



Has the 1987 crash changed the psyche of the stock market?

The evidence from initial public offerings

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Abstract

Purpose – The purpose of this paper is to utilize the initial public offerings (IPO) market to research the effect the stock market crash of 1987 had on the market psyche.

Design/methodology/approach – The paper compares the number of IPOs, as well as accounting data during the years surrounding the 1987 crash to determine if there is a change in financial quality. The underwriting fee structure, underpricing and short term price changes during one year prior to and one year following the 1987 crash are examined, as well as the long term returns surrounding the crash.

Findings – The stock market crash of 1987 did change the market psyche in the short to medium term. Results show greater risk aversion in the post crash period, as evidenced by fewer IPOs from riskier firms. Pricing is found to be more rational – less one day run-up, less upward adjustment from offering range, and less likely to be overpriced in intermediate and longer terms.

Originality/value – The paper demonstrates the importance of market sentiment and may illuminate the causes of market cycles.

Keywords Flotation, Stock markets, Stock returns, United States of America

Paper type Research paper

Introduction

On October 19, 1987 the Dow Jones Industrial Average declined 508.32 points (22.6 percent) which equates to a loss of \$500 billion. This paper is an examination of whether the 1987 stock market crash affected the psyche of the investing public. In particular, we investigate whether the crash caused a structural change in the market or a shorter-term behavioral change. The latter may include a drastic but short-term shift in risk aversion by investors resulting in a flight to quality type of phenomenon. Although flight to quality could be tested in principle with stocks that are traded, the price run up prior to the crash may make the notion of quality difficult to define and measure. A more direct approach is to examine the initial public offering (IPO) market, where the test for flight to quality is simplified to whether only better quality (larger, more profitable, longer history) unlisted firms offer IPO. We use characteristics of IPOs to see if there are changes in the quality of IPO issuers due to the stock market crash of 1987. This paper seeks to explain how the market crash affected the stock market with respect to IPOs, both immediately and in the longer term. IPOs are interesting take on the market psyche in that it involves both the response of supply from issuers and demand by the investors. The event of the crash if resulted in a flight to quality could manifest in the withdrawal from the market of certain potential issuers (lower quality) as well as investor types (less risk averse/more optimistic).



Data and theory

If the market crash caused the psyche of the market to change in the short term, irrational behavior may be observed. In particular, having observed the occurrence of a relatively rare event of over a 20 percent decline in a single day, the market would assign much higher probability for a similar decline to occur in the near future, a result of a small sample or representativeness bias. In addition, the exit of the most optimistic investors would further reinforce a greater market discount for risks. Since the riskiest stocks tend to decline more than the average, these effects would be felt mostly on high risk stocks, and investors in these stocks were burned and would avoid them.

As a result of these factors, there should be a flight to quality in the following months and years. This “flight to quality” hypothesis (Bernanke *et al.*, 1996) states that adverse shocks to the economy may be accelerated by worsening market conditions. Essentially, the financial accelerator implies that borrowers with severe agency problems have reduced access to credit during economic downturns. When applied to IPOs, the “flight to quality” has the following predictions:

- Only high quality firms issue IPOs. This means larger, more profitable, less levered firms, less need for certification from third parties such as venture capital firms, and from more established industries[1].
- The pricing of IPOs could be lower than those issued prior to the crash due to the withdrawal of the less risk averse investors; the discount is greater for riskier shares.
- The aggregate dollar and number of IPOs will decline, as lower quality issues are being shut out of the market. However, the dollar value per IPO will rise reflecting larger, less risky firms dominating the issue market.
- Investment banks would have harder time marketing new IPOs, as reflected in their greater selling expense.
- The greater aversion to risk would also reduce the demand for IPOs from new industries, a negative externality in reduced external funding for new ventures.

The null hypothesis is that the market was not affected by the crash, and there would be no difference in the pre to post crash comparison. Underlying the hypothesis are the assumptions that the market did not underestimate the probability of a crash earlier, nor did it overestimate its probability afterward. They are simply regarded as what they are, rare events. Investor sentiment is quite a relevant issue, as Siegel (1992) notes that shifts in investor sentiment, perhaps induced by noise traders, were a factor in the 1987 stock decline. Our study examines investor sentiment and market psyche through the IPO market. Similarly, Seyhuti (1990) found evidence that suggests overreaction was an important part of the 1987 crash. In a related issue, Shiller (1989) surveyed investor behavior around crashes and argued there were no changes in economic fundamentals, and that investors merely trade based on price changes.

Results*Number of IPOs*

The number of IPOs gives a sense of the IPO market momentum. Table I shows the aggregate number of IPOs in terms of issues and principal amount, both the sum and average size of the given year. We can see that in the year before the crash (1986) that the number of IPOs peaks at 708 for the eleven year period surrounding the 1987 crash. The year of 1987 had a smaller number of IPOs at 531, but this is still larger than the

Table I.
Aggregate IPOs in
number of issues and
the sum and average
principal amount

Year	Number of IPOs	Principal amount	
		Sum of all markets (\$ mil)	Average of all mkts (\$ mil)
1982	118	1,215.8	10.3
1983	673	12,071.7	17.9
1984	343	3,154.8	9.2
1985	322	6,332.8	19.7
1986	708	22,008.7	31.1
1987	531	24,055.2	45.3
1988	268	22,411.5	83.6
1989	240	13,482.2	56.2
1990	207	11,076.2	53.5
1991	387	24,908.8	64.4
1992	561	64,309.7	115.5
1 January 1987 to 19 October 1987	508	22,690.0	44.7
19 October 1987 to 31 December 1987	22	1,300.2	59.1

