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Stock Price Comovement: Evidence from India

S. Mishra and S. Dhole
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Sagarika Mishra  
Centre for Financial Econometrics  
Deakin University  
Email: mishra@deakin.edu.au

Sandip Dhole  
Faculty of Business and Economics  
University of Melbourne  
Email: sandip.dhole@unimelb.edu.au

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Abstract

This study examines the extent to which stock prices comove in an emerging economy, India. We first document that stocks listed on the National Stock Exchange (NSE) comove. Further, we find that synchronicity is positively associated with growth and earnings volatility and negatively associated with business group affiliation and leverage.

Keywords: Stock Price Synchronicity, Business Groups, Firm Growth, Leverage, Earnings Volatility

JEL Classification: G14, M41
Introduction

In this study, we examine the nature of comovement of stocks listed on the National Stock Exchange (NSE) in Mumbai. Stock price comovement has been documented in both the developed world (see for example, Crawford et al., 2012; Cahan et al., 2009; etc.) and in the emerging world (Morck et al., 2000, Khanna and Thomas, 2009.). In an efficient market, stock price comovement can happen if underlying value drivers of the firms also comove. However, stock price comovement without the comovement of the fundamental value drivers of the firms could indicate poor firm-specific information (Jin and Myers, 2006).

It has been well established that emerging market firms are characterized by high information opacity. This opacity arises from various sources, such as the complexity of organizational structure (Bertrand et al., 2002; Bae and Jeong, 2007), weak investor protection laws (LaPorta et al., 1998), etc. High information opacity would reduce the availability and quality of firm-specific information, making it likely that stock prices would be highly synchronous. Accordingly, we first test the extent to which stocks listed on the NSE move together. Using the $R^2$ as our measure of stock price synchronicity following prior research (Chan et al., 2013; Crawford et al., 2012.), we find that NSE-listed stocks exhibit appreciable synchronicity.

We next turn to some specific factors that could potentially affect the nature of the stock price comovement. We first examine the impact of growth on the extent of stock price comovement. Prior research, for example, Jenter (2005), Richardson et al. (2004), has shown that there is high insider trading in growth firms, supporting the notion that these firms have opaque information environments. Accordingly, we expect that stock price comovement would be high for growth firms. We find results consistent with our expectations.

We also examine how the affiliation to business groups (BGs) affects stock price comovement. While some prior studies (Bertrand et al., 2002; Kim and Yi, 2006) argue that BG owners

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1Business groups, loosely defined as a collection of independent firms owned by a single family or group of
take advantage of the complexity of the group structure to expropriate shareholders, other studies, for example, Gopalan and Jayaraman (2012), Siegel and Choudhury (2012), argue otherwise. We argue that if BG owners care about maintaining group reputation, they will actively work towards creating and maintaining transparent reporting environments. Consequently, the extent of comovement would be lower for stocks of firms affiliated to BGs. We find results supporting our hypothesis.

We next examine whether stocks of firms operating in industries with highly volatile earnings comove to a greater degree than stocks of firms operating in industries with more stable earnings. High earnings volatility indicates greater information asymmetry (see Gray et al., 2009). Accordingly, we expect that stock price comovement would be higher for firms operating in industries with more volatile earnings. We find results consistent with our expectations.

Finally, we study how leverage affects stock price comovement. It has been shown in the literature (Mazumdar and Sengupta, 2005; Sengupta, 1998) that cost of debt is negatively associated with the quality of disclosure. We argue that when firms have high levels of debt, they might provide more disclosure to minimize the cost of debt. Consequently, we predict that stock price comovement would be negatively associated with leverage. We find results consistent with our hypothesis.

We use India as our setting for the following reasons. First, there is a developing literature on stock price synchronicity in emerging economies. India thus becomes a natural choice for our study since India is among the fastest growing economies in the world currently. Second, since we study the impact of BG affiliation on stock price synchronicity, it becomes necessary to choose an economy where BGs are common. In India, BGs account for about a third of the total number of companies and over two-thirds in terms of revenues and profits. This makes it natural for us to use the Indian capital market to study the comovement of stock prices.

