



จุฬาลงกรณ์มหาวิทยาลัย
ทุนวิจัย
กองทุนรัชดาภิเษกสมโภช

รายงานวิจัย

การกระจายการลงทุนทางธุรกิจในประเทศไทย

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โดย
จุฬาลงกรณ์มหาวิทยาลัย
สันติ ธีรพัฒน์

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โดย

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จุฬาลงกรณ์มหาวิทยาลัย
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สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

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บทคัดย่อ

จากการศึกษาการกระจายการลงทุนทางธุรกิจในประเทศไทย โดยอาศัยข้อมูลของบริษัทจดทะเบียนในตลาดหลักทรัพย์แห่งประเทศไทย ตั้งแต่ปี พ.ศ. 2539 - 2543 พบว่าโดยเฉลี่ยบริษัทที่มีการกระจายการลงทุน มีผลทำให้มูลค่าของบริษัทลดลงเมื่อเทียบกับบริษัทที่ทำธุรกิจเพียงอย่างเดียว อย่างไรก็ตามการศึกษาไม่พบความสัมพันธ์ของระดับการกระจายการลงทุนกับอัตราผลตอบแทนจากราคาหุ้นสามัญ แต่พบว่าจำนวนหน่วยของธุรกิจ (Business Segment) มีผลเชิงลบต่อประสิทธิภาพของบริษัทซึ่งวัดโดย Tobin's Q ratio การศึกษานี้ยังทดสอบแรงจูงใจของผู้บริหารต่อระดับการกระจายการลงทุนซึ่งส่งผลต่อการลดมูลค่าของ บริษัท โดยมีสมมุติฐานของทฤษฎีต้นทุนด้านตัวแทน (Agency Costs) ที่ทำให้การลงทุนไม่เกิดประสิทธิภาพ แต่ผลวิจัยไม่พบความสัมพันธ์ดังกล่าว อย่างไรก็ตามการศึกษาพบว่ามีความสัมพันธ์เชิงบวกระหว่างผลตอบแทนผู้บริหารและระดับการกระจายการลงทุน ผู้บริหารเพิ่มระดับการกระจายการลงทุนเพื่อเพิ่มผลตอบแทนให้กับตนเอง ผลการศึกษาสนับสนุนทฤษฎีการสร้างความสำคัญของตัวผู้บริหาร (Entrenchment) การศึกษานี้ยังพบว่ากลุ่มผู้ถือหุ้นขนาดใหญ่มีผลต่อการลดระดับการกระจายการลงทุน



สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Project Title: Corporate Diversification in Thailand

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Abstract

Using the data of firms listed on the Stock Exchange of Thailand during 1996 to 2000, excluding financial institutions as well as rehabilitation firms, the study finds that on average corporate diversification is a value reduction strategy for the sample firms. When the effects of change in diversification level are investigated, it is documented that there is no association between the stock returns and the change in the level of diversification. However, there is negative relation between the change in number of segment and the firm's performance as measured by the Tobin's Q. The study also examines why management pursue the value reduction strategy focusing on the investigation of agency costs explanations. The results show that there is no relation between the managerial ownership and the diversification. But it is found that there is positive association between the managerial compensation and the diversification level. The evidence seems to be consistent with the "entrenchment" argument. This result holds when the joint effects between the managerial and entrenchment arguments are taken into account. Finally the study documents the negative association between the proportion of large shareholders and the likelihood of diversification, suggesting that concentration of holding seems to be effective in controlling the value destruction strategy.

JEL classification: G3, L2

Key words: corporate diversification, agency problems, Thailand

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1. Introduction

Corporate diversification has been received a lot of attention from academics since the wave of diversification activity in the United States during the late 1960s. For example, Ravenscraft and Scherer (1987) document that the proportion of manufacturing industry acquisitions rose from 5% of total assets acquired in 1950-1955 to 36% in 1960-1972. Also, the top 200 companies increased their average number of line of business from 4.8 to 10.9 during 1950 to 1975. The early theoretical works in this area generally argue that the benefit of diversification arises from better resource allocation and economy of scale and scope, coinsurance effect, and using internal capital source. For example, see Weston (1970) and Williamson (1975) for the financing argument and Chandler (1977) for the more efficient allocation of the diversified firms. More recent theoretical works, however, tend to point out that corporate diversification also incurs several costs such as agency problems. For example Stulz (1990), Meyer et al. (1992), and Rajan et al. (2000) argue that diversified firms invest too much in poor opportunity segments. Since corporate diversification incurs both costs and benefits, whether firms gain or loss from corporate diversification is subjected to empirical evidence. Unfortunately empirical studies to date have provided us inconclusive results on the diversification effect.

Although it was perceived that Thai companies over-diversified into nonproductive line of business prior to the 1997 financial crisis¹, the effect of corporate diversification is subjected to limited attention from academics. There are quite a few studies in this area. Kamphaeng (2000) investigates the effect of diversification on firm value during 1996 to 1998. Her study finds that on average diversification is associated with a reduction in firm value. However, there is inconclusive evidence that agency problems are responsible for these value-reducing diversification strategies. In particular, her study does not find the negative relation

¹ See for example Akyuz (2000) and Harvey and Roper (1999). In particular, Akyuz (2000) argues that a number of institutional features including government-business relation, interlocking ownership between banks and non-bank corporations, and high corporate leverage have caused excessive risk taking and inefficient and unsound investments.

between the level of diversification and the proportion of managerial equity ownership as that of Denis et al. (1997). Instead of using the managerial ownership, Hanvong (2001) examines whether there is an association between managerial compensation and firm diversification. It is shown that, on average, during 1996 to 1999 there is a positive relation between the level of diversification and managerial compensation. The results seem to suggest that managers have incentive to pursue the value-reduction strategies since they derive private benefits. Overall, the evidence in Thai market supports the agency hypothesis that agency problems are responsible for firms maintaining value-reducing diversification strategies.

There are, however, several issues of corporate diversification that remain to be investigated. For example, does diversification affect stock returns and firm's performance? If diversification leads to value-reduction, how effective are corporate control mechanisms (such as leverage, concentration of large holdings) in preventing firms to pursue such activity? In addition, there seems to be interactions among the diversification, managerial ownership, and compensation. Hence, the results of extant literature may need to take into account of these interactions in order to conclude that managers pursue their own interests.

The objective of the study is to investigate the corporate diversification in Thailand for companies listed in the Stock Exchange of Thailand. In particular it investigates whether corporate diversification is a value reduction strategy. It also examines the effect of change in corporate diversification and stock returns and firms' performance as well as the joint effects of diversification, compensation, and managerial ownership.

Using the data of firms listed on the Stock Exchange of Thailand during 1996 to 2000, excluding financial institutions such as banks, finance companies, securities companies, and insurance companies as well as rehabilitation firms. The final sample consists of 1,455 firms-year observations. It is found that on average corporate diversification is a value reduction strategy for the sample firms. The result is consistent with the evidence found by other studies in other countries such as Berger

and Ofek (1995) and Denis et al. (1997). When the effects of change in diversification level are investigated, the study documents that there is no association between the stock returns and the change in the level of diversification. This evidence is not consistent with that of Comment and Jarrell (1995). However, it is found that there is negative relation between the change in number of segment and the firm's performance as measured by the Tobin's Q. The results support the idea that the larger the number of segments the lower the firm performance.

