

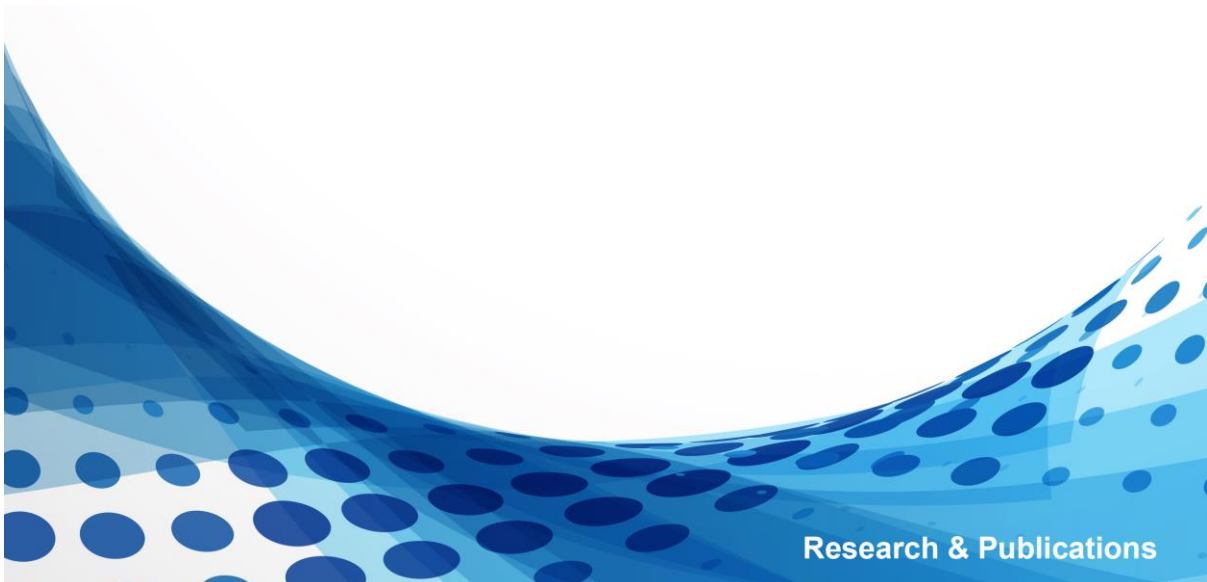


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Working Paper

## **Cyclically Adjusted PE ratio (CAPE) and Stock Market Characteristics in India**

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Research & Publications

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**September 2022**

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# Cyclically Adjusted PE ratio (CAPE) and Stock Market Characteristics in India\*

Joshy Jacob<sup>‡</sup> Pradeep K.P.<sup>§</sup>

September 29, 2022

## Abstract

We estimate the Cyclically Adjusted PE ratio (CAPE) for equity indices in the Indian market. We find the average CAPE ratio of the Indian market is lower than that of the US. Judging the market valuation level based on a long-term moving average of CAPE, we find that the CAPE has remained above the average since 2014. Prominent episodes where CAPE exceeds its average include the period before the 2008 Global Financial Crisis and the post-COVID-19 period. We find that a higher CAPE is associated with lower future returns for holding periods varying from one year to ten years, indicating the negative association between expected returns and CAPE. We also find that a higher CAPE is associated with a greater demand for IPOs by investors and more optimistic earnings forecasts by analysts. Net fundraising through equity significantly increases during periods of high CAPE suggesting rational market timing by firms.

*Key words:* CAPE, Market Irrationality, Asset Pricing, India

*JEL classifications:* E3, E7, G1, G4

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\*We thankfully acknowledge the financial support provided by the NSE Centre for Behavioral Science. Any errors are the authors' responsibility.

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# 1. Introduction

It is important to assess the level of financial market valuation relative to the fundamentals through suitable indicators. One of the widely employed indicators of market valuation is the cyclically adjusted PE ratio, popularly known as CAPE proposed by [Shiller \(2000\)](#). CAPE is known to be a contrarian predictor of future real returns ([Jivraj & Shiller, 2017](#)). We develop CAPE based on different indices in the Indian market covering its entire history. We also investigate how CAPE is associated with market outcomes such as future returns, fund raising by firms, investor sentiment towards IPOs, and analysts' expectations.

We find that the average level of CAPE ratio in India is noticeably lower compared to that reported for the US market. For instance, while the mean CAPE value for Sensex is about 24 for the period from March 1998 until February 2022, the corresponding value for the US market is about 27.5. The peak value of CAPE reached in India occurred in October 2007, whereas it peaked in the US just prior to the dot-com bubble in March 2000. On the contrary, the CAPE value of the Indian market is significantly higher compared to that based on FTSE. As reported from other markets, CAPE is a contrarian indicator of future equity returns in India. For example, over a five-year holding period, the annualized return is about 21.4% when the investment is committed during a month characterised by the lowest quintile of CAPE. On the other hand, the corresponding return falls to 7.7% when the investment is made in a month that belongs to the fifth quintile of CAPE. We find that firms favour equity buybacks and dividend payouts during periods of lower CAPE values, whereas issuance of shares and warrants is favoured during periods of higher CAPE value. The timing of equity issuance and buybacks associated with CAPE values indicate the managerial timing of equity financing decisions.

There is a significant association between investor sentiment towards IPOs and CAPE values. The average number of times an IPO receives a subscription is strongly linked to the CAPE values prevailing at the time of the IPO. The average IPO subscription reaches around 50x during months characterised by the highest CAPE quintile, in contrast, subscription is about 10x for IPOs opened during the months characterised by the

lowest CAPE quintile. Possibly as an outcome of IPO timing in periods with strong investor sentiment, we observe lower long-run returns for IPOs issued during periods characterised by high CAPE values. We also find that analysts become more optimistic in their EPS growth estimates in periods of high CAPE values. We document that nearly 5% higher annual EPS growth rate for forecasts issued during months that fall into the highest quintile of CAPE values. The impact of CAPE in the judgment of IPO investors and analysts, suggests its widespread influence on valuation as perceived by the market participants.

The findings of the paper have several implications for market participants. Primarily it suggests that the CAPE could be employed as guidance for asset allocation decisions. Particularly, the contrarian indicator of CAPE for future returns reveals that increased allocation to equity during periods of high CAPE is more likely to be followed by lower returns. Even across the industries within a market, the relative level of CAPE ratios could guide asset allocation decisions. A favourable portfolio tilt towards sectors with relatively lower CAPE values could help in strengthening the portfolio performance.

We intend to maintain frequently updated data of CAPE for public use, as a barometer of market valuation. It is intended to provide guidance for financial market practitioners, including fund managers and traders to monitor the aggregate market valuation levels. The regularly updated series of CAPE values for the Indian market can be accessed from <http://marketlens.iima.ac.in/CAPE>.

## **2. Background of CAPE**

It is important to develop an barometer that can indicate whether a market is over- or under-valued is important for several reasons. As fund managers move funds across global markets, it is important to measure the expected return potential for different markets through a comparison of the valuation levels. Such signals are immensely valuable to fund managers who decide on asset allocation based on the assessment of future expected returns. There are several measures employed to judge individual stock performance such

as price-to-book, price-to-cash, price-to-earnings, dividend yield etc. These metrics give a reasonable short-term assessment of the stock-level valuation. However, they are exposed to the influence of business cycles, when employed over the medium to long-term.

