
UNIVERSITA' DEGLI STUDI DI SIENA



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Applying Behavioral Finance to Investing

RELATORE

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Behavioral Finance: from theory to practice.

Behavioral Funds

Literature on Behavioral Funds Performance

- [“Behavioral Portfolios: Performance Measurement”](#) by Reinhart and Brennan (2003)
- In [“Behavioral Finance: Are the Disciples Profiting from the Doctrine?”](#) (2006) Colbrin Wright, Vaneesha Boney, Prithviraj Banerjee analyzed 16 behavioral funds to determine whether they successfully attract investment dollars and earn abnormal returns.

Funds analyzed

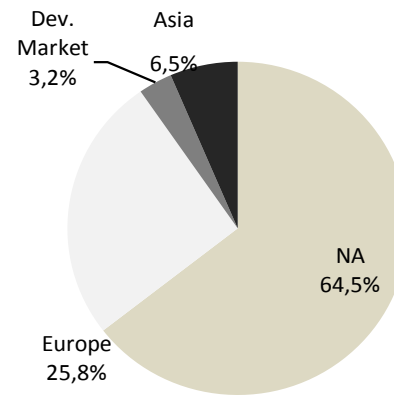
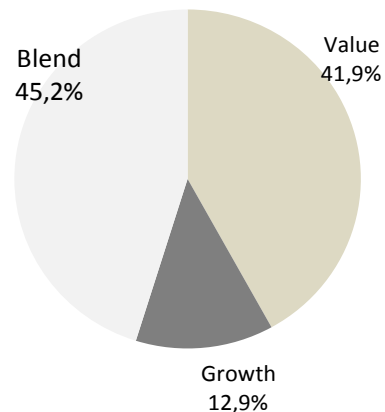
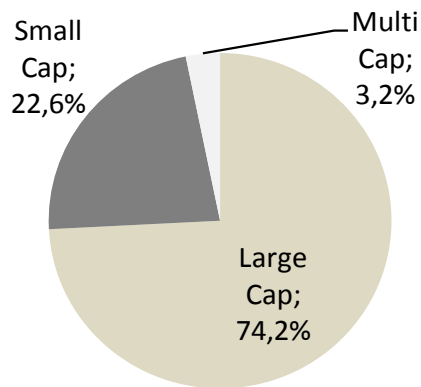
Major topics analyzed

	Reinhart	Wright	Santoni	Fund name		Reinhart	Wright	Santoni
1	KDHAX	KDHAX	KDHAX	DWS STRATEGIC VALUE FUND-A	Capacity to attract money inflow			
2	KDSAX	KDSAX	KDSAX	DWS DREMAN S/C VALUE FND-A				
3	LSVEX	LSVEX	LSVEX	LSV VALUE EQUITY FUND				
4	JPIVX	JPIVX	JPIVX	JPMORGAN INTREPID VALUE-SEL	Capacity to outperform peers and benchmark		√	
5	JPIAX	JPIAX	JPIAX	JPMORGAN INTREPID AMERICA-S				
6	JPGSX	JPGSX	JPGSX	JPMORGAN INTREPID GROWTH-SE	Risk adjusted analysis			
7	JISX	JISX	JISX	JPMORGAN INTREPID MULTI C-SE		√	√	√
8	UBRLX	UBRLX	UBRLX	UNDISCOVERED MGRS BEHV GR-IN				
9	UBVLX	UBVLX	UBVLX	UNDISCOVERED MGRS BEHV VL-IN	Style analysis	√	√	
10		LOPEX	LOPEX	DWS DREMAN CONCENT VALUE-A				
11		WOOPX	WOOPX	JPMORGAN INTREPID M/C-SEL	Seasonality effect			
12		LMVTX	LMVTX	LEGG MASON VALUE TRUST-C				
13		NLCIX	NLCIX	NICHOLAS APP US SYS L/C G-I				
14		SSLAX	SSLAX	SUNAMERICA FOCUSED L/C VAL-A	Bull vs Bear markets			
15		KDFAX	UBGAX	UNDISCOVERED MGRS BEHV GR-A				
16		NASSX	LSVPX	LSV CONSERVATIVE CORE EQUITY	Diversification			
17			LSVVX	LSV CONSERVATIVE VALUE EQUIT				
18			OSI9180	DEGROOF-EQ EMU BEHAV VL-BENA				
19			DEGEMUA	DEGROOF-EQ EMU BEHAVIOR FL-A	Consistency			
20			DEEMUBV	DEGROOF DBI-RDT- EMU BEHAV-D				
21			DEGEUFA	DEGROOF-EQ EUR BEHAV FLEX-A	Anticipate reversal			
22			DEGSUSA	DEGROOF-EQ EUR BEHAV SUST-A				
23			DEGUSBA	DEGROOF-EQ US BEHAV FLEX-A				
24			JCJBFAA	JPM CORE JAPAN BEH FIN A ACC	Anticipate reversal			
25			JPMJBAA	JPM INV-JAP BEHAVIOR F E-A€A				
26			ESPRITE	DEGROOF EQ EUROPE BEHAV VL-B				
27			ESPESCA	DEGROOF EQ SM CP EURP BV-BC				
28			OSIBEPR	DEGROOF-EQUITIES EMU BEHV-A				
29			OSEUSBV	DEGROOF-EQUITIES US-BENELX A				
30			LGTEQGS	LGT EQ FD GL SEC TRND USD-B				
31			HIEZX	VIRTUS VALUE EQUITY FUND				

