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The stock market response to the Union Budget

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The Union Budget is perhaps the most-watched event in economic policy making in India. The core fiscal issues – taxation, expenditures, the fiscal deficit – are obviously important for macro-economics. In addition, governments have often chosen to use the Budget speech as a mechanism for announcing important new policy initiatives, and for outlining some plans for economic policy in the coming months.

Casual empiricism reveals that stock market activity tends to be greatly influenced by the Budget. As of today, the highest number of trades ever recorded on NSE was 1.4 million trades, on 28 February 2001, a Budget day. The stock market response to a Budget is often viewed as an important summary statistic of the ‘quality’ of a Budget in terms of improving macro-economic prospects.

In this paper, we seek to explore the interplay between the Budget and the stock market, in the following areas –

Informational efficiency First, we seek to examine the extent to which the stock market response to the Union Budget is consistent with the behaviour that we might expect in an efficient market, i.e. in a world with speculation by rational economic agents. These explorations may be characterised as exploiting the Union Budget as an opportunity to learn about the market efficiency of the Indian equity market. Is it meaningful to pay attention to the ‘stock market response’ to a Budget? If we are to pay attention to the stock market response to a Budget, should the immediate

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response be considered important, or should the market be given ‘some time’ to digest the information?

The budget as an economic policy package We go on to ask questions about the Union Budget and its role in Indian economics, using the stock market as an information processing tool which can give us useful insights into Union Budgets.

Implications for portfolios and trading From the narrow perspective of financial market practitioners, the Union Budget is characterised by enormous market volatility and turnover. This leads to interesting practical questions, about the extent to which empirical research can guide hedging and trading around the Budget date. These questions have become particularly important owing to the fact that stock index derivatives are now traded in India, which now makes it possible for economic agents to speculate on movements of the stock index, to speculate on predictions about index volatility, and to hedge themselves against fluctuations of the index. Hence, we also utilise our empirical evidence to shed some light on questions directly connected with trading and portfolio formation.

1 Data description

In this paper, we restrict our attention to the stock market index, and do not explore questions connected with the fluctuations of individual stock prices.

1.1 Stock market index data

We construct a long time-series, consisting of 4,673 observations of daily returns on the ‘Indian stock market index’ from 4 April 1979 till 11 June 2001. This series is made up by concatenating five sets of slightly incompatible methodologies of market index calculation (Shah & Thomas 1998).

1. The first data series is for the BSE Sensex from 4 April 1979 till 1986. This data came about when the BSE Sensex was created, in 1986, and BSE back-calculated returns on the BSE Sensex portfolio (as of 1986) from 4 April 1979 onwards. This method suffers from a selection bias, since stocks selected in 1986 by a committee of stock brokers in charge of the index are likely to have fared well in preceding years. Hence, over this date range, the index series is likely to have a slight positive bias in returns.
2. The second data series is for the BSE Sensex from 1986 till 3 July 1990. BSE did not maintain the BSE Sensex in this period, which might generate a slight downward bias in returns.

3. From 3 July 1990 till 2 November 1995, we use data for Nifty, back-calculated at CMIE. The methodology here involved quarterly revisions of the Nifty set. However, 'trading frequency' was used as the liquidity metric, and BSE returns were used.
4. From 2 November 1995 till 8 July 1996, Nifty was computed using NSE returns. The Nifty set was updated using market impact cost as the liquidity metric. In this period, intra-day data is not available, and the Nifty high and low data are not accurate.
5. Finally, from 8 July 1996 onwards, we have the modern Nifty series, where Nifty was computed in real-time at NSE, and maintained using market impact cost as the liquidity metric. In this period, the Nifty high/low are accurate, intra-day data is available, etc.

A correct measurement of the returns on holding the equity index for an investor would include dividends. This is called a 'total returns' or 'TR' index. In India, the TR index series is only observed for Nifty, from 3 July 1990 onwards. In the interests of consistency and span, we use the pure price index over our entire date range, i.e. 4 April 1979 onwards.

1.2 Union Budgets

We study the movements of the Indian stock market index around all Budget dates in this period. Table 1 shows these Budget dates. There are 26 Budgets in this dataset. This is not a large dataset. This puts a constraint on certain interesting classes of questions which would require further partitioning of these observations, such as comparisons between 'Interim' and 'Final' budgets.

2 Broad empirical facts

Table 2 shows simple summary statistics about returns and squared returns. Daily returns is defined as the percentage change in the index from one day to the next. The sample mean of daily returns over all days works out to 8.4 basis points per day, and $E(r_t^2)$ works out to 2.94.

