STRUCTURE AND PRICE EFFICIENCY OF AN EMERGING MARKET

BY

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Structure and Price Efficiency of an Emerging Market[1]

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Abstract

This paper examines market structure and efficiency of price transmittals in the two national stock exchanges of India: Bombay Stock Exchange and National Stock Exchange. Price movements in a large number of important stocks in both markets are considered. The framework used is the Johansen-Juselius multivariate cointegration technique. It is discovered that price movements within each market are cointegrated. Short run ECM analysis shows that no stock in any market is exogenous thus indicating that there is considerable feedback in short run price movements from each stock. Some short run price movements are stabilizing. The Bombay Stock Exchange and National Stock Exchange appear to be reasonably efficient markets.

I. Introduction

Capital markets are essential to prevent the underutilization and waste of resources in an economy faced with declining real value of its currency. Capital markets afford the opportunity to millions of savers in a developing economy to invest their savings in various productive assets that act as a hedge to erosion of purchasing power. The ability to buy (a claim) on a fraction of a real asset and the concomitant diversification possibilities for an investor with limited resources is valuable to the individual and to the society as a whole. The individual gains insurance through risk reduction and hence saves more, while the economy achieves a higher rate of growth due to the channelisation of savings into real assets. Thus capital market development can act as a catalyst for economic development.

A prerequisite for sound capital market development is the robust functioning of the primary and secondary capital markets. Stock exchanges are secondary markets, which facilitate the price setting and trading process of securities, which are issued in the primary markets. The primary and secondary markets perform complementary roles and the healthy development of secondary markets engenders vigorous growth in primary markets as well. Price discovery is the principal function of the stock exchange. If price discovery is absent, then stock exchanges do not have any meaningful role One might as well distribute shares through banks and post offices.

In this paper we examine the structure of the Indian stock markets. We specifically study the extent of volatility and price efficiency of two of the largest markets and the only national stock exchanges (Bombay Stock Exchange (BSE) and National Stock Exchange (NSE)). Conventional wisdom suggests that Indian markets are riven with speculation and not driven by any kind of market forces. On the surface this claim might seem logical. There

are close to 23 markets that trade in the same stocks. Overall liquidity is extremely poor in most of these markets. We also find that prices are consistently different across these markets. However, a recent study (Jha et al (1998)) has shown that prices of the same stock in these markets are well integrated. A complementary line of inquiry would examine the linkages of different stock prices in the same markets. This provides the motivation for the present paper. We choose NSE and BSE for the following reasons: a) These two have the largest number of listings and therefore the highest market capitalization; b) most of the institutional investing is done in these markets; c) 'conventional' wisdom in the investing community suggests that these may be central markets.

India has attracted attention after 1991 due to its process of liberalization. It has become one of the major emergent markets in Asia. In the context of emerging markets it is important to know overall whether the Indian markets are stable. In this paper we do not undertake a comparative study of the stability of markets across India. Instead, we examine in detail the structure of the two major markets: NSE and BSE. These are the only national stock markets in India (the others being regional ones) and are, as per any yardstick of quantity, much more important than all the regional centers put together.

It would be important to know the following a) are the stocks in the two markets informationally linked over time? b) are these stocks in these markets inherently volatile? c) which stocks contribute to market stability? d) are the markets informationally efficient? e) do the stocks have a tendency to pass their volatilities to the other stocks in the market? and f) are these markets inherently unstable?

Others have raised these issues in different context. Hasbrouck (1993) has investigated the information efficiency of markets that trade in the same securities. Andersen,

and Bollerslev (1997) examine the intraday periodicity of volatility in equity markets and show that most markets have cycles of volatility in response to information inflows. Harris et. al (1995) have examined the stock markets in the United States to test whether there is indeed a central market that provides information to the rest of the markets. However to the best of our knowledge there is no extant literature on price transmittals within a given market either in a developed economy or in the context of an emerging market.

The remainder of this paper is divided into five sections. In the next section we briefly describe the two markets that are being studied, in section III, the process of data construction is described, in section IV, the methodology used is explained, section V states the results and section VI provides certain concluding remarks.

II. Brief Description of Markets

Trading in Indian stock markets is apparently fragmented. There are 23 exchanges spread across the country. These exchanges vary in terms of the magnitude of market capitalization and the number of stocks listed. The most liquid securities trade on several of these exchanges. There are significant structural differences across exchanges such as a) degree of spatial consolidation of order, b) trading and settlement procedures, and, c) the value of seats in the different exchanges. We now explain some characteristics of the two markets we study in this paper.

Bombay: BSE is organized as a voluntary non-profit making organization. Trading is done using an electronic on-line real time trading system that combines order and quote driven systems. The capacity of the system is 500,000 trades per day. Trading time runs from 10.00 a.m. to 4.00 p.m. Trading is categorized into three groups: A, B1 and B2. Trading in group 'A' securities is confined to 150 large liquid company stocks. The normal trading

cycle is 5 days, Monday through Friday. Transactions can be carried over, up to 75 days. Group B1 consists of 746 liquid firms, and, uses the same trading cycle but no carry forward of trades is allowed. Group B2 contains the remaining 5,343 securities (as of March '98). All settlement is done through the clearinghouse. The exchange conducts surveillance through price limits and position monitoring. Margins are levied at 7.5% for delivery trades and 15% for Badla transactions. Counter party risk management is facilitated by a trade guarantee fund. BSE has a total of 636 members including 289 corporate members. The average number of daily deals is 104,459.

National: The NSE is organized in the corporate form. It is unique in the sense of separation of ownership, management and trading. The exchange was set up with the initiative of the government of India with the active participation of development financial institutions and banks. Trading is done by an electronic on-line real time system that uses a pure order driven system. The system can handle up to 400,000 trades per day. Trading takes place between 10.00 a.m. and 4.00 p.m. Trading cycle runs from Wednesday to the following Tuesday. Carry forward of trades is not allowed on the NSE. Settlement is done solely through the clearinghouse. NSE uses a surveillance system of price limits and position limits to ensure market integrity. Margins are levied on members based on the value of their transactions. Counter party risk management is made possible by a Settlement Guarantee fund. There are 1026 trading members with corporates accounting for 86% of them. Trade operations occur in 190 cities within India. The average number of daily trades amounted to 148,783 (as of November 1997).

III. Data

There are close to 7000 stocks listed in BSE while this number is around 1000 in the NSE. However not all these stocks trade with any degree of frequency. In the BSE, the number of stocks that trade at least daily is 1300 while it is around 950 in NSE. For the purposes of our study, we have chosen the 10 stocks with the highest market capitalization. This seems to have a bearing on their respective frequencies of trading. The stocks chosen are shown in table (a). We note that they represent a range of industries.

Table (a) here

Intraday data for the period 1 July 1996 to 30 July 1997 from these two exchanges for the above mentioned 10 stocks was collected. We however find that there is an inherent asynchronicity in data for the chosen stocks. For example, the stock SBI trades more than 2,700,000 times during the period while, the slowest is BHEL with 88,000 trades. This implies that we should not compare the raw data for inferring dominance or otherwise of any given stock. Usage of this data would mean that "meaningless" transaction prices could be used for inferring price discovery. Hence, a method based on Harris et al (1995) is used to construct matched data sets. The reaction of the prices of a given stock to changes in the prices of the other stocks in the same exchange can be detected only if synchronous data is used. The procedure to construct this data set is outlined below.

Consider 3 stocks- M_1, M_2 and M_3 - where M_1 is the slowest and M_3 is the fastest over the chosen time interval. The speed of trading of a stock is an indication of the liquidity in terms of the number of times a given stock trades. To construct the matched data set, once

the slowest stock trades, the immediate past trade in M_2 and M_3 are chosen. This is shown in figure (a). Time in figure (a) is the clock time. The first trade in M_1 is at *a*. The closest trades

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Figure (a) here

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in the other stocks are *b*, and, *c*. Hence the first triplet is (a, b, c). We similarly construct other triplets such as (a_1, b_1, c_1), (a_2, b_2, c_2) etc.

In this paper, we use a hybrid of "replace all" and "minspan" outlined in Harris et al (1995). Under *replace all*, only the closest prior price of the other stocks are chosen. Under *minspan* the criterion is minimizing the time differential between a given trade in the slowest stock and the corresponding trades in the other stocks. In a way, *replace all* is a subset of *minspan* in our case. In the hybrid version we combined the two methods of *replace all* and *minspan*. Trades could be either prior to the slowest trade or occur after it. The average time elapsed between the slowest stock and the fastest was 22 seconds. The number of observations for each exchange is given in table (b).

Table (b) here

It is obvious that, the size of the data set will be determined by the speed of the slowest stock. A problem that might be encountered in using such a data set is the masking of the price discovery process by the bid-ask bounce of a trade across stocks. That is, a trader could trade at the bid on one stock and at the ask on the next. This type of trading could mask

the price discovery process. Harris et al (1995) have raised such an issue. Following their paper, we also construct data sets by changing the order of the stocks shown in figure (a) The data set is now governed by the fastest stock. The size of this data set is also shown in table (b)

IV. Methodology

The methodology adopted here allows us to ask the following questions viz.,

(a) Are stock prices related to each other in the long run in each of these markets?

(b) How does the price of a stock in a market move in the short run? Short run price movements of a stock in a given market can be determined by its own past prices or, in the context of integrated stocks determined by, the past prices of other stocks.

(c) Are the short run price movements stabilizing? Stock prices in the short run can adjust in various ways. A stable form of adjustment is, when the prices adjust such that the long run relationship between the stocks can be maintained.

(d) Is there a market that is exogenous to the process of price discovery (i.e., to the process of contributing to the overall process of price formation)? This analysis would split up the market into those stocks whose prices are exogenous and those that are not. Those stocks for whom changes in prices of other stocks do not matter are exogenous and, in some sense, prime movers in the market.

(e) How does the stock respond to an orthogonal shock? This is analyzed using the Impulse Response functions. We examine how the price of a given stock evolves over time in various markets in response to a random shock. It is possible to check whether the price response is mirrored across two exchanges. Any differences in the response will bring out the inherent structural differences of these exchanges. We also examine if the price response is

stock specific. That is, would the response be different if we considered a large stock, a stock belonging to a finance firm etc.

Impulse response function analysis imposes a one-time orthogonal shock and does not have any dynamics of its own (that is, this shock is not part of a larger system of shocks in the market). The information released by this shock is a market wide information, as opposed to firm specific information.

Each of the price series we used was discovered to be non-stationary and all the differenced series were stationary. Since all the prices have unit roots, the only way to examine whether each of the stocks contributes to the overall process of price formation is through the method of cointegration. Since there are more than two prices in each market we should permit for the existence of more than one cointegrating vector. This is possible using the method of Johansen and Jueslius (1990) but not the Engle-Granger (1987) methodology. Hence we prefer the former.

The Johansen and Juselius appraoch defines an unrestricted vector autoregression (VAR) of the vector of variables z_t as involving upto k lags of z_t.

$$z_t = A_1 z_{t-1} + \ldots + A_k z_{t-k} + u_t \qquad u_t \sim IN(0,\Sigma) \qquad (1)$$

where z_t is (nx1) and each of the A_1 is an (nxn) matrix of parameters.

Now consider an (nxr) matrix β such that

$$\beta' z_{t-k} \sim I(0) \qquad (2)$$

If all elements of z_t are I(1), then the columns of β must form cointegrating parameter vectors for z_{t-k} and hence z_t. Since there can be only (n-1) cointegrating vectors, β must have *r* less

than n. If, however, z_t is I(1) but the elements are not cointegrated, β must be a null matrix. Now define another (nxr) matrix α such that:

$$-A_k = \alpha\beta' \tag{3}$$

The Johansen technique is based upon the factorization of (3). This technique involves reducing (3) to solving an eigenvalue problem. The eigenvectors associated with these eigenvalues are the cointegrating vectors.

