Capital Markets Responses to News During the Italian Financial Crisis 2009 - 2013

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Abstract

During the crisis that affected the Eurozone between 2009 and 2012 among the countries hardest hit was Italy. The review of its fundamentals, including national debt levels and budget deficit both before and during the crisis, indicates that the crisis was not unjustified. However, a closer examination of the timing and duration of the crisis as related to political events and economic announcements pointed to the possibility of some level of market biases that can be analyzed through the lenses of behavioral finance. Our findings indicate that markets did depart from EMH as we identified clear signs of asymmetrical reaction to news, under-reaction and overreaction to new reliable information, and major market movements in the absence of important news.

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1. Introduction

According to the Efficient Market Hypothesis ("EMH") in its semi-strong version, capital market prices are supposed to reflect historical information as well as publicly available information, which has implications for forward looking expectations. However, since at least the early '70s, research has defied some of the predictions of EMH and suggested that it is possible that investors' decisions are influenced by psychological biases.[1] Some of the most common biases that might be responsible for EMH-predicted-price departures include anchoring, confirmation bias, cognitive dissonance and over-optimism among others. Inefficiencies could also arise from incorrect mental models, incentive problems or difficulties in translating uncertainty into risk.

Adding to the vast literature in behavioral finance, in this article we tested a few hypotheses with respect to the reaction of Italian financial markets to different types of news and announcements during the recent Italian debt financial crisis and therefore attempt to understand whether markets behaved according to the EMH or departed from it and to what extent. The identification of behavioral biases contributes to better comprehend the origin of the crisis and the way it unfolded. For this purpose, we used financial instruments from the equity, debt and derivatives markets as dependent variables, and news and announcements as binary independent variables. We investigated whether investors reacted more strongly to bad news than good news during the unfolding of the crisis, causing in part capital markets to become naïve. We speculate that investors' lopsided attention to bad news could have led to a "negative bubble" and a departure of Italian government bonds from their fundamental value. It is also possible that once a climate of optimism started again to prevail and the situation normalized, markets became less sensitive to bad announcements. Also, we probed whether investors reacted in proper proportion to new reliable information or if movements of the markets were not always justified by news.

The possibility of more attention to negative news during the crisis or under-reaction and overreaction to reliable news, can support prospect theory according to which investors would value gains and losses differently. Developed by Amos Tversky and Daniel Kahneman in the early '90s, prospect theory suggests that decisions would deviate from what indicated by the expected utility theory since the weights are not the same as the true probabilities and utilities are assessed with a value function that considers a reference point that is determined by the subjective feelings of the individual investor each time.[2] Tversky and Kahneman (1992) argue that losses cause greater emotional impact on an individual than an equivalent amount of gains, so that if an investor is presented with two choices that provide the same expected utility, he/she will be more likely to choose the one that does not involve a loss. This aversion to losses can translate into a greater sensitivity to negative news and announcements and possibly a stronger reaction to them.

We believe the Italian case can be particularly insightful because, differently from other countries within the Eurozone, Italy's economic conditions and general expectations about its

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[1] See for example Niederhoffer (1971) on the effect of news on capital markets, DeBondt and Thaler (1985) on overreaction to information or more recently Jegadeesh and Titman (1993) on capital markets under-reaction to news.

[2] The theory was proposed for the first time in 1979, and then further developed in 1992 by Daniel Kahneman and Amos Tversky.

future economic performance continued to deteriorate and remain dire after the crisis reached its peak and yet normal conditions were reestablished during the second half of 2012.[3] Moreover, as the third largest economy of the Eurozone, Italy more than Greece could have ignited the demise of the Eurozone. The Italian national debt to GDP ratio remained the second highest among the PIIGS[4] after Greece and growing; nonetheless, in Italy, the situation started normalizing for no apparent economic fundamental reason or no particular improvement in short term expectations towards the end of 2012 (year that saw Italy's GDP shrink by 2.3 percent). *Prima facie*, this suggests a role for behavioral bias in the interpretation of the crisis and provides an opportunity to test it. The period reviewed in this study goes from the beginning of 2009 to the end of 2013. This allowed us to compare market responses before, during and after the crisis given that the Greek problems became widely recognized in the latter part of 2009 and the spread of the Italian sovereign bond over the German Bund normalized around 200 basis points at the beginning of 2013.

We have divided this article into five sections being Section 1 this introduction. Section 2 includes the presentation of the relevant theory and literature regarding both behavioral biases and the recent European crisis. In the third Section, we provide a review of the data and methodology utilized in this study. In Section 4, we discuss respectively four hypotheses and our statistical findings: Hypothesis 1 deals with markets reaction to positive news versus negative news during the crisis as compared to normal periods; Hypothesis 2 reviews the effect of positive and negative news as derived from selected sentiment indexes by Thomson Reuters MarketPsych Indices ("TRMI"); for Hypothesis 3, we tested the investors' under-reaction and overreaction to new reliable information; finally, Hypothesis 4 investigates whether contrarily to the efficient market theory, major market movements occurred even in the absence of noteworthy news. Our overall conclusion is in Section 5 where we gather all the evidence presented throughout this article and discuss the role behavioral finance in explaining market performance during the Italian crisis.

2. Literature review

Recent crises, including the Asian crisis, the US subprime mortgage crisis and the more recent European crisis have spurred many studies with respect to the efficiency of capital markets. Although there is no consensus on the importance of behavioral forces as part of capital markets performance, the literature finds that the reaction to economic and political news emanating from both official and unofficial sources have an impact on the evolution of debt markets as well as equity markets. Over the last couple of decades, from a methodological standpoint a well-established literature has developed on how to link news to market performance as the mechanism through which information is incorporated into securities prices has come increasingly under examination. We have applied these methodological tools to the Italian case, including the paper of Dooley and Hutchison (2009), which studied news announcements and the spillover of the U.S. subprime crisis to emerging markets.[5] Traditional finance theory has established that the valuation impact of news is transmitted to the market

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[3] Although this can be true for Greece as well, Italy did not actually default on its debt as Greece did.

[4] This acronym has been used in reference to Portugal, Italy, Ireland, Greece and Spain.

