

Jena, Sarthak Kumar; Mishra, Chandra Sekhar; Rajib, Prabina

Article

Determinants of the choice of share buyback methods: A study in India

Cogent Economics & Finance

Provided in Cooperation with:

Taylor & Francis Group

Suggested Citation: Jena, Sarthak Kumar; Mishra, Chandra Sekhar; Rajib, Prabina (2020) : Determinants of the choice of share buyback methods: A study in India, Cogent Economics & Finance, ISSN 2332-2039, Taylor & Francis, Abingdon, Vol. 8, Iss. 1, pp. 1-25, <https://doi.org/10.1080/23322039.2020.1782073>

This Version is available at:

<https://hdl.handle.net/10419/269931>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

Determinants of the choice of share buyback methods: A study in India

Sarthak Kumar Jena, Chandra Sekhar Mishra & Prabina Rajib |

To cite this article: Sarthak Kumar Jena, Chandra Sekhar Mishra & Prabina Rajib | (2020) Determinants of the choice of share buyback methods: A study in India, Cogent Economics & Finance, 8:1, 1782073, DOI: [10.1080/23322039.2020.1782073](https://doi.org/10.1080/23322039.2020.1782073)

To link to this article: <https://doi.org/10.1080/23322039.2020.1782073>



© 2020 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.



Published online: 29 Jun 2020.



Submit your article to this journal [↗](#)



Article views: 2527



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 2 View citing articles [↗](#)



Received: 08 March 2019
Accepted: 07 June 2020

*Corresponding author: Sarthak Kumar Jena, Vinod Gupta School of Management, Indian Institute of Technology Kharagpur, Kharagpur, India
E-mail: srkjena@gmail.com

Reviewing editor:
David McMillan, University of Stirling, Stirling, UK

Additional information is available at the end of the article

FINANCIAL ECONOMICS | RESEARCH ARTICLE

Determinants of the choice of share buyback methods: A study in India

Sarthak Kumar Jena^{1*}, Chandra Sekhar Mishra¹ and Prabina Rajib¹

Abstract: This study examines signaling, excess cash flow, substitution, leverage, agency cost, stock and liquidity hypotheses by considering firm-specific parameters to find out their impact on selection between tender offer and open market method while doing buyback. This study is based on the basic premise that the rules and regulations those govern these two methods are completely different and have different objectives. This study takes 430 non-financial buybacks from 1998–1999 to 2017–2018 for analysis and these buybacks segregated in terms of tender offer (176) and open market methods (254). In this study, both univariate and multivariate tests have been employed. T-test and Wilcoxon rank sum test are used for univariate analysis, and logistic regression is used for multivariate analysis. The empirical findings corroborate the evidence that free cash flow hypothesis, leverage hypothesis, agency cost hypothesis and liquidity hypothesis are the prime motivators for choosing of tender offer than open market share repurchase. This study finds that dividend paid and choosing of tender offer are substitutes. The results also support the notion that for correcting short-term undervaluation firms choose tender offer rather than open market methods. This study is the first comprehensive analysis in the Indian context to find out the motivations behind the selection of share repurchase methods.

ABOUT THE AUTHOR

Our research team consists of Mr. Sarthak Kumar Jena, Prof. Prabina Rajib and Prof. C.S. Mishra. Prof. Rajib and Prof. Mishra are serving in Vinod Gupta School of Management, Indian Institute of Technology Kharagpur, India. Sarthak Kumar Jena is a Ph.D scholar under their joint supervision in Vinod Gupta School of Management. Prof. Rajib has research interests in Financial Accounting, Corporate Finance, Financial Markets, Risk Management using Financial & Commodity Derivatives. Prof. C.S. Mishra's areas of interest are Financial Reporting & Analysis, Business Valuation, Accounting, Earnings Management, Value relevance of accounting and Mergers & Acquisitions. We all are working on a topic (Share Buyback) that is a blend of accounting and corporate finance. The research paper focuses on the selection of share buyback methods in the context of a developing country. This study is expected to be applicable to the developing nations in the world where there are primarily two methods (viz. tender offer and open market method) used for share buyback.

PUBLIC INTEREST STATEMENT

This paper focuses on choosing of share buyback methods. Mainly, there are two methods used for share buyback worldwide such as tender offer and open market method. In tender offer, companies directly purchase shares from the shareholders and in open market method, companies purchase shares from the market through stock exchange. These two methods are governed by different sets of rules and regulations in different countries, so the use of one of the methods for share buyback is a major concern among companies. These methods serve different agenda of companies in different countries, so companies deliberately use a particular method for a share buyback. In Indian context, we find that free cash flow hypothesis, leverage hypothesis, agency cost hypothesis and liquidity hypothesis are the prime motivators for choosing of tender offer than an open market method. As this study is done in one of the major developing countries, this study also can be applied and tested in other developing nations.

Subjects: Business & Company Law; Finance; Business, Management and Accounting

Keywords: Tender offer; open market method; determinants; Indian buyback

1. Introduction

Share buyback is considered as a mainstream corporate activity after 1990; it experienced a phenomenal growth after 1990 and surpassed the total amount spent on dividend paid in USA (Grullon & Michaely, 2002; Lee et al., 2007). Globally, share repurchase is performed mainly by two methods. Either, companies' purchase shares through stock exchange known as open market method or companies buy directly from the shareholders known as tender offer. In open market method, the offer is valid for 1 to 2 year whereas, tender offer expires within a month. However, some of the studies report that the ratio of open market method to tender offer is 10:1 (Banyi et al., 2008; Comment & Jarrell, 1991; U. C. Peyer & Vermaelen, 2005). It shows that the open market method is more popular among corporates for share repurchase than tender method. But studies that compare these two methods of share repurchase in terms of signaling, free cash flow and agency cost hypotheses find that tender offer is much more efficient in signaling, reducing free cash flow and reducing agency cost. So investors react more positively to the announcement of tender offer than open market method (Comment & Jarrell, 1991; U. Peyer & Vermaelen, 2008; Vermaelen, 1981).

From the above discussion, it is evident that both the methods signal positive information to the investors, reduce agency cost and free cash flow but the tender offer does it better and in an efficient way. According to this argument, companies should prefer tender offer to open market method for share repurchase. But the actual scenario is altogether different around the world as well as in India. Globally, the ratio of open market to tender offer is 10:1 and in India the ratio is almost 2:1. In India, the ratio is low because of less number of buybacks than developed countries.

The purpose of this study is to examine the factors responsible for choosing between tender offer and open market method for repurchasing shares. We cover the whole data period starting from the inception of buyback in India. The data period spans from the financial year 1998–1999 to 2017–2018. During this period, a total number of buybacks is 430, and out of which 176 are tender offer and rest 254 are open market method. In India, the pattern of selection of tender and open market method is little aberrant. In the starting years 1998–1999 to 2003–2004, companies prefer tender offer to open market method. In between 2004–2005 to 2013–2014, most of the share buybacks have done through open market share repurchase only. But suddenly, there is a shift in the choice of repurchase methods from open market method to tender offer from the financial year 2013 to 2017. The pattern of choosing buyback methods in India (1998–1999 to 2017–2018) discussed above are given in the Section 3 (Table 3). So it is necessary to examine the cause behind such abnormal behavior among corporates regarding the selection of methods. This study tries to find out the determinants that have bearing on the selection of repurchase methods in India.

The rest of the paper is organised as follows. Section 2 provides an overview of the regulatory framework of share buyback in India and hypotheses development. Section 3 discusses the sample selection and data description. Section 4 discusses the methodology. Section 5 and Section 6 discuss the empirical analysis, result, and conclusion, respectively.

2. Law regulating buyback in India and hypotheses development

Buyback in India is governed by both Companies Act 2013 (Earlier referred to as Companies Act 1956) and Securities and exchange board of India (SEBI) Buyback regulation. SEBI recommends two methods for buyback in India such as tender offer and open market method. In tender offer companies invite the existing shareholders to tender their shares for buyback but in case of open market share repurchase companies directly repurchase the shares through stock exchanges. Both tender offer and open market methods are widely prevalent in India but the institutional

arrangement and execution of both the offers are quite different. For a better understanding of the difference, we have exhibited OnMobile Limited for open market method and Just dial limited for tender offer in Table 1.

This paragraph specially highlights the changes between tender offer and open market share repurchase those will justify the objective of the paper to study the determinants of choosing one method for share buyback in India.

Size of buyback:

- Overall, companies act limits the maximum share buyback to be less than 25% of paid-up capital and free reserves. It means before the SEBI (Buy-back of Securities) (Amendment) Regulation, 2013, there is no difference in size of the offer whether companies choose either tender offer or open market method.
- SEBI (Buy-back of Securities) (Amendment) Regulation, 2013 further prescribes that companies can only buyback up to a maximum 15% of paid-up capital and free reserve through open market share repurchase. However, there is no restriction on the size of the tender offer till it touches the maximum limit fixed by the Companies Act 2013.

Duration:

- Earlier the duration of the open market share buyback is 1 year. But now after the Amendment (2013), it is reduced to 6 months whereas Tender offer lasts for merely 10 working days.

