



Specialization Effect of Non-technological Strategic Alliances on Innovation

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Motivation of This Study

- In the last few decades, business has been experiencing a wave of organizational restructuring observed not only in the equity redistribution of ownership, but also in joint ventures and strategic alliances (Chen et al. [2015]).
- This increasing trend of strategic alliance formation has drawn increased interest not only from business practitioners but also from academicians.
- Strategic alliance formation helps to create value for the alliance partner firms through sharing resources (Chou et al. [2014], Anand and Khanna [2000], Chen, King, and Wen [2015]).
- There are a lot of research works that analyze the value creation mechanism for technological alliances (Li, Qiu, and Wang [2019], Berchicci [2013] etc.).
- Though the majority of alliances are non-technological alliances, there are not much research on the value addition mechanism of these alliances.

Research Questions

- Does non-tech alliance formation have any spillover effect on innovation?
- What specific search method (exploration of new technologies or exploitation of well-known technologies) non-tech alliance partner firms use to boost up their innovation?
- Do these alliance partner firms produce new products in post alliance years that help them to differentiate themselves from their competitors?

Contributions to the Literature

- At first, while there are a lot of research works that analyze technological alliances, to our knowledge, our paper is the first paper that examines the value addition mechanism of non-tech alliances.
- Besides that, many papers theoretically acknowledge about the Developing Specialization Effect of alliance formation and our paper finds large sample empirical evidence for such theory.
- Finally, Li et al. [2019] paper shows that alliances formed by technology conglomerates result in novel innovation through exploration of new technology. Whereas, considering non-tech alliances, we find evidence for exploitation of existing technology.

Key Findings

- Non-tech alliances result in more innovation output as measured by the number of patents and citations.
- The non-tech alliance driven increase in the number of patents is due to exploitation activities (developing specialization), as reflected by increased patents in firm's existing technological areas and more self-citations and backward citations.

Non-tech Alliance →→ Innovation↑ ← ←Exploitation ↑
formation of known technologies

Hypothesis Development

- Theoretically firms can get benefited from alliance formation in mainly two ways:
 - ❖ Knowledge Acquisition: exploration activities
 - ❖ Developing Specialization: exploitation activities
 - Knowledge Acquisition means changes in the knowledge or performance of the recipient partner firm(s) from the experience of other partner firm(s)
 - Developing Specialization means partner firms gain expertise in different subsets of a specific production unit and utilize their improved performance to a joint commercial outcome.
- H1₀: (Knowledge Acquisition Hypothesis): Non-tech alliance formation has no effect on the innovation outcome of alliance partner firms.*
H1₁: (Developing Specialization Hypothesis): Non-tech alliance formation has positive spillover effect on the innovation outcome of alliance partner firms
- H2₀: (Knowledge Acquisition Hypothesis): Non-tech alliance partner firms will innovate more in new area through exploration.*
H2₁: (Developing Specialization Hypothesis): Non-tech alliance partner firms will innovate more in their existing areas through exploitation.

Methods

To test our first set of hypothesis about the possible spillover effect of non-technological alliance formation on innovation outcomes, we run the following regression model (Here, we specifically include the R&D investment as control variable to disentangle the spillover effect of non-tech alliance from the effect of R&D on innovation)-

Baseline Model

$$\log(1 + Patent_{i,t+1}) = \beta_0 + \beta_1.NTAlliance_{i,t} + \gamma.Z_{i,t} + \theta_t + \alpha_i + \epsilon_{i,t}.$$

- $\log(1 + Patent_{i,t+1})$: logarithm of one plus the firm i 's number of patents at year $t + 1$
- $NTAlliance_{i,t}$: A dummy which takes the value of one if the firm i is in a non-tech alliance deal in the year t , and zero otherwise.
- $Z_{i,t}$: Vector of firm characteristics.
- θ_t : Year fixed effects.
- α_i : Firm fixed effect.

Results of the Baseline Regressions

This table reports the regression results on Patents for non-technological alliance partner firms.

Variables	(1) <i>Patents_{t+1}</i>	(2) <i>Patents_{t+2}</i>	(3) <i>Patents_{t+3}</i>	(4) <i>Citations_{t+1}</i>	(5) <i>Citations_{t+2}</i>	(6) <i>Citations_{t+3}</i>
<i>NTAlliance</i>	0.170*** (0.033)	0.188*** (0.037)	0.221*** (0.041)	0.241*** (0.036)	0.256*** (0.041)	0.282*** (0.046)
<i>R&D/TA</i>	0.970*** (0.105)	1.020*** (0.124)	1.113*** (0.141)	0.912*** (0.126)	0.958*** (0.149)	1.001*** (0.167)
Observations	11,138	9,307	8,009	11,138	9,307	8,009
Adj. R-squared	0.620	0.609	0.601	0.580	0.569	0.563
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry Cluster	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

So we find that non-tech alliance formation helps partner firms to develop more patents and to generate more citations in the following couple of years of alliance formation. Through further analysis, we also show that this increased innovation output is not driven by any specific type of non-tech alliances and the result holds true for all types of non-tech alliances (Marketing alliances, Licensing alliances, and Manufacturing alliances).

Exploitation Vs. Exploration

- Our empirical analysis in this section try to explore the underlying mechanism of spillover effect of non-tech alliance firms on innovation.
- For this purpose, we classify patents into two classes based on their technology classes:
 - New Patents means the patents of a firm in new technology classes which are result of exploration activities.
 - Old Patents means the patents of a firm in it's existing technology classes which are result of exploitation activities.

New Patents VS Old Patents

Regression to explore the underlying mechanism of spillover effect.

Variables	(1) <i>New. Patents_{t+1}</i>	(2) <i>New. Patents_{t+2}</i>	(3) <i>New. Patents_{t+3}</i>	(4) <i>Old. Patents_{t+1}</i>	(5) <i>Old. Patents_{t+2}</i>	(6) <i>Old. Patents_{t+3}</i>
<i>NTAlliance</i>	0.017 (0.022)	-0.014 (0.022)	-0.027 (0.022)	0.189*** (0.046)	0.184*** (0.052)	0.159*** (0.055)
<i>R&D/TA</i>	-0.102 (0.148)	-0.186 (0.143)	-0.277** (0.131)	0.908*** (0.344)	0.826** (0.384)	0.890** (0.415)
Constant	0.459*** (0.075)	0.364*** (0.077)	0.386*** (0.086)	0.774*** (0.201)	0.799*** (0.230)	0.733*** (0.237)
Observations	8,235	6,824	5,561	8,235	6,824	5,561
Adj. R-squared	0.206	0.208	0.201	0.567	0.558	0.549
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry Cluster	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Conclusions

- We find the evidence for spillover effect of non-tech alliance formation on innovation.
- This increase in patents of non-tech alliance partner firms is mainly derived from the increase in patents in firms existing technological areas rather than patents in new areas.

So Though there are many papers which provide evidence for Knowledge Acquisition aspect of alliance formation, our paper shed light on the other benefit (Developing Specialization).

References

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Thank You