The Generalized Vector Error Correction Mechanism (ECM) of the system in (1) can be written as:

$$\Delta z_t = \Gamma_1 \Delta z_{t-1} + \ldots + \Gamma_{k-1} \Delta z_{t-k+1} - \pi z_{t-1} + \xi_1(EC_1(-1)) + \xi_2(EC_2(-1)) + \ldots + \xi_r(EC_r(-1)) \tag{4}$$

where $\Gamma_i = -I + A_1 + \ldots + A_i \quad (i=1,\ldots,k)$ and $EC_j(-1)$ is the one period lagged error term when we use the jth. cointegrating vector and there are r such error terms – one for each cointegrating vector. ξ_j is the coefficient on the lagged error term from the jth. cointegrating vector. Clearly, the vector Δz may include a time trend, constant and other non-stationary variables.

To investigate for exogeneity of changes in prices we proceed as follows. If the F statistic for the ECM is insignificant we conclude that the dependent variable in question is weakly exogenous. A negative and significant sign of the coefficient on the lagged value of the error correction term would indicate stable adjustment whereas a positive and significant sign would indicate unstable adjustment. If, in addition to weak exogeneity, we find that the coefficient on lags of variables other than the variable under investigation are insignificant

then we say that the variable is strongly exogenous. Only its own lags rather than changes in the values of other prices influence it.

Dynamics of the model can be further investigated by considering the model in a VAR(1) format:

$$z_t = A_1 z_{t-1} + \varepsilon_t = \sum_{i=0}^{\infty} A_1^i + \varepsilon_{t-i}$$

This is often called a vector moving average representation (VMA)

This can then be orthogonalized so that the error terms are not correlated and written as:

$$z_t = \sum_{i=0}^{\infty} \phi_i \varepsilon_{t-i}$$

where the residuals e_{t-i} are orthogonal. The matrices ϕ_i are the impulse response functions since they represent the behavior of the modeled series in response to shocks (innovations) and the vector e_t is the vector of innovations: the vector of impacts induced for particular variables when these impacts are independent from each other.

Short run behavior of prices, therefore, provides information on whether any one stock is dominant in any market. Furthermore, it shows whether the short-run behavior of prices is stable. The impulse response function then give us some idea of the duration of instability, in case we find such instability obtaining.

V. Results

Microfit 4 program was used to estimate the model. Tables (c) and (d) provide the summary of the results. The results of the Error Correction Model are given in tables (1) and (2), the impulse responses are shown in figures (1) and (2) and figures (3) to (6) show the nature of the interstock price transmittal. There is a single cointegrating vector for BSE while there are two for NSE.

Tables c,d, 1,2 and

remaining figures here.

The estimated ECMs are subjected to a number of diagnostic tests to ensure that each regression equation is well specified. This includes Lagrange Multiplier tests for serial correlation and ARCH upto several lags, normality of residuals and RESET tests. In each case the performance of the equation was satisfactory. These results are not reported here to conserve space. The following points are to be noted.

i) In BSE, the F test statistic is strongly significant in each case so that the ECMs appear to be well specified. Thus all stock prices are endogenous and there is no exogenous stock which influences other stocks but is not influenced by them. Overall, the short-run instability is quite high. Short-run adjustment occurs only for L&T in the case of BSE. In the NSE, there are three stocks viz., Larsen and Toubro, Tisco and SBI whose short-run behavior is stable whereas Telco and RIL are unstable in the short run. F statistics are strongly significant in the case of NSE. Hence no stocks are exogenous.

ii) No stocks are exogenous to the process of price formation in BSE or NSE.

iii) The Error Correction Model also shows that the relationship between large and small stocks is not symmetric in the two exchanges. The stocks SBI and BHEL show a positive (but weak) relationship in BSE while in NSE, a change in price of SBI causes a significant decline in the price of BHEL and vice versa.

iv) The impulse response function show that the stocks traded in both the exchanges behave as though they are different commodities. This is due to the differences in the settlement cycles in these two exchanges. Hence short run arbitrage possibilities are existent.

v) The markets are for the most part informationally efficient. This is shown by the impulse response function. We find that any orthogonal exogenous event only creates extremely short run (no more than 15 trades on an average) perturbations. The duration of this short run is, hence, no more than a few minutes.

vi) Another important point that has to be noted is the fact that short-run price adjustments in the two markets show considerable variation (Table d). Some stocks cause instability whereas others have a stabilizing or random influence. Nevertheless, the presence of cointegrating relations in both markets indicates that there are long rune relations between these stocks in both markets.

On the basis of the analysis in this paper the following broad conclusions can be made about the two national stock markets of India. First, there are well-defined relations between stock prices in the long run in each of these markets. Hence market segmentation is strongly ruled out Second, the short-run behavior of stock prices is such that no stock price can be considered to be independent of the others. Short run price movements are mostly random or unstable, but the impulse response function analysis suggests that the instability does not persist for long. Thus, contrary to conventional thinking, at least the two national stock markets of India function reasonably well.

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Table (a)

List of stocks

Stock	Market Capitalization (Rs. crore)	Industry
HLL	10355	Consumer Products
BHEL	2998	Heavy Industries
ICICI	2848	Leasing and Financing
Colgate	3563	Consumer Products
L & T	6025	Construction
ACC	3254	Cement
Tisco	7289	Heavy Industries
Telco	11031	Automobiles
RIL	9784	Man-made Fibres
SBI	11270	Leasing and Financing

Table (b)

Size of the Data Set

Market	Stocks	Average time elapsed between transactions (seconds)		Data Points	
		slowest stock first	fastest stock first	slowest stock first	fastest stock first
NSE	hll, bhel, icic, colgate, l&t, acc, tisco, telco, ril, sbi	25	20	48,500	41,150
BSE	hll, bhel, icic, colgate, l&t, acc, tisco, telco, ril, sbi	40	32	33,225	27,250

Table (c)

Summary of Empirical Results

i) Long run relationship		
Market	Number of Cointegrating Vectors	Cointegrating vectors
NSE	2	-1.pbhel + .82789. phll + 3.5707. pcolgate - 1.4344. picici + 2.2564.plandt - 4.4331.ptelco + 1.811.pacc - 1.4120.ptisco - 11.2571.ril + 7.1110.psbi = 0 -1.pbhel - 1.6591. phll + 9.9232. pcolgate – 2.7829. picici + 7.8571.plandt - 14.8996.ptelco – .93926.pacc + 10.3758.ptisco + 4.1195.ril - 1.7923.psbi = 0
BSE	1	-1.phll – .94137.pbhel + 1.3021.picici – .098371.pcolgate + .43593.plandt – .25727 pacc - 1.3073.ptisco + .31921.ptelco - .14137.pril – 2.1073.psbi = 0
ii) Endogenity		
Market	Endogenous stocks(s)	Exogenous stock(s)
NSE	BHEL, HLL, Colgate, ICICI, L & T, ACC, Tisco, SBI	Telco, RIL
BSE	BHEL, HLL, Colgate, ICICI, L & T, ACC, Tisco, SBI, Telco, RIL	

Table (d)

Profile of Short Run Behavior of Prices

Markets	Stabilising stock(s)	Destabilising stock(s)	Random
NSE	L & T, Tisco, RIL	Telco, SBI	ICICI, Colgate, ACC, Tisco, Telco
BSE	L & T, Tisco, RIL	Telco, SBI	ICICI, Colgate, ACC, Tisco, Telco

Table 1
Error Correction for Stocks Traded in Bombay Stock Exchange

Regressor	Δphll	Δpbhel	Δpicici	Δpcolgate	Δpl&t
Intercept	-.056730(-.92007)	-.056730(-.92007)	-.019551(-1.3035)	-.027334(-.92993)	-.020394(-.93049)
Trend	-.2826E-4(-.37482)	-.2826E-4(-.37482)	.1675E-4(.91328)	.2012E-4(.55979)	-.1400E-4(-.52245)
Δphll(t-1)	-.3249E-3(-.25031)	-.3249E-3(-.25031)	.6676E-4(.21145)	.1962E-3(.31715)	-.6788E-3(-1.[illegible])
Δpbhel(t-1)	-.32947(-12.4131)	-.32947(-12.4131)	.020884(3.2344)	.047680(3.7681)	.032062(3.3982)
Δpicici(t-1)	.088808(.82751)	.088808(.82751)	-.37294(-14.2854)	-.011346(-.22176)	.033688(.683 9)
Δpcolgate(t-1)	.13507(2.[illegible])	.13507(2.[illegible])	-.010236(-.74544)	-.34504(-12.8219)	.028417(1.4162)
Δpl&t(t-1)	.16969(2.2547)	.16969(2.2547)	.021138(1.1606)	.10305(2.8689)	-.30535(-11.[illegible])
Δpacc(t-1)	.029590(1.8842)	.029590(1.8842)	-.0028346(-.74198)	.012964(1.7316)	.015766(2.8243)
Δptisco(t-1)	.015988(.39351)	.015988(.39351)	-.0016454(-.16648)	-.036498(-1.8843)	-.037680(-2.6389)
Δptelco(t-1)	.038688(.74265)	.038688(.74265)	.026222(2.0692)	.061990(2.4961)	.030428(1.6432)
Δpril(t-1)	.43755(4.8989)	.43755(4.8989)	.099751(4.5910)	.21366(5.0178)	.056174(1.7693)
Δpsbi(t-1)	-.14085(-2.0119)	-.14085(-2.0119)	.028004(1.6443)	.099305(2.9754)	.10154(4.0802)
Δphll(t-2)	-.7566E-3(-.58370)	-.7566E-3(-.58370)	-.1693E-4(-.053689)	.1493E-3(.24162)	-.4465E-3(-.96908)
Δpbhel(t-2)	-.18871(-6.6434)	-.18871(-6.6434)	.014402(2.0843)	.031205(2.3043)	.019428(1.9240)
Δpicici(t-2)	.11522(1.0061)	.11522(1.0061)	-.17019(-6.1089)	-.063250(-1.1585)	.0021804(.053560)
Δpcolgate(t-2)	-.0013606(-.022662)	-.0013606(-.022662)	-.010920(-.74767)	-.13788(-4.8174)	.022366(1.0480)
Δpl&t(t-2)	.26308(3.2674)	.26308(3.2674)	.029951(1.5291)	.018525(.48261)	-.16252(-5.6783)
Δpacc(t-2)	.016321(1.0041)	.016321(1.0041)	-.0032699(-.82695)	.0099091(1.2787)	.011390(1.9713)
Δptisco(t-2)	.041870(.84488)	.041870(.84488)	-.020354(-1.6884)	-.022212(-.94016)	-.0075089(-.42625)
Δptelco(t-2)	.012710(.23707)	.012710(.23707)	.028009(2.1477)	.0068745(.26897)	.013943(.73166)
Δpril(t-2)	.15675(1.6156)	.15675(1.6156)	.088799(3.7624)	.11705(2.5306)	-.032236(-.93471)
Δpsbi(t-2)	-.0030243(-.040469)	-.0030243(-.040469)	.010062(.55348)	.026090(.73233)	.047086(1.7725)
Δphll(t-3)	-.8837E-4(-.075436)	-.8837E-4(-.075436)	.5800E-4(.20353)	.5851E-3(1.0478)	-.1961E-3(-.47082)
Δpbhel(t-3)	-.091337(-3.1461)	-.091337(-3.1461)	-.5859E-3(-.082963)	.0036717(.26529)	.4604E-3(.044608)
Δpicici(t-3)	.12881(1.1126)	.12881(1.1126)	-.097954(-3.4781)	.035522(.64360)	-.049476(-1.2022)
Δpcolgate(t-3)	.018193(.30041)	.018193(.30041)	.011797(.80080)	-.10404(-3.6038)	.023965(1.1132)
Δpl&t(t-3)	.085749(1.0513)	.085749(1.0513)	.0080621(.40631)	.019814(.50955)	-.099618(-3.4357)
Δpacc(t-3)	-.0030765(-.18822)	-.0030765(-.18822)	.0032132(.80811)	-.0073608(-.94464)	.0029688(.51096)
Δptisco(t-3)	-.052933(-1.0108)	-.052933(-1.0108)	-.0050983(-.40020)	-.076568(-3.0670)	-.012809(-.68808)
Δptelco(t-3)	.016005(.29806)	.016005(.29806)	-.0057914(-.44335)	.059977(2.3429)	.011065(.57968)
Δpril(t-3)	.039417(.39383)	.039417(.39383)	.047737(1.9607)	-.0016754(-.035114)	.036403(1.0255)
Δpsbi(t-3)	-.13426(-1.7780)	-.13426(-1.7780)	-.0022888(-.12460)	-.059958(-1.6655)	-.021440(-.79875)

Table 1 cntd...

