DETERMINATION OF SHARE PRICES IN INDIA: AN ANALYSIS OF THE AGGREGATE TIME TREND

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1. Introduction

The formation of share (called stock in the USA) prices and prediction of these prices are issues which have been the subject of a substantial amount of technical and non-technical research. However, these issues are far from settled, though a few times they were thought to be so. Every seemingly convincing explanation, both on *a priori* grounds and empirical, is soon countered with evidence which undermines it considerably.

The objective in this paper is rather limited. An attempt is made to identify the factors affecting trends in share prices in India and quantify the impact of each factor on share prices. Prediction of share prices could be a more interesting subject (and if successful, far more rewarding!), but it is also less tractable. In fact, it may not be possible at all.[1/] We also limit our enquiry to an annual trend in the averages (between 'high' and 'low' prices for the year) for all the companies in our sample as aggregates. This means that we are not trying to explain (i) the daily, weekly or even monthly fluctuations in share prices, and (ii) the variations in price fluctuations of shares of individual companies.

Given our intention of establishing a relationship between our share price index and the variables that are hypothesised to affect it, qualification (i) above has to be ruled out because data for very few of the explanatory variables are available for a period of less than a year. As for (ii) above, it is discussed in another paper (planned as complementary to the present paper).

2. The Problem in Perspective

Analyses of share prices have generally been of three types: (a) the 'pure statistical' or 'chartist', (b) the 'intrinsic-worth' or 'fundamental', or (c) the 'efficient market model'.

The first type, used by most non-academic share market analysts, employs various statistical tools to ascertain patterns in share price movements and predict share prices by extending the same pattern. For our purposes, however, this has little applicability, for it does not explicitly recognise any cause-and-effect relationship between other variables and share prices.

The 'intrinsic-worth' or 'fundamental' school employs a model wherein the share prices are theorised to be linked to its 'intrinsic worth', i.e., the rate of return it is generally expected to yield.[2] The price may not actually be equal to what such a model would predict at any point of time due to other determinants, but the tendency to equate is always there, according to this theory. The exact definition of 'intrinsic-worth' is a matter of debate, but it is agreed that the two parts of this 'intrinsic-worth' consist of the expected flow of dividends and the expected capital gains. By its very nature, this method is obviously not very appealing to a stock-market operator whose sole interest is in the short term fluctuations in share prices from which he profits. For our purposes here, however, it may be an appropriate theory.

The third type of analyses, employing the efficient market model, is essentially the application of the rational expectations hypothesis to the share market.[3/] The theory contends that every bit of available information related to the prospects of a company/group of companies is instantaneously processed by the market and reflected in the share prices. Thus, between any two points of time the change in share prices is purely the effect of random occurrences in that period, obviating prediction of share prices with any degree of consistency. Generally, this model is described in three forms. The weak form (which is sometimes identified with the Random Walk hypothesis [4/]) defines the available information as those on past share prices only. The semi-strong form defines the same as any publicly available information. The strong form defines it as all information, including those available to a few only.

It needs to be noted that any testing of the efficient market model must employ a series of share prices with the minimum possible time gap between observations, as the speed of adjustment is as much a part of the hypothesis as the completeness of the assimiliation of information in the share price. Also any test has to be indirect because the hypothesis is so general. The indirect tests normally use only share price data. Thus, this model is not very useful for our present purpose as (i) annual averages should not be used to test this model[5] and (ii) it does not allow us to link share prices with any set of well-defined variables.

