THE INTRA BUSINESS GROUP EFFECTS OF INNOVATION ANNOUNCEMENTS

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ABSTRACT

This research attempts to extend the discussion of how ownership and control structures affect the shareholder wealth of member firms based on the innovation announcements of one member, using a Taiwanese sample. We combine research on stock market microstructure with more recent studies that adopt the resource-based view and agency perspectives, and argue that pyramidal ownership structure and family control increases the risk of expropriation. We find that the focal firms experience significantly positive stock market reactions to innovation announcements, and that the other member firms in the business group also experience, on average, positive abnormal returns.

Keywords: Business group, Abnormal return, Innovation

INTRODUCTION

Diversified business groups that consist of networks of legally independent firms have been very important in the development of many emerging economies (Dyer & Singh, 1998; Khanna & Palepu, 2000). Business groups are based on interfirm ties, by either, formal

ownership or informal social relations, with the individual components working together to take coordinated actions (Khanna & Rivkin, 2001). Most prior studies on business groups investigate the effects of various network relationships on the financial performance of the member firms as a whole, with the results generally showing the benefits of group membership (Guillén, 2000; Khanna & Palepu, 2000; Khanna & Rivkin, 2001). However, a deeper analysis is still needed to better understand the channels through which interfirm networks affect member firms. Therefore, the current study extends this line of research by examining the effects that membership of a business group has on the level of innovation achieved by member firms. Previous studies show that firms with the ability to carry out innovations are more likely to develop competitive advantages and thus future earnings growth (Chaney, Devinney, & Winer, 1991). In this paper, we examine this issue from both the group and member firm levels, and investigate the impacts of group membership on stock prices of member firms to the innovation announcements of other members of the group.

The ownership structure of a business group may influence innovation in several different ways. A concentrated ownership structure creates tight connections among members, in which member firms have high levels of trust and low levels of competition with each other, and this structure has a strong influence on firm-level decision making (Almeida & Wolfenzon, 2006). In a business group, since the wealth of key owners' is largely tied to the value of all the member firms, the main shareholders are likely to push managers to pursue to maximize the interests of the business group as a whole, so that the resources within it are fully shared among member firms (Tsai, 2001). In addition, because obtaining and maintaining competitive advantages is critical for success in a fast-changing market (Sheth & Parvatiyar, 1992), the main shareholders of business groups are more likely to adopt a long-term view of investment decisions. Consequently, business groups are more likely to engage in investment decisions that aim to develop value-creating innovations, and the related innovation announcements may receive more favorable market reactions.

However, a number of studies have pointed out that business groups are often held by a dominant family (Luo & Chung, 2005), especially in Asia, which may affect the innovation-related decisions that member firms make. Since family owners tend to have a relatively large share of their wealth tied to the business group, therefore, they are likely to prefer low-risk investment projects to protect their interests (Donckels & Frohlich, 1991). In addition, prior research shows that family owners often resist change and avoid making short-term decisions, and thus adopt very conservative strategies (Bauguess & Stegemoller, 2008). Furthermore, the entrenchment effects that occur in business groups may result in further negative responses from investors when innovation projects are announced by member

firms. For example, in a family-controlled business groups, many of the directors or managers may be family members, who thus have more information about innovation decisions than outside investors, thus increasing the problem of information asymmetry (Myers & Majluf, 1984). This can give rise to agency problems, and lead to a conflict of interest between the controlling and minority shareholders (Young, Peng, Ahlstrom, & Bruton, 2002). Moreover, the controlling family may have strong incentives to expropriate group resources for its own benefits (Claessens, Djankov, Fan, & Lang, 2002). Therefore, the agency cost associated with family-controlled pyramidal business groups may negatively influences the reactions of investors to innovation announcements by member firms.