Table 1. Snapshot of open market and tender method

Characteristics	Open market method (OnMobile Global Limited)	Tender method (Justdial Limited)
Board meeting For approval of buyback	4 February 2016	4 June 2015
Opening of the offer	22 February 2016	25th February,2016
Closing Of the offer	27th June,2016	10th March,2016
Maximum Number of shares to be bought	56,00,000	10,61,499
Shares Before buyback	10,96,43,996	7,05,20,004
Maximum price	Rs 150 per share	Rs 1550 per share
Maximum amount to be used	700 Million	1645.32345 Million
Shares bought back	56,00,000	10,61,499
Amount utilized	638.86 Million	1645.32345 Million
Highest price	Rs 127 per share (BSE), Rs 127.5 (NSE)	NA
Lowest price	Rs 94.20 per share (BSE), Rs 93.95 (NSE)	NA
Average price	Rs 114.08 per share	NA
Price on announcement date	RS 109.70 per share (NSE),RS 110.20 (BSE)	Rs 930.60 per share (NSE),Rs 929.35 (BSE)
Shares post buyback	10,40,43,996	6,94,73,611#
Promoters shares bought back	NA	3,45,854
Promoter holding pre buyback	46.44	32.57
Promoter holding post buyback	48.94	32.62

Note: The table illustrates the mechanism of two widely popular buyback methods (Tender and Open market) in India by taking one company from each method. OnMobile Global Limited and Justdial Limited have done buyback by opting open market method and tender offer together, respectively.

Certainty of share price and Number of shares:

- In case of tender offer, the price and quantity of share are fixed. But in case of open market method, only the maximum price and the amount to be spent for buyback is fixed.
- In tender offer, a firm cannot repurchase more shares than published in the offer document but in case of open market method a company can repurchase more shares depending on the market price.
- When the price at which the company buys shares are lower than the maximum price, and then the company can buy more shares by spending the same amount.
- Now the Amendment (2013) makes it mandatory to submit the daily information regarding the number of shares bought, the price at which the shares bought to the Stock Exchange and it will publish the information on its official website immediately. Because of these investors have information regarding the average price at which companies are buying shares.

Actual Share Repurchase:

- There is a huge uncertainty regarding the actual share repurchase after the public announcement in case of open market share repurchase.
- SEBI (Buy-back of Securities) (Amendment) Regulation, 2013 makes it mandatory to spend at least 50% of the amount embarked for buyback.
- In case of tender offer, there is no uncertainty regarding the actual buyback. It all depends on the investors to surrender their shares to the company for a share buyback.

Participation of Promoters:

- In case of tender offer, promoters can tender their shares but in case of open market share repurchase, promoters are not allowed to sell their shares.

From the above discussion, it is quite clear that open market share repurchases and tender method in India differ on several important dimensions such as size of the repurchase, execution methods, participation of promoters and buyback price as well as quantity of shares to be repurchased. So, we can infer that tender offer and open market methods are not close substitutes.

Open market share repurchase and fixed tender methods have studied extensively in the finance literature and many studies reported different usefulness such as change in the future earnings, change in risk (Bartov, 1991; Dann et al., 1991) and signaling content of these offers (Comment & Jarrell, 1991). Dann et al. (1991) reported a significant increase in the earnings following tender offer and Bartov (1991) reported a weak increase in the earnings following open market share repurchase. However, both the studies have consistent findings regarding the decrease in the common stock risk following tender offer and open market stock repurchase. Comment and Jarrell (1991) report that tender offer gives a stronger signal than open market share repurchase.

Based on the above difference and the institutional arrangement in India, this study argues that managers deliberately choose the method of the buyback for fulfilling different purposes of the company. Specifically, the regulations suggest that the likelihood of choosing one offer over another depends on the agency cost of cash flow, the strength of signaling, promoter ownership, liquidity and leverage. As these factors are not mutually exclusive, there may be more than one factor responsible for choosing one method over another. So it is required to test all the motives simultaneously to know the determinants for choosing one method over another method.

2.1. Free cash flow hypothesis

Free cash flow hypothesis propounded by Jensen (1986) for the first time raise the issue of misutilisation of free cash by the managers of the company by investing in the negative net present value projects. Some managers may over-invest (Roll, 1986), over-optimize (Heaton,

2002), and satisfy their empire building desire (Jensen, 1986). This behavior of the managers is detrimental to the value of the firms as well as erosion in the value of firms. Despite the negative consequence of over-investment, managers do this because their perquisite, prestige and power are linked to the size of the firm. So it is always better to distribute the free cash to shareholders either in the form of dividend or share buyback rather than investing in the negative net present value project. By returning the surplus cash to the shareholders, share buyback reduces the opportunity of being invested in suboptimal projects. So for over investing firms, share buyback is assumed to be a wealth-maximizing transactions.

There are many literature available on free cash flow as a motivation for share buyback in all over the world (Boudry et al., 2013; Dittmar, 2000; Lee & Suh, 2011; Mitchell & Dharmawan, 2007). However, there are very few literatures on the selection of buyback methods depending upon the availability of free cash flow. Both tender offer and open market share repurchase methods reduce the agency cost of free cash flow but the magnitude and speed at which the agency cost is reduced is different depending on the country's rules and regulations of buyback. In India, the size of buyback in tender offer is large, so the magnitude of cash involved in tender offer is more than open market share repurchase. Second, the duration of tender offer is 10 days which is quite less than the open market share repurchase which spread over 6 months, so the speed at which the agency cost will be reduced is faster in case of tender offer. Hence, if the objective of choosing buyback method is to distribute cash reserves within a short span of time then the tender offer is preferred than open market share repurchase. For example, Tata Consultancy Service (TCS) approved the largest buyback in the Indian history for Rs. 16,000 cores in 2017, 2.85% of the total paid-up capital of the company, through tender method by surpassing the earlier record of Reliance Industries of Rs.10400 cores in 2012. Again in 2018, TCS made another huge buyback of Rs. 16,000 cores representing 1.99% of the total issued and paid-up capital through the tender method. Infosys, the second largest company in the software made a huge buyback of Rs. 13,000 cores representing 4.92% of total issued and paid-up capital of the company. On the other hand, if the objective is to reduce the agency cost of free cash flow gradually or within a longer span of time with less cost, then open market share repurchase is preferred to tender offer. Open market share repurchases also gain favorable reaction from the market due to reduction in the free cash flow (Vafeas & Joy, 1995). Tender offer is costlier than open market share repurchases because of higher premium offered in the tender offer than open market share repurchases. Overall, Grullon and Michaely (2004) observed a positive relationship between the reduction in free cash flow and the market reaction to share buyback.

Reduction of free cash flow generates a positive reaction from the market only when it is backed by less investment opportunity within the firm. So to find a concrete conclusion, free cash flow and investment opportunity should be studied simultaneously. Bagwell and Shoven (1988) and Nohel and Tarhan (1998) documented that a firm is more likely to do repurchase if the company is characterized by both excess cash flow and low investment opportunities.

We have measured excess cash by taking two variables, i.e., total cash flow from operating activities to the total asset (CFL/TA) and cash/total asset (Cash/TA). Cash flow from operating activities scaled by total asset (CFL/TA) has been employed in the studies by Vafeas (1997), Dittmar (2000), and Li and McNally (2007). Based on the studies of Mitchell and Dharmawan (2007) and Vafeas (1997), we have also considered cash available in the company scaled by total asset as another measure of the free cash flow of a company. The investment opportunities are measured by taking Tobin's Q as a proxy. It is calculated by taking the market value of the asset to book the value of the asset (Lang & Litzenberger, 1989).

To study the free cash flow and investment opportunity simultaneously, two interactive dummies are used HFO and HCFLO. HFO takes the value 1, if a firm has higher cash/TA (higher than the median cash/TA of the sample) and simultaneously low Tobin's Q (Lower than the median Tobin's Q of the sample), otherwise 0. Similarly, HCFLO takes the value 1, if a firm has high operating cash

flow/TA (higher than the median cash flow of the sample) and simultaneously low Tobin's Q (lower than the median value of the sample), otherwise 0.

2.2. Substitution hypothesis

Firms can distribute the free cash flow either in the form of dividend or share buyback to the shareholders. Share buyback is more valuable and tax-efficient than dividend (Grullon & Michaely, 2002). Some studies find that dividend payment and share repurchase are substitutes (Fama & French, 2001; Grullon & Michaely, 2002; Skinner, 2008; Weigand & Kent Baker, 2009) and some studies find a complementary relationship between dividend and share repurchase (DeAngelo et al., 2000; Dittmar, 2000; Denis & Osobov, 2008; Jagannathan et al., 2000; Jain et al., 2009; Mitchell & Dharmawan, 2007). However, there is very few literature available on the selection of share buyback methods depending on the dividend payment. Lie and Lie (1999) report that firms with a low dividend yield are more likely to choose tender method for share buyback. Caudill et al. (2006) report that firms paying higher dividend are more likely to pay special dividend rather than initiate open market share repurchase. So the selection of repurchase methods may depend on dividend yield or payment of higher dividend. So we include dividend yield and dividend as a percentage of profit after tax (DP ratio) as potential determinants for choosing of share repurchase methods. Dividend yield is calculated as a dividend paid in the previous year of share repurchase announcement scaled by market capitalisation. Dividend payout ratio is calculated as dividend paid as a percentage of profit after tax.

