ผลงานวิจัยดีเด่นด้านตลาดทุน

The Effect of Venture Capital Networks and Institutions on Portfolio Companies' Performance in Southeast Asia"

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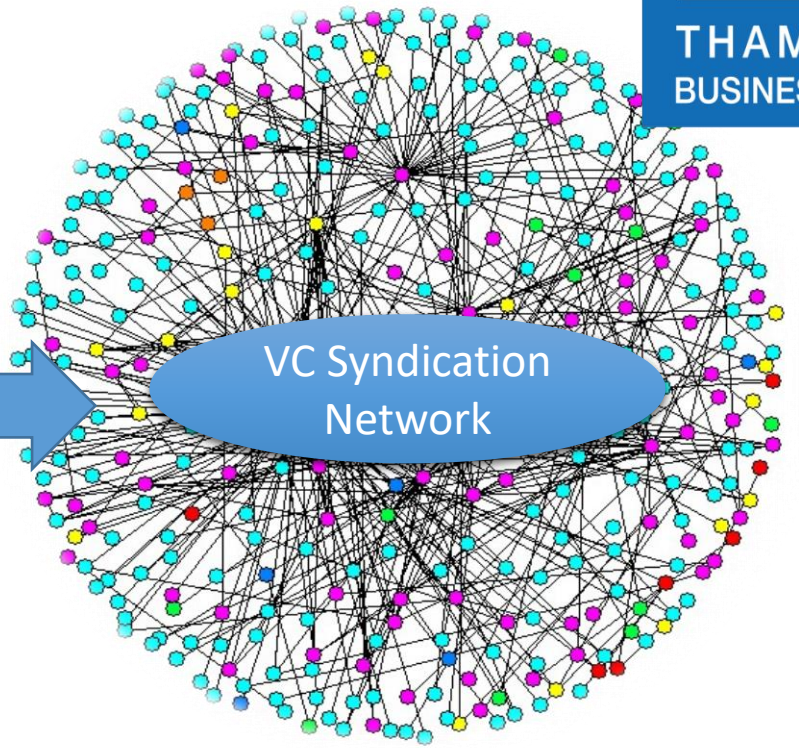
วันที่ 14 กันยายน 2563

VC Syndication network

- Information Asymmetry
  - Agency problem



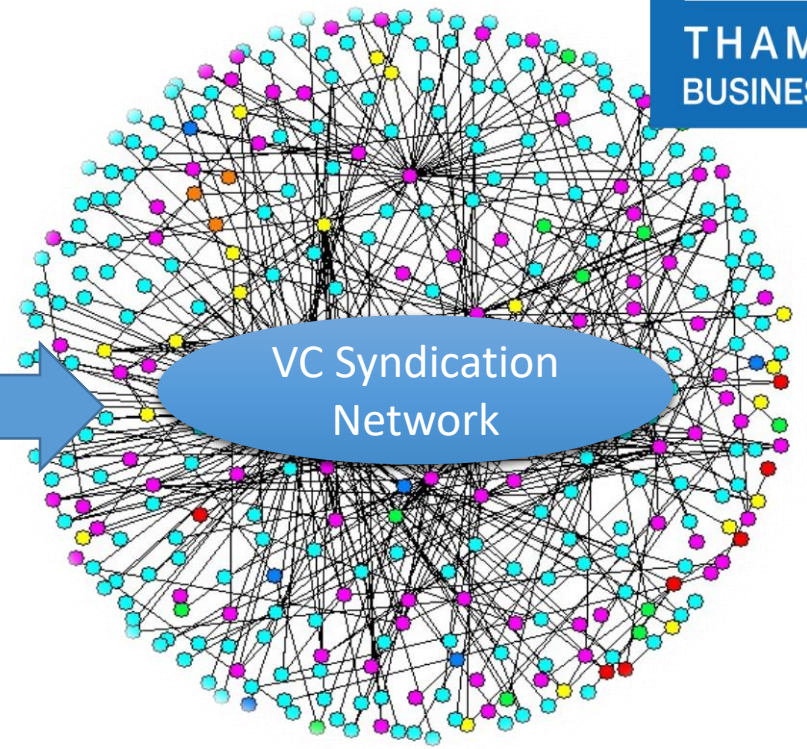
Venture capital Syndication Network

Venture capital investors rarely provide funding solely, they are usually motivated to form a syndicate to invest in their common target startups (Bygrave, 1988, Lerner, 1994). This characteristic helps connect each venture capital firms as a whole network, so called "venture capital network"

Institutional Theory and VC Syndication network

- Asymmetry information theory
- Agency theory

- **Institutional Theory**



Institutional Theory and VC Syndication network

Even though traditional cooperate finance theories, agency and asymmetric information theory, help motivate the formation of networks in emerging venture capital markets, Institutional theory is more suitable in explaining this situation, as venture capital investment is more likely to be dominated by the local institutional settings (Ahlstrom & Bruton, 2006).

Ahlstrom, D., & Bruton, G. D. (2006). Venture capital in emerging economies: Networks and institutional change. Entrepreneurship theory and practice, 30(2), 299-320.

Research Questions

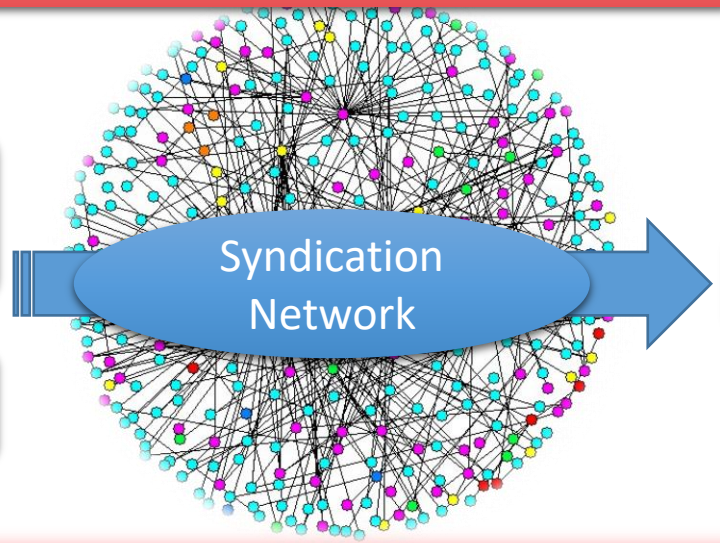
Southeast Asia emerging economies

(Bygrave, 1988; Lerner, 1994; Bruton et al., 2002)

- Information Asymmetry
  - Agency problem

- Institution Development

(Ahlstrom & Bruton, 2006; Lingelbach, 2015)



Portfolio companies

1) Does VC network enhance a performance of portfolio companies?
2) Is institutional development related to a performance of portfolio companies?
3) Does VC network help compensate a lack of fully-developed institutional development on a performance of portfolio companies?