In order to limit the influence of business cycles in the assessment of stock valuation, investors often average the performance of a firm, over a business cycle, so as to develop a more reliable metric such as the price ratio. Including the earnings of the past 5 to 10 years may also help to lower the impact of business and economic cycles. However, including the fundamentals of the firm over a long period of time, such as a decade, is likely to be impacted by the influence of inflation over time. Therefore, a comparison of the price-to-earnings ratio based on nominal earnings over a period of time may end up suggesting cheaper stock prices in the presence of non-trivial levels of inflation. For instance, a high level of inflation is likely to puff up the nominal earnings and therefore make the valuation matrices such as the price-to-earnings ratio look cheaper. As any reasonable assessment of asset bubbles would require judgement over a period of time, it is important to evaluate the price-to-earnings in terms of real earnings than nominal earnings.

It is in this context, Robert Shiller developed a long-term indicator of market valuation based on inflation adjusted earnings at the aggregate market level ([Shiller, 2000](#)), popularly known as the Cyclically Adjusted price-to-earnings (CAPE). CAPE is claimed to be a better predictor of future market returns relative to several other alternative measures (for instance, [Jivraj & Shiller, 2017](#)). Therefore, CAPE can offer a market-level outlook on the valuation levels to investors so as to guide them through fund allocation. Comparing CAPE across markets would guide investors in their global asset allocation. Furthermore, as argued, comparing the CAPE values across sectors offers valuable insights on sector rotation of investment portfolios ([Bunn et al., 2014](#)).

### **3. Estimation of CAPE**

CAPE ratio is calculated using earnings-per-share over a long period to reflect a business cycle such as 10-years to mitigate the influence of any abnormal spikes or troughs in

the earnings growth of firms during a business cycle. The data required to estimate the CAPE value includes the firm-level earnings, the market capitalisation of the stocks and inflation data over a long period in the Indian market. Based on the reported earnings, the inflation adjusted real earnings in a year  $Y$  is computed as follows:

$$\text{Real earnings}_Y = \text{Nominal earnings}_Y \times \frac{\text{Inflation index at the last year in the sample}}{\text{Inflation index}_Y} \quad (1)$$

Also, an analogous adjustment is carried out to convert the market capitalisation to the real values. Finally, CAPE is computed with the real earnings and the real market capitalisation, by aggregating the values across the constituent firms of the chosen index. The real earnings are averaged over a cycle of either 5 or 10 years. Based on the moving average of the real earnings, the CAPE for a month is estimated simply as

$$CAPE = \frac{\text{Market capitalization of the index}}{\text{Moving average of real earnings}} \quad (2)$$

where the market capitalization represents, the inflation adjusted market capitalization of the set of stocks underlying index for the corresponding period. While there are several changes in the accounting norms over the period covered in the data, which impact the earnings reported by firms, such issues are ignored in our analysis, given the difficulty to adjust the earnings over time.<sup>1</sup>

The market price data and firm-level earnings data are sourced from the CMIE Prowess database.<sup>2</sup> The changes in the index constitution over time are tracked from data available in CMIE ProwessIQ.<sup>3</sup> The data on inflation is taken from the database maintained by the Reserve Bank of India.<sup>4</sup> We develop a CAPE measure for a set of stock market indexes in India. The list of the indexes are (a) Sensex (b) BSE 100 (c) BSE 500 (d) Nifty 50 (e) Nifty 100, and (f) Nifty 500.

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<sup>1</sup>The inconsistencies in accounting income is expected to have an impact on the predictability of CAPE for future returns. A discussion of such issues is provided in Siegel (2016).

<sup>2</sup>Source:<https://prowessdx.cmie.com/>.

<sup>3</sup>Source:<https://prowessiq.cmie.com/>.

<sup>4</sup>Inflation data is sourced from the RBI public database <https://dbie.rbi.org.in/DBIE/dbie.rbi?site=statistics>

## 4. Findings and discussion

The CAPE estimates for the different equity indices in the Indian market including Sensex, for the longest available time series, are given in [Figure 1a](#) and [Figure 1b](#). [Figure 1a](#) gives CAPE estimates based on a 10-year business cycle, as used by Shiller in constructing the earliest CAPE series. [Figure 1b](#) gives the corresponding CAPE figures assuming a five-year business cycle for averaging the real earnings.

The summary statistics (mean, median, and standard deviation) of CAPE values for the different indices are given in [Table 1](#). The mean CAPE value for Sensex is about 30.6 (10-year cycle). The peak value of CAPE of 67.9 is reached in the Indian market just prior to the 2008 Global Financial Crisis. Thereafter, it remained below 40 until the market reached the post-COVID-19 recovery phase. The post-pandemic phase shows a sharp rise in the CAPE values. The pattern is more or less analogous for the other two indices, BSE 100 and BSE 500 and also for CAPE estimated assuming a 5-year business cycle (as in [Figure 1b](#)). CAPE estimates based on the NSE indices show lower average values, possibly due to the shorter time period covered by the index.

**Table 1:** CAPE - summary statistics

Index	Period	10-year cycle			5-year cycle		
		Mean	SD	Median	Mean	SD	Median
Sensex	1993-2022	30.58	11.52	25.74	23.65	7.73	21.4
BSE 100	1993-2022	29.21	10.09	24.78	23.69	6.69	23.02
BSE 500	1999-2022	26.14	6.68	24.75	25.26	7.99	23.83
Nifty 50	1997-2022	27.82	9.79	23.9	23.61	6.93	22.04
NSE 100	2006-2022	26.54	5.7	24.96	22.42	6.54	20.42
NSE 500	2004-2022	26.2	6.83	25.28	25.12	8.24	22.76

*Note:* Table shows the summary statistics of CAPE values for the different indices in the Indian market. Columns corresponding to ‘10-year’ and ‘5-year’ cycle in the table indicate the period underlying the business cycles for which earnings are averaged to estimate CAPE values.