2.3. Insider ownership and agency cost hypothesis

Insider ownership is attached to the share repurchase decisions mainly because of two reasons, i.e., reduction of agency cost and entrenchment behavior. Agency cost arises because of separation of ownership with management and entrenchment behavior arises out of human consideration such as more power, prestige and voting power in the board. Some of the earlier literature finds a reduction of agency cost as the motive for buyback (Mitchell & Dharmawan, 2007; Andriosopoulos & Hoque, 2013) and Li and McNally (2007) find the entrenchment behavior of the manager is the motive for share buyback in Canada. Bagwell (1991, 1992) for the first time associate the insider ownership with the choice of share buyback methods. He argues that firm with low insider ownership experience a low degree of information asymmetry and choose open market share repurchase and firms with a high insider ownership choose tender offer to reduce a high degree of asymmetry of information. Oded (2011) finds exactly the opposite proposition from Bagwell (1991, 1992) and reports that firms with higher inside ownership will choose open market share repurchase because of higher cost associated with the tender offer. In other words, higher inside ownership implies higher agency cost. As a result of this firm has to pay a huge premium in the tender offer. So by choosing open market share repurchase managers can avoid this cost.

In India, major corporate houses are family owned, and the concept of widely held ownership is a rarity unlike developed countries (Shleifer & Vishny, 1986; Holderness & Sheehan, 1988; Anderson & Reeb, 2003). Therefore, if we accept the findings of Bagwell (1991, 1992) then Indian firms must choose the tender method to reduce information asymmetry. On the contrary, if we accept the finding of Oded (2011) then firms must choose an open market share repurchase method to avoid the cost. So it is imperative to examine these findings in Indian context. Another important determinant in the selection of buyback method is the participation by the promoters. In India, promoters can only participate in the tender offer with the prior notice to the shareholders in the offer document. Post Buyback, promoter ownership increases in both the methods but it increases more in tender offer than open market method.

We have included two variables in the models for insider ownership, i.e. promoter ownership before buyback announcement and change in the percentage of ownership post buyback.

2.4. Leverage hypothesis

Titman et al. (2001) documented that firms adjust their capital structure to achieve an optimal one and also further reported that the gap between actual and optimal leverage ratio plays an important role in share repurchase decisions. Companies are more likely to do repurchase if their actual debt-equity ratio (D/E Ratio) is less than the target ratio (Bagwell & Shoven, 1988; Dittmar, 2000; Mitchell & Dharmawan, 2007). Lie (2002) observed that firms those choose the tender method for buyback generally have a debt ratio below the optimal level or the standard fixed by the industry.

India is different from other developed countries with respect to leverage in two aspects, i.e. 1. Indian companies are not permitted to use debt to finance the share buyback. 2. The regulation governing buyback limits the post-buyback debt-equity ratio to 2:1. (For example, SEBI has rejected the buyback proposal of Larsen and Toubro on 18 January 2019 since the debt-to-equity ratio after buyback would be more than 2:1). In other words, companies are only adjusting the debt-equity ratio by changing the equity through buyback. So in India, if there is more positive gap between the standard and actual, then firms should choose a tender offer to achieve the optimal because in tender offer more equity will be cancelled. The D/E ratio of a company is measured as the ratio of long-term liability to the paid-up capital and free reserves in the previous year of repurchase (Dittmar, 2000; Grullon & Michaely, 2002; Andriosopoulos & Hoque, 2013). By following Vafeas (1997), we have taken another variable that is the ratio of total liabilities to total asset in the previous year of share repurchase. It shows the percentage of total liabilities to total asset.

2.5. Liquidity hypothesis

Barclay and Smith (1988) propounded the liquidity hypothesis and reported that share buyback reduced liquidity in the market. Subsequently, many studies have taken place on share repurchase and post-repurchase stock market liquidity of shares (Brockman & Chung, 2001; Ginglinger & Hamon, 2007; De Ridder & Räsbrant, 2009). Brockman et al. (2008) reported for the first time the effect of liquidity on the share repurchase decisions and further added that liquidity has a direct impact on the repurchase decision of the firm and a residual effect on the dividend decisions of the firm. Oded (2011) reported that the higher the liquidity in the stock market the more is the probability of choosing open market share repurchase. In other words, the companies whose shares are actively traded in the stock market prefer open market share repurchase for buyback and vice-versa.

In India, firms directly purchase shares from the stock exchange in open market method and buy directly from the shareholders in case of tender offer. So firms might choose open market method for highly traded securities and choose the tender method for passively traded securities. Securities Exchange Board of India (SEBI) on 13 April 2015 announced that companies have to acquire and make settlement of share through stock exchange in tender offer also. There will be a separate acquisition window for tender offer in a recognized stock exchange having nationwide trading terminal. So it is necessary to test the effect of stock market liquidity on the selection of buyback methods in India. Following Brockman et al. (2008), we have used share turnover ratio and it is calculated by dividing the total number of shares traded with the outstanding shares in the previous year of share repurchase.

2.6. Signaling hypothesis

Signaling is the most popular explanation for share buyback and one of the prime motives for share buyback in all over the world. However, the strength of signaling depends on the selection of buyback methods. Regulations that govern the tender offer and open market share repurchase differentiate these two offers in terms of signaling. In tender offer, the price and quantity are fixed whereas in open market share repurchase the quantity and price is determined by the market forces. Another risk involved in open market method is regarding actual share purchase. Firms buy very less number of shares or even do not buy a single share depending on the market condition (Stephens & Weisbach, 1998). So tender offer is regarded as stronger signal than open market

share repurchases. Comment and Jarrell (1991) observed that tender offer gives stronger signal than open market share repurchase. Vermaelen (1981) reported that a signal to be credible must be costly. So in tender offers, firms pay huge premium as compared to open market share repurchase.

The present study examines on whether undervaluation (Short term or long term) determines the selection of buyback methods. Vafeas (1997) suggests that to correct short-term undervaluation firm choose open market share repurchase as it is executed gradually with less cost as compared to the tender offer. If the firm faces long-term undervaluation, then it will choose the tender method for correcting the undervaluation. The plausible argument behind this is that it is not wise to correct short-term undervaluation with paying huge premium in tender offer, so firms choose open market share repurchase for this. Therefore, it is more likely that tender offer follows long term under performance and open market share repurchase follows short term under performance.

We have included four variables for signaling, i.e. Price to book Ratio(P/B), Earning to price Ratio (EPR), Three-year ordinary cumulative return prior to announcement and Cumulative abnormal return for $(-63, -4)$. P/B ratio is taken by following (Chung et al., 2013; Dittmar, 2000; Li & McNally, 2007; Andriosopoulos & Hoque, 2013). Lower PB implies the undervaluation as the market price of company's share does not reflect its intrinsic value. Therefore, PB is expected to have a negative influence on the repurchase decisions. EPR is taken by following (Reddy Yarram, 2014). A higher value of EPR implies undervaluation. Hence, EPR is expected to have a positive influence on the repurchase decision. Three-year ordinary cumulative return and CAR $(-63, -4)$ are taken by following Vafeas (1997). Three-year cumulative return depicts long-term undervaluation, so the more negative the return is the higher the probability of choosing tender offer. CAR $(-63, -4)$ shows short-term undervaluation, the more the negative return the higher is the probability of choosing an open market method for undertaking share repurchase.

Table 2 contains a summary of all the hypotheses discussed above and their influence on tender method. It also contains the variables associated with each of the hypothesis considered for this study.

3. Sample selection and data description

The sample consists of companies those undertook buyback during the period 1998–1999 to 2017–2018 and listed in either Bombay stock exchange (BSE) or National stock exchange (NSE) in India. This paper considers the whole period starting from the inception of buyback in India to 2017–2018. During this time, 270 Indian companies announced 430 buybacks (as few companies have gone for multiple buybacks). Out of total buyback, tender method buyback is 176 and open market buyback is 254. We have excluded 56 buybacks of the financial industry as they are regulated by a different set of rules and regulation. Firm-specific parameters are collected from Prowess IQ, a database maintained by the Center for Monitoring Indian Economy (CMIE). But due to unavailability of firm-specific information, we had to exclude 37 buybacks. Hence, our sample size is restricted to 337 buybacks. It is noteworthy to mention here that as per Indian buyback regulation, no company is permitted to undertake another buyback within a period of 1 year from the date of closure of the previous buyback. Hence, even though many companies have gone for multiple buybacks, no company has undertaken two buybacks in one financial year. The year wise distribution of buybacks and value is reported in Table 3.

