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MARKET VALUATION EFFECTS AND INVESTOR PERCEPTIONS OF CONNECTED TRANSACTIONS: AN EMPIRICAL ANALYSIS FROM THE STOCK EXCHANGE OF THAILAND

Porawee Wongsatitsart[1] and Arnat Leemakdej[2]

Abstract

This study investigated the market reactions to connected transaction announcements in the Stock Exchange of Thailand (SET) and examined investor perceptions of wealth expropriation from minority shareholders within business groups. The event study methodology was used to analyze cumulative abnormal returns for all connected transactions announced by SET-listed firms from 2014 to 2019. The sample was further divided into two subgroups based on the majority stockholder's cash-flow rights in the listed firm compared with those of the connected party. To assess statistically significant differences in market responses between these subgroups, Propensity Score Matching (PSM) was employed. The results showed positive market reactions to announcements in the days preceding formal disclosure—potentially due to information leakage or anticipatory trading—but provided no evidence of a sustained positive reaction following the announcement date (day 0). Specifically, transactions involving firms with high cash-flow-rights, generated negative abnormal returns after the announcement, suggesting that the overall market response was not uniformly favorable. Investors appear to perceive these transactions as potential channels for wealth expropriation ("propping") rather than unequivocally value-enhancing events, a view confirmed by the PSM analysis. This study contributes to understanding how markets respond to connected transactions and highlights implications for wealth transfer within business groups. The findings have practical significance for companies engaging in connected transactions and for investors seeking to incorporate propping risk in portfolio and risk management.

Keywords: Connected transactions, Propping, Tunneling

1. INTRODUCTION

1.1 Background

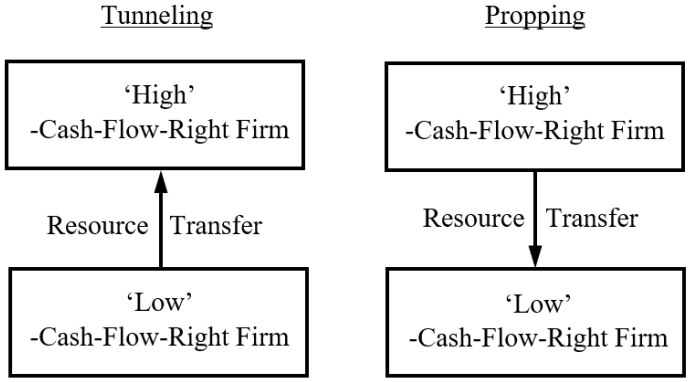
Business group structures allow controlling shareholders to transfer their resources among firms through connected transactions, which can potentially disadvantage many minority shareholders. Previous academic literature presents two opposite concepts behind the wealth expropriation of minority shareholders: tunneling (La Porta et al., 2002; Berkman et al., 2009; Jiang et al., 2010; Cho & Lim, 2018), and propping (Friedman et al., 2003; Gopalan et al., 2007; Bae et al., 2008; Choi, 2018).

[1] Porawee Wongsatitsart obtained her bachelor's degree in accounting and her master's degree in finance from the Integrated Bachelor's and Master's Degree Program in Business and Accounting (IBPM) at Thammasat Business School, Thammasat University, Thailand. She is currently a Ph.D. candidate in the Doctor of Philosophy program in Business Administration (Finance) at Thammasat University, Thailand. Email: mangporporawee@gmail.com

[2] Prof. Dr. Arnat Leemakdej is currently working as a Professor in the Department of Finance, Thammasat Business School, Thammasat University, Thailand. He obtained a DBA in Finance from Thammasat University, Thailand.

Tunneling occurs when a controlling shareholder allocates resources from the company where they have low ownership (low-cash-flow rights) to another firm where they have high ownership (high-cash-flow rights) to benefit themselves at the expense of minority stockholders of the latter firm. On the other hand, propping encompasses situations when a controlling shareholder shifts resources in the opposite way (from high- to low-cash-flow rights).

Figure 1 Tunneling and Propping in a Business Group Structure



Listed firms in the SET have specific characteristics that are suitable for investigating connected transactions. One remarkable characteristic is that Thai firms have highly concentrated ownership because business groups in Thailand are often dominated by families (Khanna & Yafeh, 2007) and only a few families control most Thai corporations (Claessens et al., 2000). About half of Thai business groups have pyramidal ownership structures (Polsiri & Wiwattanakantang, 2006). These groups made greater use of this structure after the 1997 Asian financial crisis (Connelly et al., 2012). High ownership concentration by controlling shareholders is a cause of underdeveloped legal investor protection (La Porta et al., 1998). Supporting this debate, La Porta et al. (2002) commented that countries under civil-law such as Thailand may accommodate more resource transfers than those under common-law. All of these remarkable features of Thai listed firms imply that agency conflicts between controlling shareholders and minority shareholders (Type II Agency Problem) are severe in Thailand.

Figure 2 shows an example of actual tunneling in the SET when Group Lease Public Company Limited (GL) proposed shareholders to approve a Commercial Credit and Finance PLC (CCF) share purchase from Creation Investments Sri Lanka LLC (Creation SL) in 2016 with an acquisition price that was significantly higher than the evaluated fair price. On the other side, Figure 3 presents a propping case in the same year, when Triple T Broadband Public Company Limited (TTTBB) employed Jasmine Telecom System Public Company Limited (JTS), making a profit of 21.39 million Baht for JTS after continuous losses since 2014.

