Exchange Sponsored Analyst Coverage

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Exchange Sponsored Analyst Research

ABSTRACT

This study examines the effects and consequences of an exchange-sponsored analyst coverage scheme to evaluate the effectiveness of stock exchanges promoting research coverage for firms. The context of this study is the Research Incentive Scheme pioneered by the Singapore Stock Exchange, under which the exchange acts as a 'clearing house' for matching up firms and analysts electing into the Scheme and partially funds the analyst's research coverage. The empirical evidence reveals that forecasts issued under the scheme have similar bias to those issued by analysts voluntarily following a firm, but are less accurate. The market reactions to revisions are also qualitatively similar across these forecasts. Further, after controlling for self-selection, we document a variety of benefits to a firm from joining the scheme, including: (i) a decline in market surprises at earnings announcements, consistent with analysts improving market's earnings expectations (ii) a quicker reflection of earnings and non-earnings information in stock prices (iii) an increase in stock price synchronicity, consistent with analyst helping incorporate more industry-wide information, and (iv) an increase in media visibility. We find little evidence that analyst coverage through the scheme improves liquidity or price efficiency.

1 Introduction

Analyst coverage of firms, particularly mid and small-cap firms, has been significantly declining in the past decade for a variety of reasons, including Regulation FD, the Global Research Analysts Settlement, the Sarbanes Oxley Act and the growth of low-cost internet brokerages, which have decreased the incentives from a broker-dealer perspective to provide coverage for mid- and small-cap companies.[1] This evaporation of analyst coverage for small firms has had significant effects for firms, including a reduction in the quality of analyst reports and the cost to the firms of going public.[2] The recent financial crises and the demise and mergers of financial institutions have worsened the situation further through downsizing and merging of research departments. In the midst of this, Exchanges have been touted as being in the best position to remedy the situation by acting as "arms-length" intermediaries between companies, analysts and investors (Canivet, 2009). This study examines the effects and consequences of an exchange-sponsored analyst coverage scheme to evaluate the effectiveness of Exchanges promoting research coverage for firms.

The context of this study is the Research Incentive Scheme pioneered in December 2003 by the Singapore Stock Exchange (SGX) and the Monetary Authority of Singapore (MAS). This Scheme essentially sponsors (and partially funds) analyst coverage of previously un-followed or poorly followed stocks. The SGX also acts as a 'clearing house' for matching up firms electing into the Scheme with at least two analysts from a panel of analysts, who also (independently) elect into the Scheme. Thus, both companies and analysts volunteer to enter the Scheme, but critically, the analysts do not choose the

[1] The Regulation FD prevented companies from disclosing private information to particular analysts or investors. Gomes, Gorton, Madureira (2007) document that small firms lost analyst coverage while large firms gained coverage following Reg FD. The global research settlement, which was entered into in response to enforcement actions brought by a number of federal and state regulators in the US, severely limits interactions between equity research analysts and investment bankers. It also ended the practice of tying an analyst's pay to his contributions to investment banking activities.

[2] Loughran and Ritter (2005) show that issuers accept larger IPO under-pricing to encourage a lead underwriter to provide analyst coverage. Weild and Kim (2009) note that over 70% of the IPOs during 1991-1997 were by firms raising less than $50 million and that fraction declined to less than 30% for the years 2000 to 2008. They point to the lack of analyst coverage as an important factor.

companies to cover or vice versa. The matching of an analyst to a firm is essentially conducted by the SGX. In this way, the SGX is able to inject an element of independence, and presumably increased credibility, in the analyst reports that is not possible in analyst research directly purchased by a firm.

Substantial evidence exists that firms place significant value on analyst coverage and commit resources to obtain such coverage. For instance, prior studies have shown that firms benefit in a variety of ways from analyst-coverage, including improved stock visibility, better access to external financing, improved corporate governance, etc. (e.g., Chan and Hameed (2006), Chung and Jo, 1996; Irvine 2003; Yu, 2008; Dyck, Morse, and Zingales (2010); Chang, Dasgupta and Hilary, 2006; Bowen, Chen, and Cheng, 2008). Further, consistent with analyst-coverage being important to firms, Cliff and Denis (2004) show that IPO firms allocate resources to purchase analyst coverage, while Mehran and Peristiani (2009) show that IPO firms that fail to attract sufficient interest from financial analysts are more likely to abandon their public listing and go private.[3]

Given the value that firms place on analyst-coverage and the shrinkage of research coverage by the brokerage firms, it raises an important question on whether exchanges can credibly intervene in capital markets and encourage research coverage of firms. The SGX's Research Incentive Scheme provides us with an ideal setting to study this question. Although this scheme is applicable only to stocks listed on the Singapore stock exchange, it can help address an issue that has plagued several exchanges around the world. Many stock exchanges have recently toyed with the idea of providing some form of support to encourage analysts' research coverage. For instance, Malaysian stock exchange followed the SGX scheme and introduced a similar exchange sponsored research-scheme in 2005. More recently, in the US, NYSE Euronext struck a deal with Virtua Research to make financial models of under-researched

[3] Cliff and Denis (2004) provide evidence that analyst coverage by lead underwriter is positively related to IPO underpricing and conclude that firms pay for coverage indirectly through underpricing. Bradley, Jordan and Ritter (2008) do not find any relation between underpricing and the number of analyst that ultimately cover a IPO firm by the end of its first trading year.

companies available on the NYSE website.[4] Similarly, NASDAQ-OMX has entered into an exclusive agreement with Morningstar, under which Morningstar provides research profiles of companies listed on NASDAQ OMX exchanges.

In this study, we examine two important aspects of an exchange-sponsored scheme. First, we assess the quality of earnings forecasts issued by analysts following a firm under the Research Incentive Scheme operated by the SGX (hereafter, the Scheme or the SGX scheme) by comparing these forecasts with those of the forecasts issued by analysts voluntarily following a firm. This analysis provides insights on whether and if so, how differences in incentives to issue forecasts between analysts reporting under the Scheme and those voluntarily following a firm affect the quality of the forecasts issued. Secondly, we examine the consequences to a firm from having research coverage provided by analysts under the SGX scheme. In specific, we investigate whether sponsored analyst-coverage improves a firm's information environment and its stock liquidity. If market participants do not view research coverage by exchange sponsored analysts as credible, then the covered firms are unlikely to benefit from it.

In terms of terminology, we refer to firms that have joined the SGX scheme and analysts reporting under this scheme as "*sponsored firms*" and "*sponsored analysts*" respectively, while firms that are followed by analysts voluntarily are referred to as "*voluntarily-followed firms*" and, such analysts, as "*voluntary analysts*". We refer to firms without analyst coverage as "*not-followed firms*".

We recognize that firms self-select to join the Scheme, which could potentially introduce a self-selection bias in our analysis. We control for this potential bias in one of two ways. First, we model the probability of a firm joining the Scheme and control for self-selection in cross-sectional regressions using the Heckman approach. Secondly, we use a difference-in-difference approach, where we examine the effects on a treatment firm (sponsored firm) from joining the scheme relative to the effects on a matched control firm that does not join the Scheme. Both approaches generally yield similar conclusions.

[4] Press release by NYSE-EURONEXT on May 8, 2009.

The empirical evidence reveals that the analyst forecasts issued for sponsored firms are neither more nor less biased than those of voluntarily followed firms but are less accurate (i.e., they have higher absolute forecast errors). Also, stock investors react significantly to forecast revisions by sponsored analysts and this reaction is qualitatively similar to those observed for voluntarily followed firms, even after controlling for the size of the revision. These findings support the view that sponsored analyst produce value-relevant news to stock market participants. Corroborating this evidence, we document that SGX sponsored firms have lower earnings announcements returns and that their stock prices reflect information in a more timely manner. These findings are in line with the argument that sponsored analyst research improves earnings expectations and quickens incorporation of information in stock prices. Further, consistent with the findings in prior literature for voluntarily followed firms, we show that sponsored stocks enjoy an increase in stock price synchronicity following the initiation of sponsored research coverage as well as improved media visibility. However, we find no evidence to suggest that sponsored analysts improve price efficiency (defined as stock returns following a random walk) or the stock liquidity.

The rest of this paper proceeds as follows. Section 2 provides further details on the operation of the SGX's Scheme and Section 3 outlines our main research questions. Our sample selection process is outlined in Section 4 while Section 5 contains a description of our data sources and relevant descriptive statistics. We discuss our results and robustness checks in Section 6 and we conclude in Section 7.

2 Related Literature

Prior literature has documented a variety of effects of analyst-coverage on firms. A prime effect of analyst coverage is the improved information environment for a firm's stock. Based on survey evidence, Graham, Harvey and Rajgopal (2005) note that CEOs consider analysts to be one of the most important groups influencing a firm's stock price. Baker, Nofsinger, and Weaver (2002) note that analyst reports are the primary source of information for most buy-side investors. Further, Mikhail, Walther and

Willis (2007) show that both large and small investors trade on analyst reports. Hong, Lim and Stein (2000) show that analysts role in information dissemination helps eliminate stock mis-valuations.

The improved information environment created by analysts has been show to aid firms in raising capital. Firms that receive more coverage suffer from lower information asymmetry between managers and investors, which lowers adverse selection problems when issuing equity. Analysts reports also help draw attention to a company's share issuance. Consistent with the importance of analysts for share issuances, Chang, Dasgupta and Hilary (2006) and Bowen, Chen, and Cheng (2004) document that firms with greater analyst coverage issue equity more frequently and are less influenced by external market conditions in their decisions to issue equity. Further, since equity shares of firms with analyst coverage are less likely to be undervalued compared to those without coverage, analyst coverage can potentially have an impact on a firm's ability to raise debt capital, as the undervalued equity would artificially inflate a firm's leverage.

Analysts also contribute to the corporate governance of a firm. Jensen and Meckling (1976) argue that activities involving security analysis reduce a firm's agency costs. Analysts act as external monitors of a firm's financial reports and through their private information production can help detect earnings management or financial reporting fraud (Healy and Palepu (2001) and Dyck, Morse and Zingales (2010)). Consistent with this view, Yu (2008) finds that firms with greater analyst coverage engage in lower earnings management.

Finally, Analysts coverage generates publicity for a company, which can help attract more customers and thereby increase firm value. Popular press often views analysts as a driving force to understand industry leaders, trends, forecasts, etc and often quotes analysts on these issues. Further, analysts' research coverage increases familiarity of the firm amongst investors and also makes information about the firm more easily available, both of which incentivize journalists to write about the firm. Moreover, Stoughton et al. (2001), who studies the decision of a firm to go public, demonstrates

that scrutiny of a firm by security analysts can be an important consideration in product markets. They show that private information production by analysts leads to more efficient stock prices, based on which consumers infer product quality.

Consistent with analyst coverage being important to firms, several studies have shown that firms are willing to allocate resources to acquire analyst coverage. Cliff and Denis (2004) suggest that IPO firms purchase analyst coverage by agreeing to greater underpricing at the time of the IPO. In return for the greater underpricing, which benefits the lead underwriters by enabling them to allocate IPO shares to preferred clients and by serving as the primary market maker for the high aftermarket trading volume that typically follows underpriced IPOs, the lead underwriter provides research coverage for the firm. Cliff and Denis (2004) also show that firms are likely to switch underwriters in subsequent SEOs after an IPO if the lead underwriter in the IPO does not provide research coverage. Along similar lines, Krigman, Shaw, and Womack (2001) report survey evidence indicating that an important reason for firms to switch underwriters between the firm's IPO and its subsequent seasoned equity offering (SEO) is to strategically buy additional analyst coverage from the new lead underwriter. Finally, consistent with analyst coverage being an important reason for firms to list their shares on stock exchanges, Mehran and Peristiani (2009) document that IPO firms that fail to attract sufficient research coverage from analysts are more likely to abandon their public listing and go private.

The above discussion points to the value that firms place on securing research coverage from analysts. One way to acquire such coverage is for non-covered firms to directly purchase research coverage from specialist research firms. However, this paid-for-research approach suffers from potential conflicts of interests, as firms can opinion-shop to obtain favourable analyst opinions. Moreover, analysts who are compensated directly by companies may feel pressure to optimistically bias their forecasts and recommendations in order to encourage the client firm to renew research coverage. Critics of the paid-for-research coverage allege this system to be "one of the most scurrilous practices in investor hyping"

(Metzger, 2003). Examining a sample of reports issued by paid-for-analysts, Kirk (2008) documents evidence consistent with these concerns. Moreover, there are significant concerns about the financial viability of the fee-based-research-firm business model, which relies almost exclusively on small-cap companies for its fees and, hence, are exposed to the vagaries of client-firms choosing research coverage. In line with this concern, a few fee-based research firms, including prominent ones like Dutton Associates and Independent Research Network, have closed their businesses during the recent financial crises.

Since exchanges have an interest in ensuring that firms listed on their exchanges reap the benefits of listing, including research coverage, exchanges could sponsor independent research coverage as well as act as an intermediary between analysts and companies. This paper studies the effectiveness of one such scheme that was introduced by the Singapore Stock Exchange.

3 Institutional Background

In November 2003, the Singapore Stock Exchange (SGX) in conjunction with the Monetary Authority of Singapore (MAS) pioneered a program to sponsor analyst coverage of previously un-followed or poorly followed Singapore listed stocks. The Scheme has been introduced in phases, with each phase covering a period of two years.[5] All companies listed on the SGX Mainboard and on the SGX's CATALIST (and originally, its predecessor the SGX Sesdaq) are eligible to participate in the scheme. A total of 115 companies and 9 research firms first signed up to participate in its initial phase in 2004, but this number subsequently increased to over a 150 firms and over 12 research firms.

Under the Scheme, the SGX matches each company with two participating research firms, which are then required to initiate coverage within six months and commit to generating regular research reports. Discussions with Singapore Stock Exchange officials reveal that the matching of companies with research firms is done randomly. The reports issued by sponsored analysts are posted on the SGX's website and

[5] All the companies participating in the first phase of the Scheme continue to be in the program in the second phase. The list of firms participating in the scheme has been quite stable over time.

are downloadable free of charge. Appendix A details the guidance provided by the SGX on the type and frequency of report required from the participating research firms. The sponsored company pays a nominal fee with the balance subsidized by the SGX and MAS.[6]

Within a year of the commencement of the first two-year phase, the SGX announced in November 2004, the continuation of the Scheme for a second phase. SGX attributed the early announcement of the second phase to the enthusiasm displayed by additional companies and research firms seeking to participate in the scheme and by the interest shown by market participants. At least two further phases of two years each have since been announced. In an announcement in January 2006 the SGX stated: "*Since its launch in 2003, the Scheme has attracted strong interest from our market participants. Extending the Scheme will allow more listed companies to raise their profile, and offer investors ease of access to value-added information. This is part of our continued efforts to enhance the investors' ability to make informed investment decisions and to develop a vibrant marketplace*" (Singapore Stock Exchange News Release, 25 January 2006). Thus, the SGX has a clear objective in applying this Scheme to improve the information environment and investor recognition of Singapore listed firms.