The study also examines why management pursue the value reduction strategy focusing on the investigation of agency costs explanations using the framework suggested by Denis et al. (1997). The results in Thailand show that there is no relation between the managerial ownership and the level of diversification. The result does not seem to be consistent with the evidence by Denis et al. (1997) who document statistically significant negative relation between the number of segments and managerial ownership in the U.S. market. Moreover, relating to the agency problems, the "entrenchment" hypothesis suggested by Rose and Shepard (1997) is investigated. It is found that there is statistically significant positive association between the managerial compensation and the diversification level. The evidence seems to be consistent with the "entrenchment" argument in that managers build their own empires because they receive higher compensation. The results also hold when the joint effects between the managerial ownership and entrenchment arguments are taken into account.

Finally I examine whether corporate control mechanisms are effective in curbing the agency problems incurring from diversification. Using the logit regression, it documents the negative association between the proportion of large shareholders and the likelihood of diversification, suggesting that concentration of holding seems to be effective in controlling the value destruction strategy.

The study proceeds as follows. In the next section, Section 2, I briefly discuss related previous studies. Section 3 describes the data, sample selection criteria, and the methodology. The results are presented and discussed in Section 4. The last section,

Section 5, concludes the study and discussed the policy implications as well as future research.

2. Previous Studies

Gain and Loss from corporate diversification

Lang and Stulz (1994) consider the effects of diversification on Tobin's Q, the ratio of a firm's market value to the cost of replacing its assets. They find that firm diversification and Tobin's Q are negatively related. They also investigate the argument that if diversification contributes to value, one would expect that the Tobin's Q of a diversified firm should be higher than an equivalent portfolio of specialized firms. The evidence shows the opposite conclusion: the diversified firms have lower Tobin's Q than equivalent portfolios of specialized firms. Further investigating results, they conclude that their evidence is consistent with the view that firms diversify when they have exhausted growth opportunities.

Berger and Ofek (1995) investigate the effects of diversification on firm value by calculating the ratio of the actual firm values to imputing stand-alone values for business segments. The measure defined as *the excess value measure* is adopted in most subsequent studies. Over the 1986 to 1991 sample period, their results show that diversification reduces value by 13% to 15%. The value loss is smaller when the segments of the diversified firms are in the same two-digit standard industrial classification (SIC) code. In other words, the value loss is mitigated when the diversification is within related industries. They also examine the potential sources of gains and losses from diversification. It is found that the value loss is attributable to overinvestment and cross-subsidization². For the benefits of diversification, they

² The overinvestment is measured as the sum of the depreciation-adjusted capital expenditures of all firms' segments operating in industries whose median Tobin's Q is in the lowest quartile, scaled by total sales. The cross-subsidization or the subsidization of failing segments is also the potential cause of the value loss as suggested by Meyer et al. (1992). Berger and Ofek (1995) use negative cash flow as a

document that diversification increases tax shields resulting from higher debt capacity and it allows firms to realize tax saving immediately. These benefits, however, are very small comparing to the value loss. Their study overall suggests that firms do loss in diversification. The value loss is confirmed by the results of Denis et al. (1997) and recently of Billett and Mauer (2000) who employ the same methodology but different sample³.

Comment and Jarrell (1995) document a steady trend toward greater focus, the reverse of diversification, during 1980s. Their measure of focus is a revenue-based Herfindahl Index of the degree of concentration, where an index of one represents the highest degree of focus. They find that an increase of 0.1 of the index is associated with an improvement in stock return of about 4% for the sample period of 1978-1989. Again there is clearly a loss in corporate diversification. In addition, they examine whether or not firms take some underlying advantages from diversification. They find that diversified firms do not use greater debt and do not rely less on external capital market transactions. There is also evidence that diversified firms do not increase the likelihood of a takeover.

The fact that the observed firms follow value-reduction diversification strategies raises questions about the agency problems and how effective corporate control mechanisms in place. This is the topic that will be reviewed next.

Diversification and agency costs

Denis et al. (1997) examine why firms remain diversified in spite of the fact that the value loss outweighs gain from diversification. They argue that one plausible explanation is the agency problems. Diversification may benefit managers because of

proxy for poor performance and find that the presence of negative cash flows in one or more segments has a more negative effect on diversified firm value.

³ Denis et al. (1997) use the data 933 firms in 1995 while Billett and Mauer (2000) construct a large survivorship-bias free sample of 3,734 firm-year observations during the period 1990-1998.

the power and benefits associated with the empire building as suggested by Jensen (1986) and Stulz (1990). Under this hypothesis, managers will reduce diversification only if they are restrained by certain control and monitoring mechanisms. Using the sample of 933 firms in 1995, Denis et al. (1997) provide evidence that there is strong negative relation between the level of diversification and the proportion of managerial ownership. This evidence supports their agency problem hypothesis. They also find that the value loss from diversification, using Berger and Ofek's (1995) excess value measure, is not related to either managerial or outside blockholder ownership. Thus, while higher ownership is associated with lower levels of diversification, we cannot conclude that the higher ownership leads to better (less value loss) diversification. Finally, they also investigate the change in diversification with other monitoring mechanisms such as block purchases, acquisition attempts, financial distress, and management turnover. It is documented that the decreases in diversification are strongly linked with these mechanisms.

Another version of agency problems in explaining why firms diversify despite of the value loss is managerial compensation. Rose and Shepard (1997) report that CEOs of firms with two distinct lines of business earn on average 12% to 14% more than do CEOs of comparable undiversified firms during the period of 1985 to 1990. The result, however, cannot lead to the conclusion that the diversification benefits the top managers who make the diversification decision. They argue that the observed higher compensation can be explained by either an "ability matching" or an "entrenchment" hypothesis. The "ability matching" hypothesis states that the top managers deserve to receive higher compensation due to the more difficulty of managing diversified companies. The "entrenchment" hypothesis suggests that entrenched managers may use their position to increase diversification and their own compensation. Attempting to distinguish between the two hypotheses, Rose and Shepard (1997) find that the data are more consistent with the "ability matching" hypothesis.

Diversification, financial constraints, and capital market development

Although agency problems may provide a plausible explanation for the value loss from diversification, another strand of literature has focused on internal capital allocation of diversified firms. Again there are two opposing views on how firms use internal capital. Diversification may benefit firms that face external capital constraints. For example, Weston (1970), Williamson (1975), and Stein (1997) suggest that the allocation of capital within a financial constrained firm can be beneficial, if funds are diverted to good prospect business segments. More recently, Scharfstein and Stein (2000), and Rajan et al. (2000), however, argue that capital constrained firms may allocate capital inefficiently within a firm due to coordination problems or rent-seeking behaviors of managers.