Figure 2 Real Example of Tunneling in the SET

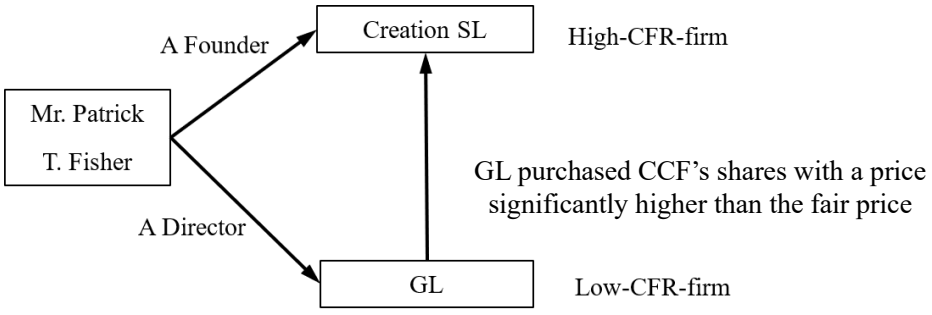
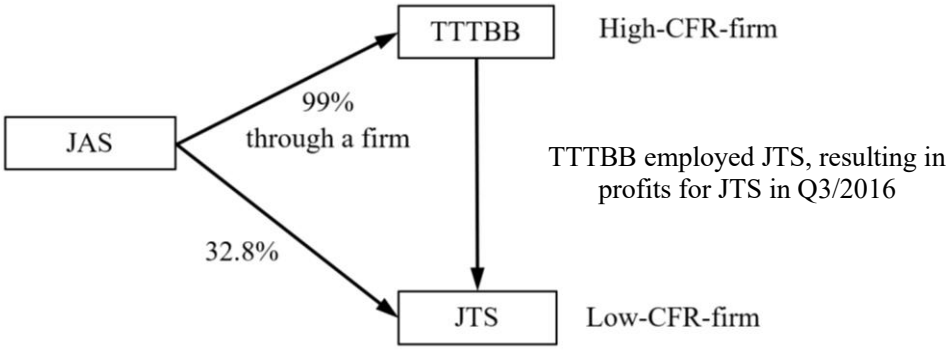


Figure 3 Real Example of Propping in the SET



1.2 Objectives and Significance of the Study

This study contributes to previous literature in two aspects. First, the study verifies the existence of tunneling or propping in a new market by analyzing market responses to connected transactions. The SET is particularly attractive in this context due to several specific characteristics as mentioned earlier. Second, this is the first study of connected transactions between listed firms and many types of connected parties (i.e., related companies, shareholders, parent companies, associates, subsidiaries), unlike previous literature which has only examined connected transactions between listed firms and their controlling shareholders (Cheung et al., 2006, 2009; Peng et al., 2011).

The overall objective of this study was to find the overall SET reaction to connected transaction announcements and to examine the existence of wealth expropriations from minority shareholders (tunneling or propping). Empirical evidence from this analysis will help researchers to understand market reactions and investor perceptions regarding connected transactions. Additionally, this knowledge should prove valuable to companies seeking to generate these transactions and investors seeking to manage their portfolios effectively.

2. LITERATURE REVIEW

2.1 Previous Research on Wealth Expropriation from Minority Shareholders Using Indirect Factors

In emerging markets, prevalence of concentrated ownership and weak investor protection causes a higher frequency of agency conflicts between main shareholders and minority shareholders. Controlling shareholders have higher voting capability; thus, they can make decisions to benefit themselves, harming the interests of minority shareholders (Shleifer & Vishny, 1997; Young et al., 2008; Panda & Leepsa, 2017).

Previous academic literature has endeavored to examine the wealth confiscation from minority shareholders using different methodologies and variables. For example, Bertrand et al. (2002) tracked the propagation of positive earning shocks to evaluate the tunneling activities of Indian business groups, discovering a significance amount of cash shifting from low- to high-cash-flow-rights firms through non-operating earning items. Bae et al. (2008) investigated propping activities by examining the consequences of earnings announcements by Korean chaebol firms on their member firm values, showing that increased (decreased) earnings announcements have positive (negative) relationships on member firm values.

Some works of literature use the divergence of cash-flow rights from voting rights as a factor for expropriation possibility. The empirical results (Lemmon & Lins, 2003; Joh, 2003)

show that wider separation of this factor causes a higher tunneling possibility. Some authors use the dividend payout as a factor for expropriation. La Porta et al. (2000) presented that higher dividends relate to lower tunneling activities, however, Faccio et al. (2001) found evidence against this conclusion. Several studies have used the amounts of related-party transactions as variables to measure expropriation. For instance, Nurazi et al. (2015) used the ratio of related current assets to total assets, while Hamid et al. (2016) used the proportion of the total amount of related-party transactions to total assets to represent the probability of expropriation of minority shareholder interests.

2.2 Previous Research on Wealth Expropriation from Minority Shareholders Using Market Reactions to Connected Transactions

Another group of literature has attempted to apply more direct avenues through which confiscation of minority shareholder interests may occur using data of transactions between listed companies and controlling shareholders. These studies have explored whether market values have changed due to expropriations from minority shareholders by controlling shareholders. Connected transactions become the focal point as a result; as La Porta et al. (2002) explain, most tunneling movements are legitimate forms of normal business deals among related parties. Therefore, connected transactions may provide avenues for majority shareholders to confiscate minority shareholder interests.

Cheung et al. (2006) examined connected transactions between Hong Kong listed firms and majority shareholders from 1998 to 2000. Their empirical findings provided support for tunneling, as evidenced by significant negative market reactions and value losses for minority shareholders. In a subsequent study, Cheung et al. (2009) observed both tunneling and propping, with tunneling being more prevalent. Furthermore, Peng et al. (2011) investigated the connected transactions in Chinese firms and demonstrated the applicability of Friedman et al.'s (2003) model. Their results revealed that the utilization of connected transactions for tunneling or propping purposes depended on the specific financial circumstances of companies, as both activities could occur within the same company at different times.

Prior academic studies (Lin, 2010; Sari, 2010; Tareq et al., 2017) have concentrated only on transactions between listed companies and controlling shareholders, examining transactions declared by low-cash-flow-rights firms. However, this study focuses on transactions between listed companies and many types of connected parties more consistent with tunneling and propping definitions. Furthermore, the evidence of tunneling or propping among listed firms in Thai business groups has not been analytically investigated. Thus, this study analyzes the valuation effects following company expropriation actions in the SET through connected transactions.

3. RESEARCH METHODOLOGY

3.1 Data Collection and Sample Selection

The sample of connected transaction announcements from 2014 to 2019 was collected from the SETSMART website (www.setsmart.com) using the keyword "Connected Transaction" in Thai to search in the historical news section. The first disclosure for each connected transaction was used as the sample, and subsequent disclosures were considered as edited announcements. To avoid date clustering bias, if there were multiple connected transactions within an announcement, only the first transaction was recognized for the event study. However, for PSM, each transaction within an announcement was treated as a separate sample. Announcements that did not provide explicit transaction amounts or had only one

director or without any ownership were excluded. In addition, data without daily stock prices in the estimation window (t = -220 to t = the beginning of the event period - 1 relative to the announcement date t = 0) or with constant stock prices over time (due to trading suspension) were removed.

