for six regression models based on prior studies by Pastusiak, Miszczyńska and Krzeczewski (2016b) and Jin, Li, Zheng and Zhong (2017), this study empirically examines the research question in the following section.

The motivation to do this research is twofold. Firstly, entrepreneurship is currently booming in China. As He et al. (2019) state, China's economic transition has greatly unleashed entrepreneurship and private enterprise development since the 1980s, and China has stepped into a new era that is characterised as 'mass entrepreneurship and innovation'. According to the *Ease of Doing Business Ranking 2020* report by The World Bank, China is ranked 31st amongst 190 nations and listed amongst the top 10 economies improving the most. To facilitate this type of fund-raising, China launched two entrepreneurship-dominated stock markets: the Growth Enterprise Board in 2009 and the Sci-Tech Innovation Board in 2019. Under upgrade circumstances, entrepreneurial firms, particularly IPO firms, should perform increasingly better.

Furthermore, the Chinese IPO market, comparable to developed markets in terms of the IPO assessment mechanism, has a few distinctive constitutional and regulatory features. Unlike IPOs on the Nasdaq, the New York Stock Exchange and other well-developed exchanges, Chinese IPO applications are assessed by the national government rather than exchanges, and firm owners and managers are required to lock their shares within the first 3 years after IPOs, namely the lock-up period. Furthermore, the listing rules vary in different stock markets. For instance, successful IPOs in China not only fulfil a range of rigorous listing requirements in terms of revenues, profits, assets and other items but are also determined by some policy-oriented factors. Thus, only well-performing firms are eligible to be listed there and expected to sustain outstanding performance after going public. Under the unique context, this study is expected to reveal some different findings to diversify the existing literature.

The rest of this article is organised as follows. Section 'Literature review' provides a literature review. Section 'Data' outlines the data. Section 'Research methodology' illustrates our analysis framework. Section 'Empirical results' shows some empirical results. Section 'Discussion' discusses our findings. Section 'Conclusions' concludes the article.

## Literature review

There are various advantages for IPO firms. Bancel and Mittoo (2009) show that listed firms in the United States present more robust growth potential annually than nonlisted

firms in terms of assets, market capitalisation and employee recruitment. Moreover, they reveal two main purposes for most firms to go public. The first is to promote the firms' reputation and visibility in their product markets because an IPO acts as an advertisement to promote both the firm and its products' prestige. The second purpose is to broaden the investor base because an IPO is an effective approach to attract a wide range of public investors. Italian evidence from the study by Pagano et al. (1998) shows that the main purpose of an IPO is to rebalance the firms' financial leverage and decrease their capital costs.

Rajan (1992) suggests that going public can also strengthen a firm's credit and negotiation power with bankers and financial creditors, enhance its financial flexibility and consequently reduce its fund-raising costs. Furthermore, IPOs are able to facilitate the firms' mergers and acquisitions (Hsieh, Lyandres, & Zhdanov, 2011). Based on the UK evidence, Chemmanur and He (2011) argue that going public is a marketing strategy for a firm to expand its product's market share or to restrain its industrial competitors and deter new entrants to the industry. This is because the shareholders of public firms are more adept at bearing higher risks and diversifying their profit variability than those of non-listed firms. Therefore, these aforementioned advantages are expected to affect post-IPO firm performance.

Some literature focuses on examining the market performance of listed firms in a wide variety of capital markets. For instance, Drobetz, Kammerman and Wälchli (2005) test the long-run performance of Swiss IPO cases during the period from 1983 to 2000 and show that the return rate in the third year after going public is 8% on an average but increases dramatically to 21% just 1 year later and up to more than 100% 5 years later. However, Kirkulak (2008) uses 433 sample companies on the Japanese stock market during the period from 1998 to 2001 and demonstrates a long-run underperformance of approximately 18%. Chen, Wang, Li, Sun and Tong (2015) examine Chinese samples between 1999 and 2007 and document first-day returns of approximately 127% on an average.

IPO firms have more access to outside resources and a variety of chances to raise capital, such as new share issuance, bank loans, mergers and acquisitions, etc., which all potentially contribute to firm management performance (Hsieh et al., 2011; Rajan, 1992). Furthermore, Maksimovic and Pichler (2001) discuss that going public is a strategy to secure a 'first-mover advantage' in the product market, which attracts prospective investors, customers, creditors and other business partners, thereby add value to IPO firms in the future. Therefore, IPO advantages may sustain operating performance for the coming years.

Entrepreneurial firms in a fast-growing process have more growth potential. Hall (1987) reveals that small firms grow faster than large firms and entrepreneurial firms grow faster than mature firms. Fazzari, Hubbard and Petersen (1988) document that entrepreneurial firms usually pay dividends and reinvest more into the next round of business for their further

growth potential, which may consequently increase firm value as measured by Tobin's Q (TobQ). As such, firms' performance sustainability is anticipated after their IPOs.

Therefore, IPO firms have more advantages than before; thus, they are expected to have better performance and maintain their performance sustainability after going public.

Furthermore, some studies have further suggested that firm management performance varies from different perspectives of methodology. Using the return on equity (ROE) method, Pastusiak et al. (2016a) find that post-IPO performance declined. By examining multiple factors including managerial ownership, age and size of IPO firms listed on the Japanese OTC market, Kutsuna, Okamura and Cowling (2002) find that management performance varies. By investigating firm performance using sales growth and ROE, Jin et al. (2017) find a negative relation between IPO volume and post-IPO performance but a positive relation between capital expenditures and operating performance.

However, none of these studies investigate management performance from an industrial perspective because firms' performance is associated with their industry interactions (Meyer-Stamer, 1999).

Firm performance is determined by a variety of factors, such as industry-specific, firm size-related, policy-oriented and economy-based factors. Firm performance is associated with industry interactions (Meyer-Stamer, 1999), which means that firm performance varies depending on its linkage to the industry. Based on evidence from the Warsaw Stock Exchange, Pastusiak et al. (2016b) suggest that the importance of an IPO to firm performance varies across different sizes of firms. This study shows that IPOs contribute little to large companies in terms of profitability whilst private companies, especially medium-sized companies, perform better than IPO firms.

As Hou and Li (2019) suggested, the operating performance of post-IPO firms from different nations varies. IPOs have a very significant association with the regional economy because IPOs have the potential to create new business and more job opportunities, attract more capital inflow and enhance local industry agglomeration (Li & Zhou, 2015). Furthermore, IPOs are viewed by local governments as engines for regional economic development (Liu, Uchida, & Li, 2020). Thus, local government officers have strong motivations to support local enterprises, particularly entrepreneurial firms, to go public (Piotroskia & Zhang, 2014); particularly in China, local economic performance is a very important indicator for local politician promotion (Bao, Johan, & Kutsuna, 2016).

Furthermore, studies also show that political connections provide Chinese IPO firms with various privileges (Bao et al., 2016; Chen, Guan, Zhang, & Zhao, 2017) because governments play a significant role in allocating investment and industrial resources and abnormal first-day returns (Chen, Cumming, Hou, & Lee, 2016). Government-dominated industrial policies and services may contribute to the potential growth of firms, and government policies vary across provinces in China.