4 Research Questions and Research Design

We examine the effectiveness of the SGX sponsored analysts coverage scheme along two dimensions. First, we investigate the quality of the forecasts issued by sponsored analysts. Secondly, we examine the effects to a firm of joining the SGX scheme. We discuss the research questions pertaining to these two aspects in sub-sections 4.1 and 4.2 respectively. In the final sub-section, we detail the research design issues to address potential self-selection concerns, which arise from firms self-selecting to join the SGX scheme.

4.1 Properties of analyst forecasts issued for sponsored relative to voluntarily followed firms.

[6] The actual fees payable to research firms during our sample period have not been disclosed by SGX.

4.1.1 Forecast bias and accuracy

Forecasts issued by analysts who voluntarily follow a firm have been extensively researched in the literature. The evidence in prior studies indicates that earnings forecasts issued by financial analysts voluntarily following a firm affect stock prices and that these forecasts are more accurate than mechanical extrapolation of historical earnings. (see Brown and Rozeff, 1978; Givoly and Lakonishok, 1979; Lys and Sohn, 1990; Francis and Soffer, 1997). However, there are good reasons why this evidence may not hold for forecasts issued by sponsored analysts. For instance, voluntary analysts have incentives to issue high quality forecasts in order to increase the fees from trading activities for their brokerage firms. Their forecasts are implicitly evaluated by the market participants and poor forecasts could adversely affect their brokerage firms' activities. In contrast, sponsored analysts are not compensated through fees from trading activities and face lower scrutiny from investors. These lower their incentives for private information production and consequently, the analysts may simply act as aggregators and disseminators of publicly available information.

Moreover, prior studies on voluntary analysts have noted that the analysts often issue optimistically biased earnings forecasts for a variety of reasons. However, these reasons do not necessarily carry over to sponsored analysts and so it is possible for forecast bias and accuracy to vary across sponsored and voluntary analysts. One explanation for an optimistic bias in voluntary-analyst's forecasts is that the bias improves analysts' access to a firm's management, which in turn, aids the analysts to provide more accurate forecasts (Francis and Philbrick, 1993; Lim, 2001). To the extent that sponsored analysts have lesser incentives to issue accurate forecasts, as discussed earlier, their incentives to issue biased forecasts to obtain access to firm's management are also lowered. But, in contrast, sponsored analysts potentially have greater desires to prevent alienation of a firm's management to ensure their continued patronage of the SGX scheme and so may be more willing than voluntary analysts to issue biased forecasts to please the firm's management.

McNichols and O'Brien (1997) attribute the optimism in analysts' forecasts to analyst's selectively reporting of forecasts only when they hold a favorable view of a firm. Unlike voluntary analysts, sponsored analysts are required to issue equity reports regularly and so have lower discretion in selectively disclosing optimistic forecasts. This argument suggests that forecast bias, if any, will be lower for sponsored analysts than for voluntary analysts. Lastly, Gu and Wu (2003) attribute forecast bias to skewness in firms' earnings rather than to analysts' behavior. In this case, there is little reason to expect the forecast bias to vary across sponsored and voluntary analysts.

Thus, there is ambiguity over whether sponsored analysts are more or less likely than voluntary analysts to issue more accurate or biased forecasts. Hence, we empirically address this issue by comparing the bias and accuracy of forecasts issued for firms sponsored under the Scheme with those issued for firms that are voluntarily followed by analysts. Following the standard approach in the literature, we calculate bias in analysts' forecasts by evaluating signed forecast errors and evaluate accuracy by examining the absolute value of forecast errors. The forecast errors (FE) are computed as difference between the forecast earnings and actual earnings, divided by stock price at the beginning of the year.

4.1.2 Market reaction to analyst forecast revisions

In addition to examining the attributes of forecasts issued by sponsored analysts, we also evaluate these forecasts in terms of investors' responses to release of forecast revisions. If analyst research generates fresh valuation relevant information then we expect to observe a significant stock price response to the release of their forecast revisions. This view is supported by a large body of prior work in developed economies going back to Elton, Gruber and Gultekin (1981), Fried and Givoly (1982) and Lys and Sohn (1990). Such market reactions to forecast revisions have also been documented in the context of Asian-Pacific markets by Lim and Kong (2004). If, investors view forecasts issued by sponsored analysts to provide new information and be as credible as those issued by voluntary analysts, then we

would not expect to see a significant difference in stock price response to the forecast revisions issued by sponsored analysts and to those issued by voluntary analysts.

In comparing forecast attributes as well as market reactions to forecast revisions across sponsored analysts and voluntary analysts, we aim to control for firm characteristics that potentially affect the quality of these forecasts or the market reactions to these forecasts. But, we are unable to control for analysts' characteristics, such as analysts' experience or affiliation, in the analysis due to lack of data availability.[7] Because of this, the analysis only reveals whether forecasts from sponsored analysts differ from those issued by voluntary analysts, but does not identify the source of the difference (such as differences in analysts types, analyst incentives, etc.).

4.2 The impact of exchange sponsored research on the information environment of firms

We next examine the effects of sponsored analyst coverage on a firm joining the SGX scheme. Since a key objective of the SGX Research Incentive Scheme in sponsoring analyst research on previously not-followed companies is the enrichment of the information available for investors to make investment decisions on a firm, we evaluate whether research coverage by sponsored analyst improves a firm's information environment. More specifically, we investigate the impact of the Scheme in terms of: (i) the market reaction to earnings announcements, (ii) the reflection of earnings information in stock prices, (iii) changes in stock price synchronicity, (iv) the effect on media visibility (v) price efficiency. We discuss our rationale and expectations with respect to each of these research questions next.

4.2.1 Market reaction to earnings announcements

A key role of the analysts is the production of new information about a firm's earnings. This activity could alter investors' beliefs about a firm's earnings, much before the earnings are publicly

[7] We are unable to identify the analysts or the brokerage firms with research reports in IBES. While IBES provides a code for each analyst and brokerage firm issuing a report, it does not identify the details of the analyst or the brokerage firms represented by these codes.

announced and thus, could reduce the information content of earnings announcements. As Ball and Shivakumar (2008) observe analysts information production decreases the relevance of earnings announcements as a source of new information to stock markets. Prior studies present evidence consistent with this argument for voluntarily followed analysts (e.g., Dempsey (1989), Shores (1990) and Ball and Shivakumar (2008)). This argument suggests that a firm's entry into the SGX scheme should reduce the extent of surprises at earnings disclosures and accordingly, lead to a decline in the magnitude of the earnings announcement returns.[8] However, if due to the lack of capital market incentives, sponsored analysts primarily focus on aggregating and disseminating publicly available information rather than on producing new information, then little change will be observed in the earnings announcement returns following initiation of sponsored analyst coverage.

Analyst coverage through the SGX scheme can also impact trading volume at earnings announcements, although the effect on trading volume could potentially be different from that on price. Bamber and Cheon (1995) and Kim and Verrecchia (1991a, 1991b) observe that trading volume represents the sum total of all belief revisions by investors, while price changes reflect changes in the aggregate market's average beliefs of firm value. If initiation of analyst coverage and the resulting private information search activity triggers greater dispersion in investors pre-announcement earnings beliefs it could manifest in higher trading volumes at earnings announcements. Thus, while increased private information production by analysts before earnings announcements can reduce the 'news' in earnings, it can be accompanied by higher trading volume due to an increased dispersion in investor beliefs.

4.2.2 Timeliness with which stock prices reflect information

[8] To the extent analysts act as external monitors of a firm's financial reports as pointed out by Dyck, Morse and Zingales (2010) and Yu (2008), one could argue that analyst-coverage improves the reliability of reported earnings for investors and thus, leads to greater earnings response coefficients. Testing this prediction is, however, made difficult by the absence of reliable data on analysts' forecasts, to proxy for earnings expectations, in the pre-scheme period for sponsored firms and for un-followed firms. The alternative proxy for earnings expectations are those based on time-series models. However, earnings expectations based on time-series models are likely to be noisier in the post-Scheme period relative to the pre-scheme period, due to greater information being available to market participants in the post-Scheme period. This increased noise could artificially attenuate earnings response coefficients in the post-Scheme period.

The arguments in the prior sub-section that analysts improve markets' expectations of earnings by producing private information prior to earnings announcements, has a direct implication for the speed with which earnings is reflected in stock prices. Moreover, prior studies, such as Rajgopal, Shevlin and Venkatachalam (2003) and Simpson (2010), point out that analysts form their forecasts not only on based on scrutiny of financial data but also consider non-financial information. Thus, analysts' activities could also potentially quicken the incorporation of non-financial information in stock prices. Hence, to the extent that analysts' activities generate new value-relevant information in a timely manner, then one should observe more of the value-relevant information to be reflected earlier in stock prices.

We measure the speed with which stock prices reflect information using the intra-period timeliness (IPT) metric developed by Butler, Kraft and Weiss (2007). This metric is designed to capture the speed (or timeliness) with which all information over a given period of time is impounded into price and is calculated for each firm-year as the sum of the firm's buy and hold return from month 1 through m (BH_m) divided by the buy-and-hold returns from month 1 through 12, for each of month m from 1 to 11, plus 0.5. That is, the inter-period timeliness (IPT) = $\sum_{m=1}^{11}(BH_m / BH_{12}) + 0.5$.[9] As the IPT can be sensitive to low values of 12-month buy and hold returns, we convert the IPT to ranks in our analysis. More timely incorporation of stock prices implies larger ranks of IPT.

4.2.3 Stock price synchronicity

We next investigate the extent to which analyst coverage affects the relative amounts of firm-specific, industry-wide and market-wide information impounded into stock prices, as measured by stock price synchronicity. Piotroski and Roulstone (2004) argue that because analysts, relative to institutional shareholders and insiders, lack access to inside information in a firm, their reports primarily contain

[9] The intuition behind the IPT statistic is as follows. IPT measures the area under a graph that plots the % of a 12-month return earned as of the end of each month. The area under this plot is higher when the percentages of the annual returns are higher across the 12 months, which occurs when information affects stock returns earlier in the 12-month period than later.

industry- and market-wide information rather than firm-specific information. Consistent with this argument, they document, using R^2 from a market model regression (i.e., stock price synchronicity) to measure the industry and market-wide information content of stock prices, a positive association between the stock price synchronicity and the number of analysts following a firm.

Morck et al. (2000) reinforce the arguments of Piotroski and Roulstone (2004) in the context of an emerging market. They observe that payoffs to producing firm-specific information are lower in emerging markets due to the weak property rights in these countries, which discourage informed investors from arbitraging on firm-specific information. Moreover, they point out that firm-specific information is difficult to produce in emerging markets for a variety of factors, including poor information disclosures, poor enforcement of accounting regulation. These arguments imply that analysts primarily produce market-wide information in emerging markets - a prediction empirically confirmed by Chan and Hameed (2006).

The arguments of both Piotroski and Roulstone (2004) as well as that of Morck et al. (2000) lead us to expect that SGX sponsored analyst research incorporate more macroeconomic and industry-wide information than firm-specific information in stock prices. Hence, we hypothesize that stock price synchronicity will increase after a firm joins the SGX scheme and that the stock price synchronicity will also be higher for sponsored firms relative to that of *not-followed firms.*

4.2.4 Media visibility

Analysts are often quoted in popular press articles for their views on individual firms, trends and forecasts. This is likely to boost media coverage of firms, which can be important to increase the firm's visibility amongst potential customers, suppliers and investors. Fang and Peress (2009) show that analyst following is a significant determinant of media coverage, and media coverage is in turn associated with a lower required rate of return. Bushee and Miller (2009) observe that investor relations professionals often

viewed media coverage as creating "credibility" for a company.

Accordingly, it is pertinent to test whether research coverage provided by sponsored analysts generates publicity for a company. We measure media visibility by counting the number of media mentions from the Factiva database for each year during the period 2003 to 2007. We consider only articles that mention in the company in either its heading or in its lead paragraph.

4.2.5 Price efficiency

Prior theoretical studies and empirical studies suggest a potential link between analyst coverage and stock price efficiency. Holden and Subramanyam (1992) and Foster and Vishwanathan (1993) present theoretical models where share prices reflect information more rapidly as the number of informed investors increase. To the extent that analysts can be regarded as informed investors, these models point to an association between speed of price adjustment and analyst coverage. A more direct link between analyst coverage and price efficiency is presented in Brennan, Jegadeesh and Swaminathan (1991) and Hong, Lim and Stein (2000), who empirically document that firms with lower analyst coverage react more slowly to new information. Hence, we examine whether analyst coverage obtained for a firm through the SGX-sponsored scheme aids its stock price efficiency.

Following Boehmer and Kelley (2009) we couch prices as being efficient when they follow a random walk and employ two measures based on (i) stock return autocorrelations and (ii) variance ratios. If prices are efficient and thus, follow a random walk, then stock return autocorrelations should be zero. In the case of variance ratios (of long-term to short-term return variances), a random walk implies a ratio equal to 1. We adopt this approach rather than examining the effect of analyst coverage on payoffs to anomalies such as price momentum and post-earnings-announcement drift, which Fama (1998) concedes as being the two most robust and persistent challenges to market efficiency paradigm, as payoffs to these anomalies are insignificant in Singapore (see for e.g., Chui, Titman and Wei (2010), Hong, Lee and

Swaminathan (2003)).

As in Boehmer and Kelley, we investigate the divergence of stock returns from a random walk by computing the absolute distance of the variance ratio from 1, |1-VR(n,m)|, where VR(*n*,*m*) is the ratio of the return variance over *m* periods to the return variance of *n* periods, each divided by the length of the respective periods. The closer the variance for long-term returns is to short-term returns, the closer the value of |1-VR(n,m)| is to zero, and the closer the return series is to a random walk. We compute |1-VR(n,m)| based on variance ratios for periods of (1,5), (1,10) and (5,10) days.

4.3. The impact of exchange sponsored research on stock liquidity

Prior theoretical literature provides ambiguous predictions for the effect of analyst coverage on a stock's liquidity. If analyst coverage attracts more uninformed investors to trade the company's shares, then analyst coverage would improve a stock's liquidity (Easley, O'Hara and Paperman 1998). However, if analyst research mainly caters to the demands of institutional investors so that the number of analysts following a firm is a proxy for informed traders, then the firm's liquidity will be negatively related to analyst coverage (Glosten and Milgrom, 1985; Brennan and Subrahmanyam 1995).