Though share buyback is introduced in late nineties in India but it ranked in 15th place globally in the most active nation in share buyback (Reddy et al., 2013). The size of share buyback touches a record of 1.1 billion on March 2008. Out of total buyback (430) during 1999–2000 to 2017–2018, open market share repurchase is 254 and tender offer is 176. Open market share repurchase is almost two times of tender offer. The highest number of share repurchase is in 2017–2018 (65) followed by 2016–2017 (45). The total number of share repurchase is segregated into tender offer and open market share repurchase in year wise. Table 3 shows a mix trend in the percentage of tender offer as a percentage of total

Table 2. Incentive for tender method

Tender method hypothesis	Sign	Variable specification (notation)
Free cash flow hypothesis		
Companies having excess cash and lesser investment opportunities are more likely to undertake tender offer when companies want a speed reduction in the agency cost.	+	Cash available in the previous year of repurchase to the total asset (CASH/TA). Cash flow from operation in the previous year of repurchase to the total asset (CFO/TA). Tobin's Q: Market value of asset to book value of asset in the previous year of share repurchase (Tobin's Q). Dummy Variable: Dummy variables represents higher cash and lower investment opportunities (HFO) and higher cash flow and low investment opportunities (HCFO)
Substitution hypothesis		
Preference for tender offer over open market method for share repurchases.	-	Dividend yeild is calculated as dividend paid in the previous year of share repurchase annoucemnt scaled by market capitalisation. Dividend payout ratio is calculated as dividend paid as a percentage of profit after tax.
Insider ownership and agency cost hypothesis		
The insider ownership either positively or negatively influences the choice of share repurchase methods.	±	Promoter ownership before buyback announcement and change in the percentage of ownership post buyback.
Leverage hypothesis		
The higher the excess leverage, the greater the likelihood of a company choosing tender method for share repurchases.	+	Excess leverage is measured as the difference between target and actual debt to total paid-up capital and free reserves. We have taken another variable that is the ratio of total liabilities to total asset in the previous year of share repurchase.
Liquidity hypothesis		
Stock market liquidity has a negative influence of choosing of tender offer for share repurchase.	-	Number of shares traded in the previous year of share repurchase to outstanding shares (T/R)
Signaling hypothesis		
Firms chose tender method for long term undervaluation and chose open market method for correcting short term undervaluation.	±	Price-to-book ratio (PB) and earning to price ratio (EPR) in the previous year of share repurchase. Three-year ordinary cumulative return and CAR (-63, -4) are also taken for measuring long term and short term undervaluation, respectively.

Note: The table presents the proposed hypotheses that have a bearing on the selection of buyback methods in India and the variables corresponding to the hypothesis taken for this study. This also indicates the relationship between the proposed variables and the selection of tender offer.

buyback. In the initial years, tender offer is the major proportion of total offer, however it decreases gradually from 2003 and continues to be in that state up to 2013. The lowest percent of tender offer is in the year 2011, where it is only 2.86% of total buyback. Tender offer as a percentage of total offer is also very low in the year 2008 and 2009. The proportion of tender offer starts increasing from the year 2014 and it continues till 2017. From the table, we can conclude that during 2005–2013, most of the companies chose open market share repurchase for buyback and from 2014 onwards most companies chose tender offer for repurchasing their share. This uneven distribution of the repurchase method in India gives an impetus to study the determinants for the selection of repurchase methods by the companies. Table 3 also reports the highest and lowest value in total share repurchase in the year 2017 and 2003, respectively. The value of tender offer is maximum in the year 2017 (Rs.4834678 Lakh) and minimum in the year 2005 (Rs.61 Lakh). The value of open market share repurchase is maximum in the year 2011 (Rs. 1,375,582 Lakh) and minimum in the year 1999 (Rs.200 Lakh).

Table 3. Year-wise classification of share buyback into tender and open market methods

Year	Total buybacks	Tender method	Openmarket method	Percentage of tender offer	Total buyback value (In Rs Lakh)	Tender offer value (In Rs Lakh)	Open Market Value(In Rs Lakh)
1999	11	10	1	90.91	5843.2	5643.42	200
2000	13	11	2	84.62	129,676.3	95,982.26	33,694
2001	27	6	21	22.22	215,410.4	12,868.57	202,541.8
2002	31	16	15	51.61	101,073.6	63,427.57	37,646.05
2003	8	3	5	37.5	5172.7	4366.46	806.21
2004	11	4	7	36.36	359,977.6	14,707.33	345,270.3
2005	10	1	9	10	36,259.8	61.04	36,198.77
2006	7	1	6	14.29	29,524.4	5247.84	24,276.52
2007	10	3	7	30	200,444.4	26,346.75	174,097.7
2008	37	3	34	8.11	421,793.9	14,875.56	406,918.4
2009	20	1	19	5	82,397.9	3999.6	78,398.3
2010	20	7	13	35	429,502.9	295,376	134,126.9
2011	35	1	34	2.86	1,376,544	962.43	1,375,582
2012	21	2	19	9.52	169,410	19,159.2	150,250.8
2013	32	5	27	15.63	1,138,309	291,335.1	846,973.8
2014	10	5	5	50	60,521.1	37,878.12	22,643
2015	17	12	5	70.59	148,287.8	124,967.8	23,320
2016	45	35	10	77.77	3,140,938	2,899,807	241,131
2017	65	50	15	76.92	5,156,759	4,834,678	322,081.1
Total	430	176	254		1.3E+07	8,751,690	4,456,156

Note: Total buyback in a year is of all buyback made during the financial year by using both tender and open market method. Tender method is the number of buyback made by using tender method only in a financial year. Open market method is the number of buyback made by using open market method only in a financial year. Percentage of tender offer is the percentage of total buyback made by using tender offer only. Total value is the aggregate value of all the buyback made in a financial year. Tender value is the sum of all buyback by the tender offer method in a given financial year. Open market value is the sum of all buybacks by the open market method in a given financial year.

3.1. Analysis of descriptive statistics (tender offer firms and open market firms)

The descriptive statistics of both open market and tender offer are presented in Tables 4 and 5, respectively. These tables present the descriptive statistics of explanatory variables discussed in Section 2.1 to 2.6.

The descriptive statistics show that the mean dividend payout ratio of open market firms (59.31) is more than tender offer firms (19.65). The average cash holding is more in tender offer firms (0.12) as compared to open market firms (0.08). Open market firms have more debts in their capital structure (0.48) as compared to tender offer firms (0.28). On average, promoters hold more percentage of equity in tender offer firm (60.33) as compared to open market firms (48.82). The average trading of share is more in open market firms (0.01) than tender firms (0.00). Tender firms have more gaps between the standard and actual (1.89) as compared to open market firms (1.75).

4. Methodology

We have collected a list of financial variables with the potential ability to explain the hypotheses discussed in the literature review section for both the methods of share buyback, i.e. tender offer and open market share repurchase. In this study, we have carried out both univariate and multi-variate analysis to support the hypothesis discussed above. In the univariate test, both parametric (t-test) and non-parametric methods (Wilcoxon rank sum) are employed to test the robustness. The t-test is used to know the difference between the means of the firms those adopt tender route and firms those choose open market method for buyback of shares. Wilcoxon rank sum test has been employed to determine if the two sub-samples, i.e. tender method and open market method are drawn from the same population.

To determine a relationship between the hypotheses discussed and the selection of buyback method a binary logit model is employed. In this method, the dependent variable is a dummy variable. The dummy variable takes the value of 1 and 0 if the companies choose the tender offer and open market method for share buyback, respectively.

Following Vafeas (1997), Mitchell and Dharmawan (2007), and Andriosopoulos and Hoque (2013), binary logit model is employed to estimate the probability of choosing tender offer for share buyback.

$$P_{(i,t)} = \frac{1}{1 + e^{-\beta X(i,t)}} \quad (1)$$

where $P_{(i,t)}$ is the probability that a firm will choose tender offer for share buyback in a period t , $X(i,t)$ is a vector of all independent variables, and β is a vector of unknown parameters to be estimated.

5. Empirical results and discussion

5.1. Univariate analysis

Table 6 provides the univariate analysis between tender offer and open market share repurchase. The table also further reports the results for t-test and Wilcoxon rank sum test.

5.1.1. Size of repurchase

The mean repurchase size of the whole sample is 11.33, it means on average Indian companies repurchase 11.33% of their outstanding shares. In case of open market share repurchase, the average share repurchase is 9.06% of outstanding shares. However, in tender offer companies repurchase 16.05% of their outstanding shares. Similarly, the median size of share repurchase of tender offer is more than open market share repurchase. Both the mean and median SHERP_SIZE are significantly more for tender offers than open market share repurchase. It shows that companies those want to repurchase more shares choose tender offer rather than open market share repurchase.

Table 4. Summary statistics of open market offer

	Mean	Median	Minimum	Maximum	Std. dev.	C.V.	Skewness	kurtosis
D_P	59.31	7.79	-23.35	1903.1	213.87	3.61	6.42	44.87
C_SH	0.08	0.04	0	0.54	0.10	1.23	2.23	5.35
C_FL	0.10	0.10	-0.39	0.74	0.12	1.22	0.56	5.30
HFO	0.13	0	0	1	0.34	2.60	2.21	2.88
HCFO	0.16	0	0	1	0.37	2.26	1.81	1.29
TLTA	0.48	0.35	0.4	2.05	0.48	1.01	0.73	-0.49
TobinQ	1.32	0.83	0.3	13.74	1.50	1.14	4.22	25.69
P_Should (%)	48.82	49.15	10.02	88.15	15.41	0.32	-0.48	0.53
Turn_Over	0.01	0.00	0	0.64	0.08	5.24	6.19	38.54
ΔP_OWN	5.14	3.71	-7.50	33.14	5.86	1.14	2.27	7.29
Return3 Years	0.54	0.36	-1.57	6.44	1.04	1.92	1.57	5.45
Return644	-0.08	-0.02	-1.13	0.66	0.37	4.35	-0.56	-0.11
Div_Yield	0.03	0.02	0	0.44	0.04	1.37	5.06	41.30
LE_V	1.75	1.89	0.68	2	0.32	0.18	-1.45	1.47
P_B	2.17	1.06	0.06	35.21	3.92	1.81	5.14	32.01
E_PR	0.11	0.09	-0.98	1.30	0.21	1.95	0.23	11.54