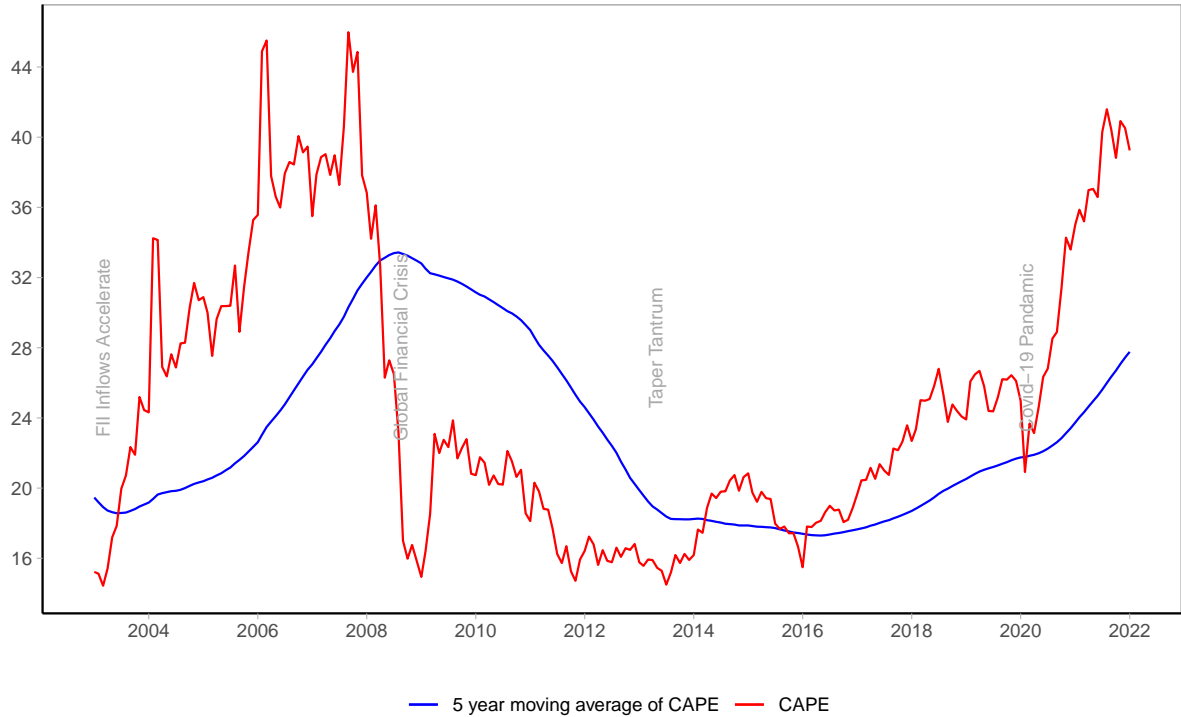
(a) Panel A: CAPE ratio BSE Indices - 10-year cycle



(b) Panel B: CAPE ratio BSE Indices - 5-year cycle

**Figure 1:** Monthly CAPE ratio - BSE Indices

*Note:* The figure shows the CAPE values from March 1998 to February 2022 period based on different business cycles. The indices represent the listed firms on the Bombay Stock Exchange.

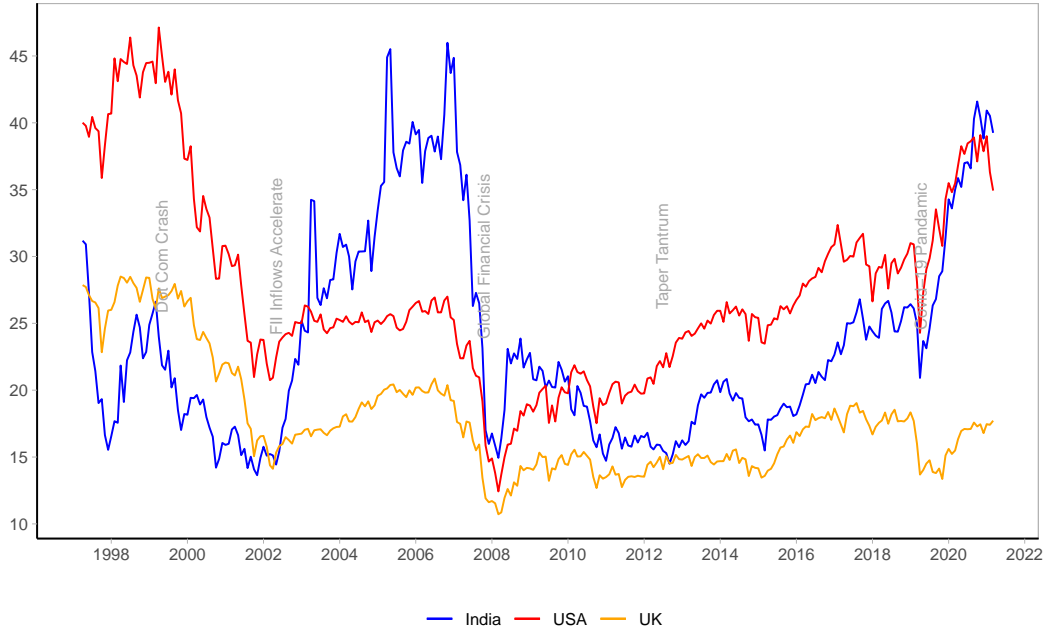


**Figure 2:** CAPE and moving average of CAPE ratio Sensex - 5-year cycle

*Note:* The figure shows the CAPE and the 5-year moving average of CAPE values from March 1998 to February 2022 period. The values correspond to Sensex assuming a 5-year business cycle.

In order to judge the level of market valuation, we compare the CAPE values with its own 5-year moving average (Figure 2). We find that the CAPE has started to exceed the moving average in the post-2014 period. The difference has become more pronounced in the post-pandemic period, with CAPE values reaching close to its pre-2008 Global Financial Crisis level. A comparison of the CAPE values of the Indian market with that of the US and UK<sup>5</sup> is provided in Figure 3. The peak CAPE value reached in the Indian market during the dot-com bubble is significantly lower compared to that observed in the US market.

<sup>5</sup>CAPE data for the US and UK are sourced from indices provided by Barclay's, accessed from <https://indices.barclays/IM/21/en/indices/static/historic-cape.app>



**Figure 3:** CAPE ratio - India and other countries

*Note:* The figure shows the CAPE values for different countries from March 1998 to February 2022. CAPE data for the US and UK are sourced from indices provided by Barclay’s accessed from <https://indices.barclays/IM/21/en/indices/static/historic-cape.app>

In contrast, the Indian market recorded a peak CAPE value during the 2005-2008 period, in line with the heightened growth expectations of the Indian economy at that time. The post-2008 Global Financial Crisis period largely shows relatively subdued CAPE values for the Indian market as compared to that of the US market. Only in the post-COVID-19 pandemic period, the CAPE values in India have surpassed that in the US market. A comparison of the CAPE values for different countries, as obtained from the data maintained by Barclays, is given in [Table A1](#) in the Appendix.

We deepen the understanding of the likely influence of CAPE in the Indian market in several ways. First, we investigate the association of CAPE with future market returns. Second, we examine the predictability of a range of corporate decisions including, equity and debt issuance, and buybacks across periods that vary in the CAPE values. Third, we study the IPO subscription and pricing for issue periods that differ in their CAPE values. Finally, we investigate the possible association between analysts’ forecast behaviour and CAPE values.

#### 4.1. CAPE and future returns

We examine the extent to which future stock returns are linked to the level of CAPE at a particular point in time, for each of the different indices. The analysis includes both univariate comparisons of returns over future holding horizons varying from one-year to 10-years and predictive regressions.

The future returns associated with varying CAPE values for Sensex are provided in [Table 2](#). The table broadly indicate that higher CAPE values are associated with lower future returns, as observed elsewhere in the world ([Jivraj & Shiller, 2017](#)). For instance, over a three-year period, the lowest range of CPAE (from 16.6 - 21.4) is associated with about 14% annualized returns, and the corresponding return for the highest range of CAPE is only about 9% (in Panel A). A similar pattern holds in the case of all the other future holding period horizons considered here, including a 10-year period. CAPE measured over the 5-year business cycle also shows a similar pattern. The distribution of the future returns for various holding periods corresponding to the CAPE quintiles is given in [Figure 4](#). In line with the average returns, the density plot [Figure 4](#) clearly shows that investments in periods characterized by higher CAPE quintiles are followed by periods with a higher probability of subdued returns.

