Stock Volatility During the Recent Financial Crisis

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http://schwert.ssb.rochester.edu/GWS110718.htm

From Presidential Debate, October 7, 2008

What is market volatility?

- Standard deviation of rates of return to broad market indexes
  - Following plots show:
    - Changes in DJIA from 1895-2011
      - Affected by growth in the level of the index
    - Percent changes in DJIA (rates of return, ignoring dividends) from 1895-2011
    - Rolling annualized standard deviations of rates of return to DJIA from 1895-2011

So what was candidate Obama talking about?

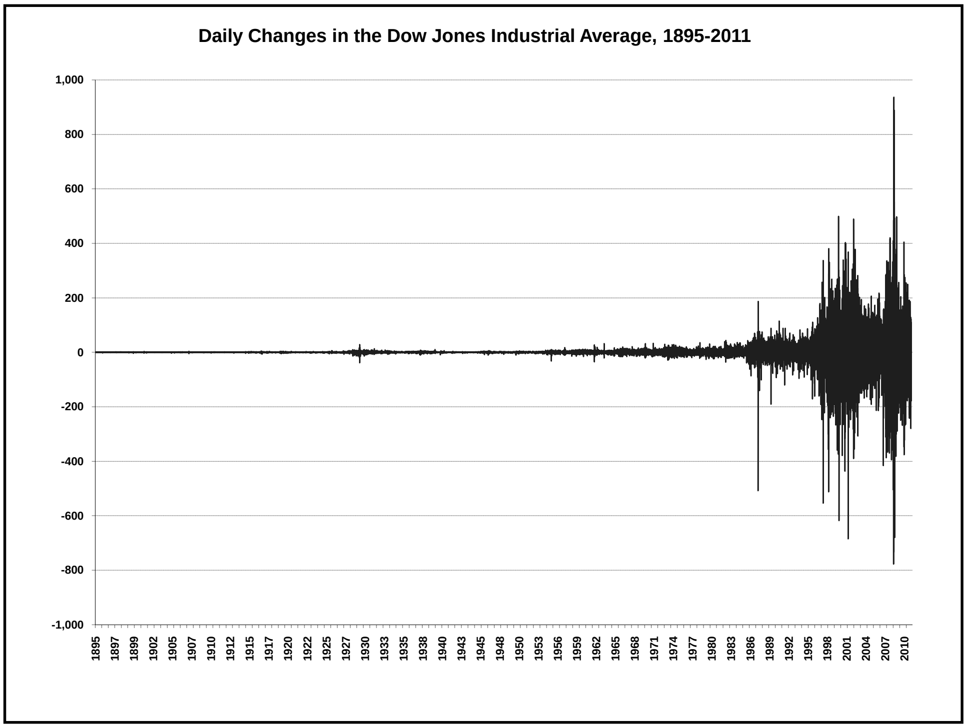
- Standard deviation of rates of return to broad market indexes
  - Following plots show:
    - Changes in DJIA from 1895-2011
      - Affected by growth in the level of the index
    - Percent changes in DJIA (rates of return, ignoring dividends) from 1895-2011
    - Rolling annualized standard deviations of rates of return to DJIA from 1895-2011

Looking at the absolute scale of stock indexes is very misleading . . .

- The sixty largest changes in the DJIA have been within the last 12 years
  - The only exception among these sixty days is 10/19/1987

The Thirty Largest Daily Increases and Decreases in the Dow Jones Industrial Index, 1885-2011 (T=34,804)

		DJIA	Chg	Ret		DJIA	Chg	Ret
1	20080929	10365.45	-777.68	-6.98%	20081013	9387.61	936.42	11.08%
2	20081015	8577.91	-733.08	-7.87%	20081028	9065.12	889.35	10.88%
3	20010917	8920.70	-684.81	-7.13%	20081113	8835.25	552.59	6.67%
4	20081201	8149.09	-679.95	-7.70%	20000316	10630.59	499.18	4.93%
5	20081009	8579.19	-678.91	-7.33%	20090323	7775.86	497.48	6.84%
6	20000414	10305.77	-617.78	-5.66%	20081121	8046.42	494.13	6.54%
7	19971027	7161.15	-554.26	-7.18%	20020724	8191.29	488.95	6.35%
8	20081022	8519.21	-526.00	-5.82%	20080930	10850.66	485.21	4.68%
9	19980831	7539.07	-512.61	-6.37%	20020729	8711.88	447.49	5.41%
10	20081007	9447.11	-508.39	-5.11%	20080318	12392.66	420.41	3.51%
11	**19871019**	**1738.74**	**-508.00**	**-22.61%**	20080311	12156.81	416.66	3.55%
12	20080915	10917.51	-504.48	-4.42%	20081020	9265.43	413.21	4.67%
13	20081105	9139.27	-486.01	-5.05%	20080918	11019.69	410.03	3.86%
14	20080917	10609.66	-449.36	-4.06%	20100510	10785.14	404.71	3.90%
15	20081120	7552.29	-444.99	-5.56%	20010405	9918.05	402.63	4.23%
16	20081106	8695.79	-443.48	-4.85%	20081016	8979.26	401.35	4.68%
17	20010312	10208.25	-436.37	-4.10%	20010418	10615.83	399.10	3.91%
18	20081119	7997.28	-427.47	-5.07%	20081124	8443.39	396.97	4.93%
19	20070227	12216.24	-416.02	-3.29%	20080401	12654.36	391.47	3.19%
20	20081112	8282.66	-411.30	-4.73%	19980908	8020.78	380.48	4.98%
21	20080606	12209.81	-394.64	-3.13%	20090310	6926.49	379.44	5.80%
22	20020719	8019.26	-390.23	-4.64%	20021015	8255.68	378.28	4.80%
23	20070809	13270.68	-387.18	-2.83%	20080919	11388.44	368.75	3.35%
24	20010920	8376.21	-382.92	-4.37%	20010924	8603.86	368.05	4.47%
25	20090210	7888.88	-381.99	-4.62%	20081216	8924.14	359.61	4.20%
26	20001012	10034.58	-379.21	-3.64%	20021001	7938.79	346.86	4.57%
27	20100520	10068.01	-376.36	-3.60%	20010516	11215.92	342.95	3.15%
28	20000307	9796.03	-374.47	-3.68%	20001205	10898.72	338.62	3.21%
29	20080922	11015.69	-372.75	-3.27%	19971028	7498.32	337.17	4.71%
30	20080205	12265.13	-370.03	-2.93%	20070918	13739.39	335.97	2.51%



