

Impact of the Subprime crisis on the reputation of rating agencies

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Abstract

We study the impact of the Subprime crisis on the reputation of Credit Rating Agencies, (CRAs), by measuring stock market reactions to changes in credit ratings before and during the crisis. Recent studies find positive significant reactions to ratings upgrades and negative significant reactions to ratings downgrades in normal times. Using standard event study methodology, we find that upgrades have insignificant effect during the crisis on both the European and American stock markets during the crisis. Besides, Downgrades have negative and significant effect on the European stock market and insignificant effect on the American stock market. Moreover, the difference-in-differences estimator provides negative and insignificant effects for upgrades and downgrades on the both stock market. This finding prove that investors neglected ratings changes during crisis. Our results can be interpreted more as a perceived weaker informational content of CRAs ratings than a loss of confidence in CRAs reputation by investors.

1 Introduction

"The story of the credit rating agencies is a story of colossal failure" Henry Waxman (california), chairman of ther House Committee. Wall Street Journal. October 23, 2008.

"There are two superpowers in the world today in my opinion. There's the United States and there's Moody's Bond Rating Service. The United States can destroy you by dropping bombs, and Moody's can destroy you by downgrading your bonds. And believe me, it's not clear sometimes who's more powerful." Thomas Friedman. February 1996.

While the rating industry has been regulated by the creation of the status of Nationally Recognized Statistical Ratings Organizations (NRSOs) since 1975, rating bias emerged recently as a concern. The failure of high grade firms in the recent decade, such as Enron (2001), Worldcom (2002) and recently

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Lehmann Brother (2008) questions the reliability of credit ratings. Thus, we study how investors perceived those failures of high grade ratings by measuring the stock market reactions to changes in credit ratings before and during the crisis. We highlight whether stock market reactions during the crisis can be interpreted either as a loss of credibility in the rating provider or as a weaker (resp. stronger) informational content of the rating. Credit rating agencies claim that their rating only reflect private information. Indeed, they argue that any opportunistic behavior, such as rating inflation or lenient grade would damage their reputation. Inflating an investment grade may be beneficial in the short term, but harmful in the long term if CRAs lose investors' confidence. A report by Standard & Poor's to the SEC in 2002 states that "The ongoing value of Standard & Poor's credit ratings business is wholly dependent on continued market confidence in the credibility and reliability of its credit ratings."¹ Our objective is to measure whether changes in market reactions before and during the crisis can be attributed to changes in reputation.

There have been a large literature that treat the information content of credit rating changes. Holthausen and Leftwich (1986), Hand et al (1992) and Heude and Blanc (2004) find negative and significant stock price reaction to downgrades but no significant reaction to upgrades. Their finding prove that downgrades have additional information content then upgrades. Hence, downgrades include private information ignored by the public. Recently, using a data after the Regulation Fair Disclosure implemented in 2000,² *Jorion et al. (2005)* find that upgrades also have significant informational content. More recently, these results have been confirmed by *May (2010)* using a data from September 2002 to March 2009. These findings confirm the view that CRAs disclose private information and that ratings changes have an informational content in normal times. They also reflect an expand use of credit rating in recent years due to the increasing usage of ratings in financial regulation and contracting, Basel II.

Very few papers investigate the impact of a financial crisis on the perceived value of CRAs ratings.

¹Standard & Poor's Ratings Service, U.S. Securities and Exchange Commission Public Hearing- November 15, 2002 Role and Function of Credit Rating Agencies in the U.S. Securities Markets <http://www.sec.gov/news/extra/credrate/standardpoors.htm>

²Regulation Fair Disclosure implemented on October 23, 2000, prohibits U.S. public companies from making selective, nonpublic disclosures to favored investment professionals within the exception of CRAs. As a result, CRAs have access to confidential information not available to other equity analysts.

Joo and Pruitt (2006) study the impact of bond ratings changes during the Korean crisis on the Korean stock market. Their data during the crisis include only downgrades changes. The major finding of their study is that bond downgrades result in strikingly more negative stock price reaction during the Korean financial crisis than either before or after. This result underlines that rating changes are valuable and highly perceived by investors in uncertain times.

Han et al. (2010) compare between the yield of new yen-denominated plain vanilla bonds issued in Japan rated by only Japanese rating agency and those rated by at least one global rating agency (Moody's or S&P). The most important finding is that during the crisis, Japanese issuers rated by S&P and/or Moody's faced yields that were 14-19 bps higher than those rated by only Japanese rating agency. In contrast with the finding of the entire data spans from 1998 to 2009 in which Japanese issuers rated by at least one global CRA faced yields that were 11-14 bps lower than those rated by only Japanese rating agency. They interpret this result by the decline in credibility and reputation of CRAs. *Duff and Einig (2009)*, study the perception of credit rating by market participants. Using a questionnaire made during April 2006, they find that CRAs' reputation followed by rating methodology robustness are the most important technical qualities for them.

Our objective is twofold. First, we want to measure whether the crisis has modified investors perception of the informational content of ratings changes. We thus expand the analysis of *Joo and Pruitt (2006)* to upgrades. Second, we want to identify whether investors perceived that CRAs could have adopted opportunistic behaviors. To do that, we use difference-in-differences estimation to measure whether stock market reactions can be interpreted as a loss of trust in the rating provider rather than a weaker informational content of the rating itself.

A general view is that CRAs do not adopt such strategic behavior for reputation concerns. However, the SEC (2008) and Financial Crisis Inquiry Commission (2011) reports point at the responsibility of CRAs for the failure of high graded mortgage related securities and the occurrence of the Subprime crisis. Thus, we use the crisis context to evaluate CRAs announcements during the crisis in order to study whether investors believe whether CRAs can strategically hide information or whether CRAs can strategically inflate rating. To assess the impact of crisis on CRAs, we analyze the stock market

reaction to issuer credit rating changes before and during the crisis. The period of crisis chosen begins in April 2007 and ends in December 2009. The pre-crisis period spans from January 2005 to December 2006. We use Reuters Xtra 3000 database to identify Standard&Poor's rating changes of issuer credit rating issued by European firms that belong to market index DowJones Stoxx 600 and by American firms that belong to market index S&P1500.

In order to find out the value of credit rating during the Subprime crisis and whether the latter has an impact on the reputation of CRAs, we study the stock market reactions to long term issuer credit rating changes before and during the crisis. Indeed, we present one of the first empirical papers that treat the reaction of the stock market to rating changes during the Subprime crisis. Hence, we conjecture that the Subprime crisis may signal either the loss of rating precision or the opportunistic behavior of CRAs who was considered as implicated in the Subprime crisis and have no incentive to cheat on downgrade but may be on upgrade credit rating.