We focus on the behaviour of the equity index for a window of 45 trading days before and after the Budget. There are 2,762 days which are outside these windows. They have mean returns of 7 basis points and mean squared returns of 2.445. The 45-day window prior to the Budget has strong positive mean returns of 19.3 basis

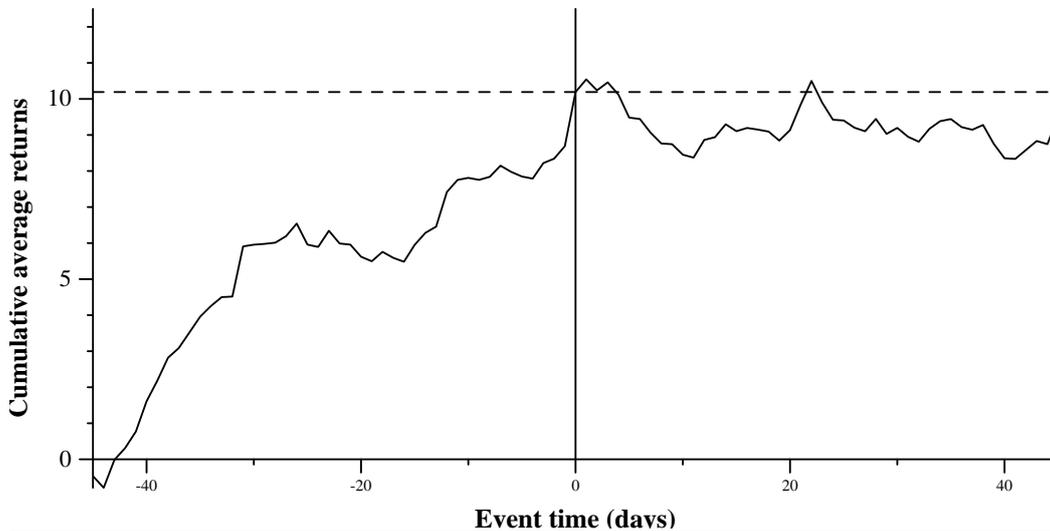
Table 1 Union Budgets from April 1979 till June 2001

	Minister	Date	Type
1	R. Venkataraman	11.3.80	Interim
2	R. Venkataraman	18.6.80	Final
3	R. Venkataraman	28.2.81	
4	Pranab Mukherjee	27.2.82	
5	Pranab Mukherjee	28.2.83	
6	Pranab Mukherjee	29.2.84	
7	V.P. Singh	16.3.85	
8	V.P. Singh	28.2.86	
9	Rajiv Gandhi	28.2.87	
10	N.D. Tiwari	29.2.88	
11	S.B. Chavan	28.2.89	
12	Madhu Dandvate	19.3.90	
13	Yashwant Sinha	4.3.91	Interim
14	Yashwant Sinha	24.7.91	Final
15	Manmohan Singh	29.2.92	
16	Manmohan Singh	27.2.93	
17	Manmohan Singh	28.2.94	
18	Manmohan Singh	15.3.95	
19	Manmohan Singh	28.2.96	Interim
20	P. Chidambaram	22.7.96	Final
21	P. Chidambaram	28.2.97	
22	Yashwant Sinha	25.3.98	Interim
23	Yashwant Sinha	1.6.98	Final
24	Yashwant Sinha	27.2.99	
25	Yashwant Sinha	29.2.00	
26	Yashwant Sinha	28.2.01	

Table 2 Summary statistics of the index time-series

	All	45 days		Non-Budget
	days	before Budget	after Budget	days
Mean r_t	0.0840	0.1930	-0.0152	0.0698
Mean r_t^2	2.9432	2.4469	4.6808	2.4450
Observations	4673	945	945	2762

Figure 1 Cumulated returns of the index around Budget dates



points per day and exhibits volatility which is much like non-budget days. The 45-day window after the budget exhibits substantially elevated volatility, with $E(r_t^2)$ of 4.6808, and slightly negative returns.

