The effect of culture on joint venture valuation: evidence from the capital market approach

Bachelor's Thesis

Supervisor: Boris van Oostveen

Name: Max van de Ven
Student number: 2964449

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University of Groningen

Faculty of Economics and Business

Nettelbosje 2, Groningen

The Netherlands

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Max van de Ven

Abstract:

Using a sample of 96 shared-equity joint venture announcements in the period 2000-2017, this study examines a major ambiguity associated with the formation of joint ventures: cultural differences. Building on the insights of Makino and Baemish (1998), both the effects of partner- and location cultural heterogeneities are examined using the Kogut and Singh (1988) index. Distinctively, the proposed model adjusts for cultural knowledge spill-over between partners. By adapting an event-study with a market model setup, this study demonstrates a significant positive capital market valuation effect associated with shared equity joint venture announcements. Yet, through an ordinary least squares regression, it fails to ascribe the cross-sectional variance to cultural heterogeneities.

Keywords: "joint venture", "cultural difference", "event study", "market model", "capital market"

JEL Classification: G14, L6, L24, M14

Word count:

1. Introduction

The contemporary globalized business climate has dramatically transformed the way firms sustain competitive advantages and nurture growth. Over the past decades, one salient transformation has been the proliferation of strategic alliances – especially joint ventures (JVs) (Das, 2012). Accordingly, the capital market performance associated with firms' declared participation in JVs has been the focal point of various empirical studies.

The majority of these studies validate this aforementioned on-going transformation as JVs seem to enhance firm's performance (e.g. Reuer and Koza, 2000; Jones and Danbolt, 2004). Yet, despite the flurry of research attention given to JVs, the determinants of cross-sectional disparity are ill-defined (Merchant and Schendel, 2000). This especially applies to the effect of location cultural differences as conflicting findings endure (e.g. Barkema and Vermeulen, 1997; Georgieva, Jandik and Lee, 2012; Hanvanich, Miller, Richards and Cavusgil, 2003). From a managerial perspective, this ambiguity makes it difficult to accurately evaluate cross-border JV projects. Fortunately, Merchant and Schendel (2000) identified a potential loophole by demonstrating that conflicting findings generally arise due to the previous studies' comparable treatment of assorted conditions under which JVs are formed.

The main aim of this study is to (1) examine whether shareholders still presume participation in a JV as a value-added opportunity for firm performance, (2) clarify whether these valuation effects depend on underlying conditions such as (relative) asset size, deal size, listing-biases and economic crises, and (3) overcome the ambiguity surrounding the effects of cultural differences, especially at location level. These objectives are analysed through an event study, which estimates the parent's shareholder value creation, a benchmark for ex ante JV performance, related with an announcement of participation. Additionally, to clarify the cross-sectional disparity, the results following the event study are examined using an OLS-regression.

The contribution of this research is as follows. First, by emphasizing on 2000 - 2017, this study aims to enhance inter-temporal generalizability by building on Hanvanich et al.'s (2003) findings over 1997–1999. Secondly, we strengthen the empirical models of Kogut and Singh (1988) and Makino and Baemish (1998) by taking into account heretofore unconsidered, but theoretically relevant, effects of cultural knowledge spill-over. Furthermore, to avoid the aforementioned common mistake of treating heterogeneous JVs as homogenous (Merchant and Schendel, 2000), this study develops a robust dataset through the implementation of stringent sample selection criteria. Finally, the study extends the empirical exploration of circumstances that affect the stock market valuation effects associated with JV announcements, such as listing-biases.

The remainder of this study is organized as follows. In section (2) the JV literature will be thoroughly reviewed - stressing the cultural effects on ex ante performance. Then, in section (3), the sample selection criteria, the market model, its statistical tests and the variable operationalization will be elucidated. Afterwards, the outcomes of the empirical study will be discussed in section (4). Lastly, the conclusion, limitations and implications for forthcoming research will be addressed in section (5).

2. Literature review and hypothesis development

Previous studies firmly substantiate that JV announcements contribute to an increase in firms' shareholder value. These positive valuation effects accrue through perceived economies of scale, access to complementary assets, cost- and/or risk sharing and the efficient exchange of knowledge under information asymmetry (Mantecon, 2009; Merchant and Schendel, 2000). For instance, over 1985-1995, Reuer and Koza (2000) demonstrate that two-parent JV announcements including at least one US partner are generally positively valued by the capital markets. Similarly, over 1991 to 1996, Jones and Danbolt (2004) demonstrate a significant positive valuation effect at announcement date. Additionally, using a sample of 1015 JVs from 1997 to 1999, Hanvanich et al. (2003) generalizes these aforementioned findings over time. Therefore, aiming to extend inter-temporal generalizability:

H1: *There is a positive capital market reaction at the announcement of a firm's participation in a JV.*

Although JVs have several benefits, potential hazards may emerge due to cultural differences. As Makino and Beamish (1998) pointed out, these cultural differences emerge on a partner- and locational level. On one hand, cooperative problems might prevail between business partners carrying a distinct national culture, potentially contributing to conflict and even deterioration of the venture (Shenkar and Zeira, 1992). Consistent with this perspective, a variety of studies including Hanvenich et al. (2003) and Makino and Beamish (1998) have concluded that larger partner cultural differences harm the continuity of JVs. Therefore:

H2: *Higher levels of partner cultural differences negatively affect the capital market reaction of a firm announcing to participate in a JV.*

On the other hand, as firms extend abroad to diversify and access new markets, partners inescapably encounter costs emerging from unfamiliarity with the local surroundings (Hanvanich et al., 2003). Accordingly, using a sample set of 228 international JVs which had at least one partner from the Netherlands, Barkema and Vermeulen (1997) found a significant negative effect between a joint venture's survival and cultural distance. However, Reuer and Koza (2000) fail to find evidential support for a significant effect of location cultural difference on JV-based shareholder value generation.

These contrasting findings potentially arises as certain cross-border JVs actually generate value by allowing for inter-partner knowledge sharing of local consumer preferences, institutional structure and business practices (Shan and Hamilton, 1991). Georgieva et al. (2012), for instance, fail to verify the perception that cultural differences are integration-obstacles for business agreements. In contrast, over a sample of 1101 JV deals, they demonstrate that the volume of cross-border agreements between the US and foreign countries positively correlates with cultural distance. This implicitly indicates that JVs are actually means to overcome the liability of foreignness.

Taken together, it is apparent that locational cultural difference can only be measured after taking into account the cultural knowledge spill-over effects between partners. Hence, it is expected that:

Hypothesis 3. *Higher levels of spill-over adjusted location cultural differences negatively affect the capital market reaction of a firm announcing to participate in a JV.*

3. DATA AND METHODOLOGY

3.1. Sample

This study focusses on two-partner equity JVs, involving at least one US listed firm operating in the manufacturing industry, regardless of the partners' industries, that were initiated between 2000 and 2017. To expose national cultures, the sample is restricted to agreements having disclosed nationalities of both partners' and targeted country. Using the Zephyr Database, this resulted in an initial database of 527 JV announcements. Building on Merchant and Schendel (2000), the following stringent sample selection criteria are enforced to ascertain that this study derives reliable measures and solely captures the effect of JV announcements:

In contrast with Hanvanich et al. (2003), this study only focuses on shared-equity JV agreements to increase the robustness of our model. JV agreements having undisclosed (53,7%), minority (9,6%) or majority (15,5%) ownership structures at announcement date were excluded, as Hauswald (2003) acknowledged the potential costs associated with unilateral value extraction by a dominant partner. [1] Thus, the presence of valuation-affecting adverse incentives required omission of 411 agreements. As observations that disclosed equity shares post-event date also had to be excluded, ownership shares were manually obtained from proxy statements and news reports found on the Zephyr and LexisNexis database.

Unlike Hanvanich et al. (2003) and Jones and Danbolt (2004), agreements altered by contingent-ownership provisions such as options and sell-out provisions were excluded. As one goal of a provision is to provide ways to overcome contractual incompleteness (Noldeke and Schmidt, 1998), the valuation effects associated with these JV agreement might be heterogeneous.