We use a standard event study methodology to check the impact of rating announcements through many window event around the announcement. We find negative and statistically significant stock market reaction to rating downgrades before the crisis on the both American and European stock markets. However, downgrades have negative and significant effect only on the European stock market during the crisis. We also find a surprising negative and statistically insignificant stock market reaction to rating upgrades during crisis on both stock markets. In contrast with the findings before the crisis, positive and significant on the both stock markets. Findings before the crisis are consistent with previous studies that find negative and significant stock market reactions to downgrades. However, findings during the crisis are in contrast with the finding of Joo and Pruitt (2006). We find that the Subprime crisis did not stronger downgrades change effects.

Finally, we use a difference-in-difference, (DID), estimation to explain the cumulative abnormal return over a two-day event window and test our conjecture. The difference-in-difference measure the change in the impact of ratings before and during the Subprime crisis and the change in the effect between firms affected by a rating and those which do not incur a rating change chosen basing on market index, industry sector and market capitalization . We find insignificant DID estimator on

the European and the American stock market to downgrades and upgrades ratings changes. These findings prove that investors neglect ratings changes and consider that it no longer conveys additional information to the market.

A contribution of this empirical study over existing literature is the use of the crisis context to provide prove whether the reputation of CRA could be affected in the case of the failure of high grade product and whether the role of information intermediary still accurate in this context.

The rest of the paper is exposed as follows. Section 2 presents our hypotheses. Section 3 and 4 describe our data and empirical strategy. Section 5 reports our results. Section 6 concludes our paper.

2 Hypotheses

The credit rating ³ is an opinion of the creditworthiness of an issuer, it must reflect his ability to meet his financial commitments. In our case, we treat solicited rating which are rating issued by CRA upon she received the request to be rated made by the issuer of the debt. First, the CRA send a team of analysts to meet the firm's management to take into account the creditworthiness of guarantors, insurers, or other forms of credit enhancement on the obligation. The rating is based on information from public and private information. Before disclosing the rating, the CRA must contact the issuer and take his approval. After an initial rating is assigned, if the CRA perceive a change in the firm is creditworthiness, it will either announce a rating change or place the firm on its "credit watch" list.⁴ As CRAs claim that their ratings changes contain private information, we should discuss first whether they adopt non-strategic behavior to disclose private information and how should be the reaction on stock prices to changes in credit ratings. Second, we will discuss whether the CRA could be opportunistic and how should be the reaction on stock prices to changes in long term issuer credit ratings.

The literature on strategic information disclosure Lizzeri (1999) and Faure-Grimaud, Peyrache and Quesada (2009) consider a model where the intermediary is honest, commits to a fee and a disclosure rule. *Lizzeri (1999)* models a non-contingent fee, ignores the renegotiation-proofness contracts and

³See appendix

⁴Credit Watch highlights the potential direction of a short- or long-term rating. It focuses on identifiable events and short-term trends that cause ratings to be placed under special surveillance. The "positive" designation means that a rating may be raised; "negative" means a rating may be lowered.

chooses the disclosure rule that maximizes the profit of the intermediary. First, he shows that a monopolist intermediary will commit to reveal nothing about the real state of the firm and will announce that a given firm hired its service. This result is to avoid that firms worth less than the average value of firms would choose not to be certified if the intermediary discloses all the information. Second, he shows that competitions may lead intermediary to disclose all information and make zero profit. He highlights that in the case of rating agency only stock market reaction to the CRAs announcement could give an answer to the question whether the CRAs provide more information than is incorporated in the asset price.

Faure-Grimaud, Peyrache and Queseda (2009) consider a contingent-fee and renegotiation-proofness contracts. they show that the monopoly CRA will disclose all information. This equilibrium is supported by the out of equilibrium that a firm without rating is worth zero. When introducing competition à la Bertrand CRAs disclose information if the quality of the firms' information is relatively high in comparison to the cost of producing an accurate rating. They show that full disclosure will be canceled when they introduce the possibility of ownership contract (disclosure right). In fact the latter will fix the price at zero so that all firms get rated. Otherwise, in the oligopoly case, the firms keep the ownership of the contract and will pay the cost of rating.

These papers theorize that CRAs are more attempted to reveal all information. Then we should ask how the precision of information will be altered?

Skreta and Veldkamp (2009) consider that the asset-issuer can shop for rating. The latter observes multiple (one or two) shadow ratings and discloses the most favorable one. They show that rating shopping is contingent on the asset complexity which causes a bias on ratings. When the asset is simple, each rating is perfectly precise (unbiased) and there is no benefit to look for an other shadow rating. As the asset is more complex the rating's precision decreases and the issuer is willing to shop for another rating and disclose the highest. Besides, they show that increasing competition between CRAs does not alleviate the problem of rating shopping since it enlarges the range of available ratings. We rely on the paper of Boot et al (2006) to predict the reaction of stock market to credit rating

changes during the crisis. *Boot et al (2006)* show that the credit ratings present a focal point for investors when multiple equilibria are possible under the assumption that institutional rigidities link the actions of some investors to choose only viable project and avoid risky project.

They theorize that a credit watch should increase the informativeness of a rating change. In the absence of watch procedure CRAs have a beliefs-coordinating role. The value of the latter role will depend on how divergent and uncoordinated the beliefs of investors in the market are. Otherwise, CRAs are most valuable when analysts' expectations are divergent in uncertain time. This implies a stronger negative (resp. positive) stock market reaction to downgrades (resp. upgrades) rating changes during a crisis if investors believe that CRA is honest and do not hide information.

Finally, to predict the stock market reaction to CRAs' announcements basing on truthful information revelation we should expect reactions in the same direction as the announcement. The Subprime crisis may signal that bias on complex product rating was altered by rating shopping, but this argument does not hold on simple product rating.

Hence, the effect of the crisis should strengthen the reaction of the stock market to credit rating in the same direction.

H1: During a crisis, investors overreact to changes in credit ratings than in normal times

The above literature did not consider that CRAs could have a strategic behavior and not report honestly ratings to maximize their profit. A general view is that CRAs do not adopt such behavior for reputation concerns. However, the Subprime crisis casts doubts on the behavior of CRAs in the rating of complex products. We present below the theoretical literature that investigates the disciplinary role of reputation for CRAs.

Benabou and Laroque (1992) study how informed agents whose announcements influence prices (journalist, financial guru and corporate executive) can build a reputation and ultimately cash on it by manipulating market prices in one direction and trading in the opposite direction. If they believe the intermediary is opportunistic, rational traders do the opposite of what the intermediary announces. Thus, the ability of opportunistic intermediaries to manipulate information is limited in the long run by the outsiders' constant reassessment of their credibility. This paper, suggests that if investors believe

that CRAs can adopt opportunistic behaviors, they will update their belief, and thus their reaction to the announcement of the CRA.