Moreover, China consists of 32 provinces, and provincial officials are responsible for developing their regional economies (Li & Zhou, 2005).

Prior research has demonstrated the phenomenon that IPO firms have different types of post-IPO operating performance in the short run or long run, but they have not investigated the extent to which performance variations are associated with IPOs. It is possible that IPOs have no contributions to firm performance. Perhaps, they make some contributions that are mitigated and offset by other factors.

## Data

Our database consists of 204 IPO firms from the GEMC. In order to examine post-IPO performance sustainability, we collected time-series data on each firm's post-IPO performance from 2009 to 2020. IPO firms distribute as Table 1.

Panel data were also collected to test the importance of an IPO for firm performance in regression models. The variables include each firm's income (IN), net profits (NP), total assets (Tast), equity (Eqty) and growth rate during this period; the independent variable is IPO volume (IPO). All these types of data are publicly available on the official website of the Shenzhen Stock Exchange (<http://www.szse.cn/www/disclosure/listed/fixed/>).

In addition to the endogenous data from firms, further data related to external factors that are potentially associated with firm performance, such as Gross Domestic Product (GDP) in the IPO year, industrial sectors (Ind) and firm location (Loc), were hand collected from some official departments. Both IPO volume and IPO price (IPOP) were collected from firms' IPO prospectuses. Investor sentiment (Senti) measured by the Shanghai stock composite index was gathered from the Shanghai Stock Exchange.

## Research methodology

Firstly, we examine management performance in terms of the ROA, ROE, return on sales (ROS), sales-to-assets (SOA), debt-to-total assets (DOA) and Tobin Q in the years after a firm goes public and then examine them further by industrial groups. After obtaining findings regarding management performance, whatever they may be, we conduct a regression model analysis to determine whether the firms' performances are attributed to their IPOs and analyse the results by some major industries to obtain further findings.

## Management performance measurement

Corporate management sustainability is the ability of a firm to maintain and improve its growth in the long run by effectively

**TABLE 1:** IPO firm distribution during 2009–2020.

Number	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
No. of IPO Firms	7	27	30	20	19	11	13	19	25	10	13	10	204

**TABLE 2:** Prior literature on firm performance measured by various proxies.

Proxies	Literature
ROA	Pastusiak et al. (2016a), Mikkelsen et al. (1997) and Jain and Kini (1994)
ROE	Pastusiak et al.(2016a) and Alipour and Pejman (2015)
ROS	Alipour and Pejman (2015)
SOA	Alipour and Pejman (2015)
DOA	Ahmed and Bhuyan (2020)
Tob Q	Singh, Tabassum, Darwish and Batsakis (2018)

DOA, debt-to-total assets; ROA, return on assets; ROE, return on equity; ROS, return on sales; SOA, sales-to-assets.

meeting the expectations of stakeholders (Neubaum & Zahra, 2006). Although this type of long-run growth can be measured using various indicators, this study employs the six most popular proxies to comprehensively test post-IPO performance, which are ROA, ROE, ROS, SOA, DOA and TobQ. These proxies have been frequently adopted by scholars to gauge firm performance, as described in Table 2.

Following Neubaum and Zahra (2006), management sustainability is the ability to maintain long-term growth, which means that firms with consecutive growth rates of any proxy retain their performance sustainability, otherwise, they do not. This study measures firm performance sustainability using the mean value of the 204 firms in each year after going public.

## Regression models

### The independent variable and measurement

Boubakri, Kooli and L'Her. (2005) suggest that IPO firms with larger IPO volumes are able to withstand tougher market conditions than those with smaller IPO volumes. Consistently, Kooli and Meknassi (2007) reveal that IPO firms with larger IPO volumes may survive longer and are unable to experience a merger than those with smaller volumes. Furthermore, Loughran, Ritter and Rydqvist (1994) suggest that the amount of IPO fund-raising is positively affected by the level of the stock market and market returns because a bullish IPO market generates great capital demand.

IPO capital is a type of new firm asset that increases a firm's total assets and consequently affects its operating performance; thus, firm performance varies based on different IPO volumes. As IPOs may alter firms' capital structure, each IPO firm has different capital expenditure strategies from others, and the importance of an IPO to different companies should vary. We propose that IPO volume may be associated with firm performance and measure it using IPO volume as follows:

$$IPO = (\ln IPO \text{ volume}) \quad [\text{Eqn 1}]$$

### Control variables and measurements

The performance of IPO firms is mainly determined by many financial factors that are subject to performance proxies, and each independent variable is measured by its mean value of 5 years. These control variables for each proxy are theoretically proposed as table 3.

**Industrial orientation:** Industrial orientation (Ind), as a vital variable, has been discussed by a number of studies

**TABLE 3:** Independent variables and their measurements for each proxy.

Proxies	Independent variables	Measurements
ROA	NP	$\overline{NP}_n^{t=1-5}$
	Net profit growth (NPGrth)	$\overline{NPGrth}_n^{t=1-5}$
	TAst	$\overline{TAst}_n^{t=1-5}$
	Total asset growth (TAstGrth)	$\overline{TAstGrth}_n^{t=1-5}$
ROE	NP	$\overline{NP}_n^{t=1-5}$
	Net profit growth (NPGrth)	$\overline{NPGrth}_n^{t=1-5}$
	Eqty	$\overline{Eqty}_n^{t=1-5}$
	Equity growth (EqtyGrth)	$\overline{EqtyGrth}_n^{t=1-5}$
ROS	NP	$\overline{NP}_n^{t=1-5}$
	Net profit growth (NPGrth)	$\overline{NPGrth}_n^{t=1-5}$
	IN	$\overline{IN}_n^{t=1-5}$
	Income growth (INGrth)	$\overline{INGrth}_n^{t=1-5}$
SOA	IN	$\overline{IN}_n^{t=1-5}$
	Income growth (INGrth)	$\overline{INGrth}_n^{t=1-5}$
	TAst	$\overline{TAst}_n^{t=1-5}$
	Total asset growth (TAstGrth)	$\overline{TAstGrth}_n^{t=1-5}$
DOA	Debt	$\overline{Debt}_n^{t=1-5}$
	Debt growth (DebtGrth)	$\overline{DebtGrth}_n^{t=1-5}$
	TAst	$\overline{TAst}_n^{t=1-5}$
	Total asset growth (TAstGrth)	$\overline{TAstGrth}_n^{t=1-5}$
Tob Q	TAst	$\overline{TAst}_n^{t=1-5} \uparrow$
	Total asset growth (TAstGrth)	$\overline{TAstGrth}_n^{t=1-5} \uparrow$

DOA, debt-to-total assets; ROA, return on assets; ROE, return on equity; ROS, return on sales; SOA, sales-to-assets; NP, net profits.

†, Only two years of TobQ are calculated because of data limitations. Firm capitalisation data are available in the IPO year and current year. (The current capitalisation can be calculated by the current share price multiplied by the number of shares.)