Table 5. Summary statistics of tender market offer

	Mean	Median	Minimum	Maximum	Std. Dev.	C.V.	Skewness	kurtosis
D_P	19.65	5.89	-50.63	213.65	36.12	1.84	2.87	10.48
C_SH	0.12	0.04	0	0.76	0.15	1.28	1.76	3.06
C_FL	0.11	0.10	-0.16	0.66	0.11	1.00	1.39	5.10
HFO	0.14	0	0	1	0.34	2.54	2.13	2.54
HCFLO	0.15	0	0	1	0.35	2.43	2.01	2.03
TLTA	0.28	0.09	0.2	1.47	0.37	1.31	1.39	1.26
TobinQ	1.48	0.93	0.1	8.24	1.60	1.09	2.22	5.42
P_Shld(%)	60.33	62.02	25.81	90	14.20	0.24	-0.44	-0.48
Turn_Over	0.00	0.00	0	0.01	0.00	1.63	2.68	7.31
ΔP_OWEN	4.64	1.93	-98.76	33.30	14.62	3.15	-3.32	24.51
Return3 Years	0.63	0.57	-1.14	3.11	0.74	1.18	0.81	1.07

(Continued)

Table 5. (Continued)

	Mean	Median	Minimum	Maximum	Std. Dev.	C.V.	Skewness	kurtosis
Return644	-0.01	0.04	-1.10	0.52	0.33	31.32	-1.28	1.62
Div_Yield	0.04	0.02	0	0.18	0.04	1.11	1.25	0.81
LE_V	1.89	2	0.66	2	0.20	0.10	-3.25	14.11
P_B	2.44	1.21	0	18.62	3.08	1.26	2.73	8.93
E_PR	0.05	0.04	-0.41	0.34	0.09	1.73	-1.04	7.70

Note: Tables 4 & 5 shows the descriptive statistics open market and tender offer, respectively.

Legends:

D_P: Dividend paid in the previous year of buyback as a percentage of profit after tax.

Div_Yield: Dividend paid in the previous year of buyback scaled by market capitalisation.

C_SH: Cash balance available scaled by total asset in the previous year of share repurchase.

C_FL: Cash flow from operational activity scaled by total asset in the year preceding share repurchase.

Tobin's Q: Market value of the asset to book value of the asset in the previous year of share repurchases.

TL/TA: Total liability as a percentage of total asset in the previous year of share buyback.

LE_V: Leverage is measured as the difference between target and actual debt to total paid-up capital and free reserves.

CAR (-63, -4): Cumulative abnormal return calculated by market model from 63 days prior to announcement of share buyback to 4 days prior to announcement.

3 Years Return: It is the sum of ordinary return 3 year prior to public announcement excluding the month of public announcement.

E_PR: Average earning to price ratio in the last three months before share repurchases announcement.

P_B: Average Market value of equity to book value of equity in the last three months before share repurchases announcement.

Prom_Own: Promoters holding in the previous year of share buyback.

ΔProm_Own: Change in the percentage of promoters holding post buyback.

Turn_Over: Turnover ratio is calculated as number of shares traded to outstanding shares in the previous year of share repurchase announcement.

Table 6. Profile of 337 repurchasing firms segregated in tender and open market method before buyback

		All Firms(337)	OMR(198)	Tender Offers(139)	Difference in Mean & Median
SHERP_SIZE	Mean	11.33	9.06	16.05	-2.88***
	Median	6.72	5.85	9.5	2.01**
Total_ASSET (Lakh)	Mean	381,022.4	385,202	372,130	0.07
	Median	58,228.5	57,387.5	65,747.5	0.5
Mark_CAP(Lakh)	Mean	643,174.1	504,455	944,737	-1.13
	Median	41,695.7	37,843.4	58,920	0.98
D_P	Mean	46.49	59.31	19.65	2.55**
	Median	6.99	7.99	5.89	-0.8
Div_Yield	Mean	0.03	0.03	0.04	-1.35
	Median	0.02	0.02	0.02	0.77
C_SH	Mean	0.09	0.08	0.12	-2.37**
	Median	0.04	0.04	0.04	0.84
C_FL	Mean	0.1	0.1	0.11	-0.99
	Median	0.1	0.1	0.1	0.73
Tobin's Q	Mean	1.37	1.32	1.48	-0.81
	Median	0.85	0.83	0.93	0.05
TL/TA	Mean	0.41	0.48	0.28	3.78***
	Median	0.29	0.35	0.09	-3.29***
LE_V	Mean	1.8	1.75	1.89	-4.84***
	Median	1.96	1.89	2	4.06***
CAR (-1,+1)	Mean	0.02	0.01	0.03	-1.98**
	Median	0.01	0.01	0.01	1.68*
CAR (-63,-4)	Mean	-0.06	-0.08	-0.01	-1.75*
	Median	0	-0.02	0.04	1.84*

(Continued)

Table 6. (Continued)

		All Firms(337)	OMR(198)	Tender Offers(139)	Difference in Mean & Median
3 Years Return	Mean	0.57	0.54	0.63	-0.85
	Median	0.41	0.36	0.57	1.51
E_PR	Mean	0.09	0.11	0.05	3.12***
	Median	0.08	0.09	0.04	-4.96***
P_B	Mean	2.17	2.17	2.44	-0.65
	Median	1.06	1.06	1.21	1.76*
Prom_Own	Mean	52.54	48.82	60.33	-6.35***
	Median	53.03	49.15	62.02	5.89***
ΔProm_Own	Mean	4.98	5.14	4.64	0.32
	Median	3.47	3.71	1.93	-1.84*
Turn_Over	Mean	0.01	0.01	0	2.51**
	Median	0	0	0	-3.81***

Note: For difference in mean, we have used T-test and for the difference in median, Wilcoxon rank sum test is used.

Legends:

SHERP_SIZE: Total number of shares offered for buyback divided by the number of outstanding shares. Total_ASSET: Total asset in the balance sheet in the previous year of share buyback; Mark_CAP: Market capitalization of repurchasing companies in the previous year of share repurchase; D_P: Dividend paid in the previous year of buyback as a percentage of profit after tax; Div_Yield: Dividend paid in the previous year of buyback scaled by market capitalization; C_SH: Cash balance available scaled by total asset in the previous year of share repurchase; C_FL: Cash flow from operational activity scaled by total asset in the year preceding share repurchase; Tobin's Q: Market value of the asset to book value of the asset in the previous year of share repurchases; TL/TA: Total liability as a percentage of total asset in the previous year of share buyback; LE_V: Leverage is measured as the difference between target and actual debt to total paid-up capital and free reserves; CAR (-1, +1): Cumulative abnormal return calculated around three days of public announcement; CAR (-63, -4): Cumulative abnormal return calculated by market model from 63 days prior to announcement of share buyback to 4 days prior to announcement; 3_Years Return: It is the sum of ordinary return 3 year prior to public announcement excluding the month of public announcement; E_PR: Average earning to price ratio in the last three months before share repurchases announcement; P_B: Average Market value of equity to book value of equity in the last three months before share repurchases announcement; Prom_Own: Promoters holding in the previous year of share buyback; ΔProm_Own: Change in the percentage of promoters holding post buyback; Turn_Over: Turnover ratio is calculated as number of shares traded to outstanding shares in the previous year of share repurchase announcement; D_P: Dividend paid in the previous year of buyback as a percentage of profit after tax; Div_Yield: Dividend paid in the previous year of buyback scaled by market capitalization.

5.1.2. Size of company

We have taken two variables (Size of total asset and Market Cap) to capture the size of the company and find that tender offer firms and open market method firms in India are not significantly different in either total asset size or market capitalization.

5.1.3. Dividend

Firms those choose open market share repurchase pay on an average 59.31% of profit as a dividend in the year prior to share repurchase whereas, tender offer firms pay on an average 19.65% of profit as dividend. It means the firms paid more dividend in the previous year choose open market method rather than tender offer. However, the difference in mean and median of dividend yield is not statistically significant.

5.1.4. Cash

The mean cash holding of open market method firms are less as compared to tender method firms. The difference in cash holding of tender offer firms and open market share repurchase firm is significantly different from each other. This means that companies those have more cash reserve choose tender offer rather than open market method.

5.1.5. Tobin's Q

The mean and median Tobin's Q of tender offer firms are more than open market share repurchase firms. It means tender offer firms have more investment opportunities than open market share repurchases firms. But the difference is not statistically significant.

5.1.6. Leverage

To capture the leverage, we have taken two variables such as debt as percentage of total asset and excess leverage (LE_V). The percentage of debt to total asset in case of tender offer (28%) is much lower as compared to open market method (48%) and is statistically significant. In other words, less levered firms choose tender offer rather than open market method. Excess leverage is calculated as the difference between the standard minus actual leverage ratio. Indian Companies Act 2013 prescribes that post-buyback debt-equity ratio must be 2:1. So the higher the leverage the more is the gap between the standard and actual. The mean and median leverage of tender offer is more than the open market share repurchase firms and they are statistically significant. It means tender firms have more scope to move towards optimum debt-equity ratio by using share buyback. From the above discussion, we can conclude that tender firms have less debt in the previous year of share repurchase than open market share repurchases.