Whether the use of internal capital benefits or hurts a diversified firm remains an empirical issue. Unfortunately, the empirical works to date provide us the mixed results. Berger and Ofek (1995) find that the value loss from diversification is positively related to the amount of investment in segments with low Tobin's Q (low prospect business segments). The finding seems to suggest that there exists inefficient cross-subsidization. In addition, Lamont (1997), Shin and Stulz (1998), and Rajan et al. (2000) present evidence of inefficient cross-subsidization and that the internal capital allocation tends to be inefficient. However, Whited (2001) argues that the observed evidence is misleading because of biased estimates of the investment prospect of the business segments. Other studies such as Hyland (1999), Campa and Kedia (1999) also argue that the results of inefficient cross-subsidization are mostly explained by the selection bias.

More recently, Billett and Mauer (2000) develop a measure of the value of the firm's internal capital market that is relatively free of the bias incorporated in earlier studies. Using a large survivorship-bias free sample, they estimate the excess value of firms based on Berger and Ofek (1995)'s methodology. Their result is similar to that of Berger and Ofek (1995) in that diversified firms trade at a discount relative to a comparable stand-alone firm. However, they find no statistical significant evidence

that the excess value measures are related to their overall internal capital market measure. They also decompose the overall measure into efficient and inefficient subsidies to financially constrained and unconstrained segments and efficient and inefficient transfer segments. Consistent with the efficient internal capital hypothesis, they find that efficient subsidies to financially constrained segments increase excess value while inefficient transfers from segments with good investment opportunities decrease excess value. Moreover, they find that efficient subsidies to unconstrained segments have no effect on excess value. Hence, overall their results suggest that financial constraint is the important link between internal capital market subsidies and diversified firm's excess value.

Other important issue in diversification is whether or not the extant empirical evidence extends beyond the results reported for U.S. firms. It should be recognized that diversification may have limited benefits in a well-developed capital market such as the U.S. where any firm has an access to the market. In a less-developed capital market diversification may be more valuable for firms who find it more costly or impossible to access the external capital. In particular, Khanna and Palepu (2000) argue that the "institutional setting" where firms operate is important in determining the relative costs and benefits of diversification. Hence, we would expect that internal capital markets are more valuable among firms in countries where capital markets are less developed, unless the agency costs accompanying diversification are significantly higher in these countries.

Lins and Servaes (1999) provide international evidence on corporate diversification. Using a sample of firms from Germany, Japan, and the United Kingdom during the 1992 to 1994, they report the value losses from diversification that are of similar magnitude to those reported for U.S. firms. Recently, Fauver et al. (1999) provide a cross-country analysis of the association between the value of corporate diversification and the capital market development, using a database of more than 8,000 firms from 35 countries. They find that the value of corporate diversification is negatively associated with the level of capital market development. In particular, they document the value loss (gain or no loss) from diversification for

well-developed (less-developed) capital market. Hence, in the less-developed capital market countries, the benefits of diversification appear to outweigh or offset the agency costs. In addition, they find that the value of corporate diversification varies with legal systems. Overall, the evidence is consistent with the argument that the “institutional setting” has an important influence on the value of corporate diversification. Their results suggest that the organizational design for firms in less developed or emerging capital markets may be different from that of the more matured markets.

In Thailand there are quite a few studies regarding corporate diversification. Kamphaeng (2000) investigates the effect of diversification on firm value during 1996-1998. Her study finds that on average diversification is associated with a reduction in firm value. However, there is inconclusive evidence that agency problems are responsible for these value-reducing diversification strategies. In particular, her study does not find the negative relations between the level of diversification and the proportion of managerial equity ownership as that of Denis et al. (1997). Hanvong (2001) examines whether there is an association between managerial compensation and firm diversification. It is shown that, on average, during 1996-1999 there is positive relation between the level of diversification and managerial compensation. The results seem to suggest that managers have incentive to pursue the value-reduction strategies since they derive private benefits. Overall, the evidence in Thai market supports the agency hypothesis that agency problems are responsible for firms maintaining value-reducing diversification strategies.

3. Data and methodology

3.1. Data and sample

The sample consists of companies listed on the Stock Exchange of Thailand during 1996 to 2000, excluding financial institutions such as banks, finance companies, securities companies, and insurance companies. The sample also excludes the rehabilitation firms and firms that have incomplete variables. The final sample

consists of 1,455 firms-year observations in 27 business segments as classified by the Stock Exchange of Thailand.

3.2. Variables construction

Level of diversification measure

This study uses two proxies of the level of diversification, as in earlier studies such as those in Comment and Jarrell (1995); namely, the number of segments reported by companies, and the revenue-based Herfindahl index. Specifically, the Herfindahl index is calculated as:

$$H = \frac{\sum_{i=1}^n S_i^2}{\left(\sum_{i=1}^n S_i\right)^2} \quad (1)$$

where S_i is the segment revenue i . The index of 1 means the single segment firm. The closer H is to one, the more concentration (less diversification) of a firm. The lower this number the higher the level of diversification. In Thailand, we cannot estimate the asset-based Herfindahl index since the listed companies do not have to report this data to the Stock Exchange of Thailand or the Security Exchange Commission (SEC).

Excess value measure

Following Berger and Ofek (1995), the value of diversification is calculated as the excess value of a diversified firm *relative* to a portfolio of industry-matched single segment firms. Specifically, the excess value is computed as the natural logarithm of the ratio of the firm's actual value to its imputed value. A firm's imputed value is the sum of the imputed values of its segments, with each segment's imputed value equal to the segment's revenue multiplied by its industry total capital to revenue median ratio.

Where the total capital is defined as market value of equity plus book value of total debt. Specifically, the excess value is calculated as:

$$EXVAL = \ln\left(\frac{V}{IV}\right) \quad (2)$$

where V is the observed actual value of a firm (market value of equity plus book value of debt) and IV is an imputed value of a firm, calculated as the sum of the imputed values of its segments, with each segment's imputed value is equal to the segment's revenue multiplied by its industry total capital to revenue median ratio.

Managerial compensation

The managerial compensation is measured in Baht and taken from the Form 56-1 filed at the Stock Exchange of Thailand. The amount reported usually includes the compensation of board of directors.

Governance control mechanisms

Due to limitation of data and business environment in Thailand, this study focuses on four control mechanisms consisting of leverage (LEV), managerial ownership (MOWN), composition of boards (OBOARD), and concentration of blockholdings (LHOLDING). The mechanisms of interests can be classified as internal and external. The former includes the leverage, managerial ownership, and composition of board while the later is concentration of blockholdings.

The data of share ownership by managerial officers and directors are from the company disclosure Form 56-1 filed at the Stock Exchange of Thailand and reported in its annual report. The number of outside board members is taken from companies' annual reports. The shareholders ownership data and other explanatory variables are collected from the Integrated SET Information Management System (ISIMS)CD-ROM and firms' annual reports.

Table 1 reports the descriptive statistics of the sample. The mean, maximum, and minimum of each variable are shown in the table respectively. The first section presents diversification measures estimated by number of segments, multi-segment indicator and Herfindahl index. In general, it can be seen that listed companies in Thailand on average have 1.794 business segments with the maximum of 12 segments during the period of 1996 to 2000. Moreover, companies have become less diversified over the sample period. The number of segments has decreased, on average, from 1.7674 in 1996 to 1.4325 in 2000.