Consistent with the ambiguous theoretical predictions, existing empirical evidence on the relation between analyst coverage and liquidity is also mixed. Using either bid-ask spread or the adverse-selection components of spread or depth as measures of liquidity, Brennan and Subrahmanyam (1995) and Roulstone (2003) document a positive relation between analyst coverage and liquidity, while Chung et al. (1995) find a negative relation. After controlling for the probability of informed trading, Easley, O'Hara and Paperman (1998) find that analyst coverage is not related to average opening quoted spreads. In a related vein, Irvine (2003) studies the effect of analyst initiation of stock recommendation on liquidity, measured either as quoted spreads or trading volume, and shows that the effects are economically meaningful only when initiation occurs with a "Strong Buy" recommendation. Finally, Demiroglu and

Ryngaert (2010) document an increase in trading volume following initiation of stock recommendation with a “Strong Buy”, but a decrease in trading volume following initiation with a “Hold".

Given the mixed findings in the literature, it is unclear whether and how SGX sponsored analyst research would impact market liquidity of sponsored firms. To the extent that sponsored analyst research enhances informed trading, we expect deterioration in liquidity. However, this effect could be offset or even entirely reversed, to the extent analyst coverage attracts uninformed investors.

To evaluate the stock liquidity effects of sponsored analyst coverage, we focus on the following measures of liquidity: (i) Relative quoted spreads (SPREAD), which is the quoted spreads scaled by the midpoint of bid and ask prices; (ii) Quoted depth defined as the dollar value of shares quoted (DEPTH respectively) at the ask and bid prices; and (iii) Trading volume, defined as dollar value of shares traded in a day (VOLUME) (v) Amihud’s price impact measure (AMIHUDPI), defined as the absolute value of daily return divided by daily share volume, multiplied by 1,000,000 (Amihud, 2002). Amihud’s measure can be interpreted as a measure of illiquidity; the larger the price impact (or price response per dollar of trading) the more illiquid is the stock. Thus, if sponsored research coverage were to improve liquidity then we could expect a negative relationship between AMIHUDPI and SPONSOR.[10] The liquidity measures are computed as the average of their daily values in a calendar year.[11]

4.4 Self-selection bias

We recognize that companies self-select to join the SGX scheme, which can potentially introduce biases in analyses comparing sponsored firms with voluntarily followed firms, or when comparing sponsored firms with not-followed firms. This bias arises, when firm characteristics that lead firms to join the scheme also cause the firm’s forecast errors or other analyzed effects (such as liquidity, media-

[10] We have alternatively investigated quoted bid-ask spread, instead of relative bid-ask spread and trading volume and depth measured in number of shares, instead of dollar value of shares. We have also defined volume as the number of trades in a day. All these alternative measures yield identical conclusions to those presented in the paper.
[11] The daily values for spreads and depth measures are obtained by averaging transaction level data over the day.

visibility, etc) to be different from those of the voluntarily followed firms. In such a case, failure to control for the firm characteristics in the analyses, would lead us to wrongly attribute the observed effects to the firm joining the scheme. Hence, our analyses attempt to control for the potential endogeneity in a firm's decision to join the SGX scheme in evaluating the effects of joining the scheme.

We use two alternative econometric techniques to control for the endogeneity arising from a firm's self-selection. First, we model an endogenous self-selection model and use the Heckman correction for the bias induced on account of firms' choosing to join the scheme. This two-stage approach uses non-sponsored firms as control firms for the analyses. In a first stage regression (described in Appendix B), we estimate the probability of a firm joining the scheme using a Probit regression and then, using these Probit estimates, compute the Inverse Mills Ratio (IMR) for firms joining the scheme as well as for firms that are not joining the scheme. In a second-stage OLS regression, we examine whether the variables of interests for sponsored firms differ from those for not-followed firms (or voluntarily followed firms as the case may be), after IMR are included as additional control variables as shown below. For sake of parsimony, we follow the approach of Campa and Kedia (2002) and allow the coefficients on IMR to differ between firms joining the scheme and firms not joining the scheme.[12]

$$VAR\_EFFECT_{it} = \alpha_1 SPONSOR_{it} + CONTROLS_{it} + \alpha_2 IMR(SF) + \alpha_3 IMR(NF) + YEAR\ FIXED\text{-}EFFECTS + e_{it} \quad (1)$$

where, VAR_EFFECT is the effect of the SGX scheme that is analyzed, such as earnings announcement returns, stock price synchronicity, media visibility, liquidity, etc., SPONSOR is a dummy variable taking the value 1 for sponsored firms, IMR(SF) and IMR(NF) are the Inverse Mills Ratios using the model described in Appendix B for sponsored firms and not-followed firms respectively, and CONTROLS is a vector of control variables.

[12] Our inferences are unaffected when we restrict the coefficient on IMR to be the same across both samples.

It should be pointed out that, due to data limitations, we are unable to impose meaningful exclusion restrictions in the two-stage Heckman model, which would require at least one variable in the selection model that is not also in the choice model. Although such exclusion criterion are not essential for identification of the model (see Li and Prabhala (2007) and Heckman and Navarro-Lozano (2004)), the lack of such exclusion criterion could potentially induce multicollinearity concerns.

Hence, as an alternative to the Heckman procedure, we employ a difference-in-difference specification, which allows us to examine changes in variables of interest between the pre- and the post-Scheme periods for treatment firms (i.e., those joining the SGX scheme) that are incremental to changes found in the control firms (i.e., those without analyst coverage) between these periods. Under this approach, we compute the change in our variables of interest for sponsored firms following a firm's entry into the scheme and compare this change with concurrent changes for a size-matched firm obtained from the sample of firms without analyst coverage ("*not-followed firms"*). This approach is implemented by estimating the following panel regression on a sample of *sponsored firms* and *not-followed firms*.

$$VAR\_EFFECT_{it} = \alpha_1 SPONSOR_{it} + \alpha_2 SPONSOR_{it}*POST_{it} + \alpha_3 NOCOVER_{it}$$

$$+ \alpha_4 NOCOVER_{it}*POST_{it} + CONTROLS_{it} + YEAR\ FIXED\text{-}EFFECTS + e_{it} \quad (2)$$

where, VAR_EFFECT, SPONSOR and CONTROLS are as defined earlier, NOCOVER is a dummy variable taking the value 1 for firms without analyst coverage that are size-matched to sponsored firms and POST takes the value 1 for periods following the sponsored firm joining the scheme. We estimate Equation (2) over the sample period 2002 to 2007, which includes data up to two years before the Scheme's commencement in 2004. We adjust the standard errors in the regression for firm cluster effects to take account of a firm with repeated observations in the sample.

5 Sample Selection and Data Description

5.3 Sample selection procedure

The Scheme was launched in several phases, and we investigate the impact of the first two phases spanning the four-year period starting December 2003 through to the end of December 2007. The first phase (which we refer to as Scheme 1) covers a period of two years, 2004 to 2005. The SGX Scheme 1 started with 115 companies and 9 research firms. The Scheme was extended in 2005 for a further period of two years, 2006-2007, with additional companies and research firms entering in the second phase (Scheme 2).

We identify our '*sponsored firms*' from announcements made by the SGX at various dates starting on 5 November 2003. We identify a set of voluntarily followed firms (*voluntarily-followed firms*) as all Singapore listed firms with analysts' forecasts available on the IBES database that are not also in the '*sponsored firms*' sample in the same year.[13] Finally, any Singapore listed firm that is not in the sponsored firms or the voluntarily-followed firms samples, is classified as a '*not-followed firm*'. Each of these classifications is year specific.

Share returns, share price, trading volume and financial statement data are obtained from Datastream (Thompson Reuters). Share returns are calculated using the daily total return index in Datastream. All of the above data items are extracted for the period January 2002 through to December 2007. Liquidity measures are calculated using transaction level data from the Thompson Reuters database. Analyst forecasts for earnings per share are obtained from IBES for the voluntarily followed firms. In the case of firms with sponsored coverage, we hand collect forecasts from analyst reports posted on the SGX website since these reports are often not available on IBES. This raises the issue of sourcing actual earnings per share. It is customary in studies investigating analyst forecast errors to use the 'actuals' reported in IBES in order to compare 'actuals' and forecasts on a like for like basis. However,

[13] In order to avoid overlap between the *voluntarily-followed firms* and *sponsored firms* samples, we perform additional analysis in which we exclude any firms that had some level of voluntary coverage prior to their election into the 'Scheme' from the *voluntarily-followed firms sample*; these firms tended to have very low levels of coverage prior to entering the Scheme. Our conclusions are unaffected by entirely dropping these firms from the analyses.

this is not possible for our sponsored firms, as the sponsored firms are often not covered by IBES. In the interest of using a consistent measure of actual earnings across all our observations, we use DataStream EPS for both sponsored and voluntarily followed firms. However, we check for the validity of this approach by comparing reported EPS amounts from DataStream with IBES actuals for voluntarily followed firms, and find that they are close to each other.[14] We also perform sensitivity tests to check if the results change when we use IBES actuals for voluntarily followed firms and DataStream EPS for sponsored firms and find that our results are robust to this modification.

5.4 Descriptive statistics

Table 1 presents the frequency statistics on the sponsored firms and equity research firms (brokers) participating in the SGX scheme for which data is available. Panel A shows that the number of firms and associated earnings forecasts have steadily increased over time. More than 95 per cent of the reports issued contain earnings forecasts and each analyst report is over 5 pages long on average. For most of the period studied there has been an average of 12 research firms participating in the Scheme. From Panel B we see that the intention of having at least 2 analysts following each firm is realized for all firms but the bottom 5%. Panel C indicates that each firm receives a median of 10 reports over a two year period. Finally, Panel D lists the research firms that elected to join the panel of analysts and subsequently issued reports. Many of these firms represent the major local brokerage houses in Singapore that have large client bases.

Table 2 presents figures on data availability. As reported in Panel A, earnings forecasts data are available for 154 SGX Scheme sponsored firms and 259 voluntarily-followed firms. We are able to access other data items from Datastream for 225 of these in total (73 sponsored and 152 voluntarily-followed firms). Panels B and C report the distribution of the sample firms and forecasts over time and

[14] Thirty one percent of our firm-year comparisons have an IBES 'actual' exactly equal to the DataStream EPS and for 80 per cent of our comparisons the difference is less than 10 per cent of EPS.

across industries respectively. The number of sponsored firms increases from 43 firms in 2004 to 72 firms in 2007, while over the same period, the number of voluntarily-followed firms decreases from 119 to 89. Approximately, 40% of both the sponsored firms and of the voluntarily-followed firms are industrial firms, while an additional about 50% of both sets of firms are in consumer goods, consumer services, financials and technology sector.

Table 3 presents univariate comparisons of firm attributes and analysts' forecasts properties for sponsored vis-à-vis voluntarily followed firms. These results indicate that the two groups of firms differ on several dimensions. Sponsored firms tend to be smaller (LogTA), have lower market-to-book ratios (MB), lower leverage (LEVERAGE), have lower earnings per share (EPS) and are more likely to be loss-making (LOSS) than voluntarily-followed firms. In terms of analyst coverage, sponsored firms are followed, on average, by two analysts whereas the corresponding figure for voluntarily-followed firms is significantly higher at 13. Sponsored firms also exhibit higher volatility in monthly stock returns (VOLATILITY) than voluntarily followed firms. Given these differences in firm characteristics, we draw conclusions based on multivariate analyses that control for the differences in these firm characteristics.

Focusing on analysts' forecast attributes in Table 3, we find that sponsored firms have significantly larger absolute values of forecast errors and the mean forecast errors tend to be more positive than those of voluntarily followed firms. However, given the significant differences in firm attributes, we do not draw any conclusions from this comparison.

6 Results

This section presents results from multivariate analysis of the forecast properties and of the impact of sponsored analysts on the information environment and liquidity of the sponsored firms. These analyses account for potential self-selection biases using the Heckman model. Additionally, analyses of the effects of sponsored analyst coverage use the difference-in-difference approach to control for self-

selection.[15]

6.1 Properties of analyst forecasts

We evaluate the quality of sponsored analyst forecasts by comparing these forecasts with the forecast issued for voluntarily-followed firms, using the following pooled regression:

$$\text{FE (or ABSFE)} = \alpha + \beta_1\text{SPONSOR} + \beta_2\text{SIZE} + \beta_3\text{LOSS} + \beta_4\text{HORIZON} + \beta_5\text{ANALYSTS} + \beta_6\text{LEV} + \beta_7\text{EPS} + \beta_8\text{ECHG} + \beta_9\text{IMR(SF)} + \beta_{10}\text{IMR(VF)} + \varepsilon \quad (3)$$

where,

FE	= the forecast error, computed as (forecast earnings – actual earnings)/stock price at the beginning of the year
ABSFE	= absolute value of FE
SPONSOR	= indicator variable equal to 1 for a sponsored firm
SIZE	= natural log of total assets (in thousands of dollars)
LOSS	= a dummy variable equal to 1 if the firm reports negative earnings
HORIZON	= the number of days between forecasts and earnings announcement dates, scaled by 365
ANALYSTS	= the number of analysts issuing forecasts for the firm
LEV	= total liabilities divided by total assets
EPS	= earnings per share
ECHG	= absolute value of earnings change deflated by total assets
IMR(SF)	= inverse Mills ratio for sponsored firms
IMR(VF)	= inverse Mills ratio for voluntarily followed firms

The coefficient on SPONSOR is expected to be significantly positive in the regression of absolute value of forecast errors, if the forecasts issued for sponsored firms are of a lower accuracy than those issued for voluntarily-followed firms. Similarly, in regression of signed forecast errors (FE), SPONSOR is expected to have a significantly positive (negative) coefficient if the forecasts for sponsored firms are more optimistically (pessimistically) biased than those issued for voluntarily-followed firms.

The regression includes a number of control variables proposed in the literature that are likely related to forecast errors. Firm size (SIZE) and number of analysts following the firm (ANALYSTS) are linked to the extent of information needed for forecasting as well as to analysts' incentives to bias their forecasts. Prior studies have shown SIZE to be positively associated with forecast accuracy (Lang and

[15] The difference-in-difference approach is not applied to the analysis of forecast properties, as forecast data is not available for sponsored firms during the pre-Scheme period.

Lundholm, 1996) and negatively with forecast bias (Lim, 2001). After controlling for the effect of size, greater number of analysts is expected to lead to greater forecast bias as intense competition among analysts induces them to issue more optimistic forecasts to obtain management favor (Gu and Wu, 2003), while the increased supply of information should leads to more accurate forecasts.

Lang and Lundholm (1996) suggest the larger magnitudes of earnings changes are likely to represent unexpected changes in the underlying business, such as the introduction of a new product or service, and so will be positively correlated with forecast accuracy. We compute the magnitude of the earnings change as the absolute value of change in earnings deflated by total assets. We control for loss reporting firms through an indicator variable (LOSS) as well as by including the level of earnings (EPS) since prior research suggests that forecast errors are affected by managers' asymmetric incentives to take a big bath when reporting losses relative to their incentives to overstate earnings when reporting profits (Hwang et al., 1996; Gu and Wu, 2003; Eames and Glover, 2003). These studies suggest more optimistically biased forecasts and larger forecast errors for loss-reporting firms (for firms with lower earnings levels) than for profit-reporting firms (for firms with higher earnings levels). HORIZON controls for the length of the forecast horizon per Brown's (2001) finding that forecasts formed closer to the earnings announcement date tend to be more accurate than earlier forecasts. Although there is little reason for HORIZON to be related to forecast bias, we include it in the FE regression for completeness. Finally, leverage (LEV) is included to control for the greater earnings uncertainty arising from increased financial risks, which causes analysts forecasts to be more optimistically biased and less accurate (Fang and Yasuda, 2009; Sadka and Scherbina, 2007)).