[1] Appropriate levels of control could also be perceived as a key mechanism to limit partners' opportunistic behaviour (Beamish and Banks, 1987). This, contrarily, implies that disproportionately owned JVs do not necessarily have to be more precarious than shared equity JVs. This paper, however, adopts Hauswald's (2003) view by assuming that the exclusion of veto power eliminates the biggest proportion of opportunistic behaviours. The latter perspective is also preferred as it partly assures that major managerial decisions are not solely taken by the dominant partner, but are, instead, the outcome of mutual consideration – accentuating the effect of cultural difference.

Therefore, 5 agreements were omitted using proxy statements and news reports found in the Zephyr database.

In addition, to enhance creditability of the market model's underlying assumptions, observations with illiquid US stocks were excluded from our sample. Given the liquidity of a stock, the capital market may adjust to new information of different firms in various ways or paces. As market liquidity has a positive impact on informational efficiency (Hodrea, 2015), the exclusion of 7 illiquid US OTC stocks likely enhanced the creditability of our results.

Furthermore, to isolate the effect of the JV announcement, observations for which at least one parent had another significant corporate matter around announcement date were manually discarded. These contemporaneous news announcements were identified using the LexisNexis database, resulting in the omission of observations that announced mergers & acquisitions (3) and other JVs (5) around event date.

Eventually, 96 JVs of interest were identified, consisting of 79.2% international JVs and 20.8% domestic JVs (appendix 7.1). The daily stock prices, adjusted for dividend and stock splits, were extracted from Datastream. The partners' asset sizes were extracted from the Orbis Database for announcements pre-2006, and using 10-K filings and annual reports for announcements post-2006. Finally, by manually screening news announcements, 26 firms that disclosed deal values at announcement date were detected.

3.2. Event-study model

Using security returns as a yardstick, this study adopts an event-study methodology which evaluates the significance of a distinct event on a company's market value (MacKinlay, 1997). According to the traditional valuation theory, the market value of a firm is equivalent to the discounted value of the expected cash flows, both generated from current assets and to-be-taken future investment opportunities (Hillier, Grinblat and Titman, 2011). Therefore, a company's valuation alters once financial markets receive information that modifies the expected cash flows. Accordingly, if assets trade at fair value under the efficient market hypothesis (Fama, 1970), the modification in stock return attributable to a JV announcement reflects investors' assessment of a company's ex ante performance. This deviation is commonly determined using so-called abnormal returns (ARs).

3.2.1. *Abnormal returns*

ARs are computed by taking the difference between the actual stock returns and the expected stock returns:

$$AR_{it} = R_{it} - E\left(R_{i,t}\right),^{2} \tag{1}$$

where the expected stock returns are determined using the market model (MacKinlay, 1997). This model anticipates a linear ex-ante relation between the returns on share *i* and the market returns:

$$E\left(R_{i,t}\right) = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \tag{2}$$

where, R_{it} is the natural logarithm of the daily price at t relative to t-1 of stock *i*, accounted for dividends per share [3] [4]. Likewise, the market benchmark, R_{mt}, is measured using the natural

[2] Then, the sample aggregated ARs over sample size N at day t is: $AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$.

[3] Continuous returns are used due to their statistical power relative to simple returns, see appendix 7.3.

[4] Even though most ex-day studies demonstrate that the stock prices fall on average by less than the dividend amount on the ex-dividend day in the US (Ruan and Ma, 2012), this study assumes that inclusion of dividends generally leads to a relative smaller deviation of the actual returns than exclusion.

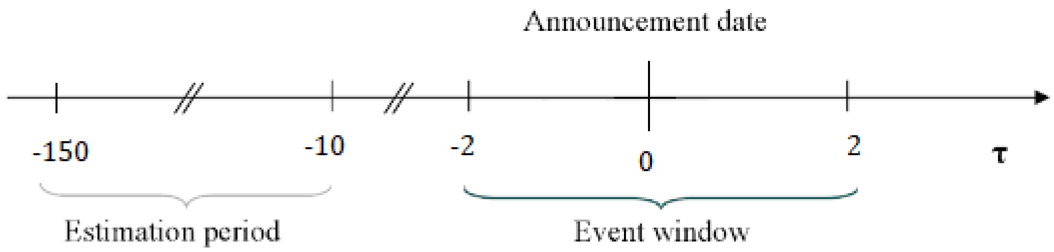
logarithm of the daily market-index price at t relative to t-1. Regression parameters α_i and β_i of security i illustrate the stock's performance in excess to the market proxy and a volatility measure of the stock relative to R_{mt}, respectively. Lastly, ε_{it} is the error term for security i on day t which is assumed to approach a normal distribution $N(0, \sigma^2_{\varepsilon_i})$.

As the study's unit of analysis consists of listed US manufacturing firms, the market index proxy used is the S&P 500. This index consists of an enormous population of capitalization weighted stocks, making it a good benchmark for national market performance.

3.2.2 *Event- and estimation window*

The return history is divided into an event window, in which the return movement is scrutinized, and an estimation window used for forecasting of the linear market model's parameters (dia. I).

Diagram I: *Timeline of the event study*



The parameters α_i and β_i, are estimated by performing an ordinary least-squares regression on realizations of R_{it} and R_{mt} over the estimation window of {-150, -10} [5] [6]. Hence, as the $E(R_{i,t})$ in the event window are out-of-sample forecasts, the model assumes that the variance determined over the estimation period persists over the subsequent forecasting period. Nonetheless, as demonstrated in section 3.3.1, there are robust tests to release this stringent assumption.

This study uses a variety of pre- and post-event days, specifically {-1,1}, {-2,1} and {-2,2}, to account for a potential leakage effect. In order to assess the impact of an announcement, the day

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[5] As displayed in appendix 7.1, 88.5% of the β_i's are significant at a 1% level.
[6] This estimation window conforms to the implied norm of relatable research, see appendix 7.2.

on which the agreement publicly appeared for the first time is designated as day 0. The AR observations are aggregated over different time intervals around announcement date to take into account price effects caused pre-announcement (e.g. rumours or leaked information) and post-announcements date (e.g. announcements which occur after the stock market closes on announcement day).

Accommodating for a multiple-day testing period, the cumulative abnormal returns (CAR_i) are being analysed:

$$CAR_i(T_1, T_2) = \sum_{t=T_1}^{T_2} AR_{it} \quad ,^{7} \tag{3}$$

Where T_1 and T_2 are the pre- and post-event days, respectively. Notably, under the presumed efficiency, long testing periods are excluded as they would only reduce the statistical power of the hypothesis testing through false inferences (MacKinlay, 1997) and the potential blossoming of (unnoticed) contemporaneous correlations.

[7] Then, the average cumulative abnormal return (CAAR) over sample size N is: $CAAR(T_1, T_2) = \frac{1}{N}\sum_{t=i}^{N} CAR_i(T_1, T_2)$.

3.3 Significance tests

There are multifarious tests available to evaluate the statistical significance of the ARs in the event window. The significance tests can generally be subdivided in parametric and non-parametric tests. A parametric test inevitably assumes that the residuals are normally distributed. Violation of this assumption customarily results in misspecified test-statistics. Nonparametric tests do not require as stringent normality assumptions. Even though our sampled (cumulative) ARs are non-normally distributed (appendix 7.4 and 7.5), important insights can still be derived from the parametric tests.

Parametric tests

Due to its better power properties compared to conventional non-standardized tests (Kolari and Pynnonen, 2010), the parametric test statistics of Patell (1976) and Boehmer, Musumeci and Poulsen (BMP) (1991) used.

3.3.1. Patell Test

Patell (1976) proposed a residual test statistic which standardizes the ARs by a predicted standard deviation. Under the assumption of uncorrelated ARs and no event-induced volatility, the t-statistics is calculated as follows:

$$t_{AAR,t} = \frac{\sum_{i=1}^{N} SAR_{i,t}}{\sqrt{N\,(M-2)/(M-4)}} \tag{4}$$

Where,

$$SAR_{i,t} = AR_{i,t}/\delta_{AR_{i,t}} \tag{5}$$

By individually weighting the observations by the inverse of a predicted standard deviation, $\delta_{AR_{it}}$, the less volatile observations gain more weight than the noisy and, thus, unreliable observations.[8] The predicted standard deviation is the original market model's standard deviation δ_{AR_i} over

[8] This adjustment is necessary due to the presence of outliers (Appendix 7.7).

