Competitive effects of US and international acquisitions: examining the abnormal returns to rivals of acquisition targets

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Abstract

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In the context of interconnected businesses and financial markets, we examine the competitive dynamics and the stock price discovery process of international acquisitions, and we measure its effects on the US market. To achieve this, we analyze a sample of large international and US acquisitions, and we compare its effects on the stock price abnormal returns of US-based rivals. This aims to improve our understanding of the information content of international mergers announcement.

We observe that international and US target acquisitions generate positive abnormal returns to the US-based rivals, but the effect is statistically significant only for US target acquisitions. We also observe that international deals are related to lower abnormal returns to the US rivals during the run-up period. The abnormal returns to the rivals during the run-up period are positively related to the abnormal returns to the targets. Also, we observe that smaller deal values are associated with higher abnormal returns to the rivals during the run-up period. We do not identify statistical differences to the rival's stock price abnormal returns when targets are publicly listed vs unlisted. We highlight several deal-specific and firm-specific characteristics that are statistically significant to explain the abnormal return to the targets, but that are not significant to explain the abnormal returns to the rivals. These include: the acquirer public status, the proportion of cash in the transaction, the premium paid, the horizontal nature of the deal and the identification of the target as Initial Industry Target.

The abnormal returns to the targets are consistent with previous studies. Targets of US and International acquisitions earn significant positive abnormal returns. US targets earn on average significant higher abnormal returns than international targets. Also, we observe that horizontal mergers are associated with higher abnormal returns to the targets than nonhorizontal mergers. Targets identified as Initial Industry Target realize significant lower abnormal returns. Finally, other deal-specific characteristics appear related to the abnormal returns to the targets, including the deal value, the acquirer public status, the proportion of cash in the transaction and the premium paid.

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> "Everybody in Wall St. is so smart, that their brilliance offsets each other. And that whatever they know is already reflected in the level of stock prices for the much, and consequently what happens in the future represents what they don't know."
>
> — Benjamin Graham 1894-1976

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1. Introduction

Mergers and Acquisitions (M&A) is a field of finance that attracts a lot of public and academic attention (Betton & al., 2008). In recent years, many high-profile M&A deals have been highlighted in the media and politicians have voiced anticompetitive concerns (Price, 2016). Mergers are particularly scrutinized when they involve large national champions (Powell, 2017). Some international mergers have been blocked by publicly-pressured politicians even after the regulators cleared the transaction (Bawania, 2019). Inversely, some large US domestic mergers have been blocked by foreign regulators such as the European Commission (Fox, 2002; Patterson 2001) citing anticompetitive risks.

Given the interconnected nature of business today, large deals with international reach are becoming more common. For instance, the proportion of cross-border mergers have increased significantly in recent years; some sources estimate 12% increase between the 1990s and 2015 (Sedar 2013; Powell, 2017). Yet, the general belief that mergers are systematically harmful to rivals remains (Brito, 2013; Molnar 2007) even though the empirical evidence does not support this hypothesis (Gaur, 2013).

Hence, the world is confronted to a situation in which the markets are global, but businesses have a national identity. This is why we are interested in studying the impact of international acquisitions on US firms. The measurable effects of international mergers could possibly differ from those of US mergers for various reasons, including: the depth of coverage by the financial press, the acquaintance of US investors with the firm, the liquidity of the stock on its trading

exchange, the timing of the announcement (e.g. during US thanksgiving week), the economic outlook of the national market in which the target operates, etc.

Our sample of international firms are all large firms which are cross-listed (either stock of ADR) in the US. These international firms were selected as they already have a presence in the US so we would expect the greatest cross-border impact of their acquisition activity. While numerous papers have studied the competitive dynamics of mergers and its effects on the merging firms and their rivals (Eckbo, 1983; Song 2000), few have focused precisely on international mergers and its competitive effects on the US domestic rivals.

This study aims to extend our understanding of the competitive dynamics of international mergers and acquisitions on the US domestic market by analyzing the price discovery process around the time of the merger announcement. With a focus on large transactions, we compare the stock price Cumulative Abnormal Return (CAR) of US rivals for transactions involving either International or US targets. We include and compare firm-specific and deal-specific characteristics that have been infrequently documented in previous studies (Song, 2000). As such, we identify deals that lead merger waves (i.e. Initial Industry Targets) and compare the abnormal returns with deals that happened later in merger waves (i.e. Lagging Industry Target). This is intended to test whether deals that occur early in merger waves lead to higher abnormal returns. Some have argued that the "degree of a surprise" of a deal has an effect on the target and the rivals' stock price (Song, 2000). Also, we distinctly identify horizontal and nonhorizontal deals to test the stock price abnormal returns in both situations. Some work on the topic have focused only on horizontal deals (Eckbo, 1985; Shahrur, 2005; Clougherty, 2009). See the

section 2 of this document for our complete literature review. We also document the status of the acquirer (private or public status, US or international) to analyze whether this has a measurable effect on the CAR. Finally, our study includes deals that involved publicly listed targets as well as unlisted targets. From this information, we compare the abnormal return to rivals of both listed and unlisted targets as we believe this has not been tested is such a way before. For more specifics on our hypotheses, see the section 3 of this document. Section 4 and 5 provide the details about our data and our methodology respectively.

Using data from 1371 US acquisitions and 238 international acquisitions that were announced between 1998 and 2017, we observe positive CAR for the rivals of both the US and the international targets. However, this effect is statistically significant only in the case of US target acquisitions. We also observed that international target deals are related to lower abnormal return to the US rivals during the run-up period (from 49 days to 2 day before the announcement). The abnormal returns to the rivals are positively related to the abnormal returns to the targets, but this effect is also statistically significant only during the run-up period. We test this relationship independently across several industry groups and the effect is statistically significant in all industry groups. We observe that US target mergers generate statistically significant higher abnormal returns to the rivals compared to mergers involving international targets. We also observe that smaller deal values are associated with higher abnormal returns to the rivals during the run-up period. Lastly, we compare the abnormal returns to the rivals for deals involving publicly listed targets and unlisted target. We did not find any statistical relations between the unlisted target deals and the abnormal returns to the US rivals.

Interestingly, several firm-specific and deal-specific characteristics that are statistically significant to explain the abnormal return to the targets are not statistically significant to explain the abnormal return to the rivals. Horizontal mergers generate significant higher abnormal return to the targets at the time of the merger announcement (-1 day to +1 day) but they do not affect the CAR of the rivals. Firms identified as Initial Industry Targets generate lower abnormal returns to the targets at the time of the mergers announcement, but the effect is not statistically significant for the rivals. Other deal-specific and firm-specific characteristics appear to be related to the abnormal returns to the targets but aren't related to the rivals, including the acquirer public status, the deal value, the proportion of cash in the transaction and the premium paid by the acquirers. See the Section 6 of this document for more the details on our results.

This study brings an international perspective to previous research that focused on the US or on a single geographic region. Our results on the abnormal returns to the US rivals of International and US targets offers new insight about the price discovery process in the field of mergers and acquisition. This improves our understanding of the information content of international mergers announcement by empirically observing that US and International mergers generate a different effect on US-based rivals. We identify several deal characteristics that are related to the target abnormal returns but aren't related to the rivals' abnormal returns – except for the deal value that has a statistically significant effect on both the rivals and the targets. Yet, the measured CARs are consistent with the literature, suggesting that targets and their rivals earn positive abnormal returns at the time of the merger announcement. This study and its results certainly extend our understanding of the competitive dynamics in the field of mergers and acquisitions.

2. Literature review

Abnormal returns to targets and rivals

Academics have studied the market reactions of mergers & acquisitions for several decades (Dodd(1977), Eckbo (1983), Mitchell & Mulherin (1996), Song (2000), Clougherty (2009)). Several studies have focused on the short-term market reaction to either the bidder or the target stock price, including Dodd (1977) who found that stockholders of both successful and unsuccessful target firms earn large positive abnormal returns. He also found that successful bidders earn significant positive abnormal returns.

The potential anticompetitive effects of mergers & acquisitions have been studied via the rivals, starting with Eckbo (1983) and the "collusion hypothesis". This hypothesis explains the empirical observation that rivals of acquisition targets earn significantly positive abnormal returns at the time of the merger proposal announcement. The rationale is that M&A tend to reduce the intensity of competition in the industry (e.g. lower output or higher prices), therefore; it would increase the likelihood of collusion among remaining rivals. Although Eckbo (1983) confirmed that rivals CAR are positively impacted by the merger announcement, the analysis could not demonstrate any anti-competitive or competitive effects. So the collusion hypothesis could not be retained to explain the positive abnormal return to rivals of targets. Thus, the effects to the rival's stock price would most likely be attributable to a potential increase of efficiency coming from the acquirer. This can take several forms, including a new technology, a better cost-structure, enhanced managerial methods or greater investment policy. This "productive efficiency" hypothesis could also explain why some rivals stock price are negatively affected by mergers.

Industry shocks and Initial Industry Targets

While studying the stock price effects of takeover announcements, Mitchell & Mulherin (1996) observed patterns among industries: deals within industries tend to cluster within a narrow range during a given sample period. Generally, they observe that half of the takeovers in an industry tend to occur within one fourth of the sample period. In some industries, 83% of the mergers occurred within 2 years – while the sample period was 8 years. This paper introduces the concept of industry shock to describe the trigger leading to the 1st deal of a series of deals within an industry (i.e. Initial Industry Target). Precisely, it was observed that half of the takeovers in a given industry occurred in only 25% of the sample period. This not only suggests that common factors influence the takeovers occurrence, but also means that external factors have a significant influence over the level of M&A activities in a given industry. This insightful observation suggests that both firm-specific and industry-specific characteristics can potentially have an influence on the likelihood of mergers and its competitive effects.

Song (2000) tested a different model that could explain the positive abnormal return to the rivals of acquisition targets that was documented almost two decades earlier by Eckbo (1983). The paper empirically tests "the acquisition probability hypothesis" which states that rivals earn positive abnormal returns to the extent that their probability of becoming a target. This hypothesis suggests that once an industry shock occurs (i.e. an acquisition is announced in a given industry), it prompts a re-evaluation of the rival's market value based on the new competitive environment. The market evaluates the characteristics of the deal just announced and whether any rivals could be the next target. Using 141 US mergers announced between 1982 and 1991, Song (2000) finds that rivals of Initial Industry Targets generate significant positive

abnormal returns. They also find that the magnitude of this abnormal return can be explained by several variables associated with the probability that the rivals will become a target such as the "degree of a surprise".

Horizontal vs nonhorizontal mergers

Healy (1992) examines the post-merger performance of 50 large US mergers through financial reporting metrics (cash flow, balance sheet assets, market value of assets, stock price, etc.). The analysis suggests that merging firms, on average, demonstrate improvement in financial performance after the merger. Also, the paper reports a strong positive relationship between the targets stock price abnormal return at the time of the announcement and post-merger financial performance. Interestingly, the post-merger financial performance improvement are more significant when merged firms have over-lapping businesses (e.g. like in horizontal mergers).

Snyder (1996) suggests another hypothesis to explain the positive/negative effects to rivals of acquisition targets. Focusing on the buyer-supplier relationship, the paper proposes a theoretical model inferring that larger buyers can obtain better prices from suppliers than smaller buyers. The model also suggests that when buyers grow through mergers (no change in industry output, but the average buyer becomes bigger), then both the merging firms and its rivals (i.e. buyers) are benefiting with increased profits at the expense of the sellers who are confronted by bigger clients. The rational is that when a seller faces a more concentrated buyer industry, the cost of losing a customer grows. This new situation becomes an incentive for the seller to offer discounts. Inversely, the model also suggests that the effect on the rivals is negative when a buyer does not reduce the industry concentration (e.g. a vertical merger that produces a bigger buyer). In this situation, the growing buyer benefits from lower prices, but the rivals don't. While the model is built with the knowledge from several past empirical studies, it is not tested

empirically in this paper. This model and variations of it are often referred as the "buyer power" hypothesis (Shahrur, 2005) or the "market power" theory (Eckbo, 1983). Alas, the model does not compare the pricing power of firms merging in the same industry (horizontal merger) vs firm merging from a separate industry (vertical merger), but it nevertheless suggests that horizontal mergers benefits the targets and the rivals while nonhorizontal mergers benefits the targets but disadvantage the rivals.