Similar to the self-selection issues discussed in section 4.4, which were in the context of analyzing the effects from a firm joining the SGX scheme, we recognize that analysts' decisions to voluntarily follow a firm could potentially introduce biases in the analyses of forecast properties. To control for this self-selection issue, we follow Heckman's approach and first model the probability of a

firm being voluntarily covered by analysts, to obtain the inverse Mills ratios (IMR), which are then included as an independent variables in the main regression comparing the properties of earnings forecasts. We estimate the inverse Mills ratios for the two groups of interest from a first stage probit regression and, in the second stage OLS regressions, allow the coefficients on IMR to be different for voluntarily-followed firms and for sponsored firms. Our inferences remain unchanged when we restrict the coefficient to be the same across both samples.

6.1.1 The accuracy and bias of exchange sponsored forecasts

Table 4 presents results from estimation of Equation (3) for both signed forecast error (measuring bias) or the absolute forecast error (measuring accuracy). The coefficient on the SPONSOR variable is statistically significant in the case of absolute forecast error, but not in the case of signed forecast error, suggesting that forecasts issued for sponsored firms are neither more nor less biased than those of voluntarily followed firms but are less accurate. The coefficient of 0.028 for SPONSOR in the regressions of absolute forecast errors suggests that the forecast errors are over twice as large as the mean absolute forecast errors of 0.022 for voluntarily followed firms. The coefficient estimates on the control variables are in line with those reported in prior studies and the explanatory power of the regressions ranges between 21% and 24%.

The analysis presented in Table 4, Panel A, utilizes all available forecasts for all firms in the sample. Since it is possible that analysts may not necessarily incorporate all information in early forecasts, we repeat this analysis using only the latest forecasts of analysts prior to earnings announcements. The results, reported in Panel B of Table 4, show qualitatively similar results as those reported in Panel A. Specifically, we continue to find that forecasts issued by sponsored analysts are not

any more or less biased than those issued by voluntary forecasts, but that their accuracy is lower.[16]

6.1.2 Market reaction to analyst forecast revisions

As discussed earlier, several studies show that voluntary analysts produce new information to stock market participants and that forecast revisions by these analysts cause significant stock price responses. In this sub-section, we examine whether investors view forecasts by sponsored analysts as producing new information or as simply incorporating publicly available information in their earnings forecasts, given the lower market-related incentives for sponsored analysts. We implement this test by examining stock price and volume responses to forecast revisions by sponsored analysts.

We measure the price and volume reactions to forecast revisions in the three-day (-1, 1) window around the forecast revisions. The stock price reaction is measured either as the cumulative abnormal returns (CAR) or as the absolute value of the cumulative abnormal returns (ABS_CAR) during the event window. The abnormal returns are calculated using the market model the parameters of which are estimated from daily returns in the (-100, -10) window before the forecast revision dates.[17] We compute volume reactions to forecast revisions as the cumulative abnormal trading volume in the event window, where abnormal trading volume is defined as share volume in day t, minus the average daily volume in the (-100, -10) window before the forecast revisions and then scaled by the average daily volume.

To examine whether the market reaction to forecast revisions varies across sponsored and voluntary analyst, we regress each of the market-reaction measures on the dummy variable for sponsored firms (SPONSOR) interacted with either forecast revisions (in the regressions of CAR) or with absolute value of forecast revisions (in regressions of ABS_CAR or ABVOL). The forecast revision (REV) is computed as the difference between the new forecast and the previous forecast issued by an analyst for a specific firm-quarter, scaled by stock price at beginning of the year. Motivated by the findings in Frankel,

[16] We repeat our estimation of all models in Table 4 after including interaction terms between SPONSOR with SIZE and the other control variables without any change in the tenor of our results.
[17] We use the Strait Times Index as the market index to compute market returns.

Kothari and Weber (2006), the regressions also include size, market-to-book ratio, trading volume, stock return volatility, number of analysts, a dummy for downward revision, and stock price synchronicity as control variables.[18]

Table 5 presents the results for our analysis of the stock market reaction to analyst revisions. Both REV and ABSREV are statistically significant in all models, indicating that both the signed and absolute size of revisions (REV and ABSREV, respectively) is highly significant in explaining the abnormal returns and abnormal volume on forecast revisions by voluntary analysts. The coefficients in these regressions indicate that stock market reacts to forecast revisions in an economically and statistically significant manner. For instance, in the regression of CAR, the coefficient on REV of 0.18 indicates that a one standard deviation increase in REV (0.033) increases the abnormal stock return at the forecast revision by 0.60%.

Moreover, the coefficient on SPONSOR is significantly positive in the ABS_CAR and ABVOL regressions, indicating that, irrespective of the magnitude of the news, investors react more to forecast revisions issued by sponsored analysts than those issued by voluntary analysts. This result is likely driven by the lower frequency of revisions by sponsored analysts relative to those by voluntary analysts, which causes each revision to potentially contain more information. The coefficient on SPONSOR interacted with REV or ABSREV is consistently insignificant in all regressions, indicating that market participants do not view forecasts issued by sponsored analyst any less credible or less informative than those issued by voluntary forecasts. Thus, even though sponsored analysts do not face the same capital market incentives as voluntary analysts, investors find their forecasts to be as useful as those issued by voluntary analysts in pricing stocks.[19] The coefficients on control variables are consistent with prior findings and

[18] Frankel et al (2006) also find that the impact of forecast revisions is associated with the percentage of institutional ownership, the number of shareholders and the number of business segments. We are unable to obtain data on these dimensions for our sample.

[19] The similar price reaction to forecast revisions for sponsored firms and voluntarily followed firms, in spite of sponsored analyst having lower forecast accuracy might seem inconsistent with investor rationality. However this need not be the case, as price reaction to forecast revisions depends on a variety of factors other than forecast

indicate that the market reactions to downward revisions are greater and that the magnitude of the price reactions are higher for more volatile and smaller firms.

In summary, the analysis of the properties of sponsored analysts' forecasts indicates that these forecasts, though less accurate, are not any different from voluntary analysts' forecasts in terms of bias or investors perception of their credible and informativeness. We next turn our attention to investigating whether and how initiation of sponsored forecasts affects a firm's information environment and its stock liquidity.

6.2 Effects of exchange sponsored research on the information environment and liquidity of firms joining the Scheme

Prior evidence on the consequences of analyst coverage is based on cross-sectional analysis. These studies, while important in their own respect, do not directly address the issue of whether a firm can reap benefits from first-time initiation of analyst coverage.[20] We investigate this issue directly for firms obtaining sponsored analyst coverage. As described in Section 4.2, we analyze a variety of effects pertaining to a firm's information environment and liquidity. We investigate the effects using both the Heckman control for self-selection as well as using a difference-in-difference approach and each of the following sub-sections presents the results for a specific effect.[21]

6.2.1 Market reaction to earnings announcements

We examine whether private information search activities of analysts improve the market's

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accuracy, including whether forecast revisions contain new information or simply move individual forecasts towards a consensus forecast.

[20] Few studies investigate the effects of first-time initiation of analyst coverage (i.e., initiation of coverage for firms with no prior analyst following). These include Bradley, Jordan and Ritter (2003) and Dhiensiri and Sayrak (2004), who study stock price reaction to first-time initiation of analyst coverage and Dhiensiri, Sayrak and Zarowin (2005), who study the effect of analyst coverage initiation on the market's ability to predict future earnings.

[21] In subsequent analyses, we do not control for number of analysts as it is almost perfectly correlated with SPONSOR. Almost all sponsored firms have exactly 2 analysts, while, by definition, not-followed firms have none. We also do not control for properties of analysts' forecasts, as these are undefined for the control sample of not-followed firms.

expectations of earnings by pre-empting the information in earnings announcements and thus, lower the information content of earnings announcements. We do this by analyzing price and volume reactions to annual earnings announcements.[22] The earnings announcement dates are obtained from DataStream. We measure the market reaction either as the cumulative absolute abnormal returns (ABS_CAR) in the three-day event window (-1, 1) around the annual earnings announcement dates (day 0) or as the cumulative abnormal volume (ABVOL) during the event window.[23] ABS_CAR and ABVOL are computed as described earlier. To ensure that the results are not driven by firm characteristics that potentially affect investor reactions to earnings announcements, we include firm size (SIZE), market-to-book ratio (MB), a dummy variable for loss-making firms (LOSS), Leverage (LEV) and stock return volatility (VOLATILITY) as control variables in the regression.

Table 6 presents the results from comparisons of market reactions to earnings announcements for sponsored firms with those for not-followed firms. In this and subsequent analyses, we compare sponsored firms with not-followed firms, as the purpose of these analyses is to evaluate the consequences for a firm joining the SGX scheme and sponsored firms would be similar to not-followed firms, if they had not joined the SGX scheme. The analyses control for self-selection bias either using the Heckman model or the difference-in-difference approach. The results from Heckman model are presented in Panel A and those from the difference-in-difference approach in Panel B.

From Panel A of Table 6, we note that the coefficient for SPONSOR is a negative and statistically significant coefficient of -0.16 in the regression of ABS_CAR, implying that the absolute price reaction to earnings announcements are significantly lower for sponsored firms as compared to that for not-followed

[22] We focus on annual earnings announcements for two reasons. First, in our sample period, quarterly disclosure is voluntary and so the effect of these announcements could vary significantly from those of mandatory disclosures. Second, although SGX firms are required to provide semi-annual financial statements, DataStream's coverage of semi-annual (as well as quarterly) earnings announcements is limited. Nevertheless, we obtain qualitatively similar results when we redo our analysis using all the earnings announcement dates, including semi-annual and quarterly announcements available from DataStream.

[23] The parameters of the market model are estimated using daily returns in the (-100, -10) window prior to the earnings announcements.

firms. We reach identical conclusions when we focus on the results from difference-in-difference approach in Panel B of Table 6. The coefficient on SPONSOR*POST is significantly negative, indicating that, even when sponsored firms from the pre-scheme period are used as the control sample, the ABS_CAR decreases upon a firm joining the SGX scheme. The coefficient of -0.03 on SPONSORED*POST implies that price reactions at earnings announcements decrease on average by 20.7% for sponsored firms relative to the pre-scheme average ABS_CAR of 14.5% for these firms.[24]

Consistent with the decrease in earnings-announcement price reaction being attributable to the SGX scheme, this decrease is observed only for the sponsored firms. The coefficient on NOCOVER*POST is -0.002, which is both economically and statistically insignificant. Also, the coefficient on SPONSOR is statistically insignificant in the difference-in-difference regression, indicating that, in the pre-scheme period, price reactions at earnings announcements are indistinguishable across the sample of sponsored firms and the sample of not-followed firms. The lower price reaction in the post-scheme period for sponsored firms supports the view that SGX sponsored analyst research helps improve market's earnings' expectations and thereby reducing surprises at earnings announcements. The coefficient on the control variables are consistent with prior studies and indicate that larger firms have lower price reaction at earnings announcements, while firms with greater uncertainty, such as loss-making firms and high volatility firms, have greater price responses at earnings announcements.

In contrast to the lower price reaction observed for sponsored firms upon joining the SGX scheme, the volume reaction at earnings announcements increases for sponsored firms as seen by the significantly positive coefficient on SPONSOR in the Heckman regression and the significantly positive coefficient on SPONSOR*POST in the difference-in-difference regressions of ABVOL. The coefficient on SPONSOR*POST of 2.374 suggests that average abnormal volume at earnings announcements more

[24] Throughout, we compute the pre-scheme averages for difference-difference-approach (or the average of not followed firms under Heckman approach) by setting the values of all relevant control variables at their unconditional means.

than doubles for sponsored firms from their pre-scheme average of 1.97. Moreover, as in regression of ABS_CAR, the coefficient on both SPONSOR and NOCOVER*POST are statistically insignificant in the difference-in-difference approach, suggesting that the increased volume reactions to earnings announcements are unique to the sample of sponsored firms in the post-scheme period.

Thus, while initiation of analyst coverage decreases the price reactions at earnings announcements, it leads to a higher volume response. These apparently contradicting results can be reconciled when one recognizes that price and volume capture different dimensions of investors' reactions. While increased private information production by analysts before earnings announcements reduce the 'news' in earnings and the associated price response, it can lead to higher trading volume if the analyst private search activities either increase dispersion in investor beliefs or attract greater investor attention to a firm's public announcements (Hong, Lim and Stein (2000)).

6.2.2 Intra-period timeliness of information in stock prices

The findings in the previous section suggest that analysts improve investors' earnings expectations, which is suggestive of sponsored analysts aiding incorporation of earnings information more quickly into current stock prices. In this section, we investigate whether initiation of sponsored analyst coverage leads to more timely incorporation of all information, both earnings and non-earnings information, in stock prices. The basic idea is to test whether analyst coverage accelerates the incorporation in stock prices of all information in a quarter. We do this by regressing IPT, the intra-period timeliness metric of Butler, Kraft and Weiss (2001) on SPONSOR dummy and additionally, in difference-in-difference approach, on the interactive dummy variables, NOCOVER and POST. The regressions also control for firm-specific characteristics that potentially affect the speed with which stock prices reflect new information.

The results from the Heckman procedure in Panel A of Table 7 show that the coefficient on

SPONSOR is a statistically significant 189.24. This coefficient is also economically significant as it suggests that sponsorship firms rank 55% higher than otherwise identical not-followed firms in terms of the timeliness with which stock prices reflect information. These results are consistent with sponsored analysts aiding market participants to impound information more quickly in share prices. We obtain very similar conclusions from the difference-in-difference approach. From Panel B, we find that coefficient on SPONSOR*POST is a significant 51.69, whereas the coefficients on NOCOVER*POST and on SPONSOR are statistically insignificant. These indicate that sponsored firms are not significantly different from not followed firms prior to firms joining the SGX scheme, but that upon initiation of sponsored analyst coverage the IPT of the firms increases, while those of not-followed firms does not. With regards to the control variables and in line with intuition, we find that larger firms generally react more quickly to information, but more risky firms, such as those with higher return volatility, leverage or those reporting losses, tend to react less quickly to information.

The results from the prior sections paint a consistent picture on the usefulness of analysts coverage to stock market participants. The analyses reveal that investors view sponsored analysts' forecast revisions as providing new information and that this new information improves their earnings expectations as well results in their impounding new information more quickly in stock prices.