The 'pure statistical' or 'chartist' method, it should be clear by now, is totally inconsistent with the efficient market hypothesis, because the former is based on the premise that some available information is not reflected in the current price but is likely to affect future price, whereas the latter totally denies such a possibility. But the 'intrinsic-worth' and 'efficient market' hypotheses may be consistent with each other. One can view the price formation process in the share market as consisting of two conceptually identifiable parts: (i) determination of the 'intrinsic-worth' of the shares using a subset of information from the complete set available (for example, the annual report, the related industrial policy decisions, the tax treatment of the company concerned, and so on), and

(ii) the fluctuations around this 'intrinsic-worth' using the rest of the information set. Implicit in this framework is the assertion that the 'intrinsic-worth' is relatively constant (because its determinants are relatively stable), whereas the rest of the price is transitory (because the rest of the information set consists of information with temporary validity and has to be continuously updated). If we can interpret the annual average of 'highs' and 'lows' as something akin to this stable 'intrinsic-worth', then what follows in this paper can also be consistent with the 'efficient market' hypothesis, though it will neither confirm nor reject the hypothesis.

3. The Basic Model

The basic model we start with is the Gordon-Lintner type, which postulates that under certain assumptions, the price of a share in period t is equal to the sum of all future dividends, appropriately discounted. This principle can be expressed in continuous form using an integral or in discrete form. We prefer the latter, because *de facto* dividends are not continuously variable over time. In algebraic terms:

$$SP_t = \sum_{i=t}^{\infty} \frac{DIV_i}{(1+r_i)^i} \qquad \text{.............} \quad (1)$$

where SP_t = share price in period t; DIV_i = dividends in period i, and r_i = discount rate in period i.

If we assume that r is constant, then the formulation becomes

$$SP_t = \sum_{i=t}^{\infty} \frac{DIV_i}{(1+r)^i} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

i.e., the subscript of r drops out.[6]

In the pure form of this model, either (1) or (2) will hold irrespective of the holding period. To show this, let us assume that the holding period is three years. Then,

$$SP_t = \sum_{i=t}^{t+3} \frac{DIV_i}{(1+r)^i} + SP_{t+3}/(1+r)^3 \quad \ldots\ldots\ldots (3)$$

$$\text{or, } SP_t = \sum_{i=t}^{t+3} \frac{DIV_i}{(1+r)^i} + \left[\sum_{k=t+3}^{\infty} \frac{DIV_k}{(1+r)^{k-(t+3)}} \right] / (1+r)^3$$

$$= \sum_{i=t}^{\infty} \frac{DIV_i}{(1+r)^i}$$

It can be seen that the logic of the formulation applies for any other holding period. But to use such a model as it is for empirical analysis would be inadvisable for various reasons.

The model is based on some assumptions which have to be assessed for their validity in real life before it can be used for empirical work, and these assumptions have to be relaxed/modified, if necessary.

The first assumption is that of certainty. In the above formulation, the dividend stream is assumed to be known to the investor. This obviously is incorrect, because at the time of investment both continued existence and the amount of dividends are uncertain. We mention the former specifically to highlight the possibility of liquidation of the company concerned as different from simply 'skipped' dividends. Apart from causing us to substitute 'expected dividends' for 'dividends' in the formulation above, it can have other implications that we will go into later.

The second assumption is that of no taxes. In fact, the investor has to pay taxes on his income, which means that apart from the usual discounting, the expected stream of income has to be reduced by the tax liability also. Moreover, since the tax rates on ordinary income (i.e., dividends in this case) and on capital gains differ, the holding period is no more irrelevant.

The third assumption is that of unchanged equity capital. With the issuing of new shares, the formulation may have to be revised. However, we retain this assumption on the ground that in general, an investor does not expect it since existing companies do not float new issues all that frequently. There may be exceptions, but not so many that this assumption is rendered conterfactual.

A key assumption, implicit in the model, is that investors have both the ability and the inclination to forecast dividends for all time to come. This assumption seems very unrealistic, because even with the best of forecasts it is widely known that the further removed it is from the present, the greater are the expected divergences from the actuals. To us, equation (3) seems more reasonable with the second term on the right estimated in a different way. We deal with this modification in the next section.

The formulation above does not consider the risk factor. It is understood that high-risk assets must promise high returns. Hence, even when the expected stream of dividends, expected terminal price of the share, and the discount rate(s) is (are) the same, the current price of the riskier share must be lower than the price of a small-risk share. This must also be taken care of in our modifications.