We contribute to the literature in the following important ways. First, we extend our understanding of stock price synchronicity by understanding how some firm and industry characteristics families, are ubiquitous in emerging economies.
affect synchronicity. While there are studies that examine different factors affecting synchronicity, such as accounting quality (Crawford et al., 2012), analyst following (Chan and Hameed, 2006), liquidity (Chan et al., 2013), to our knowledge, no study has examined how growth, earnings volatility and leverage affect stock price synchronicity. Thus, we provide more evidence on fundamental factors that affect stock price synchronicity. We also contribute to the emerging finance literature on business groups by documenting that BG stocks comove to a lesser degree. Finally, we extend the literature on stock price synchronicity in emerging markets.

The rest of the paper is organized as follows. Section 2 builds our hypotheses; in Section 3 we present the empirical models employed in this study; Section 4 describes our data and results and Section 5 concludes.

2 Institutional Setting and Hypotheses

2.1 Institutional Setting

India has been one of the fastest growing economies over the last decade. The increasing importance of India as an emerging economy, coupled with the diversity of organizational forms among the corporate entities operating in the Indian capital markets makes it an interesting research setting for academic studies. For example, in India there are public sector undertakings controlled by the Central Government and various State Governments, wholly owned subsidiaries of foreign listed companies, joint venture entities owned by Indian corporates and foreign companies, standalone Indian companies and companies owned by Indian business groups. The publicly held companies in India are listed on the stock exchanges. The two major stock exchanges are the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). Many studies that use Indian data study stocks listed on the BSE (see Chittoor et al., 2013; Sarkar et al., 2008 for recent examples). However, the BSE had been criticized for outdated trading and settlement pro-

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2 There are 22 stock exchanges in India. Refer to http://www.sebi.gov.in/sebiweb/userview/detail/2/388/No%20of%20Stock%20Exchange for details.
cedures and poor regard for investor protection. The problems at the BSE forced the government to create the NSE with the help of government-owned and controlled financial institutions in 1992. With better investor protection procedures and more professional service, the NSE gained rapid market share at the expense of the BSE. As a result, many studies that use Indian data base their samples on NSE-listed stocks (see Karmakar, 2010; Camilleri and Green, 2009 and Krishnamurti et al., 2003 for some recent examples). However, with the growth of the NSE, the BSE has also improved its operations significantly. Today, there is not much difference between the NSE and BSE as effective exchanges for stock trading in India. The NSE has a slight lead over the BSE in terms of best practices and technology. Our sample size is not compromised significantly as a result of our choosing NSE-listed stocks since most of the actively traded stocks listed on the BSE are also listed on the NSE.

2.2 Hypotheses

Stock price comovement, or the strong correlation of the firm’s returns with the market has been observed in both the developed world (Crawford et al., 2012; Callen et al., 2012, etc.) and in the emerging markets as well (see Morck et al., 2000 and Khanna and Thomas, 2009 for some examples). Stock prices can comove in an efficient market if the underlying value drivers of the firms are correlated and move together. However, there are studies that have documented comovement of prices of stocks whose fundamental value drivers are not correlated (Barberis et al., 2005 and Pindyck et al., 1993). One explanation for this observation is information opacity (Veldkamp, 2006). Specifically, when firm-specific information is not readily available (or costly to acquire), investors might settle for readily available market-wide information. This would cause the stock prices of firms to comove.

Emerging economies are often characterized by poor information environments. Consistent with the idea of high information asymmetry in emerging economies, Chan et al. (2008) and Chakravarty et al. (1998) document that B class shares of Chinese listed companies trade at a significant discount because foreign investors are at an information disadvantage, relative to domestic
investors. However, firms operating in emerging economies exhibit significant cross-sectional variation in terms of size, organizational form, and industry membership. This variation might affect the extent to which prices of individual stocks comove. In this study, we focus on some of these dimensions. Specifically, we analyze whether firm size, affiliation to business groups (BG), and membership of industry with more volatile earnings impacts the extent of stock price comovement. Additionally, we also examine whether the extent of comovement declines as the Indian equity market develops.