A number of recent studies have found evidence that business networks can significantly affect corporate innovation performance (Perks & Jeffery, 2006). In this study, we utilize the stock market reactions of member firms to measure investor perceptions of the innovation announcements of another member firm, based on the event-study methodology. We also investigate the importance of the various characteristics of business groups and ownership categories when evaluating the effects of innovation announcements across member firms. Our sample examined in this work includes 305 announcements of new products, processes and services made by Taiwanese firms from 1999 to 2010. This sample has several characteristics that make it particularly suitable for this work. First, in Taiwan, many business groups are owned by a family which has almost complete control over all the companies within the group. For example, Chin, Chen, Kleinman, & Lee (2009) stated that about 78% of Taiwanese listed companies are controlled by family groups. Second, Taiwan is an export-oriented economy, and thus its companies need to engage in more innovative activities to improve the competitiveness of their products. Finally, Taiwan's stock market is relatively efficient in responding to the announcements of listed companies (Chang, Chen, & Liu, 2004). These characteristics of Taiwanese business groups thus provide an appropriate context for testing the effects of ownership structure and family control on the stock market reactions of member firms to the innovation announcements of focal firms.

The results of our study show that shareholders of member firms realize significant and positive market responses when a focal member announces an innovation activity. We also find that the abnormal returns of member firms are greater when the ownership structure is more concentrated. The evidence further shows that family control has a significant negative relationship with the stock market reactions of member firms to innovation announcements, implying that family ownership does more harm than good with regard to investor reactions to such announcements. This result is consistent with the notion that if the ownership structure is more concentrated, then this will provide the controlling family with more opportunities to

expropriate funds from minority shareholders.

The rest of this paper is organized as follows. Section Ⅱ provides the theoretical background and hypotheses development. Section Ⅲ describes the sample and empirical methodology. The results are presented in Section Ⅳ, and the conclusions of this work are given in Section Ⅴ.

BACKGROUND AND HYPOTHESES

Business group as networks

Business groups are clusters of legally independent firms that form networks based on both formal and informal ties, thus coordinating their activities and combining their resources to create more value, and thus such networks are characterized by relational rents (Dyer & Singh, 1998). Prior research suggests that membership of a business group may lead to better financial performance for the constituent firms (Khanna & Palepu, 2000; Khanna & Rivkin, 2001). Moreover, as a result of interfirm ties, member firms are more willing to cooperate with each others in ways that facilitate exchange process (Kim, Hoskisson, & Wan, 2004). This leads to greater trust and the accumulation of internal capabilities among member firms, which can strengthen the long-run interests of the business groups as a whole (Dyer & Singh, 1998).

In addition, the core leaders of business groups are likely to have better managerial capabilities and the abilities to exert substantial control over member firms (Luo & Chung, 2005), and so may be more willing to make the longer-term strategic decisions needed to create valuable synergies (Yiu, Bruton, & Lu, 2005). This goal of maximizing the wealth of the business group as a whole can also encourage member firms to make greater investments in innovative activities, which can then lead to sustainable competitive advantages (Mahmood & Mitchell, 2004).

The resource-based view suggests that a business group's internal resources and capabilities are the sources of the competitive advantages of member firms, with Guillén (2000) arguing

that such firms can combine and apply their internal resources to create new products more quickly and cost-effectively than their independent competitors. Moreover, business groups that undertake innovation projects can develop a unique portfolio of knowledge and capabilities to create valuable synergies (Yiu, Bruton, & Lu, 2005). Therefore, business groups that engage in more innovation projects can experience more beneficial outcomes, and thus we present the following hypothesis:

Hypothesis 1. Membership of a group network leads to more positive stock market reactions for member firms when the focal firm announces an innovation project.

Direct effects of ownership structure

A higher concentration of ownership structure exists in business groups in both developed and developing economies (Shleifer & Vishny, 1986; La Porta, Lopez-de-Silanes, & Shleifer, 1999). The ultimate shareholders in such groups hold the controlling equity of one firm, which in turn holds the controlling share of other firms, and this may be repeated through a number of levels (Claessens, Djankow, & Lang, 2000). The large shareholders possess both the power and information needed to protect their interests by monitoring managers and ensuring that they do not pursue their personal interests (Anderson & Reeb, 2003). To the extent that large shareholders are concerned about growth opportunities and risk (Fama & Jensen, 1983), business groups may be more motivated to control managerial decisions to ensure that they work to undertake long-term development projects, such as R&D efforts. Moreover, prior research demonstrates that a more concentrated ownership structure can reduce the freedom that managers have to make decisions (Shleifer & Vishny, 1986). It is thus anticipated that ownership concentration will have a positive effect on innovation performance (Francis & Smith, 1995)..