In the second section, the sample characteristics measured by firm size (natural log of total asset), EBIT to sales ratio, capital expenditure to sales ratio, and Tobin's Q ratio are reported respectively. On average, the firm size has peaked at 21.8450 in 1997 and decreased to 21.6456 in 2000. The profitability ratio measured by EBIT to sales has an average of -0.0931 with maximum at 3.0842 and minimum at -375.1865 during the period of 1996 to 2000. Furthermore, the investment activity proxied by capital expenditure to sales ratio has changed from 0.2830 in 1996 to -0.0058 in 2000. Finally, the firm performance measured by Tobin's Q ratio has significantly decreased from 1.1638 in 1996 to 0.9856 in 1998 and then increased to 1.2128 and 1.3125 in 1999, and 2000, respectively.

Lastly, in the third section the governance control variables proxied by leverage, managerial compensation, managerial ownership, composition of boards, and concentration of holding are reported. It can be seen that the leverage has dramatically increased from 0.5407 in 1996 to 0.9850 in 2000. In addition, the managerial compensation has swung up and down through the sample period with an average at 25.4138, maximum at 498 and minimum at 0.0320 million Baht during 1996 to 2000. In contrary, the managerial ownership has changed slightly during 1996 to 1999 and then sharply dropped in 2000. The managerial ownership has an average of 0.2309 in 1996 and 0.1577 in 2000. The composition of boards has increased from 0.1774 in 1996 to 0.2410 in 1999 and slightly decreased to 0.2295 in 2000. Finally, concentration of holding has fractionally increased from 0.5069 in 1996 to 0.5401 in 2000.

3.3. Methodology

Excess value and diversification

To examine the association between the value loss and diversification, the excess value is regressed on the multi-segment indicator (equal to 1 if a company has more than one business segment) and control variables. Specifically,

$$EXVAL_{i,t} = \beta_0 + \beta_1 MI_{i,t} + \sum_k^n \beta_k C_{k,i,t} + \varepsilon_t \quad (3)$$

where i,t denotes security i at the period t . MI is the dummy for multi-segment firms. C_k is a control variable such as firm's size, the ratio of EBIT to sales, and the ratio of capital expenditures to sales. ε_t is the error term. If the diversification is related to the value loss, we expect β_1 is significantly negative.

Change in diversification, stock return, and firm performance

This section investigates how changes in the level of diversification affect the stock return and firm performance. The hypothesis is that the more focus the firm the better the firm stock return and performance as evidenced from the U.S. firms. Following Comment and Jarrell (1995), the stock return and firm performance, measured by Tobin's Q are regressed with the level of diversification and other control variables. Specifically, I estimate the following regressions:

$$R_{i,t} = \beta_0 + \beta_1 \Delta D_{i,t} + \beta_2 R_{m,t} + \beta_3 (R_{i,t} - R_{m,t}) + \sum_k^n \beta_k C_{k,i,t} + \varepsilon_t \quad (4)$$

$$Q_{i,t} = \beta_0 + \beta_1 \Delta D_{i,t} + \beta_2 R_{m,t} + \beta_3 (R_{i,t} - R_{m,t}) + \sum_k^n \beta_k C_{k,i,t} + \varepsilon_t \quad (5)$$

where i,t denotes security i at the period t . R and Q are stock returns and Tobin's Q , respectively. ΔD is the change in the level of diversification as measured by the number of segments reported by companies or the revenue-based Herfindahl index (H). R_m is the SET returns. R_i is the industry index returns. C_k is a control variable such as profitability and firms' size. ε_t is the error term. The negative sign of β_1 is expected if the diversification hurts firm performance.

Diversification and agency problems

The issue we want to investigate is whether the benefits or costs of diversification can be explained by agency problems. First the association between the managerial ownership and the level of diversification is examined. If there is value loss of diversification caused by agency problems, we expect the negative association between the diversification and the fraction of firm own by managers. The association can be investigated by cross tabulating the managerial ownership and the level of diversification. Alternatively it can be examined by the regression of the diversification on the managerial ownership and control variables. In particular,

$$D_{i,t} = \beta_0 + \beta_1 MOWN_{i,t} + \beta_2 MOWN^2_{i,t} + \sum_k^n \beta_k C_{k,i,t} + \varepsilon_t \quad (6)$$

where i, t denotes firm i at the period t . D is the level of diversification as measured by the number of segments reported by companies or the revenue-based Herfindahl index (H). $MOWN$ is the managerial ownership. The $MOWN^2$ is included to take into account of the possibility of nonlinear association. C_k is a control variable such as firm's size, a proxy for information asymmetry. ε_t is the error term. If the diversification is related to the value loss, we expect β_1 is significantly negative.

Moreover, managers may pursue the diversification because they get higher compensation to do so. Whether this argument is correct can be investigated by the following regression:

$$COM_{i,t} = \beta_0 + \beta_1 D_{i,t} + \sum_k^n \beta_k C_{k,i,t} + \varepsilon_t \quad (7)$$

where COM is managerial compensation for firm i at period t . D is the level of diversification as measured by the number of segments reported by companies or the revenue-based Herfindahl index (H). C_k is a control variable such as firm's size, profitability. Hence according to the compensation motivation, the coefficient of the diversification variable should be significantly positive.

Since the managerial ownership may affect the level of diversification and at the same time there is motivation for management to diversify due to the compensation incentives as suggested by the entrenchment hypothesis. Therefore, there may be confounding effects if equation 6 and 7 are regressed separately. To control for the joint effects of agency problems and diversification equation 6 and 7 are estimated simultaneously using the two state least square procedure.

Diversification and control mechanisms

In other strand of studies concerning corporate governance such as Agrawal and Knoeber (1996), they generally document that control mechanisms are related to higher firm value. If the diversification is a value destruction strategy and these mechanisms are effective, it should be expected that there are negative relations between these variables and the diversification level. To the extent that control mechanisms relate to the corporate diversification can be investigated using the following logit regression.

$$Prob(Y_i = 1) = \frac{1}{1 + e^{-(a + \sum_j b_j X_{ij} + \varepsilon_i)}} \quad (8)$$

where Y_i is equal to 1 if a firm has more than one business segment, and 0 otherwise. X_j are the control mechanisms such as leverage (LEV), managerial ownership (MOWN), composition of boards (OBOARD), and concentration of holdings (LHOLDING). If these mechanisms are effective, we expect their coefficients are statistically significantly negative.

4. Results

The preliminary results are reported in Table 2. The excess value of corporate diversification, calculated as the value of firms minus the imputed value in Baht terms. The negative (positive) value suggests value reductions (creations). Panel A shows the Baht excess value by industry while Panel B classifies the excess value by firms' size. From Panel A it is observed that the total value reductions for the whole period are -343,968.51 millions Baht. It is interesting that the overall value reductions come from the crisis year in 1997 and 1998. In addition the table reveals that some industries show value creations and some show value reductions during the sample period. For example, the firms in property industry and electronic industry consistently show value reductions while those in hotel and jewelry industry the excess values are positive during the sample period. Firms in building industry show positive value in 1996 and 1997 then positive in 1998 and 1999 then back to negative in 2000. Panel B presents value reductions of sample firms ranked by size (total asset) into quartile with the smallest firm defined as 1st quartile. It can be seen that during the whole sample period the value reductions are negative, except for the 4th quartile (largest size quartile). It should be observed that for the largest quartile the Baht excess values are all positive during the sample period.