We further examine the relationship between CAPE values and future returns through predictive regressions of the following form:

$$r_{t+k} = \alpha + \beta \times CAPE_t + \epsilon_t \quad (3)$$

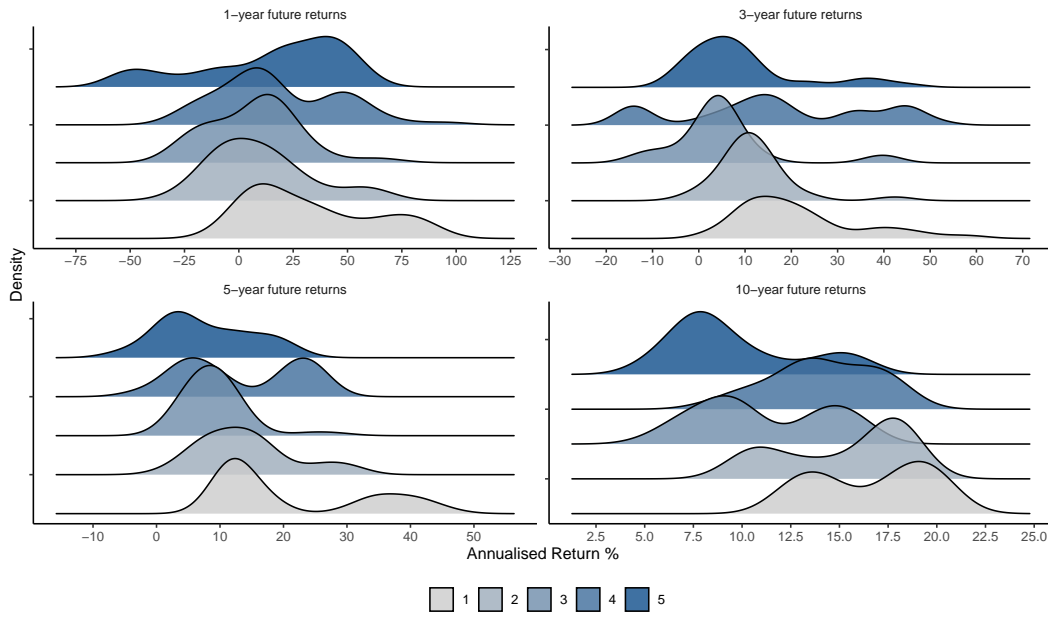
where  $r_{t+k}$  represents the annualized return for an investment committed at month  $t$ , held for a future horizon of  $k$  months. The  $k$  values range from 12 (one-year) to 120 months (10-years).  $CAPE_t$  is the CAPE value for month  $t$ .

**Table 2:** Average annualised future returns and CAPE - Sensex

CAPE Range	Annualised future returns			
	1-year	3-years	5-years	10-years
Panel A: CAPE with a 10-year business cycle				
16.6 - 21.4	24.56	14.02	14.85	18.74
21.5 - 23.8	11.49	13.05	10.77	14.56
23.9 - 30.8	17.3	18.26	12.54	12.8
30.9 - 39.1	26.39	18.46	14.72	11.75
39.1 - 67.9	12.45	8.6	7.68	9.05
Panel B: CAPE with a 5-year business cycle				
13.6 - 16.8	32.44	21.4	21.45	16.65
16.8 - 19.8	9.9	11.74	13.99	15.21
19.8 - 23.4	7.02	5.06	9.11	11.06
23.6 - 30.4	18.06	17.17	13.27	14.16
30.4 - 46	14.43	9.5	7.74	9.61

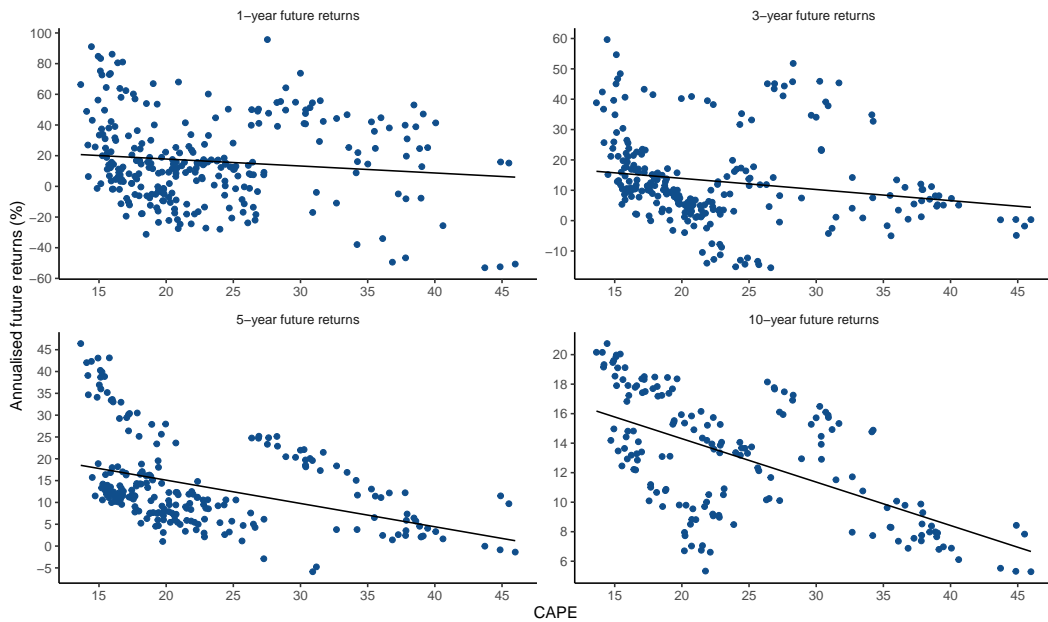
*Note:* The table shows annualised average returns for various holding periods for CAPE quintiles. The CAPE range indicates the minimum and maximum values within each quintile. Panel A (Panel B) shows the future returns for CAPE underlying a 10-year (5-year) business cycle. The CAPE values correspond to Sensex.

The estimation results are given in [Figure 5](#) and in [Table A2](#). The estimated coefficients for CAPE values, significant for all the regressions, corroborate the negative association between CAPE and future returns. For instance, a one-unit increase in the CAPE value is associated with a 0.5% decline in the annualized return over a five-year holding period. The magnitude of the coefficient is economically significant given the level of market returns during the period. The corresponding association between CAPE quintiles and future returns for BSE 500 is provided in [Table A3](#) and [Figure A1](#) in the Appendix. The regression estimates for future returns are given in [Table A4](#) and [Figure A2](#) in the Appendix. Broadly, the results based on CAPE for BSE 500 firms are consistent with those obtained for Sensex. [Raju \(2022\)](#) also find that CAPE is a significant contrarian predictor of the future returns over multiple horizons in the Indian market.



**Figure 4:** Annualised Sensex future returns and CAPE quintiles

*Note:* The figure shows the distribution of annualized returns for a 1-year, 3-year, 5-year & 10-year holding periods for different CAPE quintiles. The figure represents CAPE values assuming a 5-year business cycle for Sensex.



**Figure 5:** Annualised Sensex future returns and CAPE

*Note:* The Figure shows the estimated one-, three-, five- & ten-year annualised future returns (Y-axis) corresponding to CAPE ratio for Sensex (X-axis). The line shows regression estimates.