6.2.3 Stock price synchronicity

If sponsored analyst coverage is relatively more effective in incorporating industry-wide information than firm-specific information into stock prices then we expect stock price synchronicity to increase for firms joining the SGX scheme. We test this prediction by closely following prior studies to estimate stock price synchronicity (e.g., Chan and Hameed (2006). For each firm and year, we estimate stock price synchronicity (SYNC) as $R^2/(1-R^2)$, where R^2 is the R-squared from a regression of weekly stock return on market returns. We then examine whether SYNC systematically differs across sponsored firms and not-followed firms, after controlling for self-selection and other control variables. Following

Chan and Hameed (2006) and Hutton, Marcus and Tehranian (2009), the regressions control for firm size (SIZE), market-to-book ratio (MB), share turnover (VOLUME), return on equity (ROE) and skewness (SKEW) and kurtosis (KURT) in stock returns.

Panel A of Table 8 presents results from the regression of stock price synchronicity for a sample of SGX sponsored firms and not-followed firms. The regression, which controls for self-selection using the Heckman approach, reveals a significantly positive coefficient for SPONSOR. The coefficient of 0.27 indicates that the average sponsored firm has almost 2.5 times higher stock price synchronicity than otherwise identical firms without analyst coverage, whose average stock price synchronicity is 0.10. This finding shows that firms initiating analyst coverage improve their stock price synchronicity which is consistent with the evidence in Chan and Hameed (2006) and Piotroski and Roulstone (2004), although these latter studies focus on cross-sectional differences across firms rather than first-time initiation of analyst coverage. These results support the argument that sponsored research helps to incorporate more industry-wide information into stock prices. With the exception of the coefficient on market-to-book ratio, the coefficients on other control variables are qualitatively similar to those in Hutton, Marcus and Tehranian (2009) and Chan and Hameed (2006) even though the sample in these studies is different to ours.[25]

In Panel B, which reports regressions based on a difference-in-difference approach, we note that the coefficient on SPONSOR is insignificant, suggesting that prior to these firms joining the SGX scheme the stock price synchronicity of these firms is statistically indistinguishable from that of firms in the not-followed sample. In the post-SGX scheme period, both sponsored firms and not-followed firms have a significantly decline in stock price synchronicity, as indicated by significantly negative coefficients on both SPONSOR*POST and on NOCOVER*POST. These coefficients reflect an overall decline in stock

[25] The definition of synchronicity in Hutton et al (2009) is inversely related to the measured used in Chan and Hameed (2006) and in this study, which causes the coefficients on the control variables to have opposite signs when compared to those reported here.

price synchronicity for all stocks in SGX in our sample period.[26] However, more importantly, the coefficient on SPONSOR*POST is significantly smaller in magnitude than that for NOCOVER*POST, indicating that the decline in stock price synchronicity is much less for sponsored firms than for not-followed firms. This result suggests that, after controlling for the overall decline in stock price synchronicity, the synchronicity of sponsored firms increases following initiation of analyst coverage.

In summary, both the Heckman approach and the difference-in-difference approach document a significant increase in stock price synchronicity for sponsored firms, supporting the view that SGX sponsored analyst coverage helps incorporate relatively more industry-wide information into stock prices. This result is consistent with the effects documented for voluntary analyst coverage by Piotroski and Roulstone (2004) and by Chan and Hameed (206).

6.2.4 Media visibility

In Table 9 we present results of tests on whether sponsored analyst coverage helps firms achieve greater media coverage. The table reports estimates from a regression of the number of media mentions. Following Fang and Peress (2009), the regression controls for firm size (SIZE), market to book ratio (MB), monthly stock return volatility (VOLATILITY) and the absolute value of past year returns (ABSRET).[27]

From the regressions based on the Heckman approach in Panel A, we observe that the coefficient on SPONSOR is a significant 19.6. This indicates that, relative to not-followed firms, firms with sponsored analyst coverage are associated on average with an additional 19.6 news reports per year for the sponsored firms. In comparison, the mean number of news reports for not-followed firms is 24.4 per year suggesting that the sponsored firms enjoy a 80 % increase in annual media coverage relative to the not-followed firms.

[26] The average stock price synchronicity of firms listed in SGX declines from a high of 0.257 in 2002 to a low of 0.067 in 2005 during the sample period.
[27] Excluding ABSRET from this regression does not affect the tenor of the results.

The coefficient on SPONSOR in the difference-in-difference regressions, reported in Panel B, is statistically insignificant, implying that firms in the sponsored firms are not different from the control sample in the pre-SGX scheme. However, in the post-SGX scheme, sponsored firms enjoy a significant increase in the median mentions, as indicated by the coefficient of 11.26 on SPONSOR*POST. In contrast, the coefficient on NOCOVER*POST is statistically insignificant. These results indicate that sponsored analyst coverage lead to an increase in media mentions for firms, an inference that is in line with the conclusions drawn from the Heckman approach.

6.2.5 Price Efficiency

Next we investigate whether analyst coverage through SGX scheme helps sponsored firms achieve greater price efficiency. As in Boehmer and Kelley (2009), we study price efficiency in the context of stock prices following a random walk by evaluating the following two measures of efficiency: (i) absolute value of daily stock return autocorrelations (|AR1|) and (ii) the distance of variance ratios (of long-term to short-term return variances) from 1 (|1 – VR(1,5)| or |1 – VR(1,10)| or |1 – VR(5, 10)| , where VR(n,m)) is the ratio of the return variance over *m* periods to the return variance of *n* periods, each divided by the length of the respective periods.). The closer these measures are to zero, the higher the price efficiency. Since the measures of price efficiency are in absolute values, we evaluate whether sponsored firms enjoy higher price efficiency by testing whether these measures are significantly smaller for sponsored firms relative to that for not-followed firms. Also following Boehmer and Kelley (2009), we control for firm size (SIZE), log of stock price (PRICE) and liquidity measured as the bid-ask spread, deflated by the bid-ask mid-point (SPREAD).[28] The results are reported in Table 10.

Panel A of Table 10 indicates that sponsored firms have significantly lower autocorrelations in returns than not-followed firms, after controlling for self-selection using the Heckman approach. The

[28] Using the number of trading days or the number of zero return days as measures of liquidity does not change the tenor of our results; nor does adding the log of total trading volume as an additional control variable.

coefficient on SPONSOR in the AR1 regression is statistically significant (coefficient = -0.033, t value = -2.28). Sponsored firms also have significantly smaller values on all measurements of |1-VR(n,m)| relative to the not-followed firms. Thus, all the regressions in Panel A indicate that the prices of sponsored firms are closer to a random walk relative to the prices of the not-followed firms. The coefficients on the control variables are generally consistent with those in Boehmer and Kelley (2009).

The results in Panel B using a difference-in-difference indicate negative coefficients on both SPONSOR and SPONSOR*POST for almost all measures of price efficiency. However, the coefficients are always insignificant, with the exception of the coefficient on SPONSOR for the auto-correlation measure. Moreover, the F-test does not reject the null that the coefficient on SPONSOR*POST is equal to the coefficient on NOCOVER*POST. Thus, the evidence from the difference in difference approach does not support an improvement in price efficiency following initiation of sponsored analyst coverage,

Since we obtain contradictory evidence from the Heckman approach and the difference-in-difference approach, we conclude that the evidence for sponsored analyst coverage improved price efficiency, defined as stock returns following a random walk, is weak.[29]

6.3 The impact of exchange sponsored research on the liquidity of sponsored firms

We next investigate the association between SGX sponsored analyst coverage and stock market liquidity of sponsored firms. Given our discussion in Section 4.3, it is not clear how the SGX's Research Incentive Scheme would impact liquidity. Extant theory and evidence provide ambiguous predictions on this issue and hence, we approach this issue as an empirical one.

We collect intraday trade and quote data from the Reuters TAQTIC database over the period from

[29] The differences in results across the Heckman and the difference-in-difference approach can result either from differences in the assumptions underlying these approaches, particularly pertaining to counterfactuals, the matching procedure employed in the difference-in-difference approach or to the choice of instrument variables in the Heckman approach. We also cannot rule out the possibility that the differences in results are due to differences in the power of the tests.

2002 to 2007 to construct the liquidity measures. Following Roulstone (2003), the regressions of liquidity measures control for firm size (SIZE), stock price (PRICE) and return volatility (VOLATILITY). Panel A of Table 11 presents the results from the Heckman approach. We find that firms with sponsored coverage have statistically significantly lower spreads and Amihud's price impact factor, but higher volume and depth as compared to not-followed firms. These results suggest that sponsored firms have better liquidity than not followed firms. As regards the control variables, consistent with intuition, larger firms and higher priced firms are found to have better liquidity and trading volume, while more volatile firms are found to have greater depth and trading volume.

The results from Panel B of Table 11, which reports the regression results using difference-in-difference approach, indicate that the coefficient on SPONSOR is negative in regressions of spread and Amihud factor, while it is positive in regressions of depth and trading volume. This indicates that sponsored firms, even prior to their joining the scheme, enjoy lower spreads, larger depth and greater trading volume. However, the coefficient on SPONSOR*POST, is statistically insignificant for all our measures of liquidity. Moreover, when we test whether SPONSOR*POST = NOCOVER*POST we are unable to reject the null that the changes in liquidity to sponsored firms upon joining the SGX scheme is the same as the changes for the matched sample of not-followed firms. Thus, there is little evidence that the SGX scheme improves the liquidity of the firms.

Since the evidence from the Heckman approach and the difference-in-difference approach are mixed, we are unable to convincingly reject the null hypothesis that sponsored analyst coverage has no effect on stock liquidity. Hence, we make the more conservative conclusion that sponsored analyst coverage has no effect on stock liquidity.

7 Summary and Concluding Remarks

This study investigates the efficacy of an exchange-sponsored scheme introduced by the

Singapore Stock Exchange to promote analyst coverage of previously un-followed or poorly followed stocks. We investigate the quality of earnings forecasts issued for companies participating in the scheme relative to those issued for companies that are voluntarily followed by analysts. We also study the consequences for firms initiating sponsored analyst coverage on a firm's information environment and stock liquidity. Our findings indicate that the analyst forecasts issued under the scheme do not differ in bias from those issued by analysts voluntarily following a firm, but are less accurate. Market participants view forecast revisions by both voluntary analysts as well as sponsored analysts as informative and significantly react to their forecasts revisions.

Corroborating the evidence that forecast revisions of sponsored analysts are informative, we document that initiation of analyst coverage leads to improved expectations of earnings and more timely incorporation of information in stock prices. Moreover, sponsored analyst coverage is found to increase stock price synchronicity and media visibility. However, we find weak support for the arguments that initiation of analyst coverage under the scheme affects stock liquidity or improves price efficiency for the covered stocks. Taken together, our evidence suggests that sponsored analyst coverage can assist in improving the information environment of a firm, which is in turn associated with enhanced price synchronicity and the speed with which information is reflected in stock prices.

Given the concerns that many listed firms face in not obtaining analyst research coverage, our evidence from the Singapore Stock Exchange suggests that exchanges can play an important role in boosting coverage for the firms by acting as intermediaries. Even though analysts sponsored by the SGX are compensated in a different manner and have different incentives compared to those voluntarily following a firm, sponsored analyst coverage can benefit a firm improving the information environment for the firm.

We note that our analyses only focus on measuring the average benefit to firms from joining the SGX scheme. We leave it to future research to investigate whether the benefits vary systematically across

firms and if so, which factors determine this variation.

References

Amihud, Y., 2002, Illiquidity and stock returns: cross-section and time-series effects, Journal of Financial Markets 5, 31-56.

Ayers, B., and R. Freeman, 2003, Evidence that analyst following and institutional ownership accelerate the pricing of future earnings. Review of Accounting Studies 8 (1): 47 – 67.

Baker, K.H., J.R. Nofsinger and D.G. Weaver, 2002, International cross-listing and visibility, *The Journal of Financial and Quantitative Analysis,* Vol 37 (3): 495-521

Ball, R., and L. Shivakumar, 2008, How much new information is there in earnings? Journal of Accounting Research 46 (5), 975-1016.

Bamber, L.S. and Y.S. Cheon, 1995, Differential price and volume reactions to accounting earnings announcements, The Accounting Review, Vol. 70(3): 417-441.

Boehmer, E. and E.K. Kelley, 2009, Institutional investors and the informational efficiency of prices, Review of Financial Studies 22(9): 3563-3594.

Bhushan, R. 1989, Firm characteristics and analyst following. Journal of Accounting and Economics 11, 255-274.

Bowen, R., X. Chen and Q. Cheng, 2008, Analyst coverage and the cost of raising capital: Evidence from underpricing of seasoned equity offerings. Contemporary Accounting Research 25, 657 – 700.

Bradley, D.J., B.D. Jordan and J. Ritter, 2008, Analyst behavior following IPOs: The "Bubble period" evidence. The Review of Financial Studies 21(1), 101-133.

Brennan, M., A. Subrahmanyam, 1995, Investment analysis and price formation in securities markets. Journal of Financial Economics 38: 361 – 381.

Brennan, M., N. Jegadeesh, B. Swaminathan, 1993, Investment analysis and adjustment of stock prices to common information. The Review of Financial Studies 6(4), 799-824.

Brown, L., Rozeff, M., 1978, The superiority of analyst forecasts as measures of expectations: evidence from earnings. Journal of Finance 33, 1–16.

Brown L., 2001, How Important is past analyst earnings forecast accuracy? Financial Analysts Journal 57 (6), 44 – 49.

Bushee, B.J. and G.S. Miller, 2009, Investor relations, firm visibility and investor following, Working paper, University of Pennsylvania.

Campa J., and S. Kedia, 2002, Explaining the diversification discount. Journal of Finance 57 (4), 1731-176.

Canivet, J., 2009, Small cap analysts coverage: An "under-the-radar" dilemma. *Focus*, World Federation of Exchanges publication, April, 194: 4-6.

Chan, K., and A. Hameed, 2006, Stock price synchronicity and analyst coverage in emerging markets, Journal of Financial Economics 80 (1): 115 – 147,

Chang, X., S. Dasgupta and G. Hilary, 2006, Analyst following and financing decisions. Journal of Finance 61 (6), 3009 – 3048.

Chui, A.C.W, S. Titman and K.C.J Wei, 2010, Individualism and momentum around the world. Journal of Finance 65(1), 361-392.

Chung, K. and Jo, H., 1996, The impact of security analysts' monitoring and marketing functions on the market value of firms, The Journal of Financial and Quantitative Analysis, 31(4), 493 – 512.

Chung, K., T. McInish, R. Wood, and D. Wyhowski, 1995, Production of information, information asymmetry and the bid-ask spread: empirical evidence from analysts' forecasts. Journal of Banking and Finance 19 (6): 1025 – 1046.

Cliff, M.T. and D.J. Denis, 2004, Do initial public offering firms purchase analyst coverage with underpricing?, *Journal of Finance* 59(6): 2871-2901.