"Productive efficiency" hypothesis to explain the abnormal returns to targets and rivals

Maksimovic (2001) studied the market for corporate assets and the factors associated with the probability of asset transfer. Among the findings, it is noted that the probability of mergers and sell-offs are higher when a specific target is less productive (i.e. profitable) than the industry rivals, or when the industry experiences a positive demand outlook. The paper's main conclusion is that firms have differing levels of ability to exploit assets so that asset transfer is the means by which assets are redeployed to firms with better cost-structures. In other papers, this is sometime referred as the "productive efficiency" hypothesis (Eckbo, 1983). While "productive efficiency" could explain the positive abnormal return to the targets (e.g. the efficient acquirer will revitalize the underperforming target), it does not explain the abnormal return to rivals. The rival firms can be positively impacted if the acquisition signals that a new efficiency booster just joined the industry (such as a technology company) or the rival firms can be negatively impacted if the acquisition signals that a weak target is about the become more competitive.

Shahrur (2005) studied the effect of mergers on rivals, suppliers and customers. Using a sample of 463 horizontal takeovers from 1987 to 1999, the study compares the abnormal returns of the merging firms to portfolios of rivals, suppliers and customers in order to empirically test the effectiveness of 3 hypothesis of this field: namely the "collusion hypothesis" as originally tested by Eckbo (1983), the "buyer power" hypothesis described by Snyder (1996) as well as the "productive efficiency" as per Maksimovic (2001). It is observed that abnormal returns to the merging firms (combined wealth effect) are significantly positively correlated to the abnormal returns of separate portfolios of rivals, suppliers and customers. This is consistent with the "productive efficiency" hypothesis. Also, the observed effects on the suppliers and their customers are consistent with the "buyer power" hypothesis: the study finds no relation between horizontal mergers that increase industry concentration and the abnormal returns to suppliers and the customers. However, the results are consistent with the rejection by Eckbo (1983) of the "collusion hypothesis": the change in industry concentration is significantly negatively correlated with the abnormal return of the merging firms as well as the rivals.

More recently, Uhlenbruck (2017) studied how mergers and acquisitions impact an industry's competitive dynamics. They observe that rivals that share certain characteristics with the merging firms (customers, capabilities, suppliers) react strongly to the deal announcement. These rivals took competitive actions to strengthen their position against the new entity. While, the study doesn't look at the rivals' stock price reaction, its conclusions are compatible with the empirical evidence that rivals generally benefit from mergers and acquisitions.

Abnormal returns to rivals in an international context

Clougherty (2009) studied horizontal mergers and its effects on rivals. The study uses data from 165 large M&A that occurred between 1990 and 2002 as well as a selection of 577 rivals. The sample is predominantly composed of European businesses. The results are consistent with previous studies: both targets and rivals experience positive abnormal returns around the date of the merger announcement. The study also tests whether the abnormal returns are higher when the mergers occur earlier in mergers waves (this is intended to replicate the "degree of a surprise" concept of Song (2000)). The results suggest that target abnormal returns are higher earlier in mergers waves (i.e. pre-crest) but abnormal returns to the rivals are not related to when the merger happens during mergers waves: suggesting that the "degree of a surprise" has no influence on the abnormal returns to the rivals. This is inconsistent with the "acquisition probability" hypothesis. Finally, the study splits the mergers into 3 categories to evaluate the influence of geographic characteristics on targets and rivals' abnormal returns. The categories are: Intra-European, Extra-European and Cross-Euro-Border. They observed that targets and rivals earn positive abnormal returns in all geographic context – except the abnormal returns for Cross-Euro-Border rivals was not significant and near zero in value, suggesting that Cross-Border horizontal mergers do not significantly affect rivals stock price.

Gaur (2013) study the market reaction of the acquirer's rivals using a sample of complete and incomplete M&A announced in China from 1993 to 2008. They propose the "growth probability" hypothesis which suggests that M&A announcements signal to the market that the acquirer's industry is growing. This new information would prompt a re-evaluation of the acquirer's rivals, resulting on average in a positive market reaction. They find support for the

"growth probability" hypothesis as the acquirer rivals' market reaction was significantly positive when the acquirer's abnormal return was also positively. Table 1 summarizes the findings of the literature review and the main takeaways used to structure our hypothesis in section 3.

Table 1: Summary of literature review

Topic	Observation	Reference
Abnormal returns to targets or rivals	Both targets and rivals earn significant positive abnormal returns.	Dodd (1977) Eckbo (1983)
Industry shocks and Initial Industry Targets	Firm-specific and industry-specific characteristics can influence on the likelihood of mergers and its competitive effects. Rivals of Initial Industry Targets earn significant positive abnormal returns.	Mitchell & Mulherin (1996) Song (2000)
Horizontal vs nonhorizontal mergers	Merging firms which have overlapping businesses show stronger improvement in financial performance after the merger. Horizontal mergers benefits the targets and the rivals while nonhorizontal mergers only benefits the targets.	Healy (1992) Snyder (1996)
"Productive efficiency" hypothesis to explain the abnormal return to rivals	When firms change hands, the new owner brings "productivity" elements that benefits the targets. The effects to the rivals can be positive or negative. Abnormal returns to the horizontal merging firms are significantly positively correlated to the abnormal returns' rivals. Rivals that share certain characteristics with the merging firms display competitive aggressiveness reaction following the announcement.	Maksimovic (2001) Shahrur (2005) Uhlenbruck (2017)
Abnormal returns to rivals in an international context	Horizontal & European targets and rivals experience positive abnormal returns around the date of the merger announcement. The "degree of a surprise" has an influence on the target but no influence on the abnormal returns to the rivals. Cross-Euro-Border horizontal mergers do not significantly affect rivals stock price. Chinese acquirer rivals' market reaction is significantly positive when the acquirer's abnormal return is also positive.	Clougherty (2009) Gaur (2013)

3. Hypothesis

Abnormal returns to international rivals and targets

There are few studies about the abnormal returns to rivals in an international context. The articles covered in our literature review focus on different geographic areas and their conclusions are not directly comparable to our study. On one side, Clougherty (2009) suggests that Cross-Euro-Border horizontal mergers do not significantly affect rivals stock price. However, they observe significant abnormal returns to the rivals in the case of Intra-Euro horizontal mergers. On the other side, Gaur (2013) look at the acquirer's rival's abnormal returns in China and found a positive relationship between the acquirer's abnormal returns and their rivals. Since our dataset includes large international companies (such as Cadbury, Reuters and Tommy Hilfiger) that are important enough to be listed on CRSP, we envisage that the announcement of a merger would have an impact on the US financial markets just as it would for a comparable merger involving a US-based target. We measure this effect by calculating the CAR of the targets and the rivals. Therefore, we anticipate that rivals of both US and international targets earn significant positive abnormal returns (i.e. no effects from International Target Status). Thus:

Hypothesis 1-A (rivals):

US and International M&A generate a similar effect on the US rivals (no effects from International Target Status)

Hypothesis 1-B (targets):

US and International M&A generate a similar effect on the targets (no effects from International Target Status)

Industry shocks and Initial Industry Targets

Based on our literature review and the empirical evidence behind "the acquisition probability hypothesis" by Song (2000), we anticipate that Initial Industry Targets would generate more reaction from the financial markets since they fall in line with the "degree of a surprise" concept. We measure this effect by calculating and comparing the CAR of the Initial Industry Target deals and the Lagging Industry Target deals. Therefore, we anticipate that Initial Industry Target deals are associated with higher abnormal returns to the rivals (vs Lagging Industry Targets) as well as higher abnormal returns to the targets. Thus:

Hypothesis 2-A (rivals):

Initial Industry Target deals generate more positive effects to the rivals (vs Lagging Industry Targets)

Hypothesis 2-B (targets):

Initial Industry Target deals generate more positive effects to the targets (vs Lagging Industry Targets)

Horizontal vs nonhorizontal mergers

Based on our literature review of Healy (1992) and Snyder (1996) along with the "buyer power" hypothesis and the empirical evidence that horizontal mergers generally benefit both the targets and the rivals, we anticipate that we can observe a similar effect in our data. We measure this effect by calculating and comparing the CAR of the horizontal and the nonhorizontal deals. Therefore, we anticipate that horizontal mergers are associated with higher abnormal returns to the rivals (vs nonhorizonral mergers) as well as higher abnormal returns to the targets. Thus:

Hypothesis 3-A (rivals):

Horizontal mergers generate more positive effects to the rivals (vs nonhorizonral mergers)

Hypothesis 3-B (targets):

Horizontal mergers generate more positive effects to the targets (vs nonhorizonral mergers)

International acquirers

There are few studies about the abnormal returns to the rivals in an international context, so we find it valuable to measure the effects of the international (or US) acquirer status on the targets and the US domestic rivals. Since our database include both US and international deals of large scale, we anticipate that the international status of the acquirer will not have a significant effect on the price discovery process of the US domestic rivals following the merger announcement. Here, we are using the same logic as for Assumption 1-A/B: an acquisition of +$200M for a large CRSP listed target would most likely trigger a reaction across the financial markets (and the US-based rivals) notwithstanding if the acquirer is based in the US or Internationally. We measure this effect by calculating and comparing the CAR. Therefore, we anticipate that International acquirer deals are not associated with higher abnormal returns to the rivals (vs US acquirer deals) and are not associated with higher abnormal returns to the targets. Thus:

Hypothesis 4-A (rivals):

US and International Acquirer deals generate a similar effect on the US rivals (no effects from International Acquirer Status)

Hypothesis 4-B (targets):

US and International Acquirer deals generate a similar effect on the targets (no effects from International Acquirer Status)

Listed vs unlisted targets

Our dataset includes 264 targets that were not publicly listed at the time of the merger announcement. These are large companies that were publicly listed in the past and remained listed on CRSP. We decided to keep the transactions involving unlisted targets to measure the effects of private deals on the rivals. We anticipate that unlisted target deals would not generate as much effects on the rivals since a lot of information about the deal is not publically disclosed in a private transaction (mainly the premium paid and the information content of the target stock price adjustment). We obviously cannot measure the CAR of the target since the target itself is not publicly listed but we anticipate that unlisted target deals are associated with lower abnormal returns to the rivals (vs listed target deals). Thus:

Hypothesis 5-A (rivals):

Unlisted target deals generate a smaller positive effect on US-based rivals (vs listed target deals)

Table 2 summarizes our hypothesis and provide a condensed description of our expected results.

Table 2: Summary of hypothesis and expected observations

Explanatory variable	Hypothesis #	Dependent variable	Expected observations	Expected relationship between explanatory and dependent variables
International / US targets	1-A	Rival CAR	US or International targets ⇨ similar effect on the CAR	Neutral CAR should be similarly positive for US and Intl deals so the regression coefficient will not display any explanatory power. Consistent with Gaur (2013)
	1-B	Target CAR		
Initial industry target	2-A	Rival CAR	Initial Industry Target ⇨ higher CAR	Positive Initial Industry Target deals are associated with the "degree of a surprise" concept of Song (2000) so the regression coefficients should be positive.
	2-B	Target CAR		
Horizontal mergers	3-A	Rival CAR	Horizontal Mergers ⇨ higher CAR	Positive Horizontal deals are associated with higher CAR as per Snyder (1996) so the regression coefficients should be positive.
	3-B	Target CAR		
International acquirers	4-A	Rival CAR	US or International Acquirer deals ⇨ similar effect of the CAR	Neutral CAR should be similarly positive for deals involving US or intl. acquirer so the regression coefficients should not display any explanatory power. Consistent with Gaur (2013)
	4-B	Target CAR		
Unlisted target	5-A	Rival CAR	Unlisted target deals ⇨ lower CAR	Negative CAR should be lower for unlisted target deal since the announcement expose less information content than public deals. The regression coefficients should be negative.

4. Data

Mergers & Acquisitions dataset

We begin with a list of 46,316 US and international mergers & acquisitions transactions that occurred between 1998 and 2017 retrieved from the Thomson Reuters SDC M&A database. This list includes 18,200 domestic (United States) and 28,116 international (non-US target) transactions with a disclosed deal value of more than $200M. We then only keep the deals that led to a controlling interest to the acquirer (when acquirers owned more than 50% of the target shares after the transaction). This also excludes all deals that were not completed. This brings down the list of dataset to 11,377 US and 17,406 International mergers. To avoid duplication, we also removed the US & Canada deals from the International dataset (IMA). We consider that the US and the Canadian markets are well integrated so the targets based in Canada are part of the "Domestic" deal category. Coincidently, no Canadian target deals are left in the final dataset.

Then, we cross-verify which targets among the 27,431 remaining are also listed in the Center for Research in Security Prices (CRSP) database and we keep only those listed. The number of targets that matches our SDC download and the CRSP database amount to 3,772, including 3,362 US targets and 410 international targets.