Table 3 reports the estimated coefficients of equation 3. It documents the negative relation between the excess value of the firm (EXVAL) and the diversification measured by the multi-segment indicator (MI), the revenue-based Herfindahl index (H), and the number of segments (SEGMENT). In particular, the result shows that the coefficient of MI is equal to -0.259, statistically significant at 95% confidence level. The negative association between EXVAL and MI indicates

that the higher the diversification the lower the value of firm relative to the implied value. This result holds when the revenue-based Herfindahl index (H) and the number of segments (SEGMENT) are used in the regression since the coefficients of H and SEGMENT are positive and negative and statistically significant, respectively. The positive association between the EXVAL and H is expected since the higher the H means the lower the diversification level. Moreover the results from Table 3 show that the excess value of the firm is positively related to size (SIZE) and investment (CAPEX) but negatively related to profitability (EBITSALES). The evidence overall seems to suggest that on average corporate diversification is a value reduction strategy for the sample firms. The result is consistent with the evidence found by other studies in other countries such as Berger and Ofek (1995) and Denis et al. (1997).

Next I investigate whether the change in diversification affects the stock returns. For example, Comment and Jarrell (1995) document that in the U.S. market the corporate focus (reverse diversification) provides higher returns for investors. To examine the impact of diversification change on stock returns in Thai market equation 4 is estimated. The coefficients are reported in Table 4. In this table both the change in number of business segments (Δ SEGMENT) and the change in the Herfindahl index (Δ HI) are used as a proxy for the change in corporate diversification. It should be noted that the higher the H the lower the level of diversification. Hence the positive coefficient of Δ HI is expected if the reverse diversification provide higher stock returns. From the table, although the negative sign of Δ SEGMENT suggests that the reduction in diversification level relates to higher stocks returns, it is statistically insignificant. Moreover, the coefficient of Δ HI is negative, suggesting that the reduction of diversification level relates to lower stock returns, but also statistically insignificant. Therefore, the results seem to point out that that there is no association between the stock returns and the change in the level of diversification. This evidence is not consistent with that of Comment and Jarrell (1995).

One reason that the regression presents the inconclusive evidence between the corporate diversification and the firm's performance may come from the fact that stock

return is a noisy variable during the sample period, 1996-2000⁴. Hence, an alternative proxy for the firm's performance, measured by the Tobin's Q ratio, is investigated in Table 5. From the table, it is found that there is negative relation between the change in number of segment and the firm's performance as measured by the Tobin's Q. In particular the coefficient of $\Delta(\text{SEGMENT})$ is -0.1567 , statistically significant at 5% confidence level but the coefficient of $\Delta(\text{HI})$ is positive but statistically insignificant. It also finds that the Q ratio is positively related to the excess industry returns (INDR-MKTR) and negatively related to profit margins (EBITSALES). In summary, the results seem to support that the larger the number of segments the lower the firm performance.

Corporate Diversification and Agency Costs

The previous results seem to suggest that the corporate diversification is a value destruction strategy. Why do management pursue this strategy then? Although there may be several reasons that firms in developing capital market tend to diversify such as the credit constraints, the internal capital market motivations. This study focuses on the investigation of agency costs explanations. As suggested by Denis et al. (1997), if the value destruction is resultant from the agency problems, it should be expected that there is negative relation between the managerial holding and the level of corporate diversification. In other words, if management are the owners of the firm they incline not to diversify since the strategy leads to the reduction in their wealth. Table 6 reports the coefficients of the regression of the level of diversification and the proportion of managerial ownership (MOWN). The specification also includes the nonlinear relationship by including the term MOWN^2 . The results in Table 6 show that the coefficients of both MOWN and MOWN^2 are statistically insignificant, suggesting there is no association between the managerial ownership and the diversification. The result does not seem to be consistent with the evidence by Denis et al. (1997) who

⁴ The sample period contains the year before and after the financial crisis in 1997. The stock index peaked above 1,400 on February of 1996 and sharply declined since June of this year, one year before the crisis. The stock price index found the bottom at nearly 200 on September of 1998 before climbing up to above 400 and slightly declining at the end of December in the year 2000.

document negative relation between the number of segments and managerial ownership in the U.S. market.

The other issue of agency problems is the “entrenchment” hypothesis suggested by Rose and Shepard (1997). In particular, the “entrenchment” hypothesis suggests that entrenched managers may use their position to increase diversification and their own compensation. To examine whether there is incentive for management to diversify in order to receive higher compensation, I regress the compensation (COM) with diversification, where the estimated coefficients are reported in Table 7. It is observed that the coefficients of SEGMENT and HI are 2.5899 and -10.2514 with statistically significant at 95% confidence level, respectively. The result suggests that the higher the number of business segments (SEGMENT) the higher managerial compensation. The negative sign of HI can be interpreted in the same manner since the lower concentration (high HI) the lower the compensation. From the table, it can be seen that there is positive relations between the compensation and the SIZE and EBITSALES, respectively. The results are consistent with the argument of the “entrenchment” argument.

To control for the confounding effects between the managerial ownership argument and the entrenchment hypothesis equation 6 and 7 are estimated simultaneously using the two state least square. The estimated coefficients of this system are reported in Table 8. It is documented that the coefficients of MOWN and MOWN² are statistically insignificant while the coefficients of SEGMENT and HI are statistically significant negative and positive, respectively. The results are consistent with the previous results when the regressions are estimated separately. Hence, overall it may be concluded that the diversification motivation in Thailand is consistent with the “entrenchment” hypothesis.

Governance mechanisms and corporate diversification

The previous results seem to suggest that agency problems may explain why firms diversify since this course of action is a value destruction strategy. In this

section, I further examine whether corporate control mechanisms are effective in curbing the agency problems incurring from diversification. In studies such as Agrawal and Knoeber (1996) and Tirapat (2001) have found that control mechanisms are related to higher firm value. In particular Tirapat (2001) finds that in Thailand there is a positive relation between firm performance and managerial ownership and the large concentration holding. Since the diversification is a value destruction strategy if these mechanisms are effective it should be observed that there are negative relations between these variables and the diversification level.

In particular, the logit regression relating these mechanisms and the diversification is presented in Table 9. It is shown in the table that the coefficient of LHOLDING is -0.0512 with statistical significance at 95% confidence level. The negative association suggests that the higher the ownership proportion of large shareholders the lower the probability that firm diversify. The coefficients of other mechanisms, except for that of LEV, are negative as expected but they are all statistically insignificant. Hence, overall the results seem to suggest that concentration of holding seems to be effective in controlling the value destruction strategy.

