# Is VC market Liquid? Evidence from India

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### Abstract

This paper models investment duration in the Indian VC market, industry wise and exit route wise. We examined 3416 transactions in India, which happened in the time period of 2000-2017, and found that the probability of staying invested for more than 10 years is 70%. Exit probabilities are low in most of the sectors. Investment duration is not positively associated with the investment valuation. Majority of investments are not able to exit because of the illiquidity of VC market.

Keywords: Venture capital; Investment duration; Liquidity; Exit

JEL Codes : G24, G28, G38, M13, M16

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#### **1. Introduction**

Despite the growing interest in research and promotion of Venture Capital (VC) investments across the world, there is limited research to date on the VC exit market. Exit mechanism is a very important aspect of the entrepreneurial process for the thriving of VC industry (P. Gompers & Lerner, 1998). Entrepreneurs as well as VCs realize their share of wealth in the Entrepreneurial Firm (EF) only when they are able to exit from the investment (Covin et al., 2001; Cumming and Johan, 2008). A successful and timely exit is very important for the VCs as it helps in reputation building for the VC firm(Gompers, 1996; Hibara, 2004) as well as recycle funds for making new investments (Pearce and Barnes, 2006). Moreover, it will give confidence to Limited Partners (LP) in the VC market which will make the fund raising easy for the VC firms(Neus and Walz, 2005; Gemson and Annamalai, 2015). Given the fact that VC investors make investments with the intention of an exit with maximum easiness and return on their investments, it is high time that the focus of entrepreneurial research shift to VC exit mechanism also. This study aims to contribute to this limited body of literature by estimating the durations of VC investments and exit probabilities of VC investments. Specifically, we focus on modelling survival functions of VC investment duration on the basis of six different broad sectors to which the portfolio firm belongs to as well as on the basis of exit route adopted, namely Initial Public Offering (IPO), Strategic sale, Secondary sale, Buyback and Liquidation. The overall survival function of the VC market is also modelled to give a clear and distinct outlook about the liquidity of the Indian VC market as a whole. This study also investigates whether the less probability of exits once the investments cross a certain time period is due to the illiquidity of VC market or because the investors are willingly not exiting, allowing the value of their investments to grow over time. To our knowledge, this paper is the first to model the investment duration in VC market and study about the liquidity of the Indian VC exit market.

The rest of this paper is organized as follows. Literature review including the research questions are discussed in Section 2; Methodology and data are described in Section 3; the empirical findings are presented in Section 4 with necessary descriptive statistics. In the last section, the conclusions and implications of this research are discussed.

#### 2. Literature review and research questions

Main activities performed by VC firms may broadly be classified as investment, support, exit and reinvestment(Puri & Zarutskie, 2012). This cycle is the backbone of VC market in every country which ensures sufficient investments to Investee Firm(IF) at the right time(Rajan, 2010), constant value addition to the firm through management support(D. J. Cumming & Macintosh, 2001), exit at the right time in such a way that maximum return is realized with minimum difficulty (Covin et al., 2001) and reinvestment of the realized wealth into other potential ventures by the LPs(Gompers and Lerner, 1998; Pearce and Barnes, 2006; Cumming and Johan, 2008). Exit is a very prominent aspect of VC life-cycle. Time to exit after the investment is made i.e. the investment duration is an important measure of VC success(Wang & Wang, 2011). It is theorized that VCs add on value to the IF through their management expertise and networks(Timmons & Bygrave, 1986). More value is added in the initial years after investment, increases at a decreasing rate and reaches a plateau at some point. This is the point where marginal value added is equal to the marginal cost in investing. Ideally exits should happen at this point in time(D. J. Cumming & Macintosh, 2001). But the ability to exit at this right time is also dependent on market conditions as well as opportunities available to exit. In other words, it can be called the liquidity of VC exit market. Market liquidity is a key factor for the investors to decide whether to spare their money with (General partners) GPs for onward investments to promising ventures(Neus & Walz, 2005).

VCs usually exit by (1) Taking the investee company public (IPO); (2) Sale of shares to another company (Strategic/trade sale); (4) Sale of investee company's shares to another VC investor (Secondary sale); (5) Selling back the shares to the investee company (Buyback); and (6) Liquidation of the investee company (write-off) (Gladstone, 1988). Literature clearly shows that IPO is the most

preferred choice of exit due to reasons such as: the high return on investments for VC/PEs (Das, Jagannathan, & Sarin, 2003), the reputation building mechanism for VC/PE (Gompers, 1996; Hibara, 2004) and an implicit contract over future control for entrepreneurs (Gilson and Black, 1999; Bayar and Chemmanur, 2012). Exit through Strategic sale is the next most preferred choice for investors on account of synergistic gains that can be partly captured by the investee firm through higher acquisition premium (Gilson & Black, 1999). Buybacks are mostly compulsory buybacks by entrepreneurial team, which result in only a lower return to VCs when compared to other exit routes like IPOs, Strategic sale and Secondary sale(Das et al., 2003; Higson, 2012). Least preferred exit route is Liquidation which typically results in partial or complete loss of capital invested in the IF or very minimal returns in a few cases(Wennberg, Wiklund, DeTienne, & Cardon, 2010).