$\{-150, -10\}$ adjusted by a forecast error, C_{it}. The adjustment is necessary due to the market model's underlying assumption that the variance in the estimation window is equal to the variance in the event window. As this assumption is unlikely to hold, the ARs are standardized using:

$$\delta_{AR_{it}} = \sqrt{\delta^2_{AR_i}\, C_{i,t}} \tag{6}$$

where, $\delta^2_{AR_i}$ is the market model's residual variance of stock *i* and C_{it} reflects the variance increase due to the out-of-sample forecasting. This forecasting error is measured as:

$$C_{it} = 1 + \frac{1}{M} + \frac{\left(R_{m,t} - \bar{R}_m\right)^2}{\sum_{t=T_0}^{T_1}\left(R_{m,t} - \bar{R}_m\right)^2} \tag{7}$$

in which $R_{m,t}$ is the market return at *t*, $\bar{R}_m$ is the average market return computed over M amount of days used to estimate the market model for stock i, and T_0 and T_1 are the beginning and the end of the estimation window, respectively. Likewise, the test statistic for testing cumulative mean returns is given by:

$$t_{CAAR,} = \frac{1}{\sqrt{N}}\sum_{i=1}^{N} SCAR_i = \frac{1}{\sqrt{N}}\sum_{i=1}^{N}\frac{CAR_i}{\delta_{CAR_i}} \tag{8}$$

Where δ_{CAR_i} is the forecast error adjusted standard deviation of CAR_i. The CARs are adjusted by δ_{CAR_i}, the market model's variance adjusted for the prediction error:

$$\delta_{CAR_i} = \sqrt{S^2_{AR_i} C_{i,\tau}} \tag{9}$$

where, $\delta^2_{AR_i}$ is the market model's residual variance of stock *i,* and $C_{i\tau}$ reflects the variance increase due to the out-of-sample forecasting over the cumulated period, τ:

$$C_{i,\tau} = M + \frac{L}{M} + \frac{\sum_{t=T_1}^{T_2} \left(R_{m,t} - \bar{R}_m\right)^2}{\sum_{t=T_0}^{T_1} \left(R_{m,t} - \bar{R}_m\right)^2} \tag{10}$$

All inputs are similar to equation (7), except L is the amount of days in the event window; and T_1 and T_2 are the beginning and the end of the event window, respectively.

3.3.2. BMP Test

BMP's (1991) residual test is similar to Patell's, but loosens the stringent assumption of no event-induced variance. The BMP test statistic is t-distributed with a Df of the estimation window (140) minus 1, with an unit-normal distribution of N(0,1) under the null hypothesis. The t-value of the standardized cumulative abnormal return (SCAR) over the event window is calculated as:

$$t_{BMP} = \frac{\overline{SCAR}(\tau_1, \tau_2)\sqrt{n}}{S_{SCAR(\tau_1,\tau_2)}} \tag{11}$$

Where $\overline{SCAR}(\tau_1, \tau_2)$ is the average of the standardized CAR_i:

$$SCAR_i(\tau_1, \tau_2) = \frac{CAR_i(\tau_1, \tau_2)}{S_{CAR_i(\tau_1,\tau_2)}} \tag{12}$$

In which $S_{CAR(\tau_1,\tau_2)}$ is the forecast-error adjusted standard deviation of the CAR_i (see Patell's section); and $S_{SCAR(\tau_1,\tau_2)}$ is the cross-sectional standard deviation of $SCAR$, an estimation for the levels of event-induced variance, calculated as:

$$S_{SCAR(\tau_1,\tau_2)} = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(SCAR_i(\tau_1, \tau_2) - \overline{SCAR}(\tau_1, \tau_2))^2} \tag{13}$$

Through the standardization with $S_{SCAR(\tau_1,\tau_2)}$, higher volatility of SCARs within the event window, implies lower re-standardized return values; reducing the test statistic compared to

Patell's test. Naturally, in absentia of event-induced volatility, these standardized returns would entail the Patell (1976) t-statistic.

3.3.3. GRANK Test

This study adopts the generalized rank test (GRANK) of Kolari and Pynnonen (2010) to determine the significance of the announcement effect. The test is based on the earlier touched upon event day re-standardized ARs which have shown to be robust against event-induced volatility, sizeable price effects as well as the forecast error (Kolari and Pynnonen, 2010; Patell, 1976). Following eq. (12) and (13), the re-standardized cumulative returns are defined as:

$$SCAR_i^* = \frac{SCAR_i(\tau_1, \tau_2)}{S_{SCAR(\tau_1,\tau_2)}} \tag{14}$$

The GRANK test provides cross-sectional ranks to the $GSAR_{i,t}$. Were $GSAR_{i,t}$ consists of the $SCAR_i^*$ for the *entire* event window (eq. 14), and $SAR_{i,t}$ for every estimation day (eq. 5). In other words, the CAR period is entirely squeezed into one observation with t = 0. These ranks are then standardized so that its range becomes [0,1] instead of $[0, M + 1]$:

$$K_{i,t} = \frac{rank\left(GSAR_{i,t}\right)}{141 + 1} \tag{15}$$

Given that $K_{i,0}$ illustrates the standardized rank linked to the $SCAR_i^*$, under the absence of a mean effect:

$$E\left[K_{i,0}\right] = \frac{1}{2} \tag{16}$$

The t-ratio to test for the null-hypothesis is then equal to the deviation of the average rank over t from the expected rank over i (eq. 16), divided by the standard deviation of the average rank over t:

$$t_{grank} = \frac{\overline{K}_0 - 1/2}{S_k} \tag{17}$$

where S_K is the standard deviation of the cross-section averaged standardized rank:

$$S_K = \sqrt{\frac{1}{L+1} \sum_{t=T_0}^{T_1+1} \left(\overline{K}_t - \frac{1}{2}\right)^2} \tag{18}$$

where,

$$\overline{K}_t = \frac{1}{N} \sum_{i=1}^{N} K_{i,t} \tag{19}$$

3.4. Variable operationalization

3.4.1. Cultural Difference

Cultural difference is measured using the differences between the national cultural dimensions: power distance, individualism, masculinity, uncertainty avoidance, long term orientation (Hofstede, 1991). These dimensions are unified into a commonly used, time independent, Kogut and Singh (1988) index for both perspectives of partner- and location cultural differences. [9] [10]

Partner Cultural Difference

For partner cultural difference, the Kogut and Singh index is the arithmetic average of the squared deviations of each partner location, j, from the ranking of the unit of analysis, US:

$$PCD_i = \sum_{h=1}^{5} \left(\left(I_{h,j} - I_{h,us} \right)^2 / V_h \right) / 5 \qquad (20)$$

where, PCD_i is the cultural difference between the jth partner's country and the US partner for the ith JV, $I_{h,j}$ is Hofstede's measure for the hth cultural dimension of the jth partner's country, $I_{h,us}$ is the Hofstede's measure for the hth cultural dimension of the US, and V_h is the cross-sectional variance of the hth dimension measure. The extreme values of the PCD_i index are demonstrated in table I:

Table I: Kogut and Singh index: difference between jth partner's country and the US partner

Countries	Highest	Countries	Lowest
U.S. - Slovakia	4.58	U.S. – Ireland	0.29
U.S. - Taiwan	4.16	U.S. – New Zealand	0.23
U.S. – South Korea	4.08	U.S. – Canada	0.14
U.S. - China	4.08	U.S.– Australia	0.02
U.S. - Russia	4.08	Identical countries	0

[9] As mentioned in Hanvanich et al. (2003), cultural differences can also be associated with discrepant organizational climates. This study fails to address this perspective.

[10] To determine a venture's national culture, we examined the partners' headquarter location, which might be an inaccurate proxy for firms' national cultures (e.g. tax heavens).

Location Cultural Difference

To account for cultural knowledge spill-over effects between partners, this study measures location cultural difference by taking the minimum of the cultural differences between both partners' country and the target country. Specifically, the location cultural difference, LCD_i, is measured as the minimum of both the arithmetic average of the squared deviation of the target location from the ranking of the US, and the arithmetic average of the squared deviation of the target location from the ranking of the jth partner's country:

$$LCD_i = \text{minimum}\left(\sum_{h=1}^{5}\left(\left(I_{h,T} - I_{h,US}\right)^2 / V_h\right)/5\,, \sum_{h=1}^{5}\left(\left(I_{h,T} - I_{h,j}\right)^2 / V_h\right)/5\right) \tag{21}$$

where, $I_{h,T}$ is defined as Hofstede's measure for the hth cultural dimension of the target country. The extreme values of the right-hand side of eq. 21 are demonstrated in table II.

Table II: Kogut and Singh index: Difference between target country and jth partner's country

Countries	Highest	Countries	Lowest
Australia - Malaysia	3.78	Taiwan – Indonesia	0.72
Japan – U.S.	3.65	Hong Kong – China	0.38
Great Britain – China	3.15	Germany – Italy	0.35
France – China	2.74	Switzerland – Italy	0.31
Mexico – U.S.	2.66	Identical countries	0

3.4.2 Relative asset size

The magnitude of the market reaction may increase once a smaller organization enters into a JV with an entrenched larger firm; adding largely to the smaller company's stock of investment opportunities. This so-called signalling effect, detected by Mohanram and Nanda (1998), is taken into account by controlling for the relative asset size. The relative size is determined by dividing the logarithm of parent asset size by the logarithm of partner asset size.

3.4.3 Absolute asset size

Previous literature has found that the market valuation of a JV decision significantly depends on absolute company size as the firm's resources might affect the venture's survival rate (Havenich, 2003; Jones and Danbolt, 2004). Therefore, this study controls for the total asset's logarithmic transformation of the unit of analysis.

3.4.4 Deal size

It is apparent that deal size affects the magnitude of the market reaction as it determines the relative risk-exposure of a firm (Merchant and Schendel, 2000). Therefore, the logarithmic transformation of deal size has been controlled for.

3.4.5 Financial crises

A dummy variable for economic crises has been incorporated to control for negative market sentiments.

3.4.6 *Listing-bias*

Among others, Chang (1998) demonstrated that acquisitions of publicly traded companies paradoxically result in lower abnormal returns for the acquirer than acquisitions of an unlisted target company. While this listing-bias paradox is widely discussed in the acquisition literature, it is unaccounted for in the JV literature. Therefore, besides the main hypotheses, the study examines the presence of a listing-bias associated with JV announcement by introducing a dummy variable which demonstrates whether or not the jth partner firm is listed on an established national stock exchange.

4. RESULTS

4.1 General valuation effect

4.1.1 Parametric tests

The parametric test results of the general effect of JV announcements on stock markets are displayed in table III.[11] This table presents the statistical results of both the Patell test and the BMP test over the AARs and CAARs. As demonstrated in column (1) and (2), Patell's test finds significant outcomes at t = 0 and t = 2, with AARs of 1.1% ($p < 0.05$) and 0.2% ($p < 0.10$), respectively. Additionally, as demonstrated in columns (7) and (8), the positive CAARs of all the tested event windows attain significant statistical evidence using Patell's test. The event window {-2, 2}, in particular, derives the greatest level of significance ($p < 0.05$) with a CAAR equal to 0.93%. Especially because the (delayed) market reactions at t = 0, 1 and 2 carry a great chunk of statistical power, as shown in column (3).

Table III: Statistical results parametric tests

	(1)	(2)	(3)	(4)	(5)	(6)
Day	AAR	Patell's t-statistic	p-value	BMP's t-statistic	p-value	(4) - (2)
-2	-0.2%	- 0.505	.614	- 0.514	.608	- 0.009
-1	-0.3%	0.336	.737	0.309	.756	- 0.027
0	1.1%	2.577	.011 **	2.216	.028 **	- 0.361
1	0.2%	1.110	.268	0.915	.361	- 0.195
2	0.2%	1.959	.052 *	1.636	.104	- 0.323

	(7)	(8)		(9)	
Window	CAAR	Patell's t-statistic	p-value	BMP's t-statistic	p-value
{-1,1}	0.96%	2.323	.021 **	1.987	.049 **
{-2,1}	0.72%	1.759	.081 *	1.436	.153
{-2,2}	0.93%	2.449	.016 **	2.472	.015 **

[11] See appendix 7.6 for a visual representation of the CAARs around the event date.

In comparison, the BMP statistics are noticeably lower on and subsequent to the announcement date. This divergence becomes clearer in the column (6), where the deviation of the test statistics widens at and subsequent to announcement date. Demonstrated in column (5), this divergence forgoes the statistical significance of Pattel's AAR at t = 2 and the CAAR over {-2, 1}, as the BMP statistics reach p-values of 0.104 and 0.153, respectively.

It is apparent that, this inter-tests reduction of significance provides evidence for an event-induced increase in volatility. This highlights the urge to re-standardize the sample ARs; also when implementing the non-parametric test.

4.1.2 Non-parametric test

The non-parametric results of the Generalized rank test (GRANK) over the CAARs are demonstrated in table IV. In line with the results of the parametric BMP test, it is apparent that the GRANK test statistics are significant at the {-1,1} ($p < 0.10$) and {-2,2} ($p < 0.05$) interval.

Table IV: Statistical results non-parametric tests

Window	CAAR	GRANK test statistic	p-value
{-1,1}	0.96%	1.89	.061*
{-2,1}	0.72%	1.59	.114
{-2,2}	0.93%	2.47	.015**

*** p<0.01, ** p<0.05, * p<0.1

4.2 Regression analysis

4.2.1. Descriptive statistics

Table V demonstrates the descriptive statistics of all the implemented variables. It is apparent that the natural logarithm of relative asset size and the natural logarithm of deal value restrain the amount of observations in the regression sample. This reduction reduces the efficiency of the implemented model through an increase of the estimators standard errors. Furthermore, as the CAR(-2,2) has a mean of 0.009 with a standard deviation of 0.0059, it is apparent that there are outliers at both ends of the distribution. Following convention, observations deviating more than three standard deviations outside the range of the mean were removed (Chatterjee & Price, 1991). Values outside this range appeared to groundlessly deviate from other observations in the sample. Non-exclusions would, in contrast to the earlier robust (non-)parametric tests, bias the results in the direction of these outliers. Hence, 2 JVs were excluded: Greenbeer – Grupo (21.7%) and American Axle – Hefei (-15,7%).

Table V: *Descriptive statistics*

The descriptive statistics displayed in table 5 demonstrate all the dependent, independent and control variables of interest for the entire sample of two-partner JVs. It is apparent that outliers exists at both ends of CAR(-2,2)'s distribution.

	All JVs				
	N	Mean	Standard deviation	Min	Max
Dependent variables					
CAR(-2,2)	96	0.009	0.059	-0.157	0.217
Independent variables					
PCD	96	1.937	1.878	0	5.4
CCD	96	1.12	0.917	0	3.68
Listing-bias	96	0.417	0.496	0	1
Crises	96	0.104	0.307	0	1
Control variables					
Total assets	89	22.243	2.494	12.972	27.3
Relative assets	36	0.835	2.548	-4.362	7.511
Deal value	26	18.425	2.182	14.51	21.6

The pairwise correlation matrix is estimated and displayed in table 5. The highest observed correlation coefficient is 0.734 between partner cultural differences (PCD) and country cultural differences (CCD). This correlation is obvious as both indexes are often associated with the initiation of cross-border JVs. As advocated by Kennedy (2008), correlation coefficients which are higher than 0.8 might display multicollinearity issues. Therefore, as the correlation is nowhere near perfect, the individual variables doubtlessly explain specific firm characteristics. However, it should be noted that the relatively high coefficient results in larger variances of the coefficients, reducing the estimation efficiency.

Table VI: Multicolinearity matrix of all variables

This table demonstrates the pairwise correlation matrix of the entire sample of 96 two-partner JVs, covering the years 2000-2017. The variables of concern are the cumulative abnormal returns over {-2,2}, total assets (TA), relative assets (RA), deal value (DV), partner cultural differences (PCD), country cultural differences (CCD), a dummy variable for the presence of a financial crisis during the initiation of the JV and a dummy variable of whether the jth partner firm is listed on a national stock exchange, i.e. the listing-bias.

	1.	2.	3.	4.	5.	6.	7.	8.
1. CAR [-2,2]	1.0000							
2. TA	-0.0504	1.0000						
3. RA	-0.1424	0.4663	1.0000					
4. DV	0.0585	0.5134 *	0.2135	1.0000				
5. PCD	0.0308	0.0747	0.0851	-0.1332	1.0000			
6. CCD	-0.0613	0.1148	0.1373	0.1122	0.7335	1.0000		
7. Crises	-0.1183	-0.0728	0.1616	0.0647	-0.0870	-0.0455	1.0000	
8. Listing-bias	-0.0390	0.1384	-0.2208	0.3342	0.0701	0.1885	0.1268	1.0000

4.2.2. Regression results

For the regression analysis the CAR{2,-2} has been incorporated as the dependent variable due to the earlier discovered leakage effect (appendix 7.6). The regression results for a variety of models are demonstrated in table 7.

The results support Hypothesis 1, which argued that a positive market valuation effect would occur as a result of a firm's declared participation in a JV. The constant of every model is significantly positive, thus, a positive CAR would surface even in the unrealistic situation where all independent variables would be zero (CAR[-2,2] ≈ 0,25%, p<10%).

Table VII: Regression models

Regression analyses of CAR[-2,2] with a variety of independent variables: the natural logarithm of total assets (Orbis Database/10K-filings), relative assets defined as the natural logarithm of assets of the unit of analysis over (Orbis Database/10K-filings), the natural logarithm of the assets of jth partner (Orbis Database/10K-filings), the natural logarithm of deal value transformed to $ using the yearly averaged exchange rate (Zephyr/Proxy statements), partner cultural difference (PCD) defined using the Kogut and Singh (1988) index between both venture partners, country cultural difference (CCD) defined as the minimum of the Kogut and Singh (1988) index of cultural differences between both partners' country and the target country, a dummy variable for the presence of a financial crisis and a dummy variable for whether or not the jth partner is listed on a national stock exchange (Zephyr). ***, ** and * represent significance at 1%, 5% and 10% level respectively. Adopting the Breusch-Pagan test, models [2] and [4] show a homoscedastic variance at a 10% and 5% significance level, respectively. The other models fail to reject the null-hypothesis of homoscedasticity, and therefore have robust standard errors in their parentheses. The Swilk-test fails to reject the null-hypothesis of non-normal distributed estimated residuals for every model at a 1% level (Appendix 7.8). Nevertheless, if consistency remains, the accuracy and reliability of the estimators might prevail as normalization occurs alongside the central limit theorem.

Variables	[1]		[2]		[3]		[4]		[5]		[6]		[7]	
Total assets (ln)	- 0.0161	***	- 0.0158	***	- 0.0168	***	-0.0168	**	- 0.0170	***	- 0.0168	***	- 0.0188	**
	(0.00334)		(0.00481)[a]		(0.00375)		(0.00559)[a]		(0.00352)		(0.00384)		(0.00516)	
Relative assets (ln)	0.0108	***	0.0104	**	0.0112	**	0.0107	*	0.0120	**	0.0123	**	0.0136	
	(0.00292)		(0.00448)[a]		(0.00349)		(0.00482)[a]		(0.00413)		(0.00425)		(0.00645)	
Deal value (ln)	0.0067		0.0066		0.0070		0.0070		0.0072		0.0071		0.0079	
	(0.00468)		(0.00459)[a]		(0.00484)		(0.00495)[a]		(0.00513)		(0.00567)		(0.00637)	
PCD	–		- 0.0012		–		- 0.0031		–		–		- 0.0048	
			(0.00561)[a]				(0.00717)[a]						(0.00707)	
CCD	–		–		0.0029		0.0063		–		–		0.0123	
					(0.0113)		(0.0137)[a]						(0.00869)	
Financial Crises	–		–		–		–		- 0.0198		- 0.0231		- 0.0359	
									(0.0235)		(0.0249)		(0.0333)	
Listing-bias	–		–		–		–		–		0.00973		0.0185	
											(0.0272)		(0.0323)	
Constant	0.247	*	0.247	*	0.251	*	0.258	*	0.260	*	0.248	*	0.266	
	(0.114)		(0.115)[a]		(0.131)		(0.124)[a]		(0.113)		(0.123)		(0.164)	
Number of observations	14		14		14		14		14		14		14	
Adj. R-squared	0.525		0.461		0.463		0.393		0.478		0.403		0.209	
Kurtosis	6.223		6.243		6.025		5.864		5.833		5.487		4.594	
Skewness	- 1.978		- 1.986		- 1.943		- 1.926		- 1.905		- 1.832		- 1.700	
Swilk-test	.0008	***	.0009	***	.0008	***	.0009	***	.0010	***	.0011	***	.0005	
Breusch-Pagan (P>Chi^2)	.1992		.0601	*	0.162		0.026	**	0.710		.9086		.3383	

In contrast, the results demonstrate no evidence for Hypothesis 2 concerning the speculated negative relationship between partner cultural difference and shareholder value generation. Despite the negative sign demonstrated in (2), (4) and (7), the model lacks statistical power to support this effect. Likewise, the disclosed findings fail to support Hypothesis 3, which anticipated on a negative relationship between knowledge spill-over adjusted location cultural difference and shareholder value. Perhaps it might be more pragmatic to concentrate on the similarity of organizational culture, instead of partners' national culture, to proxy for a firm's work-related mental 'software' (Merchant and Schendel, 2000). However, such an endeavour lies outside the bounds of this study, and therefore prevails as a subject for future studies to embark on.

Likewise, the model fails to describe a significant level of cross-sectional variance to the presence of a financial crisis.

The results of this study furthermore fail to find statistical support for a listing-bias as models (6) and (7) demonstrate p-values less than 10%. Nevertheless, as Chang's (1988) findings are unaddressed in the JV literature, further research might be needed to increase consistency of these results.

More positively, the majority of the models find evidence in line with Mohanram and Nanda's (1998) signalling theory as relative size is positively associated with capital market valuations.

5. CONCLUSION AND DISCUSSION

Above all, this study demonstrates a positive capital market valuation effect associated with the sampled firm's declared participation in a JV. Therefore, building on the findings of Jones and Danbolt (2004), Hanvanich et al. (2003) and Reuer and Koza (2000), it could be concluded that JVs continue to be an attractive collaborative arrangement.

Nevertheless, this study fails to find a significant effect for the effect of both partner- and spill-over adjusted location cultural differences on capital market valuations. One should be vigilant with interpreting these no-effect results, as the extremely small sample size makes the implemented model moderately inefficient. Likewise, as the opposite holds as well, the model demonstrates the statistical strength of the signalling theory and the necessity to control for total assets.

One limitation arises due to the fact that an event study test is a joint-test problem. In other words, it simultaneously tests whether the ARs are equal to zero and whether the assumptions underlying the market model are true. Although a test value might be statistically significant, its economic meaningfulness might not be clear-cut. Therefore, other models – or, when implementing a market model, superior tracking portfolios – might have to be implemented to validate the consistency of our results.

Moreover, opportunities stem from the measurement of cultural heterogeneities. Even though the implemented empirical model refines the measurement of cultural difference by building on Kogut and Singh (1988) and Makino and Beamish (1998), it still might oversimplify the richness of culture. For instance, the build-upon Kogut and Singh index makes an invalid assumption of equivalence, as Barkema et al. (1997) demonstrate that certain dimensions of cultural differences are more influential than others in ex-ante JV valuations. In addition, it is still widely debated whether culture is static over time (Shenkar, 2001). These debates and findings unveil the necessity for an improved cultural measure.

Overall, this study provides managers/academics with a framework to analyse the effects of culture on future JV performance which should be implemented on a wider scale to derive reliable answers.

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7. Appendix

7.1 List of announced joint ventures [12]

Date	Parent name	CC	Partner name	CC	TCC	β_{Market}
9-10-2008	Agco Corporation	US	Upravleniya Traktornye Zavody	RU	RU	1.160 ***
23-8-2017	Agco Corporation	US	Charoen Pokphand Group Co.	TH	CN	1.519 ***
11-7-2017	ARAS Corporation	US	Siemens Ag	DE	US	0.774 ***
1-2-2002	Advanced Micro Devices Inc.	US	United Microelectronics Corporation	TW	ID	2.670 ***
15-6-2017	Air Products And Chemicals Inc.	US	Linde North America Inc.	US	US	1.117 ***
10-11-2004	Air Products And Chemicals Inc.	US	Air Liquide Sa	FR	CN	1.073 ***
27-10-2009	Albemarle Corporation	US	Ibn Hayyan Plastic Product Co.	ARA	ARA	1.552 ***
11-12-2008	American Axle & Manufacturing	US	Hefei Automobile Axle Co. LTD	CN	CN	1.609 ***
25-4-2007	American Axle & Manufacturing	US	Anhui Jianghuai Automobile Co.	CN	CN	1.530 ***
20-2-2008	American Railcar Industries Inc.	US	Amtek Auto LTD	IN	IN	1.334 ***
10-7-2006	Andersons Inc., The	US	Marathon Oil Corporation	US	US	1.628 ***
28-10-2008	Archer Daniels Midland Company	US	Ach Food Companies Inc.	US	US	1.110 ***
27-4-2006	Archer Daniels Midland Company	US	Gold Kist Inc.	US	US	0.980 ***
13-11-2003	Alcoa Inc.	US	Aluminium Corporation Of China	CN	CN	1.210 ***
15-7-2010	Ashland Inc.	US	Süd Chemie Ag	DE	DE	1.846 ***
3-1-2017	Volvo Car Ab	US	Autoliv Inc.	SE	SE	1.422 ***
13-3-2014	Aviat Networks Inc.	US	Ubuntu Technology (Pty) LTD	AFW	AFW	1.128 ***
1-4-2003	The Baker Hughes Inc.	US	Expro International Group Plc,	GB	US	0.840 ***
2-5-2005	Boeing Company, The	US	Lockheed Martin Corporation	US	US	0.915 ***
14-4-2006	Boeing Company, The	US	Korporatsiya Vsmpo-Avisma Oao	RU	RU	0.895 ***
8-5-2006	Brooks Automation Inc.	US	Yaskawa Electric Corporation	JP	JP	1.677 ***
23-4-2014	CHS Inc.	US	Fessenden Cooperative Asc.	US	US	0.041
26-11-2008	Cell Therapeutics Inc.	US	Spectrum Pharmaceuticals Inc.	US	US	0.406 *
9-8-2004	Chiron Corporation	US	Panacea Biotec Ltd	IN	IN	1.270 ***
7-6-2006	Conagra Foods Inc.	US	Tianjin Chalton Tomato Products	CN	CN	0.377 **
14-3-2006	Coffee Holding Company Inc.	US	Coffee Bean Trading-Roasting Llc	US	US	2.161 ***
24-5-2006	Conocophillips Company	US	Saudi Arabian Oil Company	ARA	ARA	1.156 ***
4-3-2011	Corning Inc.	US	Finolex Cables LTD	IN	IN	1.257 ***
12-1-2004	Crown Holdings Inc.	US	Ahmad Hamad Algosaibi & Bros	AFW	AFE	1.468 ***
10-9-2012	Cummins Inc.	US	Hyundai Heavy Industries Co.	KR	KR	1.755 ***
28-3-2016	Cummins Inc.	US	Olayan Group, The	ARA	ARA	0.810 ***

*** p<0.01, ** p<0.05, * p<0.1

[12] CC = "Country Code", TCC = "Target Country Code" and β_{Market} is the estimated beta for the market model.

Date	Parent name	CC	Partner name	CC	TCC	β_{Market}
29-10-2003	Cummins Inc.	US	Cummins India Ltd	IN	IN	1.561 ***
14-2-2002	Mercury Marine International	US	Cummins Inc.	US	US	1.287 ***
6-10-2011	Dana Holding Corporation	US	Bosch Rexroth Ag	DE	IT	2.087 ***
26-3-2010	Danaher Corporation	US	Cooper Industries Plc	IE	US	0.838 ***
15-5-2008	Dorman Products Inc.	US	Eastern Manufacturing Inc.	US	US	0.0282
26-5-2004	Ei Du Pont De Nemours & Company	US	Tate & Lyle Plc	GB	US	0.916 ***
31-7-2012	Eastman Chemical Company	US	Sinopec Yangzi Petrochemical Co.	CN	CN	2.011 ***
10-1-2002	Healthsouth Corporation	US	Orthofix International	US	US	0.378 **
28-3-2012	Enersys	US	Energy Leader Batteries India Pvt	IN	IN	1.747 ***
23-7-2014	Eternity Healthcare Inc.	US	Shanghai Yin Jun Inc	CN	CN	1.428
1-10-2011	Ford Motor Company	US	Sollers Oao	RU	RU	1.358 ***
22-9-2017	Ford Motor Company	US	Anhui Zotye Automobile Co., LTD	CN	CN	1.189 ***
25-4-2001	Ford Motor Company	US	China Changan Automobile Group	CN	CN	0.761 ***
4-12-2006	Fossil Inc.	US	Rajesh Exports LTD	IN	IN	1.383 ***
16-9-2011	General Electric Company	US	Rt-Biotekhprom Oao	RU	RU	1.110 ***
30-1-2017	General Motors Company	US	Honda Motor Co., LTD	JP	US	1.394 ***
14-6-2010	Greif Inc.	US	National Scientific Co LTD	ARA	ARA	1.160 ***
16-10-2006	Greenbrier Companies Inc., The	US	Grupo Industrial Monclova Sa	MX	US	2.704 ***
8-10-2009	Hain Celestial Group Inc.	US	The Hutchison China Meditech	GB	CN	1.519 ***
9-7-2001	Hain Celestial Group Inc.,	US	Thegrupo Siro Sl	ES	ES	0.774 ***
25-10-2012	Hasbro Inc.	US	Guangdong Alpha	CN	CN	2.670 ***
10-10-2011	Honeywell International Inc.	US	Sinochem Group Co., LTD	CN	CN	1.117 ***
14-7-2011	Hudson Technologies Inc.	US	Safety Hi-Tech Srl	IT	IT	1.552 ***
19-6-2009	Hormel Foods Corporation	US	Herdez Del Fuerte Sa De Cv	MX	US	1.073 ***
2-8-2010	Intel Corporation	US	Ge Healthcare Inc.	US	US	1.609 ***
21-11-2005	Intel Corporation	US	Micron Technology Inc.	US	US	1.530 ***
24-9-2012	Kellogg Company	US	Yihai Kerry Investments Co., LTD	CN	CN	1.334 ***
15-9-2015	Kellogg Company	US	Tolaram Africa	AFW	AFW	1.628 ***
3-10-2008	Eli Lilly And Company	US	Jubilant Organosys LTD	IN	IN	1.110 ***
19-7-2000	Electric City Corporation	US	Merloni Progetti Spa	IT	GB	0.980 ***
19-12-2000	Lyondell Chemical Company	US	Bayer Ag	DE	NL	1.210 ***
25-7-2011	Mine Safety Appliances Company	US	Mcr Safety	US	US	1.846 ***
31-3-2014	Magnegas Corporation	US	Future Energy Pty LTD	AU	AU	1.422 ***
14-6-2017	Mattel Inc.	US	Fosun International LTD	HK	CN	1.128 ***
13-2-2012	Microsoft Corporation	US	GE Healthcare Inc.	US	US	0.840 ***