It has been documented in prior research that information asymmetry is high for growth firms. For example, Jenter (2005), Richardson et al. (2004) and Rozeff and Zaman (1998) show that insider trading is high in growth firms. Growth firms also face intense market pressure to meet earnings expectations (Skinner and Sloan, 2002). Thus it is possible that the quality of firm-specific information of growth firms is questionable and, as such, investors depend more on market-wide information, rather than firm-specific information when evaluating these stocks. If this is so, it could be argued that stock prices of growth firms would comove to a greater degree than mature firms. We formally state our hypothesis below.\(^3\)

\[Hypothesis \ 1 \ (H1): \ The \ extent \ of \ stock \ price \ comovement \ is \ higher \ for \ growth \ firms \ than \ mature \ firms.\]

We next turn to the impact of business group affiliation on stock price comovement. Business groups (BGs) are defined as “a set of firms which, though legally independent, are bound together by a constellation of formal and informal ties and are accustomed to taking coordinated action” (Khanna and Rivkin 2001, p. 47) and are ubiquitous in emerging economies. They are particularly abundant in India (see Khanna and Yafeh, 2007), accounting for one third in terms of the number of firms and two thirds in terms of revenues and profits. In a study of Indian BGs, Bertrand et al. (2002) note that the pyramidal structure of BGs creates opportunities for group owners to engage in “tunneling” or shifting funds away from group companies where their cash flow rights are lower to group firms where their cash flow rights are higher. Tunneling is possible because of the divergence

\(^3\)All hypotheses have been stated in the alternate form.
of voting and cash flow rights in group firms, as a result of which BG owners retain much of the decision making rights, even though their cash flow rights may be low. Kim and Yi (2006) find that owners of Korean chaebols engage in significant earnings manipulation, taking advantage of the complexity of the group structure. Based on this research, one could argue that the complexity of the BG structure would make the information environment of the affiliated firms opaque, leading to greater comovement of the stock prices of affiliated firms with the market. Indeed, Khanna and Thomas (2009) find evidence consistent with this for a sample of Chilean firms.

Yet, on the other hand, there are studies by Gopalan and Jayaraman (2012) and Byun et al. (2012) that argue that the effect of BGs goes beyond the control-ownership divergence. It is quite possible that BG owners care about preserving the family business for future generations and thus provide expanded disclosure and safeguard the interests of minority shareholders. Consistent with the idea that BG owners have strong reputation concerns, Chittoor et al. (2013) find that the earnings quality of publicly listed BG firms is higher than that of standalone firms. Given the strong theoretical rationale for both possibilities, it is necessary to re-investigate the impact of BG affiliation on stock price comovement. We state our hypothesis below.

**Hypothesis 2 (H2): The extent of stock price comovement is lower for firms affiliated to business groups.**

We next turn to the earnings volatility of the industry the firm operates in. Industries with highly volatile earnings likely face greater uncertainty than industries with more stable earnings. Consistent with the notion that investors judge firms with highly volatile earnings as being risky, Gray et al. (2009) and Barth et al. (1999) find that investors demand a higher cost of equity for investing in firms with high earnings volatility. These studies suggest that when earnings are highly volatile, the quality of firm-specific information is debatable. As a consequence, it could be argued that investors would rely more on market-wide information when evaluating these stocks. This would increase the extent of comovement. Accordingly, we hypothesize that:

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4 Indeed, some of the BGs in India, for example, the Tata group, have been in existence for more than 100 years.
Hypothesis 3 (H3): The extent of stock price comovement is higher for firms operating in industries with more volatile earnings.

Finally, we study the impact of leverage on the comovement of stock prices. Mazumdar and Sengupta (2005) and Sengupta (1998) report that cost of debt is negatively associated with the quality of disclosure. Based on these studies, one could argue that firms would be motivated to voluntarily disclose more firm-specific information when they have increasing levels of debt, in order to reap a lower cost of capital. Thus, one could argue that the amount of firm-specific information would be increasing with the level of debt. Accordingly, the extent of stock price comovement would decline as the degree of leverage increases. We state the hypothesis below.

Hypothesis 4 (H4): The extent of stock price comovement is negatively associated with leverage.

We next discuss the empirical models used in this study.

3 Models

We follow prior research (Chan et al., 2013; Crawford et al., 2012; Khanna and Thomas, 2009; Chan et al., 2006; etc.) and first estimate the following regression model at the firm-level:

$$r_t = \alpha_0 + \alpha_1 r_{mt} + \eta_t$$ (1)

where \(r_t\) is the daily return for a given firm, \(r_{mt}\) is the daily return on the Nifty (the NSE index). Prior studies by Roll (1988) and Piotroski and Roulstone (2004) also include industry returns as an additional explanatory variable in equation (1) above. However, following Chan et al. (2006), we do not since in an emerging economy like India, it is possible for some industries to dominate the market. We estimate equation (1) above annually for each firm. We then estimate the extent of stock price comovement as the synchronicity measure of Morck et al. (2000) for each firm as follows:
\[
Sync_t = \ln \left( \frac{R^2}{1 - R^2} \right)
\]  \hspace{1cm} (2)

where \( R^2 \) is the coefficient of determination from equation (1) above. A high value of \( Sync_t \) indicates that the stock returns of the firm are highly correlated with the market, consistent with the notion of comovement. In all our hypotheses, we use \( Sync_t \) as the dependent variable.