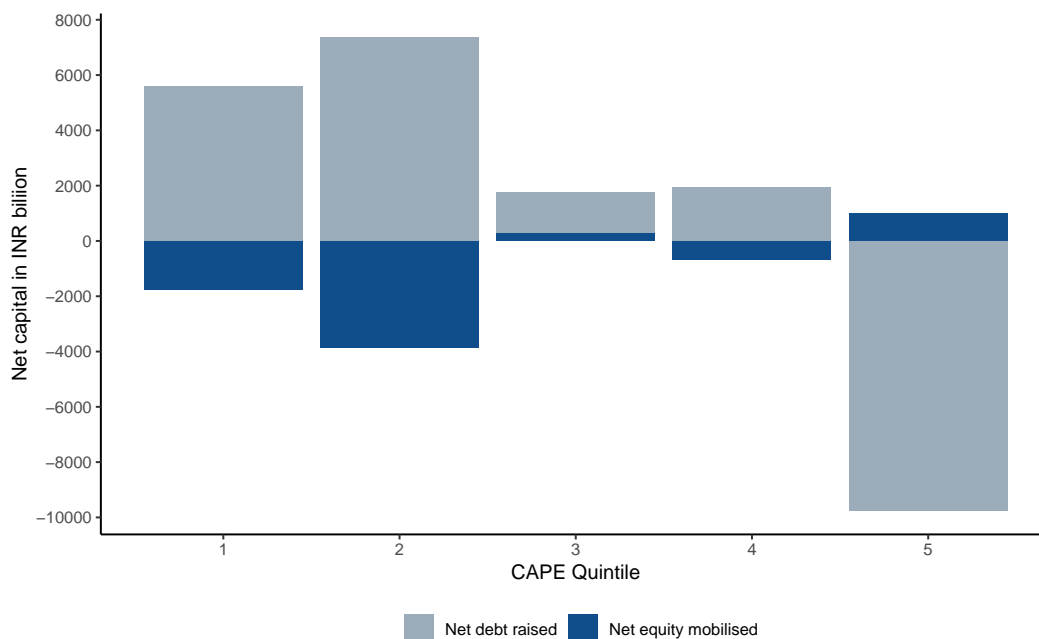
## 4.2. CAPE and corporate fund raising

We investigate the possible association between CAPE and the amount and the type of capital raised by firms. For this purpose, we compute annual net equity mobilisation and net debt financing by firms as follows:

$$\text{Net equity mobilisation} = (\text{Share issues} + \text{Warrant issues}) - (\text{Issue expenses} + \text{Equity buybacks} + \text{Dividend} + \text{Dividend tax})$$

$$\text{Net debt raised} = \Delta (\text{Long term borrowings} + \text{Short term borrowings} - \text{Cash and cash equivalents})$$

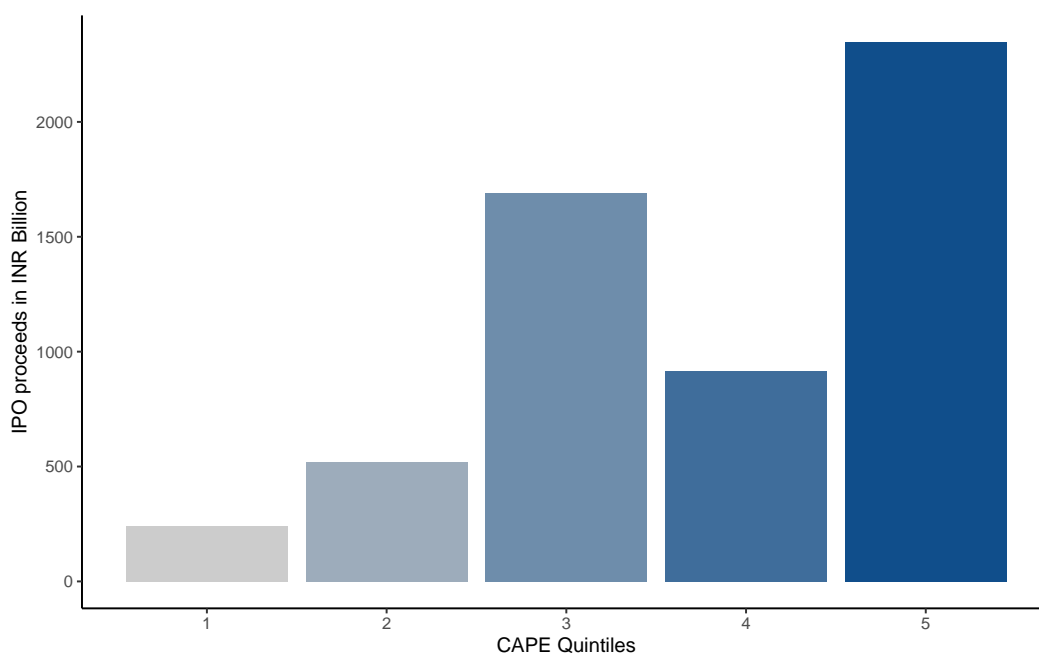
The equity and debt financing is estimated annually at the end of each financial year for all the firms listed in BSE and NSE. The total equity and debt mobilization are plotted against the CAPE quintiles, where the CAPE quintile is assigned based on the average CAPE value of the year in which financing is raised (Figure 6). The CAPE value considered is of the Sensex with a 5-year business cycle.



**Figure 6:** Net capital mobilisation and CAPE

*Note:* The Figure shows the net capital raising (Y-axis) by firms across periods that vary on CAPE quintiles (X-axis) in INR billions. The data is sourced from the cash flow statement in Prowess. The CAPE quintiles represent the average CAPE value over a given financial year.

The figure suggests that equity buybacks and dividend payouts are favoured during periods of lower CAPE values. In contrast, the issuance of shares and warrants is favoured during periods of higher CAPE values. The increase in buybacks associated with lower CAPE values indicates managerial timing of equity buying in anticipation of higher future valuations. Likewise, the increase in share issuance during periods of higher CAPE values indicates anticipation of lower future valuations and opportunistic market timing. Furthermore, the figure also suggests that the net debt raised is higher during the period of lower CAPE values. The net debt raised during periods of the highest CAPE value (5<sup>th</sup> quintile) turns negative, implying that firms tend to hold cash and pay off debt during such periods.



**Figure 7:** IPO proceeds and CAPE

*Note:* The Figure shows the net IPO proceeds (Y-axis) for firms that have issued their IPO in a month that falls into one of the CAPE quintiles (X-axis) based on Sensex.