Mathis, Mc Andrews and Rochet (2009) show that conflict of interest generated by the collect of CRAs income from the issuers, is not solved by reputation concerns. In their model, a CRA builds reputation in order to cash on it, and at equilibrium, the CRA's reputation has three phases. In the first phase the CRA builds her reputation on the market and provides accurate ratings. In the second phase, once reputation is high enough on the market, the CRA becomes more lax (will give a bad rating to a bad project), spreads decrease, and then the risk of default increases. In the third phase, the opportunistic CRA ⁵ is detected when a high grade project fails, investors on the market lose confidence, so the reputation falls down to zero. The empirical study of Mathis et al. (2009) provide evidence that CRAs varied their rating criteria over time. They show that deal level value had a small positive and significant impact on the percent of deal rated AAA, which indicate the conflict of interest in credit rating industry. They find a drop in AAA ratings between 2001 and 2003 which indicate that CRAs become more conservative after the Dot-Com crash (The default rates rise to 2.42% in 2000, 3.74% in 2001 and 3.51% in 2002).⁶ This suggest that CRA varied their rating criteria over time when they detect a high default rate but they take time to react that's why we choose to study the reaction of the market during a crisis under the assumption that CRAs did not have the time to react and varied their rating criteria. *Bolton et al (2009)* show that CRAs may inflate the quality of the firm when there are more naive investors on the market (defined as investors who does not understand the incentive of the CRA and take ratings at face value) or when CRA expected reputation costs are lower. They find that rating inflation is may be due to rating shopping.

The idea is that the failure of a highly rated product reveals to the investors the type of the CRA. Then the Subprime crisis may be a signal that the CRA cheated on the rating. As reported in the 2009 annual global corporate default study and rating transitions report of Standard&Poor's there has

⁵They consider that a truthful CRA is committed to tell the truth, hence, failure (which is only possible when a bad project has been financed after receiving a good rating.) is due to an opportunistic CRA.

⁶See figure 1. Annual corporate default provided by Standard&Poor's 2009 annual report.

been a rise in default rates⁷ to 1.72% in 2008 (14 investment-grade defaults and 88 speculative-grade defaults) and to 3.99% in 2009 (11 investment-grade defaults and 223 speculative-grade defaults). The failure of high grade corporate may be a signal that the CRA was potentially opportunistic. Since CRAs have no incentive to cheat on downgrades, we then expect the reaction to be asymmetric. Implying stronger negative stock market reaction to downgrades rating changes, and no impact or may be small magnitude negative stock market reaction to upgrades rating changes. Investors lose confidence on the CRA and consider their upgrades rating as a move to inflate rating.

H2: During the crisis, investors have asymmetric reaction to changes in credit ratings

3 Data

To assess the impact of the crisis on the reputation of CRAs, we analyze the stock market reaction to issuer credit rating changes before and during the crisis. We focus on the long term issuer credit ratings changes that reflect the CRA is opinion of an obligor is overall financial capacity to pay its financial obligations in a long term run. The period of the crisis chosen begins from April 2007⁸ and ends in December 2009. The pre-crisis period spans from January 2005 to December 2006. We use Reuters Xtra 3000 database to identify Standard&Poor's rating changes of long term issuer credit rating of European firms that belong to DowJones Stoxx 600, and rating changes of long term issuer credit rating of American firms that belong to S&P 1500. We have removed the contaminated announcement by significant events such fraud cases, mergers and acquisitions. Our final sample is presented in the following table.

⁷The default rates in 2005 was 0.57% in 2005 and 0.45% in 2006

⁸"In February, New Century reported bigger-than-expected mortgage credit losses and HSBC, the largest subprime lender in the United States, announced a 1.8 \$ billion increase in its quarterly provision for losses. In March, Fremont stopped originating subprime loans after receiving a cease and desist order from the Federal Deposit Insurance Corporation. In April, New Century filed for bankruptcy." Financial Crisis Inquiry Commission report, January 2011, official government edition.

Issuer long term credit rating changes by Standard&Poor's										
American stock market										
Downgrades					Upgrades					
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
AA				6	3	1	3	1	4	
A	8	8	8	11	12	13	15	13	6	3
BBB	25	22	20	35	47	27	26	18	21	19
BB	15	16	20	25	27	26	26	17	34	14
B	9	8	8	14	27	5	5	7	7	6
CCC					5					5
CC										1
all	57	54	56	91	121	72	75	56	72	48
European stock market										
Downgrades					Upgrades					
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
AA	2		3	9	3	3	7	4	3	
A	6	7	11	18	29	7	6	10	7	6
BBB	4	9	13	20	25	9	4	9	7	5
BB	2	5		4	5	2	4	3	1	1
B					3	2				1
all	14	21	27	51	65	23	21	26	18	13

4 Empirical strategy

4.1 Event study

We use a standard event study methodology, Mackinlay (1997). The market model is run using the estimation period $[-210, -31]$.

$$R_i = \alpha + \beta R_m + \varepsilon$$

where R_i is the log return of the stock i and R_m is the log return of the market index. The estimated parameters are used to compute the abnormal returns in the event window $[-30, +30]$

$$AR_i = R_i - \hat{\alpha} - \hat{\beta} R_m$$

The abnormal return are aggregated in order to overall inferences for the event of rating changes.

The aggregation is along two dimensions, through time and across events. The average abnormal

return, AAR, represent the aggregation across events ($AAR_{i,t} = \frac{1}{N} \sum_{i=1}^{i=N} AR_i$), the cumulative ab-

normal returns, CAR, represent the aggregation through time ($CAR_{i,t} = \sum_{t=t_0}^{t=t_1} AR_i$) and the cumu-

lative abnormal average returns (CAAR) represent the aggregation through time and across events

$$(CAAR_{i,t} = \frac{1}{N} \sum_{i=1}^{i=N} CAR_{i,t})$$

The tables will report AAR and CAAR for the window trading days $[-20, -1]$, $[-10, -1]$, $[-1, 0]$, $[0, 1]$,

$[0, 10]$, $[0, 20]$ and $[-20, 20]$ in line with previous literature.

Finally, in addition to a parametric statistical test, t-statistic, a non parametric statistical test,

Wilcoxon signed-rank, are calculated to check the significance and robustness of AAR and CAAR.

4.2 Difference-in-differences estimation

The difference-in-differences approach study the impact of a "treatment". One then compares the

difference in outcomes after and before the "treatment" for the treatment groups by the same difference

for control groups. The control group show how should be the outcome without the "treatment".