[5] Dooly and Hutchison (2009) collected announcement news from Bloomberg and the Federal Reserve Bank of St. Louis. They coded news into fifteen categories as relevant to their study, including for example bankruptcies (BR), credit events (CRD) and direct housing market policy actions (HD).

through the revision of market participant's expectations about future performance. Recent studies in behavioral finance, supported by empirical findings, have unveiled regular departures from EMH, where market participants either under-react or overreact to a series of positive or negative news announcements. Psychological biases such as over-optimism, anchoring and confirmation bias, and models of investors' sentiment are likely to play a key role in the reaction of financial markets that are not perfectly in line with EMH and the Efficient Utility Theory ("EUT"). Daniel, et al. (1998), Hong and Stein (1999), and Barberis, Shleifer, and Vishny (1998), among others, have developed behavioral models that can account for both overreaction and under-reaction in asset prices. For example, according to Barberis, Shleifer, and Vishny (1998), investors tend to under-react to sporadic news, but become very active when a security performs well and are inclined to overreact when bad news occur at the climax. Such literature tends to divide the way markets react to news and announcements into a "weak form" and a "strong form." According to the former hypothesis, the market would react more strongly to negative news rather than to positive news during a crisis; while according to the latter, capital markets would react solely to bad news during a situation of panic and ignore good news. For example, the results of the study of Afonso, Furceri, and Gomes (2011) confirms the weaker form of crisis hypothesis, while Sophia Koch and Elisabeth Baeumler's work (2013) on the news effect of credit downgrading and negative watches on the European government bond yields and stock markets corroborates the strong form.

With respect specifically the European crisis, most of the studies we have identified, deal with contagion effects within the Eurozone during the crisis (see Roberto A. De Santis, 2012); examine the effects of public statements by European Central Bank ("ECB") Governing Council members, European Union ("EU") officials and national representatives (see Büchel, Konstantin, 2013); or focus on the effect of announcements from credit rating agencies (see Fuceri and Gomes, 2011 and Mink and Haan, 2013). Koch and Baeumler (2013) have analyzed the effects of credit downgrading and negative watches on European government yields and equity markets and found a stronger reaction to negative announcements than good announcements during a crisis. With respect to contagion from Greece, by collecting daily data for government bond yields and CDS prices, De Santis (2012) found that announcements by credit rating agencies of a Greek downgrade of Greece had negative effects on Italy and other Eurozone countries.

A study about Greece that makes use of news is by Mink and De Haan (2013). Mink and De Haan collected, as dummy variables, news about Greece and news about the intentions of other countries to bail out Greece. This study focused primarily on the effect of such news on banks' stock returns. Its findings indicated that news about Greece did not lead to abnormal returns while news about a bailout did; this suggests that markets considered news about the bailout to be a signal of the inclination of European governments to use public funds to thwart the financial crisis.

Specifically related to Italy, Falagiarda and Reitz (2013), focused exclusively on the *Bel Paese* and the effects of ECB announcements about unconventional monetary policy on the perceived sovereign risk of Italy. According to Falagiarda and Reitz, ECB announcements about unconventional monetary policies substantially reduced Italian long-term government bond yield spread relative to German counterparts. With respect to interest rates, in an International Monetary Fund ("IMF") working paper, Edda Zoli (2013) concludes that news (as derived from Bloomberg) on the euro-area debt crisis and country-specific events were important drivers of sovereign spreads and increase in volatility. However, Zoli does not pay attention to the political dynamics related to the build-up of the crisis and the behavioral aspects of the transmission of

news announcements into market prices; that is, she accepts news as an indication of sovereign risk and does not investigate whether the reaction to news was consistent with rationality or not.

An insightful study by Beetsma, Giuliodori, de Jong and Widijanto (2012) makes use of the Eurointelligence newsflash, an internet-based service for economic news and analysis of the Euro area, and finds that more news coverage on average raised the domestic interest spread of PIIGS and led to an increase in the spreads of other PIIGS countries and even non-PIIGS countries. This implies that the number of articles independently from their content tended to increase volatility. Nonetheless, this study focuseds more on the quantity of news and does not differentiate between positive news and negative news as we do in our study. Although from a methodological standpoint, our analysis will not differ substantially from previous studies with respect to the use of spreads and stock returns as dependent variables, and news as dummy independent variables, differently from other papers, we have concentrated exclusively on Italy and on the effects of news and announcements on the unfolding of the crisis allowing for a more in depth analysis and measurement of the effects of such news. We not only differentiated between positive news and negative news, but also we analyzed the effects of Italian news separately from the international press. Furthermore, we examined in detail the Italian political developments and the credibility of their actors in the way they affected capital markets and government yields. The analysis of political dynamics and political news reveals that the Italian markets reacted not only to changes in expectations with regard to the economic fundamentals, but also and especially to political events. This highlights the political nature of the Italian crisis and challenges the notion that markets would respond solely to economic news as related to changes in the fundamentals.

3. Data and Methodology

We tested daily data for news and announcements and its effect on credit default swaps, the spread between the German bund and the Italian BPT (*Buoni Poliennali del Tesoro*), and the return on equity markets in Italy between 2009 and 2013. The key ingredient of our analysis is the news regarding Italian economic and political developments as reported in various newspapers. Capturing relevant news allowed us to assess their effect on capital markets and in particular, to examine the impact of positive news versus negative news throughout the unfolding of the crisis. It was our desire to obtain a broad set of news that were specifically related to Italian events, but not too large to the point of including occurrences with limited or marginal informational value.

As with previous studies, we did not find an objective method to designate the importance of different pieces of news and whether news in the press was fully unanticipated or not, however, we did attempt to a) consider only news that were not anticipated and b) account for the importance of news based on their relative position in the newspaper.[6] This is why we also examined physical newspapers rather than simply depend on on-line news; in this way, we were able to assign different 'weights' to the news based on where they were located in the newspaper (i.e. first page versus second page, above or below the fold, etc.). Furthermore, we coded only news that based on the examination of the news during the previous days appeared to be unanticipated; news that repeated themselves or seemed the logic consequence of previous ones were ignored during the coding process.