The ownership structures of listed firms and connected parties were traced using three sources. First, the connected transaction announcements on the SETSMART website were consulted. Second, if ownership structure information was not available in the announcements, shareholder lists on the SETSMART website were referred to. Third, if ownership data remained incomplete, ownership structures were traced based on lists of shareholders of unlisted companies on the Corpus website (www.corpus.bol.co.th) managed by Business Online Public Company Limited (BOL). Following Wiwattanakantang (2001), family members holding identical shares were considered as a single shareholder, including relatives sharing the same surname and relatives by marriage (in-laws) with different surnames.

Information on the total number of directors, independent directors, and the presence of audit committees on the board of directors was collected from the SETSMART website. Financial data, such as stock prices, market index prices, ROEs, total assets, leverage ratio, market values of equities, book values of equity per share, and total number of outstanding shares, were sourced from Datastream.

3.2 The Approach to Calculate Cash-flow Rights

The evaluation of cash-flow rights is required to identify two sub-groups: low- and high- cash-flow rights firms, by comparing the majority shareholder's cash-flow rights in the listed firm to that of the connected party. If the cash-flow rights of a listed firm are higher (lower) than those of its connected party, this listed firm is categorized as a high- (low-) cash-flow-rights firm.

Figure 4 shows an example of how to calculate the cash-flow rights; the X family owns fifty percent in firm A, which owns sixty percent in firm B. Following La Porta et al.'s (1999) approach, the cash-flow rights of the X family in firm B are calculated as a multiplication of shareholdings down the line, in this case, this is equal to thirty percent. To provide a better understanding, an actual example of cash-flow rights identifications from Glaewketgarn (2013) is presented in Figure 5.

Figure 4 Example of Cash-Flow Rights Calculation

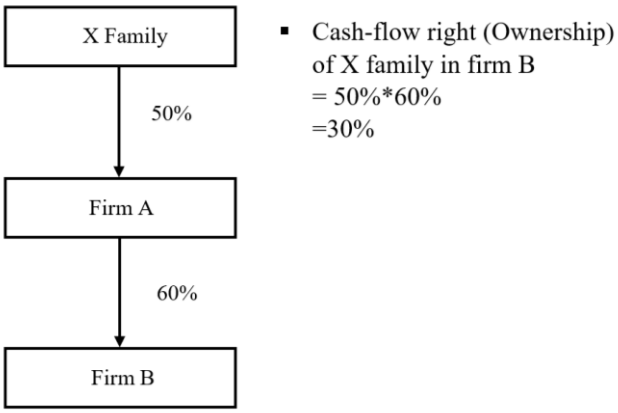
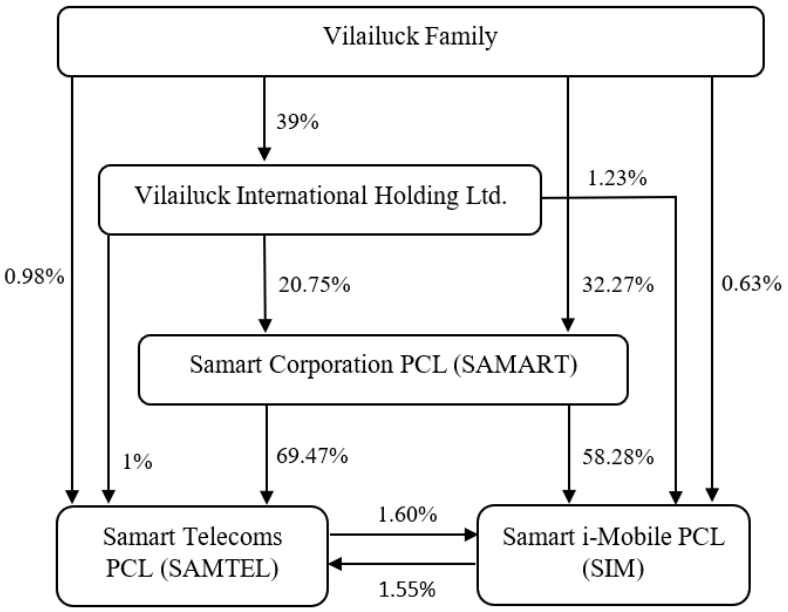


Figure 5 Real Example of Cash-Flow Rights Identification



Target firm	Cash-flow right (CFR)
SAMTEL	0.98%+(39%*1%)+(39%*20.75%*69.47%)+(32.27%*69.47%) +(32.27%*58.28%*1.55%)+(0.63%*1.55%)+(39%*1.23%*1.55%) +(39%*20.75%*58.28%*1.55%) = 29.79%
SIM	0.63%+(39%*1.23%)+(39%*20.75%*58.28%)+(32.27%*58.28%) +(0.98%*1.60%)+(39%*1%*1.60%)+(39%*20.75%*69.47%*1.60%) +(32.27%*69.47%*1.60%) = 25.10%

3.3 Event Studies: Methodology to Estimate the Valuation Effects of Connected Transactions

This study employed a conventional event study methodology, following Cheung et al. (2006, 2009) and Peng et al. (2011). The study applied the standard market model to estimate the normal returns, referring to Brown and Warner (1980, 1985), who found that other models did not convey any clear-cut benefit in detecting abnormal returns, while most event studies used the market model (Hollar, 2014). The study used dates for connected transaction disclosures posted to the SET on the SETSMART website which is the first source providing information of connected transactions to the public according to the announcement dates.

Abnormal returns were estimated by subtracting normal stock returns from actual stock returns. Since the normal returns represent gains or losses that would have been perceived if the analyzed events did not occur (expected returns with no event), therefore while the actual returns can be observed, the normal returns must also be evaluated. This study estimated the coefficients $\hat{\alpha}_i$ and $\hat{\beta}_i$ employing a single-factor market model as shown in Equation (1), with the estimation window starting at day t = -220 (Peng et al., 2011) and ending at t = the beginning of event period -1, relative to the announcement date t = 0. The estimation was conducted using the event study program developed by Leemakdej (n.d.) at Thammasat Business School.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \quad (1)$$

where R_{it} is the announcing company i's daily stock returns at time t and R_{mt} is the SET index daily returns at time t.