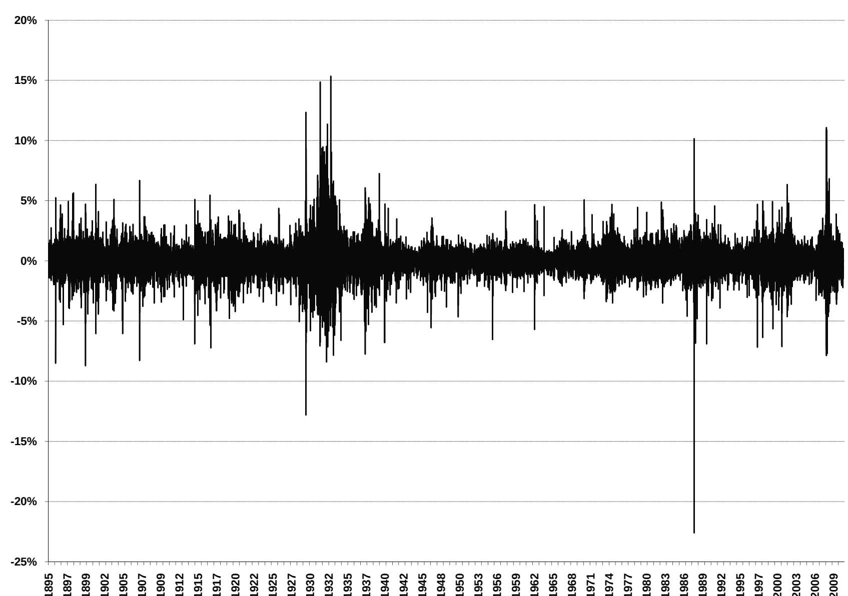
Looking at the percent change of stock indexes is relevant . . .

- This measures the rate of return on the investment
  - i.e., how many more dollars you would have at the end of the day if you invested $100 at the beginning of the day
- The nine of the sixty largest percent changes in the DJIA have occurred between 2008-2010
  - five were positive

The Thirty Largest Daily Percent Increases and Decreases in the Dow Jones Industrial Index, 1885-2011 (T=34,804)