(Hough 2006), which have presented the importance of industry effects on firm performance. Schmalensee (1985) documents that industry effects play a central role in determining profitability whilst firm factors are insignificant. In particular, Hou and Li (2019) find that industrial policy support has a positive effect on the IPO performance of Chinese firms.

This variable is measured by initial price earnings (PEs) because firms from some emerging industries, such as biomedical clean energy, are encouraged to apply for IPOs although they have low revenues and even less profits. Nevertheless, firms from these industries have high PE rates. Thus, it can be inferred that firms with high PEs are from a promising industry and will perform well.

Ind is calculated as a firm's first-day market capitalisation divided by its net profits for the year:



$$Ind = \ln(Firm\ shares * Price / NP_t) \quad [Eqn\ 2]$$

**Geographical location:** Geographical location (Loc) is a vital factor influencing firm performance across countries (Becker, Ivkovic, & Weisbenner, 2011), especially the business success of entrepreneurial firms.

This variable is quite important in the Chinese industry. Firstly, there is a very popular slang phrase within the Chinese investment industry, which is 'investments never reach Shanhaiguan'. This means that no investors would like to invest in a business located in North-east China. Secondly, because of uneven economic strength across provinces in China, firm performance varies. Entrepreneurs prefer to start their businesses in relatively developed cities, such as Shanghai, Beijing, Shenzhen, etc., where there are more business resources and capital. In addition to the very Chinese characteristic 'mass entrepreneurship and innovation' (Da Zhong Chuang Ye, Wan Zhong Chuang Xin in Chinese Pinyin), which means that the government encourages each adult Chinese to run a business as an entrepreneur, the government offers various policies and numerous funds each year to support them.

In this context, Chinese firm performance is associated with a firm location. After checking the location of each sample firm, we assess this variable based on the number of local-listed firms:

$$Loc = \ln(No.\ of\ listed\ firms) \quad [Eqn\ 3]$$

**GDP:** We include GDP to investigate its effect on firm performance for two reasons. Firstly, since 2010, China has become the world's second largest economy. According to IMF data, in 2018, China still had a fast-growing economy.

Secondly, as Espenlaub, Khurshed and Mohamed (2015) suggested, macro factors have strong association with the exit of venture capital. Yang (2018) further suggests that China's macro factors can increase the likelihood of successful exits in the Chinese stock market. Theoretically, high-speed GDP means more capital inflow, more money for investment and more firms going public. We suppose that GDP has very significant contributions to firm performance, even more than VC reputation. GDP is calculated based on the GDP in the last year before a firm's IPO:

$$GDP = \ln(GDP_t) \quad [Eqn\ 4]$$

**Investor sentiment:** According to Baker and Wurgler (2007), investor sentiment is the prediction and belief of investors about future cash flows, and it is viewed as a determinant of firm performance. De Long, Shleifer, Summers and Waldmann (1990) document that investor sentiment affects IPO prices, and other studies suggest that investor sentiment affects market capitalisation (Baker, Wurgler, & Yuan, 2010; Pagano et al., 1998). Thus, it is an important variable for the TobQ measurement, and this study measures it using the

stock composite index of the Shanghai Stock Exchange in an IPO year:

$$senti = \ln(composite\ index_t)$$

**Model development:** Based on the theoretical framework from Pastusiak et al. (2016b) and Jin et al. (2017), firm performance can be generally denoted as the following function:

$$Performance [ROA, ROE, ROS, SOA, DOA, TobQ] = \beta_0 + \beta_1 IPO + \beta_n X_n + e \quad [Eqn\ 5]$$

As such, each firm's (n) performance can be comprehensively measured by six regression models with six proxies, including ROA, ROE, ROS, SOA, DOA and TobQ, which are gauged by their mean values five years after going public. Specifically, these regression models are developed to test the importance of an IPO to firm performance as follows:

$$ROA = \beta_0 + \beta_1 IPO + \beta_2 Ind + \beta_3 GDP_{t=0} + \beta_4 Loc + \beta_5 IPOPOP + \beta_6 NPGGrth + \beta_7 TAsGrth + \beta_8 NP + \beta_9 TAs + e \quad [Eqn\ 6]$$

$$ROE = \beta_0 + \beta_1 IPO + \beta_2 Ind + \beta_3 GDP_{t=0} + \beta_4 Loc + \beta_5 IPOPOP + \beta_6 NPGGrth + \beta_7 EqtyGrth + \beta_8 NP + \beta_9 Eqty + e \quad [Eqn\ 7]$$

$$ROS = \beta_0 + \beta_1 IPO + \beta_2 Ind + \beta_3 GDP_{t=0} + \beta_4 Loc + \beta_5 IPOPOP + \beta_6 INGrth + \beta_7 INGrth + \beta_8 NP + \beta_9 IN + e \quad [Eqn\ 8]$$

$$SOA = \beta_0 + \beta_1 IPO + \beta_2 Ind + \beta_3 GDP_{t=0} + \beta_4 Loc + \beta_5 IPOPOP + \beta_6 INGrth + \beta_7 TAsGrth + \beta_8 TAs + \beta_9 IN + e \quad [Eqn\ 9]$$

$$DOA = \beta_0 + \beta_1 IPO + \beta_2 Ind + \beta_3 GDP_{t=0} + \beta_4 Loc + \beta_5 IPOPOP + \beta_6 DebtGrth + \beta_7 TAsGrth + \beta_8 TAs + \beta_9 Debt + e \quad [Eqn\ 10]$$

$$TobQ = \beta_0 + \beta_1 IPO + \beta_2 Ind + \beta_3 GDP_{t=0} + \beta_4 Loc + \beta_5 IPOPOP + \beta_6 Senti + \beta_7 TAsGrth + \beta_8 TAs + \beta_9 Mktcap + e \quad [Eqn\ 11]$$

where IPOPOP represents the IPO price,  $t = 0$  refers to the IPO year and  $t = 1-5$  means each year of the 5 years after an IPO. Ind stands for industrial orientation. GDP means gross domestic product in China. Loc denotes firm's geographical location. IPOPOP means IPO price. NP and NPGGrth represent firm's net profit and its growth rate, respectively. TAs and TAsGrth mean firm's total assets and their growth rates, respectively. Eqty and EqtyGrth refer to firm's equity and equity growth, respectively. IN and INGrth refer to firm's income and its growth, respectively. Debt and DebtGrth refer to firm's debt and its growth rate, respectively. Senti means investor sentiment. MktCap represents IPO firm market capitalisation.

## Empirical results

### Results on firm growth

Table 4 shows the mean growth rates of the independent variables in each year, and Table 5 demonstrates the post-IPO performance over the years in terms of the comprehensive variables. The one-sample test in Table 4 is very significant because the sig. values are less than or approximately 0.005 except those of NPGGrth2, EqtyGrth3 and EqtyGrth4 with sigs. of 0.138, 0.106 and 0.155, respectively.

Generally, IPO firms have positive post-IPO growth rates for these performance indicators, except the net profit growth rates (-1.307 and -1.096, respectively) in the third and fourth years. Particularly, IPO firms demonstrate very strong growth potential in the first 2 years after going public, as illustrated by INGrth (0.568, 0.569), NPGGrth (0.523, 0.648), TAsGrth (0.413, 0.334), DebtGrth (0.844, 0.564) and EqtyGrth (0.527, 0.358).