4. The Modified Model

This section deals with the modifications in the basic model, keeping in view the assumptions discussed above. Variables, that we argue are also relevant, are added, followed by a discussion of the method of testing our ultimate equation.

a. The Expected Dividend Stream

We have already said that dividends (DIV) in the certainty model need to be replaced by expected dividends (DIV^e) in the uncertainty model. The inevitable question is: How are these expectations formed?

The available literature provides two answers. Gordon (1962), for example, links dividends with the rate of return, growth in capital base, the debt equity ratio and the retention rate (or equivalently, the pay-out ratio). This would certainly be valid in an *ex post* sense, but of doubtful value in the context of an investor's expections. It can be safely assumed that investors are aware of these links (at least in an imprecise way), but do they actually estimate future dividends using their estimates of all these factors, or, do they have a short cut?

The second answer is that they do have a short cut, derived from behaviour of past dividends or a rule of thumb. Brinner and Brooks (1981), for example, use various expectations behaviour, where the future dividends stream is estimated on the basis of either a constant growth rate or dividends paid in earlier years. Alternative schemes can be tried in such an approach. We specify the following, the best of which would be determined empirically:

$$DIV_t^e = DIV_{t-1}; \text{ (static expectations);} \ldots\ldots(4)$$

$$DIV_t^e = a(DIV_{t-1} - DIV_{t-1}^e) + DIV_{t-1}^e;$$

$$\text{(adaptive expectations);} \ldots\ldots\ldots(5)$$

$$DIV_t^e = DIV_o\ (1+g)^t; \text{ (constant expectations);}.(6)$$

where

DIV_t^e = expected dividends in period t; DIV_t = actual dividends in period t; a=a constant; DIV_o = actual dividends in the initial period; g = growth in the dividend rate estimated over the total sample period.

The other type of dividend expectation generating scheme could also have alternative specifications, depending on which factors were assumed constant and which were assumed variable. We, however, use only a simple version of the same, under the assumption that the rate of return, the debt-equity ratio and the pay-out ratio are all constant. Only the capital stock is variable and it grows at a fixed rate, j. Then,

$$DIV_t^e = K_o\ (1+j)^t\ mp. \qquad \ldots\ldots\ldots\ldots\ldots(7)$$

where m = the constant rate of return on capital, and p = the constant pay-out ratio.

$$\text{However, } DIV_o = K_o \, mp$$

$$\text{or} \quad K_o = DIV_o / mp$$

Substituting this into (7), we get

$$DIV_t^e = DIV_o \, (1+j)^t$$

This is exactly the same specification as in (6), with g = j. Thus, there is no need to use (7) as a specification different from (6) and we therefore use only (4), (5) and (6) alternatively to estimate expected dividends.

b. <u>The Terminal Year Price of the Share</u>

This is possibly the most difficult part of the specification, once we forgo the discounted dividend stream model for this purpose, as an independent method of estimating share price at the end of the holding period is called for.

There could be various ways of doing this, and probably all of them affect the subjective estimate of the investor. One could base his estimates on past behaviour of share prices, on past and projected growth, on past and projected profitability, on projected investments of the company, and so on. Taking into account all this is obviously a difficult task. We make a particular behavioural assumption here to simplify matters. We assume that investors 'play safe' or are relatively risk-averse in an informal sense. The implication then would be that the terminal year share prices they would estimate would be conservative ones. In other words, they take into account a price which would be the minimum they would get in the terminal year.

This too could be achieved in various ways. For example, one could simply link the 'low's in share price during the past few years and extend it. However, given the extent of fluctuations in share prices and our assumption of 'playing safe', it does not appear to be the most attractive.

We specify the estimation procedure as the following:

$$SP_n^e = q\ A(1+k)^n/N, \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(8)$$

where SP_n^e = expected share price in period n (the terminal year), q = the share of equity in total debt plus equity, A = total assets, k = growth rate in total assets over the entire sample period, and N = number of shares.