The abnormal returns (AR_{it}) are identified by taking the disparity between actual returns

and expected returns derived by using the estimated coefficients from the market model.

$$AR_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}) \quad (2)$$

To measure the total impact of an announcement over a particular period, this study constructed security *i*'s cumulative abnormal returns (CAR_i) by summing up individual abnormal returns over the event window between dates T_1 and T_2. Equation (3) formally describes this practice.

$$CAR_i(T_1, T_2) = \sum_{t=T_1}^{T_2} AR_{it} \quad (3)$$

Three main papers analyzing market reactions to connected and related party transactions using event studies—Cheung et al. (2006, 2009) and Peng et al. (2011)—applied different event windows in their studies without any explanations about event window selections. They employed 11 event windows in total across the three studies as exhibited in Table 1. This study selected 5 windows, each covering a period one to five days around specific event dates to avoid confounding effects from other events.

Table 1 Estimation Windows and Event Windows Used in Previous Papers.

	Estimation Window	**Event Windows**
Cheung et al. (2006)	[-180, -30]	[0, 1]*, [0, 10]
Cheung et al. (2009)	Not available	[-1, 1]*, [-2, 2]*, [-2, 5]
Peng et. al. (2011)	[-220, -21]	[-10, -2], [-1, 0]*
		[-1, 1]*, [-3, 3],
		[-5, 5], [-10, 10], [1, 10]

Note: * represents event windows that were applied to the analysis in this study.

As this study holds multiple observations of connected transaction announcements, the cross-sectional average abnormal returns (*AAR*) for each day were further calculated within the event window. This process helps eliminate idiosyncrasies due to specific stocks.

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it} \quad (4)$$

The cumulative average abnormal returns (*CAAR*) were then evaluated by summing up AARs over the event window between dates T_1 and T_2.

$$CAAR(T_1, T_2) = \sum_{T=T_1}^{T_2} AAR_t \quad (5)$$

The study employed t-statistics to examine the null hypothesis that CAARs over any given periods are equivalent to zero. Under the hypothesis that empirical results imply tunneling (propping), it was expected that the CAARs would be positive (negative) for high-cash-flow-rights firms and negative (positive) for low-cash-flow-rights firms as presented in Table 2.

Table 2 Hypotheses to Identify Tunneling or Propping Using Event Studies

High-cash-flow-rights firms	Low-cash-flow-rights firms	Interpretation
significant positive market reaction (+) CAAR	significant negative market reaction (-) CAAR	Tunneling
significant negative market reaction (-) CAAR	significant positive market reaction (+) CAAR	Propping

3.4 Propensity Score Matchings (PSM): Methodology to Estimate Significant Valuation Differences Between Subsamples

Event studies can evaluate the CAARs of low- and high-cash-flow-rights firms announcing connected transactions. However, this study could not compare the market effects of these two groups, undoubtedly because of the wide gap between numbers of observations. The number of connected transactions declared by low-cash-flow-rights firms are essentially higher than transactions announced by high-cash-flow-rights companies. This study employed the returns data of listed companies that raise funds through public stock offerings to investors. As a result, controlling shareholders in listed firms typically hold a lower ownership proportion compared to those in non-listed affiliated firms, which are usually family-owned businesses. Therefore, the study applied Propensity Score Matching (PSM) to address the issue of unequal numbers of observations between subgroups.

PSM is a quasi-experimental methodology pairing each treated observation with a selected controlled sample of similar statistical properties and then comparing outcomes between these two groups. There are three main steps using this matching technique. First, the propensity scores were estimated, predicting the probabilities that connected transactions were announced by high-cash-flow-rights firms by using the logit regression model given corporate governance characteristics (*BoardSize*, *BoardInd*, *AuditCom*), financial performance variables (*ROE*, *Leverage*, *Size*, *MB*), and *TransValue*.

$$p_{i,t} = \frac{\exp\left(\beta_0+\beta_1 BoardSize_{i,t}+\beta_2 BoardInd_{i,t}+\beta_3 AuditCom_{i,t} +\beta_4 ROE_{i,t}+\beta_5 Leverage_{i,t}+\beta_6 Size_{i,t}+\beta_7 MB_{i,t}+\beta_8 TransValue_{i,t}\right)}{\exp\left(\beta_0+\beta_1 BoardSize_{i,t}+\beta_2 BoardInd_{i,t}+\beta_3 AuditCom_{i,t}+\beta_4 ROE_{i,t} +\beta_5 Leverage_{i,t}+\beta_6 Size_{i,t}+\beta_7 MB_{i,t}+\beta_8 TransValue_{i,t}\right)+1} \quad (6)$$

where *p* represents the propensity score that a transaction declared by a high-cash-flow-rights firm and the independent variables were identified as follows in Table 3.

Table 3 Definitions of the Independent Variables Applied to Estimate Propensity Scores

Independent Variable	Definition
Corporate Governance	
BoardSize	The total number of directors on the board.
BoardInd	The proportion of the number of independent directors over the total number of directors on the board.
AuditCom	A dummy variable to identify the existence of an audit committee member on the board of directors.
Financial Performance	
ROE	The proportion of net income over shareholders' equity.
Leverage	The proportion of total liabilities over total assets.

Size	The natural logarithm of total assets.
MB	The proportion of the market value of equity over the book value of equity.
Other	
TransValue	The proportion of a connected transaction amount over the total market capitalization of the company generating a connected transaction.

Second, matching each observation in the treated group (*High CFR Dummy* = 1 where the connected transaction is announced by a high-cash-flow-rights listed firm) with a sample in the control group (*High CFR Dummy* = 0 where the connected transaction is announced by a low-cash-flow-rights listed company), based on the closest difference in propensity scores. Third, after matching, the average cumulative abnormal returns (ACARs) of the treated and controlled observations were compared and the differences then estimated through ACARs (the average treatment effect on the treated observations, ATT).

$$ATT = E(CAR_1|p(x), HighCFRDummy = 1) - E(CAR_0|p(x), HighCFRDummy = 0) \quad (7)$$

where *x* represents the independent variables in Equation (6).

Thereafter, t-statistics were applied to test the null hypothesis that ATTs over any given period were equivalent to zero. To indicate that empirical results implied tunneling (propping), ATTs are expected to be statistically significant and positive (negative) as summarized in Table 4.