However, these rates predominantly show a descending trend over the years. For instance, INGrth ranges from 0.568 in the first year to 0.237 in the fourth year; NPGGrth ranges from 0.523 to -1.096, respectively, and TAsGrth ranges from 0.413 to 0.048, respectively. Moreover, these growth rates fluctuate dramatically. For instance, INGrth in the second year is 0.569, which is 0.001 higher than that of the previous year of 0.568; then, INGrth decreases remarkably by 0.427 to 0.142 in the third year and then rises significantly by 0.095 to 0.237 in the fourth year. In terms of NPGGrth, it rises by 0.125 to 0.648 in the second year and then decreases by 1.955 and

**TABLE 4:** Growth rate test of the IPO firms in 4 years after going public.

Growth rates	<i>t</i>	Sig. (two tailed)	Test value = 0			
			Mean	Mean difference	95% Confidence interval of the difference	
					Lower	Upper
INGrth <sub>1</sub>	3.951	0.000	0.568	-	0.283	0.852
INGrth <sub>2</sub>	5.150	0.000	0.569	0.001	0.350	0.787
INGrth <sub>3</sub>	4.686	0.000	0.142	-0.427	0.082	0.202
INGrth <sub>4</sub>	2.089	0.038	0.237	0.095	0.013	0.461
NPGGrth <sub>1</sub>	2.822	0.005	0.523	-	0.156	0.890
NPGGrth <sub>2</sub>	1.492	0.138	0.648	0.125	-0.210	1.507
NPGGrth <sub>3</sub>	-2.874	0.005	-1.307	-1.955	-2.204	-0.409
NPGGrth <sub>4</sub>	-3.148	0.002	-1.096	-2.403	-1.783	-0.409
TAsGrth <sub>1</sub>	9.718	0.000	0.413	-	0.329	0.497
TAsGrth <sub>2</sub>	6.961	0.000	0.334	-0.079	0.239	0.429
TAsGrth <sub>3</sub>	2.761	0.006	0.171	-0.163	0.049	0.293
TAsGrth <sub>4</sub>	1.837	0.068	0.048	-0.123	-0.004	0.099
DebtGrth <sub>1</sub>	3.596	0.000	0.844	-	0.380	1.308
DebtGrth <sub>2</sub>	6.761	0.000	0.564	-0.280	0.399	0.729
DebtGrth <sub>3</sub>	4.865	0.000	0.579	0.015	0.345	0.814
DebtGrth <sub>4</sub>	3.217	0.002	0.308	-0.271	0.119	0.497
EqtyGrth <sub>1</sub>	4.533	0.000	0.527	-	0.297	0.757
EqtyGrth <sub>2</sub>	3.637	0.000	0.358	-0.169	0.164	0.553
EqtyGrth <sub>3</sub>	1.626	0.106	0.130	-0.228	-0.028	0.289
EqtyGrth <sub>4</sub>	1.429	0.155	0.164	0.034	-0.062	0.390
No.	204	-	-	-	-	-

NP, net profits.

2.403, respectively, in the next 2 years. TAsGrth, DebtGrth and EqtyGrth show the same situation.

Therefore, IPO firms generally show positive growth rates after going public, but this growth potential is unstable and becomes weak in the following years.

Although IPO firms sustain post-IPO growth in terms of most of the independent variables, we further investigate the comprehensive performance indicators to assess performance sustainability further. Following the sustainability definition by Neubaum and Zahra (2006), Table 5 shows that IPO firms have sustainable performance over the 5 years after going public in terms of SOA, DOA and TobQ at very significant levels. SOA has a growth rate greater than 0.374 in the first year and retains rapid growth rates in the following years. The DOA retains a growth rate greater than 0.589 in the first year and then triples to 1.794 in the fourth year. TobQ retains a growth rate of approximately 1.250 in the first and last years.

In contrast, IPO firms present their ROA sustainability in the initial 3 years (0.119, 0.036 and 0.042, respectively), but it declines in the fourth year. This situation also exists for both ROE and ROS. Therefore, the IPO firms sustain their growth potentials of SOA and DOA for 5 years after IPOs; however,

**TABLE 5:** Test of performance sustainability of the IPO firms over the 5 years after going public.

Indicators <sub><i>t</i></sub>	<i>t</i>	Sig. (two tailed)	Test value = 0		
			Mean	95% confidence interval of the difference	
				Lower	Upper
ROA <sub>1</sub>	1.460	0.147	0.119	-0.042	0.281
ROA <sub>2</sub>	8.084	0.000	0.036	0.027	0.045
ROA <sub>3</sub>	5.529	0.000	0.042	0.027	0.057
ROA <sub>4</sub>	-1.111	0.268	-0.015	-0.042	0.012
ROA <sub>5</sub>	-1.529	0.128	-0.043	-0.099	0.013
ROE <sub>1</sub>	1.438	0.153	0.171	-0.064	0.408
ROE <sub>2</sub>	7.321	0.000	0.053	0.039	0.068
ROE <sub>3</sub>	3.916	0.000	0.071	0.035	0.107
ROE <sub>4</sub>	-1.653	0.100	-0.193	-0.424	0.037
ROE <sub>5</sub>	-1.888	0.060	-0.259	-0.530	0.012
ROS <sub>1</sub>	1.471	0.144	0.310	-0.107	0.727
ROS <sub>2</sub>	6.098	0.000	0.104	0.071	0.139
ROS <sub>3</sub>	3.066	0.003	0.092	0.032	0.151
ROS <sub>4</sub>	-1.464	0.145	-0.614	-1.442	0.214
ROS <sub>5</sub>	-1.812	0.072	-0.387	-0.808	0.034
SOA <sub>1</sub>	24.304	0.000	0.374	0.344	0.404
SOA <sub>2</sub>	14.051	0.000	0.395	0.339	0.450
SOA <sub>3</sub>	22.179	0.000	0.433	0.394	0.471
SOA <sub>4</sub>	15.510	0.000	0.471	0.411	0.531
SOA <sub>5</sub>	11.004	0.000	0.543	0.446	0.641
DOA <sub>1</sub>	15.999	0.000	0.589	0.516	0.662
DOA <sub>2</sub>	11.709	0.000	0.696	0.578	0.813
DOA <sub>3</sub>	13.305	0.000	0.785	0.668	0.901
DOA <sub>4</sub>	3.411	0.001	1.794	0.757	2.832
DOA <sub>5</sub>	6.412	0.000	1.394	0.965	1.823
TobQ <sub>1</sub>	12.259	0.000	1.351	1.133	1.568
TobQ <sub>5</sub>	5.688	0.000	1.250	0.816	1.683
No.	204	-	-	-	-

DOA, debt-to-total assets; ROA, return on assets; ROE, return on equity; ROS, return on sales; SOA, sales-to-assets; TobQ, Tobin's Q.

this potential sustainability is weaker for ROA, ROE and ROS performance.