Otherwise, many variables other than "the treatment" might affect the outcome, the diff-in-diff study

the impact of these other variables by examining the outcome of the control group.

In order to find out if the crisis has an impact on rating agency reputation, we measure whether the

market reactions to issuer credit ratings change in periods of crisis. Otherwise, we try to separate the

impact of the Subprime crisis on the rating changes appreciation from other events. In our case, the

"treatment" is the rating changes and the "time trend" is the crisis.

The outcomes explained by this analysis is the aggregated abnormal return through the time, the

cumulative abnormal return, calculated over a two-day event window $(0,+1)$.

Hence, We consider two groups of firms indexed by treatment status $change = (0,1)$ where 0

indicates firms which do not experience rating change, and constitute the **Control group**, and 1

indicates firms who do experience a change in rating, and constitute the **Treatment group**. We

observe firms in two periods, $Crisis = 0,1$, where 0 indicates the time period before crisis, and

constitute the **pre-crisis period**, 2005-2006, and 1 indicates a time period during the crisis, and constitute the **crisis period**, April 2007- December 2009. The control sample includes firms that haven't experienced a rating change. We build the control sample using matched samples similar to that used in the study of the performance of analyst recommendations of Desai and Jain (1995) which based the choice of matched sample on market capitalization. We also based our matched samples on same two-digit SIC code as treatment firm because we suppose that Subprime crisis has more negative impact on some sector than in others and in line with some previous event studies that used matching sample using market capitalization and industry sector firm, Barber and Lyon 1996. Moreover, we limit our matching sample to firms listed on the market index (S&P1500 and DJ Stoxx 600) due to the nature of our standard event study methodology that imply the use of market index performance to calculate the abnormal return.

The dependent variable is the cumulative abnormal return calculated over a two-day event window (0,+1).

$$CAR_{i,t} = \alpha + \beta_1 Change + \beta_2 Crisis + \beta_3 Change * Crisis + \varepsilon$$

α = Constant term corresponds to the mean CAR for the control group during 2005-2006.

β_1 = Treatment group specific effect (to account for average permanent differences between treatment and control group). This coefficient indicates the impact of rating changes over the time. It correspond to the first difference between the two groups before the crisis.

$$\beta_1 = [E(CAR_{i,t}/Change = 1, crisis = 0) - E(CAR_{i,t}/Change = 0, crisis = 0)]$$

β_2 = Time trend common to control and groups who do experience rating change and indicates the impact of the crisis within group which eliminate any group specific. It correspond to the difference of CAR in the control group between before and during the crisis.

$$\beta_2 = [E(CAR_{i,t}/Change = 0, crisis = 1) - E(CAR_{i,t}/Change = 0, crisis = 0)]$$

β_3 = It compares the difference in CAR before and during the crisis for groups who experienced rating changes by the difference in CAR before and during the crisis for groups who did not experience rating changes. This difference in differences will get ride the time trend effect. The

crucial assumption of this diff-in-diff estimation is that the time trend in the treatment group is the same as the time trend in the control group.

$$\beta_3 = [E(CAR_{i,t}/change = 1, crisis = 1) - E(CAR_{i,t}/change = 1, crisis = 0)] \\ - [E(CAR_{i,t}/change = 0, crisis = 1) - E(CAR_{i,t}/change = 0, crisis = 0)]$$

The basic analysis is to compute the average of the outcome for the two groups in the two periods. these average are represented in a table showing the groups compared on the row and the time periods on the columns. The table presented in the following section can be read in two different ways. If we read the columns first, we focus on the difference between groups over time. If we read the row, we focus on the impact of the crisis on the two groups. Those results are obtained using the regression equation to test the robustness of those results. The estimates are reported with the tables in the following section.