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[6] To capture only unanticipated news, we relied on what was self-revealed by the article and on a set of projections about economic fundamentals from various institutional sources.

The Greek crisis is considered to have started on October 18, 2009 with the announcement of the Greek government about the actual government deficit. The beginning of year 2013 corresponds to the normalization of market conditions, which reverted to the levels observed prior to the crisis. Collecting data from the beginning of the Greek crisis allowed us to search also for possible signs of contagion. The Italian financial crisis that was characterized by historic high yields of sovereign bonds started abating by the second half of 2012 with CDS prices returning to pre-crisis level; as such, we extended our study to the end of 2013 in order to analyze the impact on news and announcements on capital markets post crisis.

With respect to credit markets, we collected time series data for the daily spreads of the Italian BPT over the German Bund (the 10-year sovereign bond). The spread of the Italian sovereign debt over the German Bund is particularly useful because it is commonly reported by all newspapers in Europe, and its trend is normally followed by the general public. The Italian sovereign bonds are issued by the Italian Republic, through the Ministry of Economics and Finance ("MEF"), which relies on the *Banca d'Italia* (the Italian central bank) for the actual organization and placement of the securities to both private and institutional investors. They are divided into seven types and mainly differ based on their maturity, indexing features and coupon payments. The different types belong to three main categories: Zero Coupon, variable rate and fixed- rate debt securities. For the purpose of our study, we focused on fixed rate securities and collected data on the 10-year BPT, the 3-yeat BPT, the 5-year BPT and the 30-year BPT. All these securities are issued through an *Asta Marginale* (Dutch auction)[7] and pay semi-annual coupons at a constant fixed rate. The 3-year securities are issued twice a month while the 5-year and the 10-year securities are issued monthly in conjunction with the mid-month auction, and finally the securities with maturity at 30 years are issued quarterly. They are all traded ex-dividend ("*Corso Secco*") on the MOT ("*Mercato Telematico delle Obbligazioni*") with a three-day settlement.

With respect to the stock market, we collected daily data for the FTSE MIB index. The FTSE MIB (MIB stands for "*Milano Italia Borsa*") is the main stock market index for the *Borsa Italiana*, the Italian national stock exchange, which superseded the MIB-30 index in September 2004. Now the index consists of the 40 most-traded stocks on the exchange.[8] The FTSE MIB is the benchmark for the Italian equity market capturing approximately 80 percent of the domestic market capitalization. This index tends to be lop-sided with the top 10 stocks comprising approximately 60 percent to 70 percent of its weighting. The index's top sector exposures in terms of magnitude includes banking & financial services, oil & gas and utilities. For the derivatives market, we collected data for the 5-year sovereign CDS spreads. Since the U.S. financial crisis in 2008, the role of CDS has been more under scrutiny by both market makers and government regulators. This has been due primarily to concerns regarding the possibility that such instruments may amplify tensions on the bond markets due to their use for speculation on credit risk. CDS on sovereign issuers tends to be more concentrated than that of the CDS on corporate issuers. In December 2010, the top 10 sovereign reference entities accounted for approximately 55 percent of the notional amount of the total CDS on sovereign

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[7] The only difference with a competitive auction is in the final stage: in fact, all intermediaries who are awarded the securities will pay for them at the marginal price, being the last accepted price.

[8] From the beginning of 2004 until June 2009, the index was administered by Standard & Poor's (it used to be called S&P MIB), then in June 2009 this responsibility was transferred to the FTSE Group.

issuers. The Italian Republic was the top reference entity for CDS contracts on sovereign issuers, with approximately 12 percent of the share followed by Brazil and Spain.[9]

For the Italian news, we collected daily news from two main Italian newspapers, *Il Sole 24 Ore*, the Italian national daily business newspaper owned by *Confindustria* (the Italian employers' federation), and *Corriere della Sera*, a historic publication and one of the largest national daily newspapers in terms of number of readers. For English-language news, we compiled daily news from the Wall Street Journal (the Western version) and the Financial Times (the U.K. version). Differentiating between domestic news reported in the Italian language and those reported by the international English press allowed us to analyze differences in emphasis and their effect on capital markets.

Through a systematic codification process, we constructed dummy variables for Italian related news as identified in the first two pages of all four newspapers mentioned above on a daily basis from January 1, 2009 to December 31, 2013 with the purpose of measuring the impact of such news on the Italian capital markets. This resulted into three binary variables: positive news, neutral news and negative news where each could have a value of 1 or 0.[10] All news were classified as either political or economic news. In the codification process, only domestic news were taken into consideration since we intended to identify, isolate and analyze country specific events. Due to the high level of correlation between Italian capital markets and other markets and indexes (i.e. the S&P 500 index, the MSCI index, the STOXX 600 index, etc.), the inclusion of international news could potentially dilute the explanatory effect of on the domestic market. As such only news for which the implied effect on the Italian markets was clearly stated in the articles were taken into account. For example if the Greek crisis could entail a payment by the Italian government for rescuing Greece and this was clearly stated in the article, then such news item was coded and recorded, otherwise it was discarded. In general, the classification of positive and negative news used in our study followed the methodology of Baig and Goldfajn (1999) and, Jo and Willett (2000). Examples of good news include the announcement of economic reforms, upgraded credit ratings, enhanced political stability, good economic indicators and financial indicators (such as economic growth, lower budget deficit rate, lower unemployment), initiatives of the *Banca d'Italia*, of the Italian government and also of the ECB, IMF or other international organizations in favor of the country as well as news on positive economic outlook. On the other hand, negative news include non-credible or inconsistent economic reforms, or economic reforms that did not find approval at the parliamentary level or other stages of the legislative process, downgrades in credit ratings, constraints imposed by the Government or by the EU or other international organizations and worse than expected economic indicators (such as an increase in national debt, slower economic activity, bankruptcies of major corporations, legal proceedings against key members of the government, etc.). If news articles could not be clearly defined as positive or negative, we recorded them as neutral. We recorded as neutral also all the news that had simultaneously a positive and negative component, so that the final effect could be assumed to be inconsequential.