### Descriptive statistics of firm performance

As firms' performance is associated with their industry interactions (Meyer-Stamer, 1999), we investigate whether the performance sustainability of post-IPO firms from different industries varies. These sectors include agriculture (Agri), biomedicine (Bio), business service (Busi), information technology (IT), manufacturing (Manu), public utilities (Publ) and wholesale (Whs). Table 6 shows the different results for the performance sustainability of these sectors.

In general, the performance sustainability of post-IPO firms varies across these sectors in terms of ROA, ROE and ROS, whilst these firms from different sectors show very significant performance sustainability in terms of DOA, SOA and TobQ.

In terms of panels A, B and C, firms from both the public utility and wholesale sectors retain significant sustainability relative to others. In contrast, firms from the agricultural

**TABLE 6:** Sustainability test of the IPO firms over 5 years after going public by industrial sectors.

Indicators <sub>t</sub>	Agri	Bio	Busi	IT	Manu	Publ	Whs
<b>Panel A</b>							
ROA <sub>1</sub>	-0.018	0.075	0.023	0.417	0.037	0.45	0.019
ROA <sub>2</sub>	-0.058	0.051	0.028	0.036	0.040	0.041	0.022
ROA <sub>3</sub>	0.321	0.058	0.012	0.025	0.037	0.154	0.015
ROA <sub>4</sub>	-0.443	-0.020	-0.096	-0.012	0.005	-0.011	0.013
ROA <sub>5</sub>	-0.152	-0.006	-0.017	-0.017	-0.006	0.003	0.009
<b>Panel B</b>							
ROE <sub>1</sub>	-0.038	0.115	0.038	0.603	0.050	0.086	0.029
ROE <sub>2</sub>	-0.130	0.079	0.059	0.047	0.059	0.079	0.019
ROE <sub>3</sub>	0.014	0.088	0.025	0.037	0.052	0.064	-0.004
ROE <sub>4</sub>	-0.113	-0.185	-0.042	-0.028	-0.162	-0.030	0.002
ROE <sub>5</sub>	-0.317	-0.086	-0.057	-0.051	-0.152	0.006	0.015
<b>Panel C</b>							
ROS <sub>1</sub>	-0.090	0.188	0.043	1.108	0.091	0.115	0.005
ROS <sub>2</sub>	-0.143	0.156	0.084	0.111	0.111	0.116	0.037
ROS <sub>3</sub>	0.106	0.145	-0.139	0.061	0.074	0.365	0.017
ROS <sub>4</sub>	-0.116	-0.061	-0.109	-0.074	-0.148	-0.061	0.009
ROS <sub>5</sub>	-1.125	-0.081	-0.115	-0.088	-0.175	0.004	0.004
<b>Panel D</b>							
SOA <sub>1</sub>	0.401	0.477	0.294	0.339	0.386	0.390	0.578
SOA <sub>2</sub>	0.547	0.392	0.264	0.311	0.417	0.359	1.02
SOA <sub>3</sub>	0.501	0.437	0.296	0.414	0.433	0.375	1.23
SOA <sub>4</sub>	0.384	0.467	0.362	0.445	0.484	0.281	1.16
SOA <sub>5</sub>	0.417	0.521	0.367	0.474	0.537	0.198	1.45
<b>Panel E</b>							
DOA <sub>1</sub>	0.603	0.659	0.513	0.419	0.643	0.960	0.449
DOA <sub>2</sub>	0.793	0.732	0.822	0.599	0.682	0.970	1.578
DOA <sub>3</sub>	0.711	0.516	0.849	0.595	0.852	1.589	0.630
DOA <sub>4</sub>	2.38	0.799	1.74	0.670	2.346	2.173	2.883
DOA <sub>5</sub>	2.64	0.914	3.03	0.829	1.511	2.318	0.593
<b>Panel F</b>							
TobQ <sub>1</sub>	1.583	1.289	1.207	1.140	1.313	0.552	1.35
TobQ <sub>5</sub>	1.799	1.914	0.976	0.798	1.312	0.225	1.25
No.	6	8	10	48	117	7	8

DOA, debt-to-total assets; ROA, return on assets; ROE, return on equity; ROS, return on sales; SOA, sales-to-assets; TobQ, Tobin's Q.

sector do not, and agricultural firms underperform remarkably in ROA, ROE and ROS. Although firms from the bio-medicine, business service, IT and manufacturing sectors show sustainability in the first 3 years, they are unable to endure the sustainability in the next 2 years because of their negative rates. Interestingly, agricultural firms have higher market capitalisation than others because of their TobQs of 1.583 and 1.799 in panel F, even though these firms lose their sustainability in terms of ROA, ROE and ROS.

Therefore, the performance sustainability of post-IPO firms from different industries varies. Firms from both the public utility and wholesale sectors have stronger sustainability; in contrast, agricultural firms have no developmental sustainability. Bio-medicine, business services, manufacturing and IT firms maintain their sustainability in the first years and then lose their profit-dominated sustainability.

### Regression results on firm performance

As suggested above, IPO firms' performance sustainability varies depending on different performance measurements. Is these firms' post-IPO performance attributable to their IPOs? The following regression results answer this question.

Prior to discussing the regression results, we conduct a correlation test to explore the relations between the proposed independent variable and control variables in order to avoid potential collinearity. Variables with Pearson correlation coefficients over 0.500 at a sig. value of 0.05 are removed from the models.

Table 7 indicates some significant correlations. Firstly, the correlation between IPO and market capitalisation has a Pearson correlation coefficient of 0.613. Income has multicollinearity with total assets (Pearson 0.835), debt (Pearson 0.812) and equity (Pearson 0.513). Furthermore, total assets have significant correlations with debt (Pearson 0.908) and equity (Pearson 0.533).

Table 8 indicates the association with firm performance. With sig. values of approximately 0.005, these models, except the ROS model (sig. 0.141), have a significant goodness of fit to test the research question.

As the table shows, there is no strong evidence to suggest that IPOs contribute to firms' operating performance because of the insignificant values of the ROE (sig. 0.856), SOA (sig. 0.559) and DOA (sig. 0.276) models, whilst the TobQ model demonstrates that IPOs are related to firm market value because its coefficient is 0.254 at a very significant level of 0.027. However, the ROA model shows that IPOs have a negative effect (-0.129) on firm performance at a certain significance level of 0.104.

These financial variables determine firm performance in general. The ROA model suggests that net profit (0.474) is the most significant factor determining post-IPO performance.

TABLE 7: Correlations between independent variables.