In most business groups, a highly concentrated ownership structure is expected to improve efficiency and communication, as it gives rise to conditions of greater trust and stronger business relations, with the controlling shareholders able to make more effective use and transfer of the group's resources to execute investment decisions, thus maximizing the economic benefits of the entire group (La Porta et al., 1999). The Yulon Group in Taiwan has a typical pyramidal structure, and its member firms have been shown to outperform independent ones (Peng, 2003). The Yulon Group is extremely stable, and its shares are concentrated in the hands of a few shareholders. The member firms of this group are

distributed upstream and downstream in both the automobile and textiles industries, all of which are under the comprehensive management and financial control of large shareholders, who manages the businesses by centralized command instead of consensus. Therefore, the controlling shareholders may make greater commitments of innovative resources to member firms, and may be motivated to make more investments in R&D in order to enhance and sustain their core competences, thus benefiting all the member firms (Khanna & Palepu, 1997).

Based on the preceding discussion, we propose the following hypothesis:

Hypothesis 2. A concentrated ownership structure is positively associated with the stock market reactions of member firms to the innovation announcements of the focal firm.

Direct effects of interlocking directors

Business groups can connect member firms through informal ties based on family relations and trusted non-family members (Khanna & Rivkin, 2006), as well as through more formal economic ties, such as cross ownership and director interlocks (Lincoln, Gerlach, & Ahmadjian, 1996). Director interlocks can encourage innovation (Granovetter. 1985), as the executives of member firms can learn from each other about how to more effectively and efficiently exploit technological knowledge, and this overcome the uncertainties that commonly arise during R&D projects (Lorsch & Maclver, 1989). The same small number of directors working for various firms within a business group can lead to higher levels of trust, and this then makes it easier for companies to obtain the resources and information needed to support their innovation practices (Peng, 2004).

The innovative capabilities that exist within business groups are a combination of a complementary set of resources and information, which can enable member firms to achieve their innovative goals (Luo & Chung, 2005). Studies have also shown that the emergence of collaborative relations depends to a great extent on the level of trust between the parties involved (Gulati & Westphal, 1999), and thus member firms connected by director ties have a greater likelihood of exchanging strategic information and new ideas, thus enhancing their competitive advantages. Therefore, we present the following hypothesis.

Hypothesis 3. The presence of interlocking directors among member firms is positively associated with stock market reactions of member firms to the innovation announcements of the focal firm.

Direct effects of family control

Empirical studies show that the level of ownership concentration in diversified business groups is generally high in East Asian, with the controlling shareholders often being members of the same family. In addition, the literature shows that agency problems are more likely to exist in such contexts, as controlling shareholders may expropriate resources from minority ones (La Porta et al., 1999; Yeh, 2005), since they have voting rights that significantly exceed their cash flow rights (Westhead and Cowling, 1998). The controlling family may have strong incentives to invest in R&D projects in order to diversify their wealth, it is difficult to have a disciplined to justify their decision for long-term value creation.

The agency problem may be more serious in family-owned firms because a manager who is a family member may pursue the private interests of the family over those of other shareholders (Young et al., 2008; Jiang & Peng, 2011). For example, a family business group may provide family members with secure employment and wealth, although this makes it more difficult for these individuals to diversify their investments in both financial and human capital. Moreover, it may significantly constrain the group's capabilities in selecting and evaluating innovation projects (Hendry, 2005), and the lack of diversification could lead family shareholders to choose risk-averse decisions, and so family business groups may be less likely to engage in activities that enhance creativity and innovation (Donckels & Frohlich, 1991).

Previous research showed that family-controlled business groups produce fewer innovative products and make little investment in new technologies (Chandler, 1990). Stulz (1988) pointed out that family members may hinder innovation due to the misallocation of resources towards inefficient and risk-averse investments. Some scholars thus argue that the existence of a controlling family may destroy firm value (Dyck & Zingales, 2004). Based on the arguments set out above, we present the following hypothesis.

Hypothesis 4. Family control in a business groups is negatively associated with the stock

market reactions of member firms to the innovation announcements of the focal firm.