Returns generated from an investment also depend upon the ability to exit from the investment when the investment valuation is high (Signori, 2013). In some cases, VC funds are forced to exit because the VC fund has become very old and it is time to return the money to the investors of the fund(Cumming, 2002; Cumming and Johan, 2008). Liquidity of the VC market is a very important aspect that can ensure higher wealth realization through easy and timely exit. Market liquidity is vital for the survival of VC industry in any country. Most of the studies on VC exit market is focused on the relationship between the choice of exit route and the nature of VC funds, origin of VC funds, micro and macro-economic conditions in investor as well as investee country, returns generated etc. Very scarce literature is available on the area of VC market liquidity. Bertoni and Peter (2013) examined the difference in investment duration between domestic and foreign VC firms. Espenlaub et al., (2015) investigated the relationship between investment duration and origin of the VC fund. Schwienbacher (2005) contrasts the investment duration when an exit happens through IPOs, Trade sale and Liquidations. This study omitted another two important exit routes namely, Secondary sale and Buyback, due to the unavailability of data. All the mentioned studies on VC investment duration were an attempt to find out the relationship between investment duration and various micro, macro and behavioural variables of significance. As per the best of our knowledge, no studies have attempted to model and compare the VC investment duration in terms of probability to exit. Also this is the first study on the Indian VC market liquidity.

Industries differ from each other on terms of the level of tangible/intangible assets they generally possess, growth potential of the industry, firm life-cycle etc. As already discussed, investment duration is an important aspect over which industries may differ which in turn affect the returns generated out of the investment. This study investigates whether the industries like IT&ITES, Healthcare & life sciences, Manufacturing & Construction, Retail, BFSI and Non-Financial services differ in the in investment duration and exit opportunities they enjoy. Investigation is also done to check out the differences in the investment duration as well as probability to exit when the investments exit through five different exit routes already discussed. Overall liquidity of the Indian VC market is also examined which is an important aspect of VC ecosystem and thoroughly underresearched.

# 3. Methodology

In order to model the Survival function of investment duration of VC investments non-parametric Kaplan-Meir survival analysis method was adopted. Kaplan-Meir method addresses an important methodological issue in the modelling of VC investment duration. It is the issue of right censoring, i.e. many investments not being exited by the end of the study, which is December 2017 in our case. Traditional ways of estimating probability distributions ignores the censored cases and hence result in an inaccurate modelling of probability function. Modelling of survival functions by dynamic methods as Kaplan-Meir is the most appropriate in such junctures. In Kaplan-Meir survival modelling, investments that has not exited by the end of the study period which are considered as censored, are also taken into account and the survival distribution up to the event, i.e. VC exit in our case, is estimated by incorporating corrections for censored observations. Moreover, this method is a more dynamic method for modelling probability distribution up to an event, as instantaneous

probability of surviving at every point in time is modelled by Kaplan-Meir method. Also they supersede static models like Logit and Probit for out-of-the sample analysis (Shumway, 2001).

Survival function of investment duration up to a particular year after investment is mathematically expressed as

$$S(t_i) = \left(\frac{m_i - n_i}{n_i}\right) * S(t_{i-1})$$
 where  $i = 0, 1, 2...$ 

 $S(t_i)$  is the Survival function for the year i,  $m_i$  is the number of un-exited investment at the beginning

of the year i,  $n_i$  is the number of exits happening during the year i and  $S(t_{i-1})$  is the survival function in the previous year.

Industry wise Survival function is estimated for six different sectors and five different exit routes under study. To compare for the similarity/dissimilarity of the Kaplan Meir survival distributions across different industries and exit routes, Log rank test was also used. Log rank test is a non-parametric test used to compare different probability distributions; in our case, inter-industry and inter-exit route distributions. This test assumes that groups under comparison have the same survival distributions, which is the Null hypothesis that is tested.

#### 4. Data

Sample data set for the analysis was extracted from Venture Intelligence database. Our data set had information about 654 VC exits that happened during the period January 2000 to December 2017 and 3615 investments during 2000-17 that has not exited by December 2017 in India. Exit information was available up to 31st December 2017. Out of 3615 un-exited investment data points, 2935 data points that had details about industry of the portfolio firm, date of investment and amount invested were chosen for the study. Out of the population of 654 exits during the study period, 481 data points that had details about the industry of portfolio firm, the exit route chosen and investment duration with value realized at the exit were extracted. Data points where the investment duration is less than 15 days as well as the investment amount is less than US \$1000 were considered as meaningless outliers and removed. This pre-filtering resulted in the elimination of only a few data points and did not affect the results of the study. The total data points used for the study was 3416 which is more than 80% of the population. Our sample is a good representative of the population. Every IF was categorized into Information Technology and IT enabled Services (IT & ITES), Healthcare & Life sciences, Manufacturing and construction, Retail, Banking and Financial services Industry (BFSI) or Non-Financial services based on the nature of the firm's business. Details of exit route chosen was available for 481 exits that happened through five different exit routes namely IPO (34), Strategic sale (248), Secondary sale(122), Buyback(57) and Liquidation(20). Every exit was considered as an event. Similarly, an investment that had not exited by the end of study period, i.e. December 2017, was considered as censored. The study has used 481 events and 2935 censored cases for the estimation of Survival distribution of investment duration.

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# Table 1: Definition of variables

Variable	Definition and measurement of variable
Investment duration	Time duration measured in years between the day investments was made and exit happened. If the investment has not exited by December 2017, duration is calculated as the time duration measured in years between the day investment was made and December 2017.
Value change	Percentage increase/decrease in the value of an investment at the time of exit.
Exit status	For a given portfolio company, dummy variable '0' if the exit has happened by December 2017, dummy variable '1' if the exit has not happened.
Exit route	<ul> <li>For a given portfolio company, binary dummy variables indicate the exit route chosen for an exit. We use four dummy variables to represent five exit routes:</li> <li>IPO</li> <li>Strategic sale</li> <li>Secondary sale</li> <li>Buyback</li> <li>Liquidation</li> </ul>
Sectors	<ul> <li>For a given portfolio company, binary dummy variables indicate the sectors to which portfolio firm belongs to. We use five dummy variables to represent six sectors:</li> <li>IT &amp; ITES</li> <li>Healthcare &amp; Life sciences</li> <li>Retail</li> <li>Manufacturing &amp; Construction</li> <li>BFSI</li> <li>Non-Financial services</li> </ul>

<b>.</b> .					Tim	e to	exit(	Year	rs)			
Industry	No. of Exits	0	1	2	3	4	5	6	7	8	9	10
IT & ITES	280	15	49	44	37	42	30	30	18	7	7	1
Healthcare & Life Sciences	32	1	1	6	4	8	3	4	0	2	2	1
Retail	19	0	2	1	6	3	4	2	0	1	0	0
Manufacturing & Construction	34	1	3	9	6	6	5	3	1	0	0	0
BFSI	43	0	4	7	5	6	6	8	3	2	2	0
Non-Financial services	73	5	16	11	10	13	6	4	5	1	1	1

# Table 2: Industry wise exits for the period 2000-2017

The table shows the breakdown of number of exits happened from six different industries in India during the period 2000-2017. Year of investment in the portfolio company is assumed as 0 for each investment. Time to exit denote the time period between the investment and exit measured in years. Source: Authors calculations from Venture Intelligence (2017)

Industry					Time	to exit(Y	ears)							
	0	1	2	3	4	5	6	7	8	9	10			
IT & ITES	0.054	0.229	0.386	0.518	0.668	0.775	0.882	0.946	0.971	0.996	1.000			
Healthcare & Life Sciences	0.031	0.063	0.250	0.375	0.625	0.719	0.844	0.844	0.906	0.969	1.000			
Retail	0.000	0.105	0.158	0.474	0.632	0.842	0.947	0.947	1.000	1.000	1.000			
Manufacturing & Construction	0.029	0.118	0.382	0.559	0.735	0.882	0.971	1.000	1.000	1.000	1.000			
BFSI	0.000	0.093	0.256	0.372	0.512	0.651	0.837	0.907	0.953	1.000	1.000			
Non-Financial services	0.068	0.288	0.438	0.575	0.753	0.836	0.890	0.959	0.973	0.986	1.000			

Table 3: Industry wise exit rates for the period 2000-2017

The table shows the breakdown of exit rates happened from six different industries in India during the period 2000-17. Year of investment in the portfolio company is assumed as 0 for each investment. Time to exit denote the time period between the investment and exit measured in years. Source: Authors calculations from Venture Intelligence (2017)

### 5. Empirical analysis

## 5.1. Industry wise Survival Modelling

The investee firms of the VC investors were broadly classified into six different sectors, namely, ITES, Healthcare & Life Sciences, Retail, Manufacturing & Construction, BFSI and Non-Financial services. Table 2 and Table 3 shows the industry wise breakdown of number of exits and exit rates respectively of the investments that happened during the period 2000-17. Table 2 shows that most of the exits happened in IT &ITES, followed by Non-Financial service sector and BFSI. Out of 481 exits happened during 2000-17, 20 exits happened in IT&ITES, 73 in Non-Financial Services and 43 in BFSI. Least number of exits happened in Healthcare and Retail sectors. Higher number of exits from IT&ITES and other service industries may be attributed to the comparatively higher number of investments happening in those industries(Annamalai & Deshmukh, 2011).

Table 3 shows that investment duration is lowest in Manufacturing & construction sector and Non-Financial service sector. Average investment period for these sectors is only 3 years. Highest time to exit is 6 years for Manufacturing & Construction sector. Retail industry is also having short investment duration with 50% of exits happening in first 3 years and all the exits happening within 7 years of investment. These sectors are followed by IT&ITES with an average exit time of 4 to 5 years. Investment duration is comparatively more for Healthcare and Life Sciences with only 38% exits happening in the first 3 years. However, every exit has happened within 10 years of investment for all the industries examined.



Figure 1: Survival analysis of Industry wise investments

				Pair	r wise Compar	isons						
Industry	IT & ITES		Healthcare & Life Sciences		Retail		Manufacturing & Construction		BFSI		Non- Financial services	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
IT & ITES			2.111	.146	0.853	.356	0.186	.667	13.119	.0001*	0.694	.405
Healthcare & Life Sciences	2.111	.146			0.048	.826	0.648	.421	14.01	.0001*	0.644	.422
Retail	0.853	.356	0.048	.826			0.193	.661	8.232	.004*	0.189	.664
Manufacturing & Construction	0.186	.667	0.648	.421	0.193	.661			8.401	.004*	0.018	.894
BFSI	13.119	.0001*	14.01	.0001*	8.232	.004*	8.401	.004*			13.741	.0001*
Non-Financial services	0.694	.405	0.644	.422	0.189	.664	0.018	.894	13.741	.0001*		

# Table 4: Industry wise comparison of survival function using Log rank Test

The table shows the pair wise comparison of the survival functions in six different industries under study. Survival function is calculated by Kaplan-Meir method. Pair wise comparison is done by Log rank test at a significance level of .05. \* indicates .05 significance level. Source: Authors calculations from Venture Intelligence (2017)

Figure 1 and Table 4 shows industry wise survival function of investments in different sectors and intra-industry comparison of survival functions of investments, respectively. Survival distributions appear to be almost same for all the industries under study, except for BFSI. BFSI investments show highest probability of exit, especially once the investment duration is more than 3 to 4 years. It also exhibits comparatively lesser probability of staying invested beyond 10 years. Around 60% of the investments are able to exit in BFSI which is a higher proportion as compared to just 30% of investments in all other sectors. Only BFSI industry appears to have reasonable liquidity in exit market. The statistical significance of the difference in survival functions exhibited by different industries were statistically significantly different,  $\chi 2(5) = 19.76$ , p < .0005. To identify where the difference exists, a pair wise comparison of survival distribution was also conducted at a significance level of .05. All the survival functions except BFSI sector function were not statistically different from each other. BFSI is having significantly lower probability of staying invested for long durations and have higher chances of finding out an exit route as compared to other industries. Table 5: Count of exits through different exit routes

Exit route	No. of Exits				Tim	e to ar	n exit (	Years)				
		0	1	2	3	4	5	6	7	8	9	10
IPO	34	1	5	5	7	4	7	1	2	0	2	0
Strategic Sale	248	18	51	40	37	37	28	19	8	7	2	1
Secondary sale	122	2	7	14	13	23	15	24	13	4	6	1
Buyback	57	1	9	8	9	13	3	5	4	2	2	1
Liquidation	20	0	3	11	2	1	1	2	0	0	0	0

The table shows the breakdown of number of exits through five common exit routes in India during the period 2000-17. Year of investment in the portfolio company is assumed as 0 for each investment. Time to exit denote the time period between the investment and exit measured in years. Source: Authors calculations from Venture Intelligence(2017)

Exit route					Time to	) an exit	(Years)				
	0	1	2	3	4	5	6	7	8	9	10
IPO	0.029	0.176	0.324	0.529	0.647	0.853	0.882	0.941	0.941	1.000	1.000
Strategic Sale	0.073	0.278	0.440	0.589	0.738	0.851	0.927	0.960	0.988	0.996	1.000
Secondary Sale	0.016	0.074	0.189	0.295	0.484	0.607	0.803	0.910	0.943	0.992	1.000
Buyback	0.018	0.175	0.316	0.474	0.702	0.754	0.842	0.912	0.947	0.982	1.000

Table 6: Estimation of exit rates through different exit routes

Liquidation 0.000 0.150 0.700 0.800 0.850 0.900 1.000 1.000 1.000 1.000 1.000 1.000 The table shows the breakdown of exit rates through five common exit routes in India during the period 2000-17. Year of investment in the portfolio company is assumed as 0 for each investment. Time to exit denote the time period between the investment and exit measured in years. Source: Authors calculations from Venture Intelligence(2017)

#### 5.2. Exit route wise Survival Modelling

## 5.2.1. Analysis without censored cases

Table 5 and Table 6 shows the breakdown of number of exits and exit rates for exit through five common exit routes of IPOs, Strategic sale, Secondary sale, Buyback and Liquidation for the period 2000-17. Year of investment in the portfolio company is assumed as 0 for every investment. Time to exit denote the time period between the investment and exit measured in years.

As shown in the table 5, most widely adopted exit route is Strategic sale and Secondary sale followed by Buyback, IPO and finally the Liquidation. Out of 481 exits happened during 2000-17, 248 happened through Strategic sale, 122 through Secondary sale, 57 through Buyback, 34 through IPO and 20 through Liquidation. Table 6 shows that 50% of exits through IPO, Strategic sale and Buyback happen by the third year of investment wherein only 30% of exits via secondary sale happens within three years. It takes 4 to 5 years for 50% of Secondary sales to happen which is much more than the average exit time for IPOs, Strategic sale and Buybacks. An interesting point to note is that around 70% exits by Liquidation happens within two years of investment. Investors seem to be very conservative about staying invested in a non-promising venture for long and identify lemons fast and exit. Every investor has exited from such investment utmost by 5 to 6 years after investment. In terms of average time to exit, Liquidation is the fastest exit route followed by Strategic sale, IPO, Buyback and finally by Secondary sale. Beyond 6 to 7 years of investment, all the exit routes except Liquidation exhibit almost similar exit rates.

Figure 2: Exit route wise Survival analysis (excluding censored cases)



				Pair	wise Comparisons					
Exit route availed	IPO		Strategic sale		Secondary sale		Buyback		Liquidation	
	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.	Chi-Square	Sig.
IPO			1.186	.276	4.151	.042*	0.121	.73	5.533	.019*
Strategic sale	1.186	.276			26.503	.0001*	3.212	.07	3.661	.056
Secondary sale	4.151	.042*	26.503	.0001*			3.612	.06	29.216	.0001*
Buyback	0.121	.728	3.212	.073	3.612	.057			8.577	.003*
Liquidation	5.533	.019*	3.661	.056	29.216	.0001*	8.577	.0001*		

# Table 7: Exit route wise comparison of survival function using Log rank Test (uncensored)

The table shows the pair wise comparison of the survival functions of five different exit routes under study. Survival function is calculated by Kaplan-Meir method. Pair wise comparison is done by Log rank test at a significance level of .05. \* indicates .05 significance level. Source: Authors calculations from Venture Intelligence (2017)

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Figures 3(i) to 3(v) show the survival functions of five different exit routes: IPO, Strategic sale, Secondary sale, Buyback and Liquidation. Survival function is calculated using Kaplan-Meir method including un-exited cases. Every exit route has 2935 uncensored cases. Competing exits are not included in the calculation.

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Figure 2 shows the survival function of investments estimated on the basis of exit route without considering censored cases. Survival function was calculated without including the investment that had not exited by the end of the study period. This was plotted to compare the absolute duration to the exit for the different exit routes under study. Survival distribution was plotted for a period of 18 years. Liquidation route is the quickest exit route and Secondary sale is the slowest. Table 7 reports the result of Log rank test conducted at a significance level of .05 to check whether there is significant difference in the investment duration when exits happen through different exit routes. The survival distributions for the five different exit routes were statistically significantly different,  $\chi 2(4) = 36.16$ , p < .0005. The result implies that investment duration is significantly different for the exits that happen through different exit routes. Pair wise comparison of investment duration on the basis of exit route adopted shows that investment duration is the least for Liquidation exits and the highest for Secondary sale exits across all time points. Investment duration is not significantly different when the exit happens through IPOs, Strategic sale and Buyback.

## 5.2.1. Analysis with censored cases

Figures 3.i) to 3.v) provide information about the instantaneous probability of a VC staying invested in an IF at every point in time starting from time of investment, which is denoted by 0 up to the maximum investment duration which is 18 years in our study. Survival distribution was modelled for each exit route after including the 2935 censored cases. Kaplan-Meir dynamic modelling method corrects for the uncensored cases and gives a very realistic probability distribution of investment duration. Any exit is considered as an event and investments that do not exit even after the end period of study are considered as censored cases. There are 2935 investments that have not exited by December 2017. Events that have occurred during this period is 34 exits through IPOs, 248 exits through Strategic sale, 122 exits through Secondary sale, 57 exits through Buybacks and 20 exits through Liquidation.

Probability of staying invested up to a period may also be understood as the probability of that investment un-exited for the same time period. Hence, these diagrams may also be used to understand the exit probability through five different exit routes discussed. Every Survival distribution was a decreasing function of time which implies that probability of an exit decreases over time. Figure 3.i) shows that probability of an exit through IPO is very limited and it does not increase much with time. Investments that exit through IPO are very short duration and may be because most of those invest at the Pre-IPO stage and exit very soon. Long term investments seem to find it very difficult to achieve an IPO. Exits through Liquidations also have similar survival function as that of IPOs. Probability of exit is the least and remains the same over time for Liquidation route. It implies that if the exit does not happen in the initial years of investment, the exit is very less probable to happen and probability of exit remains stagnant after 2 to 3 years. Probability of the exit through strategic sale increases systematically for investment duration of up to six years. Then the distribution stays stagnant which means that up to six years investments have an increased probability of exiting though Strategic sale and once the investment duration crosses 6 to 7 years, exiting becomes very difficult. Similar is the case with Secondary sale also as the survival function of Secondary sale and Strategic sale appears to be almost same. Exits through Secondary sales have a comparatively high investment duration and probability to exit for a longer period of time. Probability to stay invested reached a plateau around 10 years and if the exit does not happen by that time, then the investment will mostly remain un-exited after that. Over all, these survival functions points out the illiquidity of VC exit market, especially for investments of long investment durations. It may also be a pointer to the fact that at least 40% of the VC investments are failure in terms of return generated and moreover many investments are not even able to liquidate their investment and exit even with meagre returns or loss at the worst case(Wennberg & DeTienne, 2014).

### 5.3. Indian VC market investment duration modelling

Table 8: Kaplan-Meir Estimation of Exit rates for whole Indian market

Years after an investment	Number of Exits in the year	Proportion Exiting in the Year	Cumulative Proportion Exiting at End of Year	Proportion Not exited at End of Year	Investments staying invested during the year
0	22	0.01	0.01	0.99	2935
1	75	0.02	0.03	0.97	2528
2	78	0.04	0.07	0.93	2018
3	68	0.03	0.1	0.90	1580
4	78	0.05	0.15	0.85	1300
5	54	0.04	0.19	0.81	1071
6	51	0.05	0.24	0.76	843
7	27	0.03	0.27	0.73	680
8	13	0.02	0.29	0.71	540
9	12	0.02	0.31	0.69	461
10	3	0.01	0.32	0.68	315
11	0	0.00	0.32	0.68	208
12	0	0.00	0.32	0.68	139
13	0	0.00	0.32	0.68	115
14	0	0.00	0.32	0.68	102
15	0	0.00	0.32	0.68	90
16	0	0.00	0.32	0.68	71
17	0	0.00	0.32	0.68	40

The table shows the breakdown of number of exits, exit rates and proportion not exited during the study period of 2000-2017. Year of investment in the portfolio company is assumed as 0 for each investment. Time to exit denote the time period between the investment and exit measured in years. Cumulative exit rates are calculated by Kaplan Meir method. Source: Authors calculations from Venture Intelligence (2017)

The table shows the breakdown of number of exits, exit rates and proportion of un-exited investment during the study period of 2000-2017. Cumulative exit rates are calculated by Kaplan-Meir method. Majority of exits occurred within 3 to 4 years of investment and as time flows number of exits decrease at an increasing rate and reaches nil by year 11. After year 11, no exits happen which is an important observation. VC investors do not seem to have much exit opportunity once the investment has become too old. It may be due to the erosion in the value of the investment due to the poor performance of the investee firm or illiquidity in the VC exit market. Cumulative proportion of firms exiting increases at a decreasing rate and reaches a plateau with cumulative probability remaining stagnant at .32. In other words, 68% of the investments have not exited even by 11th year of their investment and stay invested till 17 years at least which is the end period of the study. Around 1071 investments had not exited by the 5th year of their investment and 315 investments were not exited by the 10th year of investment. Investment duration of 90 investments was 15 years or more and not exited by the end period of the study.