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[9] CONSOB, February 2011.

[10] Validation statement: the codification process performed by the author was validated by Giovanna Michela Altomare, a graduate in economics from the Bocconi University in Milano, Italy and a native speaker in Italian. By following the same methodology of the author, Ms. Altomare repeated the codification process for all the newspapers including the ones in English language. Approximately five percent of the coding resulted different from the original coding.

To test our hypothesis, we used two different coding methodologies. For the first coding methodology, we considered the news on the first and second page of each individual newspaper, while for the second approach, which we named the Combined Method, we captured the most important daily news items that we found simultaneously on the front or second page of respectively both Italian newspapers and both international newspapers. With respect to the first coding methodology, in the attempt to add to the categories of good news and bad news also "mildly good news" and "mildly bad news," we reviewed individually all four newspapers. In this case, all relevant news were analyzed and coded not only based on the nature of the news, but also on the position of such news in the newspaper. We defined this methodology as the Individual Method. The position of the news on the pages of the newspapers was used as a proxy for importance and relevance. A news item above the fold line was assigned +/- 1 point (+1 for positive news; -1 for negative news), while relevant news below the fold line scored +/- 0.75 points. The news on the second page were assigned +/- 0.50 points no matter where they were positioned in the page; plus, if a news item that was placed in the first page was also reported in the second page, an additional +/- 0.25 points were recorded. In the end, the algebraic sum of all the points represented the final score for that particular day. For example if in the first page above the fold it appeared a positive news item (+1 points) and a negative news item appeared in the second page (-0.5 points) the total score for that day was +0.5 points. If the final score resulted to be greater than 0, a positive news was recorded, while we reported negative news if the final score was less than zero. A score equal to zero would correspond to neutral news. The table below reports the number of days with positive and negative news based on this methodology.

Table I: Number of News from Domestic and International Newspapers

Newspaper	Year	Positive News	Negative News
Corriere della Sera	**From 2009 to 2013**	**494**	**681**
	2009	107	77
	2010	64	99
	2011	86	156
	2012	123	142
	2013	115	207
Sole 24 Ore	**From 2009 to 2013**	**994**	**645**
	2009	233	99
	2010	205	112
	2011	177	154
	2012	194	131
	2013	185	149
Financial Times	**From 2009 to 2013**	**104**	**206**

	2009	27	27
	2010	13	33
	2011	28	72
	2012	24	31
	2013	12	43
Wall Street Journal	**From 2009 to 2013**	**94**	**100**
	2009	22	20
	2010	9	11
	2011	24	22
	2012	18	16
	2013	21	31

Corriere della Sera exhibited a prevalence on average of negative news over positive news with a ratio on average of 1.1 as the number of positive news remained greater than negative news until October 31, 2010. Conversely, for the *Il Sole 24 Ore* positive news dominated throughout the entire period with an average ratio of positive news over negative news of 2.0 and a range from 1.5 to 9.0. The ratio is the lowest in 2009. For the Financial Times, we identified a total of 104 positive news and 206 negative news. The number of negative news surpassed positive news at the end of February 2010, while the average ratio of positive news over negative news remained greater than 1.0 until mid-February 2012, but it is in 2011 that the frequency of negative news started accelerating. For the Wall Street Journal, the number of positive news versus negative news remained stable throughout the entire period; remarkably, the year with the lowest ratio of positive to negative news was 2013, which is the year when the crisis abated. For 2011, at the peak of the crisis, we registered slightly more positive news than negative news (24 versus 22).

For the Combined Method, since the intent was to identify only the most relevant news that were likely to affect capital markets, we coded concurrently the news contained in the *Corriere della Sera* and *Il Sole 24 Ore*. In this case, for the news to be reported as positive or negative, the same news item had to appear in both newspapers at the same date. When more than one piece of news was reported in the same day in both newspaper, we selected the most important one in terms of its expected effect on capital markets. In reality, the presence of more than one news item in both newspaper occurred less than 0.2 percent of the times. This was also due to the different nature and focus of the newspapers (by and large, the *Il Sole 24 Ore* emphasizes economics and financial news while *Corriere della Sera* gives more importance to political news). Although we attempted to go through the same exercise for the Financial Times and the Wall Street Journal, the limited number of news and the fact that the same news was rarely reported the same day on both newspapers prevented us from obtaining a sufficient number of data points. The table below shows the number of days with positive and negative news based on the Combined Methodology.

Table II: Number of News Based on Combined Coding

Newspaper	Year	Positive News	Negative News
Corriere della Sera/ Sole 24 Ore	**From 2009 to 2013**	**340**	**356**
	2009	79	45
	2010	71	91
	2011	78	90
	2012	66	66
	2013	45	62

For the combined coding *Corriere della Sera / Il Sole 24 Ore*, the ratio of positive over negative news was approximately 0.95 as the number of positive and negative news remained relatively balanced on average throughout the entire period. In 2010 and 2011, the ratio of positive over negative news turned in favor of negative news at approximately 0.85 on average. In 2012, we coded the same number of positive and negative news, while in 2013the ratio of positive news over negative news became again less than one despite the fact that the crisis had already subsided.

In addition to the news as reported on the front and second pages of the newspapers, we collected virtually all articles, bulletins, reports and announcements and regarding Italy from *Banca d'Italia*, the ECB the IMF and the EU between 2009 and 2013. We also assembled all press releases and studies regarding Italy from Moody's and Standard & Poor's. All these publications were reviewed and analyzed mostly for the purpose of gathering and understanding the expectations on the performance of the Italian economy and its fundamentals as compared to the actual results. The quarterly "Bulletins" of the *Banca d'Italia* were particularly insightful in terms of the state of the economy, and the effects of austerity measures and political reforms on the national debt and budget deficit. The review of this material also contributed to the identification of specific turning points that changed the overall market sentiment regarding the performance of the Italian credit and stock markets.