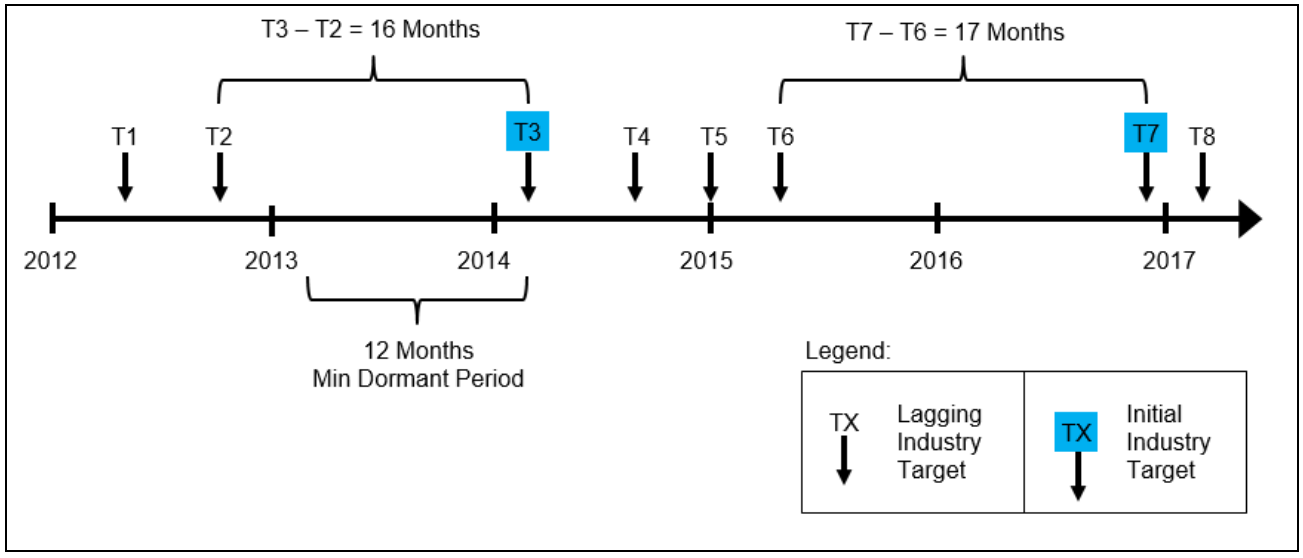
Finally, we eliminate all duplicate transactions and data entries with multiple tickers associated on a single PERMNO security identification number. We obtain 1,609 mergers, including 1,371 US target transactions and 238 international target transactions. Table 3 summarizes the screening of the transactions leading to our merger & acquisition dataset.

For most of the analysis, we removed the mergers in regulated industries such as financials and utilities (SIC code 6000 and 4000 respectively) since this is the standard practice in the field of finance (Song, 2000). Table 4 shows the detailed composition of the transactions included in our dataset as well as the breakdown of deals per target nation. It also indicates the resulting transactions once the financials and utilities exclusion has been applied. Figure 2 indicates the number of M&A per calendar year and Figure 3 provides the distribution of M&A per industry.

Identifying initial industry targets

There are 244 targets that have been identified as initial industry targets (i.e. transaction that lead mergers wave). Our approach is similar to the one used by Song (2000). We grouped the list of 1,609 targets by industry (3-digit SIC code provided by SDC Platinum) and calculated the number of months between deal announcements in each industry. All mergers that occurred more than 12-month after a preceding one (dormant period) have been identified as an initial industry target. In this work, the targets that are not identified as initial industry target are referred as lagging industry targets.

Figure 1: Identification of Initial Industry Targets



Identifying horizontal mergers

There are 1004 mergers have been identified as horizontal mergers. Similar to our approach with the initial industry targets, the horizontal mergers were identified when an acquirer and a target share the same 2-di

git SIC code. In this work, the transaction that are not identified as horizontal are referred as nonhorizontal since our methodology doesn't distinguish between vertical mergers and mergers involving outsider players (i.e. new entrants).

Table 3: Mergers & acquisitions dataset

Starting with a list of 46,316 US and international mergers & acquisitions retrieved from the Thomson Reuters SDC M&A database, we apply selection criteria that reduce the number of deals to 1371 domestic and 238 international. The remaining deals occurred between 1998 and 2017 and all targets are listed in SDC and on CRSP. Remaining deals have been completed and there are no duplicates.

Screening transactions for dataset build up	Source of data	N Domestic	N International	N All Combined
All Domestic (MA, OMA) & International Merger(IMA) 1998-01 to 2017-12 with deal value >= $200M	Thompson Reuters SDC	18,200	28,116	46,316
Percent of Shares Owned after Transaction: 50 to <= HI	Thompson Reuters SDC	11,377	17,406	28,783
Target Nation: NOT or IS Canada & US	Thompson Reuters SDC	11,377	16,054	27,431
Transfer CUSIP (6) to PERMNO	Center for Research in Security Prices (CRSP)	3,362	410	3772
Matching PERMNO with Mergers (removing duplicates when unique CUSIP/PERMNO return multiple tickers)	Center for Research in Security Prices (CRSP)	1,371	238	1609

Table 4: Mergers & acquisitions categories & statistics

We use the information retrieved from the Thomson Reuters SDC M&A database to categorize the 1609 deals in our M&A dataset. The right panel shows the same dataset that excludes the firms in the financial and the utility industries. There are 1106 mergers left in the unregulated mergers dataset and this is the one we use in the regression analysis of Section 6.

	Complete dataset *(All SIC codes)*		**All unregulated mergers** *(No SIC code 4000 & 6000)*
All categories	1609		1106
US targets	1371		951
International targets	238		155
Horizontal mergers	1004		595
Nonhorizontal mergers	605		511
Initial Industry Targets	244		182
Lagging Industry Target	1365		924
Unlisted targets	264		183
Listed targets	1345		923
International Acquirer	367		257
US acquirer	1242		849
Deal Value ($M)			
Average	3175		2670
Median	915		887
Min	200		200
Max	98189		68445
Target Nation			
US	1371		951
China	29		25
UK	26		20
Netherlands	23		8
Israel	20		18
Bermuda	18		0
Ireland	13		7
Argentina	12		7
Hong Kong	11		6
Switzerland	11		10
Germany	8		8
Italy	8		6
France	7		5
Others	52		35

Figure 2: Distribution of mergers & acquisitions per calendar year

Number of M&A transactions per calendar year in our sample of 1609 US and International mergers. The year is designated based on the announcement date. Data retrieved from the Thomson Reuters SDC M&A database.

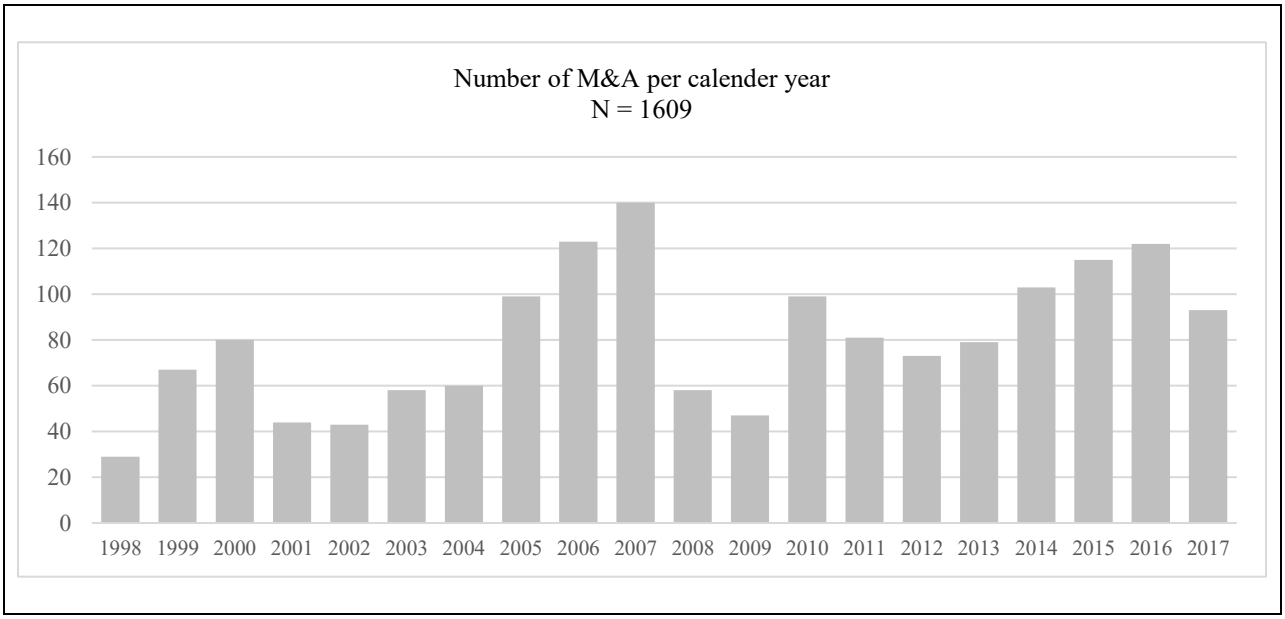
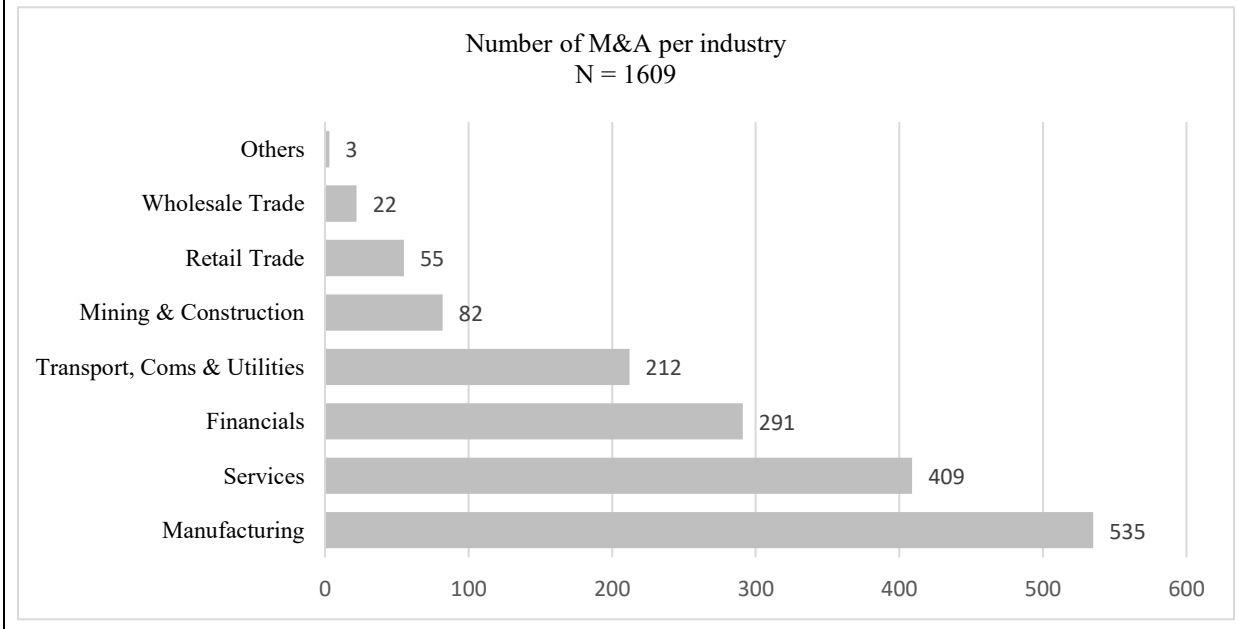


Figure 3: Distribution of merger & acquisitions per industry

Number of M&A transactions per industry in our sample of 1609 US and International mergers. The industry is designated based on the target industry. Data retrieved from the Thomson Reuters SDC M&A database. See the appendix for a list of SIC codes and long-form industry descriptions.



Rivals dataset & portfolios

In order to analyze the abnormal returns to the target's rivals, we compiled a list of all companies listed in the Center for Research in Security Prices (CRSP) database that were active between 1998 and 2017. This dataset provides the PERMRNO security identification number as well as the Standard Industrial Classification (SIC) code for each company. Out of the 32,704 companies listed in CRSP, we obtained 19,247 companies that fit within our time period.

For each of the 1,609 mergers composing the mergers & acquisitions dataset, we retrieved all companies from the rival dataset sharing the same 3-digit SIC code to form portfolios of rivals. In each portfolio, we removed all rivals that were not active (i.e. publicly listed and available in CRSP) during the specific year of target announcement. Finally, we removed from each portfolio the targets as well as the acquirers to make sure all firms in the portfolio are not a party directly involved in the deal announced. We obtained a dataset of 233,305 rivals grouped into 1,609 portfolios. The average portfolio size is 145 rivals. Table 5 provide a breakdown of rivals for various category of mergers. We note that the portfolio size is significantly smaller for rivals of initial industry targets (32 rivals on average). This seems acceptable since large portfolios have a larger count of mergers per year, thus, fewer deals can potentially be identified as initial industry target (based on a 12-month dormant period). We also note that firms which are part of the Retail Trade (SIC code 5000-5100) and Wholesale Trade (SIC code 5200-5900) industries have portfolio smaller than 25 on average. There is no obvious explanation to this.