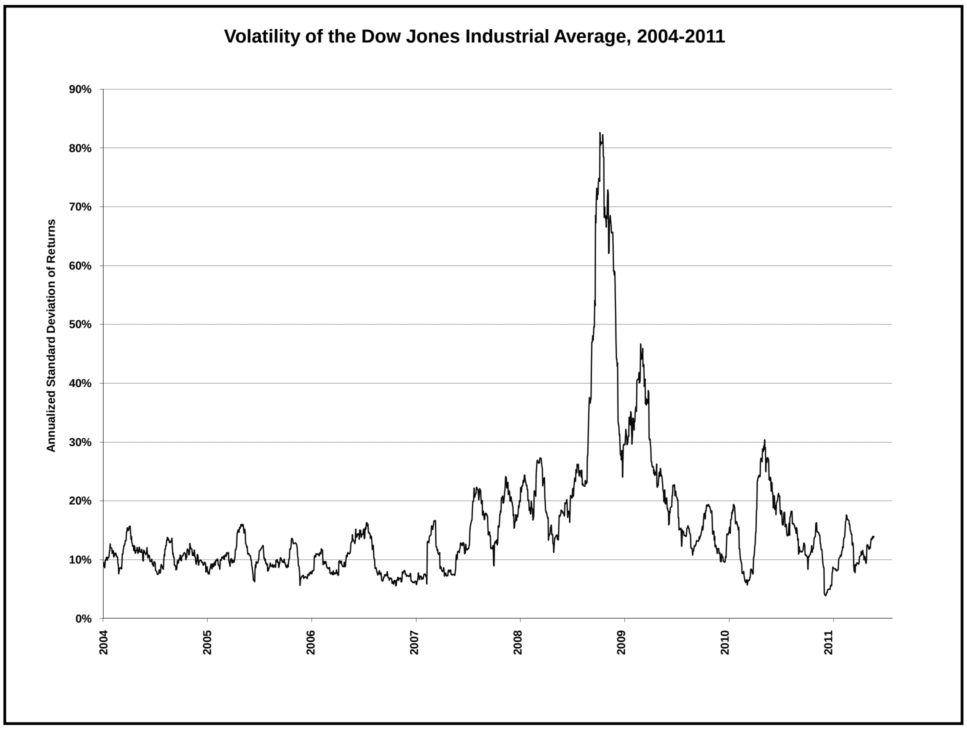
		DJIA	Chg	Ret		DJIA	Chg	Ret
1	19871019	1738.74	-508.00	-22.61%	19330315	62.10	8.26	15.34%
2	19291028	260.64	-38.33	-12.82%	19311006	99.34	12.86	14.87%
3	19291029	230.07	-30.57	-11.73%	19291030	258.47	28.40	12.34%
4	19291106	232.13	-25.55	-9.92%	19320921	75.16	7.67	11.36%
5	18991218	42.69	-4.08	-8.72%	**20081013**	**9387.61**	**936.42**	**11.08%**
6	18951220	28.77	-2.68	-8.51%	**20081028**	**9065.12**	**889.35**	**10.88%**
7	19320812	63.11	-5.79	-8.40%	19871021	2027.85	186.84	10.15%
8	19070314	55.84	-5.05	-8.29%	19320803	58.22	5.06	9.52%
9	19871026	1793.93	-156.83	-8.04%	19320211	78.60	6.80	9.47%
10	**20081015**	**8577.91**	**-733.08**	**-7.87%**	19291114	217.28	18.59	9.36%
11	19330721	88.71	-7.55	-7.84%	19311218	80.69	6.90	9.35%
12	19371018	125.73	-10.57	-7.75%	19320213	85.82	7.22	9.19%
13	**20081201**	**8149.09**	**-679.95**	**-7.70%**	19320506	59.01	4.91	9.08%
14	18930726	24.76	-1.98	-7.39%	19330419	68.31	5.66	9.03%
15	**20081009**	**8579.19**	**-678.91**	**-7.33%**	19311008	105.79	8.47	8.70%
16	19170201	88.52	-6.91	-7.24%	19320610	48.94	3.62	7.99%
17	19971027	7161.15	-554.26	-7.18%	19390905	148.12	10.03	7.26%
18	19321005	66.07	-5.09	-7.15%	19310603	130.37	8.67	7.12%
19	20010917	8920.70	-684.81	-7.13%	19320106	76.31	5.07	7.12%
20	19310924	107.79	-8.20	-7.07%	**20090323**	**7775.86**	**497.48**	**6.84%**
21	19330720	96.26	-7.32	-7.07%	19321014	63.84	4.08	6.83%
22	**20080929**	**10365.45**	**-777.68**	**-6.98%**	19070315	59.58	3.74	6.69%
23	19140730	52.32	-3.88	-6.91%	**20081113**	**8835.25**	**552.59**	**6.67%**
24	19891013	2569.26	-190.58	-6.91%	19310620	138.96	8.65	6.64%
25	19880108	1911.31	-140.58	-6.85%	19330724	94.28	5.86	6.63%
26	19291111	220.39	-16.14	-6.82%	18930727	26.40	1.64	6.63%
27	19400514	128.27	-9.36	-6.80%	**20081121**	**8046.42**	**494.13**	**6.54%**
28	19311005	86.48	-6.29	-6.78%	18930802	27.85	1.71	6.54%
29	19400521	114.13	-8.30	-6.78%	19330619	95.99	5.76	6.38%
30	19340726	85.51	-6.06	-6.62%	19010510	52.50	3.14	6.37%

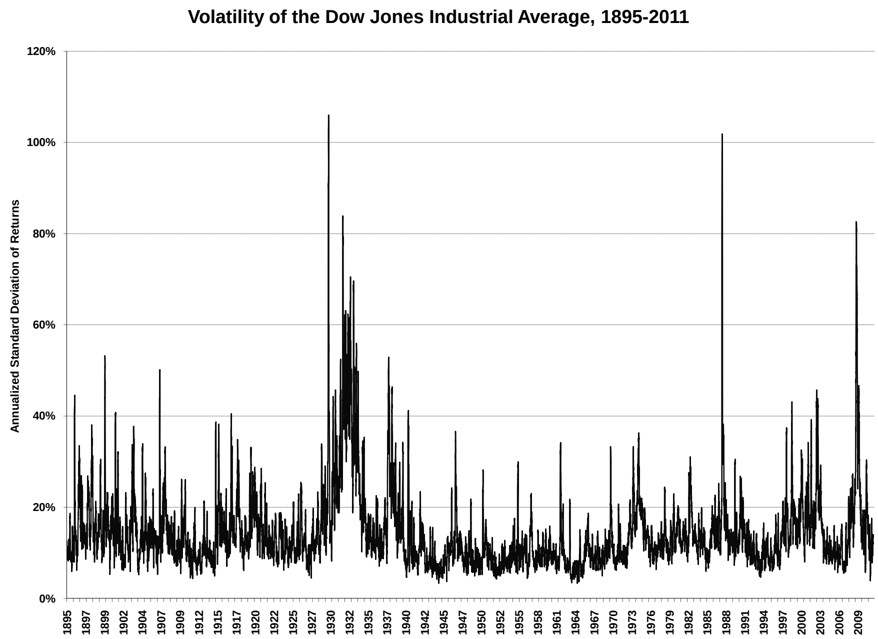
Daily Returns to the Dow Jones Industrial Average, 1895-2011