Δphll(t-4)	-.3376E-3(-.28867)	-.3376E-3(-.28867)	-.6150E-4(-.21617)	.2987E-4(.053578)	-.4764E-3(-1.1459)
Δpbhel(t-4)	-.062816(-2.1657)	-.062816(-2.1657)	.0022737(.32224)	-.0017813(-.12882)	.013897(1.3479)
Δpicici(t-4)	-.027810(-.24037)	-.027810(-.24037)	-.053727(-1.9089)	.075243(1.3642)	-.018166(-.44171)
Δpcolgate(t-4)	.024291(.40056)	.024291(.40056)	.0039014(.26447)	-.031849(-1.1017)	.0076010(.35261)
Δpl&t(t-4)	.018822(.23079)	.018822(.23079)	.0036817(.18558)	.028266(.72704)	-.056168(-1.9375)
Δpacc(t-4)	-.0019697(-.12039)	-.0019697(-.12039)	-.0027506(-.69112)	-.0020277(-.25997)	-.0092258(-1.5863)
Δptisco(t-4)	-.10377(-1.9859)	-.10377(-1.9859)	-.0087591(-.68907)	-.048473(-1.9458)	-.026281(-1.4149)
Δptelco(t-4)	.1237E-3(.0023009)	.1237E-3(.0023009)	-.0053743(-.41109)	.024690(.96370)	.023538(1.2321)
Δpril(t-4)	.12620(1.2603)	.12620(1.2603)	.053112(2.1804)	.0069614(.14583)	.048274(1.3562)
Δpsbi(t-4)	.0081375(.10759)	.0081375(.10759)	-.026693(-1.4509)	.044835(1.2435)	-.026309(-.97858)
Δphll(t-5)	-.3522E-3(-.39044)	-.3522E-3(-.39044)	-.1754E-3(-.79929)	.9471E-3(2.2022)	-.2403E-3(-.74919)
Δpbhel(t-5)	-.039159(-1.3773)	-.039159(-1.3773)	-.0018701(-.27039)	-.0015713(-.11593)	-.0014351(-.14200)
Δpicici(t-5)	-.0090946(-.080188)	-.0090946(-.080188)	-.038582(-1.3984)	-.067129(-1.2416)	-.11007(-2.7303)
Δpcolgate(t-5)	.024376(.40641)	.024376(.40641)	-.013129(-.89985)	-.021474(-.75101)	-.8264E-3(-.038759)
Δpl&t(t-5)	.086413(1.0762)	.086413(1.0762)	.032607(1.6694)	-.0046909(-.12255)	.0033508(.11740)
Δpacc(t-5)	-.0045024(-.27962)	-.0045024(-.27962)	.8791E-3(.22444)	.2820E-3(.036733)	-.010083(-1.7615)
Δptisco(t-5)	-.0065661(-.13208)	-.0065661(-.13208)	.0013324(.11018)	.0042362(.17875)	.013064(.73928)
Δptelco(t-5)	-.054888(-1.0266)	-.054888(-1.0266)	-.029964(-2.3038)	.0014754(.057885)	-.0027686(-.14567)
Δpril(t-5)	.11137(1.1361)	.11137(1.1361)	.029751(1.2476)	-.025309(-.54155)	.057108(1.6388)
Δpsbi(t-5)	-.050764(-.67624)	-.050764(-.67624)	.011171(.61176)	.045861(1.2815)	.035359(1.3251)
Δphll(t-6)	.1998E-3(.22138)	.1998E-3(.22138)	.1982E-3(.90259)	.2595E-3(.60319)	-.4343E-3(-1.3537)
Δpbhel(t-6)	.0071648(.27005)	.0071648(.27005)	-.0013606(-.21081)	.010343(.81776)	-.0078874(-.83635)
Δpicici(t-6)	-.066473(-.62860)	-.066473(-.62860)	-.048954(-1.9030)	-.037408(-.74205)	.0018953(.050421)
Δpcolgate(t-6)	-.0018544(-.033343)	-.0018544(-.033343)	-.020246(-1.4965)	-.012670(-.47786)	.015448(.78137)
Δpl&t(t-6)	.11965(1.5829)	.11965(1.5829)	-.0087696(-.47692)	-.030334(-.84178)	-.0062747(-.23352)
Δpacc(t-6)	-.020863(-1.3557)	-.020863(-1.3557)	.0021237(.56726)	-.011105(-1.5136)	-.0012296(-.22477)
Δptisco(t-6)	-.048826(-1.2175)	-.048826(-1.2175)	.0031908(.32708)	.0040685(.21281)	-.0090096(-.63203)
Δptelco(t-6)	-.0062340(-.11947)	-.0062340(-.11947)	.0040882(.32207)	.030537(1.2276)	.0075421(.40662)
Δpril(t-6)	.18458(2.0172)	.18458(2.0172)	.010797(.48503)	.0088317(.20245)	.029785(.91568)
Δpsbi(t-6)	-.028080(-.39676)	-.028080(-.39676)	.0061437(.35685)	.013471(.39925)	.0020998(.083465)
ecm1(-1)	-.78350(-.73264)	-.78350(-.73264)	.014264(.054832)	.25080(.49195)	-.53089(-1.3966)
R^2	.43775	.13983	.16767	.17698	.14228
DW	1.9762	2.0052	1.9982	1.9980	1.9971
F-stat	19.8909(.000)	4.1533(.000)	5.1468(.000)	5.4940(.000)	4.2382(.000)

Table 1 cntd...

Regressor	Δpacc	Δptisco	Δptelco	Δpril	Δpsbi
Intercept	.10935(.98675)	.037111(.93908)	-.011351(-.32900)	-.041844(-1.8489)	-.026990(-.95716)
Trend	.1038E-4(.076564)	-.5157E-4(-1.0671)	.2043E-4(.48405)	.1524E-4(.55059)	.522E-5(.10213)
Δphll(t-1)	.0018083(.77514)	.6802E-3(.81766)	.3298E-3(.45401)	.1378E-3(.28914)	-.3078E-3(-.51856)
Δpbhel(t-1)	.081757(1.7138)	.019146(1.1254)	.013470(.90689)	.027825(2.8559)	.025461(2.0975)
Δpicici(t-1)	-.21232(-1.1007)	.029993(.43605)	.058297(.97074)	.013750(.34905)	.039434(.80345)
Δpcolgate(t-1)	.12484(1.2305)	-.0056956(-.15743)	.041143(1.3025)	.015085(.72807)	.049285(1.9091)
Δpl&t(t-1)	.30366(2.2249)	.12890(2.6486)	.052331(1.2315)	.076516(2.7452)	.087977(2.5334)
Δpacc(t-1)	-.21112(-7.4795)	.020807(2.0672)	.028424(3.2344)	.012258(2.1265)	.012271(1.7085)
Δptisco(t-1)	-.13098(-1.7935)	-.73047(-28.0507)	-.046827(-2.0596)	-.019521(-1.30890	.018448(.99280)
Δptelco(t-1)	.26358(2.8151)	.027063(.81054)	-.20161(-6.9160)	-.0088581(-.46324)	.013981(.58683)
Δpril(t-1)	.71582(4.4590)	.14436(2.5217)	.17406(3.4826)	-.19766(-6.0291)	.26332(6.4465)
Δpsbi(t-1)	.40678(3.2327)	.21300(4.7470)	.083588(2.1336)	.10346(4.0258)	-.27288(-8.5226)
Δphll(t-2)	.0018265(.78401)	.5867E-3(.70620)	.8383E-3(1.1559)	.9043E-4(.19008)	.1145E-3(.19312)
Δpbhel(t-2)	.089664(1.7562)	.8136E-3(.044687)	.022627(1.4235)	.011897(1.1410)	.015864(1.2211)
Δpicici(t-2)	-.29574(-1.4367)	.065983(.89892)	-.029345(-.45789)	-.0059129(-.14066)	-.080560(-1.5381)
Δpcolgate(t-2)	-.080014(-.74148)	-.014202(-.36908)	.020563(.61205)	.0045921(.20837)	.035914(1.3080)
Δpl&t(t-2)	.082862(.57258)	.044023(.85306)	.0026598(.059034)	.010594(.35846)	.033569(.91163)
Δpacc(t-2)	-.060322(-2.0647)	.014055(1.3491)	.022669(2.4922)	.0026643(.44654)	-.0037381(-.50284)
Δptisco(t-2)	-.13773(-1.5463)	-.48556(-15.2871)	-.063915(-2.3048)	-.012628(-.69419)	.034593(1.5263)
Δptelco(t-2)	.055848(.57958)	.017048(.49612)	-.066222(-2.2074)	.014355(.72946)	-.0013266(-.054108)
Δpril(t-2)	.70970(4.0697)	.15980(2.5698)	.048079(.88555)	-.15799(-4.4362)	.056815(1.2804)
Δpsbi(t-2)	.24787(1.8454)	.076040(1.5876)	.024021(.57442)	.042769(1.5592)	-.12621(-3.6927)
Δphll(t-3)	.0018377(.87283)	.3278E-3(.43662)	.6247E-3(.95301)	.1792E-3(.41682)	.1949E-3(.36381)
Δpbhel(t-3)	.048823(.93565)	.026332(1.4151)	-.0027953(-.17206)	.0012014(.11274)	-.0079428(-.59923)
Δpicici(t-3)	-.056112(-.26966)	.040758(.54928)	.0034667(.053510)	-.032222(-.75825)	-.086572(-1.6351)
Δpcolgate(t-3)	-.027150(-.24942)	-.0034139(-.087953)	-.072715(-2.1457)	-.026742(-1.2030)	-.7109E-3(-.025666)
Δpl&t(t-3)	.025718(.17542)	-.045349(-.86744)	.0082149(.17998)	.018975(.63374)	.042563(1.1410)
Δpacc(t-3)	-.10485(-3.5690)	-.0097218(-.92799)	-.011362(-1.2422)	-.0050364(-.83944)	.0014745(.19726)
Δptisco(t-3)	-.080908(-.85958)	-.34056(-10.1463)	-.027784(-.94811)	-.041772(-2.1731)	-.0083011(-.34660)
Δptelco(t-3)	.052691(.54593)	-.0016544(-.048070)	.013823(.46003)	.4023E-4(.0020412)	.030144(1.2274)
Δpril(t-3)	-.0049420(-.027472)	.076311(1.1896)	-.049554(-.88477)	-.081851(-2.2280)	.034649(.75698)
Δpsbi(t-3)	.15730(1.1590)	.10154(2.0980)	.025268(.59797)	.023109(.83372)	-.062304(-1.8041)

Table 1 cntd...