Behavioral Funds Analyzed

- In the research I considered **31 funds** that claims to apply behavioral finance in their portfolio strategy with total cumulative **asset under management of \$16 billion.**
- In particular these funds are part of the Fuller & Thaler funds family, the JPMorgan AM funds, the Bank Degroff funds, LVS funds, Osiris funds, LGT funds.
- I analyzed their performance **from inception to 18th August 2009.**

Characteristics Funds analyzed



Behavioral Bias

- Analyst and Investors (A&I) are slow to recognize new information related to earnings surprises;
- A&I behave overconfidently to their prior view;
- A&I underweight evidence that disconfirms their prior views and overweight confirming evidence;
- A&I tend to interpret a permanent change as a temporary one.

The two main bias at the base of Behavioral Funds theory are overconfidence and anchoring. As such. For example BF explains that by buying a stock soon after a major positive earnings surprise could pay back in a significant way.

Strategy adopted to exploit market anomalies

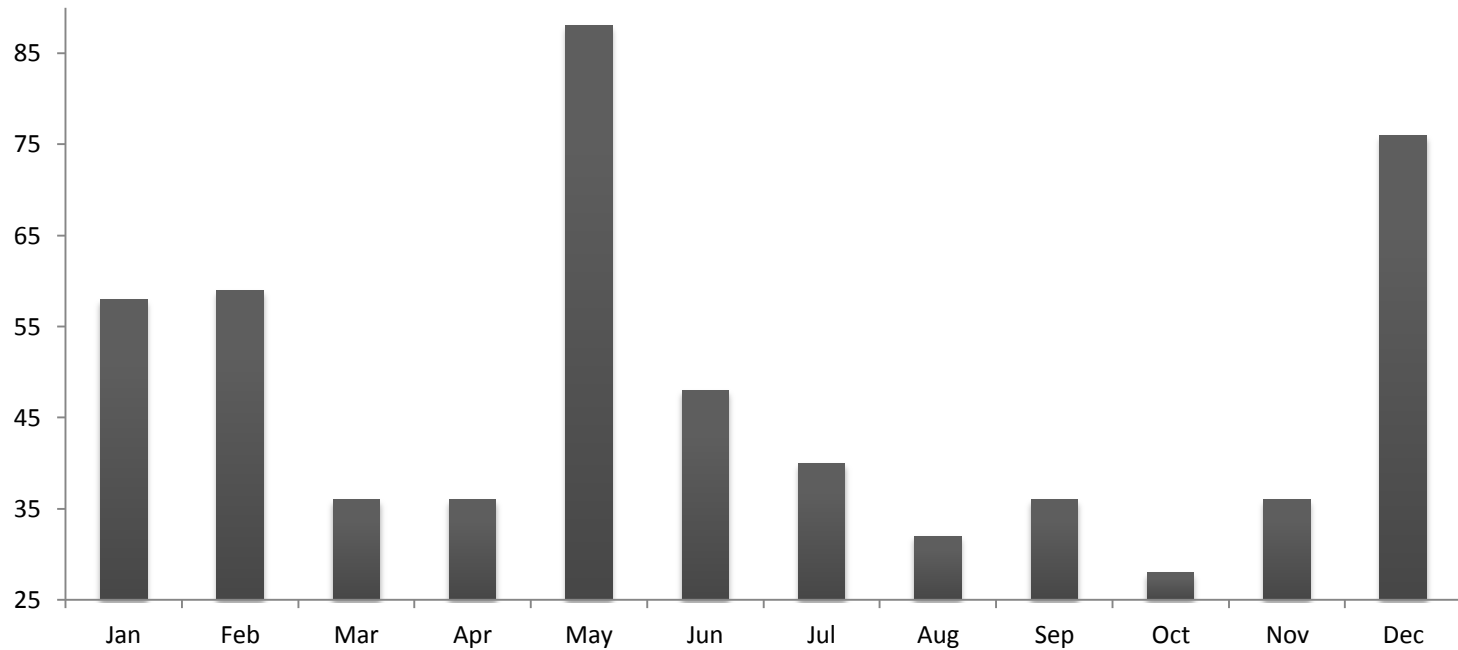
- They seek in particular to exploit the **winner-loser effect** (Behavioral Value Fund) and **post earnings announcement drift** (Behavioral Growth Fund). In particular they use large earnings surprises as a primary catalyst. The second stage of the strategy is to attempt to identify whether large earnings surprises are driven by company-specific factors.
- Another interesting characteristic of the F&T portfolio strategy is that they **do not use any target price to identify a potential exit point while they adopt a stop loss mechanism**. The idea behind this strategy is to avoid the prospect theory trap where basically investors tend to sell too early on the upside while they sell too late on the downside.
- JPMorgan Behavioral Funds identified also **insider buying** as main behavioral indicators.
- LSV AM managed by Lakonishok and two other academics specialized in behavioral finance as Andrei Shleifer of Harvard and Robert Vishny of the University of Chicago highlighted that at the heart of their strategy there is a simple receipt: "***We search for companies that have had poor performance and have disappointed investors in the past***"