How to lie with statistics . . .
- focus on very recent history

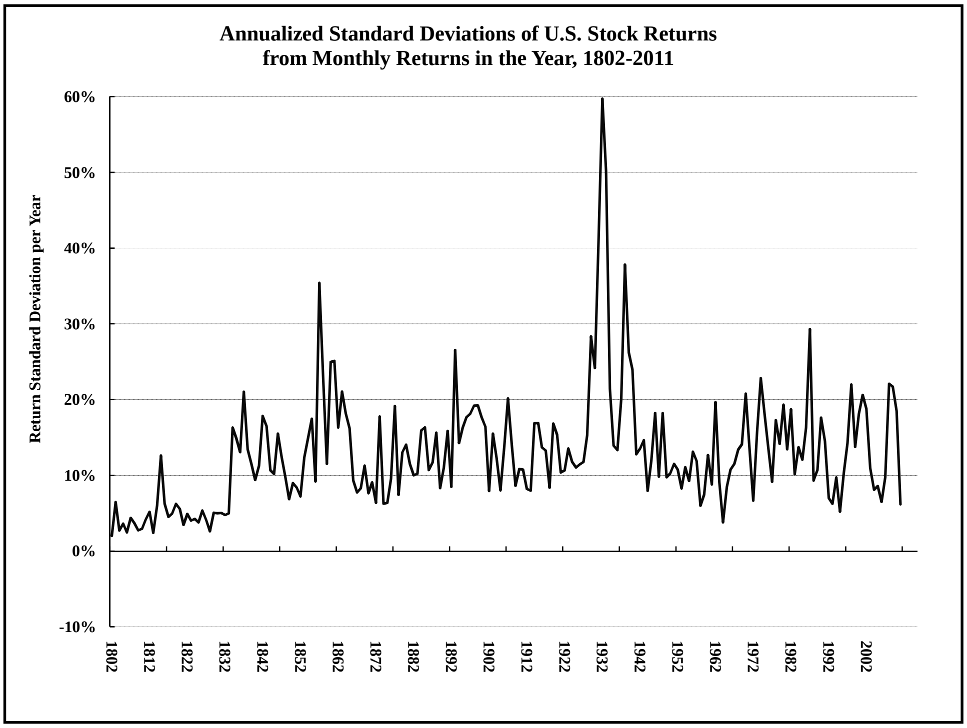
- Newspapers often focus on the last few years in discussing current conditions
  - On this basis, people would think stock volatility is unbelievably high in the past year or so . . .
  - This is misleading when viewed from the perspective on the longer history we have available to us
  - Compare the plots of rolling standard deviations from 2004-2011 versus the plot from 1895-2011 . . .
  - Good news is that things seem to have settled down a bit now (compared to 3 years ago)





Stylized Facts/Questions: A very long-term view!

- Market-level volatility has been remarkably stable over time
  - Data back to 1802, covers many wars, financial crises, depressions/recessions
  - Also, major changes in the composition of the US economy
    - Mainly banks, insurance companies, canals in early 1800s
    - Railroads started being important after 1834
    - Great Depression is the most notable period of prolonged high volatility

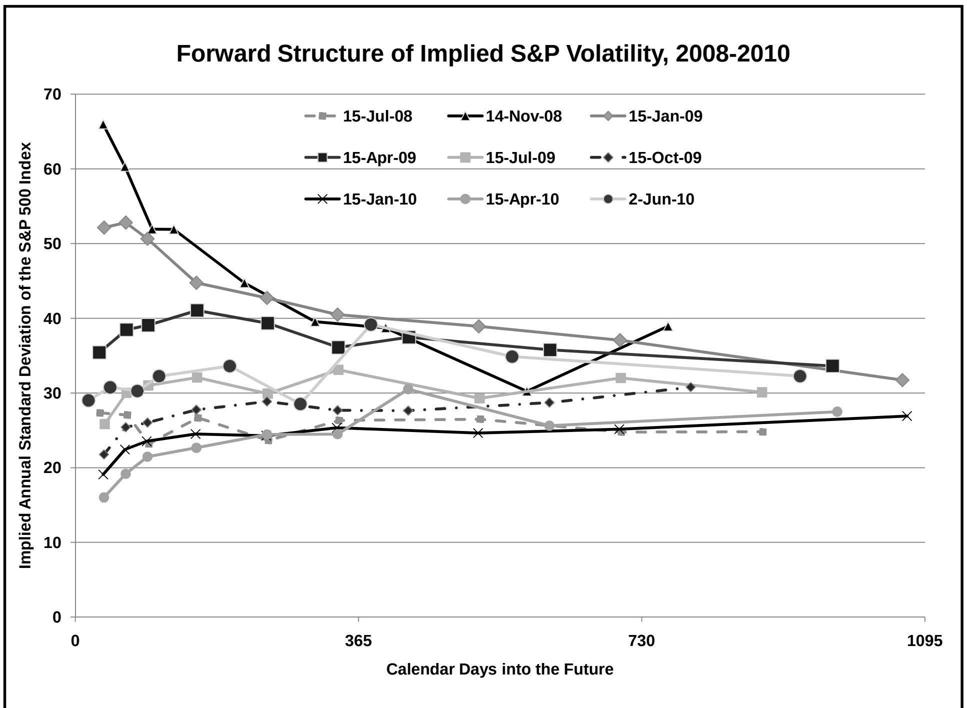


Forecasting volatility: Important because of recent high volatility

- Derivatives give us tools
  - CBOE reports implied volatility for S&P 500 options (VIX) for several maturities
  - They have also started trading futures contracts on implied volatility

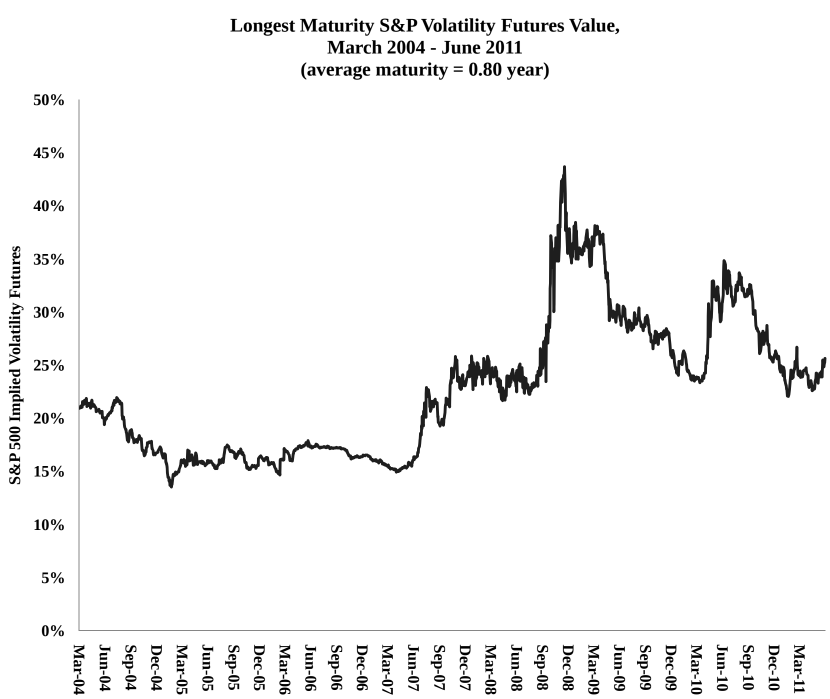
Term structure of implied volatility: Things will settle down . . .

- Looking at the term structures from 2000-2010, they were pretty flat (i.e., similar forecasts for all horizons) until October 2008
- The big spikes in volatility in Fall 2008 led to a sharply declining forecast of future volatility
- Things are now back to more normal patterns



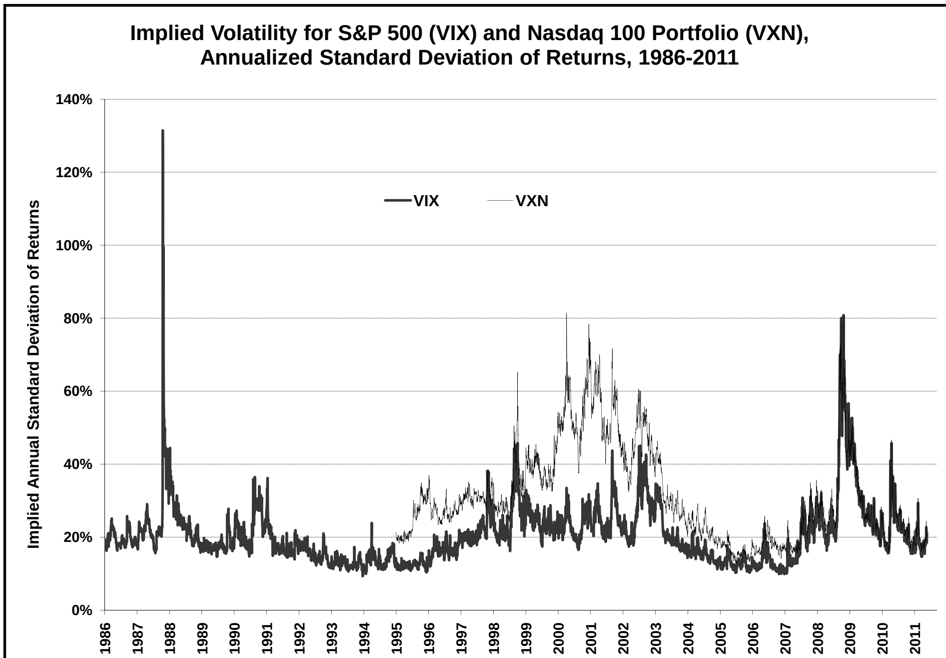
The CBOE now trades a futures contract on VIX