We extend the analysis of the association between firm-level financing and CAPE values, by investigating the variation in the amount of equity financing through initial public offerings (IPO). The association of monthly IPO proceeds raised, in periods characterised by different ranges of CAPE values, is shown in figure [Figure 7](#). The figure suggests that



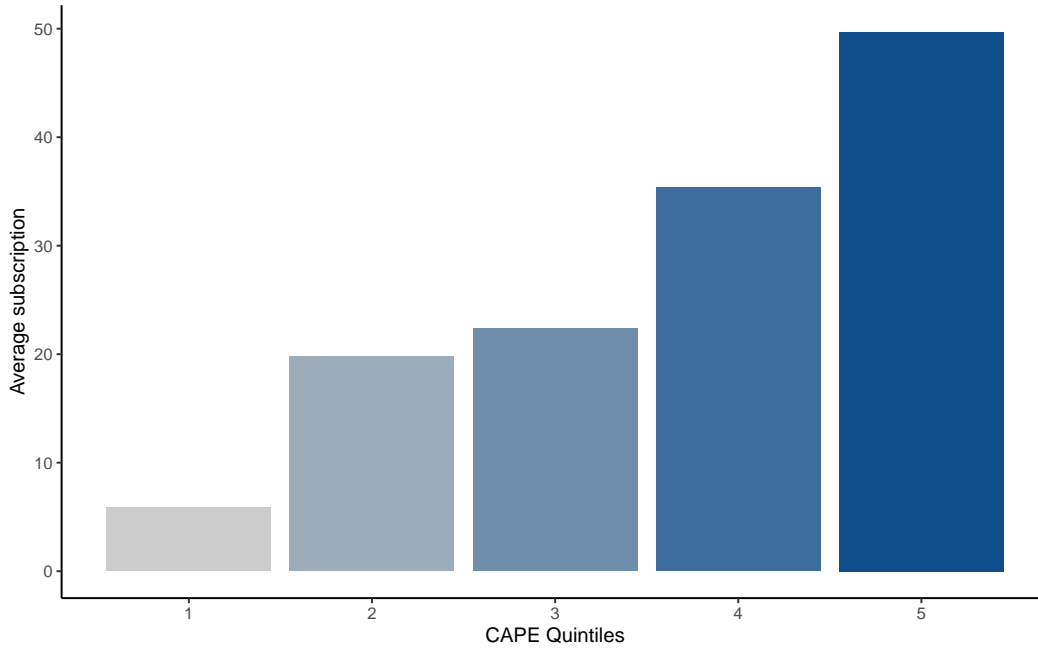
the IPO issuance by firms is systematically clustered towards periods marked by higher CAPE values.

#### *4.3. CAPE and investor response*

We analyse the investor response to IPOs issued across different time points with varying CAPE values by employing subscriptions as an indicator of investor sentiment for IPOs. For the analysis, we estimate the average value weighted subscription of IPOs issued in a month for each of the CAPE quintiles. [Figure 8](#) gives the average subscription for IPOs issued over months that vary on their CAPE quintile. The figure clearly indicates that the average subscription to IPOs increases with the CAPE quintile. The average number of times an IPO is subscribed reaches around 50x during months characterised by the highest CAPE quintile. In contrast, the average subscription remains below 10 for IPOs opened during months with the lowest CAPE quintile.

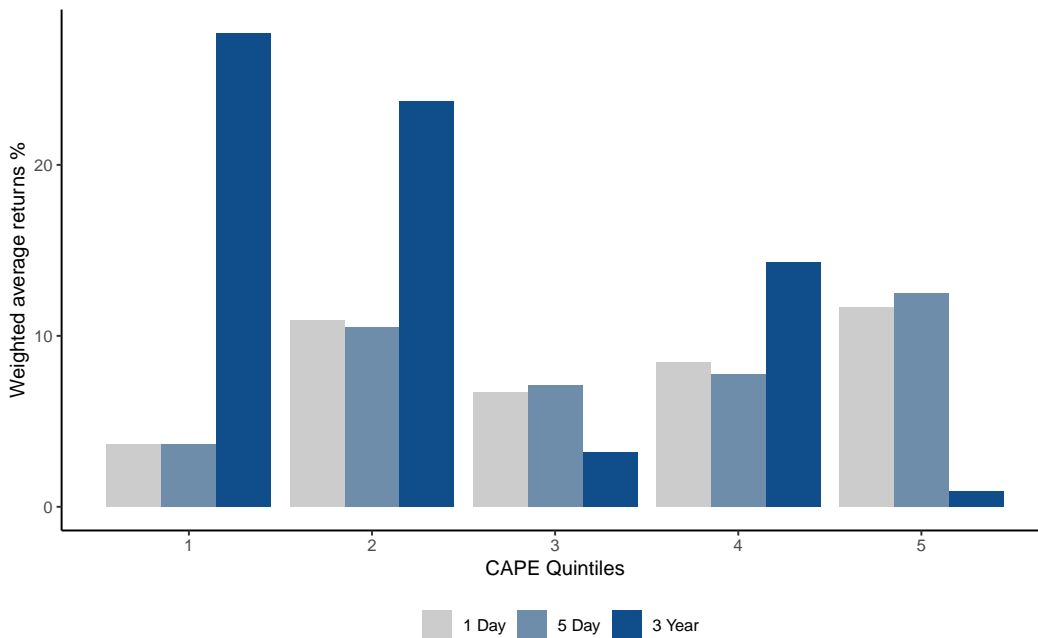
Furthermore, we examine the IPO returns across different CAPE quintiles. The returns are estimated for 1-day, 5-day and 3-year holding periods from the day of IPO listing and are estimated relative to the IPO price. The returns are weighted by IPO size within each of the CAPE quintiles. The relationship between CAPE and the weighted average returns for the different periods are plotted in [Figure 9](#).

The figure shows that the 1-day and 5-day average returns are increasing from lower to higher CAPE values, suggesting strong investor sentiment, most likely in anticipation of higher future returns. In contrast, the 3-year average returns are higher for IPOs issued in periods of lower CAPE. This indicates that IPOs that opened during periods of higher CAPE values realise lower long-run post-IPO returns. The pattern observed in [Figure 8](#) and [Figure 9](#) suggests that investor interest in IPOs increase with CAPE values. Taken together, the timing of capital raising by firms and the investor sentiment towards IPOs, imply that firms exploit the elevated pricing associated with high investor sentiment.



**Figure 8: IPO subscription and CAPE**

*Note:* Figure shows the average value weighted IPO subscription (Y-axis) for firms that have issued their IPO in a month that falls into one of the CAPE quintiles (X-axis) based on Sensex.



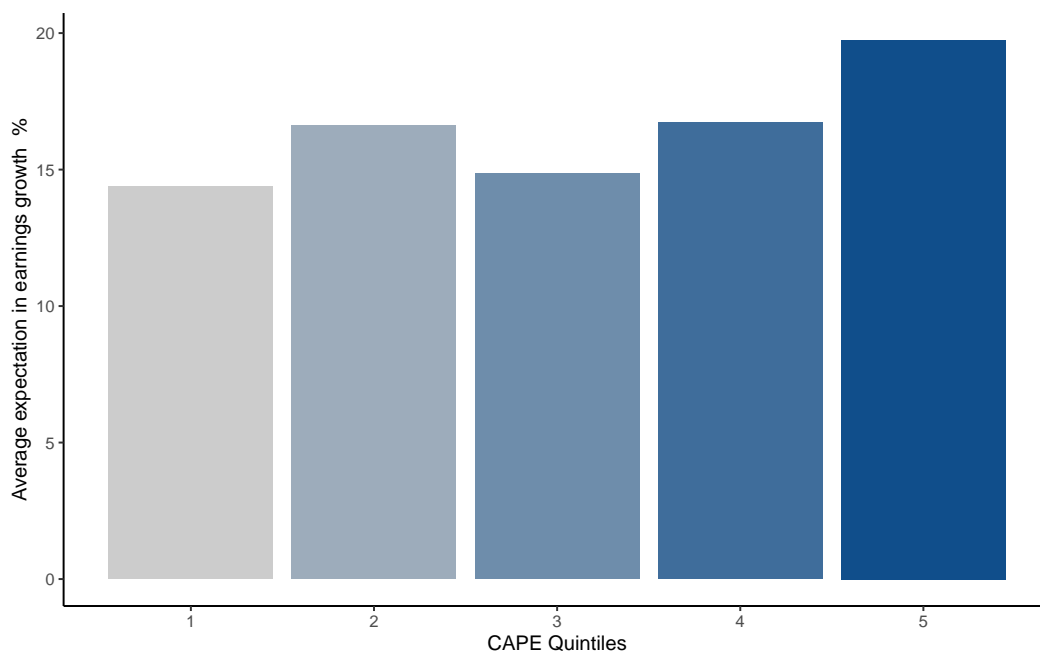
**Figure 9: IPO returns and CAPE**

*Note:* The Figure shows the weighted average of returns across 1-day, 5-day and 3-year post-listing periods (Y-axis) for firms that have issued their IPO in a month that falls into one of the CAPE quintiles (X-axis) based on Sensex.