Complementarities in the wealth effect of member firm

Family control is enhanced via the pyramidal structures that can exist within business groups, which are more common in emerging countries, where the relevant legal frameworks are underdeveloped (Jiang & Peng, 2011). When the controlling shareholders, such as families, hold less equity through a pyramidal structure, they have many opportunities to pursue private control benefits from the expropriation of minority shareholders (Claessens et al., 2000). That is, families can transfer resources from one firm to other member firms or transfer pricing contacts at below-market costs. Moreover, within such groups the controlling families may invest in potentially profitable innovation projects which only enhance their own wealth (Jensen, 1993). However, given the extensive influence of family owners on business decisions, it is often difficult to reduce the agency problem with the use of corporate governance systems (Yeh & Woidtke, 2005). Prior research has shown that a pyramidal structure may enable family-controlled business groups to realize the private benefits of the controlling shareholder, and thus may reduce firm value (Dyck & Zingales, 2004). Therefore, we present the following hypothesis.

Hypothesis 5. A pyramidal structure reinforces the negatively moderated relationship between family control and the stock market reactions of member firms to the innovation announcements of the focal firm.

SAMPLE AND EMPIRICAL METHODOLOGY

In this section, we first describe the sample design, and then explain how we measure abnormal stock returns and the proxy variables used for the cross-sectional analysis.

Sample design

We collect an initial sample of innovation announcements by firms listed on the board of the

Taiwan Stock Exchange from the Taiwan Securities and Futures Institute Database over the period from January 1999 to December 2010. The Taiwan Securities and Futures Institute Database provides news-service abstracts from major Taiwanese newspapers. We select the keywords 'new products', 'new services' and 'new processes' to search for activities related to corporate innovation, as in Hayton (2005) and Zahra, Neubaum, & Huse (2000). We also obtain information on the related firms, products, and other factors, such as processes, from these sources.

When repeated announcements are found in different publications, the announcement with the earliest date is kept in the sample. To avoid any confounding events that could distort the measurement of the wealth effects, observations are deleted that have other announcements 30 days before or after the initial date. We also exclude announcements if the announcing firm is not a business group, and at least one member of the group must be listed on the board of the Taiwan Stock Exchange. Finally, we exclude the announcing firm or members of their business group if their stock price information or financial data are not available from the Taiwan Economic Journal (TEJ) databank. The business group data, including ownership structure and the names of the directors, are obtained from the Business Groups in Taiwan (BGT) directory.

Sample characteristics

Our final sample is composed of 68 announcing firms and 129 member firms involved in 305 innovation announcements. The largest number of announcements in one year is 67 in 2009, accounting for 21.97% of the sample. Table 1 provides the sample distribution by industry. As shown in Table 1, the announcements come mainly from four industries: computers and office equipment, semiconductors, mobile communications, and optoelectronics, which together account for 63.26% of the total sample. Firms in the computer and office equipment industry have the highest frequency of innovation, with each firm on average making about eight announcements in the 12-year sample period, indicating the computer industry makes the largest contribution to Taiwan's economy. The ownership structure of the groups according to the data in the Business Groups in Taiwan (BGT) directory. The 68 announcing firms in our sample are located in 30 business groups. The groups are divided into pyramidal (60%) and cross-ownership (40%) structures. The ownership structure distribution in our sample is similar to that reported in the BGT directory.

Table 1. Distribution of Innovations by Year and Industry

	Number of Announcements	Percent of Sample	Number of Firms	Number of Member Firms
Cement and ceramics	1	0.33%	1	1
Food	14	4.59%	1	3
Plastics and chemicals	2	0.66%	1	6
Textiles	8	2.62%	4	6
Electric and machinery	30	9.84%	6	7
Elec. appliances and cables	5	1.64%	1	3
Paper and pulp	5	1.64%	2	2
Steel and iron	6	1.97%	1	3
Automobiles	2	0.66%	2	3
Chemicals	5	1.64%	2	1
Department stores	10	3.28%	2	2
Biological products	1	0.33%	2	4
Semiconductors	53	17.38%	11	25
Computers and office equipment	65	21.31%	8	11
Optoelectronics	33	10.80%	10	13
Mobile communications	42	13.77%	7	8
Electronic components	23	7.54%	7	13
Tourism	0	0	0	1
Others	0	0	0	17
Total	305	100%	68	129