Table 4 Hypotheses to Identify Tunneling or Propping Using Propensity Score Matchings

Result	Denotation	Interpretation
Significant positive ATT (+) ATT	The connected transactions of high-cash-flow rights firms received essentially positive market reactions compared to the connected transactions of low-cash-flow rights firms	Tunneling
Significant negative ATT (-) ATT	The connected transactions of high-cash-flow rights firms received essentially negative market reactions compared to the connected transactions of low-cash-flow rights firms	Propping

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics for Event Studies and Propensity Score Matching

Table 5 and Table 6 show the. descriptive statistics of connected transactions of the SET during the period 2014-2019 for event studies and PSM respectively. The sample size for event studies (n=765) is smaller than for PSM (n=912) to avoid clustering bias in calculating CAAR, as mentioned in Section 3.1. Both samples showed that during 2014-2019, connected transactions were created by 212 listed firms (about 38% of all firms listed in the SET)[3] and that these transactions were worth a combined 691.36 billion Baht (about 22.17 billion USD)[2] for event studies and 789.58 billion Baht (about 25.27 billion USD)[4] for PSM. For both groups, the means were significantly greater than the medians of the transaction amounts, indicating that the sample distributions were positively skewed.

[3] SETSMART reported that there were 556 Companies Listed on SET at the end of 2019.
[4] At 8th October 2020, a Thai Bath is 0.032 US dollars.

The substantial disparity between the mean and median transaction values, was particularly pronounced in 2019 where the mean (3,283.51 million Baht) exceeded the median (25.24 million Baht) by approximately 130 times, warranting further discussion. This extreme positive skewness likely results from a small number of exceptionally large transactions acting as outliers within the sample. Such outliers are common in connected transaction data, as business groups occasionally execute major strategic transactions involving significant asset transfers or financial restructuring.

To assess the potential impact of these outliers on the empirical results, it should be noted that the event study methodology employed in this research examines abnormal returns rather than transaction values directly. The market model estimates abnormal returns based on stock price movements, which are less susceptible to the influence of transaction size outliers. Furthermore, the PSM analysis controls for transaction value (TransValue) as a matching variable, thereby reducing potential bias from extreme observations. Nevertheless, future research could consider conducting robustness tests by winsorizing transaction values at the 1st and 99th percentiles or by excluding extreme outliers to verify the stability of the findings.

After classifying the samples for the event studies based on the relationships between the listed firms and their connected parties, it was found that 480 transactions (63% of the sample) were conducted by listed firms sharing the same controlling shareholder as the connected parties. This result differs from previous studies, which focused only on connected transactions where the connected party held shares in the listed firm (Cheung et al., 2006, 2009; Peng et al., 2011).

In both samples, the number of connected transactions conducted by low-cash-flow-rights listed companies were significantly higher than the transactions generated by high-cash-flow-rights listed companies. This is expected because listed companies must raise funds by publicly issuing stocks to investors. Therefore, main investors are prone to have a lower proportion of ownership than their ownership in non-listed connected parties, which are usually family businesses. Most of the connected transactions in the sample are transactions relating to assets and services and conducted by the listed companies in the property and construction industry.

Table 5 Descriptive Statistics of Connected Transactions Announced by Companies Listed on the SET from 2014 to 2019 for the Event Studies.

	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**All**
Amount (millions of THB)							
Total	49,495	43,629	27,568	77,437	26,973	466,259	**691,361**
Mean	369.37	363.58	212.06	624.50	236.61	3,283.51	**904.92**
Median	22.76	22.09	22.80	26.35	26.80	25.24	**24.00**
Number of transactions	134	120	131	124	114	142	**765**
Number of firms	84	73	79	82	79	89	**212**
Number of transactions classified by relationship							
Listed firm is a shareholder of the connected party	3	5	8	10	8	6	**40**
Connected party is a	38	34	35	48	39	51	**245**

shareholder of the listed firm							
Number of transactions classified by relationship							
Related company (both have same controlling shareholder)	93	81	88	66	67	85	**480**
Number of transactions classified by transaction type							
Low-CFR firms	118	112	116	105	97	124	**672**
High-CFR firms	16	8	15	19	17	18	**93**
Ordinary business transactions	11	5	2	6	8	6	**38**
Ordinary business support transactions	23	19	22	18	17	22	**121**
Real estate lease transactions for a term no longer than 3 years	31	41	40	25	24	32	**193**
Transactions relating to assets or services	46	39	46	43	39	52	**265**
Providing or receiving financial assistance	23	16	21	32	26	30	**148**
Number of transactions classified industry							
Agro & food industry	12	7	5	6	7	7	**44**
Consumer products	13	16	15	13	13	15	**85**
Financial	15	12	12	13	12	10	**74**
Industrial	15	15	21	28	19	27	**125**
Property & construction	45	44	41	28	29	38	**225**
Resources	12	8	7	8	5	13	**53**
Services	18	13	26	20	25	22	**124**
Technology	4	5	4	8	4	10	**35**

Table 6 Descriptive Statistics of Connected Transactions Announced by Firms Listed on the SET from 2014 to 2019 for PSM

		5 SEC Connected Transaction Types				
Characteristics	**All connected transactions**	**Ordinary business transactions**	**Ordinary business support transactions**	**Real estate lease transactions for a term no longer than 3 years**	**Transactions relating to assets or services**	**Providing or receiving financial assistance**
Number of transactions	**912**	52	156	198	329	177
Number of firms	**212**	22	78	99	165	89
Amount (millions of THB)						
Total	**789,582.02**	81,955.24	19,635.68	4,481.42	647,792.08	35,717.60
Mean	**865.77**	1,576.06	125.87	22.63	1,968.97	201.79
Median	**22.92**	113.27	12.94	5.90	80.00	24.59

Ratio of CT amount to the firm's market value (*TransValue*)						
Mean	**39.00**	206.55	7.66	2.26	62.20	14.99
Median	**1.32**	1.80	0.73	1.15	3.06	2.05
Number of transactions classified by firm types						
Low-CFR firms	**814**	47	144	183	288	152
High-CFR firms	**98**	5	12	15	41	25
Corporate Governance						
BoardSize	**16.62**	17.46	15.63	18.47	16.57	15.25
BoardInd	**0.27**	0.26	0.26	0.27	0.27	0.27
AuditCom	**0.20**	0.19	0.20	0.18	0.20	0.21
Financial Performance						
ROE	**0.07**	0.14	0.14	0.09	0.07	-0.04
Leverage	**0.27**	0.36	0.24	0.24	0.28	0.30
Size	**16.35**	16.68	16.39	16.27	16.44	16.13
MB	**2.35**	2.91	2.64	2.26	2.41	1.89

Note: Definitions of the variables presented in this table are provided in Table 3.