#### 4.4. CAPE and analyst expectations

We investigate the likely association between CAPE and equity analyst expectations about future EPS growth. The analysis is carried out based on one-year EPS forecasts for the Sensex firms available from the Institutional Brokers Estimate System (I/B/E/S), maintained by Reuters Datastream for the period from March 1998 to February 2022. We estimate the growth rate implied by one-year ahead EPS forecasts across months that fall into different CAPE quintiles. The EPS growth rate computed for each CAPE quintile is estimated as the market capitalisation weighted EPS growth rate of the firm underlying Sensex.

We observe significant differences in the EPS growth implied by analyst forecasts for periods that vary on the CAPE values. For instance, the average one-year EPS growth rate is about 19.2% for forecasts issued in a month where CAPE value falls into the fifth quintile. The corresponding growth figure for forecasts issued in the months that fall under the first quintile of CAPE is only about 14.2%, a difference of about 5%.



**Figure 10:** Analyst earnings growth expectations and CAPE

*Note:* The figure shows the expected annual earnings growth reflected in analysts' forecasts. Each of the monthly values of EPS growth rate corresponds to the value weighted percentage EPS growth of the constituent stocks of Sensex for which forecasts are available in a month. The CAPE represents to that of Sensex assuming a 5-year business cycle.

The relationship between the value of CAPE and the value weighted growth in the EPS is plotted in Figure 10. The figure suggests the analyst forecasts become more optimistic following periods of higher CAPE value. We observe a similar pattern for CAPE based on the other indices. The relationship between analyst forecasts and CAPE observed in India is similar to that observed elsewhere in the world. Admittedly, the finding does not mean that the analyst optimism, reflected in forecasts during periods of high CAPE values, is excessively optimistic.

## 5. Conclusion

We estimate the time series of CAPE ratio for the Indian market based on several equity indices. We find that the average level of CAPE ratio in India is significantly lower than that observed for the US market. For instance, while the average value of CAPE based on the Sensex is 23.6 for the period from March 1998 until February 2022, the corresponding figure for the US market is about 27.5. On the other hand, CAPE for the Indian market is significantly higher compared to that based on FTSE.

Furthermore, as observed for most markets, CAPE is a contrarian predictor of future returns in India. The return over a five-year holding period declines from 21.4% to 7.7% as the timing of the investment moves from a month that belongs to the first quintile of CAPE to one that falls into the fifth quintile. A similar pattern is also observed for other long-term future investment horizons. We also find that analysts and investors become more optimistic during periods characterized by higher CAPE values. In line with the investor and analyst optimism, we also document that firms rely more on equity financing (lower debt financing) during periods of high CAPE values.

Several asset allocation implications emerge from our paper. Primarily, the contrarian predictive outcomes associated with CAPE reveal that increased allocation to equity during periods of high CAPE is more likely to result in relatively lower returns. Furthermore, the relative position of different sectors on CAPE ratio could be employed in asset allocation decisions, with greater allocation in favourable sectors with relatively lower CAPE values. The regularly updated series of CAPE value for the Indian market can be accessed from <http://marketlens.iima.ac.in/CAPE>.

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## 6. Appendix

**Table A1:** Country-wise CAPE ratio statistics

Country	Mean	SD	25 <sup>th</sup> -p.tile	50 <sup>th</sup> -p.tile	75 <sup>th</sup> -p.tile
Australia	22.48	3.89	19.75	21.58	25.33
Brazil	14.72	3.46	12.10	13.73	17.31
Canada	26.90	7.89	21.75	23.94	30.80
China	19.35	7.48	14.79	16.79	21.29
Europe	21.90	7.09	17.07	20.65	23.92
France	25.27	10.51	17.26	23.28	28.77
Germany	25.11	9.29	19.17	21.81	27.23
Hong.Kong	19.49	4.16	16.85	19.51	21.47
India	30.58	11.52	22.07	25.74	35.87
Israel	21.72	8.26	15.02	18.05	28.72
Italy	23.08	12.43	12.68	20.54	27.05
Japan	41.44	22.62	22.95	27.45	64.67
Korea	16.53	4.13	13.11	15.26	18.93
Mexico	23.20	5.17	19.69	23.57	25.45
Netherlands	22.86	8.23	15.78	20.84	28.76
Poland	15.46	5.21	12.27	13.43	17.42
Russia	9.86	5.42	6.48	7.97	9.77
Singapore	18.64	4.97	15.45	16.79	20.97
South.Africa	21.10	2.83	19.18	20.65	22.72
Spain	19.98	8.37	14.45	16.66	24.12
Sweden	26.89	10.61	21.11	23.19	29.47
Switzerland	27.80	8.08	22.99	26.30	29.65
Taiwan	23.05	3.65	21.04	22.77	24.12
Turkey	13.08	4.34	9.59	12.40	15.33
UK	17.83	4.26	14.74	17.02	19.58
USA	27.49	7.32	23.20	25.69	30.63

*Note:* The table shows the summary statistics of CAPE values for different countries corresponding to a 10-year business cycle. The CAPE statistics for India are estimated for Sensex with a 10-year business cycle. All the other CAPE values are sourced from Barclay's, accessed from <https://indices.barclays/IM/21/en/indices/static/historic-cape.app>

**Table A2:** Annualised future returns and CAPE - Sensex regressions

	10-year	5-year	3-year	1-year
CAPE	-0.294*** (0.031)	-0.534*** (0.079)	-0.366*** (0.121)	-0.455* (0.232)
Intercept	20.189*** (0.797)	25.788*** (1.878)	21.244*** (2.874)	26.906*** (5.582)
Observations	168	228	252	276
Adjusted R <sup>2</sup>	0.347	0.165	0.032	0.010

*Note:* Table shows the regression estimates of future annualised returns on CAPE values based on Sensex estimated assuming a 5-year business cycle. The 10-year, 5-year, 3-year and 1-year indicates the future holding period of the investment. \*, \*\*, and \*\*\* indicates the significance levels at the 10%, 5% and 1% levels.