Since the portfolio of rivals are composed of several firms, there is a risk that multiple mergers occurred during the estimation or the observation window of the event studies. Such financial

events would potentially affect the stock price of the rivals and subsequently the calculated CAR for the portfolio of rivals. However, this phenomenon cannot occur for the Initial Industry Target deals since the dormant period (see section 5) is longer than the estimation window. Ultimately, we do not find any CAR effects associated with the Initial Industry Targets so we assume confidently that there are no "contamination" of multiple mergers events in our rival's dataset.

Table 5: Rivals dataset & portfolio size

Number of portfolio of rivals for various categories of mergers and average portfolio size per category. The average portfolio size for all 1609 portfolios is 145 rivals. The average portfolio size for the 1106 unregulated mergers is 176 rivals. We note that the portfolio size is significantly smaller for rivals of initial industry targets (32 rivals on average), Wholesale Trade & Others.

Portfolio of rivals	**N**	**AVG portfolio size (p)**
All portfolios, all industries	1609	145
US targets	1371	174
Intl target	238	117
Manufacturing	535	131
Services	409	280
Financials	291	192
Transport, Coms & Utilities	212	71
Mining & Construction	82	94
Retail Trade	55	25
Wholesale Trade	22	19
Others	3	19
All unregulated mergers *(No SIC code 4000 & 6000)*	**1106**	**176**
US targets	951	181
Intl target	145	144
Horizontal	595	190
US targets	517	197
Intl target	78	140
Initial Ind. Targets	182	32
US targets	161	33
Intl target	21	22
Unlisted Targets	183	147
US targets	149	154
Intl target	32	115
International Acquirer	257	161
US targets	133	187
Intl target	124	134

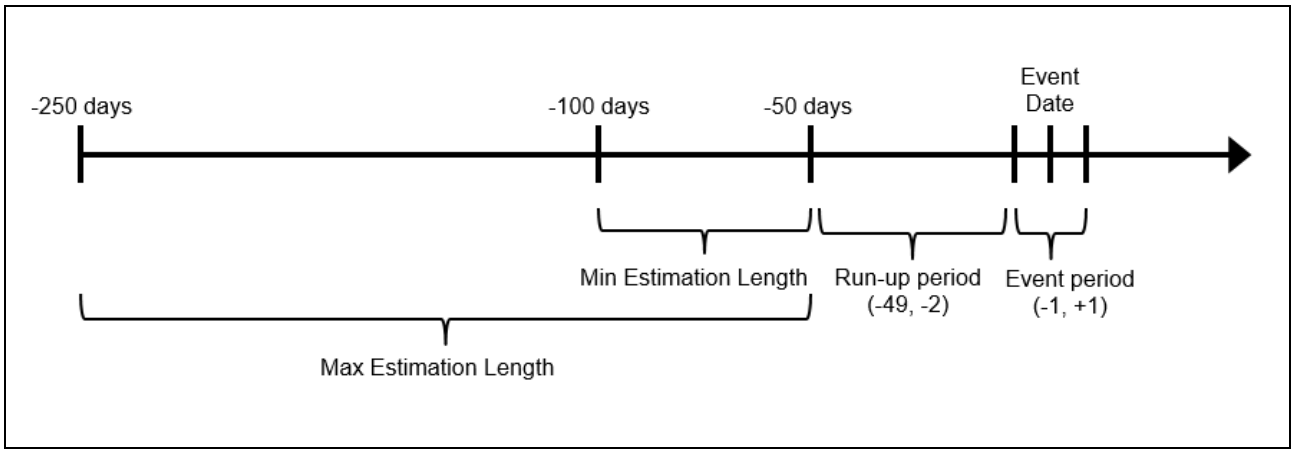
5. Methodology:

Analyzing abnormal return to targets

Using the date of the announcement and the PERMNO of each target, we perform event studies in Eventus® 9.0 to calculate the target Cumulative Abnormal Return (CAR) around the date of the merger announcement. We perform several event studies by grouping the targets into different sub-group (international target, horizontal, initial industry target, international acquirer) in order to obtain groups of Mean CARs associated with our hypothesis as well as target-specific CARs. We compare 2 event windows in these event studies: the run-up period [-49, -2] and the actual period of the event [-1, 1]. The results of the target event studies are shown in section 6, table 8. Figure 3 presents the event study timeline. The following parameters are being used:

Type of Event Study: Daily & Cross-Sectional Daily
Market Index: CRSP Equally Weighted
Estimation Period (EST): End 50 days before the event
Minimum Estimation Length (MINESTN): 50 days
Maximum Estimation Length (ESTLEN): 250 days
Autodate: Yes
Estimation Method: Ordinary least squares (OLS)
Event period search: +/-25 days

Figure 4: Event study timeline & parameters



Analyzing abnormal return to rivals

Using the portfolios of rivals and the same methodology we used to calculate the abnormal return to the targets, we perform event studies in Eventus® 9.0 to calculate the Cumulative Abnormal Return (CAR) for rivals of the targets. Since we are analyzing the stock price of a portfolio of rivals around a single event (the target merger announcement), we use the function Group in Eventus. This implies that each rivals are assigned to a group ID that has a single event date (i.e. the associated target merger announcement date). The software combines each observation into an equally weighted portfolio. Then, the portfolio of rivals is being used in the event study as a single security to calculate the cumulative abnormal return for the entire portfolio. This later output variable is the one being used as the dependent variable in our linear regression 4 to 14 (see table 7). The Group event studies parameters used are the same as those described above for the target Event studies and showed in Figure 3. The results of the rival event studies are shown in section 6, table 10.

Analyzing the relationship between the abnormal returns to targets and deal characteristics

In order to validate the hypothesis and the statistical significance of our selected deal-specific and firm-specific variables on the target CAR, we perform several linear regressions analysis using the target CAR as the dependant variables. Precisely, we perform 4 regressions using 2 linear models and the same 2 event windows as for the CAR calculation: the run-up [-49, -2] and the actual event period [-1, +1]. Regressions 1-A and 1-B include only the independent variables that are associated with our hypothesis. Regressions 2-A and 2-B include all variables from our dataset. A full description of the variables is available in the Appendix. Table 6 indicates the regression functions used. The results are discussed in section 6 of this document.

Table 6: Regression functions for abnormal returns to targets

There are 4 regressions using 2 linear models. Regressions 1-A and 2-A use the run-up CARs [-49, -2] and regression 1-B and 2-B use the event CAR [-1, +1] as the dependent variable. Regressions 1-A and 1-B include only the independent variables that are associated with our hypothesis. Regressions 2-A and 2-B include all variables from our dataset. A full description of the variables is available in the Appendix.

Regression #	Regression functions	Event Window
1-A	$CAR_{TARGET}(x) = \beta$ + Intl-Target(x) + Horizontal(x) + Initial-Industry(x) + Intl-Acquirer(x) + ε	CAR[-49, -2]
1-B		CAR [-1, 1]
2-A	$CAR_{TARGET}(x) = \beta$ + Intl-Target(x) + Horizontal(x) + Initial-Industry(x) + Log(Deal-Value)(x) + Consideration(x) + Premium(x) + Public-Acquirer(x) + Industry-Dummies + Year-Dummies + ε	CAR[-49, -2]
2-B		CAR [-1, 1]

Analyzing the relationship between the abnormal returns to the targets and the abnormal returns to the rivals

We perform several linear regressions analysis using the rival CARs as the dependant variable (an approach similar that the one we used for the regression 1-A/B and 2-A/B) but this time, the target CAR is added as an independent variable. Essentially, we perform 14 regressions, using 8 linear models. The regressions 4 to 6 have 2 versions of the same model using different event windows: the run-up [-49, -2] and the actual event window [-1, +1]. Table 7 indicates the regression functions used. A full description of the variables is available in the Appendix. The results are discussed in section 6 of this document.

Table 7: Regression functions for abnormal returns to rivals

There are 14 regressions using 8 linear models. All regressions use CAR_{RIVALS} as the dependant variable. The regressions 4 to 6 have 2 versions of the same model using different event windows: the run-up [-49, -2] and the event period [-1, +1]. Regression 7 to 10 use a mix of event windows. Regressions 11 to 14 use the same model as regression 4, but their data is limited to specific industry groups. A full description of the variables is available in the Appendix.

Regression #	Regression functions	Event Window
4-A	$CAR_{RIVALS} = \beta + CAR_{TARGET} + \varepsilon$	CAR[-49, -2]
4-B		CAR [-1, 1]
5-A	$CAR_{RIVALS}(x) = \beta + CAR_{TARGET}(x) + \text{Intl-Target}(x) + \text{Horizontal}(x) + \text{Initial-Industry}(x) + \text{Intl-Acquirer}(x) + \varepsilon$	CAR[-49, -2]
5-B		CAR [-1, 1]
6-A	$CAR_{RIVALS}(x) = \beta + CAR_{TARGET}(x) + \text{Intl-Target}(x) + \text{Horizontal}(x) + \text{Initial-Industry}(x) + \text{Intl-Acquirer}(x) + \text{Public-Acquirer}(x) + \text{Log(Deal-Value)}(x) + \text{Consideration}(x) + \text{Premium}(x) + \text{Portfolio-Size}(x) + \text{Industry-Dummy} + \text{Year-Dummy} + \varepsilon$	CAR[-49, -2]
6-B		CAR [-1, 1]
7	$CAR_{RIVALS\text{-}RUN\_UP} = \beta + CAR_{TARGET\text{-}RUN\text{-}UP} + CAR_{TARGET\text{-}EVENT} + \varepsilon$	Mixed
8	$CAR_{RIVALS\text{-}RUN\_UP} = \beta + CAR_{TARGET\text{-}RUN\text{-}UP} + CAR_{TARGET\text{-}EVENT} + \text{Neg-CAR-t-Run-up} + (CAR_{TARGET\text{-}RUN\text{-}UP})(\text{Neg-CAR-t-Run-up}) + \varepsilon$	Mixed
9	$CAR_{RIVAL\text{-}EVENT} = \beta + CAR_{TARGET\text{-}RUN\text{-}UP\_AND\_EVENT} + \text{Horizon-Initial}(x) + \varepsilon$	Mixed
10	$CAR_{RIVAL\text{-}EVENT} = \beta + CAR_{RIVAL\text{-}RUN\text{-}UP(}(x) + \text{Intl-Target}(x) + \text{Horizontal}(x) + \text{Initial-Industry}(x) + \text{Intl-Acquirer}(x) + \text{Log(Deal-Value)}(x) + \text{Consideration}(x) + \text{Premium}(x) + \text{Portfolio-Size}(x) + \text{Unlisted-Target}(x) + \varepsilon$	Mixed
Per Industry 11 12 13 14	$CAR_{RIVALS\text{-}RUN\_UP} = \beta + CAR_{TARGET\text{-}RUN\text{-}UP} + \varepsilon$	CAR[-49, -2]

6. Results:

Analyzing the abnormal returns to the targets

As describe in section 5, we perform several event studies to calculate the Cumulative Abnormal Return (CAR) for each target as well as the mean CAR for various groups of mergers. These groups are obviously associated with our hypothesis. The results are reported in Table 8. First, we find that the mean CAR for the entire sample is 6.67% during the run-up period [-49, -2] and 24.97% during the event period [-1, -1]. The magnitude of these two values are consistent with the literature: for example Song (2000) calculated the mean CAR for a portfolio of 141 target firms and obtained 5.26% during the run-up period and 17.77% during the event period. The proportion of positive CAR values among this sample is 62% for the run-up period and 90% for the event period. Both of these values are statistically significant at the 0.001 using a generic one-tail sign test. The results reported in Table 8 also provides a breakdown of the mean CAR for US and international target sub-group. The US targets generate 6.52% and 26.29% mean abnormal return during the run-up period and the event period respectively. The international targets generate 7.66% during the run-up (which is comparatively higher) but 16.09% during the event window (which is comparatively lower). These CAR values along with those from the other sub-groups cannot by themselves confirm any of our stated hypothesis. However, they are being used in the regression analysis below. Yet, we conclude from the results in Table 8 that the target cumulative abnormal returns are significantly positive in all deal characteristic categories (Horizontal, Initial Industry Target, International Acquirer and Public Acquirer) whether the targets are US or international. We also included, in Appendix, a table and a graph showing the target abnormal returns per industry.