Empirical methodology

The standard event-study method was employed to examine stock price responses to focal and member firms on the announcement of innovations, with daily stock return data obtained from the Taiwan Economic Journal (TEJ) databank. Day 0 is defined as the initial announcement date. The abnormal stock returns to announcements are measured as the difference between the actual return and an expected return generated by the market model (Brown & Warner, 1985). We use the value-weighted Taiwan Stock Exchange All-Share Index as a proxy for

market returns and estimate the firm-specific parameters of the market model using the data over a period from 200 to 40 days before the announcement date. The cumulative abnormal return (CAR) for each firm was calculated by adding the abnormal returns over the event window. We use the three-day (-1, 1) announcement-period abnormal returns of member firms as the dependent variable in the cross-sectional analysis.

Independent Variables

AR_{focal} uses three-day (-1, 1) announcement-period abnormal returns. Member firms are tied together by various relationships to share knowledge and resources to collectively enhance their performances. The extent of the announcement effects of innovation on member firms is influenced by the extent to which the announcement has an effect on the announcer.

Ownership structure has an important influence on control power with regard to member firms. Owners with large investments of capital in the business have a strong motivation to control member firms to ensure that they not only emphasize short-term returns, but also long-term objectives. Therefore, a firm's performance will be enhanced as the level of inside ownership concentration increases. We collect information on the ownership structure of each group from the BGT directory. The ownership structure dummy equals one if the group has a pyramidal structure, and zero otherwise.

If the members of one family are the controlling shareholders and have the majority of ownership, then they are able to select more board members (Yeh & Woidtke, 2005). The decisions made by such boards are more likely to pursue the interests of the controlling family, and minority shareholders may suffer from a high level of wealth expropriation. We collect information on the level of family control of each group from the Taiwan Economic Journal (TEJ) databank. Following Claessens et al. (2000) and Filatotchev, Lien, & Piesse (2005), the family control dummy equals one when a family member serves as chairman of the board and CEO, and zero otherwise.

Interlocking directorships among member firms can build a high level of trust and make the companies more willing to exchange valuable information, thus enabling the whole group to maximize its wealth (Chang & Hong, 2000). The interlocking directorships dummy variable equals one if the focal firm and other member firms have the same executives, and zero

otherwise. We collect the data for this from the Business Groups in Taiwan (BGT) directory.

Control variables

The control variables are related to: (1) member firm characteristics, which include investment opportunities, firm size, and ROA; and (2) innovation announcement characteristics of the focal firm, which include announcement frequency and technological opportunity, which is explained in more detain below. Data on the firm and innovation announcement characteristics are obtained from the Taiwan Economic Journal (TEJ) databank and data on the announcement frequency are obtained from the Taiwan Securities and Futures Institute database.

We estimate investment opportunities by a simple measure of Tobin's Q_{member} which denotes the ratio of the market-to-book value of the firm's assets, where the market value of assets equals the book value of assets minus that of common equity, and plus the market value of common equity. Tobin's Q has been widely used to distinguish firms with good investment opportunities from those with poor ones to capture the relative undervaluation of firms. Firm $size_{member}$ equals the natural logarithm of the member firm's book value of total assets for the fiscal year preceding the announcement. Prior research also suggests that firm size can affect the cumulative abnormal returns that a company has. In addition, small firms are more resource-constrained and vulnerable to market competition, and thus external resources are more valuable to these (Chaney et al., 1991), and so they should be more easily affected by the actions of member firms. ROA_{member} denotes the annual member firm return on assets prior to innovation announcements. Successful past performance provides better abilities for a firm to develop new competitive capabilities to respond to changes in market conditions (Bolton & Scharfstein, 1990).

As for the innovation announcement characteristics, announcement frequency is assessed by the number of innovation announcements made by the announcer within the twelve months preceding the announcement date (Chang & Chen, 2002). Technological opportunity at the industry level is a dummy variable, which equals one if the focal firm is in a high-technology industry and zero otherwise, as based on the classification in the Monthly Bulletin Statistics published by the Taiwanese government. Chen et al. (2002) find that the value of an innovation is higher for firms with greater technological opportunity.