In addition to daily newspapers, we collected daily data for various sentiment indexes from TRMI specifically for Italy between 2009 and 2011. MarketPsych has been developing financial text-based data and investment models since 2004 through knowledge in natural language processing, cloud computing and behavioral economics. It has published research in academic journals, textbooks, and books and began collaborating exclusively with Thomson Reuters in 2011.[11] TRMIs are evaluated on three different content sets: news, social media, and the combined content of news and social media. Reuters news comprises internet news and is restricted to top international and business news sources, top regional news sources, and leading industry sources. Three key types of indicator are provided:

- Emotional indicators such as 'Anger,' 'Fear' and 'Joy;'
- Macroeconomic metrics including Earnings Expectations and Interest Rate Forecast;

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[11] *Trading on sentiment, The Power of Minds of over Markets*, by Richard L. Peterson. *Market Psych*, by Richard Peterson and Frank F. Murtha. *Inside the Inventors' Brain*, by Richard L. Peterson.

- Buzz metrics on the asset level, i.e., Buzz, and on market-moving topics for that asset, such as Litigation, Mergers, and Volatility.

The indicators are updated every minute for companies, sectors, regions, countries, commodities and energy topics, indices and currencies, but are available also on a one-day basis, which is what was applied to this study. Typically, such indexes are translated directly into spreadsheets or charts that can be monitored by traders, risk managers or analysts. The social media collection contains finance-specific tweets and blogs. Using popularity ranks measured by incoming links, this includes generally the top 30 percent of blogs, microblogs, and other social media content. Such indices are marked as ranging from either -1 to 1 or from 0 to 1 corresponding respectively to bipolar and unipolar indices. For the purpose of our analysis, we used three indexes out of the 48 available although all indexes were tested for significance between 2009 and 2013. The three selected indexes included: 1) "Sentiment," that counts overall positive references, net of negative references, 2) "Optimism," which considers optimism net of references to pessimism, and finally 3) "Stress," that considers references to distress and danger. These indexes were chosen because they were not asset specific and were likely to capture the news that affected overall market performance during the crisis.

4. Hypotheses and Results

Hypothesis 1: During the crisis investors reacted more strongly to bad news than good news independently from the number of news items.

This hypothesis was tested on the Italian CDSs, the FTSE MIB equity index and the spread of the Italian 10-year BTP over the 10-Year German Bund. The possibility of a stronger reaction to bad news during the crisis supports the loss aversion theory where investors depart from behaviors as predicted by the EUT and therefore tend to base their decisions on potential gains and losses instead of the likelihood of the outcome. However, other possible explanations that would be consistent with such reaction include a swing to excessive pessimism and confirmation bias if investors assumed that the situation was bad and therefore they discounted positive news vis a vis negative news (and vice versa). We employed the Ordinary Least Squares ("OLS") regression with binary variables methodology; in order to isolate further the effect of news from other elements (such as the effect of international events); we included as control variables the returns on other indexes such as the S&P G1200, the STOXX 600 and the MSCI World ("MSCI"):

$$CDS\_R_t = \beta_1 POS_t + \beta_2 NEU_t + \beta_3 NEG_t + \beta_4 CNT_t + \varepsilon_t \tag{1}$$

$$MIB\_R_t = \beta_1 POS_t + \beta_2 NEU_t + \beta_3 NEG_t + \beta_4 CNT_t + \varepsilon_t \tag{2}$$

$$SPRD\_R_t = \beta_1 POS_t + \beta_2 NEU_t + \beta_3 NEG_t + \beta_4 CNT_t + \varepsilon_t \tag{3}$$

where CDS_R_t is the change in CDS prices, MIB_R_t is the return on the FTSE MIB and $SPRD\_R_t$ is the change in the spread. With respect to the coefficients, β_1 shows the effect of positive news on the dependent variable; β_2 shows the effect of neutral news on the dependent variable; and β_3 shows that the effect of negative news on CDS prices returns.[12] CNT_t identifies

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[12] For CDS and the Spread, the positive news should have a negative coefficient, while for the FTSE MIB β1 should be positive in the presence of positive news.

different control variables that we used for this analysis and β_4 represents its effect on the dependent variable.

We have run several regressions for different time periods, based on different key events that we regarded as tuning points during the crisis. The regression model that we selected is similar to what has been used in other studies that are interested in the types of news that affect the dependent variable (see Dooly and Hutchinson, 2009). The following turning points correspond to key political, economic or financial events that profoundly affected market sentiment and performance due to their expected impact on the economy or political stability:

- The beginning of the Greek financial crisis in October of 2009;
- Italy's revised outlook to negative by S&P in May 2011;
- The resignation of Mr. Berlusconi as prime minister in November 2011;
- The Default of the Greek debt in March 2012;
- The announcement of Mr. Draghi in defense of the Euro in July 2012; and
- The resignation of Mr. Monti as Prime minister in December 2012.

By relaying on the turning points listed above, we examined different periods in order to evaluate the type of market reactions to news and their intensity. In this contest, it is important to recall, that most of the Italian debt has been traditionally held by domestic investors including domestic banks, domestic non-bank and by the *Banca d'Italia* for a total of approximately 75 percent. Of the remaining 25 percent that is in the hands of foreign investors, about 20 percent is held by foreign non-banks. As such, we can expect that domestic newspapers should have a larger impact on the dependent variables.

As shown in Table 1 below, for CDS and news from *Corriere della Sera* from the beginning of 2009 to the first turning point that is represented by the beginning of the Greek crisis, a substantially larger effect of positive news than negative news was found, -1.25 versus 0.09 percent with only the former being statistically significant. This indicates that during that period, investors in CDS remained relatively optimistic with respect to the direction of the economy and the country overall. However, with the announcement by George Papandreou's new socialist government that the Greek budget deficit was actually double the previous government's estimate and hit 12 percent (which was reported in a relatively quiet manner by the Italian newspapers), all of the sudden we notice a larger effect of negative news, -0.04 versus 1.00 percent between the end of 2009 and the end of 2011, and -0.14 versus 1.37 percent for a sub-period that goes from the May 2011 through the end of 2011. May 2011 corresponds to Italy's Outlook Revised To Negative, by Standard & Poor's on risk of persistent high debt ratio. With the beginning of the Greek crisis through the resignation of Mr. Berlusconi, only the coefficients of negative news remain statistically significant.

As Mr. Berlusconi resigned at the end of 2011, we register a stronger coefficient for positive news that is also statistically significant. After a persistent campaign in both domestic and international newspapers that stressed the inability of the government to tackle effectively the financial crisis, by and large, Mr. Berlusconi's departure was received with a great sense of relief by both capital markets and foreign observers. However, with the default of the Greek debt in March 2012, the coefficient for negative news becomes stronger again (0.26 percent versus -0.93 percent) and statistically significant. The declaration of Mr. Draghi in defense of the Euro in July 2012, turned the attention to positive news once again with a coefficient of -2.06 percent, which is the highest throughout the entire period for the analysis with *Corriere della Sera*; even so, also the coefficient for negative news remained statistically significant at the 10 percent level.

By the time, Mr. Monti resigned; the situation seemed to have normalized and the attention to news, both positive and negative dropped significantly.

Table III. The Impact of Positive and Negative News from Corriere della Sera on Italian changes on CDS with control variables

Period	Period	Positive News	Negative News	Control Variable (S&P 500)	# Pos. News	# Neg. News
January 2009 - Beginning of the Greek Crisis	01/01/2009 to 10/17/2009	-1.25% (-2.73)***	0.09% (0.17)	-0.45 (-3.29)***	87	63
Beginning of the Greek Crisis –Mr. Berlusconi Resigns	10/18/2009 to 11/16/2011	0.04% (0.10)	1.00% (3.19)***	-1.45 (-9.06)***	149	249
Negative Outlook by S&P - Mr. Berlusconi Resigns	05/11/2011 to 11/16/2011	0.14% (0.17)	1.37% (2.32)***	-1.06 (-4.41)***	50	92
Mr. Berlusconi Resigns - Default of Greek Debt	11/17/2011 to 03/19/2012	-1.28% (-2.37)***	0.50% (0.88)	-1.47 (-4.80)***	42	43
Default of Greek Debt - Declaration of Mr. Draghi	03/20/2012 To 07/25/2012	-0.26% (-0.52)	0.93% (2.50)**	-1.53 (-5.52)***	29	49
Declaration of Mr. Draghi - Mr. Monti Resigns	07/26/2012 To 12/09/2012	-2.06% (-3.80)***	1.10% (1.78)*	-2.38 (-4.93)***	61	61
Mr. Monti Resigns – End of 2013	12/10/2012 To 12/31/2013	-0.06% (-0.23)	-0.02% (-0.12)	-0.81 (-3.59)***	126	216

Notes: t statistics are in parenthesis. * denotes 10% significance level, ** denotes 5% and *** denotes 1%.

The combined coding of *Corriere della Sera/Il Sole 24 Ore* corroborates the results illustrated above resulting in general in even larger coefficients both for positive and negative news and stronger statistical significance. Thus, once again, during the first part of 2009, we register more attention to positive news than negative news, but as the Greek crisis commenced, the signal reverts in favor to negative news. With the default of the Greek debt in 2012, the level of attention increases for both positive and negative news all the way through the beginning of 2013 when a condition of relative optimism seemed to be finally reestablished. The table below illustrates the results for the Italian Spread for the combined coding of *Corriere della Sera and Sole 24 Ore*.

Table IV. The Impact of Positive and Negative News from the combined Corriere della Sera and Sole 24 Ore on the Spread with Control Variables

Period	Period	Positive News	Negative News	Control Variable (S&P 500)	# Pos. News	# Neg. News
January 2009 - Beginning of the Greek Crisis	01/01/2009 to 10/18/2009	-1.51% (-2.14)**	0.05% (0.05)	-0.54 (-2.92)***	52	33
Beginning of the Greek Crisis – Mr. Berlusconi Resigns	10/18/2009 to 11/16/2011	-0.03% (-0.08)	1.11% (3.03)***	-1.25 (-8.23)***	153	188
Negative Outlook by S&P - Mr. Berlusconi Resigns	05/11/2011 to 11/16/2011	-1.22% (-1.44)	2.29% (3.54)***	-0.34 (-1.41)	37	66
Mr. Berlusconi Resigns - Default of Greek Debt	11/17/2011 to 03/19/2012	-0.85% (-1.41)**	-0.98% (-1.17)	-0.57 (-1.45)	42	20
Default of Greek Debt - Declaration of Mr. Draghi	03/20/2012 To 07/25/2012	1.63% (2.26)**	1.21% (1.86)*	-1.23 (-3.66)***	23	32
Declaration of Mr. Draghi - Mr. Monti Resigns	07/26/2012 To 12/09/2012	-0.94% (-1.79)**	0.84% (1.54)	-1.07 (-3.20)***	24	19

	12/10/2012 To 12/31/2013	-1.53% (-3.62)***	0.96% (2.82)***	-0.74 (-3.30)***	46	64
Mr. Monti Resigns – End of 2013						

Notes: t statistics are in parenthesis. * denotes 10% significance level, ** denotes 5% and *** denotes 1%.

The results illustrated in table 3 and 4 are consistent with the results for all the dependent variables and with news from various newspapers and different coding techniques.

Hypothesis 2: During the crisis, investors reacted more strongly to on-line negative news than good news as derived from the TRMI, indexes independently from the average level of each index.

Similarly to the previous hypothesis, we tested the Italian CDS, the FTSE MIB equity index and the spread of the Italian 10-year BTP over the 10-Year German Bund; however, instead of relying on daily news from newspapers, we used changes in the TRMI indexes as proxies for positive and negative news. Such indexes originate from more than 2000 online global news sources through a text recognition software virtually in real time, including the Wall Street Journal, the Financial Times, CNN, Google, Thomson Reuter, South China Morning Post and the New York Times among many others. News are both political as well economic in nature.