5 Results

5.1 Event study

Tab.1 The stock price response to downgrades issuer credit rating for the pre- and during- crisis period												
	2005 – 2006						2007 – 2009					
	American			European			American			European		
Panel A: Trading days												
	AAR (%)	p-value	Wilcoxon	AAR (%)	p-value	Wilcoxon	AAR (%)	p-value	Wilcoxon	AAR (%)	p-value	Wilcoxon
-20	-0.168	0.316	0.218	0.009	0.958	0.719	-0.187	0.494	0.426	0.125	0.634	0.937
-19	0.031	0.823	0.374	-0.111	0.577	0.512	0.490	0.052*	0.438	-0.310	0.278	0.080*
-18	-0.193	0.179	0.525	0.306	0.246	0.326	0.139	0.539	0.711	-0.781	0.233	0.390
-17	-0.056	0.634	0.417	0.009	0.962	0.432	0.147	0.565	0.127	-0.681	0.127	0.212
-16	-0.121	0.419	0.381	0.169	0.458	0.201	0.266	0.373	0.201	0.233	0.406	0.761
-15	-0.016	0.893	0.796	-0.049	0.795	0.819	-0.157	0.536	0.117	0.107	0.739	0.702
-14	0.196	0.192	0.229	-0.492	0.031**	0.064*	-0.194	0.424	0.922	0.292	0.391	0.973
-13	0.116	0.438	0.988	0.235	0.267	0.351	-0.286	0.204	0.080	0.374	0.226	0.165
-12	-0.104	0.531	0.955	0.019	0.920	0.896	0.128	0.549	0.960	0.089	0.739	0.204
-11	-0.126	0.385	0.086*	-0.378	0.166	0.225	-0.097	0.715	0.646	0.198	0.515	0.920
-10	-0.089	0.549	0.415	0.073	0.602	0.502	0.321	0.134	0.847	0.099	0.697	0.461
-9	-0.059	0.691	0.605	0.064	0.738	0.743	-0.402	0.159	0.231	-0.371	0.183	0.369
-8	-0.015	0.936	0.370	-0.174	0.494	0.092	-0.423	0.085	0.016	0.129	0.629	0.317
-7	0.043	0.778	0.685	-0.182	0.395	0.252	-0.311	0.191	0.277	-0.211	0.415	0.308
-6	0.122	0.492	0.728	0.198	0.252	0.413	0.223	0.413	0.092	0.423	0.163	0.240
-5	0.185	0.387	0.807	0.247	0.322	0.108	-0.067	0.775	0.483	-0.178	0.545	0.296
-4	-0.121	0.438	0.343	0.297	0.340	0.578	-0.405	0.085	0.146	0.210	0.368	0.125
-3	-0.430	0.018**	0.096*	0.199	0.397	0.385	-0.205	0.559	0.826	0.375	0.137	0.032**
-2	-0.130	0.575	0.235	0.108	0.632	0.670	-0.971	0.049	0.238	-0.097	0.742	0.598
-1	-0.412	0.172	0.464	0.079	0.687	0.987	-0.287	0.578	0.645	-0.170	0.545	0.933
0	-0.261	0.337	0.478	-0.421	0.069*	0.083*	-0.185	0.502	0.363	-0.345	0.236	0.278
1	-0.082	0.671	0.443	-0.005	0.988	0.857	0.212	0.349	0.879	-1.063	0.025**	0.003***
2	-0.262	0.128	0.535	-0.093	0.571	0.098	0.533	0.027	0.029	0.456	0.162	0.120
3	-0.237	0.167	0.373	-0.097	0.564	0.682	-0.028	0.888	0.987	0.644	0.113	0.016**
4	-0.043	0.734	0.809	-0.296	0.200	0.190	-0.448	0.069*	0.040**	0.002	0.995	0.738
5	-0.212	0.090*	0.092*	-0.082	0.625	0.831	0.356	0.214	0.454	-0.173	0.555	0.269
6	0.114	0.439	0.286	0.083	0.711	0.523	-0.092	0.653	0.974	-0.016	0.954	0.646
7	0.038	0.766	0.803	-0.247	0.186	0.140	0.451	0.060*	0.291	0.253	0.300	0.776
8	-0.071	0.590	0.339	0.017	0.901	0.781	0.319	0.288	0.026**	-0.110	0.783	0.145
9	-0.129	0.329	0.044	0.263	0.452	0.635	0.418	0.134	0.404	0.173	0.493	0.782
10	0.100	0.421	0.265	0.040	0.851	0.961	0.220	0.324	0.375	-0.035	0.922	0.250
11	-0.002	0.990	0.839	0.015	0.956	0.793	0.273	0.311	0.194	0.079	0.819	0.818
12	0.148	0.323	0.529	0.089	0.634	0.768	-0.168	0.525	0.731	0.208	0.393	0.452
13	0.106	0.423	0.345	0.017	0.944	0.523	0.229	0.432	0.918	0.330	0.170	0.556
14	0.007	0.952	0.791	0.312	0.073*	0.105	0.162	0.471	0.275	0.048	0.832	0.559
15	0.031	0.848	0.809	-0.217	0.290	0.213	0.491	0.025**	0.075*	-0.046	0.884	0.495
16	-0.263	0.021**	0.071*	0.097	0.596	0.566	0.048	0.868	0.679	0.580	0.137	0.094*
17	0.044	0.702	0.814	0.212	0.353	0.310	0.142	0.570	0.835	0.097	0.703	0.566
18	0.087	0.641	0.320	-0.100	0.677	0.451	-0.302	0.296	0.566	-0.253	0.327	0.095*
19	-0.126	0.405	0.271	-0.329	0.150	0.225	-0.149	0.580	0.270	0.345	0.160	0.257
20	0.051	0.741	0.841	-0.015	0.951	0.635	-0.081	0.765	0.365	-0.079	0.814	0.945
Panel B: window trading days												
	CAAR (%)	p-value	Wilcoxon	CAAR (%)	p-value	Wilcoxon	CAAR (%)	p-value	Wilcoxon	CAAR (%)	p-value	Wilcoxon
[-20, -1]	-1.347	0.059*	0.054*	0.627	0.580	0.441	-2.276	0.109	0.278	-0.146	0.900	0.524
[-10, -1]	-0.906	0.117	0.082*	0.910	0.185	0.179	-2.525	0.016**	0.170	0.209	0.820	0.741
[-1,0]	-0.673	0.138	0.450	-0.343	0.282	0.238	-0.471	0.406	0.063*	-0.515	0.232	0.312
[0]	-0.261	0.337	0.478	-0.421	0.069*	0.083*	-0.185	0.502	0.363	-0.345	0.236	0.278
[0,1]	-0.343	0.293	0.345	-0.426	0.311	0.422	0.027	0.940	0.859	-1.408	0.026**	0.010***
[0,10]	-1.046	0.057*	0.134	-0.838	0.363	0.280	1.755	0.046**	0.055*	-0.213	0.846	0.858
[0,20]	-0.962	0.244	0.314	-0.759	0.468	0.623	2.399	0.077*	0.030**	1.097	0.475	0.417
[-20,20]	-2.309	0.052*	0.016**	-0.132	0.935	0.831	0.123	0.951	0.556	0.950	0.636	0.562

Table 1 summarizes the abnormal return of stock prices effect of rating downgrades changes for the pre- and during the crisis period, on the American and the European stock market. Panel A reports the abnormal return through securities and panel B reports abnormal return through securities and days. The most interesting observation on panel A is the strong and immediate impact of rating changes the day of rating announcement, the effect is negative and significant for the two periods only on the European stock markets. Panel B emerges the immediate response on the stock prices. During the

crisis, the CAAR over the two-days window (-1.408%) is significant on the European stock market and is higher in magnitude than before the crisis (-0.426%). However, the CAAR over ten-days window is positive and significant during the crisis on the American stock market. The size of CAAR, during the crisis, before announcement is much stronger (-2.276 % on American stock market and -0.146% on European stock market) than after announcement (2.399 % on American stock market and 1.097% on European stock market) for the same window trading day, $[-20, -1]$ and $[0, 20]$.

During the crisis investor anticipated the increase of risk before the rating changes. Besides, rating changes announcement only confirm investor anticipation. Downgrades have the same effect before and during a crisis only on the European stock market. The interpretation is that investors neither overreact nor ignore rating downgrades but continue to consider that it conveys additional information to the market on the European stock market. However, investors' perception of the credit rating quality dropped during the crisis and they no longer consider ratings changes robust and convey additional information.

Our findings in normal times are in line with previous literature that find negative and significant impact of rating downgrade. However, our finding during the crisis are in contrast with the finding of Joo and Pruitt (2006) and Jorion et al. (2005). We interpret this difference in our finding by the lost of perception of credit rating quality due to the default of high rated firms.