5. Conclusion

Although it was perceived that Thai companies over-diversified into nonproductive line of business prior to the 1997 financial crisis, there are few studies of the effect of corporate diversification in Thailand. From those limited studies, Kamphaeng (2000) investigates the effect of diversification on firm value during 1996 to 1998. Her study documents that on average diversification is associated with a reduction in firm value. However, there is inconclusive evidence that agency problems are responsible for these value-reducing diversification strategies. In particular, her study does not find the negative relation between the level of diversification and the proportion of managerial equity ownership as that of Denis et al. (1997). Instead of using the managerial ownership, Hanvong (2001) examines whether there is an association between managerial compensation and firm diversification. It is shown that, on average, during 1996 to 1999 there is a positive relation between the level of

diversification and managerial compensation. The results seem to suggest that managers have incentive to pursue the value-reduction strategies since they derive private benefits. Overall, the evidence in Thai market supports the agency hypothesis that agency problems are responsible for firms maintaining value-reducing diversification strategies.

There are, however, several issues of corporate diversification that remain to be investigated. For example, does diversification affect stock returns and firm's performance? If diversification leads to value-reduction, how effective are corporate control mechanisms (such as leverage, concentration of large holdings) in helping firms to refocus? More importantly, there may be confounding effects among the diversification, managerial ownership, and compensation. Hence, the results of extant literature may need to take into account of these interactions in order to conclude that managers pursue their own interests.

Using the data of firms listed on the Stock Exchange of Thailand during 1996 to 2000, excluding financial institutions such as banks, finance companies, securities companies, and insurance companies as well as rehabilitation firms, the final sample consists of 1,455 firms-year observations. The study investigates the effect of corporate diversification on firm value. It provides evidence that on average corporate diversification in Thailand is a value reduction strategy for the sample firms. The evidence is consistent with the evidence found by other studies in other countries such as Berger and Ofek (1995) and Denis et al. (1997) and Kampeng (2000). Next I investigate whether the change in diversification level has any effects on stock returns and firm performance. It documents that there is no association between the stock returns and the change in the level of diversification. This evidence is not consistent with that of Comment and Jarrell (1995). However, it finds negative relation between the change in number of segments and the firm's performance as measured by the Tobin's Q. The results seem to support that the increase (decrease) in the number of segments provides lower (higher) firm performance.

The study also examines why management pursue the value reduction strategy focusing on the investigation of agency costs explanations using the framework suggested by Denis et al. (1997). The results in Thailand show that there is no relation between the managerial ownership and the diversification. The result does not seem to be consistent with the evidence by Denis et al. (1997) who document negative relation between the number of segments and managerial ownership in the U.S. market. In addition, the “entrenchment” hypothesis suggested by Rose and Shepard (1997) is investigated. It is found that there is positive association between the managerial compensation and the diversification level. More importantly when the joint effects between the two arguments are taken into account, the study confirms that the corporate diversification in Thailand is consistent with the “entrenchment hypothesis”.

Furthermore the study examines whether corporate control mechanisms such as concentration of holdings, composition of boards, and leverage are effective in curbing the agency problems incurring from diversification. It documents the negative association between the proportion of large shareholders and the likelihood of diversification. The result suggests that concentration of holding seems to be effective in controlling the value destruction strategy.

In conclusion it should be noted that the limitation in studying corporate diversification in Thai market is the small sample in each industry. This may affect the accuracy of the calculation of the excess value. Hence the evidence documented in the study should be interpreted with cautions. Moreover, the interesting issue to investigate in this area is the internal capital market argument. This seems to be the plausible case for the diversification in Thailand since the credit and capital market in Thailand is not fully developed. The corporate diversification may enable a firm to allocate funds among its business segments. Unfortunately, the accounting data for the business segments in Thailand is not publicly available so the argument is difficult to investigate. How to get around this difficulty and test the argument should be left for future research.

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Table 1
The Descriptive Statistics of the variables

For each variable, the table reports mean, maximum and minimum in the first, second, and third rows, respectively.

	1996	1997	1998	1999	2000	1996-2000
Diversification Measures						
Number of Segments (<i>SEGMENT</i>)	1.76736	1.81973	1.79026	1.77370	1.43252	1.79426
	12.00000	12.00000	10.00000	10.00000	10.00000	12.00000
	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
Multi Segment Indicator (<i>MI</i>)	0.38889	0.41157	0.40075	0.41590	0.28909	0.41148
	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Herfindahl index (<i>HI</i>)	0.90962	0.90237	0.90952	0.90447	0.91972	0.90811
	1.00000	1.00000	1.00000	1.00000	1.00000	1.00000
	0.25000	0.07617	0.26128	0.17888	0.11122	0.07617
Firm Characteristics						
Firm size (Total asset) (<i>SIZE</i>)	21.75719	21.84496	21.76210	21.67681	21.64559	21.81422
	25.92000	26.56900	26.46500	26.32720	26.28510	26.56900
	19.33000	19.37900	19.46800	19.20720	19.04870	19.04870
EBIT/Sales ratio (<i>EBITSALES</i>)	0.13198	-0.11031	0.06722	-2.44750	-0.46665	-0.09313
	1.06000	0.68900	2.71300	3.08420	1.99510	3.08420
	-1.68000	-15.02300	-6.28700	-375.18650	-35.03640	-375.18650
Capital Exp/Sales ratio (<i>CAPEX</i>)	0.28302	0.16584	0.09598	0.10716	-0.00578	0.12336
	12.49636	3.69600	10.76300	15.92500	1.21330	15.92500
	-1.50755	-3.02400	-6.01100	-18.40220	-9.00830	-18.40220
Tobin's Q (<i>Q</i>)	1.16378	1.01292	0.98557	1.21277	1.31245	1.03979
	6.81836	4.83500	4.86764	10.27724	35.35800	35.35800
	0.24996	0.26400	0.22283	0.27245	0.13200	0.13200
Governance Control Variables						
Leverage (<i>LEV</i>)	0.54073	0.69335	0.67299	0.80888	0.98503	0.63195
	1.17000	2.92400	3.37800	10.19100	35.17800	35.17800
	0.01000	0.00600	0.00500	0.00500	0.00400	0.00400
Managerial compensation (<i>COM</i> : million Baht)	20.90603	26.28774	23.41955	27.47467	22.28198	25.41379
	158.00000	498.00000	147.00000	204.00500	170.30000	498.00000
	0.19177	0.03500	0.03200	1.00000	0.24000	0.03200
Managerial ownership (<i>MOWN</i>)	0.23089	0.23857	0.22973	0.22290	0.15772	0.22219
	0.97340	0.92340	0.92400	0.96300	0.91380	0.97340
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Composition of boards (<i>OBOARD</i>)	0.17737	0.20240	0.21066	0.24099	0.22954	0.21484
	0.55560	0.54550	0.50000	0.62500	0.57140	0.62500
	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Concentration of holding (<i>LHOLDING</i>)	0.50685	0.51922	0.51856	0.53248	0.54013	0.52132
	0.95270	0.95270	0.97000	0.99480	0.98500	0.99480
	0.00000	0.00000	0.05210	0.08480	0.08480	0.00000

Table 2
The Value Reductions of Corporate Diversification

The table reports the value reductions (in million Baht) of corporate diversification calculated as the value of firms minus the imputed value.