4.2 How Does the SET Generally React to Connected Transaction Announcements?

This section addresses the first research question: How does the SET respond to announcements of connected transactions overall? To answer this, an event study was conducted using the full sample of connected transaction announcements by Thai listed firms on the SET from 2014 to 2019. The study estimated cumulative average abnormal returns (CAARs) for all connected transactions over various event windows, ranging from five days before to five days after the announcement date, as presented in the second column of Table 7.

Table 7 presents the Cumulative Average Abnormal Returns (CAARs) over various time windows surrounding the announcement date. The windows, denoted as [X, Y], indicate the period from X days before to Y days after the announcement; for instance, [5, 0] covers the five days preceding the announcement. The table also reports CAARs for two groups of companies: those with low cash-flow rights and those with high cash-flow rights. Firms with high cash-flow rights were defined as those disclosing related transactions.

Values in parentheses next to the CAARs represent t-statistics, which were used to assess whether the observed CAARs differed significantly from zero. In this context, the null hypothesis states that the CAAR does not significantly deviate from zero.

Overall, Table 7 reflects the complexity of market responses to connected transaction announcements, varying by the event window and cash-flow rights category. However, further research is warranted to validate these results. Additionally, the table provides CAARs for six distinct event windows, indicates the sample size (n) for each group, and highlights cases with negative t-statistics, suggesting that such announcements may have a negative impact on stock prices.

In summary, the analysis indicates that CAARs for the windows [-3, 0] and [-1, 0] are positive and significantly different from zero at the 10% level, with values of 0.0025 and 0.0022, respectively. Notably, these positive abnormal returns occurred before or on the announcement day, but not afterward. Since the event window should ideally reflect market reactions following public disclosure (from day 0 onward), the consistently non-significant or negative CAARs post-announcement suggest an absence of a positive market response to the announcement itself. This finding may be attributed to either information leakage prior to the announcement or market skepticism about the value of such transactions. Figure 6 illustrates the CAARs pattern from t = -5 to t = +5 for the full sample, revealing no consistent trend. The

CAAR increased before time t = 0 and declined thereafter.

Table 7 Event Study CAARs of Connected Transactions Announced by Companies Listed on the SET from 2014 to 2019

	All connected transactions (n = 765)		**Low-cash-flow-rights firms** (n = 672)		**High-cash-flow-rights firms** (n = 93)	
CAAR [-5, 0]	0.0000		-0.0002		0.0016	
	(0.0269)		(-0.1247)		(0.2683)	
CAAR [-3, 0]	0.0025	*	0.0021		0.0047	
	(1.6592)		(1.3641)		(0.8988)	
CAAR [-1, 0]	0.0022	*	0.0018		0.0054	*
	(1.8632)		(1.3895)		(1.7536)	
CAAR [-1, 1]	0.0017		0.0023		-0.0022	
	(1.1410)		(1.3868)		(-0.6869)	
CAAR [-2, 2]	0.0004		0.0013		-0.0064	
	(0.2261)		(0.6730)		(-1.3650)	
CAAR [0, 1]	0.0017		0.0028	*	-0.0058	**
	(1.2312)		(1.7757)		(-2.0141)	
CAAR [0, 3]	-0.0004		0.0014		-0.0133	***
	(-0.2013)		(0.6765)		(-3.3830)	
CAAR [0, 5]	0.0006		0.0026		-0.0131	***
	(0.2905)		(1.0958)		(-2.9323)	

Note: Numbers in parentheses are *t*-statistics used to test that the average is equal to zero. *, **, *** denote significance at the 10%, 5%, 1% levels, respectively.