*** p<0.01, ** p<0.05, * p<0.1

Date	Parent name	CC	Partner name	CC	TCC	β_{Market}
21-4-2008	Micron Technology Inc.	US	Nanya Technology Corporation	TW	TW	0.915 ***
15-1-2010	Micron Technology Inc.	US	Origin Energy LTD	AU	AU	0.895 ***
19-2-2008	Neurometrix Inc.	US	Cyberkinetics Neurotechnology	US	US	1.677 ***
10-1-2008	Nucor Corporation	US	Duferco SA	CH	IT	0.041
2-3-2010	Nucor Corporation	US	Mitsui & Co. (Usa) Inc.	US	US	0.406 *
9-6-2016	Nucor Corporation	US	Jfe Steel Corporation	JP	MX	1.270 ***
28-10-2005	PPG Industries Inc.	US	Sinoma Jinjing Fiber Glass Co.	CN	CN	2.161 ***
1-12-2006	PPG Industries Inc.	US	Devold Amt As	NO	US	0.377 **
24-1-2011	PPG Industries Inc.	US	Asian Paints LTD	IN	IN	1.156 ***
16-3-2011	Pepsico Inc.	US	Strauss Group LTD	ARA	US	1.257 ***
14-10-2003	Pepsico Inc.	US	Unilever Group	NL	NL	1.468 ***
24-7-2012	Polaris Industries Inc.	US	Eicher Motors LTD	IN	IN	1.755 ***
16-5-2007	Praxair Inc.	US	Yara International Asa	NO	NO	0.810 ***
27-12-2006	P&G	US	Inverness Medical Innovations	US	CH	1.561 ***
23-3-2010	Quigley Corporation	US	Phosphagenics LTD	AU	US	1.287 ***
28-7-2009	Qualcomm Inc.	US	Cellco Partnership Inc.	US	US	2.087 ***
5-3-2007	Polo Ralph Lauren Corporation	US	Compagnie Financiere Richemont	CH	CH	0.838 ***
6-6-2002	Raytheon Company	US	Valeo Sa	FR	US	0.0282
7-5-2013	Rentech Inc.	US	Graanul Invest AS	EE	US	0.916 ***
16-6-2004	Rentech Inc.	US	Headwaters Technology Group Inc.	US	US	2.011 ***
1-5-2002	Rohm And Haas Company	US	Omnova Solutions Inc.	US	US	0.378 **
11-6-2012	Schulman Inc.	US	National Petrochemical Industrial Co-	ARA	ARA	1.747 ***
19-5-2016	Tecogen Inc.	US	Tedom As	CZ	US	1.428
28-5-2010	Trimble Navigation Ltd	US	Rossiiskaya Korporatsiya	RU	RU	1.358 ***
14-9-2010	Trimble Navigation Ltd	US	Hilti AG	CH	US	1.189 ***
28-3-2003	Trimble Navigation Ltd	US	Nikon Corporation	JP	JP	0.761 ***
17-10-2013	Usg Corporation	US	Boral LTD	AU	MY	1.383 ***
13-5-2005	Unifi Inc.	US	Sinopec Yizheng Chemical Fibre	CN	CN	1.110 ***
26-4-2003	United States Steel Corporation	US	Kobe Steel Ltd	JP	US	1.394 ***
19-4-2017	Wabco Holdings Inc.	US	Beijing Huitong Tianxia Technology Co., Ltd	CN	CN	2.704 ***

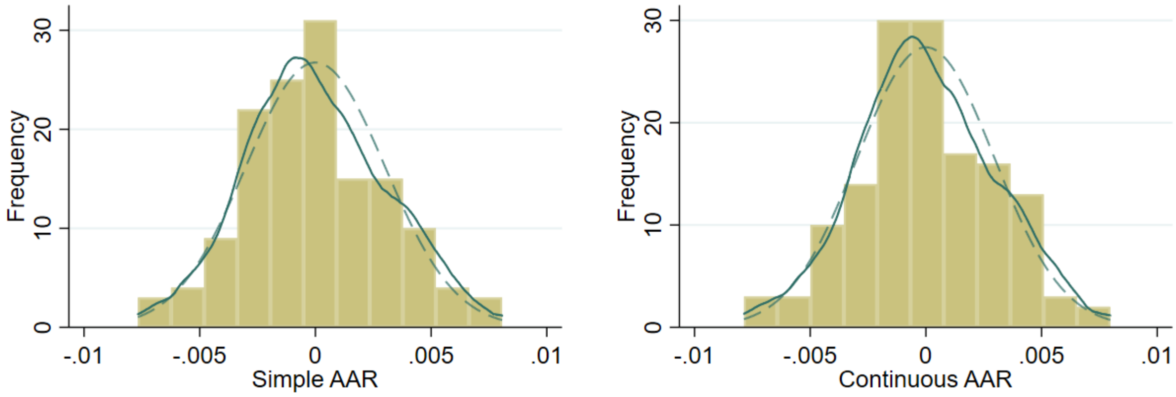
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

7.2 Recent studies using event analysis

Authors	Sample size	Estimation window	Total days for estimation window	Main event window	Total days for event window
Koh and Venkatraman (1991)	175	-270 to -71	200	-1 to 0	2
Park and Kim (1997)	174	-264 to -15	250	-2 to 1	4
Merchant and Schendel (2000)	101	-250 to -51	200	0 to 1	2
Reuer and Koza (2000)	297	-250 to -51	200	-1 to 1	3
Hanvanich and Çavuşgil (2001)	23	-121 to -21	101	-2 to 0	3
Hanvanich et al. (2003)	1015	-150 to -10	141	-1 to 1	3

7.3 Logarithmic Transformation

Below, the transformation of simple returns to continuous returns using a logarithmic transformation is displayed graphically and numerically. The Kernel Density estimation of AARs distribution compared to perfect normal distribution of returns over T, of both the simple- and continuous AARs, demonstrate the normalization process. Furthermore, the Skewness/Kurtosis test, as initiated by Belanger and D'Agostino (1990), individually tests both the skewness and kurtosis for normality and combines these statistics in an aggregated test-statistic. The null-hypothesis assumes that data is normally distributed. It builds on Jarque-Bera's test of normality by correcting for sample size. Relative to the simple returns, both the skewness and kurtosis of the continuous AAR adjusts in the direction the normal levels 3 and 0, respectively. Consequently, the confidence interval of normality increases.

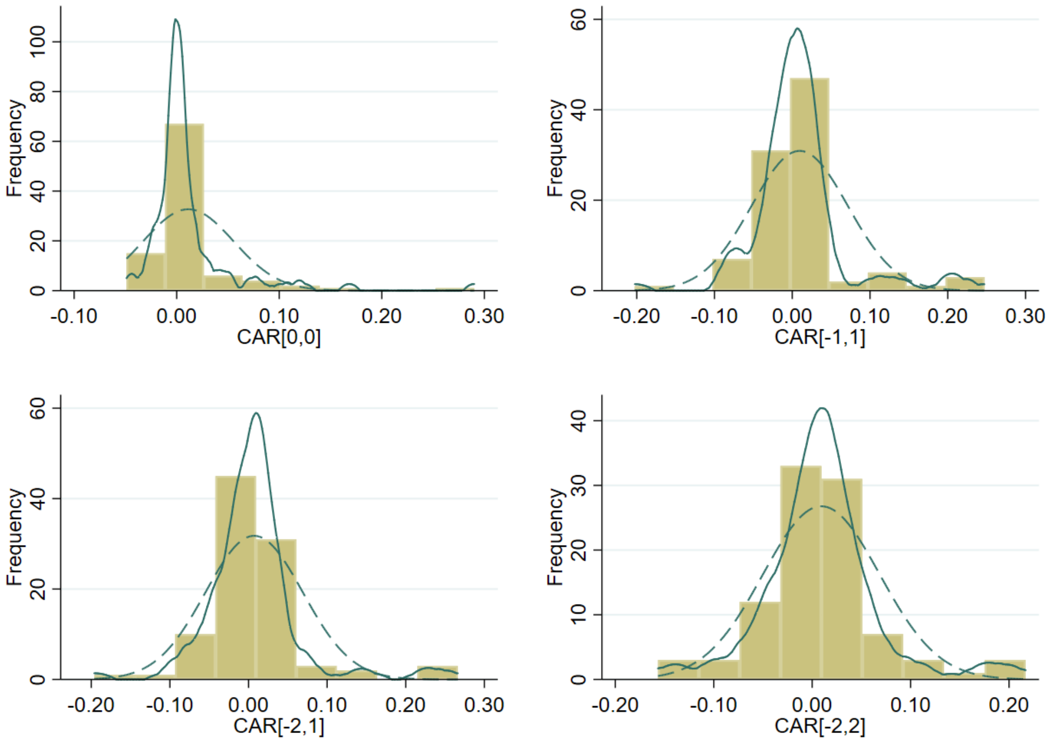


Skewness/Kurtosis tests for Normality

Variable	Obs.	Skewness	Pr(Skew)	Kurtosis	Pr(Kurtosis)	Adj Chi^2	Prob. > Chi^2
Simple	141	-.0938	0.6344	2.946	0.8922	0.24	0.8850
Continuous	141	.0770	0.6961	2.950	0.8847	0.17	0.9169

7.4 Normality of Cumulative Abnormal Returns (CARs)

The graphs present the Kernel Density estimation of the CARs distribution compared to perfect normal distribution. The apparent non-normal distribution is substantiated by the Skewness/Kurtosis test, as initiated by Belanger and D'Agostino (1990). This test individually tests both the skewness and kurtosis for normality and combines these statistics in an aggregated test-statistic. The null-hypothesis assumes that data is normally distributed. It builds on Jarque-Bera's test of normality by correcting for sample size. In all time intervals, both the skewness and kurtosis are significantly different from its optimal levels 0 and 3, respectively. move into the direction the normal levels 0 and 3, respectively. Therefore, we reject the null-hypothesis of normally distributed ARs.