Panel A: Sorted by industry sector

Industry	1996	1997	1998	1999	2000	All
Agribusiness	-12,003.44	-13,056.48	-20,344.31	-6,653.76	-21,676.06	-73,734.05
Building and Furnishing Materials	30,555.66	64,769.85	-42,852.56	24,977.55	285,419.75	362,870.25
Chemicals and Plastics	50,041.68	-323,029.40	-241,778.02	-196,662.59	96,981.00	-614,447.32
Commerce	-55,080.17	-56,439.52	-10,392.12	-25,246.69	-20,685.17	-167,843.66
Communication	132,549.76	37,996.90	75,158.49	195,619.09	71,565.00	512,889.23
Electrical Products and Computer	-10,919.67	-25,743.16	-12,261.63	-2,108.20	-3,368.96	-54,401.62
Energy	-54,553.25	166,315.20	130,537.90	136,622.71	154,526.77	533,449.33
Entertainment and Recreation	38,787.70	21,443.04	20,395.68	-2,442.78	10,855.15	89,038.79
Electronic Components	-3,011.29	7,582.31	-1,871.22	33,531.38	39,088.72	75,319.90
Foods and Beverages	-34,389.67	-281,640.03	-8,793.09	-16,699.38	-22,020.19	-363,542.37
Health Care Services	2,742.61	7,263.73	6,897.80	10,663.02	7,853.03	35,420.19
Household Goods	4,476.62	3,568.19	861.36	-8,606.35	-4,669.57	-4,369.75
Hotels and Travel Services	1,285.02	8,209.81	4,666.27	1,328.15	1,628.88	17,118.14
Jewelry and Ornaments	-1,844.83	-1,419.98	-817.98	-661.47	-1,238.33	-5,982.59
Machinery and Equipment	3,851.41	4,563.67	3,797.62	544.56	-4,142.93	8,614.33
Mining	0.00	0.00	0.00	-5,277.75	-4,457.40	-9,735.15
Others	4,096.19	893.54	2,726.00	7,490.71	369.66	15,576.10
Packaging	-2,275.10	1,609.21	1,576.81	1,341.01	802.28	3,054.21
Pharmaceutical Products and Cosmetics	-353.41	-305.25	-105.57	-208.71	37.55	-935.39
Printing and Publishing	-2,512.37	-2,139.12	-776.56	2,788.73	2,820.99	181.68
Professional Services	-7.24	-2.83	-35.44	-79.54	-84.88	-209.93
Property Development	-116,700.05	-279,181.36	-222,870.63	-85,891.15	-124,858.75	-829,501.95
Pulp and Paper	-10,470.58	-9,096.00	-30,960.27	-9,422.30	-20,371.34	-80,320.49
Warehouse and Silo	415.22	319.18	-593.38	-288.84	-80.29	-228.10
Textiles, Clothing and Footwear	299.93	4,985.59	2,443.55	-6,100.13	-48,028.96	-46,400.01
Transportation	39,167.69	52,861.18	61,505.43	36,349.08	63,548.87	253,432.25
Vehicles and Parts	3,567.25	-3,517.95	2,519.57	-1,439.81	-409.58	719.48
Total	7,715.67	-613,189.69	-281,366.28	83,466.55	459,405.24	-343,968.51

Table 2 (Continue)
The Value Reductions of Corporate Diversification

The table reports the value reductions (in million Baht) of corporate diversification calculated as the value of firms minus the imputed value.

Panel B: Sorted by firm size

Firm size is proxied by total assets.

Quartile	1996	1997	1998	1999	2000	All
1 st	-7,365.64	-7,879.07	-10,203.49	-22,832.79	24,363.31	-23,917.69
2 nd	-57,405.16	-36,734.33	-30,577.32	-28,497.48	-29,492.47	-182,706.76
3 rd	-46,777.98	-776,561.35	-358,923.53	-370,296.33	-78,902.93	-1,631,462.11
4 th	119,264.45	207,985.06	118,338.06	505,093.15	531,688.04	1,482,368.75

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Table 3
The Relationship between Excess Value of Firm and Diversification

The table reports the association between the value loss and diversification using sample period from 1996 to 2000. Specifically, this following relationship is examined:

$$EXVAL_{i,t} = \beta_0 + \beta_1 MI_{i,t} + \sum_k^n \beta_k C_{ki,t} + \varepsilon_t$$

where $EXVAL_{i,t}$ is the excess value of firm i at the period t calculated from natural logarithm of the ratio of actual value of a firm to imputed value of a firm. MI is the dummy for multi-segment firms which equal to 1 if a firm has more than 1 business segments. While $SIZE$, $EBITSALES$ and $CAPEX$ are control variables (C_k) that represent for firm's size, the ratio of EBIT to sales and the ratio of capital expenditure to sales, respectively.

INTERCEPT	-2.9389** (-7.52)	-3.0737** (-7.23)	-3.0667** (-7.84)
MI	-0.2590** (-5.29)		
HI		0.4781** (3.59)	
SEGMENT			-0.1039** (-6.15)
SIZE	0.1393** (7.65)	0.1207** (6.81)	0.1489** (8.09)
EBITSALES	-0.0463** (-11.38)	-0.0470** (-11.47)	-0.0464** (-11.44)
CAPEX	0.0599** (2.72)	0.0588** (2.65)	0.0581** (2.65)
Adjusted R-Squared	0.1374	0.1280	0.1438

** Significant at the 95% confidence level, t-statistics is in the parenthesis.

Table 4
The Estimated Relationship between Stock Return and Diversification

The table reports the investigation of relationship between stock return and diversification effect using sample period from 1996 to 2000. Specifically, the following regression is estimated:

$$R_{i,t} = \beta_0 + \beta_1 \Delta D_{i,t} + \beta_2 R_{mt} + \beta_3 (R_{It} - R_{mt}) + \sum_k^n \beta_k C_{ki,t} + \varepsilon_t$$

where i,t denotes security i at the period t . R is stock return and ΔD is the change in the level of diversification that is measured by 2 ways, change in number of business segments (*SEGMENT* in model 1) and change in Herfindahl Index (*HI* in model 2). R_m and R_{It} are the SET and industry index returns, respectively. *SIZE* and *EBITSALES* are control variables (C_k) that represent for firm's size and the ratio of EBIT to sales.

Independent variable	Stock returns	
	Model (1)	Model (2)
	Using change in number of segments	Using change in Herfindahl Index
INTERCEPT	0.7564** (1.99)	0.7309* (1.90)
$\Delta(\text{SEGMENT})$	-0.0104 (-0.26)	
$\Delta(\text{HI})$		-0.1064 (-0.40)
R_m	1.1119** (20.07)	1.1170** (20.08)
$(R_i - R_m)$	0.7611** (14.69)	0.7612** (14.48)
SIZE	-0.0350** (-2.00)	-0.0339 (-1.92)
EBITSALES	0.0254** (2.48)	0.0253** (2.46)
Adjusted R-Squared	0.3376	0.3395

** Significant at the 95% confidence level, t-statistics is in the parenthesis.

* Significant at the 90% confidence level, t-statistics is in the parenthesis.