Figure 6 CAAR Diagram for the Full Sample

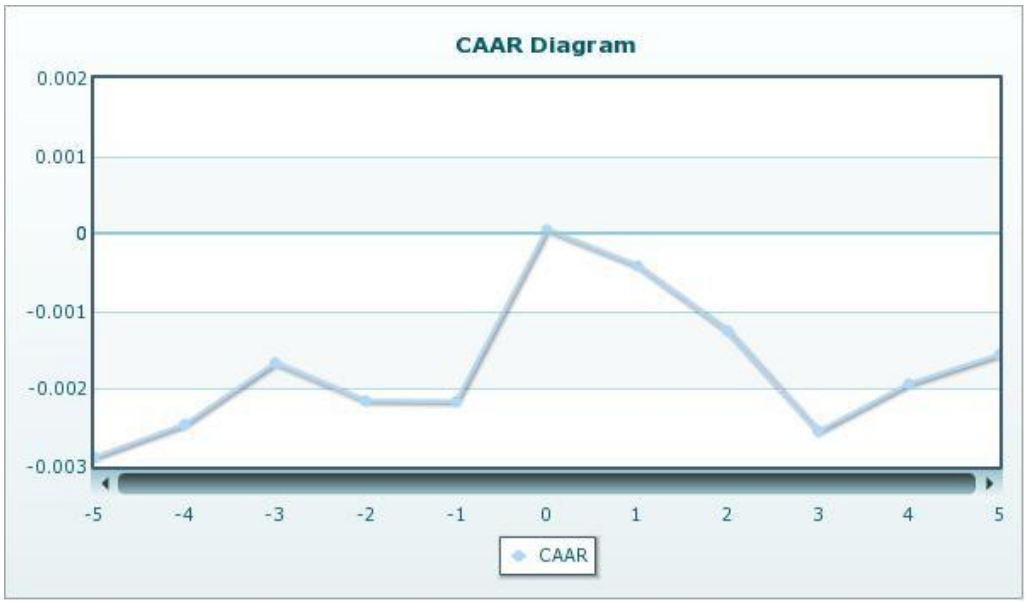


Figure 7 CAAR Diagram for the Low-Cash-Flow-Rights Listed Firms

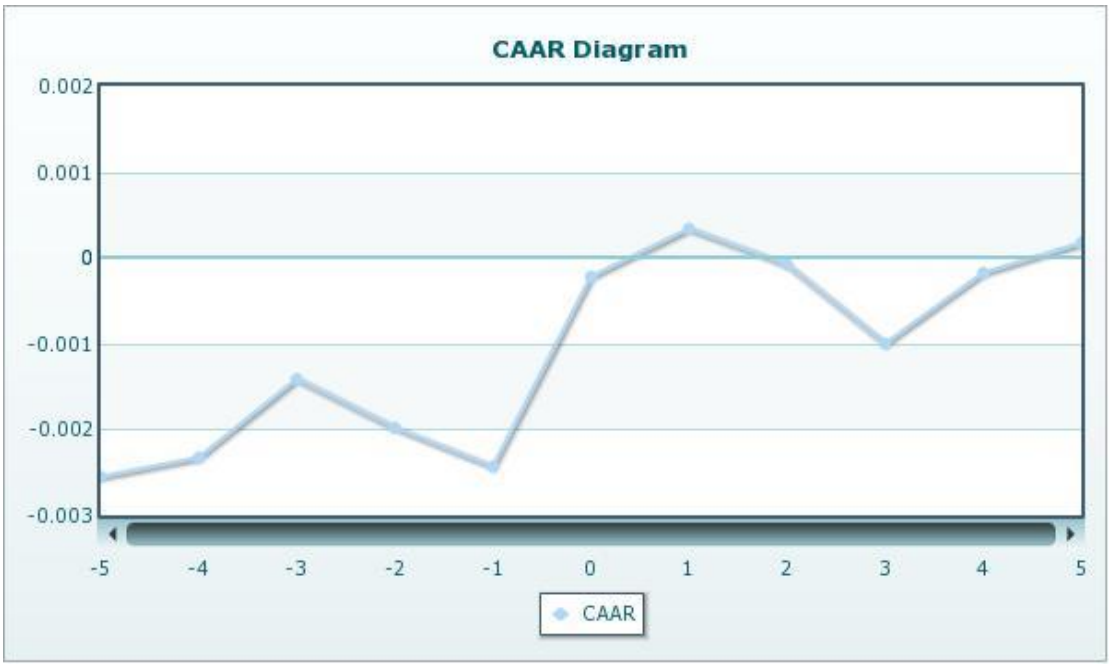
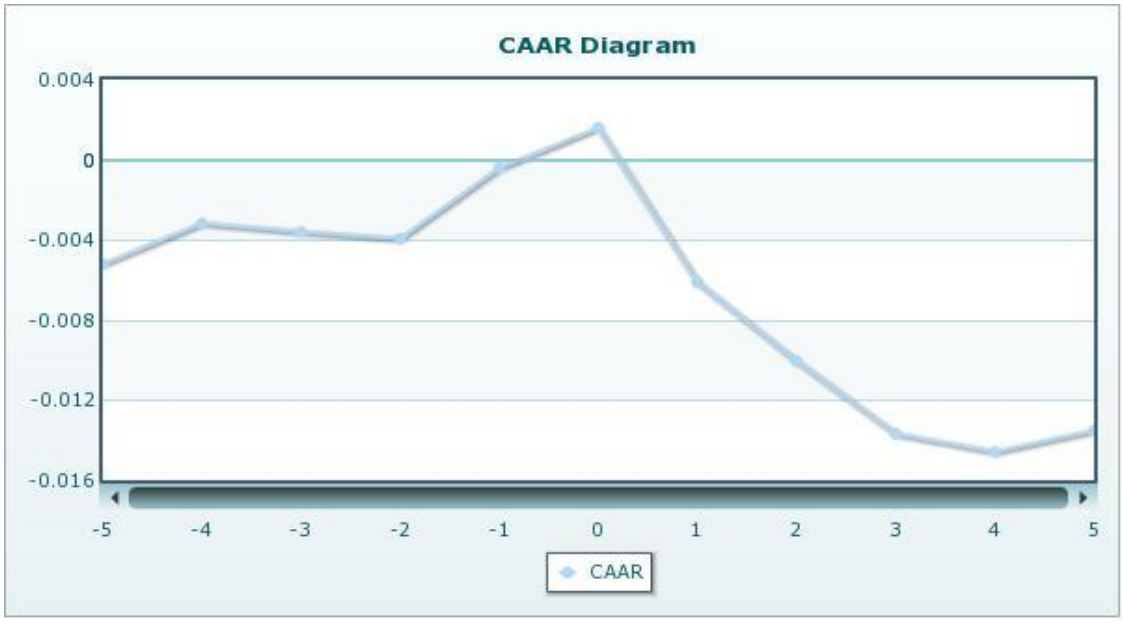


Figure 8 CAAR Diagram for the High-Cash-Flow-Rights Listed Firms



Note: CAARs throughout the event period, t = -5 to t = 5, for the Full Sample, Low-, and High-Cash-Flow-Rights Firms according to Connected Transaction Announcements Created by Firms Listed on the SET from 2014 to 2019.

4.3 Do Thai Investors Perceive Connected Transactions as Wealth Expropriation from Minority Shareholders (Tunneling or Propping)?

To answer the second research question: Do Thai investors perceive connected transactions as wealth expropriation from minority shareholders (tunneling or propping)? CAARs for two sub-groups based on the majority shareholder's cash-flow rights of the listed

firm compared with that of the connected party (i.e., low- and high- cash-flow-rights firm subgroups) were evaluated as shown in the third and the fourth columns of Table 7. During the [0, 1] event window, the analysis revealed a significantly positive CAAR for the low-cash-flow-rights firm subgroup and a significantly negative CAAR for the high-cash-flow-rights firm subgroup. This finding is consistent with the propping hypothesis discussed in Table 3, Section 3. Therefore, it was presumed that investors in the SET commonly perceived these transactions as wealth expropriation from minority shareholders of high-cash-flow-rights firms to low-cash-flow-rights firms: propping. Moreover, after dividing the entire sample into two subsamples, the study looked for a more obvious pattern in Figure 7 and Figure 8. The line graph shows an upward trend for the CAARs of low-cash-flow-rights firms and another shows a downward trend for the CAARs of high-cash-flow-rights firms which also supports Thai investors' perceptions of propping activities.

In addition, this study employed the PSM technique to alleviate the unbalanced numbers of the two sub-groups by matching the treated group (transactions of high-cash-flow-rights firms) with a statically selected control group (transactions of low-cash-flow-rights firms) based on the closest differences in propensity scores which were evaluated based on similar characteristics using the logit model, Equation (6).

Results of the PSM analysis, shown in Table 8 confirm the event study findings, showing that high-cash-flow-rights firm transactions receive significantly more negative market reactions compared to low-cash-flow-rights firm transactions. It is worth noting that this conclusion is based on a single study and further research is necessary to validate these results. The empirical results in Table 8 show that ATTs are statistically significant and negative over three event windows: [0, 1], [0, 3] and [0, 5], with values of -0.0081, -0.0151 and -0.0177, respectively. These ATTs represent that the SET exhibits substantially more negative responses to connected transactions declared by high-cash-flow-rights firms compared to those announced by low-cash-flow-rights firms. Therefore, these PSM results also support the hypothesis of propping activities. Lastly, Table 8 provides details on: CAAR values for six different time windows around the announcement date, and the number of firms in each category (n). Some CAARs with negative t statistics indicate negative CAAR values, implying that the announcements of connected transactions may lead to a decrease in stock prices for the announcing firms.