Table 8: Cumulative abnormal returns (CAR) to target firms

Results are shown for target firms. Abnormal return to targets are calculated individually first using CRSP Equally Weighted market model during an estimation window of 50-250 days that does not include the 50 days preceding the event. The table shows the equally weighed average of the individuals target CAR. The symbols $, * , ** , and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (, < or) , > etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Event Study	N =	Mean CAR (%) [-49, -2] [-1, 1]	Positive (%) [-49, -2] [-1, 1]	Patell Z [-49, -2] [-1, 1]	Portfolio Time-Series (CDA) t [-49, -2] [-1, 1]	Generalized Sign Z [-49, -2] [-1, 1]
All Targets	922	6.67 24.97	62>>> 90>>>	12.637*** 163.840***	8.042*** 120.422***	8.728*** 25.539***
US targets	802	6.52 26.29	62>>> 91>>>	11.882*** 159.526***	7.257*** 117.048***	8.228*** 24.415***
Intl targets	120	7.66 16.09	61>> 82>>>	4.310*** 41.736***	3.838*** 32.230***	2.921*** 7.674***
Horizontal	532	6.85 27.22	64>>> 92>>>	9.920*** 128.754***	6.006*** 95.523***	7.380*** 20.400***
US targets	467	6.27 28.30	64>>> 93>>>	9.207*** 123.937***	5.104*** 92.173***	6.958*** 19.651***
Intl targets	65	11.00 19.46	63>> 83>>>	3.702*** 36.147***	4.328*** 30.628***	2.462** 5.690***
Initial Industry Targets	127	9.50 16.70	69>>> 83>>>	6.407*** 49.655***	5.112*** 35.929***	4.443*** 7.816***
US targets	111	8.63 18.32	68>>> 85>>>	5.578*** 50.124***	4.302*** 36.529***	3.976*** 7.758***
Intl targets	16	15.57 5.45	75> 75>	3.358*** 7.874***	3.542*** 4.959***	2.046* 2.046*
International Acquirer	215	9.99 20.23	69>>> 87>>>	8.639*** 68.769***	6.276*** 50.835***	6.185*** 11.510***
US targets	123	12.83 25.65	81>>> 94>>>	8.493*** 64.516***	5.947*** 47.575***	6.326*** 10.297***
Intl targets	92	6.20 12.99	59>>> 77>>>	3.386*** 30.530***	2.698*** 22.602***	2.140*** 5.689***
Public Acquirer	660	7.84 28.55	64>>> 92>>>	11.608*** 151.421***	7.587*** 108.410***	8.303*** 22.875***
US targets	590	7.94 29.69	64>>> 93>>>	11.006*** 147.775***	7.035*** 106.775***	7.992*** 21.921***
Intl targets	70	9.28 18.99	61> 87>>>	3.690*** 35.934***	3.856*** 31.571***	2.291* 6.598***

We perform 4 regressions analysis using 2 linear models and the same 2 event windows as for the CAR calculation: the run-up [-49, -2] and the actual event window [-1, +1]. The results are shown in Table 9. The definition of the variables are provided in Appendix.

Regressions 1-A and 1-B examine the effects of the international targets status, the international acquirer status, the horizontal nature of the deal and the Initial Industry Target label on the target CAR during the run-up period (1-A) and during the event period (1-B). The only statistically significant variable in the regression 1-A is Intl-Acquirer, suggesting that the international acquirer status is positively related to the target CAR during the run-up period. In the regression 1-B, the Intl-Target variable appear negatively related to the target CAR. This is consistent with our previous observations in Table 8 where the mean target CAR(-1, 1) is 16.09% for the international targets and 26.29% for the US targets. Thus, we need to reject hypothesis 1-B as the international status of the target has a negative effect on the abnormal returns to the targets (vs US status).

Also in regression 1-B, the Initial-Industry variable is significantly negatively related to the target CAR, suggesting that targets identified as Initial Industry Target are associated with lower abnormal returns. This is consistent with our observations in Table 8 where mean target CAR(-1, 1) is 16.09% for the Initial Industry Target and 24.97% for the entire sample. Thus, we need to reject the hypothesis 2-B as the targets identified as Initial Industry Target are not associated with higher abnormal returns to the targets (vs Lagging Industry Targets)

Also in regression 1-B, the Horizontal variable is significantly positively related to the target CAR, suggesting that horizontal deals are associated with higher abnormal returns. This is consistent with our observations in Table 8 where mean target CAR for horizontal mergers (27.22%) is higher than the CAR of all mergers (24.97%). From this results, we cannot reject the hypothesis 3-B since horizontal mergers are associated with higher target abnormal returns (vs nonhorizonral mergers).

Finally, the Intl-Acquirer variable has no statistical effects on the dependant variable in regression 1-B. This is not consistent with the average CAR in Table 8 where international acquirer deals have a lower average CAR than the full sample (20.23% vs 24.97%). Yet, results from regression 1-B suggests that there is no effects from International Acquirer Status on the target CAR, which is consistent with hypothesis 4-B. So we cannot reject the hypothesis for the event period.

Regressions 2-A/B use the same variables as regressions 1-A/B but they include additional deal-specific and firm-specific variables that we believe are worth comparing with the rival's regressions. The Public-Acquirer and the Consideration coefficients are positive and statistically significant for both event window. This suggests that the public acquirer status and the proposition of cash used in the transaction are positively related to the target abnormal returns. The Deal-Value variable is statistically significant for the regression 2-B only [-1, +1]. This suggests that smaller deal values are associated with higher target abnormal returns, during the event period only. Finally, the Premium variable is negatively related to the run-up CAR(-49, -2) but positively related to the event CAR(-1, 1). This is somewhat contradictory so we will compare this effect with the corresponding observation in the rival's regressions.

Table 9: Regressions relating abnormal returns of target firms to merging firms' characteristics and deal characteristics

Results of the linear regression analysis performed using SAS as per the regression functions presented in Table 6. All regressions use target CAR as the dependent variable. Regressions 1-A and 1-B include only the independent variables that are associated with our hypothesis. Regressions 2-A and 2-B include all variables from our dataset. A full description of the variables is available in the Appendix. The symbols * , ** , and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels respectively. The upper values are the parameters estimated and the values in brackets are the standard errors.

Regression / Variables	1-A CAR_t(-49,-2)	1-B CAR_t(-1, 1)	2-A CAR_t(-49,-2)	2-B CAR_t(-1, 1)
Intercept	0.05216	0.25137	-0.1027	0.19005
Intl-Target	-0.01895 (0.02856)	-0.08007* (0.04197)	0.00183 (0.02862)	-0.04755 (0.02955)
Initial-Industry	0.03138 (0.02433)	-0.09099*** (0.03575)	0.04354 (0.02677)	-0.03534 (0.03643)
Horizontal	0.00182 (0.01706)	0.05029** (0.02507)	0.00252 (0.01823)	0.01289 (0.01883)
Intl-Acquirer	0.04989** (0.02882)	-0.03330 (0.03350)	0.03465 (0.02306)	-0.03333 (0.02382)
Public-Acquirer			0.0653*** (0.01988)	0.08664*** (0.02053)
Log(Deal-Value)			0.00782 (0.00722)	-0.02029*** (0.00745)
Consideration			0.00107 (0.00023854)***	0.00053624** (0.00024633)
Premium			-0.00025134* (0.00011129)	0.00345*** (0.00011492)
Portfolio size			-0.0000564 (0.00005557)	-0.00003698 (0.00005739)
SIC 10-19			-0.02284 (0.14873)	-0.01942 (0.15359)
SIC 20-39			-0.01104 (0.14612)	0.03736 (0.15089)
SIC 50-51			-0.05497 (0.15737)	0.17905 (0.16251)
SIC 52-59			-0.04734 (0.14968)	0.00091866 (0.15457)
SIC 70-89			0.00721 (0.14661)	0.02990 (0.15140)
Year 1998-2001			0.02532 (0.03528)	-0.03534 (0.03643)
Year 2002-2005			0.01977 (0.02811)	-0.05067* (0.02903)
Year 2006-2009			-0.02482 (0.02312)	-0.06054** (0.02388)
Year 2010-2013			0.00671 (0.02337)	-0.00913 (0.02413)
N	922	922	922	922
R-Square	0.0075	0.0211	0.0523	0.5384
F Value	1.74	4.94	2.77	58.51
PR > F	0.1392	0.0006	0.0001	<0.0001

Analyzing the abnormal returns to the rivals

As describe in section 5, we perform several group event studies to calculate the Cumulative Abnormal Return (CAR) for each portfolio of rivals as well as the mean CAR for various sub-groups of mergers associated with our hypothesis. The results are displayed in Table 10. First, we find that the mean CAR for the entire sample is 0.24% during the run-up period [-49, -2]. and 0.37% during the event period [-1, +1]. The magnitude of these two values are consistent with the literature: for example Song (2000) calculated the mean CAR for a portfolio of 141 targets. Song (2000) obtained 0.39% during the run-up period and 0.40% during the event period. The proportion of positive CAR in our sample is 53% for the run-up period and 56% for the event period. This is also comparable to Song (2000) who obtained 53% and 58% for comparable windows. The run-up positive value is statistically significant at the 0.01 level while the event positive value is significant at the 0.001 level using a generic one-tail sign test.

The analysis also provides a breakdown of the mean CAR for US and international target sub-groups. The rivals of the US targets generate 0.33% and 0.42% mean CAR during the run-up period and the event period respectively. The proportion of positive values are 52% and 56% respectively and both are statistically significant. The rivals of the International targets generate -0.37% during the run-up and 0.09% during the event window. The proportion of positive values are 57% and 54% respectively but the latter is not statistically significant. In the Unlisted Targets sub-group, none of the mean CARs have statistically significant positive values. These results from Table 10 along with those from the other sub-group cannot by themselves confirm any of our stated hypothesis. However, we use the rival CARs as the independent variables the regression analysis that we perform next. Yet, we can conclude from Table 10 that the abnormal

returns to the rivals of international targets appear to be positive in more than 50% of sample, but the effect is statistically significant only during the run-up period [-49, -2]. We also included, in Appendix, a table and a graph showing the rivals' abnormal returns per industry.

Table 10: Cumulative abnormal returns (CAR) to rival firms

Results are shown for the US rivals of the target firms using the same 3-digit SIC codes. Abnormal return to the rivals are calculated by combining each observation into an equally weighted portfolio. There is one portfolio per target. Then, the portfolio of rivals are being used in the event study as a single security. The abnormal return of the portfolio is calculated using the CRSP Equally Weighted market model during an estimation window of 50-250 days that does not include the 50 days preceding the event. The table shows the mean CAR of the portfolios of rivals. The last column indicates the mean percentage of rivals that subsequently became a target (before 2017). The symbols $, * , ** , and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (, < or) , > etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Event Study	N =	Mean CAR (%) [-49, -2] [-1, 1]	Positive (%) [-49, -2] [-1, 1]	Patell Z [-49, -2] [-1, 1]	Portfolio Time-Series (CDA) t [-49, -2] [-1, 1]	Generalized Sign Z [-49, -2] [-1, 1]	Percentage of rivals that subsequently became a target
All Targets	1106	0.24 0.37	53>> 56>>>	2.826** 7.012***	1.141 7.226***	2.427** 4.293***	10.31%
US targets	951	0.33 0.42	52> 56>>>	2.918** 6.954***	1.443$ 7.336***	1.909* 3.920***	10.43%
Intl targets	155	-0.37 0.09	57> 54	0.094 1.228	-0.693 0.671	1.920* 1.278	9.57%
Horizontal	595	0.14 0.46	52 57>>>	1.333$ 6.134***	0.503 6.823***	1.210 3.505***	10.61%
US targets	517	0.27 0.47	52 56>>>	1.665* 5.507***	0.918 6.438***	1.069 2.829***	10.76%
Intl targets	78	-0.80 0.36	51 61>	-0.795 2.553**	-1.042 1.862*	0.360 2.172*	9.60%
Initial Industry Targets	182	0.08 0.49	50 58>>	1.806* 2.882**	0.122 2.847**	0.664 2.443**	5.83%
US targets	161	0.28 0.57	52 58>>	2.014* 3.060**	0.363 2.926**	0.762 2.339**	5.68%
Intl targets	21	-1.48 -0.11	48 57	-0.279 0.006	-0.813 -0.248	-0.134 0.739	7.00%
Intl-Acquirer	257	0.38 0.20	58>> 54)	1.472$ 2.614**	0.784 1.646*	2.731** 1.608$	10.10%
US targets	133	1.06 0.40	56) 56)	1.371$ 2.965**	1.449$ 2.186*	1.640$ 1.640$	10.93%
Intl targets	124	-0.31 -0.01	59> 52	0.851 0.783	-0.508 -0.058	2.4243* 0.626	9.22%
Public Acquirer	756	0.24 0.46	53> 57>>>	2.245* 7.010***	0.907 6.895***	1.966* 4.146***	10.90%
US targets	664	0.30 0.52	53> 57>>>	2.428** 7.184***	1.055 7.332***	1.976* 4.072***	11.05%
Intl targets	92	-0.15 0.04	52 51	-0.199 0.489	-0.216 0.209	0.536 0.328	9.77%
Unlisted Targets	183	0.27 0.27	50 49	1.494$ 0.700	0.521 2.135*	0.315 -0.129	8.58%
US targets	149	0.00 0.35	47 49	0.754 0.994	-0.002 2.384**	-0.537 0.046	8.36%
Intl targets	34	1.45 -0.07	65 47	1.924* -0.489	1.299$ -0.257	1.850* -0.209	9.53%

We perform 14 regressions analysis using 8 linear models. The regressions 4 to 6 are produced in 2 different variation using 2 event windows: the run-up period [-49, -2] and the actual event period [-1, +1]. The results are shown in Table 11. The definition of the variables are provided in Appendix.