The sample statistics of the explanatory variables in this study are provided in Table 2, including the means, standard deviations, and correlation coefficients of all the variables. Our sample shows significant heterogeneity in abnormal returns across firms, with the mean abnormal return being 0.32 and median being 0.02. These sample firms had a 71.64% ownership structure on average, indicating that more than half the sample business groups have a concentrated ownership structure. The mean value of family control was 60.29%, which indicates that the business groups are controlled by the largest controlling family.

ESTIMATION AND RESULTS

Empirical results

We find that innovation announcers experienced significantly positive abnormal returns on the announcement day (0.24%, two-tailed, $p<0.07$) and one day before (0.42%, two-tailed, $p<0.001$). The average cumulative abnormal return from day -1 to 1 was 0.94%, statistically significant at the 1% level using a two-tailed test. For the three-day event window, more than 52.10% of the sample announcements had positive cumulative abnormal returns. Our evidence is consistent with prior studies which found that innovation announcements have a positive impact on the announcing firm's wealth (Chaney et al., 1991).

We now turn to the heart of our analysis: the effects of the focal firms' innovation announcements on member firms. The evidence on stock market reactions indicates that the member firms experienced significant mean abnormal returns only on the announcement day (0.14%, two-tailed, $p<0.07$) and one day after it (0.19%, two-tailed, $p<0.01$). For the [-1,1] three-day announcement period, the shareholders of member firms experienced a significantly positive average cumulative abnormal return of 0.32%, statistically significant at the 1% level using a two-tailed test, and 50.6% of the sample announcement effects are positive. This result suggests that network effects create strong and favorable changes in the shareholder wealth of member firms.

Table 2. Means, Standard Deviations and Correlation

	Mean	SD	1	2	3	4	5	6	7	8	9	10
1.AR $_{member}$	0.32	4.61	1.00									
2.AR $_{focal}$	0.94	5.08	0.13	1.00								
3.Interlocking directorships	0.26	0.44	0.05**	0.01**	1.00							
4.Ownership structure	0.71	0.46	0.02**	0.05**	-0.19	1.00						
5.Family control	0.60	0.49	-0.04**	-0.03**	0.18	-0.09*	1.00					
6.Tobin's Q $_{member}$	1.48	1.12	-0.16	0.05**	-0.21	0.06**	-0.35	1.00				
7.Firm Size $_{member}$	16.66	1.45	0.01**	-0.04**	-0.12	-0.19	0.11	-0.18	1.00			
8.ROA$_{member}$	6.30	11.43	0.00**	0.06**	-0.12	-0.18	0.01**	0.45	-0.05**	1.00		
9.Announcement frequency	1.58	3.14	0.09^{+}	0.01**	-0.04**	0.17	-0.28	-0.03**	-0.06**	0.04**	1.00	
10.Technological opportunity	0.78	0.41	-0.03**	0.07**	0.06**	0.62	-0.22	0.08*	-0.15	-0.01**	0.15	1.00

** $p < .01$, * $p < .05$, $^{+}$ $p < .10$

Cross-sectional regression analysis

A multivariate analysis incorporates the interaction between these control variables and captures the overall effect of the various characteristics that affect important determinants of the market reactions of member firms to innovation announcements. To further examine the effects of these factors, we carry out a multivariate cross-sectional regression of the announcement-period abnormal returns for the member firms.

All regressions are estimated using weighted least squares, with the weights equal to the reciprocal of the standard deviation of the market-model residual. This procedure is used to obtain efficient estimates, since the variances of the market-model residuals vary across announcers (Lang, Stulz, & Walkling, 1991).

Table 3 presents the results of the cross-sectional regression analysis of the announcement-period abnormal returns for the sample of member firms. Model 1 shows that the market reactions to member firms are significantly and positively associated with the stock market responses of the focal firms' announcing innovations. The evidence lends strong support for the hypothesis that a business group can be regarded as an internal network in which all member firms share innovative outcomes. Hypothesis 1 is thus supported.