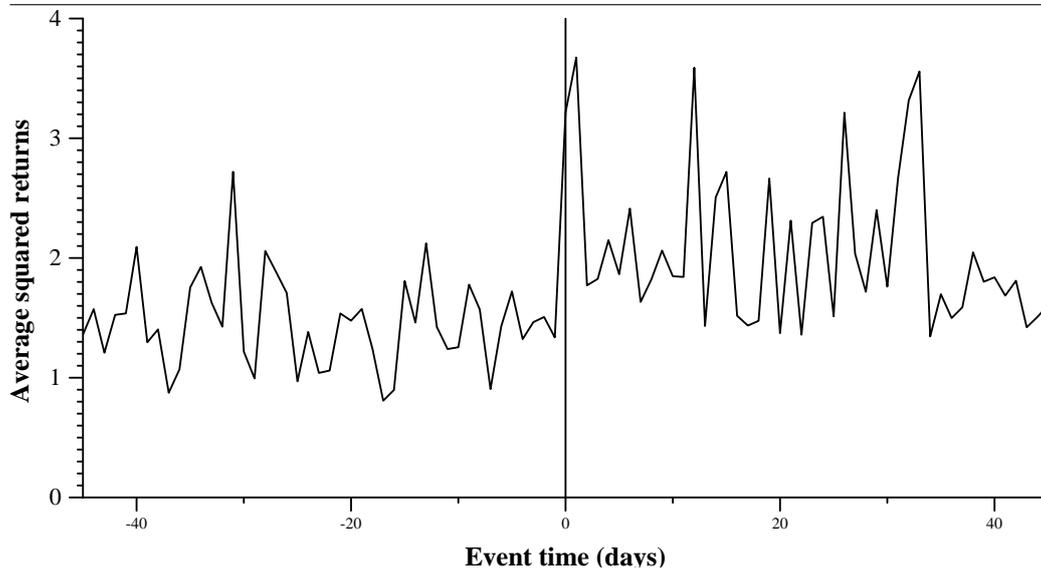
For a further empirical analysis of index behaviour around budget date, we draw an analogy from the Event Study methodology (Fama et al. 1969, Brown & Warner 1980, MacKinlay 1997). In the standard event study, a set of events is observed about individual firms – such as dates on which firms announced a stock repurchase program. The event study methodology first isolates ‘abnormal returns’ as the market model residual. The key insight of the event study methodology is to define $t = 0$ as the event date, and examine abnormal returns for all firm–event pairs before and after the event date. The average cumulated return is computed as the ‘cumulative abnormal return’.

The event study methodology has been used with enormous success in understanding the stock market response to events about firms. Under the premise that markets efficiently process information, the event study methodology reveals valuable facts about the behaviour and decisions of firms.

In our case, we are not dealing with firm–level data, hence a standard event study is not relevant. However, we do use the key insight of the event study methodology – that of defining $t = 0$ as the event date, and focusing on mean behaviour (across all events) before and after the event.

Figure 1 shows an ‘event study’ depicting cumulated average index behaviour around Budget dates. We show cumulated returns here, not the cumulated abnor-

Figure 2 Mean squared returns of the index around Budget dates



mal returns (CAR) which is normally shown in event studies. Figure 2 shows a similar ‘event study’ depicting the behaviour of squared returns around Budget dates. We use these as the foundation for addressing a variety of questions in the following sections.

3 Information and efficiency

In an ideal efficient market, markets rapidly process information. New information, and only new information, generates price volatility. If markets are strong-form efficient, then considerable information about the Budget will leak into prices prior to the Budget speech, through two channels:

- Financial markets have a strong incentive to try to anticipate future policies of the government. Hence, they will invest resources in acquiring information and in information processing in order to understand policy alternatives, and to make forecasts about future policies.
- This process would be assisted by public information releases by the government about what might be likely in the coming Budget, and by leaks of information about the upcoming budget.

In the ideal strong-form efficient market, the Budget speech would not be a surprise; markets would have fully captured all information prior to Budget date.

One difficulty in interpreting the Union Budget as an informational shock lies in the fact that in the days following the Budget, there is a non-zero flow of new information. Many announcements about taxation are clarified in following days. Sometimes, government chooses to amend proposals in response to public and parliamentary feedback. Hence, the period after the Budget date is not devoid of the flow of new information.

We can postulate four testable propositions about the informational efficiency of the stock market surrounding the Union Budget:

H1 Volatility will be higher around budget date.

If the Union Budget is an important set of economic policy announcements, it should generate enhanced price volatility when compared with non-budget dates.

H2 If markets are strong-form efficient, most information will be impounded into prices *prior* to budget date.

H3 On the Budget date and after the Budget date, volatility will be elevated (in response to new information) and will die down gradually to ‘normal’ levels.

H4 The quick reaction of markets to the budget – in one or atmost two days after the Budget speech – will be a good predictor of the long-run impact of the Budget.

These four null hypotheses are consistent with market efficiency, and can be falsified by empirical evidence. We now turn to the empirical evidence.

H1 In Table 2, we see that post-budget squared returns are much higher, at 4.6808, when compared with non-budget days, at 2.445. This is consistent with Hypothesis H1.

H2 In Figure 1, we see a 10% increase in the stock index from day -45 till date 0 (Budget date). From date 0 to date +45, the stock index returns are not statistically significantly different from 0. This suggests that substantial information processing is taking place prior to budget date. There is no evidence of over-reaction or under-reaction prior to Budget date, or immediately after it. This is consistent with Hypothesis H2.