Tab.2 The stock price response to upgrades issuer credit rating for the pre- and during- crisis period												
	2005 – 2006						2007 – 2009					
	American			European			American			European		
Panel A: Trading days												
	AAR (%)	p-value	Wilcoxon	AAR (%)	p-value	Wilcoxon	AAR (%)	p-value	Wilcoxon	AAR (%)	p-value	Wilcoxon
-20	-0.143	0.463	0.937	-0.168	0.325	0.448	-0.033	0.856	0.969	0.482	0.112	0.084*
-19	0.136	0.244	0.526	-0.123	0.699	0.861	0.231	0.252	0.294	-0.456	0.086*	0.057*
-18	-0.135	0.266	0.153	0.005	0.986	0.462	0.126	0.548	0.634	-0.458	0.017	0.163
-17	0.078	0.585	0.682	-0.143	0.411	0.112	0.117	0.535	0.953	-0.050	0.860	0.543
-16	0.189	0.185	0.090*	0.054	0.809	0.963	0.151	0.378	0.704	-0.306	0.145	0.208
-15	0.195	0.146	0.408	-0.152	0.555	0.388	-0.259	0.201	0.087	-0.221	0.370	0.448
-14	0.024	0.856	0.903	-0.051	0.802	0.797	-0.059	0.702	0.357	-0.321	0.196	0.108
-13	0.026	0.827	0.876	-0.062	0.789	0.709	-0.051	0.802	0.902	0.032	0.897	0.176
-12	0.115	0.481	0.392	-0.085	0.769	0.788	0.083	0.697	0.222	0.319	0.103	0.367
-11	0.002	0.994	0.118	-0.103	0.577	0.544	-0.075	0.732	0.945	-0.358	0.090*	0.062*
-10	-0.002	0.989	0.530	0.068	0.730	0.843	0.367	0.073	0.305	0.281	0.226	0.111
-9	-0.125	0.301	0.049	-0.077	0.655	0.357	-0.009	0.969	0.745	-0.073	0.718	0.282
-8	-0.114	0.391	0.508	0.163	0.328	0.253	-0.537	0.017**	0.041**	0.023	0.920	0.802
-7	0.136	0.251	0.240	0.004	0.989	0.484	0.015	0.931	0.934	-0.040	0.841	0.415
-6	-0.180	0.223	0.109	-0.129	0.577	0.806	0.153	0.443	0.946	-0.612	0.002***	0.004***
-5	0.211	0.121	0.347	-0.373	0.190	0.180	-0.220	0.223	0.764	-0.210	0.258	0.220
-4	-0.073	0.583	0.195	0.244	0.165	0.203	-0.084	0.627	0.368	0.141	0.559	0.754
-3	0.374	0.020**	0.297	-0.198	0.387	0.203	0.313	0.199	0.096*	0.228	0.278	0.512
-2	-0.197	0.242	0.014	-0.293	0.342	0.176	-0.171	0.440	0.176	-0.094	0.700	0.908
-1	0.079	0.522	0.407	0.260	0.235	0.477	0.345	0.102	0.568	0.142	0.461	0.665
0	0.145	0.288	0.638	0.351	0.068*	0.070*	-0.128	0.545	0.543	-0.010	0.954	0.592
1	0.206	0.119	0.051*	-0.155	0.476	0.448	-0.205	0.240	0.461	0.407	0.060	0.103
2	-0.049	0.733	0.213	0.628	0.036	0.035	0.285	0.103	0.110	-0.343	0.128	0.199
3	0.027	0.818	0.651	0.011	0.948	0.944	-0.006	0.980	0.550	-0.151	0.466	0.462
4	-0.031	0.788	0.512	-0.319	0.139	0.220	0.294	0.153	0.250	-0.493	0.026**	0.040**
5	-0.152	0.123	0.173	-0.068	0.699	0.709	0.133	0.489	0.932	0.058	0.702	0.434
6	-0.073	0.568	0.382	-0.112	0.715	0.575	0.038	0.875	0.444	-0.214	0.438	0.608
7	0.144	0.206	0.606	-0.428	0.080	0.064	-0.187	0.311	0.168	0.156	0.313	0.415
8	-0.089	0.473	0.390	0.056	0.749	0.797	-0.146	0.442	0.664	-0.067	0.725	0.507
9	0.224	0.142	0.961	-0.318	0.150	0.369	-0.311	0.121	0.044	0.112	0.684	0.821
10	-0.025	0.830	0.348	0.096	0.696	0.544	-0.018	0.919	0.949	0.117	0.442	0.425
11	0.033	0.787	0.833	0.154	0.571	0.779	0.166	0.328	0.510	-0.108	0.641	0.852
12	0.024	0.844	0.756	-0.251	0.434	0.095*	0.139	0.524	0.196	0.013	0.956	0.927
13	0.064	0.636	0.680	0.084	0.795	0.212	0.156	0.439	0.952	-0.237	0.233	0.141
14	-0.140	0.254	0.251	0.117	0.561	0.898	0.051	0.747	0.894	-0.124	0.491	0.512
15	-0.042	0.743	0.564	0.082	0.718	0.963	0.032	0.876	0.573	0.208	0.394	0.487
16	-0.047	0.689	0.941	-0.105	0.465	0.521	-0.194	0.303	0.413	-0.184	0.447	0.766
17	0.038	0.711	0.980	0.249	0.430	0.963	-0.127	0.561	0.462	0.150	0.598	0.915
18	-0.063	0.638	0.330	-0.490	0.015**	0.074*	-0.279	0.132	0.061*	-0.161	0.497	0.462
19	-0.101	0.291	0.113	-0.172	0.323	0.381	-0.184	0.340	0.133	-0.045	0.777	0.921
20	0.002	0.989	0.728	-0.440	0.074	0.060	-0.134	0.536	0.154	-0.489	0.024**	0.081*
Panel B: Window trading days												
	CAAR (%)	p-value	Wilcoxon	CAAR (%)	p-value	Wilcoxon	CAAR (%)	p-value	Wilcoxon	CAAR (%)	p-value	Wilcoxon
[-20, -1]	0.596	0.400	0.365	-1.157	0.197	0.225	0.402	0.665	0.716	-1.550	0.126	0.161
[-10, -1]	0.109	0.796	0.619	-0.330	0.598	0.506	0.171	0.769	0.737	-0.214	0.716	0.760
[-1,0]	0.225	0.244	0.344	0.612	0.051*	0.102	0.217	0.433	0.524	0.132	0.537	0.871
[0]	0.145	0.288	0.638	0.351	0.068*	0.070*	-0.128	0.545	0.544	-0.010	0.954	0.592
[0,1]	0.351	0.071*	0.146	0.196	0.453	0.414	-0.333	0.233	0.933	0.397	0.164	0.176
[0,10]	0.327	0.414	0.986	-0.257	0.679	0.981	-0.251	0.693	0.943	-0.428	0.454	0.346
[0,20]	0.095	0.858	0.830	-1.029	0.372	0.583	-0.625	0.452	0.349	-1.405	0.076*	0.077*
[-20,20]	0.692	0.457	0.310	-2.186	0.144	0.243	-0.224	0.874	0.619	-2.955	0.040**	0.018**