Main Findings (1/3)

- There is **no clear evidence of overperformance of behavioral funds** versus the relative indexes. Over a long period. On the 5 year performance only 47% of the funds beat the benchmark. On a shorter horizon (2009) the funds improved their performances versus the benchmark with 57% of them managing to beat it.
- As regarding volatility, 60% of the funds analyzed reported a **lower volatility** versus the relative benchmark as we would expect from a behavioral funds of which majority are invested in value/blend stocks.
- I found a **very interesting seasonality effect** on the funds performances. The first finding was that, in the past 5 years, in 88% of the case the average cumulative performances of behavioral funds in the month of May tend to outperform its benchmark and it happens the same for 76% of the cases during the month of December and 56% in January. On the opposite side August and October are the three worst months with only 32% and 28% respectively average outperformance. It is interesting to note that in 8 months out of 12 on average behavioral funds tend to underperform its benchmark.

Main Findings (1/3): Seasonality

% Funds outperforming benchmark (monthly analysis 2005-2009)



Main Findings (2/3)

- I analyzed the performance of the funds during bear and bull cycles in the past 20 years. I analyzed three negative cycles in the past 20 years. August 1998, with the Dow Jones collapsing 15%, the period April 2002 till October 2002 (-27%) and finally the period August 2007 till March 2009 (-47%). I found out that on average the **behavioral funds are not particularly good in beating the market during “bear” market period** and in two cases of three the performance was poor.
- I analyzed also the performance during bull market periods. The first period analyzed goes from September 1998 to May 2001 when the Dow Jones Industrial index increased by 44%, then February 2003 to July 2007 (+69%) and February 2009 to August 2009 (+29%). **In periods of “bull” markets we found out that behavioral funds tend to do better** than bear markets with behavioral fund managing to beat the benchmark in majority of the cases.

Main Findings (3/3)

- In order to check the last hypothesis of the previous point 8) I verified of the **consistency of performance of specific funds** versus the benchmark in the three bull market period. I found **very limited correlation** with only 1 funds able to outperform in all the three period and 30% able to outperform in two out of three period. This means that one of the possible explanation of the negative performance due to the entrance of non expect is not plausible.
- Another aspect I analyzed was the capacity of the behavioral funds to predict reversal in the 6 cycles analyzed during the past 20 years . In our study I concentrated on a short period (2 months after a bear/bull trend start) trying to verify the ability of the behavioral funds to anticipate the reversal of the trend. I found out that behavioral funds have the capacity in the first two months of bear market (in 2002 and 2007) to behave better than during the entire bear market considered. An interesting aspect is that exactly the opposite happens during periods of bull market when behavioral funds needs more time to capture the reversal. Overall I would say that the **capacity of behavioral funds to anticipate reversal is difficult to support.**