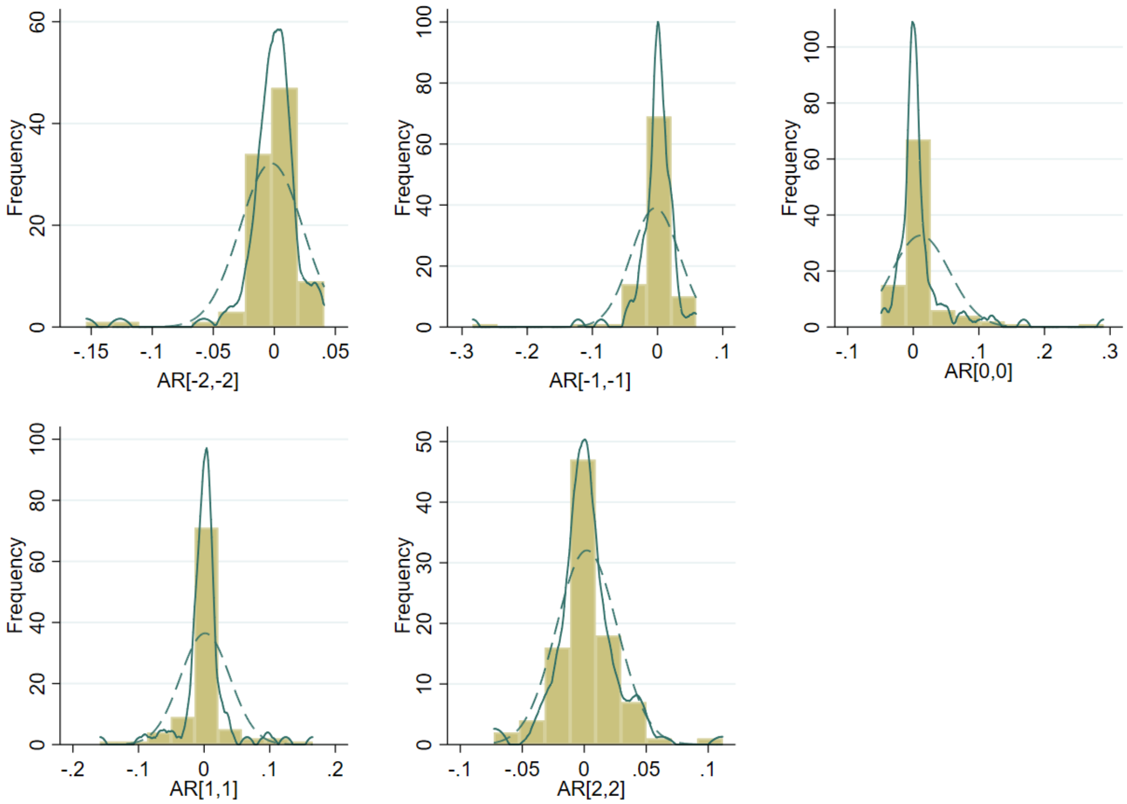


Skewness/Kurtosis tests for Normality

Variable	Obs.	Skewness	Pr(Skew)	Kurtosis	Pr(Kurt.)	Adj Chi^2	Prob. > Chi^2
CAR[0,0]	96	3.547	0.0000	19.934	0.0000	72.09	0.00000
CAR[-1,1]	96	1.225	0.0000	7.862	0.0000	27.28	0.00000
CAR[-2,1]	96	1.398	0.0000	8.978	0.0000	31.92	0.00000
CAR[-2,2]	96	.6438	0.0105	5.762	0.0009	14.17	0.00008

7.5 Normality of Abnormal Returns (ARs)

The graphs present the Kernel Density estimation of ARs distribution compared to perfect normal distribution. The apparent non-normal distribution is substantiated by the Skewness/Kurtosis test, as initiated by Belanger and D'Agostino (1990). This test individually tests both the skewness and kurtosis for normality and combines these statistics in an aggregated test-statistic. The null-hypothesis assumes that data is normally distributed. It builds on Jarque-Bera's test of normality by correcting for sample size. In all time intervals, both the skewness and kurtosis are significantly different from its optimal levels 0 and 3, respectively. move into the direction the normal levels 0 and 3, respectively. Therefore, we reject the null-hypothesis of normally distributed ARs.

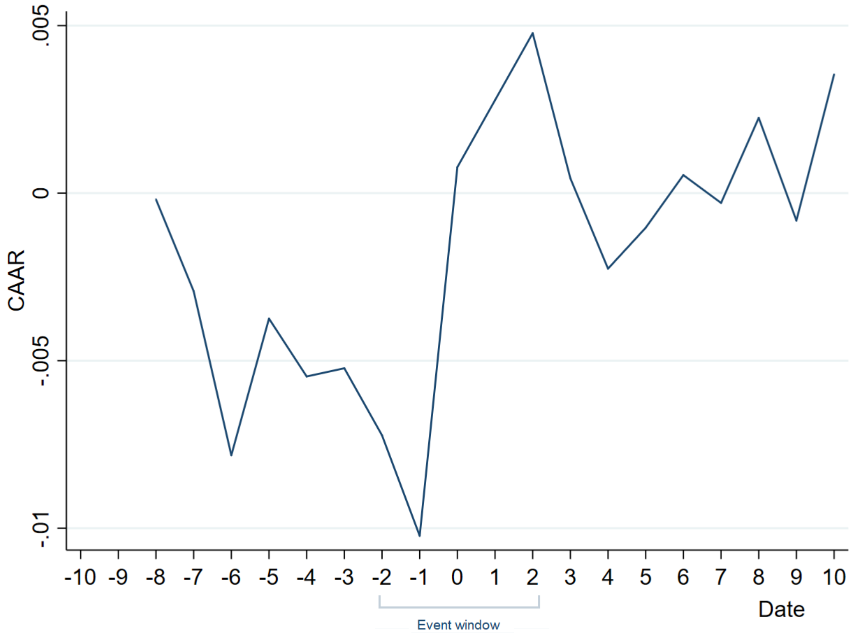


Skewness/Kurtosis tests for Normality

Variable	Obs.	Skewness	Pr(Skew)	Kurtosis	Pr(Kurt.)	Adj Chi^2	Prob. > Chi^2
AR $t = -2$	96	-3.28	0.0000	19.12	0.0000	68.34	0.0000
AR $t = -1$	96	-4.80	0.0000	35.26	0.0000	84.03	0.0000
AR $t = 0$	96	3.54	0.0000	19.93	0.0000	72.09	0.0000
AR $t = 1$	96	0.35	0.1413	10.43	0.0000	20.49	0.0000
AR $t = 2$	96	0.65	0.0096	7.42	0.0000	18.27	0.0001

7.6 Visual representation of the CAARs around the event window

The diagram of the CAARs over the event date demonstrate evidence against the efficient market hypothesis as the financial market overreacts and then gradually adjusts. It is apparent that there is a downward trend in the sample, which is offset as a result of the joint venture announcements.



7.7 Descriptive Statistics of ARs over the event interval {-2,2}

The descriptive statistics of the ARs are displayed below. The presence of outliers highlight the necessity to standardize the ARs by the predicted standard deviation.

	-2	-1	0	1	2
Average	-0.00238	-0.00339	0.011362	0.001598	0.002112
Standard deviation	0.025647	0.037173	0.043854	0.03761	0.024326
Median	0.001015	0.002019	0.000652	0.002277	0.00011
Kurtosis	17.07882	34.07355	17.9533	7.895799	4.701665
Skewness	-3.33546	-4.88136	3.606616	0.356935	0.687667
Range	0.195094	0.342891	0.338967	0.324089	0.183427
Minimum	-0.15418	-0.28368	-0.04892	-0.15862	-0.07172
Maximum	0.040912	0.059206	0.290052	0.165467	0.111712
N	96	96	96	96	96

7.8 Normality of estimated residuals per model

In line with the Swilk test, the graphical representations lead us to conclude that there is non-normality of the residuals. Nevertheless, if consistency remains, the accuracy and reliability of the estimators might prevail as normalization occurs alongside the central limit theorem.