Δphll(t-4)	.8994E-3(.42787)	.2837E-3(.37843)	.3069E-3(.46896)	.3772E-4(.087867)	.1424E-3(.26625)
Δpbhel(t-4)	.026660(.51138)	.015295(.82271)	.0051010(.31427)	.016580(1.5573)	.017120(1.2906)
Δpicici(t-4)	-.35268(-1.6960)	-.072249(-.97429)	-.019537(-.30176)	-.0067643(-.15928)	-.032790(-.61970)
Δpcolgate(t-4)	-.10511(-.96434)	.040649(1.0459)	-.5642E-3(-.016625)	-.037887(-1.7021)	-.017407(-.62766)
Δpl&t(t-4)	-.035432(-.24172)	-.024998(-.47824)	-.9792E-3(-.021457)	.0034779(.11618)	.0099829(.26766)
Δpacc(t-4)	-.018621(-.63324)	.0098057(.93510)	.011406(1.2458)	-.6551E-3(-.10908)	-.010529(-1.4072)
Δptisco(t-4)	-.023657(-.25189)	-.21697(-6.4785)	-.011359(-.38845)	-.031021(-1.6173)	.0047601(.19918)
Δptelco(t-4)	-.026862(-.27809)	-.7498E-3(-.021767)	-.023508(-.78170)	-.012384(-.62777)	-.0048707(-.19817)
Δpril(t-4)	.10594(.58860)	.17366(.27058)	-.034183(-.61003)	.0048710(.13252)	.075516(1.6490)
Δpsbi(t-4)	.32506(2.3912)	.091168(1.8808)	-.5686E-3(-.013436)	.047641(1.7161)	-.0019629(-.056750)
Δphll(t-5)	.2216E-3(.13668)	.1633E-4(.028238)	-.2607E-4(-.051633)	-.6739E-4(-.20352)	-.9737E-4(-.23600)
Δpbhel(t-5)	-.0045882(-.089785)	-.0039868(-.21879)	.020788(1.3066)	.014657(1.4045)	.0047536(.36558)
Δpicici(t-5)	-.48642(-2.3862)	-.0088043(-.12112)	-.043171(-.68022)	-.080762(-1.9400)	-.147799-2.8493)
Δpcolgate(t-5)	-.10948(-1.0155)	.0035970(.093570)	.016272(.48480)	.0019097(.086742)	.4164E-3(.015180)
Δpl&t(t-5)	-.082159(-.56929)	.017529(.34062)	-.044432(-.98888)	-.014966(-.50778)	.039159(1.0664)
Δpacc(t-5)	-.055306(-1.9110)	.0023735(.22998)	.0035927(.39873)	-.0055272(-.93514)	-.0051264(-.69615)
Δptisco(t-5)	-.037978(-.42505)	-.10937(-3.4326)	-.0025876(-.093017)	-.0028085(-.15391)	.027068(1.1906)
Δptelco(t-5)	.13646(1.4200)	-.014258(-.41606)	-.024024(-.80298)	.0067519(.34404)	.024557(1.00430
Δpril(t-5)	.0075365(.042773)	.011833(.18832)	-.047072(-.85808)	-.0073211(-.20345)	.026690(.595320
Δpsbi(t-5)	.22521(1.6692)	.13988(2.9074)	.015595(.37125)	.020829(.75592)	.0022052(.064234)
Δphll(t-6)	-.0013597(-.83825)	.3949E-3(.68261)	.2407E-3(.47660)	.1788E-3(.53971)	-.1570E-3(-.38034)
Δpbhel(t-6)	.051951(1.0894)	-.039759(-2.3382)	-.014991(-1.0097)	-.4373E-4(-.0044900)	.4030E-3(.033214)
Δpicici(t-6)	-.43893(-2.3094)	-.014354(-.21178)	-.020621(-.34848)	-.031873(-.82114)	-.054379(-1.12440
Δpcolgate(t-6)	.024106(.24115)	.019039(.53411)	.019820(.63685)	.0023142(.11336)	-.0054243(-.213260
Δpl&t(t-6)	.0032608(.024000)	.073612(1.5194)	-.028634(-.67694)	.0070429(.25383)	.013135(.37997)
Δpacc(t-6)	-.036401(-1.3160)	.0098249(.99608)	-.0090529(-1.0512)	-.0015923(-.28188)	-.0097908(-1.3911)
Δptisco(t-6)	-.062092(-.86145)	-.075977(-2.9560)	-.012093(-.53888)	-.026931(-1.8296)	-.0082906(-.45205)
Δptelco(t-6)	.10295(1.0977)	.057007(1.7046)	.013253(.45387)	.017683(.92322)	.0051173(.21444)
Δpril(t-6)	-.013479(-.081954)	-.0061081(-.10415)	-.010302(-.20119)	.0044664(.13297)	.079113(1.8904)
Δpsbi(t-6)	.10459(.82222)	-.024645(-.54331)	-.017720(-.44743)	-.020530(-.79029)	-.0015678(-.048439)
ecm1(-1)[3]	.88719(.46157)	.35160(.51298)	.24952(.41696)	-.090953(-.23170)	-.31646(-.64707)
R^2	.12634	.40109	.087248	.064346	.099435
DW	1.9898	1.9905	2.0003	1.9983	1.9896
F-stat	3.6945(.000)	17.1100(.000)	2.4421(.000)	1.7570(.000)	2.8209(.000)

[3] ecm1 = -.0012(phll) + .0011(pbhel) + .0016(picici) + .0001(pcolgate) + .0005(pl&t) + .0003(pacc) + .0016(ptisco) + .0004(ptelco) + .0002(pril) + .0027(psbi)

Table 2
Error Correction Model for Stocks traded in National Stock Exchange

Regressor	Δpbhel	Δphll	Δpcolgate	Δpicici	Δpl&t
Intercept	.094308(.34942)	-.17726(-.24957)	.88326(4.1642)	-.21609(-2.2242)	.52571(3.0088)
Trend	-.4628E-4(-.23433)	.7217E-4(.13886)	.6356E-3(4.0949)	-.1034E-3(-1.4548)	.3698E-3(2.8921)
Δpbhel(t-1)	-.25048(-9.4204)	-.019766(-.28248)	.0051202(.24503)	.046350(4.8428)	.037991(2.2071)
Δphll(t-1)	-.015999(-1.5185)	-.25556(-9.2170)	-.0076184(-.92008)	.0016570(.43691)	-.021651(-3.1742)
Δpcolgate(t-1)	-.0063010(-.16325)	-.030634(-.30160)	-.27643(-9.1133)	-.012860(-.92566)	-.019237(-.76991)
Δpicici(t-1)	-.056445(-.75644)	.064992(.33097)	-.095425(-1.6272)	-.10893(-4.0554)	-.013256(-.27441)
Δpl&t(t-1)	.053787(1.2214)	-.087799(-.75762)	.016804(.48555)	-.014192(-.89534)	-.076594(-2.6867)
Δptelco(t-1)	-.4086E-3(-.079619)	.029720(2.2007)	.0054623(1.3544)	-.4264E-3(-.23085)	-.0060927(-1.8339)
Δpacc(t-1)	.024474(4.7157)	.047747(3.4959)	.022628(5.5480)	-.0091555(-4.9008)	.0024237(.72138)
Δptisco(t-1)	.0085776(.10511)	.81222(3.7821)	.27936(4.3560)	.14744(5.0194)	.053428(1.0113)
Δpril(t-1)	-.0026371(-.67064)	-.0026728(-.25829)	.2214E-3(.071653)	-.1594E-3(-.11259)	-.0014203(-.55797)
Δpsbi(t-1)	.11110(1.7032)	.27272(1.5887)	.16098(3.1402)	.011793(.50226)	.085501(2.0247)
Δpbhel(t-2)	-.078065(-2.8251)	-.054265(-.74624)	.0018869(.086890)	.0063895(.64239)	.026848(1.5009)
Δphll(t-2)	.028634(2.6418)	-.054476(-1.9099)	.0027957(.32821)	.014723(3.7738)	-.0026060(-.37139)
Δpcolgate(t-2)	-.037186(-.93180)	-.23705(-2.2572)	-.086078(-2.7446)	-.028580(-1.9895)	.048609(1.8815)
Δpicici(t-2)	-.061385(-.82061)	-.056547(-.28725)	.014058(.23914	.014405(.53500)	.052827(1.0909)
Δpl&t(t-2)	.064386(1.4581)	-.016652(-.14330)	-.0078906(-.22738)	-.018861(-1.1866)	-.0041033(-.14354)
Δptelco(t-2)	.0012499(.26760)	.019903(1.6192)	.0031991(.87151)	-.7672E-3(-.45633)	-.0041592(-1.3755)
Δpacc(t-2)	.010697(1.8656)	.020009(1.3260)	.010336(2.2938)	-.0089416(-4.3322)	-.2022E-3(-.054470)
Δptisco(t-2)	-.10291(-1.2286)	.66721(3.0269)	.042856(.65105)	.075301(2.4975)	.0024011(.044281)
Δpril(t-2)	-.0011073(-.31515)	-.0027074(-.29282)	-.3962E-3(-.14350)	-.4155E-3(-.32858)	-.0020388(-.89636)
Δpsbi(t-2)	.092238(1.3769)	.16035(.90962)	.095305(1.8104)	.0017131(.071045)	-.083332(-1.9216)
Δpbhel(t-3)	-.023900(-.86510)	-.065756(-.90446)	-.0079083(-.36425)	.017722(1.7821)	-.0076172(-.42591)
Δphll(t-3)	.0079195(.72590)	-.023770(-.82793)	-.0043934(-.51241)	.1435E-5(.3654E-3)	-.0070923(-1.0042)
Δpcolgate(t-3)	-.042385(-1.0557)	-.073638(-.69698)	-.0073636(-.23338)	.019230(1.3306)	.057113(2.1974)
Δpicici(t-3)	.0097928(.12994)	-.015835(-.079841)	.012447(.21016)	.014263(.52578)	-.035677(-.73125)
Δpl&t(t-3)	.079006(1.7882)	.010694(.091979)	-.010498(-.30235)	.034917(2.1956)	.0022398(.078309)
Δptelco(t-3)	.8027E-3(.19493)	.022485(2.0749)	.0030094(.92991)	-.7606E-3(-.51310)	-.0031989(-1.1999)
Δpacc(t-3)	.017895(3.0584)	.020976(1.3622)	.010656(2.3173)	-.0032412(-1.5389)	.0035604(.93991)
Δptisco(t-3)	.18461(2.1958)	.48195(2.1783)	.13238(2.0035)	.038311(1.2659)	-.026906(-.49434)
Δpril(t-3)	-.0023640(-.77773)	.1745E-3(.021819)	-.0021714(-.90899)	-.6105E-3(-.55798)	-.0025621(-1.3020)
Δpsbi(t-3)	-.024780(-.37236)	.027808(.15879)	.014911(.28511)	-.011874(-.49569)	.0074059(.17191)

Table 2 cntd...