	Ind	Loc	GDP	Senti	IPO	IPOP	MktCap	IN	INGrth	NP	NPGrth	TAst	TAstGrth	Debt	DebtGrth	Eqty	EqtyGrth
Ind	Pearson Correlation Sig. (two tailed)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Loc	Pearson Correlation Sig. (two tailed)	-0.116	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GDP	Pearson Correlation Sig. (two tailed)	0.100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Senti	Pearson Correlation Sig. (two tailed)	0.002	0.420**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IPO	Pearson Correlation Sig. (two tailed)	0.972	0.000	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IPOP	Pearson Correlation Sig. (two tailed)	-0.059	0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MktCap	Pearson Correlation Sig. (two tailed)	0.404	0.977	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IN	Pearson Correlation Sig. (two tailed)	0.010	-0.099	0.187**	-	-	-	-	-	-	-	-	-	-	-	-	-
INGrth	Pearson Correlation Sig. (two tailed)	0.884	0.160	0.007	-	-	-	-	-	-	-	-	-	-	-	-	-
NP	Pearson Correlation Sig. (two tailed)	0.497**	0.060	-0.395**	-0.260**	-	-	-	-	-	-	-	-	-	-	-	-
NPGrth	Pearson Correlation Sig. (two tailed)	0.000	0.394	0.000	0.000	-	-	-	-	-	-	-	-	-	-	-	-
TAst	Pearson Correlation Sig. (two tailed)	0.437**	0.035	-0.032	0.613**	0.441**	-	-	-	-	-	-	-	-	-	-	-
TAstGrth	Pearson Correlation Sig. (two tailed)	0.000	0.617	0.651	0.000	0.000	-	-	-	-	-	-	-	-	-	-	-
Debt	Pearson Correlation Sig. (two tailed)	0.207**	0.034	-0.124	0.418**	0.120	0.490**	-	-	-	-	-	-	-	-	-	-
DebtGrth	Pearson Correlation Sig. (two tailed)	0.004	0.633	0.083	0.000	0.097	0.000	-	-	-	-	-	-	-	-	-	-
Eqty	Pearson Correlation Sig. (two tailed)	0.055	-0.002	0.006	0.074	0.036	0.008	0.243**	-	-	-	-	-	-	-	-	-
EqtyGrth	Pearson Correlation Sig. (two tailed)	0.451	0.983	0.930	0.306	0.618	0.905	0.001	-	-	-	-	-	-	-	-	-
N	Pearson Correlation Sig. (two tailed)	-0.128	0.050	0.033	0.163*	0.088	0.049	0.064	0.221**	0.157*	-	-	-	-	-	-	-
	Pearson Correlation Sig. (two tailed)	0.073	0.483	0.646	0.022	0.215	0.491	0.372	0.002	0.029	-	-	-	-	-	-	-
	Pearson Correlation Sig. (two tailed)	-0.263**	-0.053	-0.078	0.097	-0.081	0.073	-0.033	0.083	0.165*	0.440**	-	-	-	-	-	-
	Pearson Correlation Sig. (two tailed)	0.000	0.481	0.297	0.196	0.278	0.333	0.663	0.267	0.027	0.000	-	-	-	-	-	-
	Pearson Correlation Sig. (two tailed)	0.344**	-0.051	-0.177*	-0.357**	0.273**	0.262**	0.471**	0.835**	0.048	-0.005	-	-	-	-	-	-
	Pearson Correlation Sig. (two tailed)	0.000	0.475	0.013	0.000	0.000	0.000	0.000	0.000	0.510	0.582	0.945	-	-	-	-	-
	Pearson Correlation Sig. (two tailed)	-0.193**	-0.025	0.115	0.267**	-0.096	-0.169*	-0.242**	0.034	0.245**	0.317**	0.308**	0.028	-	-	-	-
	Pearson Correlation Sig. (two tailed)	0.007	0.728	0.111	0.000	0.183	0.019	0.001	0.639	0.001	0.000	0.000	0.703	-	-	-	-
	Pearson Correlation Sig. (two tailed)	0.224**	-0.026	-0.187**	-0.295**	0.319**	0.134	0.402**	0.812**	0.073	0.005	-0.040	0.908**	0.005	-	-	-
	Pearson Correlation Sig. (two tailed)	0.002	0.717	0.008	0.000	0.000	0.061	0.000	0.000	0.313	0.945	0.590	0.000	0.948	-	-	-
	Pearson Correlation Sig. (two tailed)	-0.135	0.028	0.014	0.176*	0.094	-0.136	-0.045	0.048	0.158*	0.132	0.216**	0.018	0.339**	0.088	-	-
	Pearson Correlation Sig. (two tailed)	0.061	0.695	0.845	0.014	0.193	0.060	0.539	0.509	0.027	0.066	0.004	0.806	0.000	0.220	-	-
	Pearson Correlation Sig. (two tailed)	0.240**	0.053	0.018	-0.168*	0.172*	0.186**	0.289**	0.513**	0.114	0.155*	0.052	0.533**	0.058	0.358**	0.021	-
	Pearson Correlation Sig. (two tailed)	0.001	0.462	0.799	0.018	0.016	0.009	0.000	0.000	0.113	0.029	0.490	0.000	0.423	0.000	0.773	-
	Pearson Correlation Sig. (two tailed)	-0.081	-0.011	0.071	0.111	0.061	-0.086	-0.083	0.031	0.229**	0.146*	0.173*	-0.022	0.295**	-0.028	0.094	0.166*
	Pearson Correlation Sig. (two tailed)	0.266	0.877	0.322	0.122	0.396	0.235	0.254	0.665	0.001	0.042	0.020	0.757	0.000	0.701	0.192	0.021
N	-	204	204	204	204	204	204	204	204	204	204	204	204	204	204	204	204

NP, net profits.

\*\*, Correlation is significant at the 0.01 level (two tailed).

\*, Correlation is significant at the 0.05 level (two tailed).



**TABLE 8:** Estimation results of multiple regressions of firms' performance indicators on IPO and other explanatory variables.

Variables	ROA	ROE	ROS	SOA	DOA	TobQ
IPO	-0.129 (0.104)**	-0.013 (0.856)	-0.061 (0.607)	0.041 (0.559)	-0.059 (0.276)	0.254 (0.027)*
IPOP	-0.036 (0.681)	0.074 (0.375)	0.094 (0.385)	-0.168 (0.022)	-0.192 (0.001)	0.025 (0.784)
Ind	-0.039 (0.646)	-0.016 (0.853)	-0.048 (0.679)	-0.197 (0.005)	-0.151 (0.010)	0.171 (0.107)
Loc	-0.071 (0.343)	-0.067 (0.373)	-0.049 (0.546)	0.060 (0.352)	-0.012 (0.817)	-0.017 (0.825)
GDP	0.046 (0.540)	0.007 (0.927)	0.057 (0.472)	0.091 (0.157)	0.008 (0.887)	0.110 (0.152)
Senti	-	-	-	-	-	0.020 (0.813)
IN	-	-	0.083 (0.485)	0.402 (0.000)	-	-
INGrth	-	-	0.011 (0.902)	0.362 (0.000)	-	-
NP	0.474 (0.000)	0.444 (0.000)	0.055 (0.632)	-	-	-
NPGrth	0.089 (0.293)	0.081 (0.332)	-0.206 (0.011)	-	-	-
TAst	0.093 (0.245)	-	-	***	***	0.007 (0.956)
TASrth	-0.103 (0.176)	-	-	-0.206 (0.001)	-0.229 (0.000)	0.023 (0.760)
Debt	-	-	-	-	0.746 (0.000)	-
DebtGrth	-	-	-	-	0.219 (0.000)	-
Eqty	-	-0.225 (0.002)	-	-	-	-
EqtyGrth	-	-0.031 (0.659)	-	-	-	-
MktCap	-	-	-	-	-	***
Adjusted R <sup>2</sup>	0.226	0.232	0.024	0.381	0.573	0.071
Sig.	(0.000)	(0.000)	(0.141)	(0.000)	(0.000)	(0.005)
No.	204	-	-	-	-	-

DOA, debt-to-total assets; ROA, return on assets; ROE, return on equity; ROS, return on sales; SOA, sales-to-assets; TobQ, Tobin's Q; NP, net profits.