Table 2 summarizes the abnormal return of stock prices effect of rating upgrades changes for the pre- and during the crisis and on the American and European stock market. Panel A reports the abnormal return through securities and panel B reports abnormal return through securities and days. The most interesting observation on panel A is the immediate impact of rating changes on day of announcement before the crisis, the effect is positive and significant for the both stock markets. During the crisis, panel A, emerge some positive and insignificant AAR before rating changes. We also find negative and

insignificant AAR the day of the announcement on the both American and European stock market. Panel B emerge the asymmetric response for upgrades between the two periods. We find positive and significant CAAR over the two-days event before the crisis on the American stock market. Besides, we find positive and significant effect only the day of the rating announcement on the European stock market. During the crisis, the CAAR is negative, significant and similar in magnitude after upgrade rating announcement and before announcement on the European stock market. However, upgrades ratings changes have negative insignificant effect after announcement and positive insignificant effect before announcement. For comparison, before the crisis, upgrades ratings changes have immediate positive and significant effect on the both stock market. Hence, investors ignored rating upgrades during the crisis or even react in the sens inverse of the announcement. The most important finding is that rating upgrades, during the crisis, did not have a positive impact on the stock prices. Apparently, the crisis brings upgrades effects to zero or even negative. These findings before the crisis are in line with previous literature, Holthausen and Leftwich (1986) and May (2010), that find positive and insignificant effects of rating upgrades. Moreover, these findings during a crisis are in line with the analysis of recession on the paper of Jorion et al. (2005).

To illustrate whether this negative impact was related to the crisis or other macroeconomic variable we use the DID estimate which main results are reported in the following section.

5.2 Difference in Differences estimation

Tab.3 Compute the DID estimate of the effect downgrades issuer credit rating on American stock market				
		Time		
		2005-2006	2007-2009	Difference between periods
Mean CAR[0, 1]	Treatment Group	-0.00343	0.027%	0.3697%
	Control Group	0.00787%	0.463%	0.4548%
	Difference between groups	-0.351%	-0.436%	-0.0850% <i>DID estimate</i>

Tab.4 Compute the DID estimate of the effect downgrades issuer credit rating on European stock market				
		Time		
		2005-2006	2007-2009	Difference between periods
Mean CAR[0, 1]	Treatment Group	-0.4263%	-1.4085%	-0.9822%
	Control Group	0.4247%	0.4161%	-0.0086%
	Difference between groups	-0.8510%	-1.8246%	-0.9736% <i>DID estimate</i>

Tab.5 Regression estimate of the effect downgrades issuer credit rating						
	American			European		
Variable	Coefficient	t-Stat	Prob	Coefficient	t-Stat	Prob
C	0.0000787	0.016133	0.9871	0.004247	0.472959	0.6365
CHANGE	-0.003507	-0.508261	0.6114	-0.008510	-0.670134	0.5032
CRISIS	0.004548	0.782820	0.4340	-8.56E-05	-0.008541	0.9932
CHANGE*CRISIS	-0.000850	-0.103547	0.9176	-0.009736	-0.687167	0.4924
Adj R-squared	-0.001032			0.017634		
F-Stat	0.740591			3.124174		
N	756			356		

Tables 3 and 4 report the compute of DID estimate using the average of CAR of each group and on each period. The importance of double differencing is fully appreciated if we read those tables by rows. The first row in table 3 and 4 conclude that downgrades during the crisis are effective. Table 3 and 4 emerge that the CAR of control group during the crisis is higher than the treatment group. The DID estimate show that, during the crisis, downgrades effect was much stronger on the European stock market than the American stock market. Table 5 check the robustness of these findings through a DID regression. We find that the initial difference between the two groups, β_1 is negative and insignificant on the both stock markets. The difference pre- and during the crisis for the control group is reproduced by β_2 , it is positive and insignificant on the American stock market and negative and insignificant on the European stock market. By contrast, the DID estimator, β_3 , is negative and insignificant on the both stock markets. These finding suggest that investors neglected downgrades ratings changes. In contrast, with the boot et al (2006), CRAs did not play the role of the focal point on the market. Moreover, we suggest that the fail of high rated firms during the Subprime crisis question the bias and the informational content of ratings changes.

Tab.6 Compute the DID estimate of the effect upgrades issuer credit rating on American stock market				
Time				
		2005-2006	2007-2009	Difference between periods
Mean CAR[0, 1]	Treatment Group	0.3511%	-0.3332%	-0.6843%
	Control Group	0.1006%	-0.2031%	-0.3037%
	Difference between groups	0.2505%	-0.1301%	-0.3806% <i>DID estimate</i>

Tab.7 Compute the DID estimate of the effect upgrades issuer credit rating on European stock market				
Time				
		2005-2006	2007-2009	Difference between periods
Mean CAR[0, 1]	Treatment Group	0.1964%	0.3972%	0.2008%
	Control Group	-0.1095%	0.1781%	0.2877%
	Difference between groups	0.3060%	0.2190%	-0.0869% <i>DID estimate</i>

Tab.8 Regression estimate of the effect upgrades issuer credit rating						
Variable	American			European		
	Coefficient	t-Stat	Prob	Coefficient	t-Stat	Prob
C	0.001006	0.392070	0.6951	-0.001095	-0.339637	0.7345
CHANGE	0.002505	0.690358	0.4902	0.003060	0.678512	0.4982
CRISIS	-0.004338	-1.248069	0.2125	0.002877	0.676781	0.4993
CHANGE*CRISIS	-0.002505	-0.509600	0.6105	-0.000869	-0.145535	0.8844
Adj R-squared	0.004093			-0.007987		
F-Stat	1.883522			0.474388		
N	646			200		

Tables 6 and 7 report the compute of DID estimate using the average of CAR of each group and on each period. The first row in table 6 and 7 conclude that upgrades during the crisis have negative effect. Moreover, table 6 emerge that the CAR of the control group during the crisis is negative which implicant the negative impact of the crisis on the control group. Table 7 emerges that the CAR of the

control group during the crisis is lower than the treatment group. The DID estimate show that, during the crisis, upgrades effects are negative on the both stock markets. Table 8 check the robustness of these findings through a DID regression. We find that the initial difference between the two groups, β_1 is, 0.002505, positive and insignificant on the American stock market and, 0.00306, positive and insignificant on the European stock market. The difference pre- and during the crisis for the control group is reproduced by β_2 , it is negative and insignificant on the American stock market and positive and insignificant on the European stock market. Finally, the DID estimator, β_3 , is negative and insignificant on the both stock markets. Our findings, suggest that investors neither neglect the CRA announcements which implicant that we reject our hypotheses. Hence, ratings changes do not convey additional information to the market.