H3 In Figure 2, we see enhanced volatility from date 0 till date 35 or so, after which volatility dies down to “normal” pre-budget levels. This is consistent with Hypothesis H3.

H4 In Figure 1, we see that there is no systematic movement in the market (on average) after the Budget date. Hence, the level of the stock market index prevalent immediately after the Budget is a fairly accurate predictor of where the index will be one month later.

Thus these broad features of the data are consistent with information processing by rational speculators, and are consistent with the null hypothesis of an efficient stock market.

The puzzling feature of this evidence is the extent to which volatility is elevated *after* the budget date, without being associated with systematic changes in the index. In some years, post-budget returns are positive; in other years post-budget returns are negative; on average, there is no clear pattern about movement in the index after budget date (in contrast with the clear evidence in favour of a strong pre-budget rally). This suggests that stock market investors who stay invested in equities in the period after the budget are not being compensated for the higher risk that they take in this period.

4 The budget as an economic policy package

Figure 1 suggests that the Budget is an economic policy package which adds 10% to the level of the stock market index, on average. This suggests that (on average) Union Budgets are beneficial policy packages for the macro-economy.

It appears that Budgets are not surgical introductions of new information into the economy – many clarifications and possibly changes in policy do take place in the following 35 trading days, which gives us strong elevated stock market volatility over this period. However, these clarifications and changes in policy (on average) have no effect on the level of stock prices, when compared with the level seen immediately after Budget day.

In the future, this evidence may guide stock market speculators to buy the Indian equity index on date -45 and sell on date 0 .

5 Implications for portfolios and trading

These results have two important implications for financial trading and portfolio strategies :

- In the post-budget period, equity investors seem to be enduring higher volatility, without any excess returns in compensation. While this feature continues to exist, it may make sense for many investors to short sell index futures on budget date, and reduce their beta for a period of roughly two calendar months.

- Volatility speculators may find opportunities to buy volatility (i.e. buy the at-the-money index call option + buy the at-the-money index put option) before Budget date, and sell volatility a few weeks after Budget.

In an efficient market, implied volatilities on the index options market should show such patterns too, where index options become costly shortly before the Budget date, and prices of index options drop sharply after the news of the Budget seems to have been absorbed in the market.

6 Conclusion and areas for further work

A first order regularity about the Indian stock market index is the enormous importance of the Union Budget in influencing prices and volatility. Our results may be summarised as follows:

- The stock market appears to be fairly efficient at information processing about the Union Budget.
- Union Budgets add 10% to the stock index, on average, and yield elevated volatility starting from the Budget date for the following 30 trading days or so.
- There is a puzzle in the post-budget period, where equity investors are exposed to substantially higher volatility without higher returns as a consequence. It immediately suggests hedging strategies for equity investors, who could benefit by short-selling index futures on or near budget date. In the long term, if enough economic agent engage in such behaviour, we may see a shift in the behaviour of the index.

This paper is only a first examination of a wide range of questions on the interplay between the Union Budget and the stock market. Other areas which merit further exploration include:

- Will the nascent index options market successfully exhibit time-variation in the implied volatility, so that the simple volatility speculation strategies described in Section 5 would be unprofitable?
- The stock market receives some budgets well and others badly. It would be useful to test whether, ex-post, it the case that the budgets which were well-received were actually followed by strong GDP growth.
- In recent years, economic reforms have tried to reduce the extent to which the State engaged in industrial policy by modifying taxes and engaging in direct expenditures aimed at encouraging or discouraging particular industries.

If stock markets process information well, this should have a consequence that the cross-sectional variation of stock returns for firms or industries should be more homogeneous in the decade of the 1990s. In other words, in years or industries where government has attempted to have ‘industrial policy’, the market model R^2 should be lower.

- When the Finance Minister reads out the budget speech, the efficient stock market should react within seconds to each sentence that is read out, in terms of a direct impact on stock prices of firms and industries that are either positively or negatively affected. Given that intra-day stock price information is now available, it should be possible to test whether such impacts do take place, and whether there is over-reaction or under-reaction in these immediate responses.
- The Indian economy has seen major changes in the role of Government, and hence the Union Budget, in the economy from 1991 onwards. The stock market has seen major improvements in liquidity from 1995 onwards. The technologies and institutional mechanisms for transferring and processing information, which are the foundation of information processing by financial markets, have been transformed over the years.

Hence, the empirical evidence shown here – based on the average behaviour surrounding 26 Budgets from April 1979 onwards – is of limited value in making statements about the relationship between the stock market and the Union Budget *today*. As further data accumulates, it would be important to reassess the evidence by focusing on a homogeneous policy regime, i.e. the period from 1995 onwards.

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