Δpbhel(t-4)	-.087103(-3.1666)	-.078883(-1.0897)	-.019398(-.89732)	-.5810E-3(-.058678)	-.025262(-1.4186)
Δphll(t-4)	.010632(.97675)	-.030082(-1.0502)	-.0077029(-.90049)	-.0040781(-1.0409)	-.2589E-3(-.036738)
Δpcolgate(t-4)	-.011204(-.28086)	-.041567(-.39596)	-.012705(-.40528)	.023968(1.6692)	.022136(.85716)
Δpicici(t-4)	.11016(1.4702)	-.22981(-1.1655)	.0094815(.16102)	.066141(2.4524)	.027539(.56775)
Δpl&t(t-4)	.018532(.42030)	.092457(.79679)	.048096(1.3880)	-.018058(-1.1378)	-.041749(-1.4626)
Δptelco(t-4)	.3614E-3(.10535)	.012097(1.3401)	.0018576(.68909)	-.4194E-3(-.33971)	-.0022715(-1.0229)
Δpacc(t-4)	.0085316(1.4769)	.042344(2.7854)	.0085387(1.8808)	-.0029778(-1.4321)	-.5462E-3(-.14605)
Δptisco(t-4)	-.099904(-1.1890)	.50066(2.2642)	.0055256(.083678)	.0078882(.26081)	-.034711(-.63812)
Δpril(t-4)	-.0024913(-1.0056)	-.5026E-3(-.077093)	-.0029304(-1.5052)	-.7782E-3(-.87275)	-.0019767(-1.2326)
Δpsbi(t-4)	.12635(1.9012)	-.17421(-.99605)	-.022027(-.42173)	-.033800(-1.4128)	.026748(.62169)
Δpbhel(t-5)	-.039914(-1.5028)	.044392(.63514)	.0095337(.45676)	.0036310(.37980)	.0020654(.12013)
Δphll(t-5)	-.0048620(-.45973)	-.031823(-1.1434)	-.0070979(-.85401)	-.3516E-3(-.092351)	-.0096495(-1.4094)
Δpcolgate(t-5)	.036591(.95988)	.32363(3.2260)	.0096692(.32276)	.022093(1.6101)	.034429(1.3951)
Δpicici(t-5)	-.085577(-1.1622)	-.11544(-.59573)	.028180(.48698)	-.016796(-.63369)	.0096257(.20193)
Δpl&t(t-5)	-.0053096(-.12058)	.15950(1.3764)	-.028498(-.82351)	.014098(.88944)	.029622(1.0391)
Δptelco(t-5)	-.2282E-3(-.091618)	.0027644(.42180)	.9986E-3(.51023)	.2058E-3(.22956)	-.0016347(-1.0139)
Δpacc(t-5)	.0096585(1.8165)	.011060(.79039)	.0068889(1.6486)	-.7978E-3(-.41684)	-.0013992(-.40650)
Δptisco(t-5)	-.12027(-1.4552)	.45045(2.0710)	-.040519(-.62382)	-.064312(-2.1617)	-.037273(-.69662)
Δpril(t-5)	-.0020125(-1.1505)	.5185E-3(.11263)	-.0026742(-1.9453)	-.8371E-3(-1.3296)	-.0017693(-1.5624)
Δpsbi(t-5)	.085813(1.3219)	-.42505(-2.4880)	.015024(.29448)	.016462(.70448)	.016917(.40253)
ecm1(-1)	-.46714(-.47340)	-.86531(-.33323)	-.73715(-.95057)	-.11493(-.32356)	-1.0464(-1.6380)
ecm2(-1)	-.041492(-.042048)	.36430(.14029)	-3.2944(-4.2482)	.72402(2.0384)	-1.9782(-3.0967)
R^2	.11345	.12970	.21235	.11794	.054869
DW	2.0028	2.0092	2.0008	1.9928	1.9998
F-stat	3.6626(.000)	4.2655(.000)	7.7167(.000)	3.8273(.000)	1.6617(.002)

Table 2 cntd...

Regressor	Δptelco	Δpacc	Δptisco	Δpril	Δpsbi
Intercept	-40.9125(-13.1193)	1.0876(.76100)	.44684(3.7027)	7.8652(1.9848)	.47742(3.2457)
Trend	-.026990(-11.8277)	.7323E-3(.70025)	.3084E-3(3.4927)	.016711(5.7629)	.3311E-3(3.0766)
Δpbhel(t-1)	.7410E-3(.0024118)	.23382(1.6608)	.024076(2.0251)	.30252(.77493)	.023289(1.6072)
Δphll(t-1)	.014501(.11912)	-.095454(-1.7110)	-.0071258(-1.5126)	-.040749(-.26342)	-.0084410(-1.4700)
Δpcolgate(t-1)	.30456(.68292)	-.12910(-.63169)	-.023323(-1.3514)	-.31176(-.55015)	-.0032395(-.15401)
Δpicici(t-1)	.19795(.22959)	.32418(.82046)	.0014870(.044569)	.14045(.12819)	.016481(.40526)
Δplst(t-1)	-.18385(-.36133)	.11929(.51158)	.0017965(.091238)	.41237(.637790	-.0076688(-.31954)
Δptelco(t-1)	-.10916(-1.8410)	.0010716(.039434)	.0029340(1.2786)	.029686(.39399)	.0045121(1.6133)
Δpacc(t-1)	-.019217(-.32046)	-.40009(-14.5590)	.0091837(3.9575)	-.055424(-.72735)	.0080608(2.8499)
Δptisco(t-1)	-.75400(-.79965)	1.3648(3.1585)	-.054852(-1.5033)	.99365(.82930)	.15989(3.5951)
Δpril(t-1)	-.3110E-4(-.6846E-3)	-.012010(-.57680)	-.0023461(-1.3344)	.025447(.44076)	-.0040994(-1.9129)
Δpsbi(t-1)	.045061(.059785)	1.0965(3.1746)	.090451(3.1011)	.32017(.33429)	-.12649(-3.5580)
Δpbhel(t-2)	.28835(.90314)	.40679(2.7802)	-.8341E-3(-.067512)	-.21310(-.52524)	-.013795(-.91601)
Δphll(t-2)	.13964(1.1150)	.015636(.27244)	-.0014057(-.29005)	-.11093(-.69708)	-.0011192(-.18946)
Δpcolgate(t-2)	.35588(.77181)	.17922(.84814)	.023632(1.3244)	.42177(.71982)	.034820(1.6010)
Δpicici(t-2)	-1.0442(-1.2081)	1.2173(3.0734)	.084448(2.5248)	.27615(.25144)	.047047(1.1540)
Δplst(t-2)	-.14291(-.28009)	.18001(.76989)	-.0061226(-.31009)	-.046078(-.071071)	-.0046510(-.19326)
Δptelco(t-2)	-.079855(-1.4796)	-.015147(-.61241)	.0027171(1.3010)	.017177(.25047)	.0023951(.94088)
Δpacc(t-2)	-.034170(-.51575)	-.21356(-7.0340)	.1389E-3(.054193)	-.021369(-.25383)	-.9819E-3(-.31421)
Δptisco(t-2)	-.33320(-.34428)	.070563(.15910)	-.094186(-2.5148)	-.29186(-.23732)	-.053206(-1.1655)
Δpril(t-2)	-.0037215(-.091671)	-.013016(-.69964)	-.0026404(-1.6807)	.021294(.41279)	-.0041935(-2.1900)
Δpsbi(t-2)	-.55515(-.71725)	.21551(.60758)	.027126(.90564)	.27200(.27655)	-.0058370(-.15988)
Δpbhel(t-3)	.27508(.86176)	-.069144(-.47267)	-.025348(-2.0520)	-.42631(-1.0510)	-.0093717(-.62244)
Δphll(t-3)	.023976(.19020)	-.0081347(-.14082)	-.0081160(-1.6637)	.053261(.33250)	-.022331(-3.7557)
Δpcolgate(t-3)	-.28576(-.61602)	.085090(.40026)	.027227(1.5167)	.30398(.51568)	.039416(1.8014)
Δpicici(t-3)	-.43796(-.50295)	.17030(.42675)	-.024559(-.72880)	.030035(.027144)	.025681(.62526)
Δplst(t-3)	-.24580(-.48151)	.11694(.49986)	.0026318(.13323)	.48015(.74019)	.0062606(.26001)
Δptelco(t-3)	-.063416(-1.3328)	.2189E-3(.010037)	.0029009(1.5755)	.013761(.22760)	.0026346(1.1739)
Δpacc(t-3)	-.060978(-.90193)	-.081463(-2.6293)	.0057689(2.2050)	-.025771(-.29998)	-.0019476(-.61074)
Δptisco(t-3)	1.6669(1.7159)	.40314(.90557)	.014985(.39862)	-.26621(-.21566)	.010085(.22009)
Δpril(t-3)	-.0046575(-.13261)	-.012904(-.80170)	-.0028636(-2.1069)	.014506(.32503)	-.0037901(-2.2878)
Δpsbi(t-3)	-1.4706(-1.9126)	-.31385(-.89068)	.0067955(.22838)	-.42513(-.43511)	.015075(.41567)

Table 2 cntd...

Δpbhel(t-4)	.11116(.34975)	-.14364(-.98622)	-.024112(-1.9605)	.10194(.25240)	-.021328(-1.4227)
Δphll(t-4)	-.019497(-.15503)	-.047485(-.82389)	-.0054358(-1.1169)	.29983(1.8761)	-.010854(-1.8296)
Δpcolgate(t-4)	-.47497(-1.0305)	.045074(.21339)	-.0093724(-.52546)	-.038186(-.065198)	-.6898E-4(-.0031731)
Δpicici(t-4)	.32122(.37103)	.28193(.71060)	.031443(.93854)	.58528(.53202)	-.0025150(-.061589)
Δpl&t(t-4)	-.39352(-.77240)	.94489(4.0470)	-.0046107(-.23386)	.48527(.74958)	.0057573(.23958)
Δptelco(t-4)	-.035747(-.90193)	.0093459(.51456)	.0019436(1.2672)	.011965(.23758)	.0011844(.63356)
Δpacc(t-4)	-.065279(-.97802)	-.028464(-.93058)	.0040476(1.5671)	-.018757(-.22116)	.0049936(1.5862)
Δptisco(t-4)	1.0496(1.0812)	-.23686(-.53237)	-.034462(-.91727)	-.83949(-.68047)	-.082218(-1.7954)
Δpril(t-4)	-.0016782(-.058632)	-.0063363(-.48305)	-.0011447(-1.0334)	.011137(.30618)	-.0023151(-1.7148)
Δpsbi(t-4)	.11663(.15188)	-.0059834(-.017002)	.031168(1.0488)	.32226(.33025)	.043562(1.2027)
Δpbhel(t-5)	.032648(.10639)	-.14790(-1.0516)	-.0091989(-.77461)	-.60290(-1.5461)	-.0036329(-.25098)
Δphll(t-5)	-.022618(-.18510)	.070725(1.2630)	-.0062762(-1.3272)	-.19045(-1.2265)	.2492E-3(.043243)
Δpcolgate(t-5)	-.52584(-1.1938)	-.11434(-.56645)	.014671(.86073)	.11498(.20542)	.030548(1.4704)
Δpicici(t-5)	-.48357(-.56837)	.23254(.59642)	.059463(1.8061)	.99670(.92191)	-.046869(-1.1679)
Δpl&t(t-5)	.039381(.077400)	.38433(1.6483)	.017767(.90239)	.67827(1.0491)	.015421(.64258)
Δptelco(t-5)	-.022968(-.79818)	.0058448(.44322)	.9971E-3(.89541)	.0074569(.20393)	.8881E-3(.65434)
Δpacc(t-5)	-.020195(-.32871)	-.044404(-1.5772)	.1992E-3(.083784)	-.057539(-.73703)	.6064E-3(.20927)
Δptisco(t-5)	.13876(.14530)	.74470(1.7016)	-.012456(-.33704)	-.19799(-.16315)	.053905(1.1967)
Δpril(t-5)	-.0012655(-.062616)	-.0095458(-1.0306)	-.0014607(-1.8676)	.0055030(.21427)	-.0027323(-2.8660)
Δpsbi(t-5)	.34454(.45933)	-.37000(-1.0764)	.018028(.62108)	.58290(.61155)	-.014766(-.41735)
ecm1(-1)[4]	28.1800(2.4716)	-3.0459(-.58296)	-.96803(-2.1940)	230.1553(15.8858)	-1.5073(-2.8028)
ecm2(-1)[5]	149.3163(13.0962)	-4.1458(-.79345)	-1.6537(-3.7480)	-45.4104(-3.1343)	-1.8409(-3.4232)
R^2	.48036	.16531	.15693	.50828	.16096
DW	2.0020	2.0023	2.0026	2.0071	1.9978
F-stat	26.4592(.000)	5.6686(.000)	5.3277(.000)	29.5869(.000)	5.4908(.000)