As we do not find asymmetric reaction to ratings changes, we rejected the loss of reputation of CRAs on the market. Indeed, the markets participants neglected CRAs announcement during the crisis which implicant that CRAs downgrades during the crisis did not aggravate the situation of some firms. Our finding are in contrast with Joo and Pruitt (2006) empirical paper on the Korean crisis because of the unbiased ratings announcement before the crisis. The biases in rating of simple product (fail of high rated corporate) question the additional content of information and the accuracy of the credit rating.

6 Conclusion

We study the impact of the Subprime crisis on CRAs using standard event methodology and Difference in Difference estimator. Recent studies find positive significant reactions to ratings upgrades and negative significant reactions to ratings downgrades in normal times. They explain this impact by the informational content of the rate. We support through our empirical study that rating impact is contingent to the CRA is reputation and/or information content. The event study provides evidence that rating downgrades still have effect only on the European stock market. The rating upgrades have small and positive impact before the crisis and negative impact during the crisis on the both stock prices. The DID estimate provides insignificant effects of rating upgrades and rating downgrades on the both American and European stock market. Our finding sustain the idea that market participants neglected ratings changes during the crisis and no longer consider CRAs as robust information provider. This paper provide evidence that investors update their beliefs about credit rating qualities but do not provide evidence if they reassess CRAs' reputation.

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7 Index

Rating	Definition
AAA	An obligation rated 'AAA' has the highest rating assigned by Standard & Poor's. The obligor's capacity to meet its financial commitment on the obligation is extremely strong.
AA	An obligation rated 'AA' differs from the highest-rated obligations only to a small degree. The obligor's capacity to meet its financial commitment on the obligation is very strong.
A	An obligation rated 'A' is somewhat more susceptible to the adverse effects of changes in circumstances and economic conditions than obligations in higher-rated categories. However, the obligor's capacity to meet its financial commitment on the obligation is still strong.
BBB	An obligation rated 'BBB' exhibits adequate protection parameters. However, adverse economic conditions or changing circumstances are more likely to lead to a weakened capacity of the obligor to meet its financial commitment on the obligation.
BB	An obligation rated 'BB' is less vulnerable to nonpayment than other speculative issues. However, it faces major ongoing uncertainties or exposure to adverse business, financial, or economic conditions which could lead to the obligor's inadequate capacity to meet its financial commitment on the obligation.
B	An obligation rated 'B' is more vulnerable to nonpayment than obligations rated 'BB', but the obligor currently has the capacity to meet its financial commitment on the obligation. Adverse business, financial, or economic conditions will likely impair the obligor's capacity or willingness to meet its financial commitment on the obligation.

CCC	An obligation rated 'CCC' is currently vulnerable to nonpayment, and is dependent upon favorable business, financial, and economic conditions for the obligor to meet its financial commitment on the obligation. In the event of adverse business, financial, or economic conditions, the obligor is not likely to have the capacity to meet its financial commitment on the obligation.
CC	An obligation rated 'CC' is currently highly vulnerable to nonpayment.
C	A 'C' rating is assigned to obligations that are currently highly vulnerable to nonpayment, obligations that have payment arrearages allowed by the terms of the documents, or obligations of an issuer that is the subject of a bankruptcy petition or similar action which have not experienced a payment default. Among others, the 'C' rating may be assigned to subordinated debt, preferred stock or other obligations on which cash payments have been suspended in accordance with the instrument's terms or when preferred stock is the subject of a distressed exchange offer, whereby some or all of the issue is either repurchased for an amount of cash or replaced by other instruments having a total value that is less than par.
D	An obligation rated 'D' is in payment default. The 'D' rating category is used when payments on an obligation are not made on the date due even if the applicable grace period has not expired, unless Standard & Poor's believes that such payments will be made during such grace period. The 'D' rating also will be used upon the filing of a bankruptcy petition or the taking of similar action if payments on an obligation are jeopardized. An obligation's rating is lowered to 'D' upon completion of a distressed exchange offer, whereby some or all of the issue is either repurchased for an amount of cash or replaced by other instruments having a total value that is less than par.
Plus (+) or minus (-)	The ratings from 'AA' to 'CCC' may be modified by the addition of a plus (+) or minus (-) sign to show relative standing within the major rating categories.

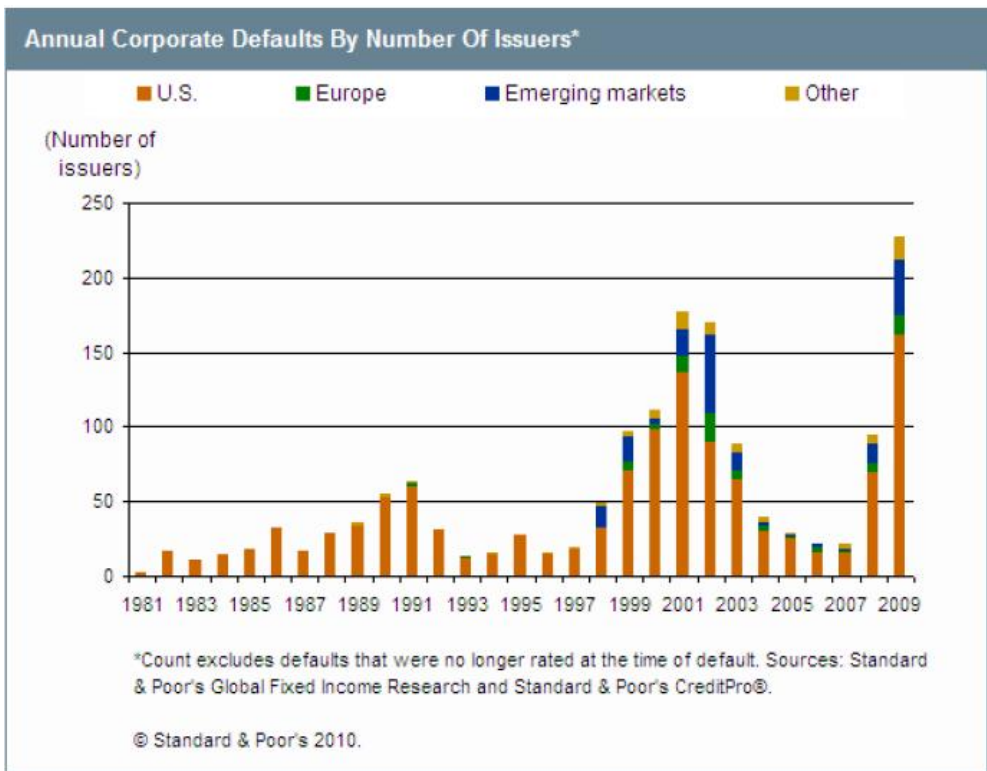


Figure 1: Annual corporate default