We find that the target CAR variables are statistically significant to explain the rival CAR variables in the run-up period based on the observation in regressions 4-A, 5-A and 6-A. All CAR_t(-42, -2) coefficients are positive and significant. These results suggest that the abnormal returns to the targets are positively related to the abnormal returns to the rivals. We also tested this effect across various groups of industry to strengthen our empirical evidence. Table 13 shows the results of regression 11 through 14. We see that CAR_t(-49, -2) coefficients are positive and statistically significant across all industry groups. However, this effect is not statistically significant during the event period (-1, +1) as the target CAR coefficients of regression 4-B, 5-B and 6-B are not statistically significant.

Going back to Table 11, we observe that the international target coefficients are statistically significant and negative in the regressions 5-A and 6-A. This suggests that international targets are negatively related to the abnormal returns to the rivals. This is consistent with our previous observations in Table 10 where mean CAR for US target mergers (0.33%) is higher than the mean CAR for international target mergers (-0.37%). However, this effect is not statistically significant during the event period (-1, +1) as seen in regression 5-B and 6-B. Thus, we need to reject hypothesis 1-A as the international status of the target has a significant effect on the abnormal returns to the rivals. Put differently, these regressions suggests that US and International M&A do not generate a similar effect on the US rivals.

The Initial-Industry variable in regressions 5-A/B and 6-A/B has no statistical significance. This is consistent with the mean CAR in Table 10 which do not display a consistent behavior (mean CAR is lower than the full sample during the run-up but higher during the event period). Thus, we cannot accepts hypothesis 2-A as the Initial Industry Target deals are not associated with higher abnormal returns to the rivals (vs Lagging Industry Targets).

The Horizontal variable in regressions 5-A/B and 6-A/B has no statistical significance. This is consistent with the mean CAR in Table 10 which do not display a consistent behavior (mean CAR is lower than the full sample during the run-up but higher during the event period). Thus, we cannot accept hypothesis 3-A as the horizontal deals are not associated with higher abnormal returns to the rivals (vs nonhorizontal deals).

The Intl-Acquirer variable in regressions 5-A/B and 6-A/B has no statistical significance. This is consistent with the mean CAR in Table 10 which did not display a consistent behavior (mean CAR is higher than the full sample during the run-up but lower during the event period). Thus, we cannot reject the hypothesis 4-A since the international status of the acquirers has no significant effects on the abnormal returns to the rivals.

Regression 6-A and 6-B (in Table 11) and 7 through 9 (in Table 12) also include additional deal-specific and firm-specific variables that we included in our target regression analysis (2-A and 2-B). Two observations are worth mentioning: the Deal-Value variable is negatively related to the abnormal return to the rivals during the run-up period. Thus, smaller deal values appear to be related to higher abnormal returns during the run-up period. However, this effect is positive

during the event period. The most interesting observation from regression 6-A/B and 7 though 9 is that several variables that were statistically significant in our target CAR regressions analysis (2-A and 2-B) are not statistically significant in the regressions relating to the abnormal returns to the rivals. These are: the Acquirer-Public variable, the Consideration variable and the Premium variable.

Finally, we test the hypothesis 5-A about the Unlisted Target deals and its effects on the rival CARs. We perform a separate regression using a larger merger sample that does not exclude the unlisted target observations. The results are displayed in Table 12, regression 10-A. For obvious reason, we could not include the CAR target as an explanatory variable in the statistical model. We see that the Unlisted Target coefficient is not statistically significant. This is consistent with the mean CARs in Table 10 which did not display an obvious pattern. Thus, we cannot accept hypothesis 5-A: Unlisted Target deals are not associated with abnormal returns to the rivals.

Table 11: Regressions relating abnormal returns of rival firms to target abnormal returns, merging firms' characteristics and deal characteristics

Results of the linear regression analysis performed using SAS as per the regression functions presented in Table 7. Regressions 5-A and 5-B include only the independent variables that are associated with our hypothesis. Regressions 6-A and 6-B include all variables from our dataset. A full description of the variables is available in the Appendix. The symbols * , ** , and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels respectively. The upper values are the parameters estimated and the values in brackets are the standard errors.

No Variables	4-A CAR_r(-49,-2)	4-B CAR_r(-1, 1)	5-A CAR_r(-49,-2)	5-B CAR_r(-1, 1)	6-A CAR_r(-49,-2)	6-B CAR_r(-1, 1)
Intercept	-0.00149	0.00304	0.00146	0.00197	-0.00400	0.00309
CAR_t(-49, -2)	0.05522*** (0.00948)		0.05517*** (0.00591)		0.05373*** (0.00971)	
CAR_t(-1, 1)		0.00360 (0.00290)		0.00321 (0.00293)		0.00342 (0.00426)
Intl-Target			-0.01505* (0.00823)	-0.00193 (0.00374)	-0.01632* (0.00835)	-0.00170 (0.00379)
Initial-Industry			0.00165 (0.00701)	0.00113 (0.00319)	0.00081393 (0.00782)	-0.000080661 (0.00354)
Public-Acquirer					-0.00258 (0.00584)	0.00408 (0.00265)
Horizontal			-0.00312 0.00491	0.00261 (0.00223)	-0.00271 (0.00532)	0.00086134 (0.00241)
Intl-Acquirer			0.00251 (0.00658)	-0.00105 (0.00298)	0.00457 (0.00674)	-0.00161 (0.00305)
Log(Deal-Value)					-0.00619*** (0.00211)	0.00205** 0.00095773
Consideration					-0.00002783 (0.00007037)	0.00000252 (0.00003162)
Premium					-0.00000103 (0.00003256)	-0.00000141 (0.00002078)
Portfolio-Size					-0.00002058 (0.00001623)	-0.00001628** (0.00000735)
SIC 10-19					0.05098 (0.04340)	-0.02049 (0.01966)
SIC 20-39					0.05135 (0.04264)	-0.01457 (0.01932)
SIC 50-51					0.02837 (0.04592)	-0.02229 (0.02082)
SIC 52-59					0.03668 (0.04368)	-0.01451 (0.01979)
SIC 70-89					0.04787 (0.04278)	-0.01499 (0.01938)
Year 1998-2001					0.01210 (0.01030)	0.00512 (0.00467)
Year 2002-2005					0.00659 (0.00820)	0.00209 (0.00372)
Year 2006-2009					0.01299* (0.00675)	0.00358 (0.00307)
Year 2010-2013					0.00848 (0.00682)	-0.00252 (0.00309)
N	922	922	922	922	922	922
R-Square	0.0356	0.00177	0.0399	0.0040	0.0593	0.0245
F Value	33.95	1.54	7.61	0.74	2.99	1.19
PR > F	<0.0001	0.2143	<0.0001	0.5918	<0.0001	0.2563

Table 12: Additional regressions relating abnormal returns of rival firms to target abnormal returns and a combination of deal characteristics

Results of the linear regression analysis performed using SAS as per the regression functions presented in Table 7. Regressions 7-8-9 include independent variables that use a mix of observation windows and variables that combine deal characteristics. Regression 10 use a larger merger sample that does not exclude the unlisted target observations. It tests the unlisted target effects on rival CAR. A full description of the variables is available in the Appendix. The symbols * , ** , and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels respectively. The upper values are the parameters estimated and the values in brackets are the standard errors.

No / Variables	7 CAR_r(-49,-2)	8 CAR_r(-49,-2)	9 CAR_r(-1, 1)	10 CAR_r(-1, 1)
Intercept	-0.00241	0.00311	0.00295	0.00606
CAR_t(-49,-2)	0.05559*** (0.00950)	0.03493** (0.01631)		
CAR_t(-1, 1)	0.00360 (0.00642)	0.00408 (0.00644)		
CAR-t(-49, 1)			0.00283 (0.00251)	
CAR_r(-49,-2)				-0.02920** (0.01211)
Intl-Target				-0.00305 (0.00329)
Intl-Acquirer				-0.00123 (0.00272)
Horizontal				0.00154 (0.00197)
Initial-Industry				0.00002533 (0.00278)
Log(Deal-Value)				0.00121 (0.000082518)
Consideration				-0.00001284 (0.00002363)
Premium				0.00001231 (0.00001295)
Portfolio-Size				-0.00000981* (0.00000526)
Neg-CAR_t-runup		-0.00706 (0.00661)		
Neg-CAR_t-runup x CAR_t(-49,-2)		0.02855 (0.02574)		
Horizon-Initial			-0.00411 (0.00640)	
Horizon-Initial x CAR-t(-49, 1)			0.01947 (0.01728)	
Unlisted-Target				-0.00084918 (0.00275)
N	922	922	922	1106
R-Square	0.0359	0.0385	0.0033	0.0156
F Value	17.12	9.18	1.01	1.74
PR > F	<0.0001	<0.0001	0.3864	0.0681

Table 13: Regressions relating abnormal returns of rival firms to the target abnormal returns (grouped per industry)

Results of the linear regression analysis performed using SAS as per the regression functions presented in Table 7. Regressions 11-12-13-14 use the same model as regression 4-A, but each use a specific dataset from a different group of industry. This is intended to strengthen our empirical observation from regression 4-A. A full description of the variables is available in the Appendix. The symbols * , ** , and *** denote statistical significance at the 0.10, 0.05 and 0.01 levels respectively. The upper values are the parameters estimated and the values in brackets are the standard errors.

No / Variables	11 CAR_r(-49,-2) Manufacturing	12 CAR_r(-49,-2) Services	13 CAR_r(-49,-2) Mining & Constructions	14 CAR_r(-49,-2) Retail, Wholesale & Others
Intercept	0.00247	-0.00219	-0.00193	-0.01626
CAR_t(-49,-2)	0.02971** (0.01327)	0.04480*** (0.01449)	0.25854*** (0.04208)	0.13115*** (0.04259)
N	444	344	70	64
R-Square	0.0112	0.0272	0.3569	0.1327
F Value	5.01	9.56	37.74	9.48
PR > F	0.0256	0.0022	<0.0001	0.0031

7. Conclusion

This study and the results presented increase our understanding of the competitive dynamics of large international mergers and its resulting effects on the stock price discovery process of US domestic rivals. It brings a fresh international perspective that was not present in previous work which focused mainly on the US or on a specific foreign market. We compare the stock price cumulative abnormal return of US rivals for transactions involving international and US targets. We also examine how several deal-specific and firm-specific characteristics are related to the abnormal returns of the rivals.

We find that both rivals of US and International targets earn positive abnormal returns around the merger announcement date, but the effect is statistically significant only for the rivals of US targets. We observed that international target deals are related to lower abnormal return to the US rivals during the run-up period. This result is contrary to our expectation: we anticipated that large international mergers and large US mergers would generate similar effects on the US rivals. Finally, the abnormal returns to the rivals during the run-up period are positively related to the abnormal returns to the targets. Also, we observe that smaller deal values are associated with higher abnormal returns to the rivals during the run-up period.

Interestingly, several deal characteristics that are statistically significant to explain the abnormal return to the targets are not statistically significant to explain the abnormal return to the rivals. Thus, horizontal mergers generate significant higher abnormal return to the targets at the time of the merger announcement, but they do not appear to be related to the abnormal return to the

rivals. Initial Industry targets deal are associated with lower abnormal returns to the targets but are not associated with the abnormal return to the rivals.

The measured CARs for the targets are consistent with previous studies (Eckbo 1983, Song 2000) both in the magnitude than in the average direction of the effect. Targets of US and International acquisitions earn significant positive abnormal returns. US targets earn on average significant higher abnormal returns than International targets. Also, we observe that horizontal mergers are associated with higher abnormal returns to the targets than nonhorizontal mergers. Targets identified as Initial Industry Target realize significant lower abnormal returns than targets identified as Lagging Industry Target. Our regression analysis, that includes numerous deal variables, highlights several interesting relationships with the target CARs: the public status of the acquirer, the proportion of cash in the transaction and the premium paid are statistically positively related to the abnormal returns to the targets. Also, the deal value is negatively related to the abnormal return to the targets.