Table 8 ACARs And ATTs for Connected Transactions Announced by Companies Listed on the SET from 2014 to 2019

	All connected transactions (n = 912)		
	High-cash-flow-rights firms (Treated group) (n = 98)	**Low-cash-flow-rights firms (Control group)** (n = 98)	**Difference (ATT*)*** (n = 98)
ACAR [-5, 0]	0.0047	0.0027	0.0020
			(0.0070)
ACAR [-3, 0]	0.0081	0.0077	0.0004
			(0.0063)
ACAR [-1, 0]	0.0059	0.0026	0.0033
			(0.0042)
ACAR [-1, 1]	0.0002	0.0036	-0.0033
			(0.0051)
ACAR [-2, 2]	-0.0005	0.0054	-0.0059

			(0.0069)	
ACAR [-2, 5]	-0.0032	0.0105	-0.0138	
			(0.0096)	
ACAR [-3, 3]	-0.0022	0.0111	-0.0133	
			(0.0082)	
ACAR [-5, 5]	-0.0048	0.0095	-0.0143	
			(0.0102)	
ACAR [0, 1]	-0.0031	0.0050	-0.0081	*
			(0.0048)	
ACAR [0, 3]	-0.0077	0.0074	-0.0151	**
			(0.0066)	
ACAR [0, 5]	-0.0068	0.0109	-0.0177	**
			(0.0083)	

Note: Numbers in parentheses are standard errors to test that the average is equal to zero. *, **, *** denote significance at the 10%, 5%, 1% levels, respectively.

5. CONCLUSION

Outstanding characteristics of Thai listed companies, such as highly concentrated ownership, pyramidal ownership structure, and weak legal protection of minority shareholders, imply strong agency conflicts between controlling shareholders and minority shareholders. These type II agency problems motivate the controlling shareholders to expropriate wealth out of the minority shareholders of their low-cash-flow-rights firms (Tunnelling). However, the opposite concept involves attracting investors to own the low-cash-flow-rights firm's shares, often convincing the firms in a business group to make an unwritten commitment to support their member firms (Propping). Therefore, this study attempts to examine the market reactions to connected transactions and analyze that the controlling shareholders tend to tunnel or to prop through these transactions using event studies and propensity score matchings (PSM).

The methodologies, main results, and answers to the two research questions are summarized in Table 9. Overall, the empirical results indicate that the SET market reaction to connected transactions is not uniformly positive. While minor positive abnormal returns were observed in the days preceding the announcement, market reactions after the event date were either insignificant or negative, particularly for high-cash-flow-rights firms. This indicates that investors may perceive connected transaction announcements with skepticism, possibly due to concerns about wealth expropriation from minority shareholders via propping mechanisms.

Table 9 Summary of Methodologies, Results, and Answers to the Research Questions

Research Question	Methodology	Result	Answer
Q1: How does the SET generally react to connected transaction announcements?	Event study	CAAR [-3, 0] and CAAR [-1, 0] are significantly positive.	SET shows mixed reactions to connected transaction announcements, with positive pre-announcement effects but no sustained positive post-announcement reaction.

Q2: Do Thai investors perceive connected transactions as wealth expropriation from minority shareholders (tunneling or propping)?	Event study	CAAR [0, 1] of the low-cash-flow-rights firm subgroup is significantly positive while the CAAR [0, 1] of the high-cash-flow-rights firm subgroup is significantly negative.	Thai investors perceived overall connected transactions as bridges for wealth expropriations from the minority shareholders of high- to low-cash-flow-rights firms (propping).
	PSM	ATT [0, 1], ATT [0, 3], and ATT [0, 5] are significantly negative.	

Many people would be satisfied with the empirical results implying propping activities that benefit the minority shareholders of low-cash-flow-rights listed firms. However, there are some points that need to be addressed. First, propping is negative tunneling (Bae et al., 2008): it is a wealth expropriation from the minority shareholders of high-cash-flow-rights firms. Moreover, Friedman et al. (2003) suggested that the main objective when controlling shareholders prop up their member companies is to preserve the option to dispossess minority shareholders' wealth. They intend to make a benefit from tunneling to outweigh their sacrifice from prior propping. Several studies (Jian & Wong, 2004, 2010; Ying & Wang, 2013) also support that propping is normally followed by tunneling.

Under Thailand's regulatory framework governed by the Securities and Exchange Commission (SEC), connected transactions are classified into three size categories based on transaction value relative to firm size: small, medium, and large. Each category triggers different disclosure and approval requirements, with larger transactions requiring more stringent oversight including shareholder approval and independent financial advisor opinions. The propping evidence documented in this study carries important regulatory implications. Given that propping involves wealth transfers from high-cash-flow-rights firms to low-cash-flow-rights firms, policymakers should consider whether current size-based thresholds adequately capture transactions with high expropriation potential. It is plausible that propping activities may be more concentrated in certain size categories. For instance, controlling shareholders seeking to support financially distressed member firms through propping may prefer medium-sized transactions that provide meaningful support while avoiding the intensive scrutiny associated with large transactions requiring shareholder approval. However, this study did not explicitly analyze market reactions across SEC-defined size categories due to data limitations. Future research should examine whether propping tendencies differ systematically across small, medium, and large connected transactions. Such analysis could inform regulatory discussions regarding whether size-based thresholds should be supplemented with additional criteria to more effectively protect minority shareholders from wealth expropriation.

This study opens several avenues for future research. First, the significant pre-announcement abnormal returns observed in this study warrant investigation into potential information leakage mechanisms and insider trading activities surrounding connected transaction announcements. Second, future studies should examine the post-COVID-19 market dynamics, as the pandemic may have altered investor perceptions and regulatory environments

affecting connected transactions. Third, more detailed analysis of controlling shareholder motivations, the timing of propping versus tunneling activities, and the specific channels through which wealth transfers occur, would provide deeper insights into these complex corporate governance issues. Finally, longitudinal studies tracking the same firms over extended periods could help identify patterns of sequential propping and tunneling activities, addressing the temporal dynamics that this cross-sectional analysis cannot capture.

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