5.1.7. Cumulative average return

Tender offer earns more announcement return than open market share repurchases during the initial 3 days of announcement (-1, +1) and the difference is statistically significant. The mean and median short-term return (-63, -4) of open market method firms is lower than tender firms and these are statistically significant. It suggests that open market share repurchase firms are more undervalued in short term than the tender offer. However, there is no significant difference of last 3- year CAR before the announcement of either tender offer firms or open market method firms.

5.1.8. Earning to price ratio (E_PR)

Both mean and median E_PR of open market share repurchase firms are higher than tender firms and the difference are significantly different. It means open market share repurchase firms are more undervalued than tender offer firms.

5.1.9. Price to book ratio (P_B)

The difference in the median P_B ratio between tender offer firms and open market share repurchase firms is significant. It shows that open market share repurchase firms are more undervalued than tender offer in the previous year of buyback announcement.

5.1.10. Promoter ownership

Both the mean and median promoter ownership is more in tender firms as compared to open market method firms. In addition to this, the change in promoter ownership is more in case of open market firms as compared to tender firms.

5.1.11. Liquidity

We have taken Turnover ratio to capture the liquidity of shares before the announcement of share buyback. Both the mean and median turnover of shares of open market share repurchase firms are significantly more from tender offer firms. It means the shares of open market share repurchase firms are traded more in the stock exchange in the previous year of share repurchase than tender offer firm.

To summarize, the univariate analysis presented in Table 6 shows that the size of repurchase is more in tender offer firms than open market share repurchases firms. Tender offer firms have more cash reserves and lower leverage ratio than the open market share repurchase firms. Open market share repurchase firms pay more dividend than tender offer firms in the previous year of share repurchase. The turnover ratio states that the shares of open market repurchasing firms are traded more as compared to the shares of tender offer firms. It means the stock market liquidity of open market firms are more than tender offer firms. Open market share repurchase firms are more undervalued than tender offer firms; further open market share repurchase firms are more short term undervalued than the tender offer. Thus, the univariate statistics support the excess capital hypothesis, undervaluation hypothesis, leverage hypothesis and liquidity hypothesis. Since the motives are not mutually exclusive and multiple motives for choosing buyback methods can be significant, it is possible that firms choose a different method for undertaking share buyback for more than one motives. As many of the hypotheses are interrelated, it is difficult to come to a conclusion from the univariate analysis. Therefore, in the next section, we have estimated the probability of choosing a tender method for buyback by employing binary logit model, as given in Eq. (1).

5.2 Multivariate analysis using binary logit model

Before going for multivariate analysis, it is necessary to examine the association among the independent variables considered for the study. For this, we have computed the Bonferroni correlation as given in Table 7.

All the correlations calculated are of low magnitude, except few. So in order to examine further, we check the multicollinearity among all variables. To examine multicollinearity among the independent variables, we have conducted variance inflation factor (VIF) test and found these values to be approximately 1 except two dummy variables (HFO and HCFLO). However, HFO and HCFLO are within the standard limit of 10. Hence, it can be concluded that variables are not correlated and can be used for multivariate analysis.

Table 8 presents the results of seven logit regression models, i.e. Models I–vii, have been considered in this study. We have considered six models to accommodate each individual hypothesis and then one last model for the testing of all hypotheses simultaneously. Model I considers only the independent variables explaining the excess cash flow hypothesis. In this model, we have considered two variables and two dummies, i.e. Cash/TA, Cash flow/TA, HFO and HCFLO for comparing the effect of these four variables on choosing repurchase methods. Model II considers variables those determine the relationship between dividend paid and the selection of share repurchase methods. We have taken two variables, i.e. dividend payout ratio and dividend Yield. Model III considers the role of leverage on the selection of repurchase methods for buyback. For this, we have considered two variables, i.e. Total liability/Total Asset and LEV. Model IV captures the effect of insider ownership to select the buyback methods between tender offer and open market method. In India, the majority of shareholding is owned by promoters' group, so we have taken two variables, i.e. promoters ownership in the previous year of buyback and change in the

Table 7. Correlation matrix

	Share_rep	D_p	C_sh	C_fl	Hfo	Hcflo	TL/TA	Tobinq	Prom_own
Share_rep	1								
D_p	-0.1	1							
C_sh	0.16	0	1						
C_fl	0.06	0.11	0.04	1					
Hfo	0.01	-0.05	0.02	-0.49	1				
Hcflo	-0.02	-0.06	0.01	-0.58*	0.9	1			
TL/TA	-0.2	-0.04	-0.24	-0.09*	-0.01	-0.02	1		
Tobinq	0.05	0.27*	0	0.31*	-0.1	-0.13	-0.09	1	
Prom_own	0.30*	0.06	0.03	0.05	0.01	0	-0.1	0.17	1
Turn_over	-0.1	-0.03	-0.04	0.01	-0.05	-0.06	0.01	0.03	0.01
ΔProm_Own	-0.02	-0.06	-0.03	-0.12	0.01	0.03	0.04	-0.27*	-0.25*
Return3years	0.04	-0.07	-0.06	0.16	-0.05	-0.05	0	0.05	-0.04
Return644	0.1	-0.04	0.01	0.07	-0.04	-0.07	-0.02	0.05	0.07
Div_yield	0.07	0	-0.02	-0.07	-0.14	0.01	-0.01	-0.14	-0.04
Le_v	0.26*	0.03	0.15	0.01	0.05	0.06	-0.79*	0.06	0.15
P_b	0.03	-0.02	0.08	-0.08	0.07	0.08	-0.03	0.03	0.05
E_pr	-0.14	0.26*	-0.14	0.01	-0.06	-0.03	0.03	0.02	-0.12

	Turn_over	Change_own	Return3years	Return644	Div_yield	Le_v	P_b	E_pr	VIF
Share_rep									
D_p									1.1
C_sh									1
C_fl									1.8
Hfo									5.9
Hcfl									6.8
TL/TA									2.9
Tobinq									1.3
Prom_own									1.1
Turn_over	1								1
ΔProm_Own	-0.04	1							1.1
Return3years	0.15	-0.03	1						1
Return644	-0.03	-0.05	-0.04	1					1
Div_yield	-0.07	0.17	-0.06	0.04	1				1.2
Le_v	-0.04	-0.04	0.01	0.08	-0.02	1			2.9
P_b	-0.05	-0.05	-0.1	0.11	-0.07	0.07	1		1
E_pr	0.09	0.02	0.12	-0.17	0.08	-0.03	-0.1	1	1.1

Notes: (i) * shows the value significant at 5% level

Note: The table shows the correlation among the variables considered for the multivariate analysis and it also indicate the result of VIF test for multicollinearity.

Table 8. Multivariate logit regressions

Variable	Model-I		Model-II		Model-III		Model-IV		Model-V		Model-VI		Model-VII	
	Coeff.	P-Value	Coeff.	P-Value	Coeff.	P-Value	Coeff.	P-Value	Coeff.	P-Value	Coeff.	P-Value	Coeff.	P-Value
Intercept	-1.09***	0.00	-0.74***	0.00	-5.48***	0.01	-4.09***	0.00	-0.7***	0.00***	-0.54	0.00***	-8.91***	0.00
C_sh	2.68***	0.01											0.01*	0.1
C_fl	0.88	0.51											2.22*	0.09
Hfo	1.14	0.32											0.25	0.87
Hcflo	0.97	0.39											2.63*	0.08
D_p			-0.00*	0.08									-2.77*	0.07
Div_yield			3.64	0.21									0.22	0.71
TL/TA					0.11***	0.00							0.06***	0.00
Le_v					2.56***	0.01							7.23**	0.02
Prom_Own							0.06***	0.00					0.02***	0.00
ΔProm_Own							0.02	0.16					0.25*	0.1
Return3 years									0.14	0.29			0.19	0.65
Return(-64, -4)									0.49**	0.04			8.26**	0.03
P_b									0.01	0.72			2.46**	0.03
E_pr									-1.70**	0.03			-0.02*	0.06
Turn_over											-1.39	0.08**	-1.5**	0.1

Notes: ***, ** and * show the value of significant at 1%, 5% and 10%, respectively.

Note: The table shows presents the results of seven logit regression models, considered in this study. Model 1 considers only cash flow hypothesis, Model 2 considers substitution hypothesis, Model 3 considers leverage hypothesis, Model 4 considers agency hypothesis, Model 5 considers signaling hypothesis, Model 6 considers liquidity and hypothesis and Model 7 considers all the hypotheses simultaneously.

percentage of ownership post buyback. Model V captures the role of signaling hypothesis on the selection of repurchase methods. We have taken four variables, i.e. P_B ratio, E_PR ratio, 3 years return and CAR (−64, −4). Model VI considers only the effect of liquidity hypothesis on the selection of share repurchase methods. Model VII considers all the hypotheses altogether. It takes all the independent variables simultaneously to find the combined effect of all the hypotheses for the selection of buyback methods between tender offer and open market methods.