Demiroglu, C. and M. Ryngaert, 2010, The first analyst coverage of neglected stocks, Financial Management.

Dempsey, S.J., 1989, Predisclosure information search incentives, analyst following, and earnings announcement price response, The Accounting Review 64 (4), 748-757.

Dhiensiri, N. and A. Sayrak, 2004, "The value effects of of analyst coverage initiations." Working paper, University of Pittsburgh.

Dhiensiri, N., A. Sayrak, and P. Zarowin 2005, "The impact of analyst coverage initiation on the market's ability to anticipate future earnings." Working paper, New York University.

Dyck, A., A. Morse and L. Zingales, 2010, "Who Blows the Whistle on Corporate Fraud", Journal of Finance, forthcoming.

Eames, M.J. and S.M. Glover, 2003, Earnings predictability and the direction of analysts' earnings forecast errors, The Accounting Review 78(3), 707-724.

Easley, D., M. O'Hara, J. Paperman, 1998, Financial analysts and information-based trade. Journal of Financial Market 1: 175 – 201.

Elton, E. J., Gruber, M. J., & Gultekin, M. 1981, Expectations and share prices. Management Science, 27, 975–987.

Fama, E.F., 1998. Market efficiency, long-term returns and behavioral finance. Journal of Financial Economics 49, 283-306.

Fang, L. and A. Yasuda, 2009, The effectiveness of reputation as a disciplinary mechanism for sell-side research, Review of Financial Studies 22(9), 3735-3778.

Fang, L. and J. Peress, 2009, Media coverage and the cross-section of stock returns, The Journal of Finance, 64(5), 2023-2052.

Francis, J. and L. Soffer, 1997, The relative informativeness of analysts' stock recommendations and earnings forecast revisions. Journal of Accounting Research35 (2), 193–212.

Francis, J. and D. Philbrick, 1993, Analysts' decisions as products of a multi-task environment. Journal of

Accounting Research 31, 216 – 231.

Frankel, R., S. Kothari, and J. Weber, 2006, Determinants of the Informativeness of Analyst Research, Journal of Accounting and Economics 41, 29-54.

Fried, D., and D. Givoly, 1982, Financial analysts' forecasts of earnings: A better surrogate for market expectations, Journal of Accounting and Economics, 4, 85– 107.

Givoly, D. and J. Lakonishok, 1979. The information content of financial analysts forecasts of earnings: some evidence on semi-strong efficiency. Journal of Accounting and Economics 2, 165–186.

Glosten, R., and P. Milgrom, 1985, Bid, ask, and transaction prices in specialist market with heterogeneously informed traders. Journal of Financial Economics 14: 71 – 100.

Gomes, A., G. Gorton and L. Madureira, 2007, SEC Regulation Fair Disclosure, information, and the cost of capital. Journal of Corporate Finance 13, 300–334.

Graham, J., C. Harvey and S. Rajgopal, 2005, The economic implications of financial reporting. Journal of Accounting and Economics 40(1-3), 3 – 73.

Gu, Z. and J.S. Wu, 2003, Earnings skewness and analyst forecast bias, Journal of Accounting and Economics 35, 5 – 29.

Healy P., and K. Palepu, 2001, Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. Journal of Accounting and Economics 31, 405 – 440.

Heckman, J.J and S. Navarro-Lozano, 2004, Using matching, instrumental variables and control functions to estimate economic choice models, Review of Economics and Statistics 86, 30-57.

Hong, D., C.M. Lee and B. Swaminathan, 2003, Earnings momentum in international markets. Working paper, Social Science Research Network.

Hong, H., T. Lim and J. Stein, 2000, Bad news travels slowly: Size, analyst coverage and the profitability of momentum strategies. Journal of Finance 55, 265 – 295.

Hutton, A., A.J. Marcus, H. Tehranian, 2009, Opaque financial reports, R^2 and crash risk, Journal of Financial Economics 94, 67-86.

Irvine, P., 2003, The incremental impact of analyst initiation of coverage, Journal of Corporate Finance 9, 431 – 451.

Jensen, M., and W. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs, and ownership structure. Journal of Financial Economics 3, 305 – 360.

Kim, O., and R. Verrecchia, 199la, Trading volume and price reactions to public announcements, Journal of Accounting Research 29: 302-321.

Kim, O., and R. Verrecchia, 199lb, Market reaction to anticipated announcements, Journal of Financial Economics 30: 273-309.

Kirk, Marcus, 2008, Can companies buy credible analyst research, Working paper, Social Science Research Network.

Krigman, Laurie, Wayne H. Shaw and Kent L. Womack, 2001, Why do firms switch underwriters?,

Journal of Financial Economics 60: 245-284.

Lang, M., Lins, K. and Miller, D., 2003, ADRs, analysts, and accuracy: Does cross-listing in the United States improve a firm's information environment and increase market value?, Journal of Accounting Research, 41(2), 317-345.

Lang, M., Lins, K. and Miller, D., 2004, Concentrated control, analyst following and valuation: Do analysts matter most when investors are protected least?, Journal of Accounting Research, 42(3), 589 – 623.

Li, K. and N.R. Prabhala, 2007, Self-selection models in Corporate Finance, Handbook of Corporate Finance: Empirical Corporate Finance, Volume I, edited by Espen Eckbo, Elsevier Science.

Lim, T., 2001, Rationality and analysts' forecast bias, Journal of Finance 56, 369-385.

Lim, T.K and H.C. Kong, 2004, New evidence on price impact of analyst forecast revisions, International Review of Financial Analysis 13, 161-190.

Loughran, T., and J. Ritter, 2005, Why has IPO underpricing changed over time? Financial Management, Vol. 33 (3), 5-37.

Lys, T. and S. Sohn, 1990, The association between revisions of financial analysts' earnings forecasts and security-price changes, Journal of Accounting and Economics 13, 341-363.

Mehran, H. and S. Peristiani, 2009, Financial visibility and decision to go to private, Review of Financial Studies, forthcoming.

Metzger, C., 2003, A year later: the cost of coverage/credibility, Investor Relations Updates, April 2003, 1–7.

Mikhail, M., B. Walther, and R. Willis., 2007, "When Security Analysts Talk, Who Listens?" The Accounting Review 82, 1227-1253.

Morck, R, B. Yeung and W. Yu, 2000, The information content of stock markets: Why do emerging markets have synchronous stock price movements? Journal of Financial Economics. 58(1), 215-260.

O'Brien, P.C. and R. Bhushan, 1990, Analyst following and institutional ownership, Journal of Accounting Research 28, 55-76.

Piotroski, J., and D. Roulstone, 2004, Then influence of analysts, institutional investors, and insiders on the incorporation of market, industry, and firm-specific information into stock prices. The Accounting Review 79 (4): 1119 – 1151.

Rajgopal, S., T. Shevlin and M. Venkatachalam, 2003, Does the Stock Market Fully Appreciate the Implications of Leading Indicators for Future Earnings? Evidence from Order Backlog", Review of Accounting Studies 8: 461-492

Roulstone, D., 2003, Analyst following and market liquidity. Contemporary Accounting Research 20 (3): 551 – 578.

Sadka, R. and A. Scherbina, 2007, Analyst disagreement, mispricing and liquidity, Journal of Finance, 62(5), 2367-2403.

Sayrak, A. and N. Dhiensiri, 2003, The value effects of analysts' coverage initiations, Working Paper, Sabanci University and University of Pittsburgh.

Simpson, A., 2010, Analyst's use of non-financial information disclosures, Contemporary Accounting Research, Forthcoming.

Singapore Stock Exchange, 2003, SGX and MAS to Introduce Research Incentive Scheme, SGX News Release, 29 September.

Singapore Stock Exchange, 2004, SGX to Launch Phase Two if Research Incentive Scheme, SGX News Release, 24 September.

Singapore Stock Exchange, 2006, SGX-MAS Research Incentive Scheme Extended, SGX News Release, 25 January.

Shores, D., 1990, 'The Association between interim information and security returns surrounding earnings announcements', *Journal of Accounting Research*, 28(1): 164-181.

Stoughton, N.M., K.P.Wong and J.Zechner, 2001, IPOs and product quality, *Journal of Business* 74(3): 375-408.

Weild, D., and E. Kim, 2009, Market structure is causing the IPO crises, Capital Market Series. Grant Thornton Publication.

Yu, F. 2008. Analyst coverage and earnings management. Journal of Financial Economics 88 (2), 245-271.

Appendix A

Operational details of the SGX Research Incentive Scheme

This exhibit lists the main operational features of the Scheme extracted from the original press release in 2003 (Singapore Stock Exchange, 2003).

Eligibility

The Scheme is open to the following, subject to the approval of SGX and MAS: -

· All companies listed on the SGX Mainboard and SGX Sesdaq (now SGX CATALIST); and

· All research firms that are licensed or exempted from licensing under the Financial Advisers Act (FAA) with an established track record in issuing or promulgating analyses or reports concerning securities. The research team should comprise of at least 3 analysts, with at least 3 years of relevant experience each.

Frequency of Reports from Research Firms

Research firms are required to produce a minimum of one initiation of coverage report within five months (later extended to six) of being allocated an SGX company. While the frequency of reports is flexible taking into account developments and events that would affect a company, the Scheme sets a minimum as follows: In any one year, research firms are required to produce two 'coverage of results' reports (corresponding to the half-year and full-year result announcements by the company) and two update reports, to be issued at any time.

Content of Reports from Research Firms

While each research firm would have its own style of presentation the Scheme does require the quality of reports be of a similar standard to those issued voluntarily by the research firms. At a minimum, the reports are required to cover the following content:

At initiation of coverage

- Company background
- Identification and discussion of risks
- Analysis of recent financials
- Peer group analysis
- Valuation
- Recommendation

Coverage of Results

- Analysis of result and analyst's view of outlook
- Valuation
- Recommendation

Update reports

- Description of trigger event(s) for the update
- Analysis of the impact of such event(s) against the company's outlook
- Valuation
- Recommendation

Appendix B

Heckman Procedure: estimation of stage one probit regressions

In a first stage probit regression, we estimate the probability of a firm joining the scheme using a pooled sample of both SGX sponsored firms and not-followed firms over the period from 2004 to 2007. We employ explanatory variables previously found to be influential in the choice of analysts to follow a firm voluntarily. In other words we assume that the firms that elect to enter the SGX scheme are closer in characteristics to firms that might be voluntarily followed, than to those which do not elect to join the Scheme. Prior research on analyst coverage finds that analysts' decisions to voluntarily cover a firm are at least partly based on the balance of benefits and costs of initiating coverage (e.g., O'Brien and Bhushan, 1990). Because trading commission is an important source of revenue for brokers and analysts, analysts are more likely to cover firms that potentially can generate more trading commission. We argue that firms with large size, high trading volume, and high market-to-book ratio (glamour stocks) are more likely to receive voluntary analyst coverage since these firms tend to have higher investor interest and higher trading activities. Bhusan (1989) argues that analysts are more likely to cover firms which have returns that are highly correlated with market returns because the cost to acquire information for these firms is lower. Thus, we include these characteristics in our probit model in Panel A of Table A1, to estimate the probability of a firm entering the SGX sponsored research sample. The results from the probit model reported in Panel A of Table A1 show that, relative to not-followed firms, SGX sponsored firms tend to have larger firm size, higher trading volume, higher r-squares from the market model and lower stock return volatility. Pursuant to the first stage regression, we compute the inverse Mills ratios separately for sponsored and not-followed firms and include them as independent variables in the main regressions. We follow a similar process to estimate inverse Mills ratios (IMR) for sponsored firms and voluntarily followed firms using the probit model reported in Panel B of Table A1. We find that, relative to voluntarily firms, SGX sponsored firms tend to have smaller size, lower market-to-book ratio, lower trading volume, and lower volatility in monthly returns. These results are largely consistent with findings in prior studies.

Table A1: Self-selection models

Panel A: Self-Selection Model of SGX Sponsored Firms and Not-Followed Firms

This table reports the results from a probit model where the dependent variable is an indicator variable equal to one for firms sponsored by SGX and zero otherwise. The sample consists of SGX sponsored firms and firms that are not followed by financial analysts over the period from 2004 to 2007. SIZE is the natural log of total assets (in thousands of dollars). MB is the market-to-book ratio. VOLUME is the natural log of the total trading volume in the previous year. VOLATILITY is the standard deviation of monthly stock returns in the previous year. RSQ is the r-squared from the market model estimated from the daily returns in the previous year. *, **, and *** indicates the coefficient is statistically significant at 10%, 5% and 1% level, respectively.

	Coefficient	Chi Square	Pr > ChiSq
SIZE	0.121***	7.93	0.005
MB	-0.017	0.25	0.616
VOLUME	0.098***	9.90	0.002
VOLATILITY	-3.688***	20.87	<.0001
RSQ	2.319**	6.40	0.011
YEAR FIXED EFFECTS	Yes		
Sponsored Firm-years		252	
Not Followed Firm-years		671	
Log Likelihood		-483.508	

Panel B: Self-Selection Model of SGX Sponsored Firms and Voluntarily-Followed Firms

This table reports the results from a probit model where the dependent variable is an indicator variable equal to one for firms sponsored by SGX and zero otherwise. The sample consists of SGX sponsored firms and firms that are voluntarily followed by financial analysts over the period from 2004 to 2007. SIZE is the natural log of total assets (in thousands of dollars). MB is the market-to-book ratio. VOLUME is the natural log of the total trading volume in the previous year. VOLATILITY is the standard deviation of monthly stock returns in the previous year. RSQ is the r-squared from the market model estimated from the daily returns in the previous year. *, **, and *** indicates the coefficient is statistically significant at 10%, 5% and 1% level, respectively.

	Coefficient	Chi Square	Pr > ChiSq
SIZE	-0.339***	52.54	<.0001
MB	-0.407***	32.89	<.0001
VOLUME	-0.067	2.13	0.144
VOLATILITY	-1.903***	4.04	0.044
RSQ	-0.680	0.57	0.450
YEAR FIXED EFFECTS	Yes		
Sponsored Firm-years		252	
Voluntarily Followed Firm-years		419	
Log Likelihood		-357.726	

Table 1

Summary Statistics for SGX Sponsored Analyst Reports

This table provides frequency distributions on various aspects of the firms participating in the sponsored analyst scheme introduced by the Singapore Stock Exchange.