We can conclude this study by highlighting two broad takeaways. First, international financial events, such as large mergers, generate an effect on the US stock market that is function of the national identity of the firms involved. We observed that international target deals were associated with lower abnormal return to the US-based rivals. Second, the stock price discovery process of rivals of acquisition targets is rather different than the targets. Only some effects that are empirically observable for the targets appear to also be significant to the rivals. This work contribute to the pool of knowledge on the competitive effects of mergers & acquisition, particularly on the stock price abnormal return to the US rivals of international acquisitions.

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Appendix

Description of variables

Variable	Description
CAR_r(x, y)	Cumulative abnormal returns to the portfolio of rivals. The number in brakets indicates the event window used in the calculation of the variable such as (-49, -2) for the run-up period and (-1, 1) for the event period.
CAR_t(x, y)	Cumulative abnormal returns to the targets. The number in brakets indicates the event window used in the calculation of the variable such as (-49, -2) for the run-up period and (-1, 1) for the event period.
Intl-Target	This variable is set to 0 when the target is based in Canada or in the US. It is set to 1 if the country is not Canada or the US. The source of information is the Thompson Reuters SDC platinum database.
Intl-Acquirer	This variable is set to 0 when the acquirer is based in Canada or in the US. It is set to 1 if the country is not Canada or the US. The source of information is the Thompson Reuters SDC platinum database.
Horizontal	This variable is set to 1 when the target and the acquirer share the same 2-digit SIC code. In this case, the merger is considered horizontal. Otherwise, it is set to 0 and the merger is considered nonhorizontal. The source of information is the Thompson Reuters SDC platinum database.
Initial-Industry	This variable is set to 1 when the target is identified as an Initial Industry Target. See section 4 to read about the methodology of identification. Otherwise, it is set to 0 and the target is considered Lagging Industry Target. The source of information is the Thompson Reuters SDC platinum database.
Public-Acquirer	This variable is set to 1 when the acquirer ultimate parent company is listed as Public company. Otherwise the variable is set to 0. The source of information is the Thompson Reuters SDC platinum database.
Log(Deal-Value)	This variable is the natural log of the disclosed deal value, including cash and shares. The source of information is the Thompson Reuters SDC platinum database.

Variable	Description
Consideration	This variable is the proportion of cash in the transaction, expressed in percentage. The variable is 0 for a stock-only merger, it is 100 for a cash only merger and it is between 0 and 100 if it is a cash and stock merger. The source of information is the Thompson Reuters SDC platinum database.
Premium	This variable is the calculated premium of the offer price vs the target stock price one day prior to the announcement date. The source of information is the Thompson Reuters SDC platinum database.
Portfolio-size	This variable represents the number of firms composing the portfolio of the target's rivals. It includes all the firms that were used to calculate the variable CAR-r. The rivals are assigned based on the 3-digits SIC code. See section 4 to read about the methodology.
Neg-CAR_t-runup	This variable is set to 1 when the variable CAR_t(-49, -2) is negative and the variable is set to 0 when the is equal to zero or positive.
Neg-CAR_t-runup x CAR_t(-49, -2)	This variable is the variable Neg-CAR_t-runup multiplied by the associated CAR_t(-49, -2) value. Thus, it is equal to zero when CAR_t(-49, -2) is positive otherwise it takes the value of CAR_t(-49, -2).
Horizon-Initial	This variable is set to 1 when the Horizon variable AND the Initial-Industry variable is equal to 1. It is set to zero otherwise. Thus, it allows the identification of horizontal deals that involve a target identified as Initial Industry Target.
Horizon-Initial x CAR-t(-49, 1)	This variable is the variable Horizon-Initial variable multiplied by the associated CAR_t(-49, -2) value. Thus, it returns only the CAR_t(-49, -2) values for horizontal deals that involve a target identified as Initial Industry Target. Otherwise, it the variable is equal to 0.
Unlisted-Target	This variable is set at to 1 when the target is identified as "unlisted" – which is a target that is not listed in CRSP at the time of the merger. Otherwise, it is equal to zero. The source of data is CSRP.

Table A-1: Target abnormal returns per industry

SIC Code	Industry Description	Average CAR(-49,-2)	Average CAR(-1,1)	N
All SIC	All Industries	5.72%	21.70%	1345
1000-1799	Mining & Construction	2.04%	11.51%	70
2000-3999	Manufacturing	7.18%	27.68%	444
4000-4999	Transport., Com. & Utilities	3.12%	14.69%	156
5000-5100	Wholesale Trade	5.69%	46.25%	17
5200-5900	Retail Trade	4.70%	17.73%	44
6000-6799	Finance, Insurance, And Real Estate	3.98%	14.57%	267
7000-8999	Services	7.26%	24.12%	344
9000-9999	Public Administration & Unclassified	-4.70%	47.91%	3

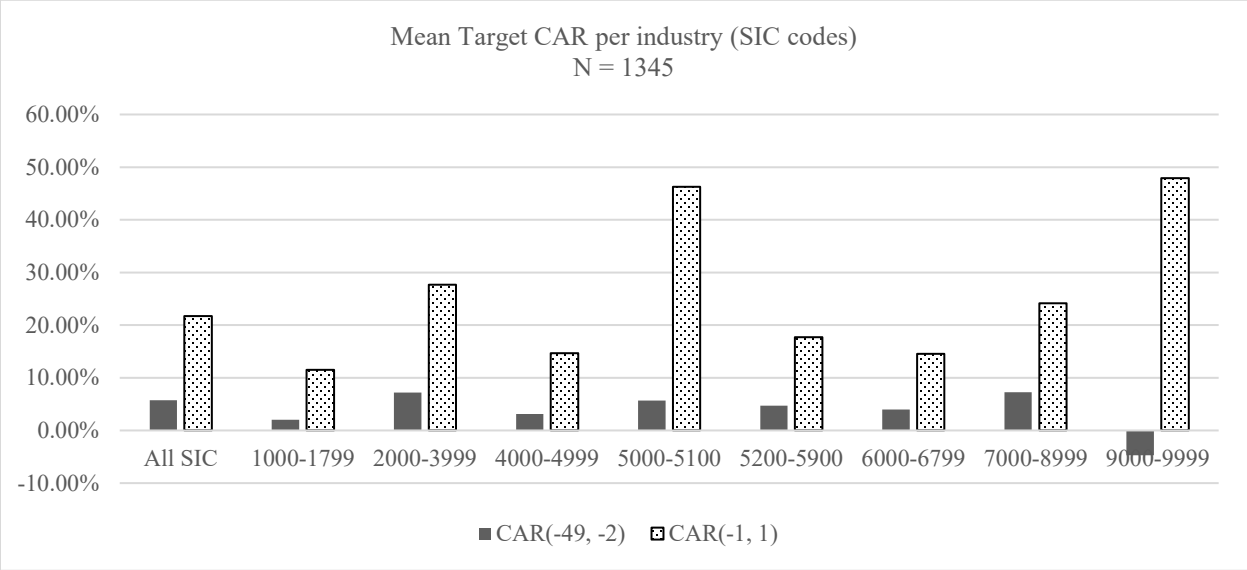
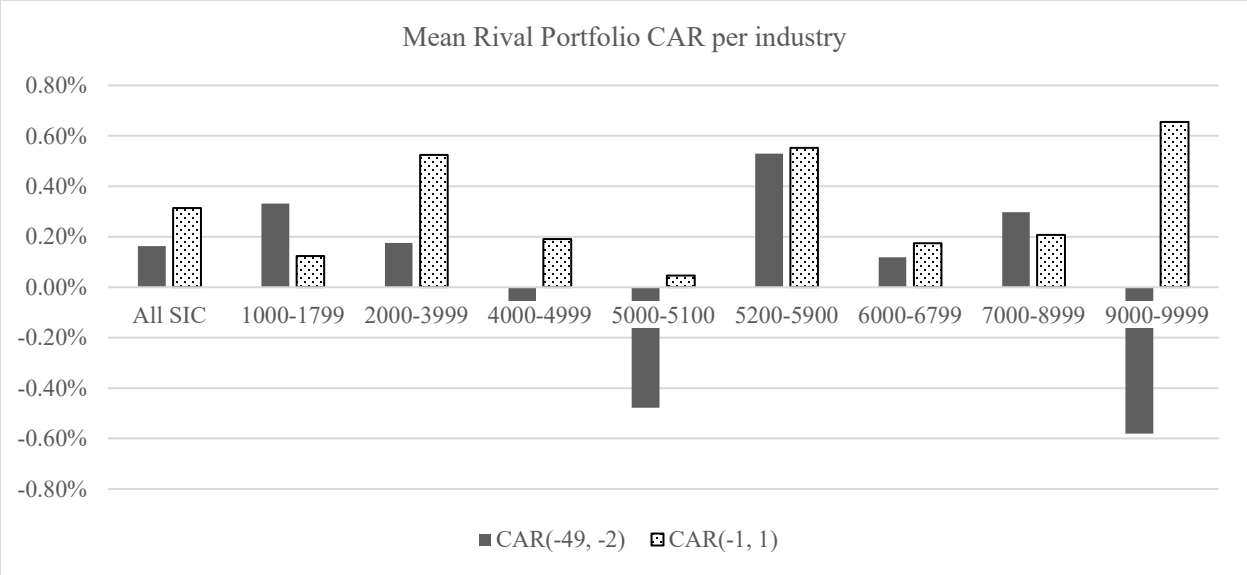


Table A-2: Portfolio of Rivals' abnormal returns per industry

SIC Code	Industry Description	Average CAR(-49,-2)	Average CAR(-1,1)	N
All SIC	All Industries	0.16%	0.31%	1609
1000-1799	Mining & Construction	0.33%	0.12%	82
2000-3999	Manufacturing	0.18%	0.52%	535
4000-4999	Transport., Com. & Utilities	-0.11%	0.19%	212
5000-5100	Wholesale Trade	-0.48%	0.05%	22
5200-5900	Retail Trade	0.53%	0.55%	55
6000-6799	Finance, Insurance, And Real Estate	0.12%	0.17%	291
7000-8999	Services	0.30%	0.21%	409
9000-9999	Public Administration & Unclassified	-0.58%	0.66%	3



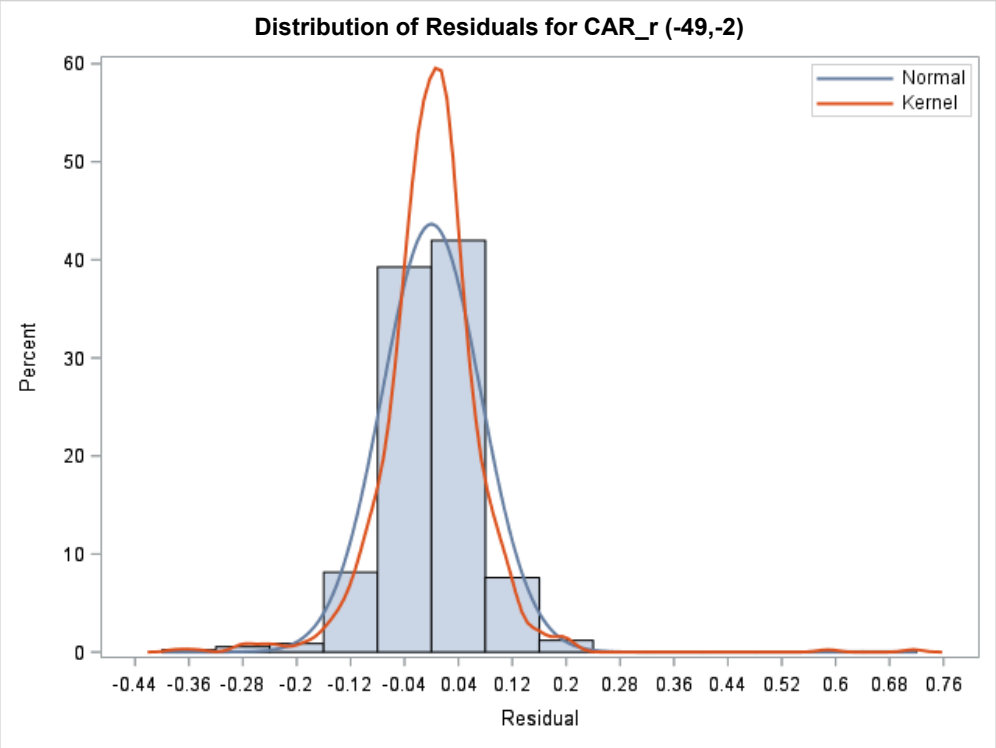
Standard Industrial Classification (SIC)