Figure 4: Investment duration model for Indian VC market



Survival rate of VC investment over a period of 18 years is modelled using Kaplan-Meir survival analysis. Survival rate is a decreasing function of time which reaches a plateau at some point in time i.e. the probability of staying invested in a company decreases as the time flows and remains the same after a specific time period. The figure points out that the probability of staying invested is high in the initial time periods and decreases over a period of 10 years to reach a plateau, after which no decrease in probability is exhibited. In other words, investments in a portfolio company have a higher probability of exiting in the initial years, reaches a plateau within 10 years of investment. If the exit does not happen within that time, there is almost 70% probability that the investment will not be exiting anytime in the near future, which means that the VC investment becomes illiquid. Ideally in a liquid and vibrant market, the probability of staying invested should reach zero over a long period of time. This observation points to the possibility of VC exit market being very illiquid and less vibrant in India, especially for long duration investments, which makes the exit impossible once the investment crosses a certain time frame. This phenomenon may also be due to the possibility that VC investors do not prefer to exit from promising portfolio firms and stay invested for a very long time period. The motivation for this strategy is possibly because investment period could be highly correlated with the high value creation on their investment. Hence we hypothesise that, *H*<sub>0</sub>: *The investment duration and the value of the investment are not positively correlated. H<sub>a</sub>*: The investment duration and the value of the investment are positively correlated.

Investment Duration(Years)	No. of observations	Pearson Correlation	Sig.
>1	234	.131	0.045*
>2	211	.124	.072
>3	167	.105	.176
>4	129	.089	.316
>5	87	.039	.723
>6	54	074	.594
>7	28	.117	.267
>8	16	.186	.490
>9	10	.067	.855
>10	5	897	0.0001*

Pearson Correlation test is conducted at a significance level of .05 to check the correlation between investment duration and the percentage change in the value of the investment. Test was conducted independently for years ranging from 1 to 10 and more. The results are reported in the Table 9. Table 9: Correlation table for investment duration and value change

The table shows the Pearson correlation between the duration and value of the investment. Test was conducted at a significance level of .05. \* indicates significance at .05 level. Source: Authors calculations from Venture Intelligence (2017)

Table 9 reports that there is a significant positive correlation of .131 between the investment duration and value of the investment when the investment is in the first year, even though the correlation is very small. But for investment durations from 2 to 9 years, there is no significant correlation between the investment duration and value creation. Moreover, the value decreases significantly as the investment duration becomes 10 year or more with a negative correlation coefficient of -.897. Hence we do not reject the null hypothesise that the value of the investment is not positively correlated with the duration of the investment and reject the alternative hypothesis. This points to the fact that majority of the long duration investments are not due to possibility of an increase in investment value with the passage of time, but due to the illiquidity of the VC exit market. Hence it may be concluded that Indian VC market is very poor in liquidity and probability of around 70% for an investment not finding a way to exit make investment in Indian market very unattractive.

## 6. Conclusion and implications

Indian VC market is an interesting mix of opportunities and threat. While the year-on-year increasing number of investments shows the investor's interest in the market, there is a reason for the investors to be concerned also. Indian VC exit market is not very liquid. Most of the sectors other than BFSI are not liquid, especially when the investment duration increases. Exit probabilities in the Indian market are low. Investments whose duration is more than 10 years have almost 70% probability of staying invested. This should be a matter of concern for VC firms, LPs and policy makers. Illiquidity will drain away investor's interest in the market and they gradually become unwilling to bet on that market. This will reduce the flow of money to GPs which will in turn affect their fee income. Eventually, it will result in the entrepreneurial firms; especially those belong to illiquid sectors, not getting enough funding opportunities. Policy makers need to draw their immediate attention to this issue to ensure the thriving of the VC industry.

More research may be conducted to find out the relationship between the long term investment duration and valuation of IFs who have not made any exit transaction anywhere in the recent past. Our study has focused only on the firms whose valuation was available because of some exit happening from that company. Getting the valuation of an entrepreneurial firm in Indian market is difficult otherwise. Future research may focus on the IFs whose valuations are not readily available also.