We test H1-H4 using the following empirical model:

\[
Sync_{it} = \beta_0 + \beta_1 Factor_{it} + \beta_2 Size_{it} + \beta_3 MTB_{it} + \beta_4 Loss_{it} + \beta_5 Illiquidity_{it} + \sum_j \gamma_j Ind_j + \epsilon_{it} \tag{3}
\]

In the general equation (3) above, \( Factor_{it} \) represents high growth (defined as a dummy variable equal to 1 if the value of the natural logarithm of the market-to-book ratio lies above the median of the distribution; zero otherwise) for H1, BG affiliation (defined as a dummy variable equal to 1 if the firm is affiliated to a BG; zero otherwise) for H2, high earnings volatility (defined as a dummy variable equal to 1 if the average earnings volatility – measured by the annual standard deviation of earnings per share at the 2 digit National Industrial Classification (NIC) code level – lies above the median of the distribution; zero otherwise) for H3 and leverage (defined as the ratio of long-term and short-term debt to total assets) for H4. H1 and H3 (H2 and H4) predict that the sign on \( Factor_{it} \) would be positive (negative) and significant.

The other control variables are \( Size_{it} \) (the natural logarithm of total assets)\(^5\), \( MTB_{it} \) (the market-to-book ratio, defined as the ratio of long-term and short-term debt to market capitalization), \( Loss_{it} \) (a dummy variable equal to 1 if the net income in the previous period is negative; zero otherwise) and \( Illiquidity_{it} \) (defined as the ratio of average annual trading volume to the annual shares outstanding). We additionally use industry dummies based on the two-digit NIC codes. The control variables have been obtained from prior research (for example, Crawford et al., 2012 and Callen et al., 2012)

\(^5\)The size control variable is omitted from the model for H1
4 Data and Results

4.1 Data

We obtain financial statement variables from the Prowess database maintained by the Centre for Monitoring the Indian Economy (CMIE). Prowess contains financial statement data on comprehensive sample of about 23,000 firms that operate in the Indian markets. It is used extensively in studies using Indian data (see for example, Siegel and Choudhury, 2012; Chittoor et al., 2009 and Khanna and Palepu, 2000a). We obtain daily returns and trading volume data from Bloomberg. Our sample covers the fifteen year period from 1995-2009. From our initial sample, we delete observations with missing values for our key variables. Finally, we drop observations lying above (below) the 99th (1st) percentile of the distribution of our explanatory and dependent variables to mitigate the effect of possible outliers. This results in a final sample of 26,133 firm-year observations for which we have usable data.

Panel A of Table 1 presents descriptive statistics for our sample. The Table shows that the mean (median) value of synchronicity ($Sync$) is -4.63 (-4.40). The mean and median synchronicities are comparable to those reported by Crawford et al. (2012) for their sample of US firms. The mean (median) $R^2$ from the estimation of equation (1) is 5.4% (1.1%). These statistics are different from those reported by Crawford et al. (2012) for US firms, Morck et al. (2000) for their large sample of emerging market firms and Gul et al. (2010) for their sample of Chinese firms. This is not surprising as country-specific factors can heavily influence the degree of association between a firm’s returns and the market return. Both the mean and median values of synchronicity are statistically significant ($p < 0.01$). The Table also shows that the mean (median) total assets for our sample firms is INR 2,196.13 million (375.90 million) and the mean (median) sales are INR 1,718.36 million (321.00 million). We further find that 29.75% of the firms are affiliated to BGs. These statistics are similar to those reported by other studies using Prowess data and lend confidence to the robustness of our sample.

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6Crawford et al. (2012) report mean and median synchronicities of -4.48 and -3.32 respectively.
Panel B of Table 1 presents the correlation matrix for the key variables. The Table presents the Pearson (Spearman) correlations along the upper (lower) diagonal. The Table shows that synchronicity is positively associated with total assets, sales, market-to-book ratio, earnings volatility and illiquidity. We find that synchronicity is negatively associated with leverage. However, we find that BG affiliation is also positively associated with synchronicity. This is against the hypothesized relation in H2. However, given that correlations are univariate tests of association, definitive conclusions should not be drawn from these. Multivariate analyses are necessary to validate the hypothesized associations. However, given that all the correlations reported are significant, it shows that these variables are associated with synchronicity.