A. Sample Distribution

Year	*Number of Reports*	*Number of Firms*	*Number of Brokers*	*Number of Forecasts*	*% of reports with forecasts*	*Number of Pages*
2004	497	61	9	479	0.96	5.45
2005	827	95	12	791	0.96	4.95
2006	991	154	13	973	0.98	6.13
2007	840	150	12	819	0.98	5.18
Total	3155	154	13	3062	0.97	5.46

B. Number of research firms per sponsored compa□ompany

Scheme	N	Mean	Min	5th Pct	Median	95th Pct	Max
1	95	2.01	2	2	2	2	3
2	154	2.21	1	2	2	3	5
- 2 (continuing from Scheme 1)	95	2.31	1	2	2	3	5
- 2 (new entrants to Scheme 2)	59	2.07	1	2	2	2	3

C. Number of reports each sponsored firm received within two years of entering the Scheme

Scheme	N	Mean	Min	5th Pct	Median	95th Pct	Max
1	95	13.94	5	9	15	18	28
2	154	11.89	1	8	11	15	30
- 2 (continuing from Scheme 1)	95	12.40	3	9	12	15	30
- 2 (new entrants to Scheme 2)	59	11.07	1	8	10	14	23

D. Research firms participating in the SGX Scheme

Broker Code	Broker Name	Number of firms	Number of reports	Average number of pages per report
BNP	BNP Paribas Peregrine Securites	6	48	4.04
CIMB	CIMB-GK Research	14	125	4.50
CLSA	CLSA (Singapore)	30	233	2.76
DBS	DBS Vickers Research	51	539	4.75
DMG	DMG & Partners Securities	19	225	7.26
KIM ENG	Kim Eng Research	22	250	4.78
NRA	NRA Capital	45	350	4.60
OCBC	OCBC Investment Research	38	487	6.65
PHILLIP	Phillip Securities Research	40	355	5.89
SIAS	SIAS Research	33	153	7.18
SP	Standard & Poor's	13	48	3.63
UOB	UOB Kay Hian Research	35	193	6.87
WESTCOMB	Westcomb Securities	24	148	5.99

Table 2
Sample Selection and Summary Statistics of Analyst Forecasts

A. Sample Selection Procedure

	Number of observations	Number of firms
SGX sponsored forecasts	3,062	154
One-year ahead earnings forecasts from IBES not sponsored by SGX	8790	259
Total forecasts	11,852	413
Matched with DataStream	8,560	225
Final sample after eliminate extreme values of forecast errors	8,352	225

B. Sample Distribution

	Sponsored		Voluntarily Followed	
	No. of forecasts	No. of firms	No. of forecasts	No. of firms
2004	241	43	2,230	119
2005	475	59	1,630	115
2006	480	73	1,414	95
2007	454	72	1,428	89

C. Sample distribution by industry

	Sponsored		Voluntarily Followed	
Industry	Forecasts	Firms	Forecasts	Firms
Oil & Gas	22	1	144	4
Basic Materials	53	3	48	3
Industrials	682	34	1,770	67
Consumer Goods	347	14	197	16
Health Care	33	1	125	4
Consumer Services	114	8	1,128	21
Telecommunications	0	0	331	2
Utilities	0	0	85	2
Financials	147	5	2,740	27
Technology	225	10	161	16

Table 3
Comparison of Forecast Errors

This table reports descriptive statistics for a sample of 1,650 forecasts made for firms sponsored by SGX and 6,702 forecasts issued voluntarily by analysts for Singapore firms over the period from 2004 to 2007. FE is the forecast error, computed as (forecast earnings – actual earnings)/stock price at the beginning of the year. ABSFE is the absolute value of FE. HORIZON is the number of days between forecasts and earnings announcement dates, scaled by 365. SIZE is the natural log of total assets (in thousands of dollars). MB is the market-to-book ratio. LOSS is a dummy variable equal to 1 if the firm reports negative operating earnings. ANALYSTS is the number of analysts issuing forecasts for the firms. LEV is the ratio of total liabilities to total assets. EPS is the earnings per share. VOLATILITY is the standard deviation of monthly stock returns in the previous year. RSQ is the r-squares from the market model estimated from the daily returns in the previous year. Two tailed p-value (in parentheses) for the test of difference in mean is based on a t-test with standard errors adjusted for firm clustering effect, while two-tailed p-value (in parentheses) for the test of difference in median is based on median scores.

	Sponsored (N = 1,650)			Voluntarily Followed (N = 6,702)			Difference		Difference	
	Mean	Std Dev	Median	Mean	Std Dev	Median	in Mean	(p-value)	in Median	(p-value)
SIZE	12.425	1.126	12.372	15.317	2.170	14.927	-2.891	(<0.001)	-2.555	(<0.001)
MB	1.223	0.729	1.021	2.124	1.959	1.473	-0.901	(0.007)	-0.452	(<0.001)
LOSS	0.030	0.171	0.000	0.014	0.117	0.000	0.016	(0.435)	0.000	(<0.001)
ANALYSTS	2.059	0.393	2.000	13.080	6.414	14.000	-11.021	(<0.001)	-12.000	(<0.001)
LEV	0.460	0.170	0.468	0.533	0.218	0.493	-0.073	(0.093)	-0.025	(<0.001)
EPS	0.072	0.104	0.046	0.415	0.466	0.190	-0.342	(<0.001)	-0.144	(<0.001)
VOLATILITY	0.090	0.057	0.075	0.072	0.044	0.063	0.018	(0.026)	0.012	(<0.001)
FE	0.002	0.060	0.004	-0.006	0.042	-0.002	0.008	(0.182)	0.006	(<0.001)
ABSFE	0.041	0.044	0.025	0.022	0.036	0.009	0.019	(<0.001)	0.016	(<0.001)
HORIZON	0.428	0.284	0.395	0.450	0.287	0.427	-0.021	(0.070)	-0.033	(<0.001)

Table 4
Regression of analyst forecast errors on sponsored versus voluntary coverage.

This table reports results from year-fixed effect regressions of analyst forecast errors on the variable SPONSOR which indicates whether a firm has exchange sponsored analyst coverage. The other independent variables are a set of controls previously shown to be associated with the accuracy of analyst forecasts. The sample consists of all forecasts made for sponsored as well as voluntarily followed firms during the period from 2004 to 2007, inclusive. FE is the forecast error, computed as (forecast earnings – actual earnings)/stock price at the beginning of the year. ABSFE is the absolute value of FE. SPONSOR is a dummy variable taking value of 1 if the forecast is made for a firm sponsored by SGX, and 0 otherwise. SIZE is the natural log of total assets (in thousands of dollars). LOSS is a dummy variable equal to 1 if the firm reports negative operating earnings. HORIZON is the number of days between forecasts and earnings announcement dates, scaled by 365. ANALYSTS is the number of analysts issuing forecasts for the firms. LEV is the ratio of total liabilities to total assets. EPS is the earnings per share. ECHG is the absolute value of earnings change deflated by total assets. IMR(SF) and IMR (VF) are the inverse Mills ratios, derived from a probit model estimated across sponsored firms (SF) and voluntarily followed firms (VF), respectively (as described in Appendix B). Panel A uses all analysts forecasts, while Panel B includes only the last forecast made for a firm prior to its annual earnings announcement. We use Rogers (1993) standard errors to calculate t-statistics, which control for firm cluster effects. *, **, and *** indicates that the coefficient is statistically significant at 10%, 5% and 1% level, respectively.

Panel A: Analysis of forecast errors using all available forecasts

		FE		ABSFE	
	Expected sign?	Coefficient	t-stat	Coefficient	t-stat
SPONSOR		0.007	0.67	0.028***	3.52
SIZE		-0.005**	-2.10	0.005**	2.24
LOSS		0.090***	5.27	0.060***	5.59
HORIZON		-0.004	-1.24	0.012***	4.46
ANALYSTS		0.002***	3.32	-0.002***	-3.57
LEV		0.042***	2.82	-0.013	-1.08
EPS		-0.029***	-2.61	0.018	1.59
ECHG		-0.094**	-2.23	0.092*	1.89
IMR(SF)		0.001	0.04	-0.012*	-1.73
IMR(VF)		-0.002	-0.19	-0.026***	-2.73
YEAR FIXED EFFECT		Yes		Yes	
N		8,352		8,352	
Adj R^2		21.33%		23.80%	

Panel B: Analysis of forecast errors using only the latest forecasts prior to earnings announcements

	FE		ABSFE	
	Coefficient	t-stat	Coefficient	t-stat
SPONSOR	-0.010	-0.92	0.042***	4.89
SIZE	-0.006***	-2.67	0.005**	2.43
LOSS	0.054***	3.25	0.049***	4.06
HORIZON	0.018*	1.72	0.015*	1.90
ANALYSTS	0.002***	2.83	-0.002**	-2.23
LEV	0.032***	2.60	0.013	1.16
EPS	-0.045***	-2.77	0.035**	2.28
ECHG	-0.083***	-3.10	0.102***	3.15

IMR(SF)		0.013	1.58	-0.022***	-3.69
IMR(NF)		0.006	0.51	-0.034***	-4.04
YEAR EFFECT	FIXED	Yes		Yes	
N		689		689	
Adj R^2		18.83%		21.51%	

Table 5
Market Reaction to Forecast Revisions

This table reports results from year-fixed effect regressions of market reactions to revisions in analyst forecasts. The sample consists of forecast revisions for SGX sponsored and voluntarily followed firms listed in Singapore during the period from 2004 to 2007, inclusive. CAR is the cumulative abnormal returns in the three-day (-1, 1) window around the forecast revisions, where abnormal return is computed using the market model estimated with daily stock and market returns in the (-100, -10) window prior to the forecast revision. ABS_CAR is the absolute value of CAR. ABVOL is the cumulative abnormal trading volume in the (-1, 1) window, while abnormal volume is computed as the difference between the share volume minus the mean daily volume in the (-100, -10) window prior to the forecast, scaled by the mean daily volume. SPONSOR is a dummy variable taking a value of 1 if the forecast is made for a firm sponsored by SGX, and 0 otherwise. REV is the difference between the new forecast and the previous one issued by the same analyst for the same firm, scaled by the stock price at the beginning of the year. ABSREV is the absolute value of REV. SIZE is the natural log of total assets (in thousands of dollars). MB is the market-to-book ratio. VOLUME is the natural log of the total trading volume in the previous year. VOLATILITY is the standard deviation of monthly stock returns in the previous year. RSQ is the r-squares from the market model estimated from the daily returns in the previous year. ANALYSTS is the number of analysts issuing forecasts for the firms. DOWN is an indicator variable equal to 1 if the forecast is a downward revision. IMR(SF) and IMR (VF) are the inverse Mills ratios, derived from a probit model estimated across sponsored firms (SF) and voluntarily followed firms (VF), respectively (as described in Appendix B). We use Rogers (1993) standard errors to calculate t-statistics, which control for firm cluster effects. *, **, and *** indicates that the coefficient is statistically significant at 10%, 5% and 1% level, respectively.

	CAR		ABS_CAR		ABVOL	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
REV	0.181**	2.23				
REV*SPONSOR	0.024	0.21				
ABSREV			0.151**	2.09	17.744**	2.12
ABSREV*SPONSOR			0.050	0.49	-7.485	-0.69
SPONSOR	0.020	1.48	0.027**	2.04	2.696**	2.54
SIZE	-0.001	-1.17	-0.004**	-2.54	-0.081	-0.78
MB	-0.001	-0.63	0.002	1.11	0.161**	2.30
VOLATIITY	0.002	0.07	0.118***	3.10	3.427	1.37
VOLUME	0.000	-0.43	0.001	1.01	-0.040	-0.39
ANALYSTS	0.000	1.06	0.000	0.21	0.006	0.18
DOWN	-0.006***	-2.95	0.002	1.33	0.052	0.35
RSQ	0.016	1.57	0.002	0.25	0.660	0.84
IMR(SF)	-0.010	-1.26	-0.015**	-2.12	-1.354**	-2.18
IMR(VF)	-0.002	-0.15	-0.016	-1.29	-0.454	-0.4
YEAR FIXED EFFECT	Yes		Yes		Yes	
N	5,580		5,580		5,550	
Adj R^2	2.85%		14.98%		4.07%	

Table 6
Market Reaction to Earnings Announcements

This table reports market reaction to earnings announcements. The sample in Panel A consists of earnings announcements of SGX sponsored firms and firms that were not followed by financial analysts over the period from 2004 to 2007, inclusive. In Panel B, SGX sponsored firms are matched with firms not followed by analysts by firm size in the year when the sponsored firm received SGX sponsorship. The sample in Panel B contains earnings announcements for SGX sponsored firms and not-followed firms over the period from 2002 to 2007, inclusive. ABS_CAR is the absolute value of cumulative abnormal returns in the three-day (-1, 1) window around the earnings announcement, while abnormal returns is computed using the market model estimated form daily stock and market returns in the (-100, -10) window prior to the announcement of annual earnings. ABVOL is the cumulative abnormal trading volume in the (-1, 1) window, while abnormal volume is computed as the difference between the share volume minus the mean daily volume in the (-100, -10) window prior to the earnings announcement divided by the mean daily volume. SPONSOR and NOCOVER are indicator variables for SGX sponsored firms and not-followed firms, respectively. SIZE is the natural log of total assets (in thousands of dollars). MB is the market-to-book ratio. LEV is the ratio of total liabilities to total assets. VOLATILITY is the standard deviation of daily stock returns in the previous year. LOSS is a dummy variable equal to 1 if the firm reports negative earnings. IMR(SF) and IMR(NF) are the inverse Mills ratios, derived from a probit model estimated across sponsored firms (SF) and not-followed firms (NF), respectively (as described in Appendix B). POST is a dummy variable equal to one if the earnings announcement is made after the firm received SGX sponsorship, and zero otherwise. We use Rogers (1993) standard errors to calculate t-statistics, which control for firm cluster effect. *, **, and *** indicates that the coefficient is statistically significant at 10%, 5% and 1% level, respectively.