Traders, cognitive heuristic and intraday anomalies

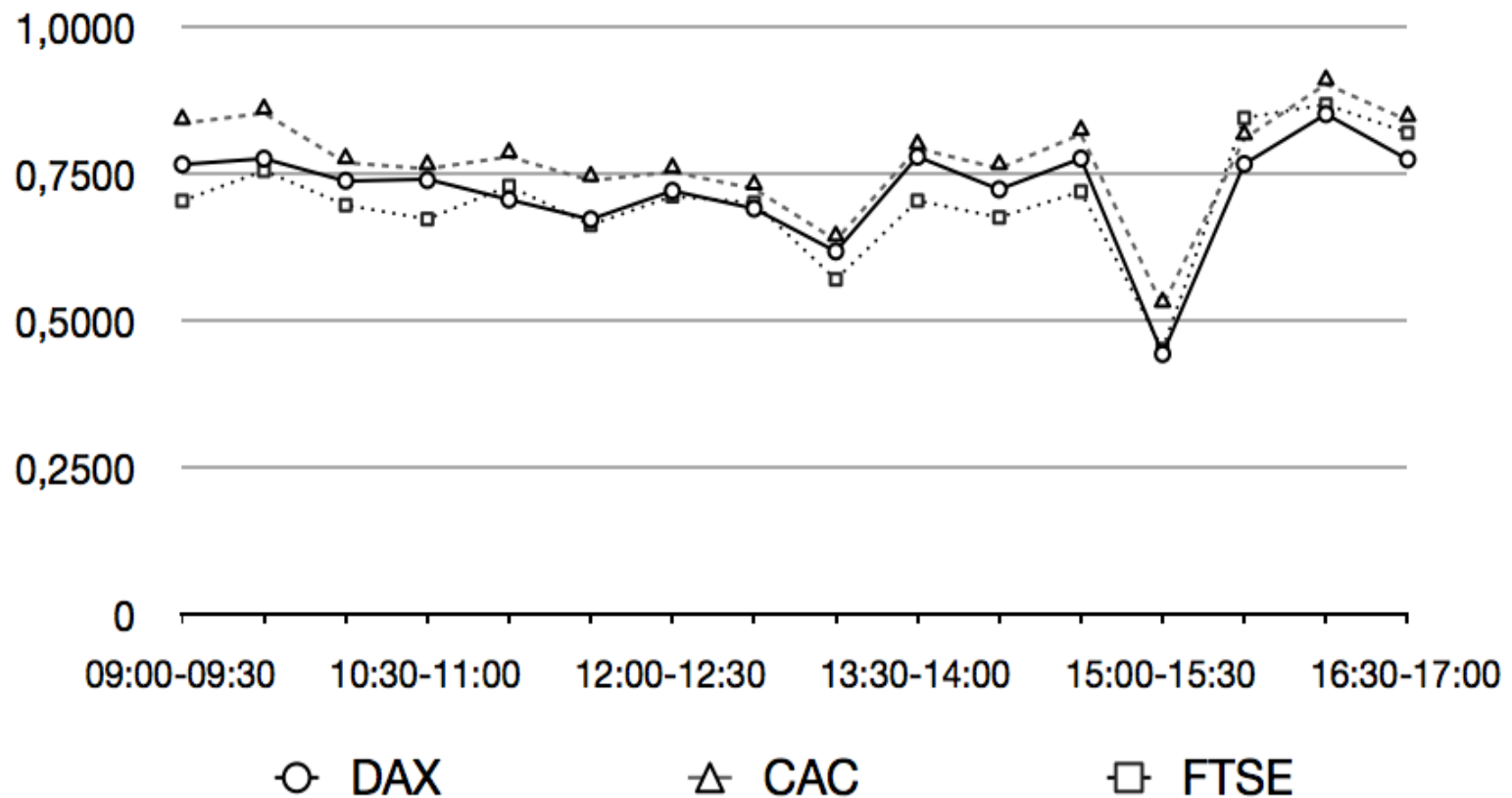
Future vs Index

- The relationship between the price series of futures and stock markets is one of the most widely researched topics in finance. The reason is that **futures contracts can provide a sentiment indicator to predict and adjust prices of stocks.**
- There is evidence in literature that price dynamics is such that **arbitrage opportunities on futures and stock markets are uncommon.** However, there is also wide consensus that the **realignment of prices** in the two **markets is not instantaneous** and that stock indexes follows the corresponding future indexes with a time lag ranging from five minutes (Stool-Whaley 1990) to forty-five minutes (Kawaller et al. 1987).
- The growth of online trading and the globalization of financial markets should most probably shorten this lag. These factors also accelerate the integration between US and European financial markets. The continuous release of information and the nonstop trading activity are two powerful forces leading in this direction.

The data

- The statistical analysis used intraday, minute by minute, prices of S&P 500 nearest futures (SPH0) and of CAC, DAX and FTSE indexes. Data are referring to two periods: from February 1, 2010 to March 11, 2010 (i.e. 30 trading days) and from March 29, 2010 to April 30, 2010 (i.e. 25 trading days).
- The S&P 500 index Futures is one of the most widely traded index futures contracts in the United States.
- The CAC 40 is a [market value-weighted index](#), which represents a capitalization-weighted measure of the forty most significant values among the one hundred highest [market caps](#) on the Paris Bourse (now Euronext Paris).
- The DAX, with a market capitalization of 656 billion euro, is a [blue chip stock market index](#) consisting of the thirty major [German](#) companies trading on the [Frankfurt Stock Exchange](#).
- The FTSE 100 Index — also called FTSE 100, FTSE, or, informally, the "footsie" — is a [share index](#) of the one hundred most highly [capitalized](#) UK [companies](#) listed on the [London Stock Exchange](#).

Correlation between S&P Futures and the DAX, CAC, FTSE: 30-Minute Intervals (January–June 2010)



Correlation between S&P Futures and the DAX, CAC, FTSE: 30-Minute Intervals (January–June 2010)

Time Period (CET time)	DAX	CAC	FTSE
09:00-09:30	76.68%	83.66%	70.49%
09:30-10:00	77.67%	85.42%	75.62%
10:00-10:30	73.91%	76.99%	69.76%
10:30-11:00	74.01%	75.94%	67.38%
11:00-11:30	70.69%	77.99%	73.02%
11:30-12:00	67.34%	73.95%	66.38%
12:00-12:30	72.19%	75.39%	71.27%
12:30-13:00	69.17%	72.56%	70.17%
13:00-13:30	61.88%	63.79%	57.11%
13:30-14:00	78%	79.42%	70.52%
14:00-14:30	72.43%	75.98%	67.67%
14:30-15:00	77.69%	81.82%	72.08%
15:00-15:30	44.41%	52.54%	45.23%
15:30-16:00	76.75%	81.07%	84.59%
16:00-16:30	85.25%	90.36%	86.9%
16:30-17:00	77.54%	84.2%	82.06%

The first fall is interpreted as derived from the flows of news coming from U.S. Usually U.S. corporate reports results and news at 6:00 am U.S. time (13:00 CET).



The second drop is attributed to the timing hole when U.S. futures contracts have no trading platform where to trade.