4.2 Results

Growth

Column 1 of Table 2 presents the results for H1, which examines whether there is any difference in the extent of comovement of stocks of growth firms and mature firms. The hypothesis predicts that growth stocks would comove to a greater degree than mature stocks, owing to greater information asymmetry for growth stocks. The Table shows that the coefficient on the growth dummy is positive and significant (coefficient=1.04, p < 0.01), consistent with our prediction. We also find that the coefficient on size is positive and significant (coefficient=0.58, p < 0.01), suggesting that larger stocks tend to comove, probably owing to greater correlation of their fundamental value drivers. We also find a negative and significant coefficient on the loss dummy (coefficient=−0.08, p = 0.01). The coefficient on illiquidity is positive and significant (coefficient=0.28, p < 0.01), suggesting that prices of illiquid stocks are synchronous. The coefficients on the control variables are consistent with those reported in prior studies.
Affiliation to Business Groups

Column 2 of Table 2 presents the results for H2, which tests the difference in the extent of comovement of stock prices of firms affiliated to business groups (BGs) and those of standalone firms. The hypothesis predicts that BG stocks would have more firm-specific information available and would thus comove to a lesser degree. In other words, the predicted coefficient on the BG dummy is negative. The Table shows that this is indeed so. Specifically, the coefficient on the BG dummy is –0.05 (p = 0.07), consistent with the prediction of H2. This result is also consistent in spirit with Chittoor et al. (2013), who find that publicly listed firms affiliated to Indian BGs have higher earnings quality than public standalone firms and suggests that owners of Indian BGs keep the information environments of publicly listed group firms relatively transparent. The signs on the control variables are also consistent with those reported in Column 1 above.

(Insert Table 2 here)

Earnings volatility

We next present the results for H3, which tests whether there is any difference between the comovement of prices of firms operating in industries characterized by highly volatile earnings and those operating in industries with less volatile earnings. H3 predicts that stock prices comove to a greater degree for firms operating in industries with highly volatile earnings and thus predicts a positive and significant coefficient on the earnings volatility dummy. Consistent with these predictions, Column 3 of Table 2 shows that the coefficient on earnings volatility is positive and significant (coefficient=0.54, p<0.01). The signs on the control variables are again consistent with those reported in Column 1.

Leverage

Finally, we present the results for H4, which tests whether debt has any impact on the extent to which stock prices comove. H4 predicts that stock prices of highly levered firms comove to a
lesser degree than that of firms with low debt. These results are presented in Column 4 of Table 2. Consistent with these predictions, we find that the coefficient on the high debt dummy is negative and significant (coefficient= –0.40, p <0.01). Column 4 also shows that the signs on the control variables are consistent with those reported in Column 1.

5 Conclusion

In this paper, we examine some economic factors that affect the extent to which stock prices comove. Stock price comovement in the absence of the comovement of fundamental value drivers of firms is often attributed to information opacity. We focus on a sample of Indian firms and show that there is significant comovement of stock prices of firms listed on the National Stock Exchange (NSE). We further find that the extent of comovement is lower for firms affiliated to business groups and firms with high debt. Comovement is higher for growth firms and firms belonging to industries with high earnings volatility. Our study joins some recent research that examines stock price synchronicity in emerging economies and presents some additional evidence on factors that affect the extent of comovement.

We would, however, like to add the following caveat to our results. Our measure of stock price synchronicity implicitly assumes that the $R^2$ from the market model measures firm-specific information. However, this is not necessarily true. Indeed, the use of the $R^2$ has been criticized on this ground in recent times by Alves et al. (2010) and Skaife et al. (2006). An alternate explanation for a high $R^2$ is that the fundamental drivers of firm value are highly correlated. The empirical methodology used in this study cannot rule out this alternate explanation. To the extent that these criticisms are valid, they affect the inferences drawn in this study. That said, the use of the $R^2$ can be justified by the fact that it is an established measure of stock return synchronicity.