Model 2 serves as a baseline model that includes all the potential explanatory variables. A pyramidal ownership structure is significantly and positively related to the member firms' announcement-period abnormal returns. The regression results indicate that a concentrated ownership structure is more worthwhile for group members that also undertake strategic activities. The results further show when focal and member firms have interlocking directorships then this has significant and positive impacts on the stock market responses of member firms. Finally, the evidence indicates that a family-controlled business group is significantly and negatively associated with the announcement-period abnormal returns. The evidence thus strongly supports that family control is harmful to the market valuation of member firms, and so hypotheses 2, 3 and 4 are supported.

Model 2 shows that several control variables have significant explanatory power with regard to the wealth effects of member firms when innovation announcements are made. The focal

firm's abnormal returns (AR_{focal}) and announcement frequency show significantly positive market reactions to member firms, while the Tobin's Q and technological opportunity receive significantly negative market reactions. With regard to the technological opportunity, Kelm et al. (1995) argue that the market reaction to innovation announcements by firms which operate in high R&D intensity industries should be relatively small, because investors typically expect such announcements by these firms. Furthermore, this evidence is consistent with the view that R&D investments are undertaken at the expense of short-term earnings (Laverty, 1996). In addition, we also find that member firms with lower growth opportunities receive significantly more positive market reactions to innovation announcements of the focal firm than firms with good growth opportunities. We also find that announcements by frequent announcers are associated with the positive abnormal returns of member firms. This result is similar to the finding in Kelm et al. (1995) that frequent announcers are able to capitalize on follow-up investment projects and build a more innovative image that helps to create future investment opportunities.

We tested hypothesis 5 by including an interaction term between ownership structure and family control in Model 3. If family control is unfavorable, and thus reduces the positive influence of concentrated ownership structure, the member firms' share prices might be negatively influenced by the interaction term. The results confirm this prediction, and thus support hypothesis 5, that family control plays an important role in reducing the positive impacts of ownership structure.

Table 3. Cross-Sectional Regression Analyses of Factors Affecting Announcement-Period Abnormal Returns of Member Firms

Variable	Model		
	1.	**2.**	**3.**
Intercept	0.19	0.59	0.57
	(0.19)	(0.74)	(0.76)
Ownership structure		0.74	2.23
		(0.07)+	(0.00)**
Family control		-0.62	1.02
		(0.07)+	(0.11)
Interlocking directorships		0.75	1.10
		(0.02)*	(0.00)**
AR_{focal}	0.12	0.12	0.12

	(0.00)**	(0.00)**	(0.00)**
Tobin's Q $_{member}$		-0.31	-0.38
		(0.03)*	(0.01)*
ROA $_{member}$		0.01	-0.00
		(0.82)	(0.96)
Firm size $_{member}$		0.02	-0.04
		(0.79)	(0.72)
Announcement frequency		0.11	0.07
		(0.02)*	(0.12)
Technological opportunity		-1.19	-1.01
		(0.00)**	(0.02)*
Ownership structure* Family control			-2.45
			(0.00)**
Adjusted R^2	0.02	0.03	0.04
F-Statistic	17.01**	4.66**	5.39**
N	1014	1014	1014

** p< .01, * p< .05, $^+$ p< .10 (t-stats in parentheses)

To test the robustness of the results, we conduct several additional tests. We test the regression results by substituting the cumulative abnormal return in (-1, 1) for other event windows of (-5, +5) and (-10, +10), and the results under different event windows are very similar.

Although the findings suggest that ownership structure has a strong influence on the stock market reaction of member firms to innovation announcements, the results could be subject to the potential problem of multicollinearity, since some of the independent variables are correlated. Aiken & West (1991) suggest centering variables to reduce his problem, and we carried this out by subtracting each variable from its mean value in the sample, and then undertook an ordinary least squares regression analysis using the centered variables. Although not reported here, the results under the centering approach remained the same. Therefore, the conclusions drawn from our analysis are not seriously biased by the problem of multicollinearity.