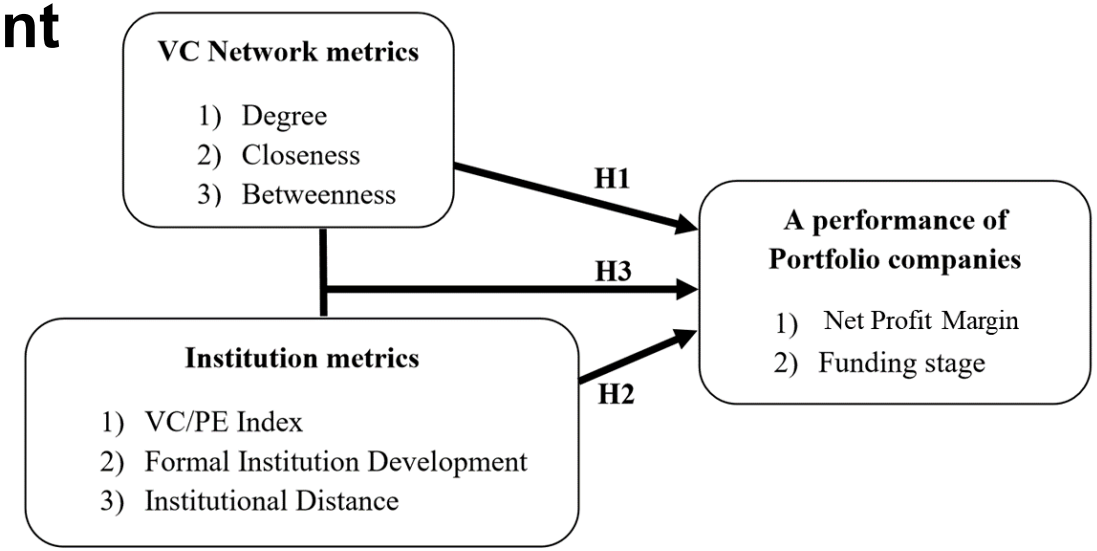
Purpose of Study

Objectives

1) To study the impact of VC network and institutional development on a performance of portfolio companies in Southeast Asian emerging economy.

2) To study the interaction between institutional development and VC network on portfolio companies' performance in Southeast Asian emerging economy.

Hypotheses Development



H1a: Degree is positively related to a performance of portfolio companies in Southeast Asian emerging economy.

H1b: Betweenness is positively related to a performance of portfolio companies in Southeast Asian emerging economy.

H1c: Closeness is positively related to a performance of portfolio companies in Southeast Asian emerging economy.

H2a: VCPE is positively related to a performance of portfolio companies in Southeast Asian emerging economy.

H2b: FID is positively related to a performance of portfolio companies in Southeast Asian emerging economy.

H2c: IDIST is negatively related to a performance of portfolio companies in Southeast Asian emerging economy.

H3a: The interaction between VC network metrics and VCPE/FID is positively related to enhance portfolio companies' performance in Southeast Asian emerging economy

H3b: The interaction between VC network metrics and IDIST is negatively related to enhance portfolio companies' performance in Southeast Asian emerging economy

Significance of Research

This study helps clarify the significant role of networks and institutions in venture capital investment in emerging economies and provide a better understanding of how they are related to a performance of portfolio companies.

Contributions

VC network literature

pioneer an investigation of the venture capital network in Southeast Asia, as well as network metrics, by using a unique hand-collected data from syndicated deals.

Entrepreneurial finance literature

Develop a theoretical framework showing that different level of VC networking involved in different institution development offers different performance advantages of VC backed companies, by using a quantitative approach

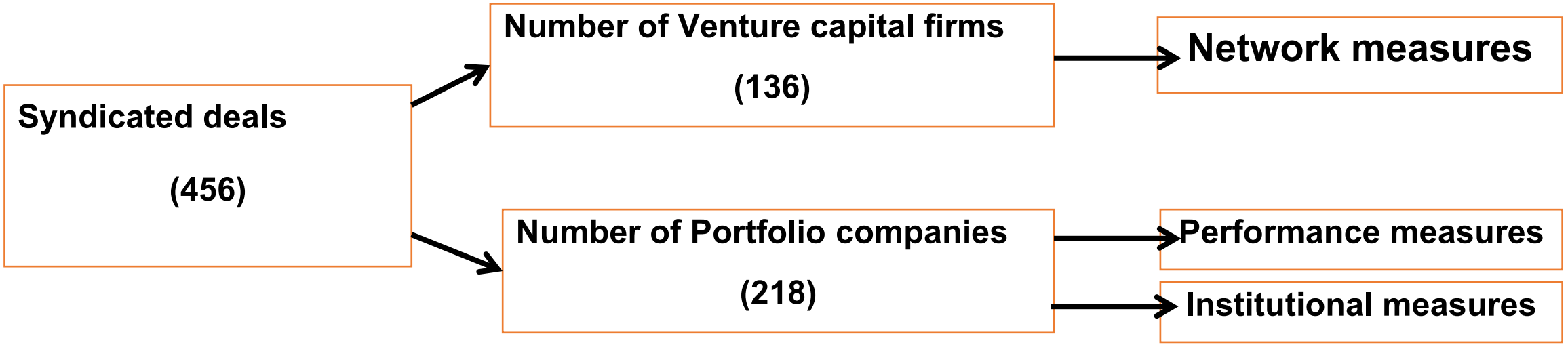
Managerial Contribution

The results also benefit to practitioners, entrepreneurs and entrepreneurial ventures that seek venture capital financing in emerging economies. It provides an insight of how each venture capitalist strategically invest in Southeast Asian ventures by considering a level of partners' networks and institutions of investees' country

Samples and Data

Samples

Unbalanced, multi-variate, time-series panel data sets



Data sources and Methodologies

Independent variable: **PM**

Observations	Number of Portfolio companies
30 (15/15)	22 (11/11)

Independent variable: FS

Observations	Number of Portfolio companies
23 (10/13)	15 (6/9)

Portfolio performance measures Net profit margin and Funding stage

A report of companies' balance sheet and income statement to examine financial and operating performance of portfolio firms

VC Network centrality measures Degree, Betweenness, and Closeness

Network analysis is calculated by "Pajek software" (De Nooye et al., 2005) and visualized by NetDraw program

Institutional Development measures VC/PE Attractiveness Index, Formal Institution Development, and Institutional Distance

The reports of VC/PE Attractive Index and World Governance Indicator (WGI) for constructing metrics of institutional factors

Random Effect panel regression with control variables: VC and portfolio companies characteristics. Entrepreneurs' Industrial and Singapore fixed effects, computed by using STATA program

Measurement of variables

A performance of portfolio companies **Portfolio Firm-level**

i. Net profit margin

ii. Funding stage

(Baum & Silverman ,2004)

VC Network metrics **Venture Capital Firm-level**

i. Degree

ii. Betweenness

iii. Closeness

(Abell & Nisar, 2007; Hochberg et al,, 2007)

Institutional Development metrics **Country-level**

i. VC/PE Attractiveness Index

ii. Formal Institution Development

iii. Institutional Distance

(Kaufmann et al., 2010; Li & Zahra, 2010; Li et al., 2014; Scheela et al., 2015; Groh, et al., 2013)

Control variables **Firm-level**

i. Portfolio companies' size

ii. Portfolio companies' Age

iii. Industry dummy

iv. Singaporean VC dummy

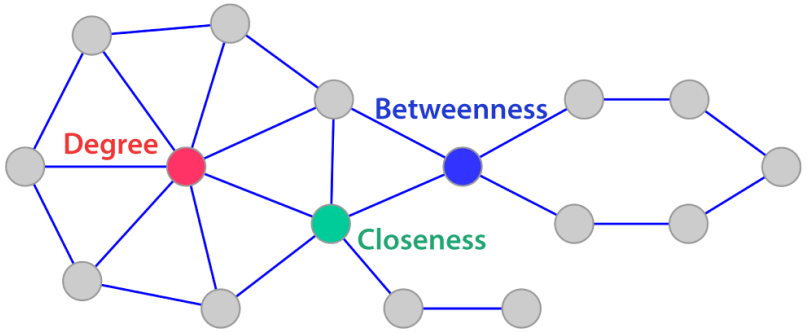
(Jeng & Wells, 2000; Hochberg et al., 2007; Groh & Wallmeroth, 2016)

Measurement of variables

A performance of portfolio companies	Portfolio Firm-level

Net Profit Margin (PM)	Funding Stage (FS)
• Net Profit & Loss divided by operating revenue • (Baum & Silverman ,2004)	• Recent funding round portfolio firms achieves, assigned in an interval score from one to four, beginning in order from up to seed stage, series A, series B, and series C or above.

Measurement of variables



VC Network metrics **Venture Capital Firm-level**

(Abell & Nisar, 2007; Hochberg et al,, 2007)

Degree (DEGREE)

- The number of links to other VCs in the network

Closeness (CLOSE)

$$\frac{The\ number\ of\ the\ rest\ VCs}{The\ sum\ of\ all\ possible\ distance\ between\ target\ VC\ and\ all\ others}$$

Betweenness (BETW)

$$\frac{The\ number\ of shortest\ paths\ between\ other\ VCs\ that\ pass\ through\ target\ VC}{The\ number\ of\ shortest\ paths\ between\ two\ VCs}$$

Measurement of variables

Institutional Development metrics **Country-level**

VC/PE Attractiveness Index (VCPE)

- Country-level Annual VC/PE country attractiveness report from Groh et al. (2018)
- Scheela et al., 2015; Groh, et al., 2013

Formal Institution Development (FID)

- An average Six institutional dimensions of Rule of law, Government effectiveness, Control of corruption, Regulatory quality, Political stability, and Accountability from the World Governance Indicator (WGI)
- Kaufmann et al., 2010; Li & Zahra, 2010

Institutional Distance (IDIST)

- The absolute value of differences in FID between countries of VCs and portfolio companies
- Li et al. (2014)
- Kaufmann et al., 2010; Li et al., 2014

Random Effect Regression Model

The general form of the structural equation in this study is shown below,

$$\pi_{it} = \alpha_0 + \alpha_1(X)_t + \alpha_7(SIZE)_{it} + \alpha_8(AGE)_{it} + \alpha_9(INDUS)_{it} + \alpha_{10}(SING)_{it} + \varepsilon_{it}$$

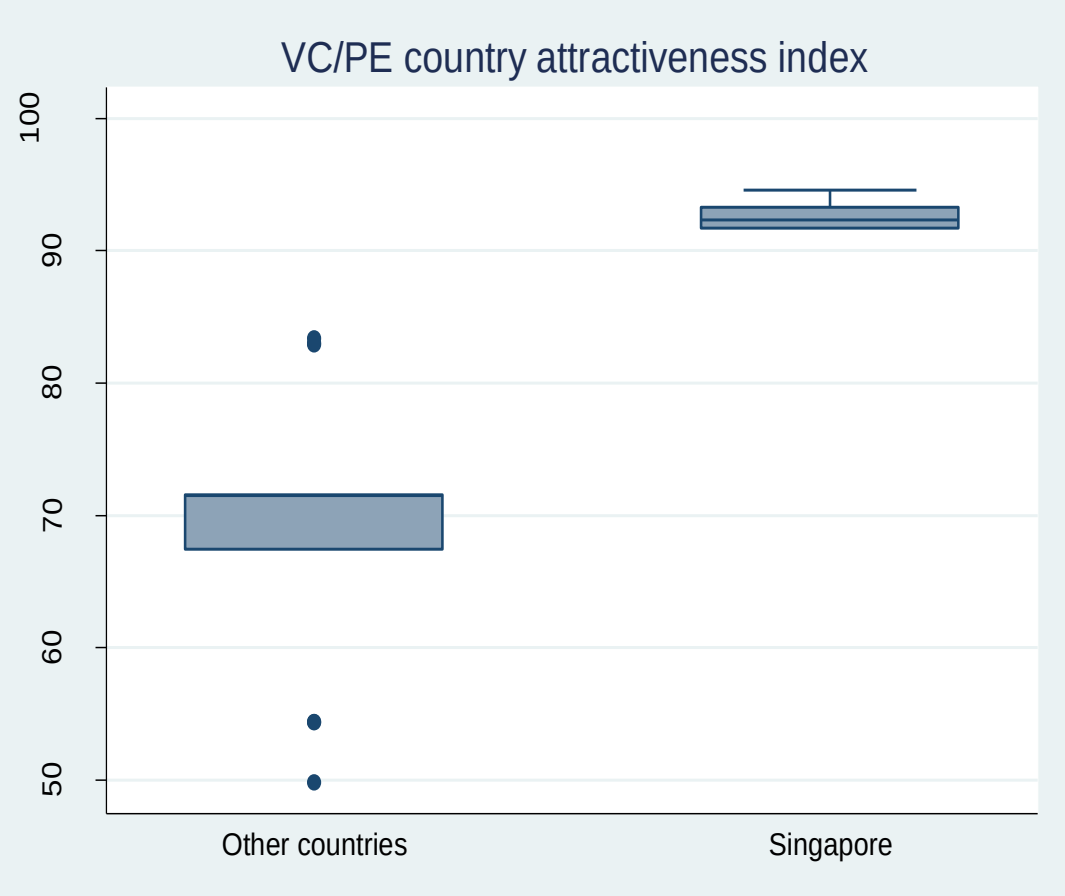
- where
  - π_{it} = Dependent variables (PM and FS)
  - X = Independent variables
  - α = coefficient
  - i = portfolio firm i
  - j = Venture capital firm j
  - t = Year
  - ε = Within-entity error term

Designated regression models

		Dependent variable: Return on Revenue (ROR) and Funding Stage (FS)														
	Random Effects GLS regression.	H1			H2			H3								
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
VC Network metrics	Degree															
	Closeness															
	Betweenness															
Institutional metrics	VCPE															
	FID															
	IDIST															
Interaction terms	Degree X VCPE															
	Degree X FID															
	Degree X IDIST															
	Closeness X VCPE															
	Closeness X FID															
	Closeness X IDIST															
	Betweenness X VCPE															
	Betweenness X FID															
	Betweenness X IDIST															
Control variables	Venture's size (Total asset)															
	Venture's age (YEAR)															
Dummy variables	Singaporean VC dummy (SING)															
	Singapore fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
	Industry fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Initial Analysis

Southeast Asia: Emerging countries and Singapore



Two-sample t-test of VCPE

Group	*Observation*	*Mean*	*Std. Err.*	*Std. Dev.*	*t*	*P-Value*
Emerging	15	69.522	2.606	10.095	-8.854	0.000
Singapore	15	92.725	0.271	1.050		
Difference		*-23.202*	*2.620*			

Notes: (1) VCPE stands for Venture capital/Private equity Attractive Index (2) *Test: H_a: two sided, H_o: Difference in means = 0*. The t statistic is -8.854 and the p-value is less than .001. The p-value indicates that a t value extremely less than -8.854 occurs less than 1 out of a thousand times under the null distribution (assuming no difference between the two groups). This means that it is highly unlikely that the two groups are equal.

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Hypothesis testing

Random Effect Regression of Hypothesis 1 (Panel A: PM)

		Dependent variable: Return on Revenue (ROR) and Funding Stage (FS)														
	Random Effects GLS regression.	H1			H2			H3								
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
VC Network metrics	Degree															
	Closeness															
	Betweenness															
Institutional metrics	VCPE															
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Interaction terms	Degree X VCPE															
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	Closeness X VCPE															
	Closeness X FID															
	Closeness X IDIST															
	Betweenness X VCPE															
	Betweenness X FID															
	Betweenness X IDIST															
Control variables	Venture's size (Total asset)															
	Venture's age (YEAR)															
Dummy variables	Singaporean VC dummy (SING)															
	Singapore fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
	Industry fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

1st Hypothesis

Model 1 - 3

Results

	ALL	Emerging	Singapore
Degree	**1.048*** **	0.002	0.121
Total asset	0.0001	**-0.00003*** **	0.003
INDUS	-1.765	-1.162	0.551
Age	1.881	**0.525*** **	-0.007
SING	-	0	1
Const.	-14.648	-3.478	-19.854
N	30	15	15
No. group	22	11	11
R2_overall group	0.0001	0.047	0.001
Chi-Square	185.85***	10673.70***	23.03***
p	0	0.522	0.615

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Hypothesis 1

Model 1.1 and 1.2

- Degree is insignificance to PM in both groups
- Size is negatively and significantly related to PM in emerging countries
- Age is positively and significantly related to PM in emerging countries

Results

	ALL	Emerging	Singapore
Closeness	19.398	0.038	-52.236
Total asset	0.0001	**-0.00003*** **	0.001
INDUS	-1.104	-1.165	0.643
Age	2.279	**0.529*** **	1.957
SING	-	0	1
Const.	-16.184	-3.444	-11.646
N	30	15	15
No. group	22	11	11
R2_overall group	0.076	0.046	0.207
Chi-Square	2.90	8123.55***	3.34
p	0.329	0.821	0.357

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Hypothesis 1

Model 2.1 and 2.2

- Closeness is insignificance to PM in both groups
- Size is negatively and significantly related to PM in emerging countries
- Age is positively and significantly related to PM in emerging countries

Results

	ALL	Emerging	Singapore
Betweenness	-25.978	**12.544*** **	**-119.122***
Total asset	0.0001	**-0.00002*** **	0.005
INDUS	-0.797	-1.160	2.380
Age	2.226	**0.570*** **	-1.158
SING	-	0	1
Const.	-14.196	-4.316	-22.431
N	30	15	15
No. group	22	11	11
R2_overall group	0.129	0.025	0.511
Chi-Square	12.43***	27379.70***	49.65***
p	0.6	0	0.044

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Hypothesis 1

Model 3.1 and 3.2

- Betweenness is positively and significantly related to PM in emerging countries
- Size is negatively and significantly related to PM in emerging countries
- Age is positively and significantly related to PM in emerging countries
- Betweenness is negatively and significantly related to PM in Singapore

Results

Hypothesis 1

H1a: Degree is positively related to a performance of portfolio companies in Southeast Asian emerging economy.

H1b: Betweenness is positively related to a performance of portfolio companies in Southeast Asian emerging economy.

~~H1c: Closeness is positively related to a performance of portfolio companies in Southeast Asian emerging economy.~~

- **Venture Capital Network Centrality is significantly related to a performance of portfolio companies in Southeast Asian emerging economy, yet Firm size and age come out significantly related to net profit margin in emerging countries.**

Results

Hypothesis 1

- The result of the hypothesis supports the motives of venture capital syndication under **the theory of agency and information asymmetry** and also confirms that VC syndication network is beneficial to the subsidiaries. As the prior literatures (Sorenson & Stuart, 2001; Brander et al., 2002; Baum & Silverman, 2004; Teten et al., 2013; Bellavitis et al., 2014) stated that VC network assists portfolio companies in providing an access to useful information and resources that might help increase competitive advantages and becoming more profitable.

Results

Hypothesis 1

- This finding is mainly in line with research studies of venture capital network effect on portfolio companies' performance in various parts of the world including Bellavitis et al. (2014) in the UK and Continental Europe, Hochberg et al.(2007) in the US, and Liu & Chen (2014) in China.
- The network measure of brokerage (Betweenness) has stronger economic effect on performance than do measures capturing the number and quality of relationships (Degree and Closeness). we examine the significance of a VC firm's ability to act as an agent between other VCs (betweenness) that indirect relationships (those requiring intermediation) are much more important in the way venture capital industry is organized in SEA emerging economies.
- However, if we take all the results in the first hypotheses, VC network might not always be important in a group of emerging countries, venture capitalists should invest in their target ventures by considering a decent amount of total asset and greater age of the ventures.

Results

Hypothesis 1

- Contradict to the phenomenon happens in Singapore, the upper tier of VC network centrality, which may be explained from the alternative evidence by Kuen (2014) stating that in economies with high dependence on social networks, **VCs make use of their networks to seek for potential ventures, but they might not necessarily invest in those ventures as networks is not the most essential factor for them.**
- Another evidence from Bellavitis et al., (2017) showing that **lower network centrality VC firms may perform better as they are more beneficial for using their network and connection in a cohesive network, rather than high network centrality firms.**

Hypothesis testing

Random Effect Regression of Hypothesis 2 (Panel A: PM)

		Dependent variable: Return on Revenue (ROR) and Funding Stage (FS)														
	Random Effects GLS regression.	H1			H2			H3								
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
VC Network metrics	Degree															
	Closeness															
	Betweenness															
Institutional metrics	VCPE															
	FID															
	IDIST															
Interaction terms	Degree X															
	Degree X															
	Degree X															
	Closeness X VCPE															
	Closeness X FID															
	Closeness X IDIST															
	Betweenness X VCPE															
	Betweenness X FID															
	Betweenness X IDIST															
Control variables	Venture's size (Total asset)															
	Venture's age (YEAR)															
Dummy variables	Singaporean VC dummy (SING)															
	Singapore fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
	Industry fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

2nd Hypothesis

Model 4 - 6

Results

	ALL	ALL	ALL
VCPE	-1.975	-	-
FID	-	-34.572	-
IDIST	-	-	-0.091
Total asset	-0.0004	0.0001	0.0001
INDUS	-0.076	0.219	-1.099
Age	2.914	2.454	2.413
Const.	121.346	-25.169	-12.378
N	30	30	30
No. group	22	22	22
R2_overall group	0.245	0.193	0.087
Chi-Square	3.25	3.49	2.81
p	0.210	0.360	0.691

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Hypothesis 2

Model 4-6

- VCPE, FID, and IDIST are insignificance to PM

Results

	ALL	Emerging	Singapore
VCPE	-1.975	**0.093*** **	-7.976
Total asset	-0.0004	**-0.00004*** **	-0.001
INDUS	-0.076	-1.270	-0.459
Age	2.914	**0.450*** **	1.624
SING DUMMY	-	0	1
Const.	121.346	-8.696	733.623
N	30	15	15
No. group	22	11	11
R2_overall group	0.245	0.003	0.297
Chi-Square	3.25	124233.62***	3.86
p	0.210	0	0.297

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Hypothesis 2

Model 4.1-4.2

ONLY IN EMERGING COUNTRIES

- VCPE is positively and significantly related to PM
- Size is negatively and significantly related to PM
- Age is positively and significantly related to PM

Results

	ALL	Emerging	Singapore
FID	-34.572	**12.390*** **	56.696
Total asset	0.0001	**-0.00008*** **	0.004
INDUS	0.219	-1.994	0.848
Age	2.454	**0.687*** **	-0.734
SING DUMMY	-	0	1
Const.	-25.169	3.616	-109.308
N	30	15	15
No. group	22	11	11
R2_overall group	0.193	0.033	0.020
Chi-Square	3.49	487743.79***	1.53
p	0.360	0	0.640

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Hypothesis 2

Model 5.1-5.2

ONLY IN EMERGING COUNTRIES

- FID is positively and significantly related to PM
- Size is negatively and significantly related to PM
- Age is positively and significantly related to PM

Results

	ALL	Emerging	Singapore
IDIST	-0.091	-0.009	0.314
Total asset	0.0001	**-0.00003*** **	0.001
INDUS	-1.099	-1.168	0.509
Age	2.413	**0.524*** **	1.574
SING DUMMY	-	0	1
Const.	-12.378	-3.345	-21.920
N	30	15	15
No. group	22	11	11
R2_overall group	0.087	0.048	0.156
Chi-Square	2.81	10326.88***	2.25
p	0.691	0.149	0.505

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Hypothesis 2

Model 6.1-6.2

- Size is negatively and significantly related to PM in emerging countries
- Age is positively and significantly related to PM in emerging countries

Results

Hypothesis 2

H2a: VCPE is positively related to a performance of portfolio companies in Southeast Asian emerging economy.

H2b: FID is positively related to a performance of portfolio companies in Southeast Asian emerging economy.

~~H2c: IDIST is negatively related to a performance of portfolio companies in Southeast Asian emerging economy.~~

- **Institutional development is positively and significantly related to a performance of portfolio companies in Southeast Asian emerging economy.**

Results

Hypothesis 2

- Formal institutional development has positive impact on portfolio companies' performance in other emerging countries but not in Singapore.
- This answers the question of how significant **institution theory** is in emerging economies as Ahlstrom & Bruton, 2006 argue that institutional theory is more suitable in explaining the role of network as the practice of venture capital which is influenced from institutional changes.

Results

Hypothesis 2

- The significant effect of institutions in Southeast Asia region preliminary serves as an empirical evidence supporting the findings of institutional development in emerging markets from the prior studies (Scheela et al. (2015) Bruton et al. (2004) Ahlstrom & Bruton (2006)
- This outcome affirms a consistency to a major role of institutions in enhancing portfolio companies' success yet been found in China and Southeast Asian developing countries, where we extended to the new evidence of insignificant effect in Singapore.
- We could not find a significance of institutional distance like the study of VC cross-border investment from Li et al. (2014) who found the significant effect of institutional distance between VCs and portfolio firms on venture capital exit success.
- Portfolio companies with lower total assets and older age tend to perform better than those younger firms or with higher total assets.

Hypothesis testing

Random Effect Regression of Hypothesis 3 (Panel A: PM)

		Dependent variable: Return on Revenue (ROR) and Funding Stage (FS)														
	Random Effects GLS regression.	H1			H2			H3								
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
VC Network metrics	Degree															
	Closeness															
	Betweenness															
Institutional metrics	VCPE															
	FID															
	IDIST															
Interaction terms	Degree X VCPE															
	Degree X FID															
	Degree X IDIST															
	Closeness X VCPE															
	Closeness X FID															
	Closeness X IDIST															
	Betweenness X VCPE															
	Betweenness X FID															
	Betweenness X IDIST															
Control variables	Venture's size (Total asset)															
	Venture's age (YEAR)															
Dummy variables	Singaporean VC dummy (SING)															
	Singapore fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
	Industry fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

- 3rd Hypothesis

Model 7 - 15

Results

	ALL	ALL	ALL
Degree X VCPE	**1.064*** **	-	-
Degree X FID	-	**1.256*** **	-
Degree X IDIST	-	-	1.053
Total asset	0.0001	0.00005	0.0001
INDUS	-1.937	-2.019	-0.820
Age	1.950	2.037	2.251
Const.	-10.793	-8.140	-17.582
N	30	30	30
No. group	22	22	22
R2_overall group	0.001	0.002	0.104
Chi-Square	196.49***	311.94***	3.28
p	0	0	0.301

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Hypothesis 3

Model 7-9

- The interaction term between DEGREE and VCPE is positively and significantly related to PM
- The interaction term between DEGREE and FID is positively and significantly related to PM

Results

	ALL	ALL	ALL
Closeness X VCPE	0.038	-	-
Closeness X FID	-	0.057	-
Closeness X IDIST	-	-	0.022
Total asset	0.0001	0.0001	0.0001
INDUS	-1.032	-1.046	-0.959
Age	2.326	2.324	2.376
Const.	-14.850	-14.751	-14.308
N	30	30	30
No. group	22	22	22
R2_overall group	0.079	0.076	0.088
Chi-Square	3.13	3.54	2.98
p	0.543	0.474	0.805

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Hypothesis 3

Model 10-12

- The interaction terms between CLOSENESS and VCPE/FID/IDIST are insignificance to PM

Results

	ALL	ALL	ALL
Betweenness X VCPE	-0.236	-	-
Betweenness X FID	-	-0.079	-
Betweenness X IDIST	-	-	-0.416
Total asset	0.0001	0.0001	0.00009
INDUS	-0.612	-0.823	-1.061
Age	2.046	2.287	2.373
Const.	-13.885	-14.961	-11.528
N	30	30	30
No. group	22	22	22
R2_overall group	0.172	0.115	0.093
Chi-Square	27.09***	12.08***	3.08
p	0.144	0.697	0.614

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

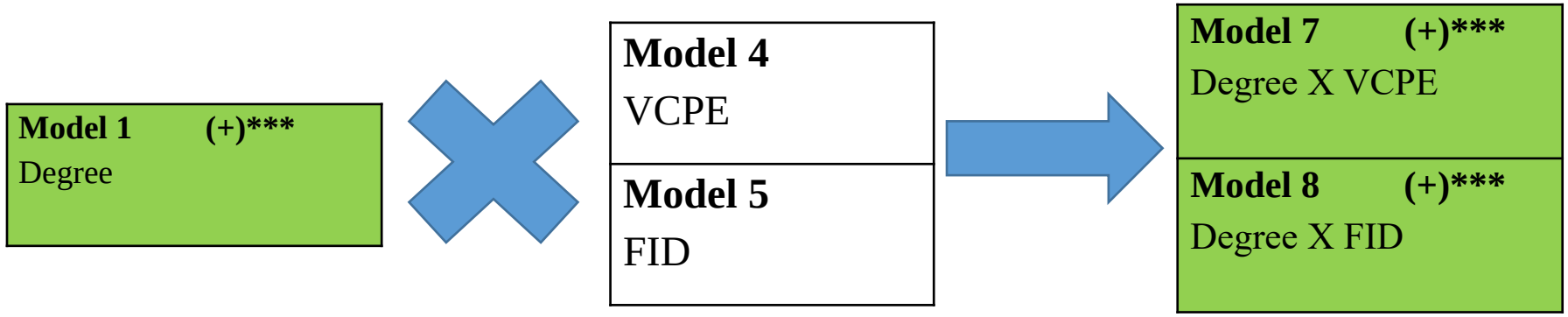
Hypothesis 3

Model 13-15

- The interaction terms between BETWEENNESS and VCPE/FID/IDIST are insignificance to PM

INTERACTION TERMS

Dependent variable: PM (**Overall**)



- This implies that apart from promoting portfolio companies' performance, a level of VC network centrality strongly affect and goes along with a level of institutional development of investee's country, which together help encourage profitability of portfolio companies.
- This also points out a significance and a usefulness of using VC network for VC-backed companies in Southeast Asian region.

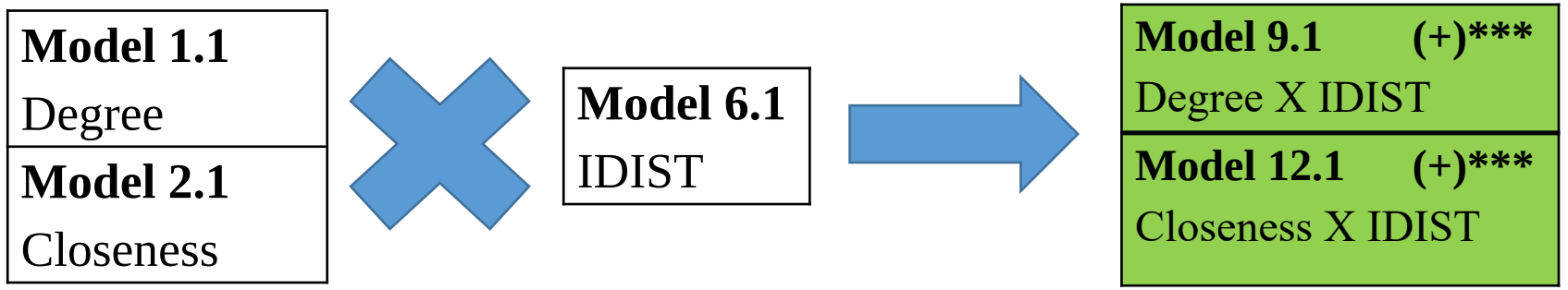
INTERACTION TERMS

Dependent variable: PM (**Emerging countries**)

- Both Betweenness network centrality and institutional development still have a strong effect on PM. Their supportive interaction helps enhance performance of portfolio companies.
- In other words, portfolio companies among emerging countries, who funded by high networked VCs and whose country has high level of institutional development, tend to be more profitable than the opposite kind of companies.

INTERACTION TERMS

Dependent variable: PM (**Emerging countries**)



- The synergic effect between these two factors is compensating to enhance profitability of portfolio companies. This unveils and addresses a strong linkage of the interaction between VC network and institutional differences in empowering the profitability of portfolio companies.
- It seems that these two factors, Network centrality and Institutional development, somehow supporting each other in some way to enhance a performance of portfolio companies.

Results

Hypothesis 3

H3a: The interaction between VC network metrics and VCPE/FID is positively related to enhance portfolio companies' performance in Southeast Asian emerging economy

H3b: The interaction between VC network metrics and IDIST is negatively related to enhance portfolio companies' performance in Southeast Asian emerging economy

- **The interaction between VC network metrics and Institutional development metrics has a positive impact on a performance of portfolio companies in Southeast Asian emerging economy.**

Results

Hypothesis 3

- Both VC network and institutions plays a pivot role in supporting and compensating each other, and consequently provide an extent to which level of VC network centrality and formal institutional development together being able to enhance a performance in portfolio companies in Southeast Asia, particularly in emerging economies.
- While we also found an evidence of the powerful influencers of interaction term on portfolio companies' performance that are VC network for the overall SEA portfolio companies, and institutional distance between VCs and VC-backed firms for SEA emerging countries.
- Again, firm's internal influence on the performance of portfolio companies includes such important factors as Total asset and Year of incorporation. Larger portfolio companies prone to have a slightly lower profitability since they may bear a lot of expenses from higher amount of total assets in relation to operating revenue comparing to the smaller ones. Moreover, the older portfolio companies seem to have higher net income in relation to operation revenue than the younger companies. The more years the company is in the market, the higher profitability it has.

Results of Hypotheses (Pooled A, A1, A2)

	Hypotheses	Results Dependent variable: PM		
		Overall	Emerging	Singapore
H1	VC Network metrics are positively associated to a performance of portfolio companies in Southeast Asian emerging economy.	Model 1 (+)*** Degree	Model 1.1 Degree	Model 1.2 Degree
		Model 2 Closeness	Model 2.1 Closeness	Model 2.2 Closeness
		Model 3 Betweenness	Model 3.1 (+)*** Betweenness	Model 3.2 (-)*** Betweenness
H2	Institutional development metrics are positively related to a performance of portfolio companies in Southeast Asian emerging economy.	Model 4 VCPE	Model 4.1 (+)*** VCPE	Model 4.2 VCPE
		Model 5 FID	Model 5.1 (+)*** FID	Model 5.2 FID
		Model 6 IDIST	Model 6.1 IDIST	Model 6.2 IDIST
H3	The interaction between VC network metrics and Institution Development metrics is positively related to enhance portfolio companies' performance in Southeast Asian emerging economy	Model 7 (+)*** Degree X VCPE	Model 7.1 Degree X VCPE	Model 7.2 Degree X VCPE
		Model 8 (+)*** Degree X FID	Model 8.1 Degree X FID	Model 8.2 Degree X FID
		Model 9 Degree X IDIST	Model 9.1 (+)*** Degree X IDIST	Model 9.2 Degree X IDIST
		Model 10 Closeness X VCPE	Model 10.1 Closeness X VCPE	Model 10.2 Closeness X VCPE
		Model 11 Closeness X FID	Model 11.1 Closeness X FID	Model 11.2 Closeness X FID
		Model 12 Closeness X IDIST	Model 12.1 (+)*** Closeness X IDIST	Model 12.2 Closeness X IDIST
		Model 13 Betweenness X VCPE	Model 13.1 (+)*** Betweenness X VCPE	Model 13.2 (-)** Betweenness X VCPE
		Model 14 Betweenness X FID	Model 14.1 (+)*** Betweenness X FID	Model 14.2 Betweenness X FID
		Model 15 Betweenness X IDIST	Model 15.1 (-)*** Betweenness X IDIST	Model 15.2 Betweenness X IDIST

Results of Hypotheses (Pooled B)

	Hypotheses	Results Dependent variable: FS
		Overall
H1	VC Network metrics are positively associated to a performance of portfolio companies in Southeast Asian emerging economy.	Model 1 (+)*** Degree
		Model 2 Closeness
		Model 3 (+)*** Betweenness
H2	Institutional development metrics are positively related to a performance of portfolio companies in Southeast Asian emerging economy.	Model 4 VCPE
		Model 5 (+)*** FID
		Model 6 IDIST
H3	The interaction between VC network metrics and Institution Development metrics is positively related to enhance portfolio companies' performance in Southeast Asian emerging economy	Model 7 (+)*** Degree X VCPE
		Model 8 (+)*** Degree X FID
		Model 9 Degree X IDIST
		Model 10 (+)*** Closeness X VCPE
		Model 11 (+)*** Closeness X FID
		Model 12 Closeness X IDIST
		Model 13 (+)*** Betweenness X VCPE
		Model 14 (+)*** Betweenness X FID
		Model 15 Betweenness X IDIST

Conclusions

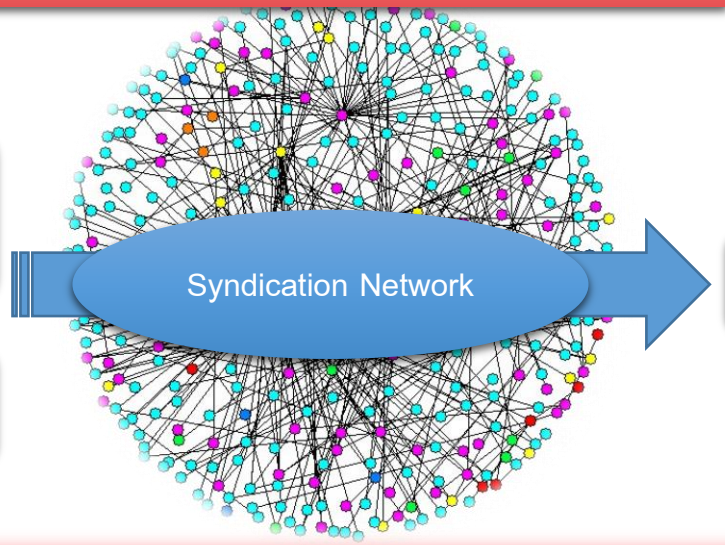
Southeast Asia emerging economies

(Bygrave, 1988; Lerner, 1994; Bruton et al., 2002)

- Information Asymmetry
- Agency problem

- Institution Development

(Ahlstrom & Bruton, 2006; Lingelbach, 2015)

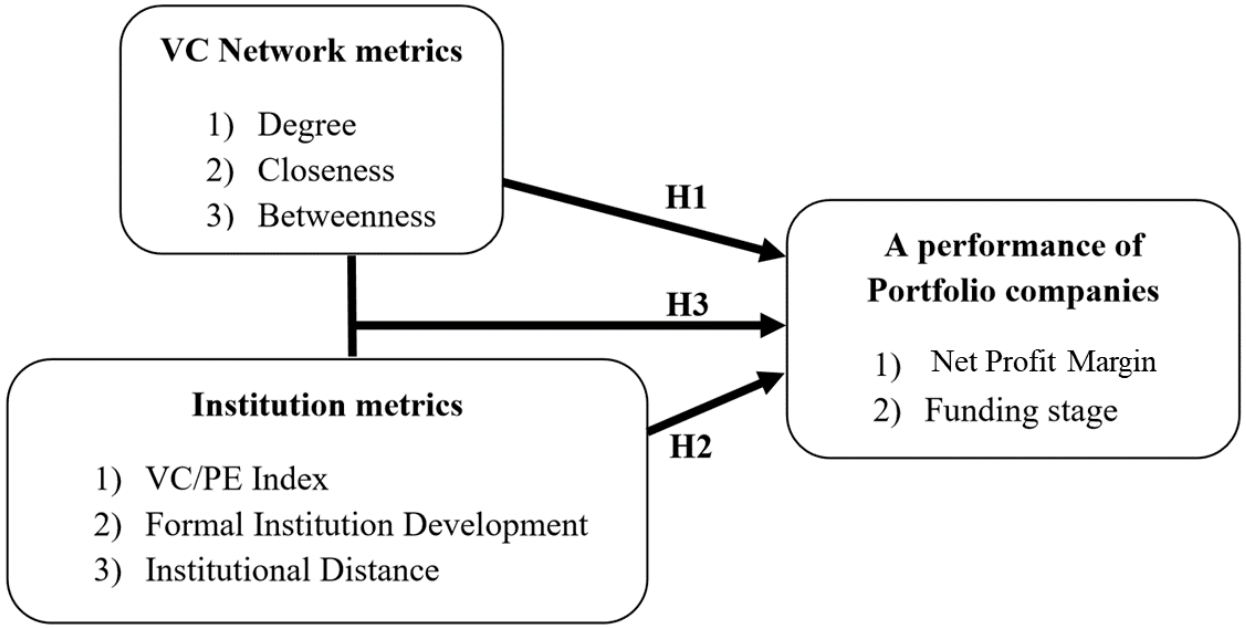


Portfolio companies

To clarify the role of networks and institutions on VC-backed firms in SEA VC market, we then investigate the relationship between networks and institutions and their impact on portfolio company's performance.

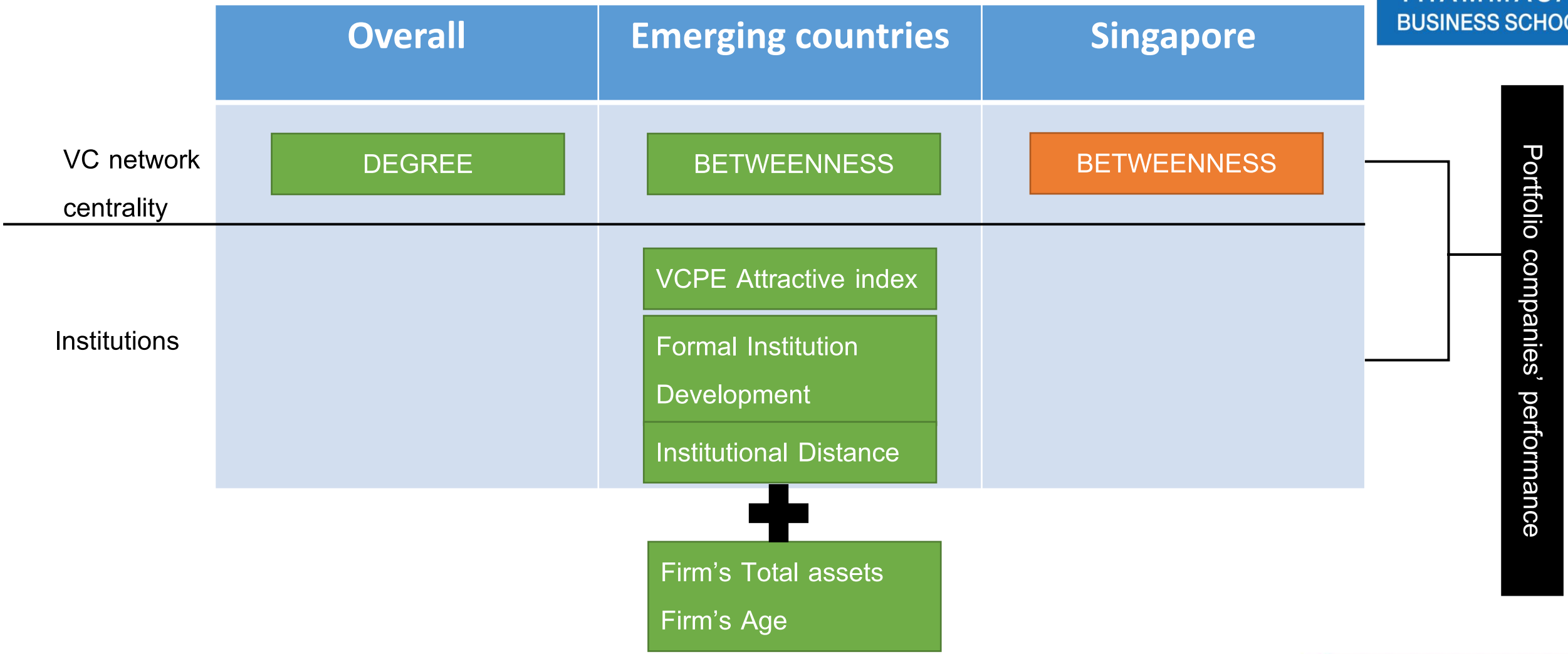
Our study will initiate an empirical evidence by quantifying VC networks and institutions among SEA countries and implementing time-series panel regressions through the performance of VC-backed companies.

Empirical Results



1) Venture Capital Network Centrality is positively and significantly related to a performance of portfolio companies in Southeast Asian emerging economy
2) Institutional development is positively and significantly related to a performance of portfolio companies in Southeast Asian emerging economy.
3) The interaction between VC network metrics and Institutional development metrics has a positive impact on a performance of portfolio companies in Southeast Asian emerging economy.

Empirical Results



Academic Contributions

This study helps clarify the significant role of networks and institutions in venture capital investment in emerging economies and provide a better understanding of how they are related to a performance of portfolio companies.

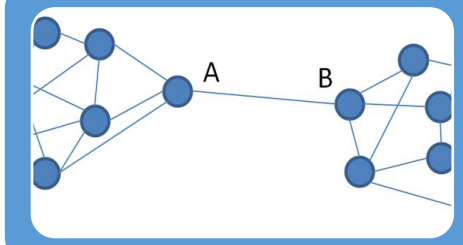
Venture capital and Entrepreneurial finance literature

- ✓ We pioneer in quantifying VC network centrality in SEA region and demonstrate the evidence of the positive effect of venture capital network on portfolio companies' performance in Southeast Asia emerging economies.

- ✓ We initiate using a measurement of institutional development to investigate its impact on portfolio companies' performance and provide the evidence of the positive effect among emerging countries. Besides the previous evidence of the positive impact of institutions on VC activities, this study provides an extent to which institutions could further relate to the performance of portfolio companies.

- ✓ We initiate a theoretical framework representing that different level of VC networking involved in different institution development offers different performance advantages of VC backed companies in Southeast Asia emerging economies, which result in providing the empirical evidence showing that VC network can compensate for less formal institution in providing a better performance of their portfolio companies. There is joint effect in terms of the substitution and support between institutional development and VC network centrality within Southeast Asian syndication networks on shaping portfolio companies' profitability.

Managerial Contributions



VC network capturing the number and quality of relationships (Degree and Closeness) would have not always been important, startups may seek for VC financing with network measure of brokerage (Betweenness) in emerging market. In contradict to Singapore, Betweenness imposes the negative effect.

Higher networked VCs should be more concerned and aware of the intensity of institutional system, such as investment regulation and government support, of their target investee's country.

Venture capitalists should invest in their target ventures by considering a decent amount of total asset and age of the ventures.

Besides, we hope that this work will encourage both **government and policymakers** to take more action in institutional development in venture capital investment, especially laws and regulations, **in helping sustain startups survival in the market.** Furthermore, they should provide a concrete projection on how they can facilitate more open innovation practices to **create a better ecosystem in the industry, for example, facilitating networks and connections among Southeast Asian VC investors, accelerators, and startup companies (including SMEs) .**

ผลงานวิจัยดีเด่นด้านตลาดทุน

The Effect of Venture Capital Networks and Institutions on Portfolio Companies' Performance in Southeast Asia"

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