**Table A3:** Annualised future returns and CAPE - BSE 500

Annualised future returns				
CAPE Range	1-year	3-years	5-years	10-years
Panel A: CAPE assuming a 10-year business cycle				
16.1 - 20.6	27	14.67	13.97	15.21
20.7 - 22.8	13	11.96	10.87	14.02
22.8 - 26.3	15.72	10.96	10.58	13.95
26.3 - 32.5	0.95	6.81	8.16	10.05
32.6 - 45.2	11.17	1.91	9.48	7.9
Panel B: CAPE assuming a 5-year business cycle				
13.3 - 18.9	31.33	16.84	14.65	14.55
19 - 21.8	9.8	11.34	10.13	11.28
21.8 - 26.6	20.27	12.42	12.09	10.78
26.7 - 30.4	17.33	13.17	15.48	12.25
31.2 - 47.8	7.54	3.57	4.01	8.28

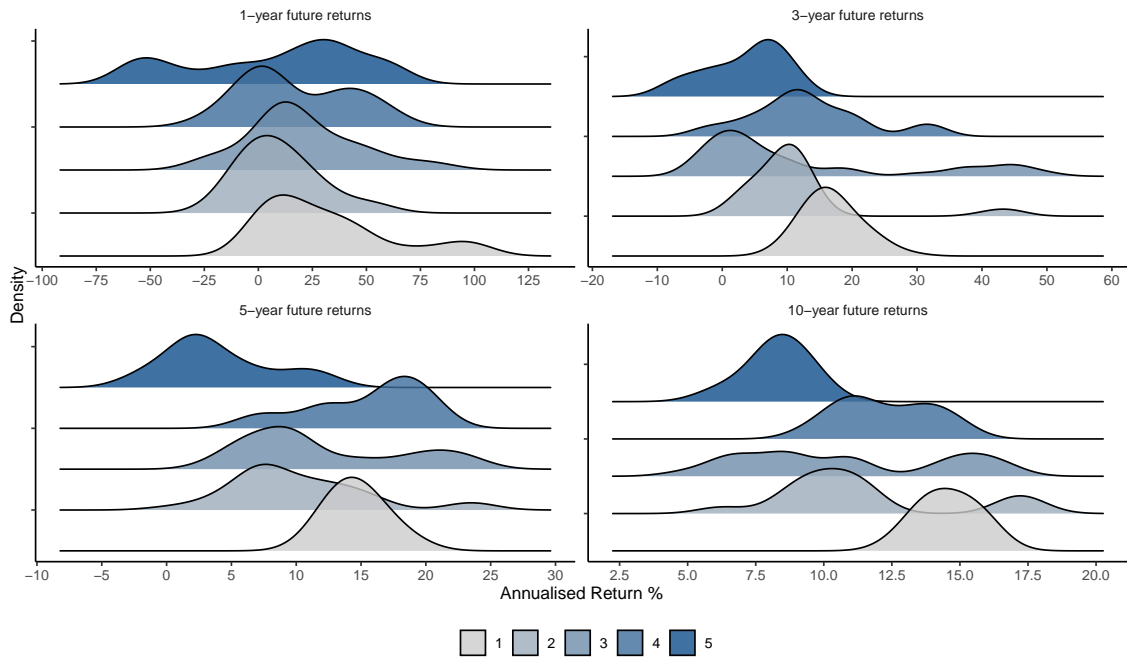
*Note:* The table shows annualised average returns for various holding periods for each of the CAPE quintiles. The CAPE range indicates the minimum and maximum CAPE values within each quintile. Panel A shows the future returns for CAPE underlying a 10-year business cycle and Panel B provides the corresponding figures for CAPE estimates with a 5-year business cycle. The CAPE values correspond to BSE 500.



**Table A4:** Annualized future returns and CAPE - BSE 500 regressions

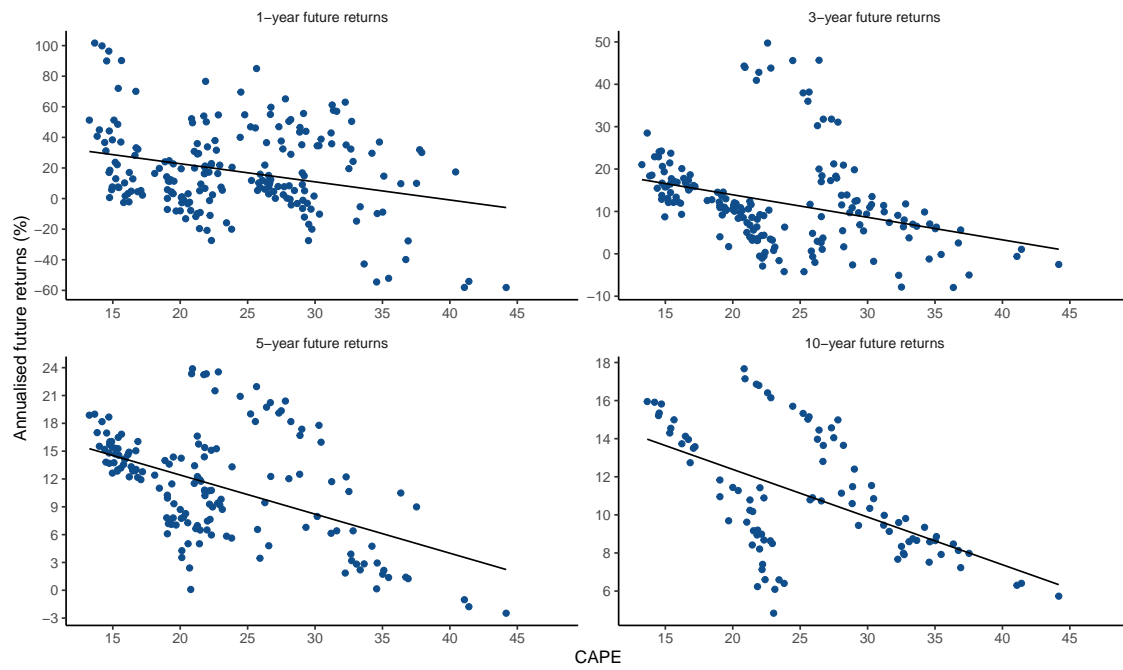
	10-year	5-year	3-year	1-year
CAPE	-0.250*** (0.041)	-0.422*** (0.060)	-0.531*** (0.119)	-1.186*** (0.289)
Intercept	17.392*** (1.080)	20.858*** (1.426)	24.555*** (2.881)	46.503*** (7.240)
Observations	96	156	180	204
Adjusted R <sup>2</sup>	0.279	0.237	0.096	0.072

*Note:* Table shows the regression estimates of future annualised returns on CAPE values based on BSE 500 estimated assuming a 5-year business cycle. The 10-year, 5-year, 3-year and 1-year indicates the future holding period of the investment. \*, \*\*, and \*\*\* indicates the significance levels at the 10%, 5% and 1% levels.



**Figure A1:** Annualised BSE-500 future returns and CAPE

*Note:* The figure shows the distribution of annualized returns for a 1-year, 3-year, 5-year & 10-year holding periods for different CAPE quintiles. The figure represents CAPE values assuming a 5-year business cycle for BSE 500.



**Figure A2:** Annualised BSE-500 future returns and CAPE - regression results

*Note:* The figure shows the regression estimates of future annualised returns (Y-axis) on CAPE values (X-axis) based on BSE 500 estimated assuming a 5-year business cycle. The 10-year, 5-year, 3-year and 1-year indicates the future holding period of the investment.