Table 5
The Estimated Relationship between Firm Performance and Diversification

The table reports the investigation of relationship between firm performance and diversification effect using sample period from 1996 to 2000. Specifically, the following regression is estimated:

$$Q_{i,t} = \beta_0 + \beta_1 \Delta D_{i,t} + \beta_2 R_{mt} + \beta_3 (R_{it} - R_{mt}) + \sum_k^n \beta_k C_{ki,t} + \varepsilon_t$$

where i,t denotes security i at the period t . Q is firm performance, measured by Tobin's Q . ΔD is the change in the level of diversification that is measured by 2 ways, change in number of business segments ($SEGMENT$ in model 1) and change in Herfindahl Index (HI in model 2). R_m and R_t are the SET and industry index returns, respectively. $SIZE$ and $EBITSALES$ are control variables (C_k) that represent for firm's size and the ratio of EBIT to sales.

Independent variable	Tobin's Q	
	Model (1)	Model (2)
	Using change in number of segments	Using change in Herfindahl Index
INTERCEPT	1.6385** (2.43)	1.5360** (2.24)
$\Delta(SEGMENT)$	-0.1566** (-2.24)	
$\Delta(HI)$		0.6766 (1.44)
MKTR	0.1216 (1.22)	0.1061 (1.06)
(INDR - MKTR)	0.3013** (3.55)	0.3023** (3.49)
SIZE	-0.0227 (-0.73)	-0.0177 (-0.56)
EBITSALES	-0.0129** (-3.96)	-0.0130** (-3.94)
Adjusted R-Squared	0.0247	0.0218

** Significant at the 95% confidence level, t-statistics is in the parenthesis.

Table 6
The Estimated Relationship between Managerial Ownership and Diversification

The table reports the association between the managerial ownership and the level of diversification using sample period from 1996 to 2000. Specially, this following regression is estimated:

$$D_{i,t} = \beta_0 + \beta_1 MOWN_{i,t} + \beta_2 MOWN^2_{i,t} + \sum_k^n \beta_k C_{k,i,t} + \varepsilon_i$$

where i,t denotes security i at the period t . D is the level of diversification that is measured by 2 ways that are number of business segments and Herfindahl Index. MOWN is the managerial ownership but the model also includes the term “ $MOWN^2$ ” to take into account of possibility of nonlinear association. The control variable (C_k) consists of only one variable, SIZE, that represents for firm’s size.

Independent variable	Number of segments	Herfindahl Index
INTERCEPT	-7.0569** (-11.40)	1.5486** (19.14)
MOWN	0.3454 (0.71)	-0.1009 (-1.57)
MOWN ²	-0.5152 (-0.74)	0.1083 (1.19)
SIZE	0.4038** (14.49)	-0.0288** (-7.92)
Adjusted R-Squared	0.1375	0.0431

** Significant at the 95% confidence level, t-statistics is in the parenthesis.

Table 7
The Estimated Relationship between Managerial Compensation and Diversification

This table reports the relationship between managerial compensation and diversification effect using sample period from 1996 to 2000. Specifically, this following regression is estimated:

$$COM_{i,t} = \beta_0 + \beta_1 D_{i,t} + \sum_k^n \beta_k C_{k,i,t} + \varepsilon_t$$

where i,t denotes security i at the period t . COM denotes managerial compensation. D is the level of diversification that is measured by 2 ways, number of business segments ($SEGMENT$ in model 1) and Herfindahl Index (HI in model 2). The control variables (C_k) consist of $SIZE$ and $EBITSALES$ that represent for firm's size and the ratio of EBIT to sales, respectively.

Independent variable (Value of coefficients are represented in million)	Managerial compensation	
	Model (1) Using number of segments	Model (2) Using Herfindahl Index
INTERCEPT	-192.0000** (-16.42)	-195.0000** (-15.15)
SEGMENT	2.5899** (5.02)	
HI		-10.2514** (-2.53)
SIZE	9.7572** (17.73)	10.5063** (19.78)
EBITSALES	0.2640** (2.14)	0.2803** (2.25)
Adjusted R-Squared	0.2713	0.2607

** Significant at the 95% confidence level, t-statistics is in the parenthesis.

Table 8
The Estimated Relation of Joint Effects between the Managerial Ownership and
Compensations on Diversification

The table reports the estimated coefficients of the following system of equation using the two stage least square procedure. Specifically, the following equations are estimated:

$$\text{Equation 1: } D_{i,t} = \beta_0 + \beta_1 MOWN_{i,t} + \beta_2 MOWN^2_{i,t} + \sum_k^n \beta_k C_{k,i,t} + \varepsilon_i$$

$$\text{Equation 2: } COM_{i,t} = \beta_0 + \beta_1 D_{i,t} + \sum_k^n \beta_k C_{k,i,t} + \varepsilon_i$$

where i,t denotes security i at the period t . D is the level of diversification that is measured by 2 ways that are number of business segments and Herfindahl Index. $MOWN$ is the managerial ownership but the model also includes the term “ $MOWN^2$ ” to take into account of possibility of nonlinear association. COM denotes managerial compensation. The control variables (C_k) consist of $SIZE$, $EBITSALES$ that represent for firm's size and the ratio of EBIT to sales, respectively.

	Using Number of Segments		Using Herfindahl Index	
	Equation 1	Equation 2	Equation 1	Equation 2
Intercept	-46.3742 (-0.16)	-391.6835** (-4.32)	8.2477 (0.17)	-495.0572** (-3.87)
MOWN	54.0333 (0.16)		-9.1674 (-0.16)	
MOWN ²	-21.6127 (-0.33)		3.6783 (0.28)	
SEGMENT		-27.4469** (-2.07)		
HI				191.9510** (2.25)
SIZE	1.7646 (0.18)	21.3528** (4.10)	-0.2613 (-0.16)	15.8757** (6.53)
EBITSALES		0.0434 (0.04)		0.1416 0.14

** Significant at the 95% confidence level, t-statistics is in the parenthesis.

Table 9
The Estimated Relationship between Governance Control Mechanisms and Diversification

The table reports the relationship between the governance control mechanisms and diversification effect using sample period from 1996 to 2000. Specifically, this following logit regression is estimated:

$$\text{Pr } ob(Y_i = 1) = \frac{1}{1 + e^{-(a + \sum_j b_j X_{ji} + \varepsilon_i)}}$$

where i denotes security i . Y is equal to 1 if a firm has more than 1 business segments, and 0 otherwise. X s are the control mechanisms that consist of leverage (LEV), managerial ownership ($MOWN$), composition of boards ($OBOARD$), and concentration of holding ($LHOLDING$).

Independent variable	Coefficients
LEV	0.0855 (1.01)
MOWN	-0.2665 (-1.08)
OBOARD	-0.7704 (-1.43)
LHOLDING	-0.5122** (-2.26)

** Significant at the 95% confidence level, t-statistics is in the parenthesis.