Average Volumes for S&P Futures: 30-Minute Intervals (September 2010)

Time Period (CET)	Volumes (Average Values)
09:00–09:30	71.43
09:30–10:00	57.23
10:00–10:30	49.27
10:30–11:00	54.30
11:00–11:30	43.43
11:30–12:00	51.73
12:00–12:30	28.77
12:30–13:00	39.80
13:00–13:30	38.70
13:30–14:00	50.97
14:00–14:30	110.00
14:30–15:00	86.43

On average, the highest volumes are traded in the opening phases of the market and gradually decrease to reach the lowest values in the mid of the day. Later, from 13:30-14:00 onward, there is a strong speed up.

This evidence supports the hypothesis that US futures and European stocks markets react differently to the release of U.S. new information. In US markets, as argued by Admati-Pfleiderer (1988) and Chae (2005), trading volumes decrease prior to the scheduled announcements.

Cognitive Heuristic

- Professional financial traders are overwhelmed with information and extracting relevant information is a long and hard task, while trading decisions require immediate actions.
- Professional traders, who have acquired expertise in their activity, integrate information and make critical decisions by instinct, which is a highly automatized skill.
- Their brain integrates unconsciously a huge amount of information from the stock market and from external sources, especially when they operate at a time frame that is intraday.
- Overconfidence is considered a key personality trait of financial traders. DeBondt and Thaler (1995) argue that “perhaps the most robust finding in the psychology of judgment is that people are overconfident”. In terms of information collecting, overconfident subjects do not process exhaustively all the available information but use rules of thumb to determine which pieces of information deserve to be processed.

Main Findings (1/2)

- There is a strong correlation between futures and indexes throughout the day, especially in the opening and closing of the EU markets. CAC index is the most strongly correlated with the futures, and then we have DAX and FTSE.
- There is a correlation fall between 13:00 and 13:30 and another remarkable fall between 15:00 and 15:30.
- The strength of futures-indexes correlation decreases and weakens in 10 minutes.

Main Findings (2/2)

- The paper provides, at my knowledge, for the first time evidence on a different source of profitable arbitrage, which depends on the imperfect international integration of financial markets.
- I found confirmation of the well established strong correlation between futures and stock indexes throughout the day, especially in the opening and closing of the European markets.
- My novel result is that the correlation falls quickly and remarkably between 13:00 and 13:30 and between 15:00 and 15:30 (CET), while it reaches its peak between 16:00 and 16:30. The first fall is interpreted as derived from the pre-release of news coming from U.S.
- Both findings indicate that the disclosing of information from U.S. is not efficiently processed by European markets.

**Rating agency: market discipline, predictive power
and information value.**

Retail customers and use of financial information

Rating agency, Retail customers and information processing

- The objective of our analysis was 1) to check the ability of rating agency to signal US banking failure 2) cognitive failure of retail customer to utilize this information
- I checked the time of the first downgrade to E (lowest rating) of the 116 Banks failed in USA in 2009. The analysis is made on a quarters and on a full year.
- The study shows that above 72% of U.S. banks failed in the 2009 downgraded to E 4 quarters prior to failure while 94% of U.S banks failed in the 2009 downgraded to E 2 quarters prior to failure
- The analysis highlights as the rating agencies in the 2009 perceived and signaled to banking market the risk of U.S.A. banks and the probability of their bankruptcy.
- Customer deposits did not react promptly to rating changes and the signals provided by the rating agency.


Ratings


Rating	Description
A+ and A	An institution that has an exceptional financial condition, little or no nonperforming assets, and is highly capitalized with strong earnings. These grades represent the highest level of financial soundness.
B+	An institution with an overall strong financial condition, but not as strong as A+ and A rated companies. The company is most likely to meet its credit obligations under severe economic, financial and business conditions.
B	An institution with an adequate financial condition that is likely to meet its credit obligations under severe economic, financial and business conditions.
B- and C+	An institution with an adequate financial condition but is more susceptible to adverse changes in economic conditions that could affect its ability to meet its credit obligations. Lowest investment grade rating.
C and C-	An institution whose financial condition is judged to be relatively weak and its ability to meet financial obligations could be affected by adverse economic, financial or business conditions. Non-investment grade.
D and E	Institutions are likely to have financial problems (poor LACE Financial ratios). Careful consideration should be made about investments in these institutions. These institutions are likely to have a higher probability of failure than institutions with higher ratings. LACE Financial recommends that all credits on D and E rated institutions be secured. Non-investment grade.

Ratings of banks that failed in the USA in 2009

% rated Banks

Scale	4Q05	4Q06	4Q07	1Q08	2Q08	3Q08	4Q08	1Q09	2Q09
A	29,0%	35,9%	8,1%	0,0%	2,7%	0,0%	0,0%	0,0%	0,0%
B+	32,3%	17,5%	8,1%	2,6%	2,7%	0,9%	0,0%	0,0%	0,0%
B	29,0%	17,5%	13,5%	2,6%	2,7%	0,0%	0,0%	0,0%	0,0%
B-	6,5%	9,7%	10,8%	9,2%	8,1%	4,4%	2,0%	0,0%	0,0%
C+	0,0%	3,9%	9,0%	9,2%	7,2%	3,5%	0,0%	1,2%	0,0%
C	3,2%	5,8%	5,4%	6,6%	2,7%	2,6%	2,0%	0,0%	2,1%
C-	0,0%	4,9%	9,9%	10,5%	7,2%	6,1%	2,0%	3,5%	2,1%
D	0,0%	1,9%	4,5%	2,6%	5,4%	6,1%	5,9%	1,2%	0,0%
E	0,0%	2,9%	30,6%	56,6%	59,5%	76,3%	88,1%	93,0%	93,6%

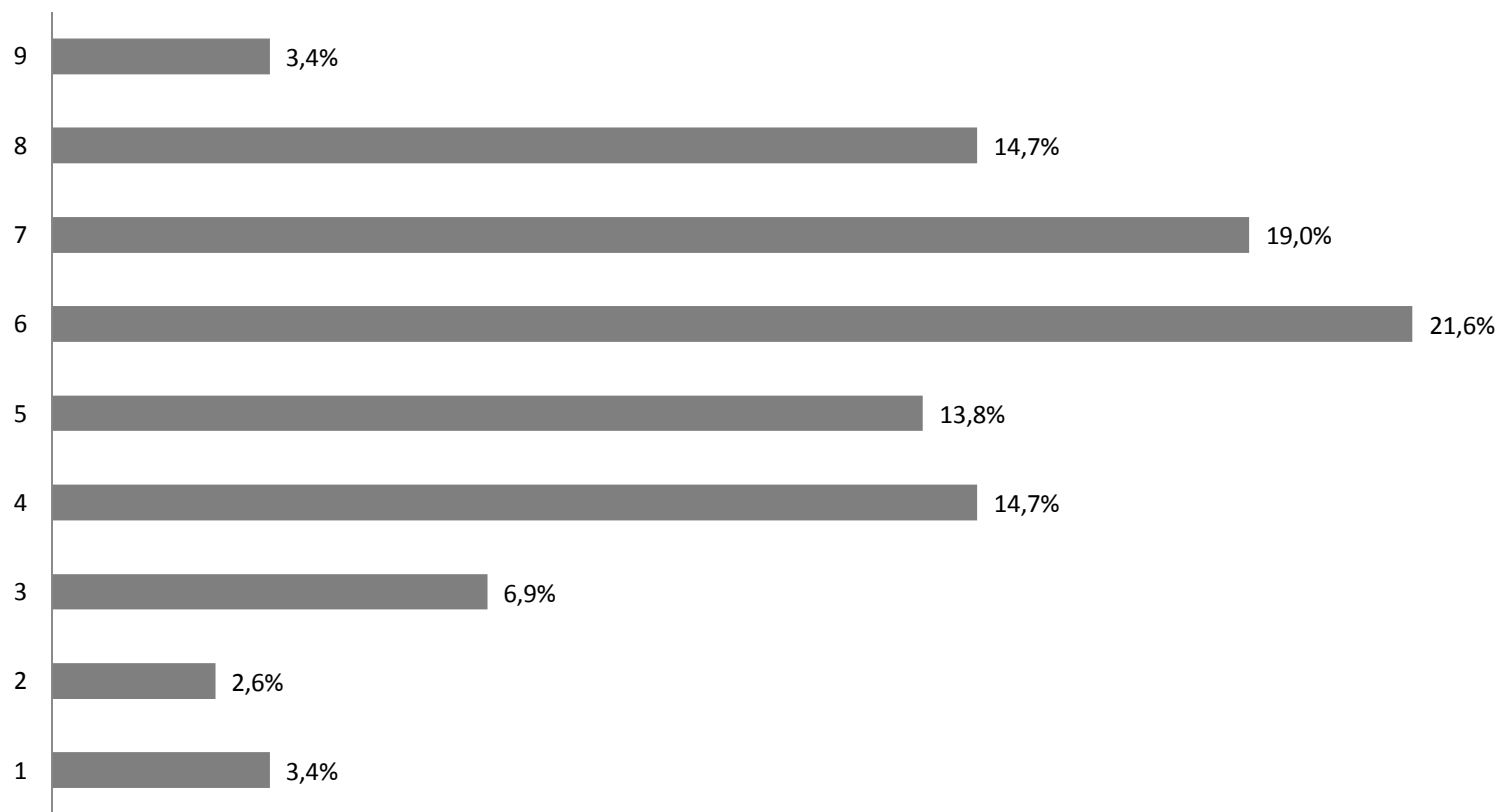
 := Investment Grade

 := Lowest Investment Grade

93% of the USA Banks failed in 2009 were rated “E” already in 2Q09 showing good capacity to predict banks failure from rating agency

Source: FDIC (3)

Number of Quarters banks has been downgrade to E before bankruptcy (2009)



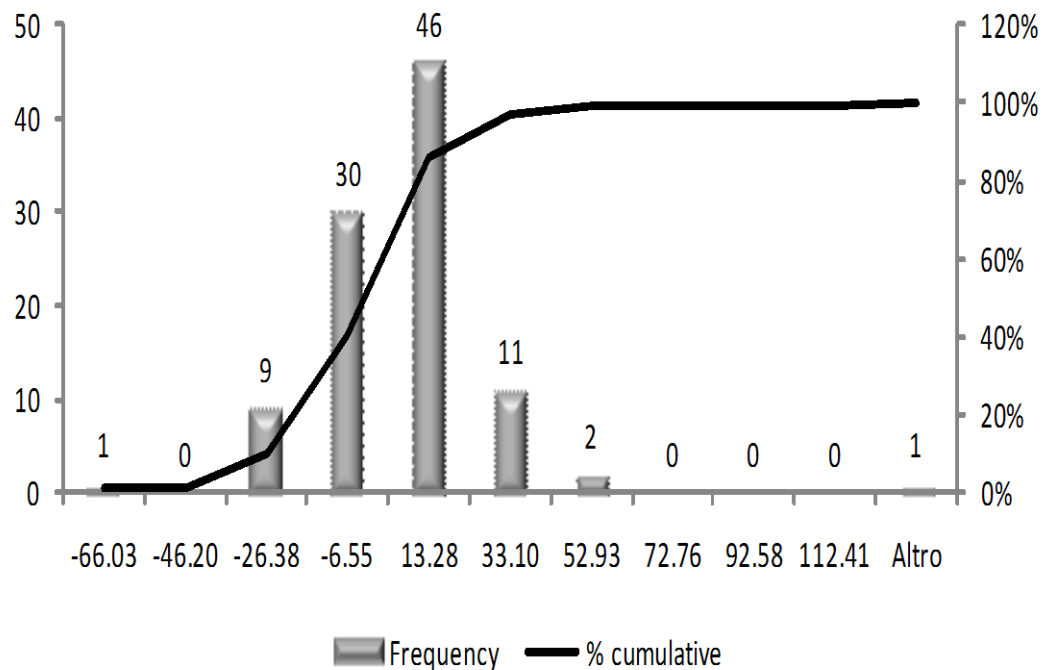
Characteristics of banks that failed in the USA in 2009-in first ten days of June 2010

NPA's/Asset %		14.34%
Leverage Capital/Assets %		3.15%
Total Cap/Assets %		4.24%
Tier 1/Asset		3.08%
ROA %		-6.81%
Total Assets (\$mln) medio		878.85
TOTAL LOANS (\$mln)		590.79
TOTAL DEPOSITS (\$mln)		714.87
<i>Customers</i>		656.36
<i>Others</i>		60.53
LOANS/DEPOSITS		80.95%
LOANS/DEPOSITS customers		95.43%
LOANS/ASSETS		71.43%

The major reason for the USA banking failure were the high Non performing asset formation that reached on average 14% the quarter prior of the failure.

Distribution frequencies Customers Deposits Banks failed in 2009

Classes	Frequency	% cumulative
-66.03	1	1.00%
-46.20	0	1.00%
-26.38	9	10.00%
-6.55	30	40.00%
13.28	46	86.00%
33.10	11	97.00%
52.93	2	99.00%
72.76	0	99.00%
92.58	0	99.00%
112.41	0	99.00%
Altro	1	100.00%



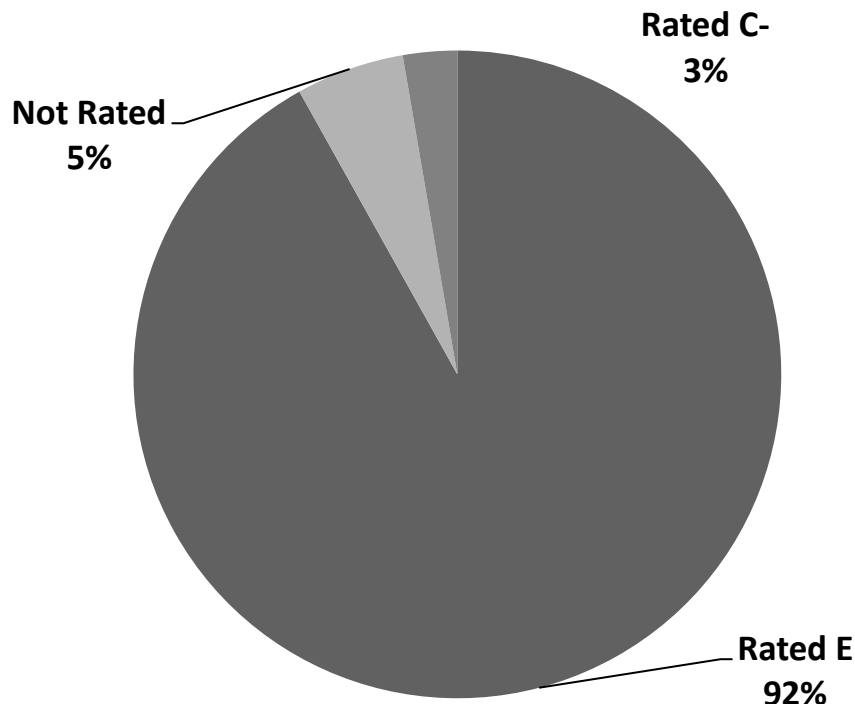
No evidence of bank run

Anomalies in uninsured time deposits growth

- The analysis considered 73 Banks failed in 2009 (among the total 116) that provide data regarding the trend of time deposits differentiated in two categories: time deposits at or below insured limits (\$250.000) and time deposits above insured limits (>\$250.000). The differentiation is crucial because without any doubts allows to see the trend of uninsured deposits as such highly risky one, before the banking failure. The data are provided by the FDIC.
- The analysis shows that **out of 73 Banks in 37 cases (51%) deposits not insured by FDIC continued to grow the year before the bankruptcy (2008)**. The data allows also to analyze the semester/nine months before the failure and also in this case 41 Banks out of 73 (56%) experienced a growth.
- The data allows also to study the trend of insured versus uninsured time deposits. **The trend is strange and in some respect illogical because it shows that in 30 cases out of 73 (41%) uninsured deposits behave in terms of trend better than insured one**. Depositors ignored completely the information provided by the rating agency.