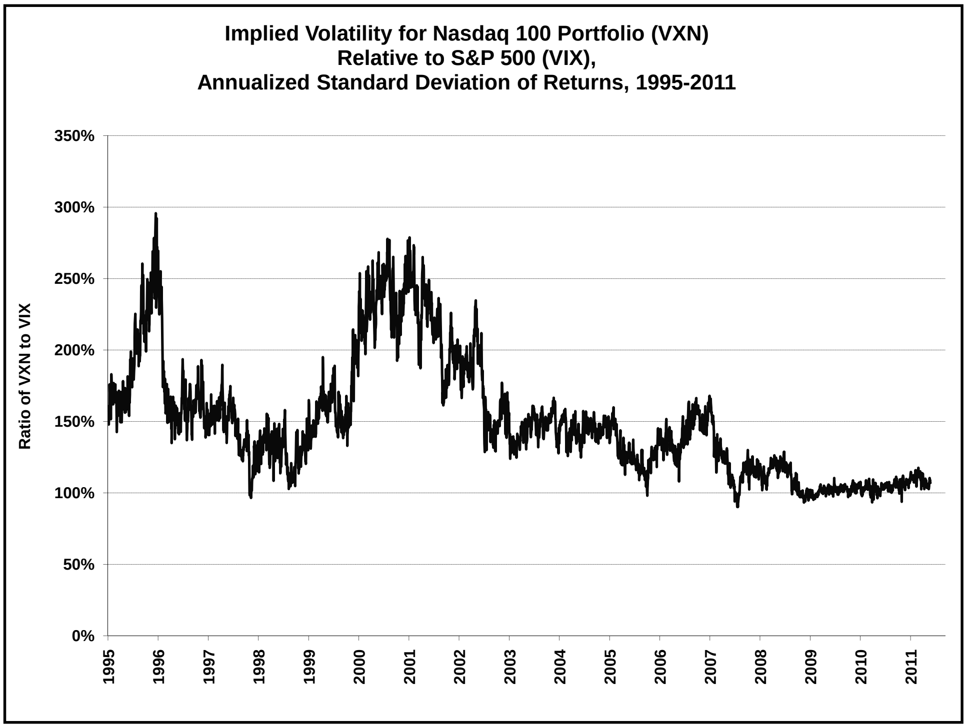
- Looking at the longest future maturity (typically about 9-10 months)
  - Futures value of VIX peaks at 43% in mid-December 2008, and now has returned to around 25%
  - Even at the worst of the liquidity crisis, traders were not expecting the spike in volatility to last long or be as bad as it was briefly in the Fall of 2008



Sometimes Sectors Drive Market Volatility: Technology in 2000-2002

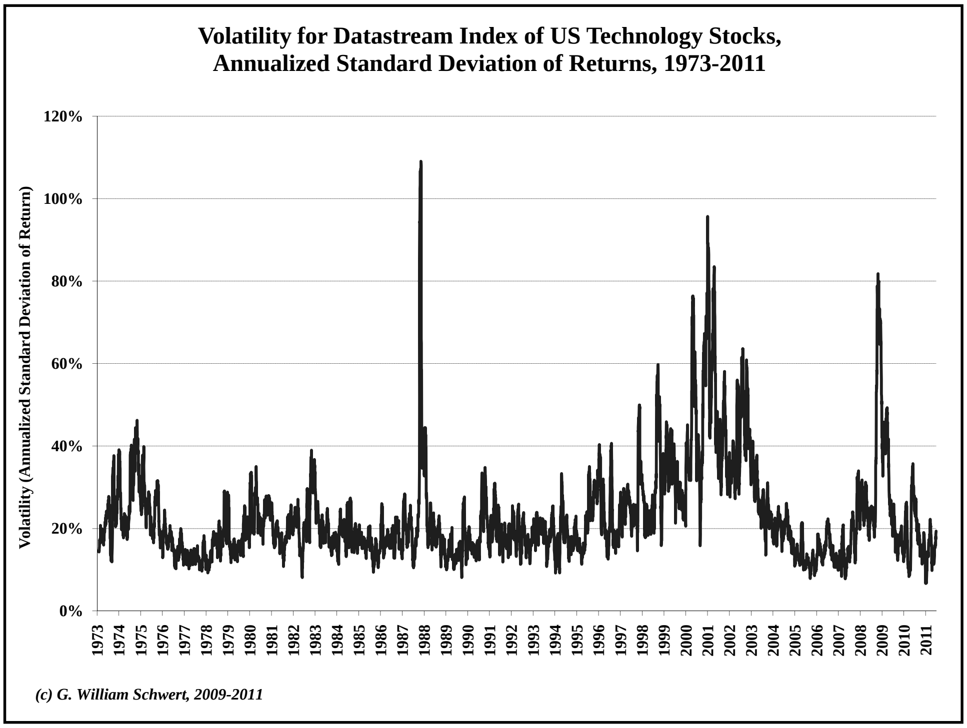
- Next figure shows the implied volatility series published by CBOE with ticker symbols VIX (S&P) and VXN (Nasdaq)
  - VXN is much higher, especially in 1998-2002; similar since mid-2007





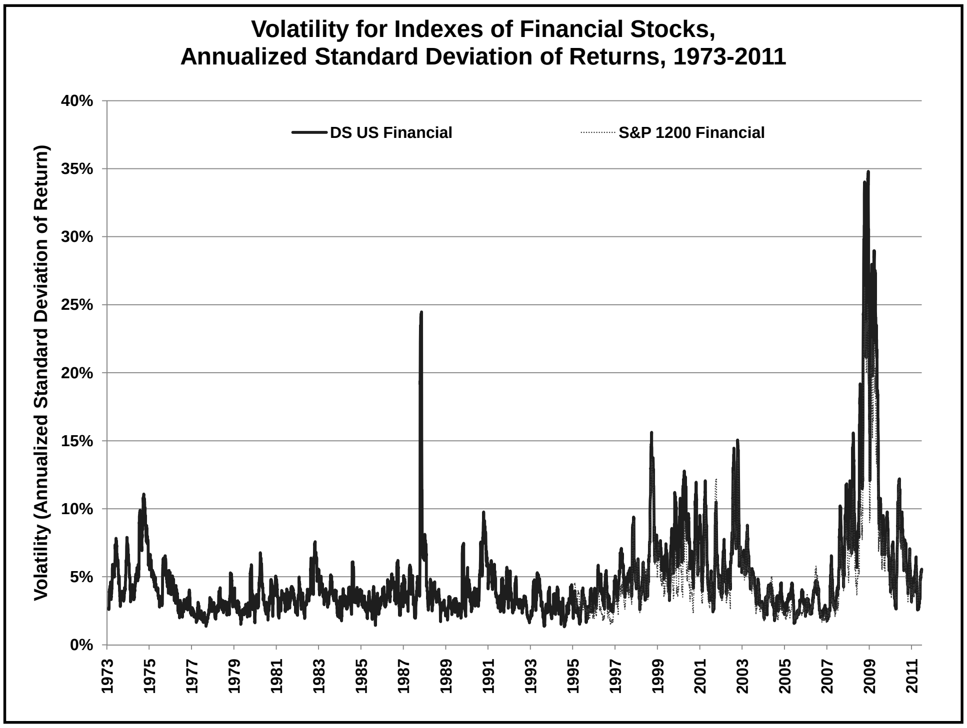
Actual Volatility of Technology Stocks

- Next figure shows historical volatility for:
  - the Datastream US Technology portfolio, since 1973
    - The "DOT.COM" period from 1998-2002 was a period of very high volatility
    - Not just internet and computer stocks, biotech too
    - Increased substantially in 2008-2009, but not like financial stocks



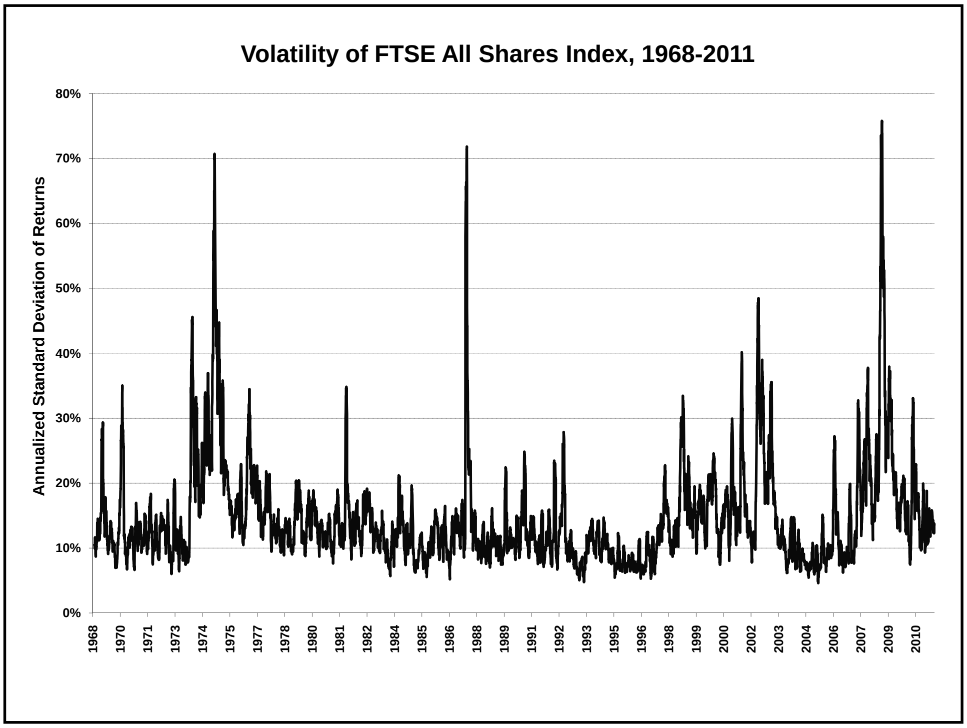
Was the 2008 Credit Crisis a Finance "Bubble"?

- Next figure shows historical volatility for:
  - the S&P 1200 Financial portfolio, and the Datastream US Financial portfolio, since 1973
    - They all move together, increasing modestly during the Technology "bubble" from 1998-2002
    - Increased substantially in 2008-2009 during the liquidity crisis



International Volatility

- Following figures show historical volatility for:
  - FTSE All Shares Index in London since 1968
  - the Nikkei 225 and Topix Indexes in Japan, since 1950
    - They all move together, increasing modestly during the Technology “bubble” from 1998-2002
    - Increased substantially in 2008-2009 during the liquidity crisis


Volatility of FTSE All Shares Index, 1968-2011
Annualized Standard Deviation of Returns
80%
70%
60%
50%
40%
30%
20%
10%
0%
1968
1970
1971
1973
1974
1975
1977
1978
1980
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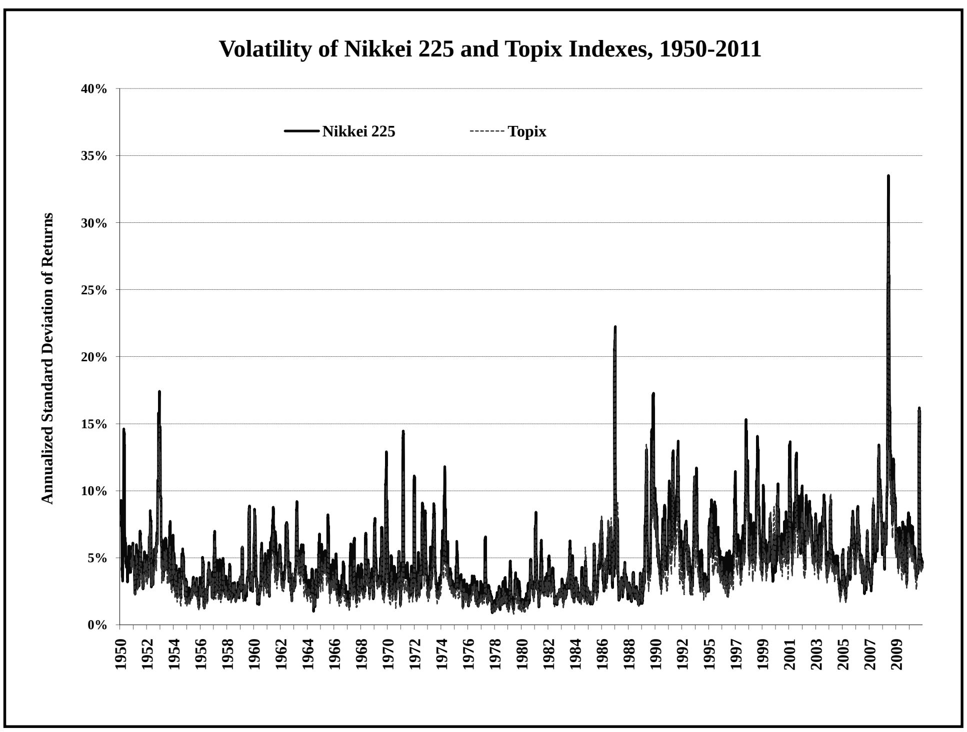
Volatility of Nikkei 225 and Topix Indexes, 1950-2011
Nikkei 225
Topix
Annualized Standard Deviation of Returns
40%
35%
30%
25%
20%
15%
10%
5%
0%
1950
1952
1954
1956
1958
1960
1962
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1966
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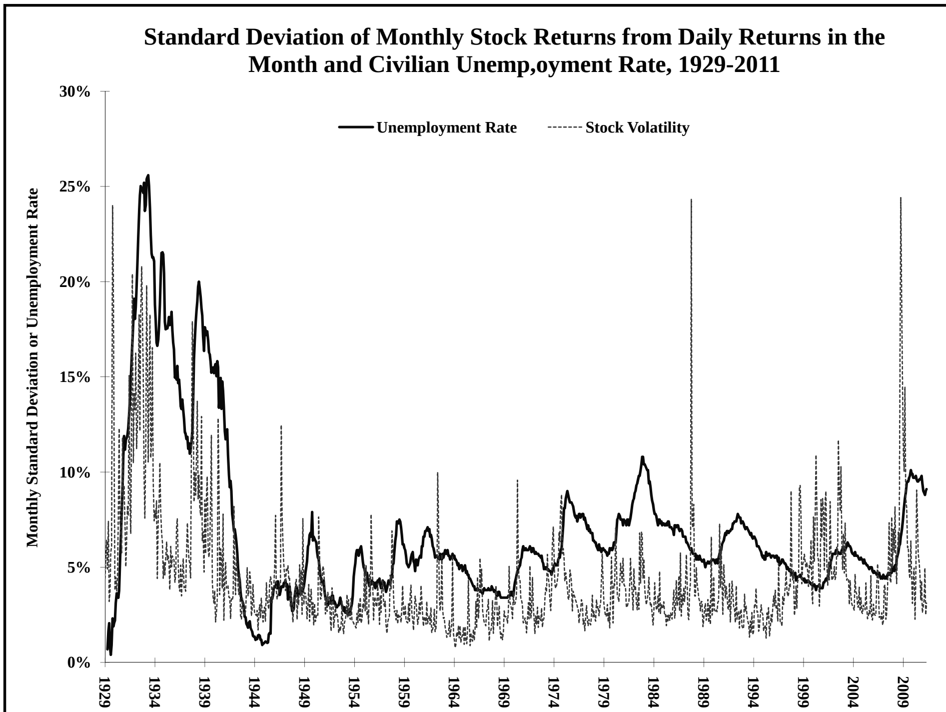
2007
2009

Links to Real Economic Activity: The Unemployment Rate

- During the Great Depression, the unemployment rate and stock volatility moved closely together
- Not true since that time
- While Candidate/President Obama's statement alluding to the Great Depression was accurate for stock volatility, it is far off for the unemployment rate
  - Unemployment since 2008 has **not** been greater than it was from Sept-82 through June-83



Summary

- Market-level volatility often rises after prices fall
  - Recent poor performance of the market is consistent with the higher levels of volatility [counter-cyclical]
  - Inflation of index levels exaggerate perceptions of increased volatility

Summary

- Because volatility is easy to see in real time, it has become a major focus of the news media and politicians
  - and, therefore, of main street America
- For most people, who should be buy-and-hold long-term investors, short-term burst of volatility should not be a cause of concern

Summary

- Structural problems in the economy often cause companies, employees, and politicians to blame “Wall Street”
- In an internationally competitive world, high-paying (unionized) manufacturing jobs for relatively low-skilled workers are going to continue to disappear in the US

Summary

- Similarly, perhaps well-intentioned efforts to extend home ownership to people who would not traditionally qualify for mortgage loans led to risk-taking in real estate markets that was either ignored or not well-understood

Summary

- Until market forces are allowed to set competitive wage rates in industries and market-clearing prices for housing, the stories about unemployment in states with expensive unionized labor and still over-priced houses will continue
  - Government programs to delay these adjustments just prolong the pain . . .