The above specification describes the expected share price as the liquidation price of the share, i.e., per share value of the shareholders' portion of the total assets. Brinner and Brooks (1981) use a specification which is essentially similar. However, they use replacement cost of assets rather than book values, and instead of specifying growth rate of assets, they specify a growth rate of retained earnings to arrive at the rise in asset value. This, to us, seems incomplete because assets could increase through debt financing too. The other difference is that they inflate asset values with an inflation term. Our reason for not including an inflation term is that we use it as a separate variable. Finally, we could not use replacement cost figures because of non-availability of such figures in India. (Such figures are published regularly in the USA). Also, it is doubtful whether an average investor thinks of asset values as replacement values rather than book values.

c. Taxes

The relevant taxes here are corporate income tax, the personal income tax and the capital gains tax.[7] The corporate income tax is relevant for equation (7). However, as it can be easily ascertained, it makes no difference to our argument as long as it is constant. Strictly speaking, the effective rate may not be constant, but then the same argument could be applied to m and p also. We have assumed them constant only as an approximation, and the same applies to the corporation income tax rate.

Another tax relevant for the present purpose is the personal income tax. Whichever scheme of expected dividend generation we take, the stream will have to be net of personal income tax.

Similarly, the terminal year price of the share would be net of the capital gains tax that would be levied on it. It should be noted here that the choice of the holding period would determine whether this rate would be different from the other rate, because to be eligible for the lower capital gains rate, a share has to be held for at least three years(one year, from assessment year 1988-89).

The following is a restatement of our earlier equation, with taxes:

$$SP_t = \sum_{i=t}^{n} \left[DIV_i^e \, (1-T_{p,i})/(1+r)^i \right] + \left[SP_n^e - T_{c,n}(SP_n^e - SP_t) \right]/(1+r)^n$$

This is equivalent to

$$SP_t = \sum_{i=t}^{n} \left[DIV_i^e \, (1-T_{p,i})/(1+r)^i \, (1-T_{c,n}(1+r)^{-n}) \right] +$$

$$\frac{SP_n^e \, (1-T_{c,n})(1+r)^{-n}}{1-T_{c,n}(1+r)^{-n}}$$

$$= \sum_{i=t}^{n} \left[DIV_i^e \, (1-T_{p,i})/(1+r)^i \, (1-T_{c,n}(1+r)^{-n}) \right] + \frac{\left[\bar{q}A(1+k)^n/N \right] (1-T_{c,n}) \, (1+r)^{-n}}{1-T_{c,n} \, (1+r)^{-n}} \quad \ldots\ldots\ldots(9)$$

where the new notations are: T_p = marginal rate of personal income tax, and T_c = marginal rate of tax on capital gains.

d. The Discount Rate

There are two major approaches to the specification of the discount rate. Theoretically, if we consider investment in shares as any other investment, i.e., postponement of present consumption for higher future consumption and conceptualise the equilibrium in the familiar indifference map-budget line analysis, then the proper discount rate would be the marginal rate of substitution between present and future consumption, because that would be the minimum interest rate necessary for the investor to refrain from consuming all his income and to make him invest. However, application of this empirically is not an easy task for want of any dependable estimate of the rate, especially in view of the various imperfections in the market.

The alternative is more practical. It is simply the use of the opportunity cost, defined in this context as the highest risk-free rate of interest that the investor can earn on his investment. We chose the 12-month deposit rates of commercial banks as the discount rate, because this is the rate that can be considered risk-free.

e. <u>The Degree of Risk</u>

Even when the expected divided stream and expected share prices in the terminal year are equal in two different years (not different <u>shares</u>, because we are concerned with an aggregate share price index), the prices that investors would be willing to pay for shares in general could vary according to differences in perceived risk. Here the risk is not the usual 'beta',[8/] which is applicable to individual shares, but the market risk. This could arise due to drastic changes in government policies, changes in general economic enviornment, and other such factors influencing the whole share market. Investors' purchase price would of course be based on their expectations, and they would have to consider the probability and extent of their expectations being belied. In other words, they have to hedge against unforeseen events of general import about which they have no specific idea. This is what we call market risk, which again has to be based on available information.