Rating Bank failed evolution (Banks that report uninsured time deposits growth)

Rating of Bankrupted Banks with increasing uninsured deposits



Out of 37 Banks with an anomalous trend of uninsured deposits (i.e.: increasing in the period before the failure) 34 Banks have been rated E by the rating agency, 1 has been rated C-, 2 was not rated.

In 84% of the case (31 Banks) the rating E has been assigned at least 3 quarters in advance respect of the date of Bankruptcy.

Rating Bank failed evolution (Banks that report uninsured time deposits growth)

2009 Bank Failures	State	Failure Date	4Q05	4Q06	4Q07	1Q08	2Q08	3Q08	4Q08	1Q09	2Q09	3Q09
Bank of Clark County	WA	16/01/09	B	B+	B	D	C-	C-				
Ocala National Bank	FL	30/01/09	B+	A	E	E	E	E				
Alliance Bank	CA	06/02/09	A	B+	C-	E	E	E				
Pinnacle Bank	OR	13/02/09	B	D	E	E	E	E				
Silver Falls Bank	OR	20/02/09	B+	A	B-	D	E	E				
Heritage Community Bank	IL	27/02/09	B	C-	E	E	E	E				
Security Savings Bank	NV	27/02/09	B+	A	E	E	E	E				
Freedom Bank of Georgia	GA	06/03/09		B	E	E	E	E				
Colorado National Bank	CO	20/03/09	B	B	B	E	E	E	E			
Omni National Bank	GA	27/03/09	B-	B	E	E	E	E	E			
New Frontier Bank	CO	10/04/09	B+	B	C	C	E	E	E			
American Southern Bank	GA	24/04/09					NB	E	E			
Westsound Bank	WA	08/05/09	A	A	D	E	E	E	E			
Strategic Capital Bank	IL	22/05/09	A	A	B+	C+	D	E	E			
Bank of Lincolnwood	IL	05/06/09	B	C	E	E	E	E	E			
Cooperative Bank	NC	19/06/09		A	B	B-	C+	D	E	E		
Mirae Bank	CA	24/06/09		B+	C+	C+	C-	D	D	E		
Neighborhood Community Bank	GA	24/06/09		A	E	E	E	E	E	E		
Bank of Wyoming	WY	10/07/09		B-	C-	C-	E	E	E	E		
Security Bank of Houston County	GA	24/07/09		C+	B-	E	E	E	E	E		
Security Bank of Jones County	GA	24/07/09		B+	B	C-	E	E	E	E		
Waterford Village Bank	NY	24/07/09								NB		
First State Bank of Altus	OK	31/07/09		B+	D	E	E	E	E	E		
Community First Bank	OR	07/08/09		A	A	C-	E	E	E	E		
First Coweta Bank	GA	21/08/09		B+	C-	E	E	E	E	E		
Affinity Bank	CA	28/08/09		B	E	E	E	E	E	E		
Mainstreet Bank	MN	28/08/09		C-	E	E	E	E	E	E		
Inbank	IL	04/09/09		A	C-	C-	C-	E	E	E		
Warren Bank	MI	02/10/09		B-	E		E	E	E	E	E	
Jennings State Bank	MN	02/10/09		E	E		E	E	E	E	E	
San Joaquin Bank	CA	16/10/09		B+	B+		B+	C-	E	E	E	
Madisonville State Bank	TX	30/10/09		A	A		S	C+	C	C+	E	
United Commercial Bank	CA	06/11/09		A	B+		C	C-	C-	E	E	
Orion Bank	FL	13/11/09		A	E		E	E	E	E	E	
Valley Capital Bank	AZ	11/12/09									NB	
Imperial Capital Bank	CA	18/12/09		B	B-	C-	D	E	E	E	E	E
RockBridge Commercial Bank	GA	18/12/09			B		B-	C	E	E	E	E

Conclusions (1/2)

Human mind is subject to information overload that can impair decision making

Results suggest that:

- Investors (professional and non professional) are slow in reacting to unexpected news
- They are not able to differentiate between noise and signal
- Investors adhere to prior beliefs in spite of new information
- They use rules of thumbs to determine which pieces of information deserves to be processed
- Professional traders interpret information and make critical decision by instinct

Conclusions (2/2)

On the back of the three empirical investigation proposed

it is possible to demonstrate:

new market anomalies and arbitrage opportunities

- Seasonality effects on portfolio management performance
- Intra day anomalies among S&P 500 future and EU Index
 - Banking failure-retail clients and uninsured deposits