\*, \*\*represent the significance levels at 0.005 and 0.015, respectively.

\*\*\*The variables are removed because of collinearity reported in Table 7.

Similarly, it is also the most significant factor in the ROE model (0.444), followed by the equity model (-0.225). The SOA model shows that total asset growth (-0.206) has a negative association with firm performance. In contrast, both income (0.402) and income growth (0.362) have the most significant contributions to firm performance. In terms of the DOA model, both debt (0.746) and debt growth (0.219) are the most contributors.

These external factors, except IPOP and Ind, have no association with firm performance. The SOA and DOA models reveal that both the IPO price (-0.168) and industry (-0.197) factors are negatively associated with firm performance. Nevertheless, both external and financial variables are insignificant for the ROS model.

Therefore, IPOs are unable to improve firm operating performance, but they are significant to firm market performance; furthermore, IPO price and firm industry

characteristics are negatively associated with asset-based operating performance.

We test this question further using three major industry groups: manufacturing, IT and others. Consistently, the TobQ model shows strong evidence that IPOs contribute to firm market performance for these three groups of firms ( $\beta$  values: 0.440, 0.447 and 0.626, respectively). However, the ROA (-0.154), ROS (-0.167) and DOA (-0.179) models suggest that IPOs are negatively associated with firm performance for manufacturing firms, and this finding is supported by the ROS of IT firms. This is partially because IPO firms are keen to pursue their advantages from their scale, such as assets and sales. This will be verified by the next table.

Table 9 provides more information on external variables than Table 8. The variable Loc is significant to SOA (sig. 0.031) for manufacturing companies, whilst IT firm performance is significantly affected by the GDP of the macro-economy (sig. 0.098). Moreover, investor sentiment is related to firm market performance as measured by the TobQ model.

Accordingly, further testing reveals a consistent finding that IPOs contribute to firm market performance. Evidence from manufacturing firms reveals a different finding that IPOs are negatively associated with firm performance in terms of ROA, ROS and DOA.

## Discussion

The results from Tables 4, 5 and 6 suggest that IPO firms are able to retain their growth potential over the first 3 years after going public, but the potential is not sustained after the third year in terms of profit-related factors (such as ROA, ROE and ROS). This interesting finding is different from prior research (Mikkelsen et al., 1997; Pastusiak et al., 2016a), which finds that operating performance deteriorates in the first year post-IPO. This is possibly because of the unique Chinese IPO regulations that firm owners as key insiders have to lock up their shares for at least 3 years after IPOs, namely the lock-up period, because share lockups, as a commitment device, are able to address agency problems and conflicts of interest between insider and outsider investors (Brav & Gompers, 2003). Owners such as CEOs and managers have to sustain firm growth for high stock prices as much as possible; therefore, IPO firms employ lockups to signal their outstanding performance and high quality (Ho, Huang, Lin, & Lin 2010).

After the period, the owners and managers are able to sell their shares, which should account for why sustainability does not remain after the third year. This finding is consistent with those of prior literature (Mikkelsen et al., 1997; Pastusiak et al., 2016a) for various reasons, such as insider ownership changes (Mikkelsen et al., 1997) and agency problems (Jain & Kini, 1994).

**TABLE 9:** Estimation results of multiple regressions of firms' performance indicators on IPO and other explanatory variables by major industrial sectors.

Variables	Sectors	ROA	ROE	ROS	SOA	DOA	TobQ
IPO	Manu.	-0.154 (0.089)**	0.102 (0.196)	-0.167 (0.076)**	-0.010 (0.921)	-0.179 (0.019)*	0.440 (0.000)*
	IT	-0.275 (0.139)**	-0.233 (0.235)	-0.305 (0.076)**	-0.038 (0.830)	0.129 (0.350)	0.447 (0.000)*
	Others	0.323 (0.110)**	0.291 (0.154)	0.276 (0.143)**	0.055 (0.763)	0.029 (0.847)	0.626 (0.000)*
IPOP	Manu.	0.082 (0.333)	0.230 (0.008)*	0.111 (0.199)	-0.199 (0.028)*	-0.250 (0.001)*	0.026 (0.799)
	IT	-0.065 (0.761)	-0.018 (0.934)	0.081 (0.668)	-0.210 (0.309)	-0.045 (0.774)	0.428 (0.003)*
	Others	0.064 (0.818)	0.291 (0.154)	0.102 (0.692)	-0.159 (0.491)	-0.278 (0.158)	0.301 (0.077)
Ind	Manu.	-0.092 (0.335)	-0.176 (0.08)**	-0.030 (0.771)	-0.064 (0.518)	-0.050 (0.536)	0.246 (0.030)*
	IT	-0.120 (0.551)	-0.065 (0.765)	-0.111 (0.530)	-0.375 (0.060)**	-0.602 (0.000)*	-0.130 (0.350)
	Others	0.081 (0.749)	0.011 (0.976)	-0.020 (0.937)	-0.050 (0.819)	0.021 (0.913)	0.106 (0.534)
Loc	Manu.	-0.001 (0.987)	-0.086 (0.326)	-0.004 (0.961)	0.198 (0.031)*	0.045 (0.544)	-0.055 (0.598)
	IT	-0.270 (0.105)**	-0.221 (0.197)	-0.257 (0.090)**	0.047 (0.765)	-0.044 (0.717)	0.075 (0.472)
	Others	-0.063 (0.751)	-0.032 (0.874)	-0.012 (0.950)	-0.042 (0.805)	0.009 (0.950)	-0.157 (0.208)
GDP	Manu.	0.003 (0.966)	-0.084 (0.310)	0.046 (0.583)	0.108 (0.209)	-0.005 (0.945)	0.062 (0.521)
	IT	-0.015 (0.921)	-0.081 (0.616)	-0.033 (0.812)	0.050 (0.741)	0.191 (0.098)**	0.143 (0.159)
	Others	0.145 (0.435)	0.089 (0.636)	0.169 (0.338)	0.100 (0.544)		
Senti	Manu.	-	-	-	-	-	-0.156 (0.198)
	IT	-	-	-	-	-	-0.117 (0.331)
	Others	-	-	-	-	-	0.053 (0.679)
IN	Manu.	-	-	0.080 (0.384)	0.547 (0.000)*	-	-
	IT	-	-	0.331 (0.046)*	0.218 (0.244)	-	-
	Others	-	-	0.142 (0.442)	0.314 (0.071)**	-	-
INGrth	Manu.	-	-	-0.047 (0.505)	0.171 (0.029)*	-	-
	IT	-	-	-0.065 (0.656)	0.316 (0.053)**	-	-
	Others	-	-	-0.075 (0.677)	0.514 (0.006)*	-	-
NP	Manu.	0.788 (0.000)*	0.656 (0.000)*	0.652 (0.000)*	-	-	-
	IT	0.364 (0.062)**	0.275 (0.158)	0.367 (0.034)*	-	-	-
	Others	0.366 (0.072)**	0.324 (0.112)**	0.427 (0.033)*	-	-	-
NPGrth	Manu.	0.022 (0.808)	-0.126 (0.188)	0.093 (0.352)	-	-	-
	IT	0.247 (0.215)	0.161 (0.423)	0.093 (0.583)	-	-	-
	Others	0.475 (0.034)*	0.386 (0.088)**	0.360 (0.088)**	-	-	-
TAsT	Manu.	0.118 (0.185)	-	-	***	***	-0.546 (0.000)*
	IT	0.404 (0.062)**	-	-	-	-	-0.640 (0.000)*
	Others	-0.004 (0.983)	-	-	-	-	-0.428 (0.001)*
TAsTGrth	Manu.	-0.081 (0.302)	-	-	-0.198 (0.019)*	-0.238 (0.000)*	-0.184 (0.043)*
	IT	-0.281 (0.144)**	-	-	-0.106 (0.532)	-0.112 (0.375)	-0.321 (0.004)*
	Others	-0.040 (0.835)	-	-	-230 (0.161)	-0.446 (0.158)	0.051 (0.679)
Debt	Manu.	-	-	-	-	0.789 (0.000)*	-
	IT	-	-	-	-	0.631 (0.000)*	-
	Others	-	-	-	-	0.749 (0.000)*	-
DebtGrth	Manu.	-	-	-	-	0.268 (0.000)*	-
	IT	-	-	-	-	-0.21 (0.102)**	-
	Others	-	-	-	-	0.402 (0.171)	-
Eqty	Manu.	-	-0.574 (0.000)*	-	-	-	-
	IT	-	0.231 (0.272)	-	-	-	-
	Others	-	0.159 (0.420)	-	-	-	-
EqtyGrth	Manu.	-	-0.052 (0.474)	-	-	-	-
	IT	-	-0.084 (0.625)	-	-	-	-
	Others	-	0.025 (0.897)	-	-	-	-
MktCap	Manu.	-	-	-	-	-	***
	IT	-	-	-	-	-	***
	Others	-	-	-	-	-	***
Adjusted R2	Manu.	0.571 (0.000)*	0.526 (0.000)*	0.526 (0.000)*	0.429 (0.000)*	0.628 (0.000)*	0.268 (0.000)*
	IT	0.157 (0.098)**	0.080 (0.232)	0.299 (0.012)*	0.097 (0.061)	0.477 (0.000)*	0.602 (0.000)*
	Others	0.270 (0.045)*	0.253 (0.056)**	0.327 (0.022)*	0.359 (0.009)*	0.456 (0.001)*	0.627 (0.000)*
No.	Manu.	117	-	-	-	-	-
	IT	48	-	-	-	-	-
	Others	39	-	-	-	-	-
<b>Total</b>		<b>204</b>	-	-	-	-	-