# References

- Annamalai, T. R., & Deshmukh, A. (2011). Venture capital and private equity in India: an analysis of investments and exits. *Journal of Indian Business Research*, 3(1), 6–21. https://doi.org/10.1108/1755419111112442
- Bayar, O., & Chemmanur, T. J. (2012). What drives the valuation premium in IPOs versus acquisitions? An empirical analysis. *Journal of Corporate Finance*, 18(3), 451–475. https://doi.org/10.1016/j.jcorpfin.2012.01.007
- Bertoni, F., & Peter, A. (2013). Cross-border investments and venture capital exits in Europe. *Corporate Governance: An International Review*, (Vc).
- Covin, J. G., Daily, C. M., & Dalton, D. A. N. R. (2001). WEALTH AND THE EFFECTS OF FOUNDER MANAGEMENT AMONG IPO-STAGE NEW VENTURES, 658, 641–658. https://doi.org/10.1002/smj.182
- Cumming, D. J. (2002). Contracts and Exits in Venture Capital Finance CONTRACTS AND EXITS IN VENTURE CAPITAL FINANCE\*. *Aarhus Business School*, (October). Retrieved from www.cbs.dk/LEFIC%0Awww.cbs.dk/LEFIC
- Cumming, D. J., & Macintosh, J. G. (2001). Venture capital investment duration in Canada and the United States, *11*, 445–463.
- Cumming, D., & Johan, S. A. binti. (2008). Preplanned exit strategies in venture capital. *European Economic Review*, 52(7), 1209–1241. https://doi.org/10.1016/j.euroecorev.2008.01.001
- Das, S. R., Jagannathan, M., & Sarin, A. (2003). Private equity returns: an empirical examination of the exist of venture-backed companies. *Journal of Investment Management*, 1(1), 1–26. https://doi.org/10.2139/ssrn.298083
- Espenlaub, S., Khurshed, A., & Mohamed, A. (2015). Venture capital exits in domestic and cross-border investments. *Journal of Banking and Finance*, *53*(November), 215–232. https://doi.org/10.1016/j.jbankfin.2014.11.014
- Gemson, J., & Annamalai, T. R. (2015). A new perspective on private equity stage financing : evidence from investments in infrastructure. *Venture Capital*, *17*(4), 299–325. https://doi.org/10.1080/13691066.2015.1052193
- Gilson, R. J., & Black, B. S. (1999). Require an Active Stock Market? *Journal of Applied Corporate Finance*, 11(4), 36–48.
- Gompers, P. A. (1996). Grandstanding in the venture capital industry. *Journal of Financial Economics*, 42(1), 133–156. https://doi.org/10.1016/0304-405X(96)00874-4
- Gompers, P., & Lerner, J. (1998). What drives venture capital fundraising? *Brookings Papers* on *Economic Activity: Microeconomics*, 1998(1998), 149–204. https://doi.org/10.2139/ssrn.57935
- Hibara, N. (2004). Grandstanding and Venture Capital Firms in Newly Established IPO Markets, 9(3), 77–93.
- Higson, C. (2012). The Performance of Private Equity, 40(1), 253–277.
- Neus, W., & Walz, U. (2005). Exit timing of venture capitalists in the course of an initial public offering. *Journal of Financial Intermediation*, 14(2), 253–277. https://doi.org/10.1016/j.jfi.2004.02.003
- Puri, M., & Zarutskie, R. (2012). On the Life Cycle Dynamics of Venture-Capital- and Non-Venture-Capital-Financed Firms, *LXVII*(6).
- Rajan, T. (2010). A Life-Cycle Analysis of VC-PE Investments in India. *Journal of Private Equity*.
- Schwienbacher, A. (2005). An Empirical Analysis of Venture Capital Exits in Europe and the United States. *EFA 2002 Berlin Meetings Discussion Paper*, (Icm), 1–38.
- Shumway, T. (n.d.). ForcastingBankruptcyHazardModel.pdf. Journal of Business.
- Signori, A. (2013). The valuation of IPOs and its influence on a private firm 's exit decision,

(November).

Timmons, J. A., & Bygrave, W. D. (1986). Venture capital's role in financing innovation for economic growth. *Journal of Business Venturing*, *1*(2), 161–176. https://doi.org/10.1016/0883-9026(86)90012-1

Wang, L., & Wang, S. (2011). Economic Freedom and Cross-Border, (71072036).

- Wennberg, K., & DeTienne, D. R. (2014). What do we really mean when we talk about `exit'? A critical review of research on entrepreneurial exit. *International Small Business Journal*, 32(1), 4–16. https://doi.org/10.1177/0266242613517126
- Wennberg, K., Wiklund, J., DeTienne, D. R., & Cardon, M. S. (2010). Reconceptualizing entrepreneurial exit: Divergent exit routes and their drivers. *Journal of Business Venturing*, 25(4), 361–375. https://doi.org/10.1016/j.jbusvent.2009.01.001