Although the TRMI indexes are commonly used in the market place by traders as lead indicators of market performance and trends, in our study we utilized them to assess ex post whether Italian capital markets reacted asymmetrically to positive and negative news during the crisis. In order to derive positive and negative news from various indexes, we considered whether the index for each day was increasing or decreasing; it follows that when the index was increasing, there were either good news or bad news based on the specific nature of the index and vice versa when it was declining. As mentioned in Section 3, in order to measure the effect of news, we selected the following three indexes:

- "Sentiment:" this index remained negative for the entire period with an average of -0.136 and a standard deviation of 0.049. Since the index is bipolar from -1 to +1, the fact that it remained negative throughout the period indicates the prevalence of negative news over positive news and therefore a negative market sentiment as fueled by the news;
- "Optimism:" this index also ranges from -1 to +1 and captures optimistic references net of pessimistic ones. With an average of -0.005 and a standard deviation of 0.010, the index changed sign from positive to negative and vice versa multiple times;
- "Stress:" this index, which is unipolar (i.e. it ranges from 0 to 1) and measures distress and danger, had an average of 0.074 and a standard deviation of 0.010. The closer the index is to 1 the higher is the level of stress and perceived danger as captured by the index.

The OLS regression methodology was employed as follows:

$$CDS\_R_t = \alpha + \beta_1 TRMIUP_t + \beta2 TRMIDW_t + \varepsilon_t \tag{4}$$

$$MIB\_R_t = \alpha + \beta_1 TRMIUP_t + \beta2 TRMIDW_t + \varepsilon_t \tag{5}$$

$$SPREAD\_R_t = \alpha + \beta_1 TRMIUP_t + \beta_2 TRMIDW_t + \varepsilon_t \tag{6}$$

where CDS_R_t is the percentage change in CDS prices, MIB_R_t is the return on the FTSE MIB and $SPRD\_R_t$ is the percentage change in the Spread. With respect to the coefficients, β_1 shows the effect of the an increase in the index on the dependent variable, while β_2 shows the effect of the a decrease in the index on the dependent variable.[13] Similarly to what we did for Hypothesis 1, we ran several tests for different time periods, based on the specific turning points and we tested the hypothesis that investors both in equity and debt markets were more likely to respond to negative news during the crisis than during normal times. Our findings confirm this hypothesis because for the CDS, the FTSE MIB and the Spread, during the crisis only the coefficients for negative news were meaningful and statistically significant while prior to the crisis we registered no effect. However, the coefficient related to positive news becomes meaningful and statistically significant after turning points that indicated strong positive signals and therefore when confidence was reestablished (i.e the resignation of Mr. Berlusconi). Remarkably, once the market conditions reverted to those prior to the crisis, in most cases the effect of change in sentiment became once again virtually irrelevant in explaining market performance.

Consistently for the CDS, FTSE MIB and Spread, the Sentiment index provides the strongest results in terms of magnitude of the coefficients and statistical significance as compared to Optimism and Stress. Nonetheless, also for the Stress and Optimism we consistently observe asymmetrical market reaction for good versus bad news. The table below illustrates the impact of the changes in the Sentiment index on the Italian Spread.

Table V. The Impact of the Sentiment Index on the Spread

Events	Period	Positive News	Negative News	# Positive Upticks	# Negative Upticks
January 2009 - Beginning of the Greek Crisis	01/01/2009 to 10/18/2009	0.23% (0.46)	-0.64% (-1.40)	92	114
Beginning of the Greek Crisis – Mr. Berlusconi Resigns	10/18/2009 to 11/16/2011	-0.37% (-1.29)	-0.96% (-3.49)***	256	287
Negative Outlook by S&P - Mr. Berlusconi Resign	05/20/2011 to 11/16/2011	-0.86% (-1.34)	2.19% (4.01)***	54	75
Beginning of Greek Crisis- Declaration of	10/18/2009 to 07/26/2012	-0.34% (-1.46)	0.83% (3.56)***	455	361

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[13] For Sentiment and Optimism, an increase of the index signals positive news. On the other hand, for Stress an increase in the index signals the presence of negative news.

Mr. Draghi					
Mr. Berlusconi Resigns - Default of Greek Debt	11/17/2011 to 03/19/2012	-0.90% (-1.75)*	-0.40% (-0.65)	399	324
Default of Greek Debt - Declaration of Mr. Draghi	03/20/2012 To 07/25/2012	0.36% (0.84)*	1.00% (1.89)*	55	37
Declaration of Mr. Draghi - Mr. Monti Resigns	07/26/2012 To 12/09/2012	-0.98% (-2.60)**	0.04% (0.13)	48	48
Mr. Monti Resigns – End of 2013	12/10/2012 To 12/31/2013	-0.29% (-1.27)	0.01% (0.06)	143	134

 Notes: t statistics are in parenthesis. * denotes 10% significance level, ** denotes 5% and *** denotes 1%.

Although it might make common sense that negative news would play an important role during tumultuous times since there would be more negative news than positive news, we notice that neither the number of downticks versus upticks of the indexes, nor the absolute level of the indexes for the various periods seem to consistently drive our results. During the entire period, the number of upticks versus downticks remains well balanced and even in favor at times of positive news.

Regarding the Stress index, we also notice that the effects of downticks on the CDS and the Spread tend to be stronger when the level of stress is higher rather than when it is lower even in the presence of the same number of downticks and upticks. Thus, *prima facie* the absolute level of stress is relatively unimportant in this case.[14] This is contrary to certain studies that have made use of cortisol on groups of volunteers (with the use of a control group that take a placebo); whose findings suggest that it is the level of stress (as increased artificially by the use of cortisol in the human body) that causes a risk-averse-behavior rather than its relative change.[15] Our results could entail that once investors reach a certain level of psychological stress, they will engage in behaviors that protect them from being 'psychologically harmed' by welcoming good news more than bad news. Table 6 below shows that with the highest level of average stress, after the resignation of Mr. Berlusconi, positive news had a much stronger impact than negative news. The protective effect of this coping mechanism would allow investors to keep the problem within reasonable levels so that they would adapt to the new situation.[16] However, a new change in the level of stress would force individuals to new coping behaviors in order to adapt.

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[14] This might entail that when stress is high, a little relief in stress leads immediately to a greater level of "hope."

[15] See Kandasamy, 2013, according to which elevated levels of stress would shift risk preferences.

[16] See Pearlin and Shooler, 1978.