In Model I, we have only tested free cash flow hypothesis and its impact on choosing tender offer over open market by Indian companies. In this model, C_sh is positive and significant indicating that companies with excess cash at their disposal tend to go for buyback with the tender method only. The result is consistent with the current scenario in India where TCS and Infosys two major giant in the software industry announced buyback through tender offer because of huge cash reserve. Our result is also consistent with the prediction by Oded (2011) and empirically supported by Vafeas (1997). In Model II, we have tested the substitution and complementary relationship between dividend payment and selection of the method for buyback. DP ratio is negative and significant. It shows a negative relationship between dividend paid in the last year and choosing of tender offer for buyback. It means that dividend paying firms prefer open market method for buyback rather than tender method. Our result is contradictory to Vafeas (1997) who report that there is no relation between dividend payment and the choice of repurchase methods. In Model III, we have tested the leverage hypothesis by taking two variables, i.e. TL/TA and L_ev. L_ev is positive and significant and it shows that low-levered companies prefer tender method to repurchase share over open market method. The result is consistent with the notion that companies prefer tender offer to adjust capital structure to a large extent. The results are consistent with Lie (2000) and contradict the findings by Vafeas (1997). However, TL/TA is positive and significant and it shows that as leverage increases firms become more likely to prefer tender offer than open market method, and it is consistent with Vafeas (1997). In Model IV, we have examined the impact of promoters' ownership on the selection of share repurchase methods. Promoters' ownership in the previous year of share buyback is positive and significant and it means more the promoter ownership in the year before buyback the higher is the likelihood of choosing tender offer in India. It is specifically applicable for Indian buyback environment because in India promoters are allowed to participate in the buyback in case of tender offer only. Our result supports the findings of Vafeas (1997) and contradicts the findings of Oded (2011). Model V tests the signaling hypothesis and its impact on the selection of buyback methods. It is hypothesized that firms correct their short-term undervaluation by choosing open market rather than tender offer because it is too costly for firms. This is supported by our result where 60 days pre buyback cumulative abnormal return is positive and significant. Another two variables (P_B ratio and E_PR ratio) are significant in explaining the relationship between short-term undervaluation and choosing tender offer. These variables are consistent with our hypothesis that firms choose tender offer to correct long-term undervaluation and choose open market share repurchase to correct short-term undervaluation. However, firms correct their long-term undervaluation by choosing tender offer method but we don't find results in support of the selection of tender offer in case of long-term undervaluation. We also hypothesize that in the long run if firms return decreases then it chose the tender method to correct undervaluation. However, the result shows that tender offer firms outperform the open market method firms in the last 3 years before share repurchase. There is a positive but insignificant relationship between the selection of tender offer and 3 years return. This is inconsistent with the findings by Vafeas (1997). In Model VI, we have tested the effect of liquidity on selection of repurchase methods. We have hypothesized that the firms whose stock are traded more in the stock exchange prefer open market method rather than tender offer. Our finding support our hypothesis as Turn_ over ratio is negative and significant. It shows firms choose tender offer when its shares are not traded much in the stock exchange. Our results support the finding of Oded (2011) who proposes that the higher the liquidity of stock the more the probability of choosing open market method. Model VII test the entire hypothesis discussed above simultaneously to examine their impact on the selection of repurchase methods as these hypotheses are not mutually exclusive. The result shows that huge cash reserves and operating cash flow combined with low investment opportunities choose tender offer rather than open market method. Dividend paid in the

last year and choosing of tender offer substitutes Indian context. Leverage hypothesis also holds true as tender offer firms are lower levered at the time of share repurchase. The final analysis also supports the management entrenchment hypothesis, where promoters want to increase their ownership by choosing tender offer for buyback. The results support that for correcting short-term undervaluation companies prefer open market method as we did not find any evidence in support of choosing tender offer to correct long term undervaluation. Lastly, companies whose shares are traded more prefer open market method than tender offer, so Turn_over is negative and significant.

6. Conclusion

This study examines the determinants of the choice between tender offer and open market method of Indian companies from 1998–1999 to 2016–2017 by using both univariate and binary logistic regression. This study examines the impact of all individual hypotheses (Signaling, leverage, substitution, agency, free cash flow and liquidity) on the selection of tender method for buyback. It also examines the combined effect of all the hypotheses on selection of tender method for buyback.

This study finds that companies having huge cash reserve and higher cash flow combined with lower investment opportunities prefer tender method for share buyback. Companies with high promoters' ownership choose tender offer to reduce agency cost and to participate in the buyback in India. Leverage hypothesis also holds true in Indian context because tender offer firms are less levered than open market method firms at the time of buyback. So firms choose tender offers to make speedy adjustment in the capital structure. In India, dividend paying firms prefer open market method, so we find a negative relationship between dividend paid in the last year and choosing of tender offer. We also find liquidity hypothesis to be significant enough to influence the selection of repurchase method. Companies with the higher turnover ratio are less likely to choose tender offer. Lastly, the study finds that for correcting short-term undervaluation companies prefer open market method rather than tender offer for share buyback. From the above findings, it became quite evident that the two methods those are widely prevalent in India serve different purpose of the companies. They are not close substitute to each other, so that firms can blindly choose one over another. The companies should select the repurchase method depending on the purpose of the buyback.

Funding

The authors received no direct funding for this research.

Author details

Sarthak Kumar Jena¹

E-mail: srkjena@gmail.com

ORCID ID: <http://orcid.org/0000-0003-4252-6804>

Chandra Sekhar Mishra¹

E-mail: csmishra@vgsom.iitkgp.ernet.in

Prabina Rajib¹

E-mail: prabina@vgsom.iitkgp.ernet.in

¹ Vinod Gupta School of Management, Indian Institute of Technology Kharagpur, Kharagpur, India.

Citation information

Cite this article as: Determinants of the choice of share buyback methods: A study in India, Sarthak Kumar Jena, Chandra Sekhar Mishra & Prabina Rajib, *Cogent Economics & Finance* (2020), 8: 1782073.

References

- Anderson, R. C., & Reeb, D. M. (2003). Founding-family ownership and firm performance: Evidence from the S&P 500. *The Journal of Finance*, 58(3), 1301–1328.
- Andriosopoulos, D., & Hoque, H. (2013). The determinants of share repurchases in Europe. *International Review of Financial Analysis*, 27, 65–76. <https://doi.org/10.1016/j.irfa.2012.12.003>
- Bagwell, L. S. (1991). Share repurchase and takeover deterrence. *The Rand Journal of Economics*, 22(1), 72–88. <https://doi.org/10.2307/2601008>
- Bagwell, L. S. (1992). Dutch auction repurchases: An analysis of shareholder heterogeneity. *The Journal of Finance*, 47(1), 71–105. <https://doi.org/10.1111/j.1540-6261.1992.tb03979.x>
- Bagwell, L. S., & Shoven, J. B. (1988). Share repurchases and acquisitions: An analysis of which firms participate. In *Corporate takeovers: Causes and consequences* (pp. 191–220). University of Chicago Press.
- Banyi, M. L., Dyl, E. A., & Kahle, K. M. (2008). Errors in estimating share repurchases. *Journal of Corporate Finance*, 14(4), 460–474. <https://doi.org/10.1016/j.jcorpfin.2008.06.004>
- Barclay, M. J., & Smith, C. W., Jr. (1988). Corporate payout policy: Cash dividends versus open-market repurchases. *Journal of Financial Economics*, 22(1), 61–82. [https://doi.org/10.1016/0304-405X\(88\)90022-0](https://doi.org/10.1016/0304-405X(88)90022-0)
- Bartov, E. (1991). Open-market stock repurchases as signals for earnings and risk changes. *Journal of Accounting and Economics*, 14(3), 275–294. [https://doi.org/10.1016/0165-4101\(91\)90015-G](https://doi.org/10.1016/0165-4101(91)90015-G)
- Boudry, W. I., Kallberg, J. G., & Liu, C. H. (2013). Investment opportunities and share repurchases. *Journal of Corporate Finance*, 23, 23–38. <https://doi.org/10.1016/j.jcorpfin.2013.07.006>
- Brockman, P., & Chung, D. Y. (2001). Managerial timing and corporate liquidity: Evidence from actual share repurchases. *Journal of Financial Economics*, 61(3), 417–448. [https://doi.org/10.1016/S0304-405X\(01\)00068-X](https://doi.org/10.1016/S0304-405X(01)00068-X)
- Brockman, P., Howe, J. S., & Mortal, S. (2008). Stock market liquidity and the decision to repurchase. *Journal of Corporate Finance*, 14(4), 446–459. <https://doi.org/10.1016/j.jcorpfin.2008.06.001>