DOA, debt-to-total assets; ROA, return on assets; ROE, return on equity; ROS, return on sales; SOA, sales-to-assets; TobQ, Tobin's Q; NP, net profits.

\* and \*\* represent the 0.05 and 0.15 significance levels, respectively.

\*\*\*The variables are removed because of collinearity reported in Table 7.

Table 8 reveals that IPOs have a significant contribution to firm market performance as measured by the Tobin's Q model, which is different from the finding of Jain and Kini (1994); these authors show post-IPO declines in market value. Furthermore, this table shows that IPOs have no association with firm operating performance. It makes sense because IPO firms expend more money on both R&D and capital expenditures than their pre-IPO firms (Lu, Kao, & Chen, 2012), and the increases may promote firms' valuation.

Unlike prior research showing that operating performance decreases after IPOs, this article finds that there is no relationship between IPOs and firm operating performance in general. There are two possible reasons for this; one is that IPO firms retain most of the money they raised, and the other is that the money flees from IPO firms. This is a very interesting finding and motivates us to perform further research on the following question: Do IPO firms spend their new capital on firm development or elsewhere?

Table 9 shows industry-specific results. IPOs are negatively associated with ROA, ROS and DOA for manufacturing firms only. Although this is consistent with other research (Chen, Jin, Li, & Zheng, 2018; Pastusiak et al., 2016a), a majority of Chinese firms are keen to pursue advantages of scale in assets and sales (Rashidin, Javed, Chen, & Wang 2020) rather than improve business management and operating efficiency, particularly for asset-dominated manufacturing firms, which leads to underperformance in terms of ROA, ROS and DOA.

Therefore, these findings account for the research question that IPOs are not significant to operating performance of post-IPO firm in long run, even though IPO firms have growth from the first year after going public. However, IPOs contribute to firm market value, because of the positive relationship between IPOs and firm market value.

The limitations of this research are twofold. One is the short period of the TobQ data. We collected the data for a period of 2 years only, namely the IPO year and 2020, which makes it impossible for us to investigate post-IPO sustainability in market performance. Another one is only investigating post-IPO firm performance, it would be better to compare it with non-IPO firm performance to understand further IPO significance, which is expected to be conducted by further research.

The significant managerial implication for this research is that the managers should spend IPO fund effectively to sustain firm operating performance, which potentially contributes to firm market performance.

## Conclusion

This study, by sampling both panel and time-series data from 204 Chinese IPO firms listed on the GEMC, investigates post-IPO firm performance sustainability over 5 years after going public and explores whether IPOs contribute to sustainability.

This article examines the research question comprehensively using six regression models with five operating performance measurements (ROA, ROE, ROS, SOA and DOA) and a market performance measurement – TobQ.

This study makes some significant findings. Firstly, IPO firms are able to maintain their performance sustainability over the first 3 years after going public, but the sustainability is unable to be maintained after the third year in terms of profit-related indicators, which is different from the findings of prior research. IPOs may contribute to firm market performance only, but they are insignificant to firm operating performance in general. Furthermore, industry-adjusted evidence suggests that IPOs are negatively associated with operating performance in terms of ROA, ROS and DOA. Furthermore, IPO firms are keen to pursue advantages of scale in assets and sales, which lead to underperformance in terms of ROA, ROS and DOA in the manufacturing industry.

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### Competing interests

The authors have declared that no competing interest exists.

### Authors' contributions

Q.G. and H.L. designed the model and the computational framework and analysed the data. H.L. and J.Z. carried out the implementation. J.Z. and H.L. performed the calculations. Q.G. and H.L. wrote the manuscript with input from all authors. Q.G. conceived the study and was in charge of overall direction and planning.

### Ethical considerations

This article followed all ethical standards for carrying out research without direct contact with human or animal subjects.

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### Data availability

The data that support the findings of this study are available from the corresponding author, H.L., upon reasonable request.

### Disclaimer

Opinions expressed in the submitted article are our own and not an official position of the institution or funder.

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