[4] ecm1 = -.0005(pbhel) + .0003(phll) + .0007(pcolgate) - .0004(picici) + .0004(pl&t) - .0012(ptelco) + .0004(pacc) - .0005(ptisco) - .0043(pril) + .0028(psbi)

[5] ecm2 = -.0003(pbhel) - .0006(phll) + .0038(pcolgate) + .0008(picici) + .0029(pl&t) - .0054(ptelco) + .00038(pacc) + .0034(ptisco) + .0008(pril) - .0002(psbi)

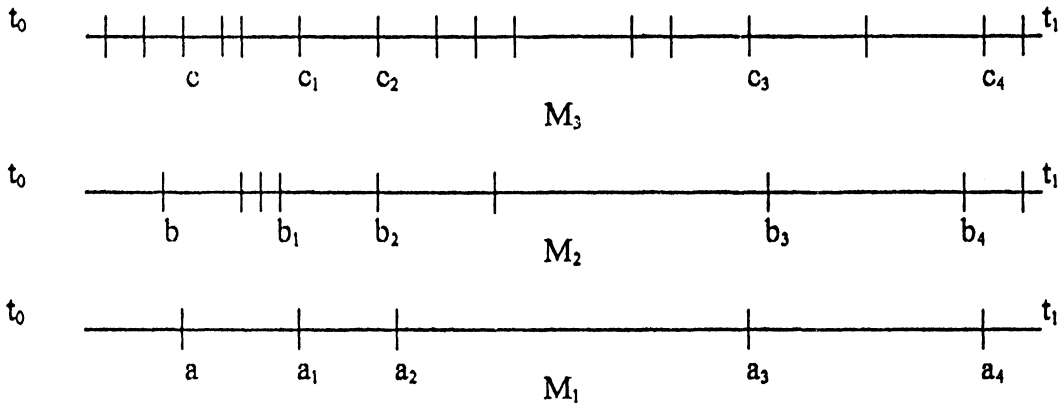


Figure (a)

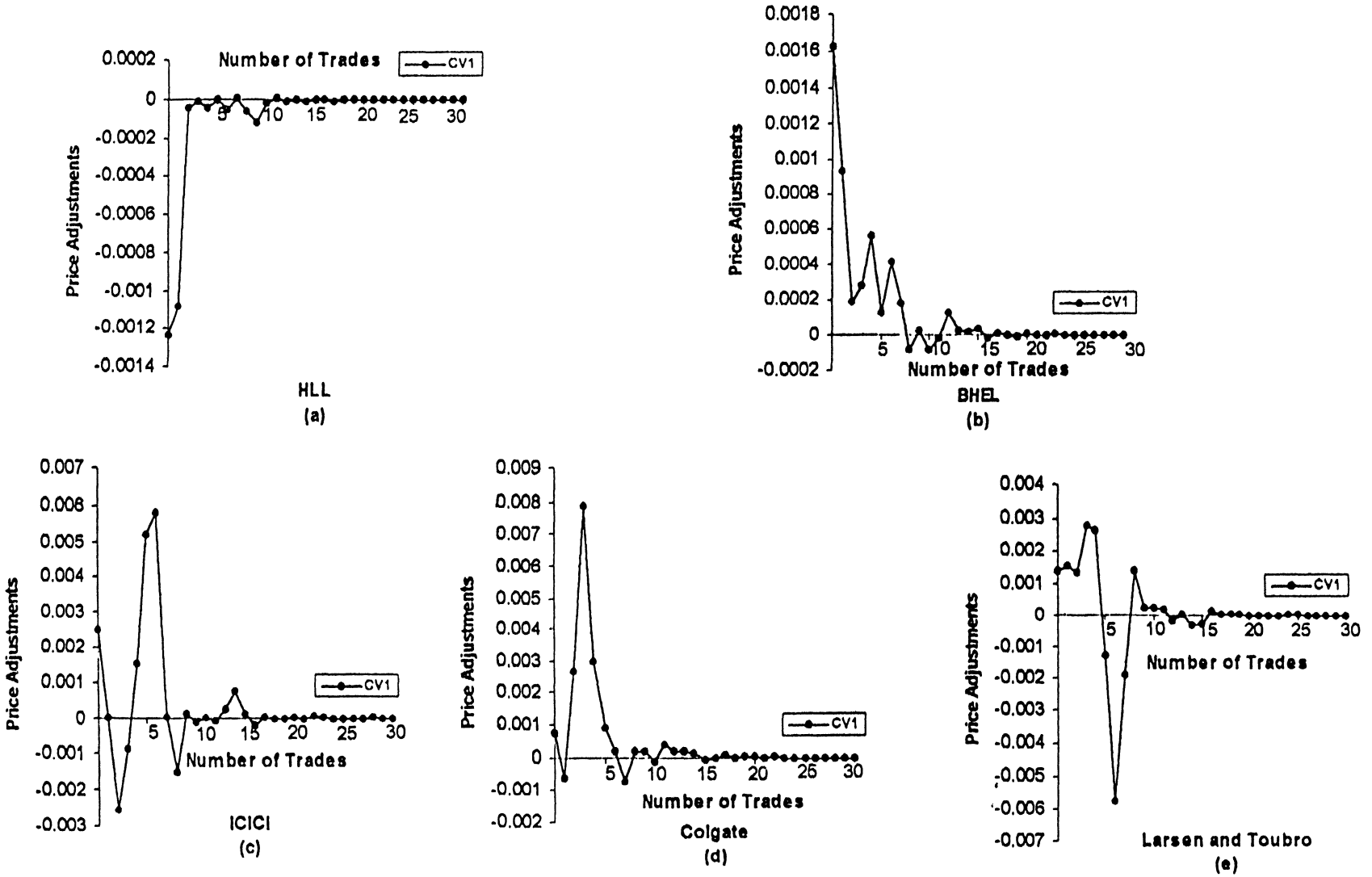
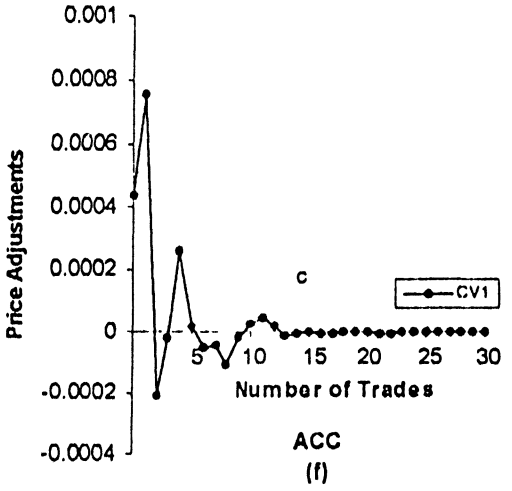
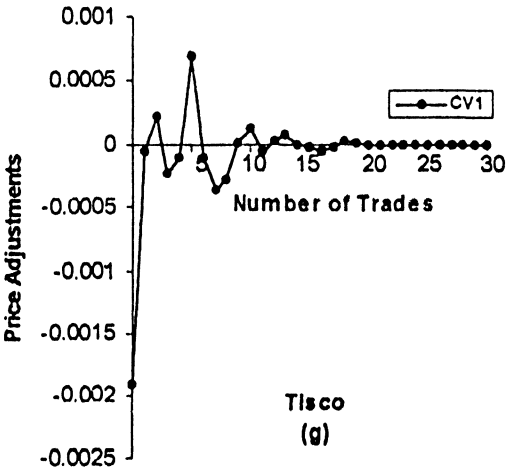


Figure 1
Impulse Response of Major Stocks Traded in BSE

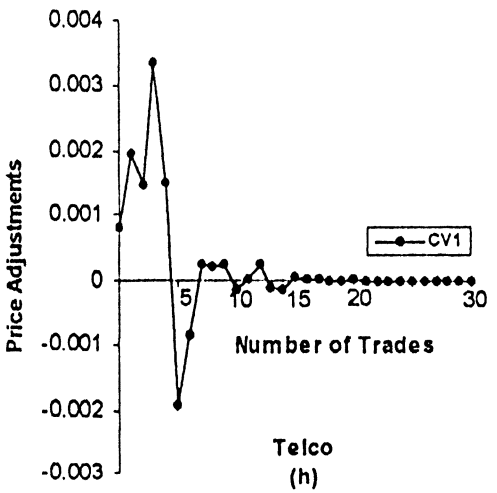
Figure (1) cntd..



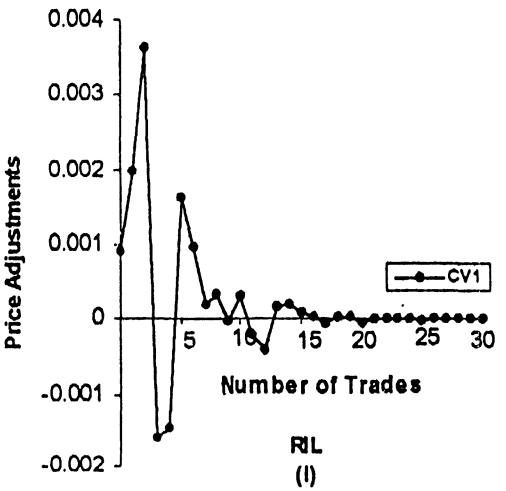
ACC
(f)



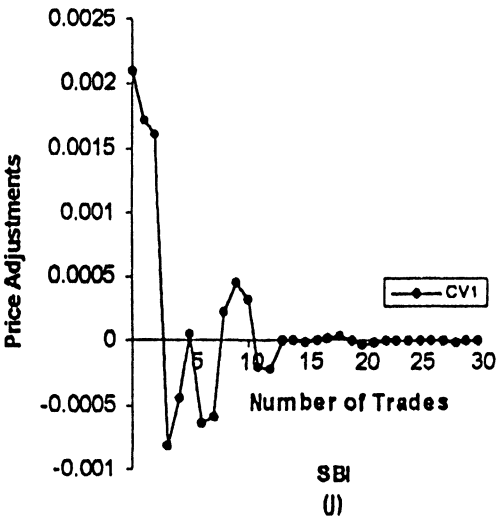
Tisco
(g)



Telco
(h)



RIL
(I)



SBI
(J)