While our study makes interesting contributions to the literature on stock return synchronicity, we believe that there are avenues for future research in this area. Specifically, we see two broad areas where more academic research could be fruitful. The first avenue is to refine the measure of
stock return synchronicity by identifying and isolating the extent to which the firms’ fundamental value drivers are correlated. Such an approach would greatly mitigate the measurement error inherent in the extant methodology and allow researchers to draw cleaner inferences.

The second avenue is to further examine stock return synchronicity in the context of specific types of market participants. For instance, separate analyses for firms with high analyst following, more predictable earnings, market leaders, etc. will provide novel insight into the efficacy of the $R^2$ as a measure of firm-specific information.
References


Table 1: Descriptive Statistics and Correlations

Panel A: Descriptive Statistics

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<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
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<tbody>
<tr>
<td>Sync</td>
<td>-4.63</td>
<td>2.60</td>
<td>-4.40</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.05</td>
<td>0.09</td>
<td>0.01</td>
</tr>
<tr>
<td>TA</td>
<td>2,196.13</td>
<td>6,041.10</td>
<td>375.90</td>
</tr>
<tr>
<td>Sales</td>
<td>1,718.36</td>
<td>4,436.60</td>
<td>321.00</td>
</tr>
<tr>
<td>MTB</td>
<td>6.33</td>
<td>12.11</td>
<td>1.63</td>
</tr>
<tr>
<td>Lev</td>
<td>0.29</td>
<td>0.20</td>
<td>0.29</td>
</tr>
<tr>
<td>NG</td>
<td>0.30</td>
<td>0.46</td>
<td>0.00</td>
</tr>
<tr>
<td>Earnings Volatility</td>
<td>8.32</td>
<td>20.36</td>
<td>1.74</td>
</tr>
<tr>
<td>Illiquidity</td>
<td>0.57</td>
<td>1.40</td>
<td>0.08</td>
</tr>
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</table>
Panel B: Correlations among Key Variables

<table>
<thead>
<tr>
<th></th>
<th>Sync</th>
<th>R²</th>
<th>TA</th>
<th>Sales</th>
<th>MTB</th>
<th>Lev</th>
<th>BG</th>
<th>Earnings Volatility</th>
<th>Illiquidity</th>
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<tr>
<td>Sync</td>
<td>1.00</td>
<td>0.70***</td>
<td>0.33***</td>
<td>0.34***</td>
<td>0.34***</td>
<td>-0.04***</td>
<td>0.18***</td>
<td>0.31***</td>
<td>0.32***</td>
</tr>
<tr>
<td>R²</td>
<td>1.00</td>
<td>1.00</td>
<td>0.49***</td>
<td>0.49***</td>
<td>0.43***</td>
<td>-0.06***</td>
<td>0.18***</td>
<td>0.45***</td>
<td>0.38***</td>
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<tr>
<td>TA</td>
<td>0.56***</td>
<td>0.56***</td>
<td>1.00</td>
<td>0.83***</td>
<td>0.33***</td>
<td>0.08***</td>
<td>0.20***</td>
<td>0.68***</td>
<td>0.18***</td>
</tr>
<tr>
<td>Sales</td>
<td>0.53***</td>
<td>0.53***</td>
<td>0.89***</td>
<td>1.00</td>
<td>0.37***</td>
<td>0.04***</td>
<td>0.20***</td>
<td>0.63***</td>
<td>0.19***</td>
</tr>
<tr>
<td>MTB</td>
<td>0.52***</td>
<td>0.52***</td>
<td>0.53***</td>
<td>0.56***</td>
<td>1.00</td>
<td>-0.13***</td>
<td>0.14***</td>
<td>0.28***</td>
<td>0.25***</td>
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<tr>
<td>Lev</td>
<td>-0.04***</td>
<td>-0.04***</td>
<td>0.31***</td>
<td>0.28***</td>
<td>-0.08***</td>
<td>1.00</td>
<td>0.14***</td>
<td>0.03***</td>
<td>-0.04***</td>
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<td>BG</td>
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<td>0.19***</td>
<td>0.42***</td>
<td>0.38***</td>
<td>0.22***</td>
<td>0.15***</td>
<td>1.00</td>
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<tr>
<td>Earnings Volatility</td>
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<td>0.51***</td>
<td>0.75***</td>
<td>0.65***</td>
<td>0.39***</td>
<td>0.21***</td>
<td>0.38***</td>
<td>1.00</td>
<td>0.17</td>
</tr>
<tr>
<td>Illiquidity</td>
<td>0.64***</td>
<td>0.64***</td>
<td>0.42***</td>
<td>0.41***</td>
<td>0.50***</td>
<td>-0.07***</td>
<td>0.15***</td>
<td>0.37***</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*** indicates significance at the 1% level of significance.