We use a very rough method of taking this into account. An often-used method of measuring risk is the mean-variance method which,however, is applicable only to individual shares. We employ only the aggregated share price index which consists of the annual averages. However, the range of variations is available, and the range standardised by the mean is what we adopt as a measure of risk. It is not as if further details of share prices are not available; but the cost of collecting such a mass of data did not seem commensurate with its utilisation by us, and we decided to opt for the more rough and ready measure of risk.

We introduce this variable independently in our equation instead of discounting the expected dividend stream and the expected share price in the terminal year by this variable. The reason is its rough and ready nature. Given this nature of the variable, we cannot expect it to be a perfect substitute for a better measure of risk. Hence, we would be content to get an approximation of its impact on share prices, while we know *a priori* the mechanism of its effect.

In our estimation, we use three measures of risk based on the above description. The difference between the three measures is only that of the number of years for which share price information is used to measure risk - one, three and five.

f. Inflation

It is well known that expectations about inflation or depression are reflected in the stock market very quickly and sometimes very decisively. The example of of the stock (share) market in the USA in the 'thirties bears ample testimony to this statement.[9] But in the framework that we have developed so far, the entry of an inflation variable separately is somewhat uncertain.

It could be argued that the expected dividend stream is already discounted and thus inflation is no more relevant for the first term of the right hand side in equation (9). However, the process of discounting could also be interpreted, especially when the discount rate is specified, the way we have done, as simply a method of finding out dividends over and above the 'safe' rate of return. With such an interpretation, the scope for using inflation rate separately does not disappear.

As far as expected share price is concerned, the role of inflation cannot be overlooked. Inflation is bound to affect the 'liquidation price' of the share in nominal terms through its effect on asset prices of the companies. It could also affect the expected terminal year price directly, through a general boom in the share market.

Thus, on balance, it seems reasonable to accept that expected inflation could affect current share prices, but the route such an impact could take is somewhat uncertain. As such, we introduce the expected inflation rate as a separate variable in the explanation of share prices.

The generation of expected inflation rate is specified as a simple static expectation type:

$$P_t^e = P_{t-1} \qquad \qquad \dots\dots\dots\dots\dots\dots\dots \quad (10)$$

where P_t = rate of inflation (as derived from the consumer price index), and the superscript e denotes expected value.

This formulation, however simplistic, avoids the computational problems of a more complex formulation. We already have three different expectation formulae for dividends and three alternative definitions of risk. Also, using equation (5) to generate expected dividends implies use of a grid-search method in estimation. Using a similar formulation for inflation would impose another grid-search which would cause our results to be extremely fragile.

g. The Holding Period

This is one parameter whose value is an empirical matter entirely, and our choice is arbitrary of necessity, since there is no study in India on the period that shareholders hold their shares. However, there are some indications available to the casual observer of the share market. While most of the day-to-day transactions in the market are those between speculators whose holding period normally does not exceed six months, a large part of the total equity of the corporate sector belongs to institutional investors, including inter-corporate investments. There are two further factors, both related to the income tax. Under Section 80CC of the Income-tax Act, 1961, investment in certain new ventures are tax-exempt to the extent of 50 per cent of the total investment, provided such shares are held for five years. Also, to avail of the substantially lower marginal tax rate on capital gains, the asset had to be held for at least three years. Thus, while the presence of a large number of speculators undertaking the bulk of the stock market transactions would tend to shorten the average holding period, the presence of institutional investors and tax rules would tend to lengthen it. Keeping these opposing features in view, we arbitrarily take a value of one year for n, the holding period.

h. Bonus Issues

Bonus issues of shares, i.e., allocation of free shares to the existing shareholders in a particular proportion (specified in each case when the management declares its decision to issue bonus shares) to their original share-holding, are intended to capitalise the accumulated reserves. The real position of the company is not changed by such issues at all; in the balance sheet the amount of share capital goes up by the same amount by which reserves and surplus fall. However, it has some effects which are important. First, given the norms about debt-equity ratio, a rise in equity qualifies the companies at the maximum permissible debt-equity level to borrow further. Second, since generally the market treats bonus issues as a signal of healthy financial position and growth, it makes raising resources from the market easier. For these reasons it would be a mistake to treat bonus issues as a purely accounting change raising the number of shares.

The implication for our analysis is that at least two variables are affected by bonus issues. While the spurt in the number of shares in the market leads to a fall in share price, this decline in price is probably not in the same proportion as the proportion of existing shares and bonus shares, because of the positive impact of bonus shares on the investor assessment of the issuing company, as suggested above. This precludes any simple adjustment of the dependent variable in our equation to be estimated.

An alternative way would be to prepare a weighted index of bonus issues and use it as an explanatory variable in the share price equation. Even in an aggregative analysis like ours, construction of a variable representing bonus issues is perhaps not an insurmountable problem, but it could introduce multicollinearity in the equation, as risk is measured as the dispersion of share prices around the mean for the year, and bonus issues almost certainly affect the dispersion. This problem, fortunately, does not arise at least theoretically within our specification because the risk variable is lagged, whereas the bonus shares variable is unlagged. Hence, use of an aggregate weighted series of bonus issues is made in our estimation. The construction of the series is explained in the Annexure.

5. The Final Equation

The factors discussed above do not exhaust the list of factors possibly determining share prices. The extent of government control of the corporate sector, the inflow of foreign equity capital, and numerous such other factors also have an impact on share prices. We have singled out factors which we believe have an impact through the normal process of share price formation rather than as exogenous shocks. While it is true that the share price boom in 1984-85 cannot be explained without the non-residant Indians' attempt to gain control of some Indian companies, we do not consider such events regular enough to be part of our model.

The equation to be tested, then, is

$$SP_t = f\ (DPV_t, B_t, R_{j,t-1}, P_{t-1}) \ldots\ldots\ldots\ldots (11)$$

where

DPV_t = the right land side of equation (9) with $n = 1$, and DIV_i^e generated through the three alternative schemes specified by equations (4), (5) and (6);

B_t = bonus issues;

$$R_{j,t} = \sum_{n=t-j-1}^{t} \frac{SP(High) - SP\ (low)}{SP\ (Average)}, \quad j = 1,3,5; \text{ and}$$

P = annual percentage rate of inflation as per consumer price index.

We propose to first construct three alternative series of DPV, based on the three expected dividend generation schemes. Then, we estimate equation (11) and choose the scheme which yields the lowest residual sum of squares. The format would alternatively be linear and log-linear.

In the case of the adaptive expectations scheme of expected dividends generation the initial value of DIV^e is assumed equal to the intercept term of a compound growth rate equation for actual dividends over the sample period. In equation (5), a is also unknown and we propose to estimate it through the grid-search method while estimating equation (11), with the restriction $0 < a < 1$.

6. Results

Before estimating equation (11), we tried a few simple regressions in an attempt to (a) assess the impact of a few variables which are commonly presumed to substantially affect share prices, and (b) provide a benchmark against which our final results can be assessed. The estimated equations are given below.

$$SP_t = \underset{(4.02)}{17.81} + \underset{(3.00)}{3.39}\ EPS \qquad R^2 = 0.28$$

$$= \underset{(2.98)}{13.61} + \underset{(3.83)}{0.56}\ BV \qquad R^2 = 0.39$$

$$= \underset{(2.90)}{13.59} + \underset{(0.07)}{0.14}\ EPS + \underset{(1.97)}{0.54}\ BV \qquad R^2 = 0.39$$

$$= \underset{(2.77)}{13.29} + \underset{(3.71)}{0.67}\ NW \qquad R^2 = 0.37$$

$$= 13.29 + \underset{(0.10)}{0.21}\ EPS + \underset{(1.81)}{0.64}\ NW \qquad R^2 = 0.37,$$

(t - values in parentheses)

where EPS = Earnings per share;
BV = book value per share; and
NW = net worth per share.

It can be easily seen that while all three variables are individually significant, their ability to explain movements in share prices (as denoted by the R^2s), either singly or in combinations, is not particularly high. We have not used BV and NW together because one can *a priori* establish the dependence between the two, as they are derived from the two sides - assets and liabilities (non-current) - of the balance sheet. One can probably hazard a guess that the balance sheet variables are relatively more important than EPS in determining share prices, though the evidence is not strong enough to make a conclusive statement. This is, however, not improbable because while there are always ups and downs in any business, its ability to absorb temporary setbacks is what can be expected to determine shareholder confidence, and this ability is reflected in the balance sheet variables.

The above equations are, in any case, <u>ad hoc</u> in nature and are not really the ones in which we are actually interested. Our main interest lies in the estimation of equation (11), the results of which are given in the table below. Equations nos. 4,5 and 6 are estimated through the grid-search method with the restriction that $0 \leq a \leq 1$, while the rest are estimated through the ordinary least squares (OLS) method.

The first three equations are estimated with DPV calculated though equation (4) in the text, and using R1, R3 and R5. A striking observation is that the explanatory power of the equation increases as we increase j in R_j. Also, the first two have what one would consider <u>a priori</u>, wrong sign for the coefficients of R_j. However, all is not well with the third either, as out of four, three explanatory variables have statistically insignificant coefficients. Given the high R^2, this is not plausible and indicates multicollinearity. Before we discuss our attempts to deal with this problem, let us briefly go through the other first-round results.

TABLE I

First-Round Regression Results with Three Alternative Definitions of DPV_t and R_{t-1} Each

Equation No.	Period	DPV_t variant	Regression Coefficients (t values in parentheses)							$\bar{R}^2$
			Constant	DPV_t	B_t	$R_{1,t-1}$	$R_{3,t-1}$	$R_{5,t-a}$	P_{t-1}	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1.	1961-82	A	10.96 (1.87)	0.04 (2.32)	-0.01 (-1.30)	47.12 (2.77)			-0.04 (-1.40)	0.4443
2.	1963-82	A	8.18 (1.04)	0.04 (2.53)	-0.01 (-0.64)		36.28 (1.46)		-0.02 (-0.74)	0.6715
3.	1965-82	A	28.77 (3.07)	0.01 (0.94)	-0.00 (-0.46)			-48.62 (-1.51)	0.06 (1.97)	0.8243
4.	1961-82	B (a = *)	-	-	-	-	-	-	-	-
5.	1963-82	B (a=0.40)	2.51 (0.31)	0.07 (3.14)	-0.01 (-0.55)		45.58 (1.92)		-0.04 (-1.34)	0.7171
6.	1965-82	B (a=0.16)	11.23 (0.91)	0.08 (2.19)	0.00 (0.01)			-9.23 (-0.27)	(-0.00) (-0.03)	0.8628
7.	1961-82	C	14.09 (1.95)	0.03 (0.45)	-0.03 (-1.92)	38.65 (1.80)			-0.02 (-0.21)	0.2767
8.	1963-82	C	16.13 (1.77)	0.05 (0.90)	-0.01 (-1.47)		9.48 (0.34)		-0.02 (-0.28)	0.5553
9.	1965-82	C	31.41 (4.26)	0.03 (1.09)	-0.00 (-0.55)			-60.14 (-2.46)	0.03 (0.64)	0.8280

Note: DPV variant A denotes static expectations, B denotes adaptive expectations, and C denotes constant expectations.

*: The grid-search method broke down in this case as no maxima was reached for $\bar{R}^2$ with $0 < a < 1$.