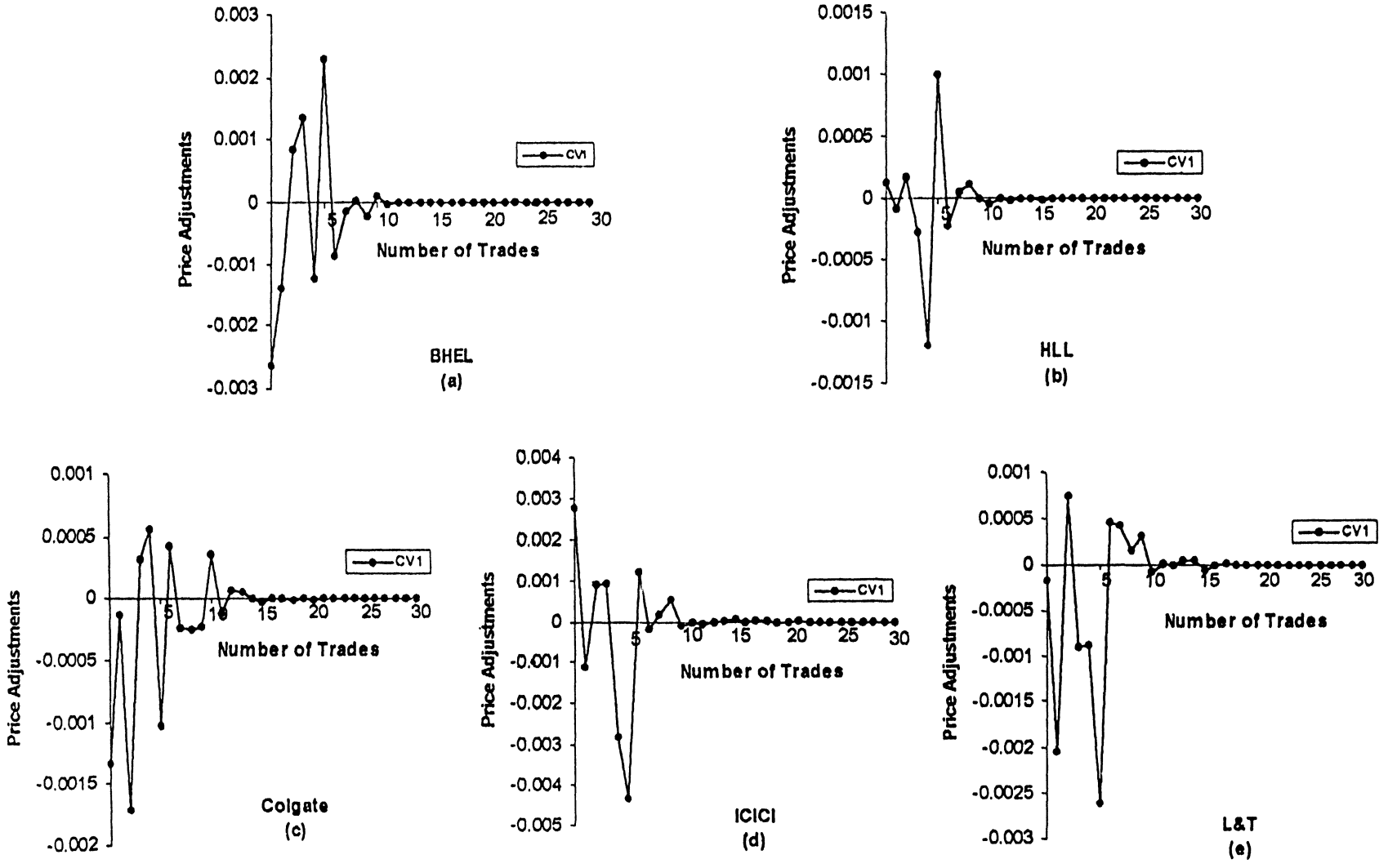
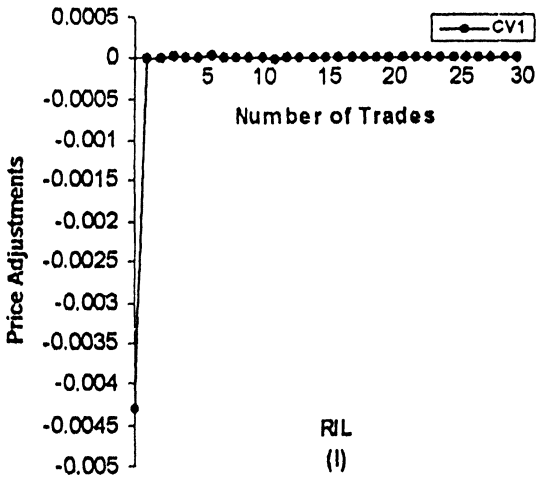
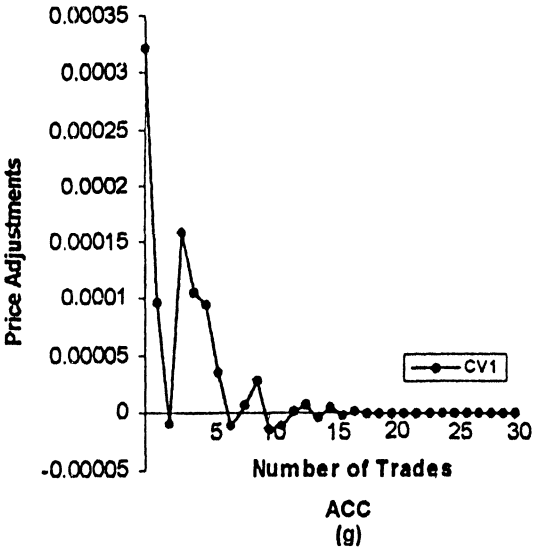
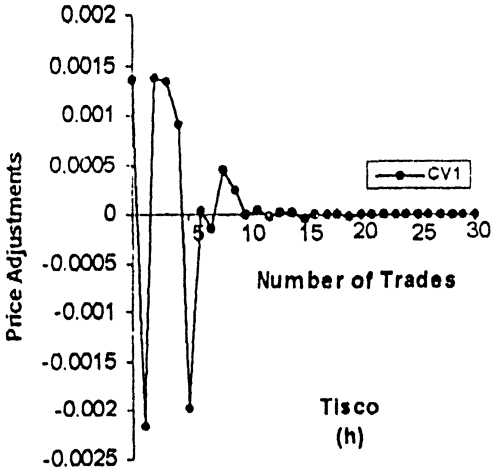


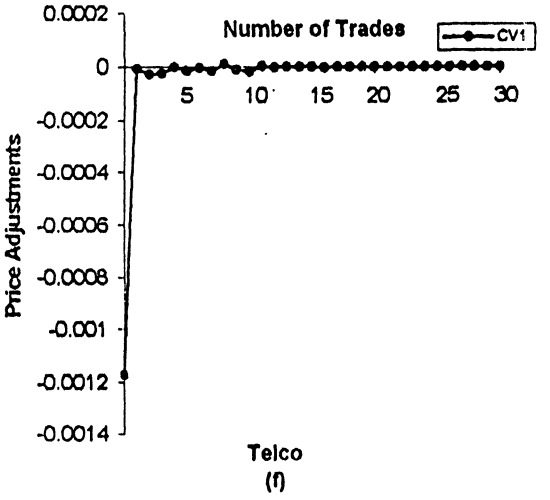
Figure 2
Impulse Response of Major Stocks Traded in NSE

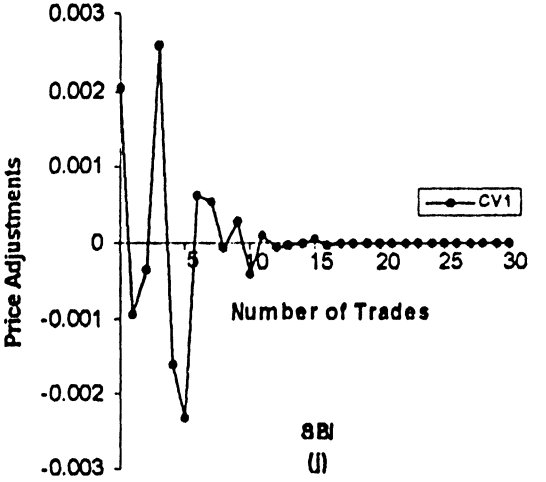
Figure (2) cntd..











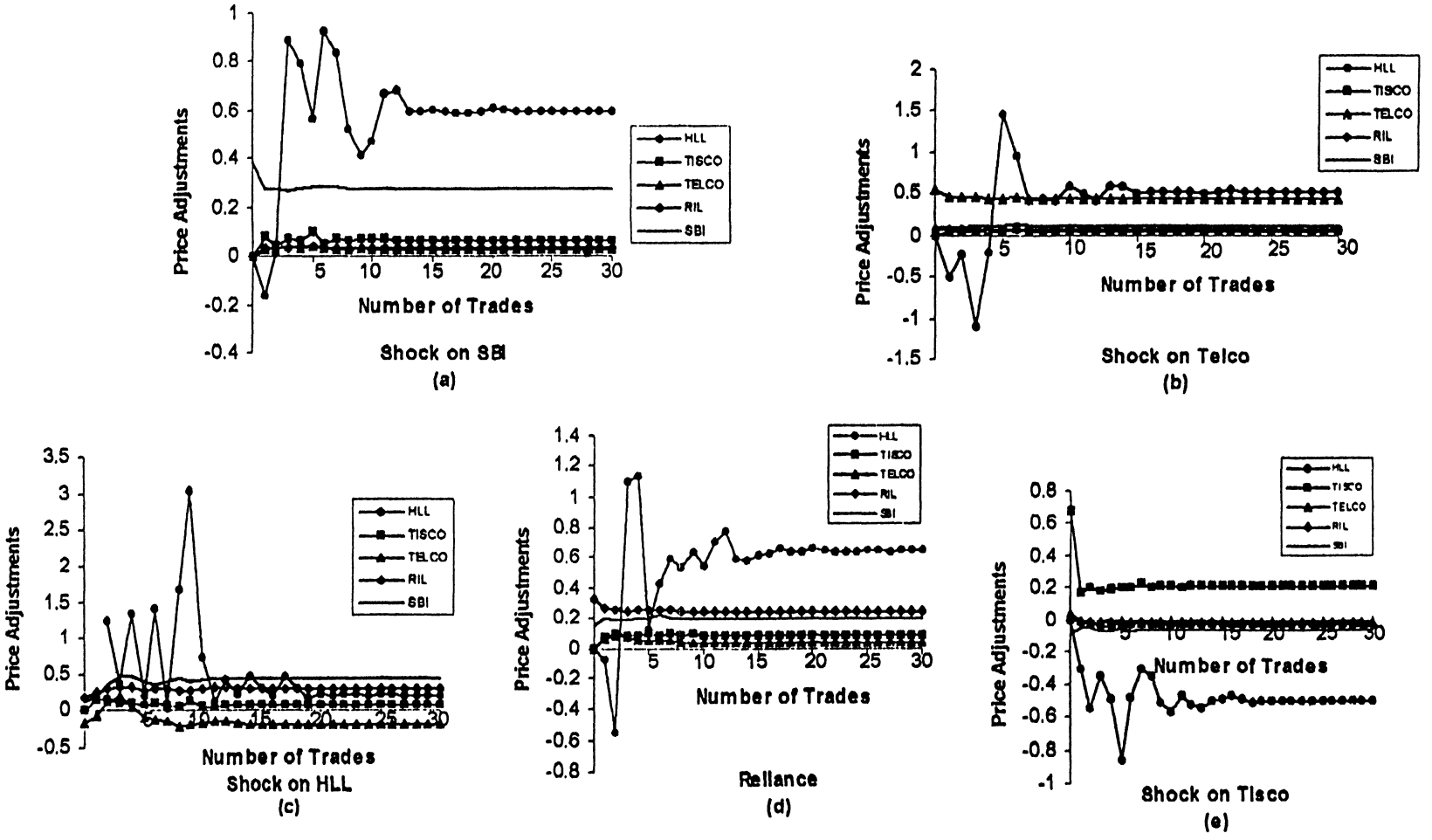
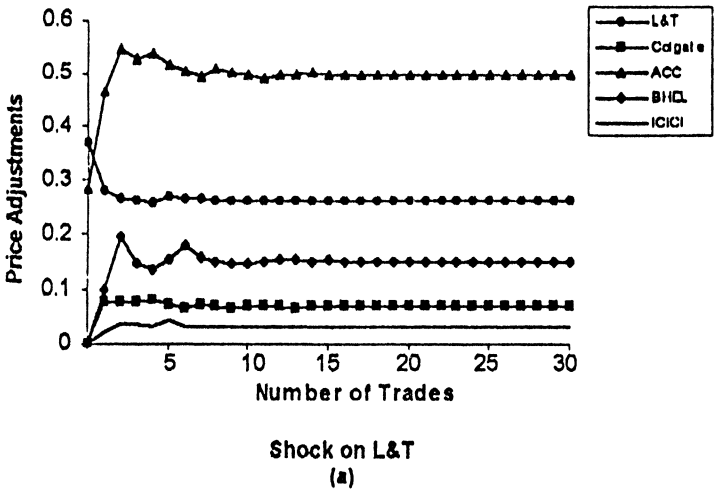
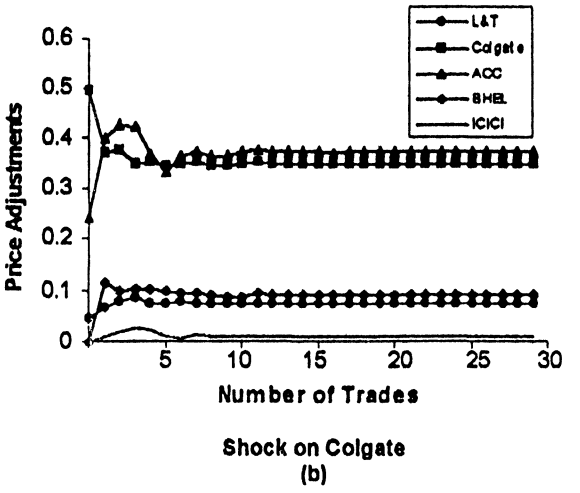