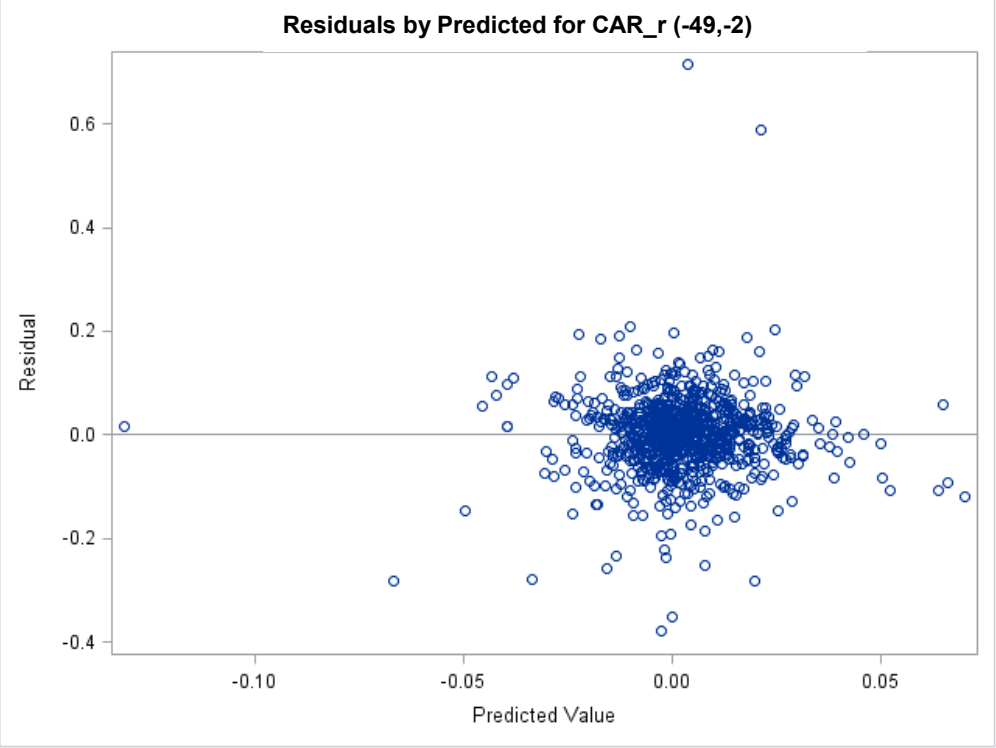
Table A-3: List of SIC code and complete industry description as per North American Industry Classification System (NAICS)

SIC code	Industry
1000 to 1799	Mining & Construction
2000 to 3999	Manufacturing
4000 to 4999	Transportation, Communications, Electric, Gas, And Sanitary Services
5000 to 5199	Wholesale Trade
5200 to 5999	Retail Trade
6000 to 6799	Finance, Insurance & Real Estate
7000 to 8900	Services
9000 to 9999	Public Administration & Unclassified

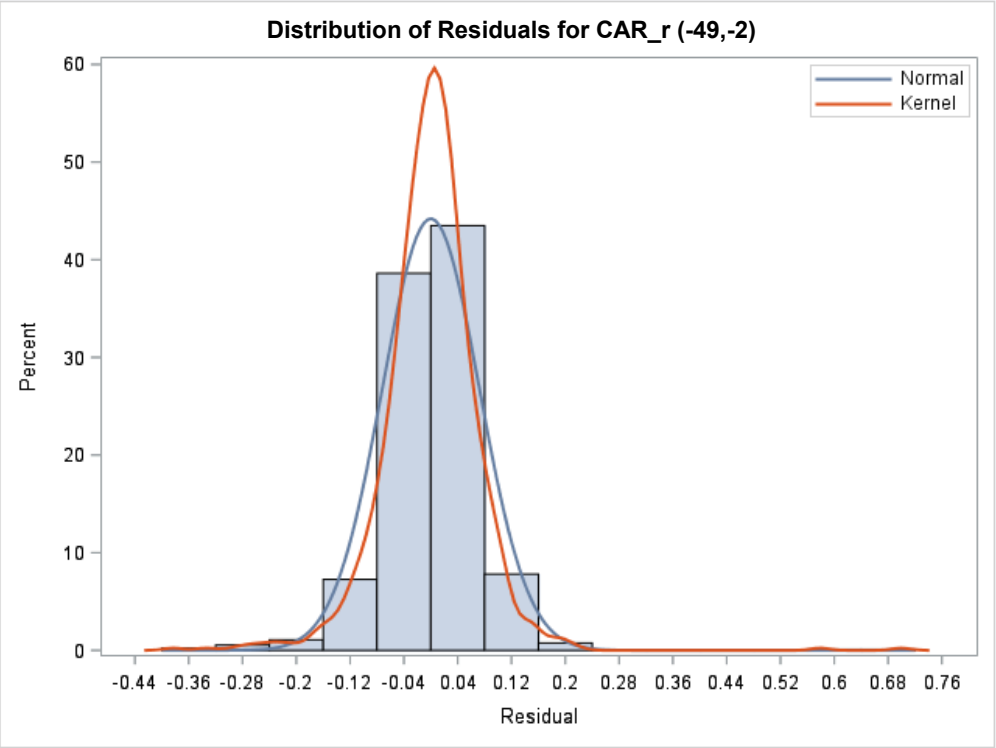
Distribution of residuals and Plots of residuals for selected linear regression analysis

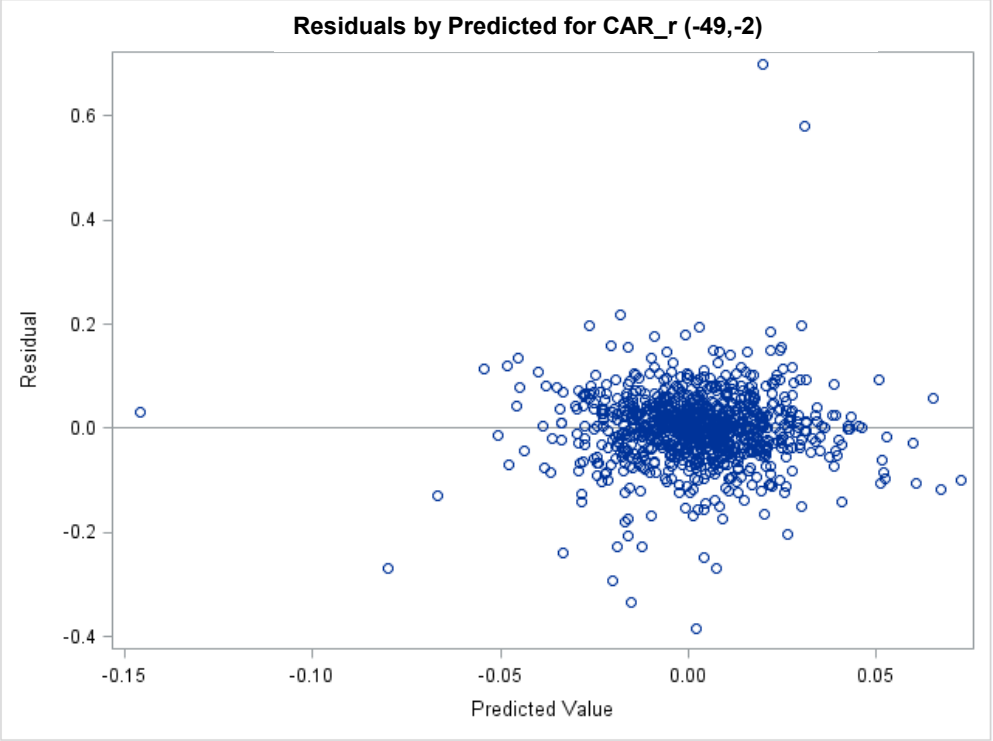
Regression 4-A:



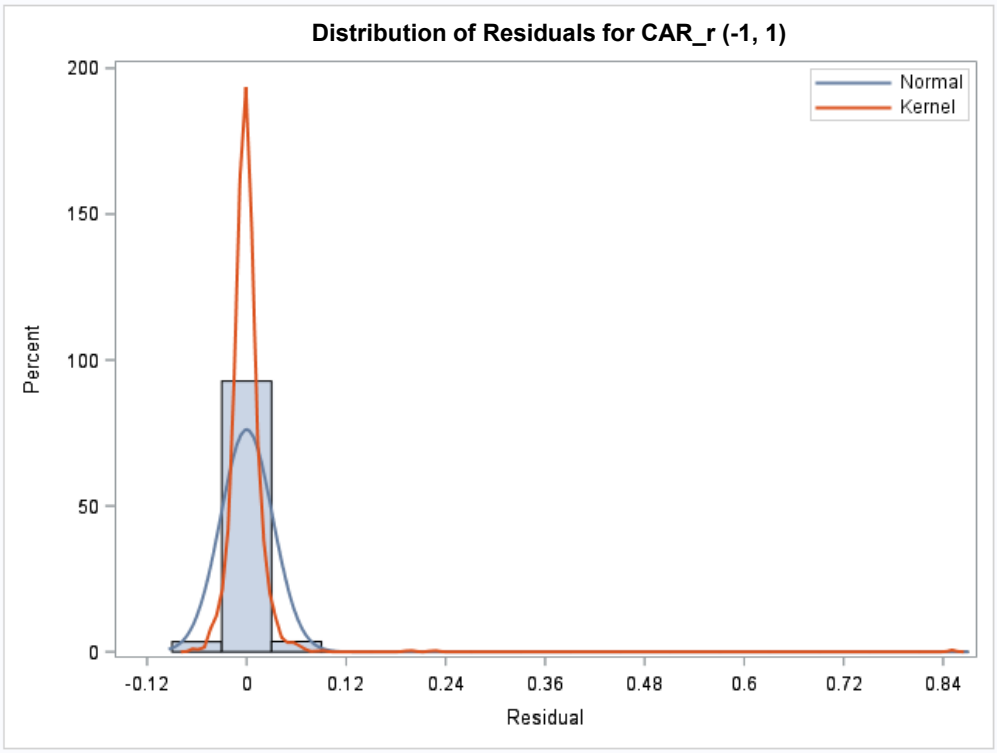


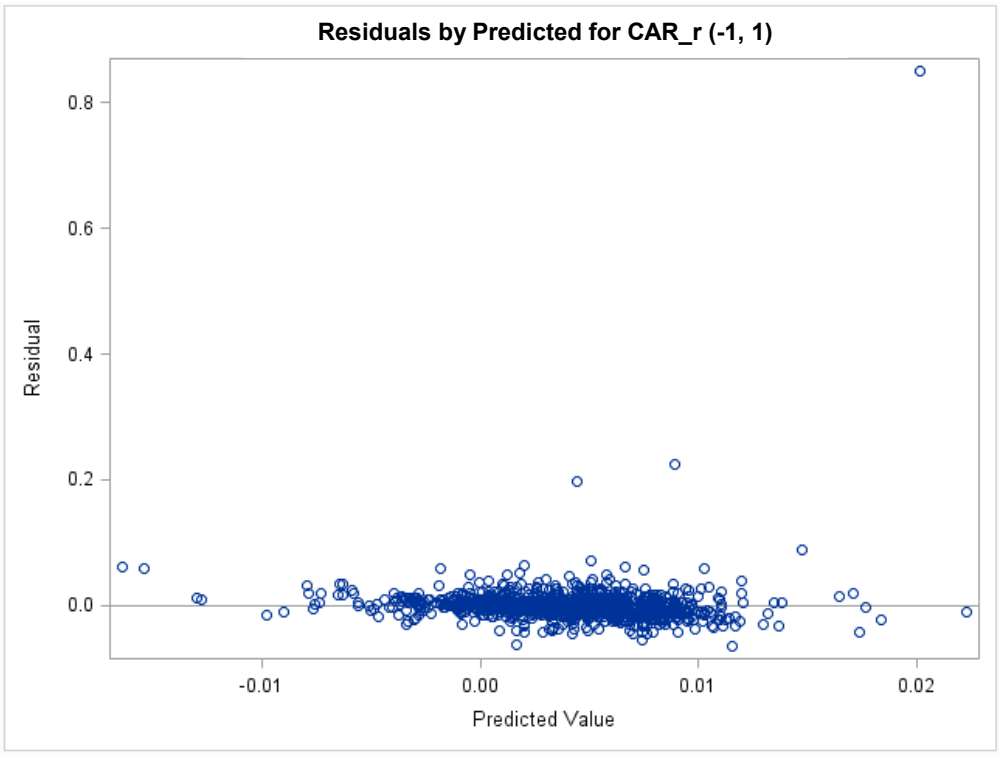
Regression 6-A:





Regression 10:





Regression 13: