An Empirical Analysis of Relationship between Private Equity Investments and Exits in India

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ABSTRACT

During the last decade the growth in the private equity industry in India has been phenomenal, especially in the recent five years. Private equity industry has become the prime interest area for many researchers and academicians in India. Private equity industry in India is burgeoning area of research, which inherits many explorations and untapped potential areas of research. One such untapped area of research is the empirical research is relationship between Private equity investments and exits in India. The research question which has leaded the study is that Private equity industry being in its transition stage, does the performance and opportunities created by the early starters has proven the potential and invites more investors and investments? In this line, this study is an attempt to assess the interrelationship and causal effect in the relationship using VECM (Vector Error Correction Model) and Granger causality model. The results of the study confer that existence of long run causal relation between Private Equity Investments and Private Equity Exits. Thereby, the study emphasis the impact of private equity exits on private equity investments in India. Private Equity Exit opportunities for the investments made plays crucial role in attracting Private Equity investments in India.

Keywords— Equity, Investment, VECM, Cointegration

I. INTRODUCTION

Private equity investment is well defined by its inherited name, Private equity investments refers to the investments made in privately held firms in the form of equity investments rather than debt form. Private equity is the major investment supportive avenue to the potential entrepreneurs as they share their business risk and return with the investors and are not burdened with the pressure of immediate repayment of interest or principal. Private equity investments are made in novice, high risk and high growth potential firms. Private equity investments are made for unspecific time period. However, it is not the permanent investment. Private equity is a renowned form of financial support, especially for the startups at its early stages of crucial development. Private equity is also a multi staged financial support. Private Equity provides financial assistance at various stages of venture development.

There is the evident regional disparity in the development of private equity industries across the globe. Researchers endorsed region specific variables as the attributes for the regional disparity. Variables such as GDP, industrial production, stock market development, interest rates, ease of doing business etc. Many literatures have identified the established market for exit as a determinant for the private equity investment in the specific region. Private equity investors seek their returns from their exit from the investment of firm. The exit routes could be IPO, Public Sale or Strategic sale. Thereby, potential exit environment for the private equity investments forms the major requisite for the development of the private equity market.

The aim of this paper is to extend the knowledge deeper into the relationship between private equity investments and exits. The paper access the private equity exits rather than the overall exit opportunities.

The paper is organized as per the following sections: Section 1 brings in the brief Introduction. Section 2 reviews the related literature and it also includes statement of the problem and need and significance of study. Section 3 describes the research methodology, framework and modeling of this research article. Section 4 presents the empirical results followed by Section 5 with conclusion and suggestions. Section 6 and 7 states the limitation of the study and scope for further research respectively. Appendix and Bibliography is also provided.

II. LITERATURE REVIEW

Bonini and Alkan (2009) assessed the venture capital investments across 16 countries to determine the factors influencing concentration venture capital investment in few countries. Panel data was framed the study period from 1995 to 2002 for the analysis. The results stated that socio economic conditions of the state, market capitalization and investment profile were found be dominant features differentiating the concentration of venture capital investments across countries. However, IPO and R & D expenditure were found to be insignificant.

Yixi Ning, Wei Wang, Bo Yu (2014) analyzed the forces driving venture capital investments and the causes of

volatility. GDP growth rate, industrial production index and low employment rate were found to exert significant influence on venture capital industry. Bond market and stock performance exert positive influence and drives venture capital investments.

Ricardo dos Santos Dias and Marcelo Alvaro da Silva Macedo (2016) assessed factors affecting demand and supply of private equity funds. The study emphasised that presence of good exit market for the investment is essential which is reflected through impact of capital market on venture capital investments.

Berlin, Mai (2010) assessed the varying patterns of private equity activities and factors creating such patterns. The private equity amount raised and amount invested in European countries along with the macro determinants – the conditions of financial market, labor market rigidities, liquidity in the stock market, endowment of human capital and business confidence level.

Steven A. Carvell, Jin-Young Kim Qingzhong Ma Andrey D. Ukhov (2013) assessed the relationship among fund raising activities In the capital market, economic development, capital market valuation and flow of venture capital investment. Capital market's fund raising activities were found to be correlated with the venture capital investment flows. GDP were found to drive both financial activities and flow of venture capital investments.

Vinay Kumar, Scott Orleck (2002) stated that development of private equity varied across industrialized nations and assessed the rationality behind it. The empirical analysis indicated that profitable exit options are highly influencial in the growth and development of private equity.

Herbert Ooghe, Ann Bekaert and Peter van den Bossche (1989) states that technological innovation enables the country to compete with industrialized countries. However, traditional financing sources refrain from providing capital assistance to such technological innovation based ventures, as these ventures tends to more riskier in terms of profitability and growth potential. Venture capital as new form of financing is developed to resolve such issue.

Richard Florida and Martin Kenney (1998) assessed the venture capital role in fostering high technology entrepreneurship. Though, venture capital is definite requisite for high technology entrepreneurship; it would certainly assist in the promotion of entrepreneurship by assisting in entering the industry and survival with their industry experience and networking. The study emphasize that the supply of venture capital attracts entrepreneurs and high potential resources towards formation of new enterprise.

Astrid Romain and Bruno Van Pottelsbberghe (2004) assess the macroeconomic impact of venture capital highlighting the two main aspects: innovation and absorptive capacity. The result of the study state that the increase in the Venture capital intensity paves way for the easier absorption of the generated knowledge by firms and universities. Venture capital is also a significant factor, in the contribution to the productivity growth, in improving the R&D elasticity in terms of output. Thus, enhances the overall performance of the economy on the select parameters of innovation and absorptive capacity.

Luisa Alemanya and José Martíb (2005) analyses the economic impact of venture backed companies or firms. Select sample is compared with control group in terms employment growth, sales revenue, gross margin, total assets, taxes paid and also net intangible asset using panel data analysis. The select variables exhibit faster growth rate than the non-venture backed companies and the results stated that there was a positive relationship between cumulative venture capital investment and growth of the select variables. The empirical evidence states that venture capital funding exhibits significant and positive effect on performance; and thus, venture backed companies exerts greater level of impact on the economy.

2.1 Statement of the Problem

The nature of private equity industry across the globe is disparate. It is essential to understand regional specific nature of venture capital investments to have better insights. Private equity industry in India is in nascent stage. International studies on Private equity have covered greater extent of research arenas comparatively. Researchers are in the conduit in the exploration of various aspects of Private Equity industry in India. However, the private equity in India inherits untapped potential areas of research. The growth of private equity investments has been tremendous in the last five years. The industry also simultaneously witnessed the growth in private equity exit. Is this symptom boon or bane for private equity industry? 'Is this good sign for the growth of Private equity industry in India?' is the leading question to this research. The research in the line of relationship between private equity investments(PEI) and private equity exits (PEE) still remains unexplored in Indian context. The interrelationship between private equity investments and private equity exits are proposed for assessment.

2.2 Need and Significance of the Study

There are many studies which confers that opportunities for exit in the developed open market/ IPO as one of the factors influencing venture capital investments. However, in India, venture capital investments being still in growth stage and venture capital exits are found to be more through Strategic alliances, PEMA, Public Market. There are very few studies in Indian scenario which is directly focused on the interrelationship between private equity investments and private equity exits. The research question which has lead the study is that Venture capital industry since being in nascent stage, does the performance and opportunities created by the early starters has proven the

potential and invites more investors and investments? In this line, this study is an attempt to assess the interrelationship and causal effect in the relationship using VECM (Vector Error Correction Model) and Granger causality model.

III. RESEARCH METHODOLOGY, FRAMEWORK AND MODELING

Private equity investments (USD Million) and Private equity exits (USD Million) in India are considered for the study. The time frame of the study is from 2008 to 2017. Private equity investment and exit data in India is gathered from PWC – Money tree India report. Private equity investments in the study include PIPE, Buyouts, Pre IPO and Venture capital investments. To study the interrelationship between the variables Johansen Co-Integration test and Vector error correction model are used.

3.1 Hypothesis Considered for the Study are as Follows:

- H_{0A1}: There is no long run relationship between private equity investments and exits in India.
- H_{1A1}: There is a long run relationship between private equity investments and exits in India.
- H_{0B1}: There is no short run relationship between private equity investments and exits in India.
- H_{1B1}: There is a short run relationship between private equity investments and exits in India.
- H_{0C1}: There is no causal relationship between private equity investments and exits in India.
- H_{1C1}: There is causal relationship between private equity investments and exits in India.

3.2 Models used for Empirical Testing

The relationship between Private Equity Investments and Private Equity Exit are assessed - both long run relationship and short run relationship using VECM model Wald Test. Granger Causality is used to know the causational relationship. Five Econometric procedural steps are followed in assessing the relationship between Private Equity Investments and Private Equity Exit in India. The first step is the stationarity tests of the variables using Augmented Dicky Fuller test. Johonson Cointegration Test can be applied to test the long run relationship between the variables, however, only if the

variables are essentially stationary in the same order. VECM model essentially requires variable to be non-stationary at level and to become stationary at its first difference. The second step after the stationarity condition being satisfied is to proceed with the cointegration test. Engle and Granger (1987) have stated that the relationship between the variables can be assessed through VECM model if the variables are cointegrated. The third step is to proceed with VECM model if the variables are cointegrated. To estimate the error correction model the residuals from the equilibrium equation could be used. The fourth step is to perform the various diagnostic tests to scrutinize the validity and reliability of these models. The diagnostics tests are the test for heteroscedasticity, autocorrelation and normality of the residuals. The final step is to test the causal relationship using Granger Causality that is to assess the direction of causation.

IV. EMPIRICAL RESULTS AND FINDINGS

4.1 Essential Prerequisite Tests
4.1.1 Unit Root Test

To analyze the long run relationship between PEI and PEE using VECM model, Johansen and Julies (2000) emphasis the use of co integration test which in turn insists on stationarity of the variables to be tested. Co-integration of time series rely on the precondition that series has to be integrated in the same order. Two series of variables are said to be cointegrated in the same order d (i.e I(d)) if the each series restores stationarity if it is differenced d times.

Unit root test assess stationarity and also tests for any serial correlation which could exist in the series by adjusting through lag changes residuals of the regression. This is very crucial as a serial correlation could lead to spurious results. The select variables private equity investments and exits are subjected to the preliminary and essential prerequisite test of stationarity. Augmented Dickey Fuller Test is applied to test stationarity of the select target series.

The unit root test is performed on both at level and at first difference for the variables, represented in Exihibit No 1.

EXHIBIT 1
Results of Augmentted Dickey Fuller Test (Unit Root Test)

Variable	p- Value At Level	p- Value At First Difference
PEI	0.3504	0.0000
PEE	0.6703	0.0000

Exhibit No.1 depicts that for the null hypithesis "PEI and PEE have a unit root at level" p- Value is not significant (not less than 0.05) and hence null hypothesis is failed to be rejected. The variables again were subjected scrutiny of stationarity under first difference (I(1)) and p value is found to be significant. we reject null hypothesis of presence of unit root in both the series of PEE and PEI.

Both Private Equity investments and exits are found to stationary at level at first level of differencing **I(1)** and non-stationary at level. The results of these select variables in the Augmented Dickey Fuller test are the desired results which essentially permit the variables to further proceed to the next stage of modeling. Data series of both variables PEI and PEE are found to be integrated at first difference that is both variables are I (1) and hence, proceeded with Johansen Cointegration Test.

4.1.2 Cointegration Test

If the two variables perceive a common trend or co- integrated, it would confirm the existence of at least a unidirectional causality or bidirectional causality. Cointegration test will project the presence or absence of Granger –Causality but does not portray the direction of causality between variables. The direction of causality (if the target variables confirm cointegration) can be detected using Vector Error Correction Model. VECM is derived from the long run co-integrating vectors. Both trace statistics and Max eigen Values are used for cointegration test. Null hypothesis is that "there is no cointegration between the PEI and PEE". Null hypothesis will be rejected if the critical value is exceeded by trace statistics or Max Eigen values exceed. Rejection of null hypothesis is the desired result which infers that independent variable is characterized with non zero coefficient values.

The results of Cointegration test are provided in Exhibit 2 This exhibit presents the Johenson Cointegration test at lag 2 levels. Lag selection is made using minimum AIC.

EXHIBIT 2
Results of Cointegrating Model

Cointegration Eq	CointEq1
PEI	1
PEE	-1.9397
	-0.36383
	(-5.33147)
C	-490.0274

Source: Computed Data

Results of the Johansen Cointegration Tests

Vector	Trace Statistcs	Max Eigen Statistics	5% Critical Value for Trace Statistics	5% Critical Value for Eigen Value Statistics	Remarks
$H_0 : r = 0$	20.18884	19.57432	15.49471	14.26460	Cointegration
$H_1 : r > 1$	0.614524	0.614524	3.841466	3.841466	

Source: Computed Data

The null hypothesis of the Johansen Cointegration test is that "There is no cointegration between PEI and PEE". The p value of Trace Statistic is found to be 0.0091, which is less than the critical value 0.05 and the p value is significant. Thereby, the null hypothesis gets rejected. The results of the Johansen Cointegration test confers that there is Cointegration between the variables PEI and PEE. According to Trace Statistic at 95% confidence level there are at least one Cointegrating vector.

The results of Maximum Eigen test is reported in Exhibit No 2. The variables are subjected to maximum eigen value test to test the cointegration among the variables. The maximum eigen value of the should be greater than the critical value to reject the null hypothesis. According to Eigen Value test statistic, there is a evidence of one cointegrating vector with the p value of 0.0066. Similar to the trace test, the test results of maximum eigen value statistic test is found to reject the null hypothesis and alternate hypothesis being accepted. That is there is cointegration between the variables PEI and PEE.

Both trace statistic and maximum eigen value statistic affirm the presence of cointegration between the variables PEI and PEE. The number of lags to be used in Johansen Cointegration Test is identified using Akaike Information Criterion (AIC). Therefore, endorse to proceed with Vector Error Correction Model.

4.2 Vector Error Correction Model

Dynamic relationship between the series is described by the error correction model (ECM), if the series are co-integrated as per the Granger representation theorem. Vector Error Correction Model is a restricted VAR model especially for co-integrated non- stationary series. The co integration term is known as the error correction term since the deviation from long run equilibrium is corrected gradually through a series of partial short run adjustments. The strength of Error Correction Model is that is captures the both long run equilibrium relation and short run dynamics between two series.

Engle and Granger (1987) demonstrated that error - correction represents the changes in the dependent variable as a function of the level of disequilibrium in the co-integrating relationship and changes in the explanatory variable.

The results of Johansen Cointegration Test affirming the presence of cointegration is the desired results which otherwise would not have been legitimate according to the guidelines to run a restricted VaR model (VECM) rather would have obligated to perform only unrestricted

VaR. Therefore, VECM is executed with 2 lags according lag selection criterion. VECM model examines the long run relationship between the variables PEI and PEE. Thereby, the long run cointegrated vector model is developed.

The vector auto regressive model provides with the t- statistics and standard error. The system equation is build to compute the p-value. VECM model further provides insights about the causality among the variables with the aspects of longitivity of the relationship called as short run causality and long run causality.

4.2.1 Long Run Causality

Long run causality is affirmed when the coefficient of the variable has negative sign and it is significant with the p value less than 0.05. Long run causality refers to the rate at which adjustment is made to attain the long run equilibrium. Long run causality runs from independent variable to dependent variable. Accordingly, the results with negative and significant co efficient (-0.6707 and 0.004 respectively), exhibits the long run causality running from Private Equity Exits to Private Equity Investments **(Exhibit No 3).**

EXHIBIT 3
Results of Regression Equation

	PEI (-1)	D(PEI(-1))	D(PEI(-2))	D(PEE(-1))	D(PEE(-2))	C
Co effiecient	-0.6707	-0.1411	-0.0531	-0.4483	0.063	59.54
t statistics	-3.0815	-0.780145	-0.3758	-1.1007	0.214452	0.3214
Probability	0.004	0.4406	0.7093	0.2785	0.8314	0.7498

Source: Computed Data

4.2.2 Short Run Causality

Wald statistics examines the short run causality among the variables PEI and PEE running from PEI to PEE. The results of Wald statistics is reported in **Exhibit No 4.** The null hypothesis is that there is no short run causality running from PEE to PEI. The p-value in wald statistics is examined to accept or reject the null hypothesis.

If the p-value is significant that is being less than 0.05, the null hypothesis is rejected which infers that there is a short run causality running from independent variable to dependent variable. Short run causality running from PEE to PEI is examined with wald statistics results infers that there is no short run causality.

EXHIBIT 4
Short Run Causality between PEI and PEE

Wald test Test Statistic	Value	df	Probability
F- Statistic	1.7345	(2,35)	0.1913
Chi Square	3.469	2	0.1765

4.3 Fitness of the Model

Fitness of the model and the statistical error is examined. High R squared infers good explanatory power and Significant F- statistics confirms model fitness. A linear equation to become BLUE (that is Best linear

Unbiased Estimate) has to satistify the following conditions- the there should be no heteroscedasticity and serial correlation among the residuals; and residuals have to be normally distributed.

The model projects the R squared value 0.45 holds good explanatory power. The rationale for the R squared value of 0.45 is that Private Equity industry is still in its transformation stage from budding to growth stage (both in private equity investments and private equity exits). In the future, model could be anticipated to produce results with better explanatory power. The F statistic is found to be 0.0005 which is less than 0.05. Serial correlation test is run to for the presence of serial correlation in the residuals. The p value of the test is 0.0819 which is more than 0.05 and therefore null hypothesis is not rejected. Therefore is no serial correlation. Breuch Pagan Godfrey test of heteroskedasticity is conducted to assess the heteroskedasticity and the results with p value 0.5471 indicate that there is no heteroskedasticity among the residuals. Jarque – Bara statistic, which is used check the normal distribution of residuals. Jarque – Bara statistic exhibits the probability value of 0.8198, which confirms the normality among the residuals. (EXHIBIT 5).

EXIHIBIT 5
Test Results for Heteroskedasticity

Heteroskedasticity Test: ARCH
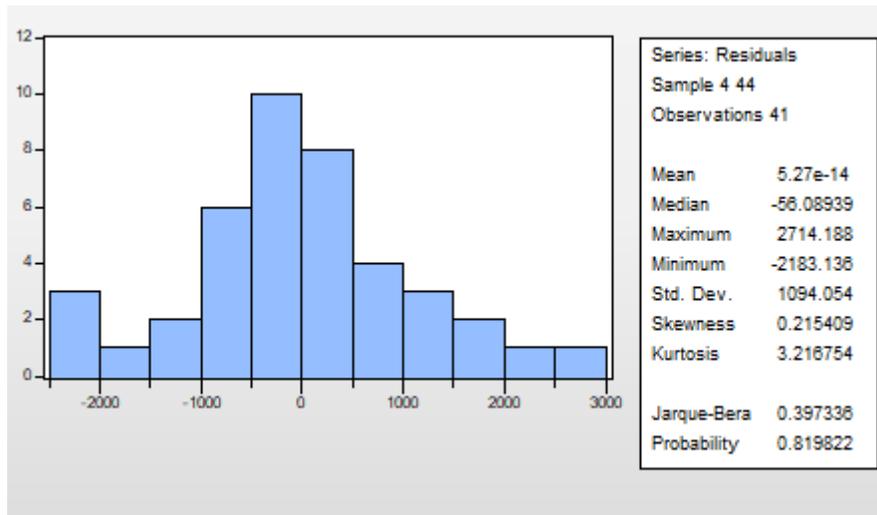
F-statistic	0.574465	Prob. F(2,36)	0.5681
Obs*R-squared	1.206179	Prob. Chi-Square(2)	0.5471

Test Results for Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.294074	Prob. F(2,33)	0.1167
Obs*R-squared	5.004612	Prob. Chi-Square(2)	0.0819

Test for Normality

The summary of findings of this model is that there is long run causality from PEE to PEI. However there is no short run causality between the variables.

4.4 Granger Causality Test

Granger causality test is conducted further to establish the direction of relationship among the variables. The results of the granger causality test confer the presence of unidirectional causality relationship between private equity investments and private equity exit, that is flowing from Private equity exit to private equity investments. According to the test statistic, the null hypothesis is rejected which implies PEE Granger causes PEI. Therefore, it confers that Private Equity Exits granger causes Private Equity Investments in India.

EXHIBIT 6
Granger Causality Test Results to Assess the Granger Causal relationship between PEI and PEE

Null Hypothesis	Lags	F- Statistic	p-Value
PEI does not Granger Cause PEE	2	0.90042	0.4151
PEE does not Granger Cause PEI	2	6.18283	0.0048

V.   CONCLUSION AND SUGGESTIONS

The study made confirms the solid relationship between Private Equity Investments and Private Equity Exits with the Johansen Co-integration Test and VECM test. Johansen Co-integration Test implies the co-integration between these variables. VECM proves that there is a long run relationship between Private Equity Exits and Private Equity Investments. However, the short run relationship between PEI and PEE is not evident with results. The study confers that performance and opportunities created by the early starters has proven the potential and has invited more investors and investments over the period of time. Private equity exits have portrayed the exit market opportunities available in India and also the scope for the specific industries. Thereby, with this empirical evidence, it can be said that Private equity Exits in India has also been an influential factor for attracting more Private Equity Investments in India.

Policy initiatives have to be framed to encourage the private equity exits with more tax benefits. This would in turn indirectly provides and encourages the private equity investors to opt for exits at the right time and enhance their liquidity to reinvest in various emerging potential ventures. Private equity has been an financial intermediary supporting novice entrepreneurial ventures which fails to access the traditional sources of finance. The growth of private equity investments and exits portray the growth of the sustainable entrepreneurial development. Private equity has to be considered as driving force for entrepreneurial development which is crucial for employment generation and national development. Legal framework for private equity operators has to become more conducive. Private equity exits are rather a portrayal of entrepreneurial talents in India thereby encouraging more investors. Hence Private Equity Exits has to be considered to obtain special privileges and more exit routes with public participation. The awareness about the private equity industry still desires to be enhanced among the stake holders of the industry.

Limitations of the Study

The study considers solely the private equity investments and exits. Various endogenous factors influencing the growth of private equity investments and exits are not included.

Scope for Future Research

Further research might be extended sector specific private equity investments and exits. Compare the pattern of private equity operations of emerging private equity industry of different geographies.

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