CONCLUSION

This paper examined the impact on the wealth of member firms of business group when the focal firm announces an investment in an innovation project, and further investigated the influence of ownership structure and family control on the stock market reactions of member firms to innovation announcements. The results show that, on average, member firms experience a significantly positively share price response, providing strong support for the argument that network factors have a significant impact on financial performance, in line with the conclusion of Khanna & Rivkin (2001). This paper also supports the findings of Joh (2003) that a group with a highly concentrated ownership structure has high controlling power over member firms (Yeh, 2005), which has a significantly positive effect on performance, and that interlocking directorships among member firms can enhance competitive advantage of the group as a whole (Peng, 2004), consistent with La Porta et al.'s, (1999) conclusion that key owners of business groups may offer more resources to member firms in order to benefit from innovations. In addition, our results for family control are similar to that in Filatotchev et al. (2005) and Yeh & Woidtke (2005), which found that that such control leads to greater agency costs as core shareholders use their controlling power to move valuable resources from member firms in which they have less ownerships to other ones in which they have a greater share of ownerships, in order to maximize family wealth, which has a negative effect on corporate performance and causes lower stock market valuation. Our study suggests that business groups with highly concentrated family-controlled business groups are more likely to suffer from wealth expropriation when they operate in the context of weaker investor protection laws and lower disclosure levels being required (Claessens et al., 2002).

This study is related to Zahra, Neubaum and Huse (2000) and Chang, Wu and Wong (2010), in that both these earlier papers also investigated innovation performance and the control effects of ownership. Nevertheless, our study also differs from these works, as it focuses on the effects of innovation announcements on the other members of the business group, while they focused on the announcing firm. In addition, Chang, Wu and Wong (2010) was carried out at the firm-level, and argued that because family control is associated with agency cost, family-controlled firms have a negative impact on innovation and receive lower stock market valuations. The current study extended the ownership structure variable and tested this conclusion using a Taiwanese sample, and the results showed that business groups are more likely to be able to afford the intra-firm resources needed to support and further enhance the innovation performance of member firms. Finally, Zahra, Neubaum and Huse (2000)

evidences that firms which invest in new product innovations are associated with better financial performance, consistent with the finding of Chaney and Devinney (1992) that firms which can achieve product innovations are likely to experience long-term performance improvements in the market. Our finding of more excess returns going to firms which make innovation announcements is consistent with the results of these earlier studies, which showed that new product innovations generally lead to positive stock market valuations for the member firms of a business group.

Prior research found that announcements of new innovation project can help build a positive image that increases opportunities for differentiation and the generation of competitive advantages (Chen et al., 2002). The benefits of product innovation are tied to the establishment of new technologies, expanded market boundaries, and even the creation of new markets, and thus investors have a positive reaction to new product announcements (Chaney et al., 1991). The results in this paper are in line with the evidence in prior literature. Furthermore, our findings show that a highly concentrated ownership structure can form a unified culture with a common set of values, which is useful with regard to sharing new knowledge and undertaking cooperative projects, thus benefiting member firms (Nahapiet & Ghoshal, 1998). However, the govermance structures that operate within business groups may also influence the attitudes of investors. Francis, Schipper, & Vincent (2005) found that the family owners generally have greater power and more incentive to expropriate the interests of the minority shareholders in order to maximize family wealth. As such, when new products are announced by family-controlled business groups, investors may face a greater agency problem in assessing the impact of such announcements on future earnings, and thus discount the market valuation of member firms due to this greater uncertainty. In support of this idea, this research finds that family control is associated with less favourable market reactions to member firms when new product announcements are made.

This paper has several limitations. First, this study is based on a single stock market, Taiwan, which provides relatively weak protection for minority shareholders (La Porta et al. 1998; Yeh & Woidtake, 2005), and future research may investigate whether our results can be extended to other countries with better protection of investors' rights. Second, in this study we found that the investors responded more negatviely to innovation announcements made by family controlled buinsess groups. Future research can add the factor of institutional investors or independent directors, which may also affect the valuation of member firms within family-controlled business groups. Finally, a concentrated family-controlled ownership structure may promote opportunities for financial tunneling (Joh, 2003), as this enables family members to use their controlling power to transfer resources to their favored member firms, and future research can use other announcements that may influence of impacts of

ownership structure to examine this issue.

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