Panels A and B of Table 1 are based on a sample of Indian firms drawn from the Prowess database of the Centre for Monitoring the Indian Economy (CMIE) and Bloomberg. The sample covers the period from 1995-2009. The sample consists of 26,133 firm-year observations. The variables are defined as follows: Sync is a measure of stock price synchronicity based on Morck et al. (2000). It is calculated as:

\[
Sync = \log \left( \frac{R^2}{1 - R^2} \right)
\]

where \( R^2 \) is the coefficient of determination from a market model estimated annually from daily returns data at the firm level, \( R^2 \) is the coefficient of determination, as explained above, TA is the total assets (in INR millions) at the end of the year, Sales is the net sales (in INR millions) for the year, MTB is the market-to-book ratio, calculated as the ratio of the market capitalization to the book value of equity, at the end of the year, Lev is the ratio of long-term and
short-term debt to total assets, BG is a dummy variable equal to 1 if the firm is affiliated to a business group; it is zero otherwise, *Earnings Volatility* is the annual standard deviation of earnings (in INR million) measured at the two-digit National Industrial Classification (NIC) code, and *Illiquidity* is the ratio of annual average trading volume to shares outstanding at the end of the year. The correlations in the upper (lower) diagonal represent the Pearson (Spearman) correlations.
Table 2: Hypotheses

\[ \text{Sync}_{it} = \beta_0 + \beta_1 \text{Factor}_{it} + \beta_2 \text{Size}_{it} + \beta_3 \text{MTB}_{it} + \beta_4 \text{Loss}_{it} + \beta_5 \text{Illiquidity}_{it} + \sum_j \gamma_j \text{Ind}_j + \epsilon_{it} \]

<table>
<thead>
<tr>
<th></th>
<th>Predicted Sign</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
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<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>-17.06***</td>
<td>-18.08***</td>
<td>-16.27***</td>
<td>-18.79***</td>
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<tr>
<td></td>
<td></td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Growth</td>
<td>+</td>
<td>1.04***</td>
<td></td>
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<td></td>
<td></td>
<td>(0.00)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BG</td>
<td>-</td>
<td>-0.05*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.07)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EarnVol</td>
<td>+</td>
<td></td>
<td>0.54***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.00)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lev</td>
<td>-</td>
<td></td>
<td></td>
<td>-0.40***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td>Size</td>
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<td>0.58***</td>
<td>0.66***</td>
<td>0.55***</td>
<td>0.70***</td>
</tr>
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<td></td>
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<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.00)</td>
</tr>
<tr>
<td>Loss</td>
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<td>-0.084**</td>
<td>-0.29***</td>
<td>-0.430***</td>
<td>-0.22***</td>
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<td>(0.00)</td>
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<tr>
<td>Illiquidity</td>
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<td>0.28***</td>
<td>0.31***</td>
<td>0.31***</td>
<td>0.30***</td>
</tr>
<tr>
<td></td>
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<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.01)</td>
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<tr>
<td>MTB</td>
<td>?</td>
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<td>0.02***</td>
<td>0.01***</td>
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<td>(0.00)</td>
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<tr>
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<td>Included</td>
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<td>0.31</td>
<td>0.31</td>
<td>0.32</td>
</tr>
</tbody>
</table>

*, and *** represent statistical significance at the 10% and 1% levels respectively. The p-values are reported in parentheses.

The regression results presented above are based on the sample identified in Table 1. The variables identified as Factor in the model above are defined as follows: Growth: A dummy variable equal to 1 if the observation lies above the median of the distribution of the market-to-book ratio; zero otherwise, BG: A dummy variable equal to 1 if the firm belongs to a business group; it is zero otherwise, EarnVol: A dummy variable equal to 1 if the observation lies above the median of the distribution of the earnings volatility; zero otherwise, Leverage: A dummy variable equal to 1 if the observation lies above the median of the distribution of the leverage; zero otherwise, Loss: A dummy variable equal to 1 if the net profit after tax for the year is negative; it is zero otherwise. Columns (1) to (4) in the Table present results for Growth, BG, EarnVol and Leverage respectively. The other variables are as defined in Table 1 above.