- Caudill, S. B., Hudson, C. D., Marshall, B. B., & Roumantzi, A. (2006). An empirical model of choice of one-time corporate cash disbursement methods. *Studies in Economics and Finance*, 23(1), 27–50. <https://doi.org/10.1108/10867370610661936>
- Chan, K., Ikenberry, D. L., & Lee, I. (2007). Do managers time the market? Evidence from open-market share repurchases. *Journal of Banking & Finance*, 31(9), 2673–2694. <https://doi.org/10.1016/j.jbankfin.2006.09.017>
- Comment, R., & Jarrell, G. A. (1991). The relative signaling power of Dutch-auction and fixed-price self-tender offers and open-market share repurchases. *The Journal of Finance*, 46(4), 1243–1271. <https://doi.org/10.1111/j.1540-6261.1991.tb04617.x>
- Dann, L. Y., Masulis, R. W., & Mayers, D. (1991). Repurchase tender offers and earnings information. *Journal of Accounting and Economics*, 14(3), 217–251. [https://doi.org/10.1016/0165-4101\(91\)90013-E](https://doi.org/10.1016/0165-4101(91)90013-E)
- De Ridder, A., & Råsbrant, J. (2009). The market liquidity impact of repurchase trading. *Nasdaq OMX Website*.
- DeAngelo, H., DeAngelo, L., & Skinner, D. J. (2000). Special dividends and the evolution of dividend signaling. *Journal of Financial Economics*, 57(3), 309–354. [https://doi.org/10.1016/S0304-405X\(00\)00060-X](https://doi.org/10.1016/S0304-405X(00)00060-X)
- Denis, D. J., & Osobov, I. (2008). Why do firms pay dividends? International evidence on the determinants of dividend policy. *Journal of Financial Economics*, 89(1), 62–82. <https://doi.org/10.1016/j.jfineco.2007.06.006>
- Dittmar, A. K. (2000). Why Do Firms Repurchase Stock*. *The Journal of Business*, 73(3), 331–355. <https://doi.org/10.1086/209646>
- Economic Times. (2008, May 1). *Share buybacks in India touch a record \$1.1 bn*. Retrieved October 1, 2019, from <https://economictimes.indiatimes.com/markets/stocks/news/exemption-from-share-buyback-tax-major-relief-to-it-bigwigs/articleshow/71224632.cms>
- Fama, E. F., & French, K. R. (2001). Disappearing dividends: Changing firm characteristics or lower propensity to pay? *Journal of Financial Economics*, 60(1), 3–43. [https://doi.org/10.1016/S0304-405X\(01\)00038-1](https://doi.org/10.1016/S0304-405X(01)00038-1)
- Ginglinger, E., & Hamon, J. (2007). Actual share repurchases, timing and liquidity. *Journal of Banking & Finance*, 31(3), 915–938. <https://doi.org/10.1016/j.jbankfin.2006.07.006>
- Grullon, G., & Michaely, R. (2002). Dividends, share repurchases, and the substitution hypothesis. *The Journal of Finance*, 57(4), 1649–1684. <https://doi.org/10.1111/1540-6261.00474>
- Grullon, G., & Michaely, R. (2004). The information content of share repurchase programs. *The Journal of Finance*, 59(2), 651–680. <https://doi.org/10.1111/j.1540-6261.2004.00645.x>
- Heaton, J. B. (2002). Managerial optimism and corporate finance. *Financial Management*, 31(2), 33–45. <https://doi.org/10.2307/3666221>
- Holderness, C. G., & Sheehan, D. P. (1988). The role of majority shareholders in publicly held corporations: An exploratory analysis. *Journal of Financial Economics*, 20, 317–346. [https://doi.org/10.1016/0304-405X\(88\)90049-9](https://doi.org/10.1016/0304-405X(88)90049-9)
- Hovakimian, A., Opler, T., & Titman, S. (2001). The debt-equity choice. *The Journal of Financial and Quantitative Analysis*, 36(1), 1–24. <https://doi.org/10.2307/2676195>
- Jagannathan, M., Stephens, C. P., & Weisbach, M. S. (2000). Financial flexibility and the choice between dividends and stock repurchases. *Journal of Financial Economics*, 57(3), 355–384. [https://doi.org/10.1016/S0304-405X\(00\)00061-1](https://doi.org/10.1016/S0304-405X(00)00061-1)
- Jain, B. A., Shekhar, C., & Torbey, V. (2009). Payout initiation by IPO firms: The choice between dividends and share repurchases. *The Quarterly Review of Economics and Finance*, 49(4), 1275–1297. <https://doi.org/10.1016/j.qref.2009.09.003>
- Jensen, M. C. (1986). Agency cost of free cash flow, corporate finance, and takeovers. *Corporate Finance and Takeovers. American Economic Review*, 76(2).
- Lang, L. H., & Litzenberger, R. H. (1989). Dividend announcements: Cash flow signalling vs. free cash flow hypothesis? *Journal of Financial Economics*, 24(1), 181–191. [https://doi.org/10.1016/0304-405X\(89\)90077-9](https://doi.org/10.1016/0304-405X(89)90077-9)
- Lee, B. S., & Suh, J. (2011). Cash holdings and share repurchases: International evidence. *Journal of Corporate Finance*, 17(5), 1306–1329. <https://doi.org/10.1016/j.jcorpfin.2011.06.006>
- Li, K., & McNally, W. (2007). The information content of Canadian open market repurchase announcements. *Managerial Finance*, 33(1), 65–80. <https://doi.org/10.1108/03074350710715818>
- Lie, E. (2002). Do firms undertake self-tender offers to optimize capital structure? *The Journal of Business*, 75(4), 609–639. <https://doi.org/10.1086/341637>
- Lie, E., & Lie, H. J. (1999). The role of personal taxes in corporate decisions: An empirical analysis of share repurchases and dividends. *Journal of Financial and Quantitative Analysis*, 34(4), 533–552. <https://doi.org/10.2307/2676233>
- Mitchell, J. D., & Dharmawan, G. V. (2007). Incentives for on-market buy-backs: Evidence from a transparent buy-back regime. *Journal of Corporate Finance*, 13(1), 146–169. <https://doi.org/10.1016/j.jcorpfin.2006.12.002>
- Nohel, T., & Tarhan, V. (1998). Share repurchases and firm performance: New evidence on the agency costs of free cash flow. *Journal of Financial Economics*, 49(2), 187–222. [https://doi.org/10.1016/S0304-405X\(98\)00022-1](https://doi.org/10.1016/S0304-405X(98)00022-1)
- Oded, J. (2011). Stock repurchases: How firms choose between a self tender offer and an open-market program. *Journal of Banking & Finance*, 35(12), 3174–3187. <https://doi.org/10.1016/j.jbankfin.2011.05.006>
- Peyer, U., & Vermaelen, T. (2008). The nature and persistence of buyback anomalies. *The Review of Financial Studies*, 22(4), 1693–1745. <https://doi.org/10.1093/rfs/hhn024>
- Peyer, U. C., & Vermaelen, T. (2005). The many facets of privately negotiated stock repurchases. *Journal of Financial Economics*, 75(2), 361–395. <https://doi.org/10.1016/j.jfineco.2004.02.003>
- Reddy, K. S., Nangia, V. K., & Agrawal, R. (2013). Share repurchases, signalling effect and implications for corporate governance: Evidence from India. *Asia-Pacific Journal of Management Research and Innovation*, 9(1), 107–124. <https://doi.org/10.1177/2319510X13483518>
- Reddy Yarram, S. (2014). Factors influencing on-market share repurchase decisions in Australia. *Studies in Economics and Finance*, 31(3), 255–271. <https://doi.org/10.1108/SEF-02-2013-0021>
- Roll, R. (1986). The hubris hypothesis of corporate takeovers. *The Journal of Business*, 59(2), 197–216. <https://doi.org/10.1086/296325>
- Shleifer, A., & Vishny, R. W. (1986). Journal of political economy. *Large Shareholders and Corporate Control*, 94(3, Part 1), 461–488.
- Skinner, D. J. (2008). The evolving relation between earnings, dividends, and stock repurchases. *Journal*

- of *Financial Economics*, 87(3), 582–609. <https://doi.org/10.1016/j.jfineco.2007.05.003>
- Stephens, C. P., & Weisbach, M. S. (1998). Actual share reacquisitions in open-market repurchase programs. *The Journal of Finance*, 53(1), 313–333. <https://doi.org/10.1111/0022-1082.115194>
- Vafeas, N. (1997). Determinants of the choice between alternative share repurchase methods. *Journal of Accounting, Auditing & Finance*, 12(2), 101–124. <https://doi.org/10.1177/0148558X9701200201>
- Vafeas, N., & Joy, O. M. (1995). Open market share repurchases and the free cash flow hypothesis G35. *Economics Letters*, 48(3), 405–410. [https://doi.org/10.1016/0165-1765\(94\)00631-B](https://doi.org/10.1016/0165-1765(94)00631-B)
- Vermaelen, T. (1981). Common stock repurchases and market signalling: An empirical study. *Journal of Financial Economics*, 9(2), 139–183. [https://doi.org/10.1016/0304-405X\(81\)90011-8](https://doi.org/10.1016/0304-405X(81)90011-8)
- Weigand, R. A., & Kent Baker, H. (2009). Changing perspectives on distribution policy: The evolution from dividends to share repurchase. *Managerial Finance*, 35(6), 479–492. <https://doi.org/10.1108/03074350910956945>
- Yeh, H. T., Huang, Y. X., & Chung, K. C. (2013). Empirical study on influential determinants for enterprise capital reduction: Evidence from cash reduction and stock repurchase. *International Journal of Organizational Innovation (Online)*, 5(4), 100.



© 2020 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.



You are free to:

Share — copy and redistribute the material in any medium or format.

Adapt — remix, transform, and build upon the material for any purpose, even commercially.

The licensor cannot revoke these freedoms as long as you follow the license terms.

Under the following terms:

Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made.

You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

No additional restrictions

You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

***Cogent Economics & Finance* (ISSN:) is published by Cogent OA, part of Taylor & Francis Group.**

Publishing with Cogent OA ensures:

- Immediate, universal access to your article on publication
- High visibility and discoverability via the Cogent OA website as well as Taylor & Francis Online
- Download and citation statistics for your article
- Rapid online publication
- Input from, and dialog with, expert editors and editorial boards
- Retention of full copyright of your article
- Guaranteed legacy preservation of your article
- Discounts and waivers for authors in developing regions

Submit your manuscript to a Cogent OA journal at www.CogentOA.com