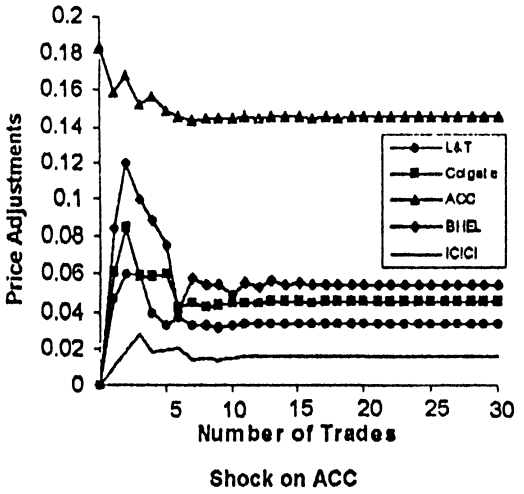
Figure (3)
Interstock Price Transmittal in BSE (top 5 based on market capitalization)



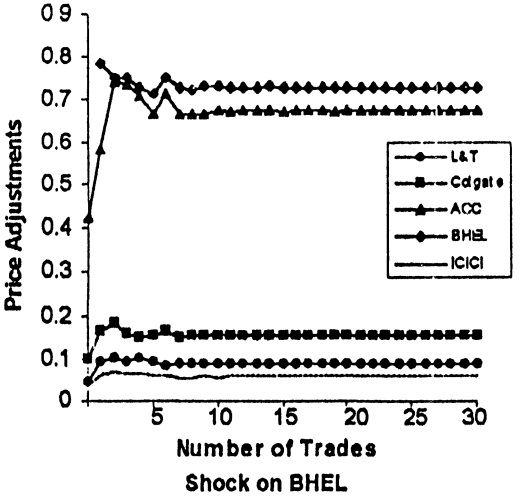
Shock on L&T
(a)



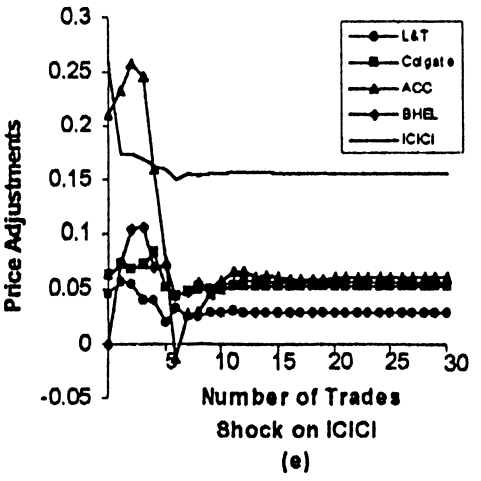
Shock on Colgate
(b)



Shock on ACC
(c)



Shock on BHEL
(d)



Shock on ICICI
(e)

Figure (4)
Interstock Price Transmittal in BSE (last 5 based on market capitalization)

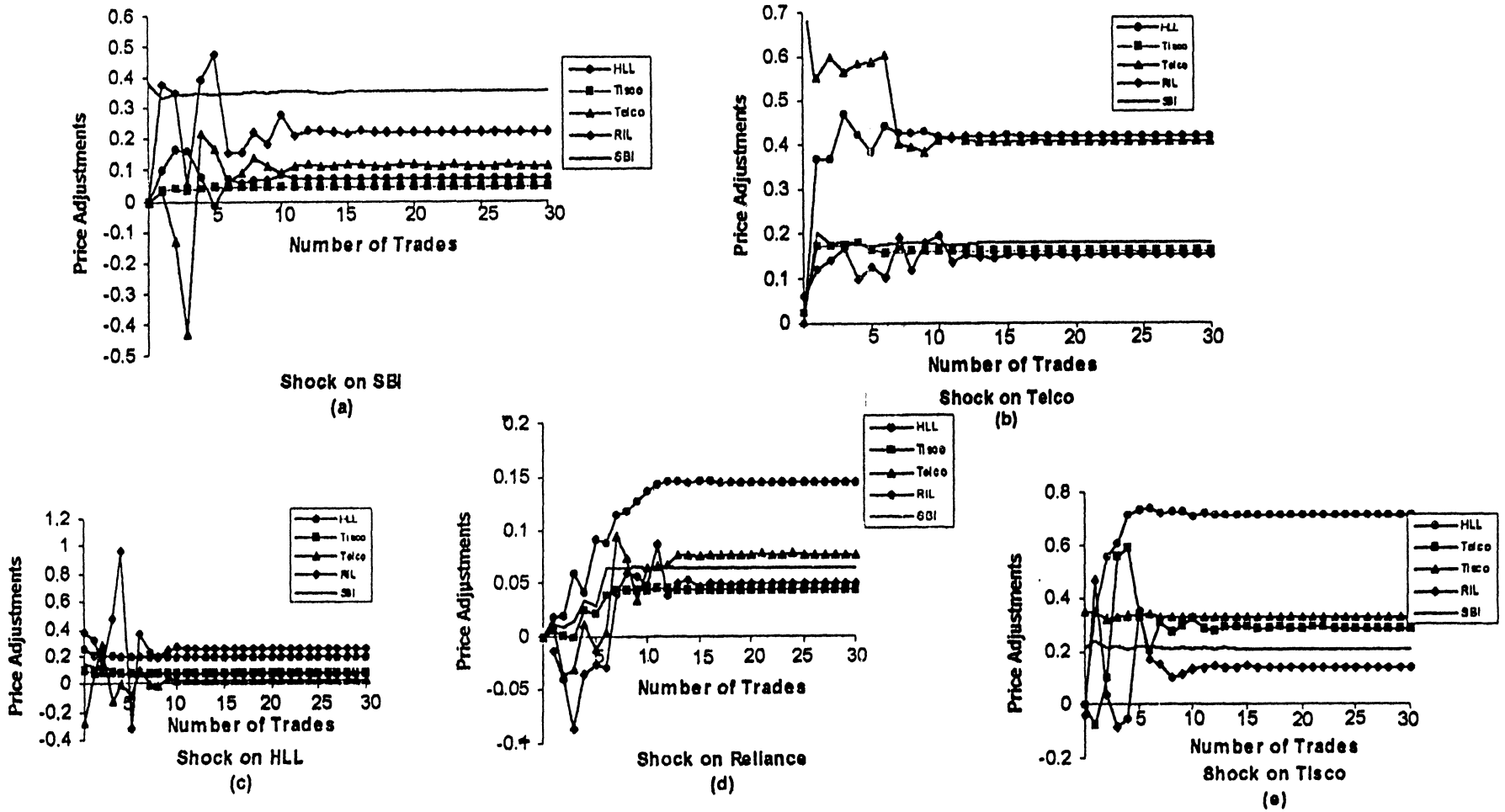


Figure (5)
Interstock Price Transmittal in NSE (top 5 based on market capitalization)

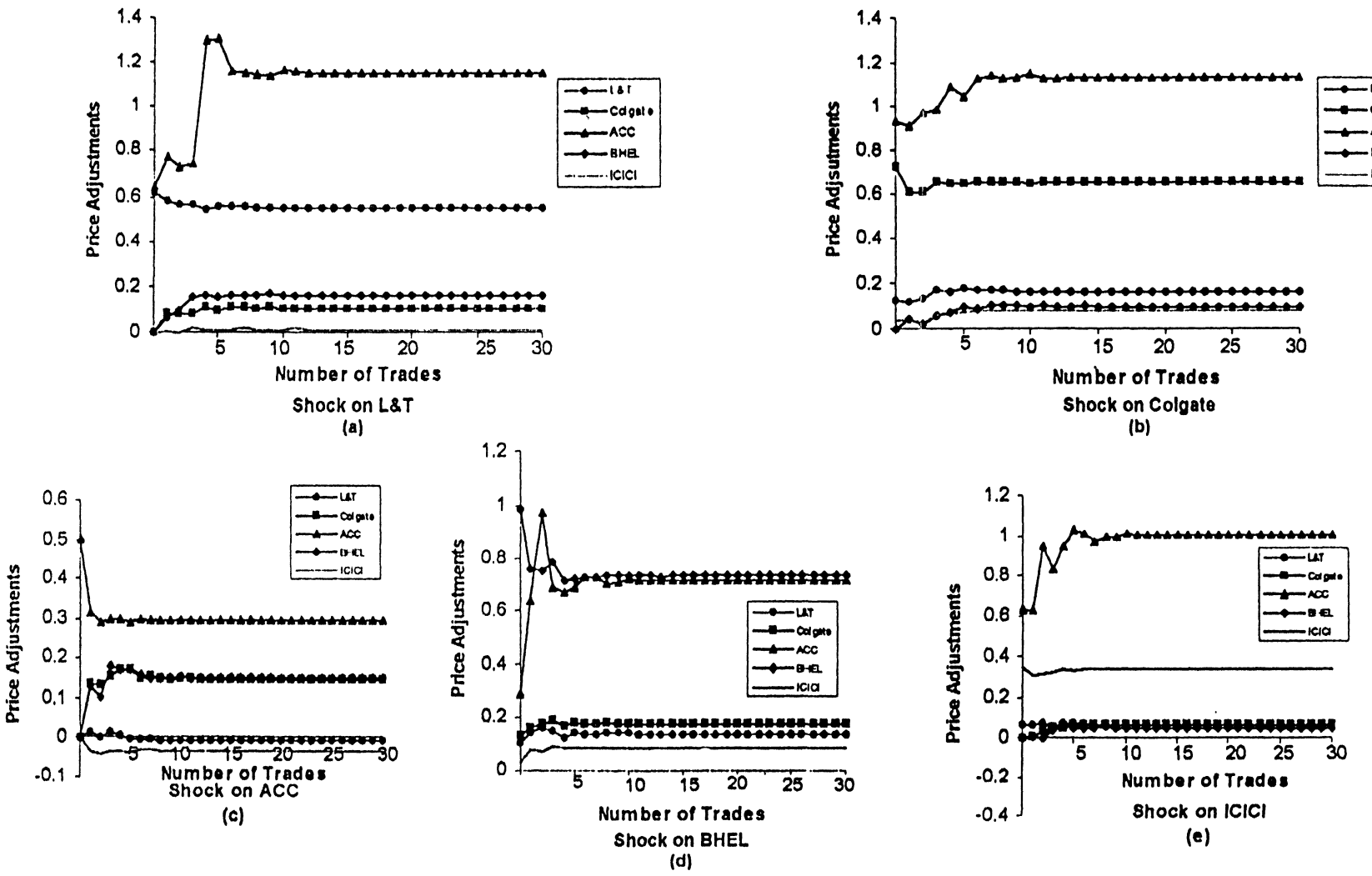


Figure (6)
Interstock Price Transmittal in NSE (last 5 based on market capitalization))