Panel A: Heckman Procedure

	ABS_CAR		ABVOL	
	Coefficient	t-stat	Coefficient	t-stat
SPONSOR	-0.163***	-2.60	7.112***	2.57
SIZE	-0.026***	-3.64	-0.566**	-2.22
MB	-0.001	-0.31	-0.053	-1.42
LOSS	0.042**	2.27	-1.799***	-3.67
LEV	0.028	0.80	0.689	0.63
VOLATILITY	0.016***	3.75	-0.132	-1.06
IMR(SF)	0.062**	2.05	-2.286	-1.21
IMR(NF)	0.178***	2.78	-3.811*	-1.93
YEAR FIXED EFFECT	Yes		Yes	
N	861		840	
Adj R^2	18.91%		6.45%	

Panel B: Difference-in-Difference procedure

	ABS_CAR		ABVOL	
	Coefficient	t-stat	Coefficient	t-stat
SPONSOR	0.012	0.82	0.002	0.00
SPONSOR * POST	-0.030**	-2.34	2.374***	3.03
NOCOVER * POST	-0.002	-0.17	0.325	0.34
SIZE	-0.033***	-6.52	-0.097	-0.53
MB	0.000	0.00	-0.007	-0.09
LOSS	0.045***	3.31	-1.253**	-2.14
LEV	0.065*	1.93	0.779	0.63
VOLATILITY	0.007***	2.73	-0.037	-0.28
YEAR FIXED EFFECT	Yes		Yes	
N	790		762	
Adj R^2	18.87%		4.45%	
	F-value	p-value	F-value	p-value
SPONSOR * POST = NOCOVER * POST	4.67	0.031	4.71	0.030

Table 7
Analysis of the Timeliness of Earnings

This table reports from regressions of the timeliness of earnings. The sample in Panel A consists of SGX sponsored firms and firms that were not followed by financial analysts over the period from 2004 to 2007, inclusive. In Panel B, SGX sponsored firms are matched with firms not followed by analysts by firm size in the year when the sponsored firm received SGX sponsorship. We then analyze the timeliness of earnings for SGX sponsored firms and not-followed firms over the period from 2002 to 2007, inclusive. We measure the timeliness of earnings as $\sum_{m=1}^{11}(BH_m / BH_{12}) + 0.5$ where BH_m is the buy-and-hold return from the beginning of the year to the end of month m. SPONSOR and NOCOVER are indicator variables for SGX sponsored firms and not-followed firms, respectively. SIZE is the natural log of total assets (in thousand of dollars). MB is the market-to-book ratio. LEV is the ratio of total liabilities to total assets. VOLATILITY is the standard deviation of monthly stock returns in the previous year. LOSS is a dummy variable equal to 1 if the firm reports negative earnings. IMR(SF) and IMR(NF) are the inverse Mills ratios, derived from a probit model estimated across sponsored firms (SF) and not-followed firms (NF), respectively (as described in Appendix B). POST is a dummy variable equal to one if the earnings announcement is made after the firm received SGX sponsorship, and zero otherwise. We use Rogers (1993) standard errors to calculate t-statistics, which control for firm cluster effect. *, **, and *** indicates that the coefficient is statistically significant at 10%, 5% and 1% level, respectively.

Panel A: Heckman Procedure

	Coefficient	t-stat
SPONSOR	189.243**	2.12
SIZE	4.615	0.48
MB	-3.076	-1.21
LEV	-59.479	-1.53
LOSS	-94.110***	-4.58
VOLATILITY	-10.785**	-2.35
IMR(SF)	-98.631*	-1.78
IMR(NF)	-51.702	-0.71
YEAR FIXED EFFECT	Yes	
N	896	
Adj R^2	23.83%	

Panel B: Difference-in-Difference procedure

	Coefficient	t-stat
SPONSOR	-20.674	-0.96
SPONSOR * POST	51.690**	1.98
NOCOVER * POST	-10.457	-0.45
SIZE	23.586***	3.73
MB	-3.860	-1.25
LOSS	-114.759***	-5.17
LEV	-62.558*	-1.67
VOLATILITY	-16.589***	-3.89
YEAR FIXED EFFECT	Yes	
N	840	
Adj R^2	10.90%	
	F-value	p-value
SPONSOR * POST = NOCOVER * POST	5.3	0.022

Table 8
Analysis of Stock Price Synchronicity

This table presents results from regressions of stock price synchronicity. The sample in Panel A consists of SGX sponsored firms and firms that were not followed by financial analysts over the period from 2004 to 2007, inclusive. In Panel B, SGX sponsored firms are matched with firms not followed by analysts by firm size in the year when the sponsored firm received SGX sponsorship. We then analyze stock price synchronicity for SGX sponsored firms and not-followed firms over the period from 2002 to 2007, inclusive. Stock price synchronicity is defined as $R^2/(1-R^2)$, where R^2 is the r-squares from the market model estimated using weekly stock and market returns. SPONSOR and NOCOVER are indicator variables for SGX sponsored firms and not-followed firms, respectively. SIZE is the natural log of total assets (in thousands of dollars). MB is the market-to-book ratio. VOLUME is the natural log the trading volume in the previous year. LEV is the ratio of total liabilities to total assets. ROE is the net income divided by common shareholder's equity. SKEW and KURT are the skewness and kurtosis of weekly returns in the previous year. IMR(SF) and IMR(NF) are the inverse Mills ratios, derived from a probit model estimated across sponsored firms (SF) and not-followed firms (NF), respectively (as described in Appendix B). POST is a dummy variable equal to one for firm years after the firm received SGX sponsorship, and zero otherwise. We use Rogers (1993) standard errors to calculate t-statistics, which control for firm cluster effect. *, **, and *** indicates the coefficient is statistically significant at 10%, 5% and 1% level.

Panel A: Heckman Procedure

	Coefficient	t-stat
SPONSOR	0.267***	5.10
SIZE	0.014***	2.87
MB	0.003**	2.56
VOLUME	0.009***	4.22
LEV	-0.012	-0.79
ROE	0.002	0.86
SKEW	-0.006**	-2.05
KURT	-0.002**	-2.25
IMR(SF)	-0.151***	-3.90
IMR(NF)	-0.116***	-2.88
YEAR FIXED EFFECTS	Yes	
N	915	
Adj R^2	36.37%	

Table 8 (contd)

Panel B: Difference-in-Difference procedure

	Coefficient	t-stat
SPONSOR	-0.034	-0.94
SPONSOR * POST	-0.041**	-2.04
NOCOVER * POST	-0.100***	-3.11
SIZE	0.027***	3.15
MB	0.005	0.93
VOLUME	0.034***	4.07
LEV	-0.002	-0.08
ROE	-0.009	-0.86
SKEW	0.005	0.77
KURT	-0.002	-1.32
YEAR FIXED EFFECTS	Yes	
N	840	
Adj R^2	25.20%	
	F-value	p-value
SPONSOR * POST = NOCOVER * POST	6.93	0.008

Table 9
Analysis of Media Coverage

This table presents results from regressions of media coverage defined as the number of media mentions of the firm. The sample in Panel A consists of SGX sponsored firms and firms that were not followed by financial analysts over the period from 2004 to 2007, inclusive. In Panel B, SGX sponsored firms are matched with firms not followed by analysts by firm size in the year when the sponsored firm received SGX sponsorship. We then analyze media coverage for SGX sponsored firms and not-followed firms over the period from 2003 to 2007, inclusive. SPONSOR and NOCOVER are indicator variables for SGX sponsored firms and not-followed firms, respectively. SIZE is the natural log of total assets (in thousands of dollars). MB is the market-to-book ratio. VOLATILITY is the standard deviation of monthly stock returns in the previous year. ABSRET is the absolute value of stock returns in the previous year. IMR(SF) and IMR(NF) are the inverse Mills ratios, derived from a probit model estimated across sponsored firms (SF) and not-followed firms (NF), respectively (as described in Appendix B). POST is a dummy variable equal to one for firm years after the firm received SGX sponsorship, and zero otherwise. We use Rogers (1993) standard errors to calculate t-statistics, which control for firm cluster effect. *, **, and *** indicates the coefficient is statistically significant at 10%, 5% and 1% level.

Panel A: Heckman Procedure

	Coefficient	t-stat
SPONSOR	19.616**	2.41
SIZE	12.237*	1.74
MB	2.115**	2.17
VOLATILITY	-12.312	-0.52
ABSRET	1.042	0.49
IMR(SF)	-17.885	-1.05
IMR(NF)	31.197	0.80
YEAR FIXED EFFECT	Yes	
N	664	
Adj R^2	14.24%	

Panel B: Difference-in-Difference procedure

Parameter	Coefficient	t-stat
SPONSOR	2.797	0.56
SPONSOR * POST	11.262**	2.26
NOCOVER * POST	-1.824	-0.56
SIZE	11.395*	1.82
MB	2.276**	2.10
VOLATILITY	22.121	0.78
ABSRET	-0.489	-0.65
YEAR FIXED EFFECT	Yes	
N	870	
Adj R^2	12.79%	
	F-value	p-value
SPONSOR * POST = NOCOVER * POST	10.94	0.001

Table 10
Analysis of price efficiency

This table presents results from regressions of measures of stock price efficiency. The sample in Panel A consists of SGX sponsored firms and firms that were not followed by financial analysts over the period from 2004 to 2007, inclusive. In Panel B, SGX sponsored firms are matched with firms not followed by analysts by firm size in the year when the sponsored firm received SGX sponsorship. We then analyze the measures of stock price efficiency for SGX sponsored firms and not-followed firms over the period from 2002 to 2007, inclusive. |AR1| is the absolute value of first-order auto-correlation coefficient of daily stock returns. VR(n,m) is the variance ratio of m-day return variance (deflated by m) to n-day return variance (deflated by n). SPONSOR and NOCOVER are indicator variables for SGX sponsored firms and not-followed firms, respectively. SIZE is the natural log of total assets (in thousands of dollars). PRICE is the natural log of stock price at the beginning of the year. SPREAD is the average bid-ask spread in the previous year. IMR(SF) and IMR(NF) are the inverse Mills ratios, derived from a probit model estimated across sponsored firms (SF) and not-followed firms (NF), respectively (as described in Appendix B). POST is a dummy variable equal to one for firm years after the firm received SGX sponsorship, and zero otherwise. We use Rogers (1993) standard errors to calculate t-statistics, which control for firm cluster effect. *, **, and *** indicates the coefficient is statistically significant at 10%, 5% and 1% level, respectively.

Panel A: Heckman Procedure

	|AR1|		|1 – VR(1,5)|		|1 – VR(1,10)|		|1 – VR(5,10)|	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
SPONSOR	-0.144***	-3.42	-0.760***	-3.47	-1.269***	-3.16	-0.206***	-3.08
SIZE	-0.001	-0.12	-0.002	-0.06	-0.030	-0.47	-0.010	-1.32
PRICE	-0.030***	-5.30	-0.067**	-2.12	-0.022	-0.36	0.018*	1.70
SPREAD	0.523***	3.75	6.158***	7.76	13.334***	8.94	1.680***	6.06
IMR(SF)	0.076***	2.77	0.375**	2.30	0.704**	2.43	0.136***	3.03
IMR(NF)	0.060*	1.65	0.458**	2.28	0.650*	1.70	0.084	1.42
YEAR FIXED EFFECT	Yes		Yes		Yes		Yes	
N	899		899		899		899	
Adj R^2	33.27%		37.32%		37.01%		23.83%	

Panel B: Difference-in-Difference procedure

	|AR1|		|1 – VR(1,5)|		|1 – VR(1,10)|		|1 – VR(5,10)|	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
SPONSOR	-0.033**	-2.28	-0.140*	-1.88	-0.215	-1.63	-0.030	-1.25
SPONSOR * POST	-0.021	-1.18	-0.126	-1.18	-0.206	-1.04	0.008	0.28
NOCOVER * POST	-0.025	-1.22	-0.164	-1.38	-0.323	-1.39	-0.036	-1.12
SIZE	-0.007	-1.33	-0.042	-1.54	-0.082	-1.53	-0.017	-1.64
PRICE	-0.040***	-5.16	-0.163***	-5.09	-0.192***	-3.86	0.012	0.87
SPREAD	0.494***	3.02	5.452***	6.28	12.044***	6.69	2.036***	3.87
YEAR FIXED EFFECT	Yes		Yes		Yes		Yes	
N	846		846		846		846	
Adj R^2	35.99%		45.37%		47.53%		30.80%	
	F-value	p-value	F-value	p-value	F-value	p-value	F-value	p-value
SPONSOR * POST = NOCOVER * POST	0.07	0.784	0.2	0.656	0.56	0.453	2.19	0.139

Table 11
Analysis of Liquidity Measures

This table presents results from regressions of stock liquidity. The sample in Panel A consists of SGX sponsored firms and firms that were not followed by financial analysts over the period from 2004 to 2007, inclusive. In Panel B, SGX sponsored firms are matched with firms not followed by analysts by firm size in the year when the sponsored firm received SGX sponsorship. We then analyze stock liquidity for SGX sponsored firms and not-followed firms over the period from 2002 to 2007, inclusive. SPREAD is the average quoted spread scaled by the mid-point of the bid and ask prices. DEPTH is the natural log of the daily average dollar value of shares available to trade at the best bid and ask prices over the year. VOLUME is the natural log of the average daily value of shares traded. AMIHUDPI is the measure of price impact of trades, calculated as the absolute daily return divided by daily share volume, multiplied by 1,000,000, and then averaged over the year. SPONSOR and NOCOVER are indicator variables for SGX sponsored firms and not-followed firms, respectively. SIZE is the natural log of total assets (in thousands of dollars). PRICE is the natural log of average stock price over the year. VOLATILITY is the standard deviation of monthly stock returns in the previous year. IMR(SF) and IMR(NF) are the inverse Mills ratios, derived from a probit model estimated across sponsored firms (SF) and not-followed firms (NF), respectively (as described in Appendix B). POST is a dummy variable equal to one for firm years after the firm received SGX sponsorship, and zero otherwise. We use Rogers (1993) standard errors to calculate t-statistics, which control for firm cluster effect. *, **, and *** indicates the coefficient is statistically significant at 10%, 5% and 1% level, respectively.

Panel A: Heckman Procedure

	SPREAD		DEPTH		VOLUME		AMIHUDP1	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
SPONSOR	-0.239***	-4.17	2.943***	5.64	5.828***	7.83	-4.212**	-2.23
SIZE	-0.017**	-2.09	0.601***	6.84	0.324***	2.99	-0.714**	-2.35
PRICE	-0.013*	-1.85	-0.410***	-5.24	0.201***	2.64	0.206	0.95
VOLATILITY	-0.152	-1.29	5.844***	7.10	9.890***	7.53	-1.715	-0.47
IMR(SF)	0.088***	2.76	-1.586***	-5.16	-2.873***	-6.56	0.571	0.53
IMR(NF)	0.229***	4.61	-2.189***	-5.11	-4.593***	-7.94	5.906***	3.80
YEAR FIXED EFFECT	yes		Yes		Yes		Yes	
N	675		675		775		775	
Adj R^2	37.88%		51.59%		56.86%		24.29%	

Table 11 (contd)

Panel B: Difference-in-Difference procedure

	SPREAD		DEPTH		VOLUME		AMIHUDP1	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
SPONSOR	-0.027**	-2.34	0.325*	1.71	0.558**	2.37	-1.053	-1.61
SPONSOR * POST	0.017	1.26	-0.137	-0.73	-0.407	-1.62	0.539	0.83
NOCOVER * POST	0.025*	1.78	0.002	0.01	-0.335	-1.46	0.600	0.96
SIZE	-0.038***	-5.23	0.761***	7.49	0.772***	5.78	-0.984***	-3.83
PRICE	-0.022**	-2.30	-0.255**	-1.98	0.315**	2.06	-0.042	-0.17
VOLATILITY	-0.001	0.01	2.799***	2.84	5.783***	4.59	3.247	1.18
YEAR FIXED EFFECT	Yes		Yes		Yes		Yes	
N	514		514		562		562	
Adj R^2	37.89%		40.63%		47.13%		15.89%	
	F-value	p-value	F-value	p-value	F-value	p-value	F-value	p-value
SPONSOR * POST = NOCOVER * POST	0.25	0.617	0.66	0.417	0.10	0.751	0.01	0.921