The fourth to sixth equations are estimated with DPV calculated through equation (5) in the text and estimating a through the grid-search method. The method broke down while estimating the fourth equation using R1 as we had error sum of squares (ESS) continuously falling as we increased a, and when a = 1, equation (5) is the same as equation (4). That is why in the table of results, the fourth equation shows blanks. The fifth and sixth equations are a little better than the second and third respectively. However, while in the third equation the coefficient of R_j was insignificant and that of P_{t-1} was not, in the sixth equation the situation is reversed. Also, the insignificant coefficient for DPV in the third equation turns significant in the sixth. The coefficient of the risk variable again changes sign as we increase j from 3 to 5.

Using equation (6) of the text to derive DPV results in lower explanatory power of the equations. The peculiarity of the variable R_j persists with change in the mathematical sign of the coefficient when j = 5.

While the first nine regresions do result in some confusion, careful observation reveals certain common features. First, going simply by the explanatory power, the R_j variable with j = 1 is not very useful. While in every equation it has a statistically significant coefficient, it also has a wrong sign. If the aggregate

TABLE II

Second-Round Results (After Dropping P_{t-1})

Equation No.	Period	DPV_t variant	Constant	DPV_t	B_t	$R_{1,t-1}$	$R_{3,t-1}$	$R_{5,t-1}$	$\bar{R}^2$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
10.	1961–82	A	13.60 (2.39)	0.02 (2.51)	−0.02 (−1.99)	36.07 (2.33)			0.4098
11.	1963–82	A	12.25 (2.21)	0.03 (5.60)	−0.01 (−1.17)		22.05 (1.43)		0.6758
12.	1965–82	A	14.34 (2.24)	0.04 (6.95)	0.00 (0.02)			4.63 (0.24)	0.7828
13.	1961–82	B (a=*)	–	–	–	–	–	–	–
14.	1963–82	B (a=0.46)	10.97 (2.05)	0.04 (5.92)	−0.01 (−1.32)		21.27 (1.43)		0.6989
15.	1965–82	B (a=0.16)	11.62 (2.36)	0.08 (9.46)	−0.00 (−0.01)			−10.28 (−0.66)	0.8694
16.	1961–82	C	14.84 (2.43)	0.01 (1.66)	−0.03 (−2.02)	36.08 (2.10)			0.3093
17.	1963–82	C	17.90 (2.79)	0.03 (4.48)	−0.02 (−1.66)		4.04 (0.21)		0.5742
18.	1965–82	C	28.93 (4.72)	0.05 (8.13)	−0.00 (−0.44)			−52.29 (−2.53)	0.8310

Note: See Table I

*: As in Table I.

remains unaffected. The purpose of taking weighted total of bonus issues was to carry out some alternative and additional work which has not been reported in this paper.

Whenever any reference is made to shares or share capital, it is to be understood as ordinary equity, and not preference shares. We have treated preference shares as neither debt nor equity, but a third source of funds.

The aggregate share prices series is not an index, but only weighted averages. To do this, we had to express all the prices of shares which had a face value other than ten rupees in line with prices of shares which had a face value of ten rupees. This was achieved by proportionately increasing or decreasing the actual share prices using the ratio of actual face value and our standard face value of ten rupees.

In quantifying bonus issues, we have used the relevant ratios. Rights issues have been treated on par with ordinary new issues due to lack of sufficient details. So is the case with debenture conversions. In the latter case, of course, there is a reduction in long-term debt also.

The tax rates are calculated as ratios of total tax assessed to gross income assessed as given in All India Income Tax Statistics. The limitations of these data are well known. The only reason we can adduce for using these data is that there is no alternative source of data on taxation of different types of income.

The rate of interest series is from various Reserve Bank of India publications, primarily the Report on Currency and Finance (various issues). The inflation rate is proxied by a consumer price index for urban non-manual workers, for which the source was again the Report on Currency and Finance.

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