Note: Data are from Thomson Financial Securities Data Corporation

preceding years of 1985 with 322 and 1984 with 343 IPOs. The relatively high number of offerings in 1987 reflects the fact that there was a robust market for 9-10 months prior to the crash. Clearly, the years of 1986 and 1987 had significantly larger quantity of IPOs. After the 1987 crash, the quantity of IPOs did not reach the 1987 level until five years later in 1992 when the number of the IPOs hit 561. In the three years following the 1987 crash, the number of IPOs did not exceed 300 per year. Clearly, the 1987 crash had an effect upon the quantity of IPO for several following years. Lowry (2002) finds that investor sentiment is a determinant of aggregate IPO volume. The quantity of IPOs had risen prior to the market crash, reflecting the sentiment driving the market to new heights and overvaluation, which also drove the IPO market. The year 1987 is of particular interest, as the table shows the momentum of IPOs were much in line with the general stock market overheating at the time. Although we feel investor sentiment influenced the IPO market following the 1987 crash, managerial timing to avoid the depressed stock market may also be a plausible explanation.

In terms of the principal amount, Table I shows both the sum and average principal amount for each of the eleven years surrounding the 1987 crash. The principal amount numbers are not inflation adjusted. The years 1986 and 1987 were peak years with the sum in 1986 at \$22 billion and 1987 at \$24 billion. The numbers in 1987 are the sum of two regimes – the uptrend in principal continued up to the October crash, and declines afterward. The decline in the number of IPOs immediately after the crash may be a result of investment bankers concern over their reputation. Dunbar (2000) studied how the withdrawal of IPO from October 1987 to December 1987 affected market share of investment banks later, their ability to complete IPOs did impress potential issuers, so this factor may be more important than cost of issuance. In the year 1988, although we see a similar aggregate level at \$22 billion, the issue market was dominated by large issues, with average issue size almost twice that of previous years. This supports the tendency of investors' flight to quality immediately after the crash. But in the years following a decline to \$13 billion in 1989 and \$11 billion in 1990. However, the market recuperates by 1991 as the sum resumes to the 1987 level of \$24 million. The experience of the crash appears to have left the market with a sour taste, or bad memory for at

least 2-4 years, before a gradual recovery due to penned up supply by firms. It is possible given the momentum of the upward trend from 1985 to 1986, the number of IPOs in 1987, 1988 would have been higher.

The psyche of the stock market

Size

We observe another interesting issue is in terms of the average size of the IPO. It appears as though after the 1987 crash, the average size of IPOs increased. In 1988, the average size increased to 83 million, up from 45 million in 1987. Furthermore, within the year of 1987, before the crash the average IPO size was \$44.7 million, whereas after the crash, the average IPO size increased to \$59.1 million. This is evidence that the market would only accept IPOs of larger, more established companies. This is consistent with the prediction of the hypothesis. We can also see that in the years following the 1987 crash, the average IPO size stays above the 1987 levels. In 1989, the average IPO size was \$56 million and in 1990, the average IPO size was \$53 million. The decline in average issue size could be consistent to a reduction of investors' flight to quality, allowing smaller issues to be offered.

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Volume

We examine the quantity and volume of IPOs per month in 1987, as well as the monthly figures 5 years prior to the crash to see if there is a decline in IPOs in months prior to 10/19, to enable us to determine whether the IPO market anticipated the market decline. Furthermore, we seasonally adjust the data by dividing the IPOs number and volume in each month by its previous five years of monthly average as shown in Table II. The seasonally adjusted figure represents the IPOs number and volume in each month divided by its previous five years average of the same month. In the year 1987, the seasonally adjusted monthly number of IPOs is 1.31 in January, 2.44 in February, 1.88 in March and 1.89 in April. In May, June, July and August, the numbers drop slightly to 1.46, 1.70, 1.47 and 1.34. In September, the number increases to 1.88, but drops to 0.70 in October and declines greatly in November and December to 0.16 and 0.17.

The same trend can be seen in terms of volume. In the year 1987, the seasonally adjusted monthly sum of volume of IPOs is 6.40 in January, 4.84 in February, 6.57 in March and 2.44 in April. In May, June, July and August, the numbers drop slightly to 3.05, 3.50, 3.57 and 1.96. In September, the number increases to 4.49, but drops to 1.21 in October and declines greatly in November and December to 0.26 and 0.70.

We split the sample into three-time periods: the pre 1987 crash time period from 1982 to 19 October, 1987, the post crash from 20 October, 1987 to 1989 and the post crash 1990-1992. This is to separate the data into the pre crash period, the near term after crash period, and longer term after crash period.

Financial data

We examine the accounting data of IPOs during the years surrounding the 1987 crash to determine if there is a change in quality from a financial standpoint. If we observe a change in the quality of financial indicators after the 1987 crash, it is evidence that the market would only absorb more financially stable, higher quality IPOs. To differentiate whether the change in market's attitude is short term or structural, we examine characteristics of issues (as indicators of quality) for the immediate two years post crash period (October 1987 to December 1989), and the period after (1990-1992) (see Tables III and IV). In general, we find more homogenous and higher quality in the first

	1982	1983	1984	1985	1986	Average 1982-1986	1987	Seasonally Adjusted 1987
<i>Number of IPOs per month</i>								
January	8	10	52	15	22	21	28	1.31
February	8	25	37	17	30	23	57	2.44
March	8	48	31	19	40	29	55	1.88
April	11	25	26	16	33	22	42	1.89
May	7	52	31	25	63	36	52	1.46
June	7	59	23	24	90	41	69	1.70
July	8	74	24	30	78	43	63	1.47
August	5	74	34	27	73	43	57	1.34
September	5	60	21	19	52	31	59	1.88
October	11	72	20	44	81	46	32	0.70
November	12	77	22	47	67	45	7	0.16
December	28	97	22	39	79	53	9	0.17
<i>Principal amount (\$ mil) sum for each month</i>								
January	29.4	122.2	570	159.9	460.9	268	1718	6.40
February	49.1	578.5	272	204.9	440.2	309	1497	4.84
March	90.2	1551	302.3	288.70	1119	670	4401	6.57
April	68.5	520.1	139.1	461.7	1447	527	1286	2.44
May	71.7	917.8	355.2	358.6	2612	863	2636	3.05
June	33	1322	197.2	438.8	2482	895	3130	3.50
July	78.1	1195	106.9	602.7	1685	733	2615	3.57
August	53.8	1273	495.5	491.1	2215	906	1774	1.96
September	44.5	1266	203.9	225.5	1051	558	2507	4.49
October	127.3	1415	235.7	1613	3054	1289	1565	1.21
November	207.7	857.8	140.9	734.4	3720	1132	299	0.26
December	362.5	1053	141.1	753.7	1722	806	563	0.70

Table II.

Number and principal amount per month for IPOs (1982-1987)

Note: The seasonally adjusted figure represents the IPOs number and volume in each month divided by its previous five years average of the same month

Source: Data are from Thomson Financial Securities Data Corporation

two years, but greater dispersion in quality in the next three years, indicating a mixture of both high and low quality issuers. Thus, we find that there was a change in the market psyche, but it was only temporary.

In terms of revenue before the 1987 crash, the average revenue was \$197 million, \$182 million two years after the crash, and \$122 million during the three to five years after the crash. In particular, we examined 1987 and noted that the average revenue was \$119 million while the median was only \$23 million. Thus, the year was dominated by a few large revenue issuers. The median revenue, however, before the 1987 crash are \$18.6 million, and increased to \$34.7 million two years after the crash, and \$26.95 million during the three to five years after the crash. The standard deviation of revenue was \$276 million before the crash, \$327 million two years after the crash, and \$469 million during the three to five years after the crash.

A similar pattern can be seen with respect to net income with both the mean and median, as one observes a larger dollar amount of net income after the 1987 crash. The mean net income prior to the 1987 crash is \$3.38 million, \$5.13 million post crash to 1989, and \$4.38 million three to five years after the crash. The same trend can be seen in the median with IPOs of less profitable firms with median net income of \$0.90 million

	Revenue (\$ mil)	Net income after taxes (\$ mil)	Long term debt (\$ mil)	Debt to equity ratio	Return on common equity	Venture capital backed	Previous leveraged buyout	Number of employees
Mean	197.65	3.38	85.23	86.37	15.51	0.44	0.16	2286
	182.82	5.13	55.31	84.79	17.17	0.38	0.02	1394
	122.53	4.38	70.92	94.58	14.33	0.22	0.13	1795
	0.0179	0.01245	0.02291	0.3657	0.98528	0.4635	0.1547	0.27176
Median	18.60	0.90	2.40	20.75	11.78	no	no	500
	34.70	1.40	3.00	16.41	12.14	no	no	542
	26.95	1.35	3.50	24.38	11.39	no	no	265
SD	276.61	21.25	190.61	211.47	18.99	0.50	0.17	1837
	327.61	16.56	181.50	353.75	19.25	0.42	0.15	2089
	469.01	19.18	308.04	494.32	34.30	0.49	0.34	5057
Skewness	11.89	5.57	19.98	20.07	11.96	0.10	5.41	5.73
	6.71	7.22	7.06	15.43	10.61	1.35	6.17	2.86
	15.55	6.30	10.93	13.28	12.03	0.48	2.22	5.66
Kurtosis	203.16	343.71	555.49	570.80	183.50	-1.99	27.28	40.25
	61.90	73.31	62.40	251.77	126.14	0.17	36.15	8.64
	287.80	59.20	155.74	207.34	210.79	-1.77	2.92	36.01

Notes: Data are for the last 12 months prior to going public; financial data is not inflation adjusted

Source: Data are from Thomson Financial Securities Data Corporation

Table III. Financial data per firm prior to IPO

Table IV.
Financial data per firm
prior to IPO

Year	Revenue (\$ mil)	Net income after taxes (\$ mil)	Long term debt (\$ mil)	Debt to equity ratio	Return on common equity	Venture capital backed	Number of employees
Mean							
1982	29.02	0.91	42.57	15.85	74	0	140
1983	65.75	1.33	78.33	12.84	73	1.30	562
1984	41.15	1.56	45.36	15.77	60	0.50	182
1985	110.65	5.53	69.05	15.51	39	4.65	589
1986	84.84	3.2	78.41	15.24	40	3.95	765
1987	119.94	3.81	95.49	17.42	31	5.46	505
1988	122.15	6.49	61.27	17.96	23	2.24	475
1989	130.38	3.82	137.41	14.55	22	2.91	293
1990	202.4	4.35	108.75	13.20	29	7.72	1109
1991	160.21	5.15	73.19	13.78	39	11.80	1218
1992	193.71	2.7	85.75	15.17	46	15.50	579
1987 before crash	122.56	3.86	97	16.88	32	5.70	527
1987 post crash	44.64	2.53	47.03	33.27	11	0	214

Notes: Data are for the last 12 months prior to going public; financial data is not inflation adjusted
Source: Data are from Thomson Financial Securities Data Corporation

occurring prior to the crash, whereas after the crash the market required firms to be more profitable with median net income of \$1.4 million during the two years after the crash, with a slight decline of \$1.35 median net income three to five years after the crash. This is consistent with the hypothesis of the market fleeing to larger, more profitable firms after the crash. The standard deviation in net income is also larger prior to the 1987 crash, at \$21.25 million, \$16.56 post crash to 89, and \$19.18 million three to five years after the crash.

The amount of leverage that companies are willing to take on, or that the market may be willing to bear with respect to an IPO may have changed after the 1987 crash. We examine both the dollar amount of debt as well as the percent of debt to equity. In terms of the dollar amount of debt, from 1984, there is a steady increase in the debt leading up to 1987. There had been a steady increase in debt/ leverage too, by issuers prior to the crash, however, the trend was reversed in 1988. It is interesting to note that in 1987, before the crash the average debt was \$63 million, but in the months after the crash, the average level of debt was only \$23 million, indicating that the market was not willing to accept an IPO from a risky company with a lot of debt.

In terms of averages prior to the 1987 crash long term debt is \$85 million, yet in the two years following the crash, long term debt declines to \$55 million, yet creeps upwards to \$70 million three to five years after the crash indicating that the market impact is temporary.

A similar pattern can be seen for the debt to equity ratio starting in 1984, with a visible increase in the debt leading up to 1987. In 1984, debt to equity ratio for companies conducting an IPO was 45 percent, increasing to 69 percent in 1985, 78 percent in 1986 and 95 percent in 1987. Once again, we see a retrenchment in terms of the market's ability to digest a company with more debt after the crash. During 1987 before the crash, the debt to equity ratio was 97 percent, after the crash it was 47 percent indicating that companies conducting an IPO after the crash were much less leveraged and thus less risky.

These are pre IPO leverage ratio which reflects, consistent with the flight to quality hypothesis, less willingness for the market to bear risks, or demand greater quality, as the equity base is a function of past profits. The mean and median debt/equity ratio also show the same trend of more debt/equity prior to the 1987 crash, with a decline in debt/equity after the crash, with the numbers increasing in the 3-5 year period after the crash. According to Wolfson (1996), the 1987 stock market crash demonstrates the modern debt-deflation process encompasses falling asset prices and debt repayment difficulties.

In terms of the return on equity, we see a trend of less profitable firms able to conduct an IPO prior to the crash with an average ROE of 15.51 percent prior to the crash, yet after the 1987 crash, the average ROE increases to 17.17 percent indicating that the market was risk adverse, requiring higher profitability after the crash. The median numbers show a similar trend with ROE of 11.78 percent prior to the crash, 12.14 percent in the two years after the crash and declining to 11.39 percent three to five years after the crash.

This is consistent with the hypothesis of the market fleeing to more profitable firms after the crash. The most divergence we see is during 1987 prior to the crash, the return to equity ratio is 16.88 percent, whereas after the 1987 crash, the ratio doubles to 33.27 percent. This indicates that in the short term, the market required substantially higher profitability to accept an IPO. In addition, return on equity is an after leverage number, thus highly levered firm's high ROE is due to use of debt at interest cost lower than

return on assets, and thus, previous IPOs with higher leverage, even at same ROE, reflect it comes from a greater risk source. Thus, again the results are consistent with the flight to quality hypothesis as investors look for higher profit not due to debt use. In a related issue, Lauterbach and Ben-Zion (1993) study the effects of the 1987 crash on the Tel-Aviv Stock Exchange and find that the crash and its aftershocks lasted for a week and selling pressure was concentrated in higher beta, larger capitalization and lower leverage firm stocks.

During the 1982-1992 period the number of employees increases on average, from 140 employees in 1982 to 562 in 1983, dipping in 1984 to 182, increasing to 765 in 1986. The average number of employees at a company conducting an IPO in 1987 is 505 and we observe a decline in the following two years to 475 in 1988 and 293 in 1989.

The number increases substantially to 1109 in 1990 and 1218 in 1991. During the year of 1987 before the crash, the number of employees is 527, but for firms conducting an IPO after the crash, the number declines to 214. Thus, there is a post crash decline in average number of employees per firm and yet an increase in revenue per share. So what kind of industry dominates these firms? They could not have been service, or retail industries with many employees, nor very high tech with few employees, as we know there would be few new industries, or risky firms. So, they are established and capital intensive firms. The predominant industry having an IPO after the 1987 crash until the end of 1988 was manufacturing, with 104 of the 214 IPOs being in manufacturing (49 percent). In contrast, from 1986 to before the 1987 crash, only 360 of the 1216 IPOs being in manufacturing (30 percent).

As is often the case in behavioral finance, it should be noted that there is no specific rationale for a change in financial fundamentals given the rather swift market adjustment in 1987. However, Shiller's (1989) survey research indicated that investors traded primarily on price movements and emotions, rather than trading on economic fundamentals.

Venture capital and leveraged buyouts

During the period prior to the crash from 1982 to 1987, there is a decline in the percent of IPOs which are venture capital backed. The decline in venture backing prior to the crash reflect IPOs of firms that are of higher risks, lacking certification of venture capital funds. In 1982, 74 percent are venture backed, 73 percent are venture backed in 1983. This level declines to 60 percent in 1984 and further declines to 39 percent in 1985. It stays at a similar level in 1986 at 40 percent, but further declines to 31 percent in 1987, 23 percent in 1988 and 22 percent in 1989. The decline after the crash is the result of larger, more established firms that need not have venture backing due to their long history in business. Within the year of 1987, prior to the crash the venture capital backing level was 32 percent and post crash it was 11 percent. The level begins to increase steadily in 1990 at 29 percent, 39 percent in 1991 and 46 percent in 1992 as a result of quality firms which have gone through the due diligence process and were deemed worthy of funding by venture capitalists and are seeking to conduct IPOs.

In the post 1987 crash years, the data indicates that those firms that received venture capital backing were smaller firms in terms of principal in both the near term (1987 crash – 1989) and further out in time (1990-1992). For firms not receiving venture capital conducting IPOs during the time period of the 1987 crash – 1989, the average size in terms of principal was \$187 million, whereas those firms that received venture capital backing were much smaller, with an average size of \$56 million. (For further discussion on IPOs as a means of exit for venture capital, see Gilson and Black, 1999.)

The ability of buyout groups (managers and buyout funds) to turn a quick profit depends on the level of equity in that high stock prices reduce the debt/equity ratio in addition to debt reduction from paying off debt, and high stock prices enable using IPOs to cash in. The percentage of IPOs having conducted a previous leveraged buyouts are relatively low during 1982-1984, ranging from 0 percent to 1.30 percent and 0.5 percent. In 1985 it increases to 4.65 percent, in 1986 it increases to 3.95 percent and 5.46 percent in 1987. It declines somewhat in 1988 and 1989 to 2.24 percent and 2.91 percent, respectfully. After the 1987 crash, with less favorable stock prices, there are fewer IPOs as lower stock prices means lower IRR to the buyout group, which would make their payback period longer. Although it is not possible to measure privately held bought out companies, if the market crash is affecting operating business of some firms adversely, it may cause business failures, explaining part of the smaller pool of firms to offer IPOs. Kosedag and Michayluk (2004) also document that the majority of the repeated leveraged buyouts (LBOs) were performed following the 1987 stock market crash.

The level of previous leveraged buyout companies increasing to 7.72 percent in 1990, 11.80 percent in 1991 and 15.50 percent in 1992. In these later years following the crash, the percent increase is due to penned up supply, for these buyout groups to cash out and reduce the already long payback period.

Underwriting and pricing

Differences in pricing and underwriting during the ten years surrounding the 1987 crash can be seen in Table V. The offer price is reasonably constant over the entire time period ranging from a low of \$8.91 in 1984 to a high of \$12.83 in 1992, within the usual price range. During 1987 up until the crash, the average price was \$10.75, but fell to \$8.33 after the crash indicating that stock market prices as a whole fell and that the market was not willing to pay high prices for IPOs, however, the offer price is based on the number of shares offered. In 1988, the average price was at a similar level to 1987 at

Year	Offer price	Issue priced relative to filing range		
		Above (%)	Within (%)	Below (%)
1982	\$10.68	13.27	60.18	26.55
1983	\$20.75	11.08	66.77	22.15
1984	\$8.91	1.17	69.01	29.82
1985	\$10.77	4.67	79.13	16.20
1986	\$11.02	3.12	82.15	14.73
1987 Before crash	\$10.75	4.76	77.58	17.66
1987 Post crash	\$8.33	0.00	95.45	4.55
1988	\$10.28	2.72	82.88	14.40
1989	\$12.15	5.58	89.27	5.15
1990	\$11.04	8.00	82.50	9.50
1991	\$11.93	8.81	81.61	9.59
1992	\$12.83	8.39	78.57	13.04
Average 1982 to 10 October 1987	\$12.15	6.35	72.47	21.19
Average 20 October 1987 to 1992	\$11.09	4.03	84.97	11.00
<i>t</i> -test	1.53	2.17*	1.68*	3.89**

Notes: *Statistically significant at the 0.05 level; **statistically significant at the 0.01 level

Source: Data are from Thomson Financial Securities Data Corporation

Table V.
Pricing

\$10.82, but rose slightly in 1989 to \$12.15. We observe that during the 1982-1992 time period, firms aim to offer at around \$12/share. The lower price immediately post crash at \$8.33 could be the result of planned IPOs that previously aimed at \$12 but had to reduce their price to market them after the crash. Later issues in years 1988 and beyond could adjust the number of shares to offer and still maintain the \$12 target.

We examine whether an issue is priced above, within or below its filing range during the five years prior to 1987, as well as the five years after the 1987 crash. During 1987 prior to the crash 4.76 percent were price above the filing range, 77 percent were priced within the filing range, and 17 percent were priced below the filing range. We observe the high ratio of above versus below the filing range and the trend. Due to the original range being set with the prevailing market condition in mind whether hot or cold market for IPOs, the adjustments prior to offer reflect short term demand or speculative fervor for the shares. It could also reflect perceived under or over pricing. Intentional underpricing after the crash may be necessary, thus, to explain the observations.

After the crash in 1987, there were no IPOs priced above the filing range, 95 percent were priced within the filing range and 4.55 percent were priced below range reflecting greater caution and more effort put into pricing to gauge the market, again consistent with a perception in a change in the market's demand for IPOs. In the three years prior to the 1987 crash, the percent priced below the filing range declines each year from 29 percent in 1984, to 16 percent below in 1985, to 14 percent in 1986, indicating that markets were growing hot. In the years following the 1987 crash, you tend to see more investment banks pricing the issue within the filing range, erring on the side of conservatism. In 1988, the percent priced within range is 82.88 percent up from 78.37 percent in 1987. The same conservative pricing trend continues in 1989 at 89.27 percent priced within range, 1990 with 82.50 percent priced within range, and 1991 with 81.61 percent priced within range. This contrasts with the number of IPOs priced within range in the years leading up to the 1987 crash. In the years 1982-1984, 60.18, 66.77 and 69.01 percent, respectively were priced within range. In hot markets, lesser firms may try to aggressively price their IPOs, which may explain the higher numbers of IPOs below the original filing range in hot markets.

Underwriting fees

We also examine the fee structure of IPO to get a sense of change in the investment banks' effort needed to market IPOs due to short term or structural change in the market (Table VI). The fees we look at are the gross spread, the reallowance fee and underwriting fee. The gross spread is very constant over the time period ranging from a high of 8.72 percent in 1982 to a low of 7.24 percent in 1992, with the midpoint in time of 1987 at 8.04 percent. This near constant fee centering around 7 percent is well documented (Chen and Ritter, 2000).

The slight increase in the gross spread percentage seen in the few months after the 1987 crash of 8.47 percent is clearly a function of lower prices and greater selling effort needed to market the issues. The reallowance fee and underwriting fees are also extremely resilient to the market crash of 1987. This may in part be due to the numbers being a function of investment bankers rather than market sentiment. Reallowance expense is that portion of fee the underwriting group decided to share with the selling brokers – it reflects the need to give brokers more incentives to sell – a result of less perceived demand and greater need to market. The large increase in reallowance to selling brokers, 36 basis points (2.00-1.64 percent), account for most of the increase, 45

Year	Gross spread as % price	Reallowance fee as % of principal	Underwriting Fee as % of principal	Overalloc amt sold as % of amount
1982	8.72	2.30	1.80	5.39
1983	8.16	1.74	1.67	6.88
1984	8.59	1.87	1.78	5.80
1985	8.29	1.68	1.65	10.30
1986	7.98	1.56	1.61	11.68
1987 Before crash	8.02	1.64	1.65	9.58
1987 Post crash	8.47	2.00	1.21	6.97
1988	7.91	1.67	1.53	8.66
1989	8.10	1.46	1.60	7.01
1990	7.77	1.42	1.45	6.22
1991	7.40	1.12	1.47	7.67
1992	7.24	0.95	1.53	9.40
Average 1982 to 10 October 1987	8.29	1.80	1.70	8.27
Average 20 October 1987 to 1992	7.81	1.44	1.46	7.65
t-test	0.84	1.75*	1.62	0.44

Notes: *Statistically significant at the 0.05 level; **statistically significant at the 0.01 level

Source: Data are from Thomson Financial Securities Data Corporation

Table VI.
Underwriting fees

basis points (8.47-8.02 percent), in fees charged by the lead banks between the pre and post crash period.

Another way to measure market receptiveness to new issues is to look at the overallocation sold numbers. Overallocation is a function of both underpricing and temporary excess demand for the shares and is also a means underwriters receive compensations. In 1982, the amount of overallocation sold as a percent of the total principal amount was a relatively low 5.39 percent, in 1983 it was similarly 6.88 percent and 5.80 percent in 1984. During the period 1985-1987, the percent of overallocation sold increased to 10.30 percent in 1985, 11.68 percent in 1986 and 9.48 percent in 1987. Within 1987 prior to the crash, the overallocation sold was 9.58 percent, but dropped to 6.97 percent after the crash. In the years following, the number declines to 8.66 percent in 1988, 7.01 percent in 1989 and 6.22 percent in 1990 evidencing that the market's excess demand for IPOs was less for a few years following the crash.

The potential perception of higher gross spread in the pre period is mainly due to the period's higher percentage of smaller IPOs. There is a possibility that structure of the market might have changed, such as a reduction in transaction costs that favor larger issues, but our data indicates otherwise. We find between the period 1987 crash – 1989 and 1990-1992 a doubling of the issue size from \$13.5 mm to \$27 mm. This reduces gross spread by 64 basis points for small issues and by 23 basis points for larger issues.

New industries versus established industries

We also examine the number of IPOs in new industries versus IPOs in established industries five years prior to the crash and five years following the crash. New industries are defined as those firms conducting an IPO with a new SIC code within five years of the IPO. Established industries are those firms conducting an IPO with an SIC code that is over five years old. Our rationale for looking at the quantity of IPOs in

new versus established industries is to not only examine another indicator of the markets appetite for risk following the market crash, but also to document a possible negative externality of market crash. This is whether the flight to quality also crowd out risk capital for entrepreneurial ventures.

The sample of all IPOs was divided into those in new industries and those in established industries. The process for dividing the firms is as follows. Industry classification codes for the IPOs were obtained from Thomson Financial Securities Data Corporation. SIC codes were obtained going back to 1926. A new industry is formed when the first industry classification appears. An IPO is categorized as occurring in a new industry for the first five years after the first IPO appears in the industry. An IPO is categorized as occurring in an established industry five years after the first IPO appears in the industry.

Looking at Table VII, one can see that the percent of IPOs in new industries versus established industries in the five years prior to the crash is 5.68 percent, whereas after the crash the percent declines to 1.48 percent. New industries present a special complication for the investing public in that less is known about a new industry in terms of profitability, strategy and risk. The reduction in the supply of IPO funds after 1987, especially for new industries shows the market could affect the supply of funds to firms for investments (Morck *et al.*, 1990). Whereas with an established industry more information is available and better understood given the longer history. In terms of numbers, the number of IPOs in new industries during the five years prior to the crash was 149, compared to 26 IPOs during the five years after the crash. For established industries, the number of IPOs during the five years prior to the crash was 2625, compared to 1760 during the five years after the crash. Thus, given that fewer IPOs in new industries chose to go public after the 1987 crash leads one to believe that because the market was less willing to bear risk, the ability of new industries, which are inherently more uncertain, suffered. Thus, we are able to document a case of negative externality of market crashes.

Underpricing and short term stock returns

Any change in the market psyche will likely alter the level of issue underpricing. Hypothetically, if the investors' psyche has changed and they demand greater compensation for risk, underpricing after the 1987 crash will be higher, to compensate investors for their higher perception of risks. One could call this hypothesis the "increase risk aversion hypothesis". The alternate hypothesis is that due to a change in market psyche, instead of demanding greater compensation for risks, the market will only have demand for quality IPOs, and no demand for low quality IPOs. Another aspect which may occur is that the low quality IPO are priced at such a steep discount, that the potential issuing firms would withdraw. As a result, only quality issues were offered and there is an increase in quality but no increase in underpricing. One could call this the "flight to quality hypothesis". Note this flight to quality hypothesis is also supported by our previous results with accounting numbers, volume, amount per

Table VII.
Number of new industries offering IPOs in each year around this period

	IPOs in new industries	IPOs in established industries	Percent of IPOs in new/established industries
1982 to 19 October 1987	149	2625	5.68
20 October 1987 to 1992	26	1760	1.48

issue, etc. Of course, we should also mention that there is the null hypothesis that the 1987 crash had no effect.

Numerous studies document underpricing of IPOs such as Stoll and Curley (1970), Logue (1973), Reilly (1973) and Ibbotson (1975). Our study looks at the level of underpricing surrounding the 1987 crash. Table VIII illustrates the amount of underpricing and the short term price changes during one year prior to and one year following the 1987 crash, as well as the three-year period beyond each one year period surrounding the crash. In terms of underpricing, there is larger underpricing in both latter periods following the 1987 crash when compared to the periods prior to the crash. For the -48 months to -13 months prior to the crash, the mean first day return is a mere 5.9 percent and similarly, for IPOs one year prior to the crash, the mean first day return is 5.75 percent. After the crash, the amount of underpricing increases to 6.5 percent for the year after the crash and rises to 10.03 percent for the period +13 months to +48 months after the 1987 crash. The result that underpricing after the 1987 crash is higher lends support for the "increased risk aversion hypothesis". It appears that the market crash of 1987 did affect the psyche of the market. In order to compensate investors for their higher perception of risks, the market demanded greater compensation for this risk. It should be noted that the pricing of IPOs compared to its filing range (Table V) is related to the IPO underpricing shown in Table VIII.

In terms of short term price changes, the one month return declines steadily over the periods prior to the crash and continues to decline further after the crash. The one month Nasdaq adjusted return for the period -48 to -13 months prior to the crash was 7.62 percent, and 5.97 percent for those IPOs occurring within one year prior to the crash. The one month returns decline further after the crash with the Nasdaq adjusted return being 4.68 percent for those firms doing an IPO within one year of the crash and the return being 3.14 for firms doing an IPO 13 months to 48 months after the crash.

Time of IPO issue	N	Mean first day return	One month return	Nasdaq adjusted	Six month return	Nasdaq adjusted
-48 to -13 months prior to 1987 crash	903	5.90	11.43	7.62	18.63	7.33
-12 to -1 month prior to 1987 crash	687	5.75	6.96	5.97	22.79	3.42
+1 to +12 months after 1987 crash	231	6.50	9.21	4.68	24.34	10.03
+13 to +48 months after 1987 crash	776	10.03	4.64	3.14	19.64	8.54
t-test (-48 to -13) to (+13 to +48)		1.73*	2.08*	1.91*	1.06	1.32
t-test (-12 to -1) to +1 to +12)		3.62**	3.57**	2.49*	0.76	2.41*

Notes: This table is a comparison of underpricing and short term returns looking at the time period of three-year before last year, last year before, one year after and three years after that, i.e. -48 to -13, -12 to -1, +1 to +12, +13 to +48 months; Nasdaq adjusted return is the one month return for the IPO subtracting off the corresponding Nasdaq return for the given time period; *statistically significant at the 0.05 level; **statistically significant at the 0.01 level

Sources: Data are from The University of Chicago's Center for Research in Securities Prices (CRSP) as well as Thomson Financial Securities Data Corporation

Table VIII.
Underpricing and short
term returns

For the six month returns, a somewhat opposite effect is seen. Prior to the crash, the six month Nasdaq adjusted return is 7.33 percent for firms doing an IPO 48 months to 13 months prior to the crash. For firms doing an IPO within the year just prior to the crash, the six month Nasdaq adjusted return is 3.42 percent. After the crash, for firms conducting an IPO within a year after the crash, the six month Nasdaq adjusted return is 10.03 percent and for firms doing an IPO 13 months to 48 months beyond the crash, the Nasdaq adjusted return is 8.45 percent. The latter is an indication of underpricing, or compensation for risk when discount for risk in the after crash period went up.

Long term stock returns

In addition to looking at short term pricing effects, this paper seeks to explain how the 1987 crash affected the stock market with respect to IPOs in the longer term. There have been several studies documenting the long-run underperformance of IPOs such as Loughran and Ritter (1995), and Brav and Gompers (1997). We examine how this phenomenon changes surrounding the 1987 crash by looking at 1 year, 3 year and 5 year returns, both raw and Nasdaq market adjusted returns.

There are statistically significant differences between the long term returns of IPOs prior to and after the crash. The one year market adjusted return average for the five years and ten months prior to the crash is -10.57 percent compared to -0.05 percent after the crash. This difference is statistically significant with a *t*-statistic of 3.35. Similarly, the three-year market adjusted return average prior to the crash is -34.32 percent compared to -3.24 percent after the crash (see Table IX). This difference is statistically significant with a *t*-statistic of 4.09. The five year market adjusted return average prior to the crash is -22.64 percent compared to -2.36 percent after the crash. This difference is statistically significant with a *t*-statistic of 3.83. These long term returns indicate that investors demand greater compensation for risk in the form of

Year	One year raw return	One year market adjusted	Three-year raw return	Three-year market adjusted	Five-year raw return	Five-year market adjusted
1982	15.53	-4.88	32.02	-36.99	92.82	-14.78
1983	25.99	4.84	14.72	-38.61	77.95	4.89
1984	-23.29	-27.41	26.17	-51.84	89.41	-20.82
1985	28.05	-0.32	6.24	-39.21	11.56	-64.58
1986	3.21	-12.73	17.87	-20.73	36.22	-24.69
1 January 1987 to 19 October 1987	-16.47	-22.90	-2.81	-18.52	34.28	-15.83
Average prior to crash	5.50	-10.57	15.70	-34.32	57.04	-22.64
20 October 1987 to 1988	21.02	4.28	54.16	7.52	73.51	-9.87
1989	10.41	-15.50	50.52	15.44	73.24	15.92
1990	-23.55	-18.91	11.26	-34.69	65.93	-9.83
1991	53.55	23.22	30.51	-2.31	92.77	3.56
1992	15.58	6.66	33.83	-2.16	91.17	-11.59
Average after crash	15.40	-0.05	36.06	-3.24	79.32	-2.36
<i>t</i> -test for prior and after crash	2.46*	3.35**	3.12**	4.09**	2.45*	3.83**

Notes: *Statistically significant at the 0.05 level; **statistically significant at the 0.01 level

Sources: Data are from The University of Chicago's Center for Research in Securities Prices (CRSP) as well as Thomson Financial Securities Data Corporation

Table IX.
Long term returns

higher returns. In the process, they avoided the long term decline in IPOs due to over pricing at IPOs, or market exuberance. It is important to note that some of the period in the before crash did not cover the year of the crash, and thus, the long term decline is not due to the crash alone. The results could also be explained by greater speculation when the IPO is initially traded on the stock exchange during the pre-period IPO market. In the post-period, higher quality IPOs and less speculation in that early trading period could lead to superior long-term returns. This possibility is supported by the one-month return returns of Table VIII showing lower one month returns after the crash implying less speculation. Finally, the result is also consistent with having higher average quality issuers after the crash, and thus, avoiding unmet expectations in previous years.

Conclusion

We find evidence that the stock market crash of 1987 did change the market psyche, as demonstrated by this detailed study into one market, the IPO market. We show evidence in support of a change in greater risk aversion in the post crash period as evidenced by fewer IPOs from riskier firms (small issue size, more debt, lower revenue, less profit, etc.) as they were being shut out of the market. We find pricing to be more rational – less one day run-up, less upward adjustment from offering range, and less likely to be overpriced in intermediate and longer terms.

However, we find the change in market psyche is short to medium term, in this case extending from 1987 post-crash to 1990. After these 3-4 years, the market recovers, and once again exhibits more optimism with the return of less risk averse investors, as seven years later, in the mid 1990 till 2000 when the tech market bubble burst again. Thus, the effect of the crash was felt, but could not be said with lasting memory. However, it does demonstrate the role of market sentiment, and how it changes determines stock market prices, and provide some explanation of the market cycles – alternating periods of exuberance and cautious aversion.

Note

1. An alternative explanation is that investors myopic loss aversion may also explain why investors remember what happened recently but slowly forget what happened in the past. For further reading, (see Bernartzi and Thaler, 1995).

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Further reading

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