Table VI. The Impact of the Stress Index on the Italian CDS

Events	Period	Stress Downtick	Stress Uptick	Uptick	Downtick	Mean	St. Dev
January 2009 - Beginning of the Greek Crisis	01/01/2009 to 10/18/2009	-0.62% (-1.65)	-0.29% (-0.82)	145	145	0.0761 9275	0.0110 1149
Beginning of the Greek Crisis – Mr. Berlusconi Resigns	10/18/2009 to 11/16/2011	0.18% (0.59)	0.62% (2.02)**	376	383	0.0737 871	0.0111 612
Negative Outlook by S&P - Mr. Berlusconi Resigns	05/20/2011 to 11/16/2011	0.29% (0.44)	1.73% (2.65)***	92	89	0.0785 644	0.0130 109
Beginning of Greek Crisis- Declaration of Mr. Draghi	10/18/2009 to 07/25/2012	-0.01% (-0.06)	0.63% (2.51)**	501	510	0.0747 375	0.0112 381
Mr. Berlusconi Resigns - Default of Greek Debt	11/17/2011 to 03/19/2012	-1.41% (-2.93)***	0.44% (0.83)	62	62	0.0791 2204	0.0124 9048
Default of Greek Debt - Declaration of Mr. Draghi	03/20/2012 To 07/25/2012	0.26% (0.66)	0.82% (1.89)*	63	65	0.0761 0372	0.0091 4618
Declaration of Mr. Draghi - Mr. Monti Resigns	07/26/2012 To 12/09/2012	-1.44% (-2.37)**	-0.04% (-0.06)	65	72	0.0720 0592	0.0095 5594
Mr. Monti Resigns – End of 2013	12/10/2012 To 12/31/2013	-0.41% (-1.87)*	0.14% (0.62)	196	191	0.0730 65543	0.0096 91295

Notes: t statistics are in parenthesis. * denotes 10% significance level, ** denotes 5% and *** denotes 1%.

Overall, the results of our analysis indicate that investors became more risk averse during the crisis and less risk averse - more inclined to buying rather than selling - after the declaration of Mr. Draghi and therefore once confidence was reestablished. Investors acted also when the stress level started dropping after the peak of the crisis, although before the crisis with even higher level of stress there was no coefficient that was statistically significant for either upticks or downticks. This could imply that the crisis had a lasting effect even after normal conditions were reestablished and the Stress level dropped below the initial levels in 2009.

<u>Hypothesis 3: During the Italian financial crisis, investors under-reacted and overreacted to new reliable information.</u>

The results from the previous hypotheses, suggest the presence of some inefficiencies and a stronger attention to negative news during the crisis, thus we suspect that other inefficiencies such as the phenomenon of under-reaction and overreaction could have been present at that time. As previously indicated, during the last two decades, empirical research in finance has identified examples of behavioral biases that can be responsible to make market depart from EMH that include under-reaction to reliable information (either good or bad) as well as overreaction to reliable or less reliable information (see De Bondt and Thaler, 1985 and 1987). We tested the presence of under-reaction and overreaction on CDS, the FTSE MIB index and the Spread. Also in this case, a parsimonious OLS model was employed as follows:

$$CDS\_R_t = \beta_1 News_t + \beta_2 Lag1_t + \beta_3 Lag2_t + \beta_4 Lag3_t + \varepsilon_t \tag{7}$$

$$MIB\_R_t = \beta_1 News_t + \beta_2 Lag1_t + \beta_3 Lag2_t + \beta_4 Lag3_t + \varepsilon_t \tag{8}$$

$$SPREAD\_R_t = \beta_1 News_t + \beta_2 Lag1_t + \beta_3 Lag2_t + \beta_4 Lag3_t + \varepsilon_t \tag{9}$$

where CDS_R_t is the change in CDS prices, MIB_R_t is the return on the FTSE MIB and $SPREAD\_R_t$ is the change in Spread. With respect to the coefficients, β_1 measure the effect of current news (either positive or negative), while β_2, β_3 and β_4 show the effect of the lagged news (either positive or negative) for the previous three periods (three days) on the dependent variables. Although many tests were performed by using a different number of lags (up to ten), the results suggested that beyond the third lag, the news had virtually no effect on the dependent variable. The analysis was performed for different periods in conjunction with the same turning points during that we illustrated in the previous sections. Once again, we used news from our database from *Corriere della Sera*, the *Il Sole 24 Ore*, the combined *Corriere della Sera / Il Sole 24 Ore* as well as the TRMI Sentiment index.

<u>Under-reaction</u>

We organized the results of this analyses based on the particular events for which we were able to detect signs of under-reaction; these events include the default of Greece in March 2012, the announcement of Mr. Draghi in July 2012, and finally the resignation of Mr. Monti in December 2012.

The table below shows that for the period starting in March 2012 and ending with the announcement of Mr. Draghi, the Lag 3 was statistically significant, indicating that the negative news of three days prior still had a meaningful effect on the change in prices of the Italian CDS and the Spread. All three coefficients are approximately all at the one percent level although it is for news that come from different sources and for the CDS and the Spread alike.

Table VII. The Default of the Greek Debt and Under-reaction Effects

Event	Period	Metric	Source	Lag1	Lag2	Lag3	Pos / Neg
Default of Greek Debt - Declaration of Mr. Draghi	03/20/2012 To 07/25/2012	CDS	Sole			1.00% (1.99)**	Neg
		CDS	Sentiment Index			1.00% (2.01)**	Neg
		Spread	Sole			1.02% (1.73)*	Neg

Notes: t statistics are in parenthesis. * denotes 10% significance level, ** denotes 5% and *** denotes 1%.

Also for the period that began with the announcement of Mr. Draghi, we detected an anomaly where new information continued to have an effect on the dependent variable one or two days after their release. The effect of Lag 1, however, appears less dependable as an indication of initial under-reaction since the timing of the release of the news (above all for our database of positive and negative news that are originated from physical newspapers) could vary substantially depending on the type of news and the source because the piece of news could have been known one day prior, but for practical purposes could have appeared in the newspaper with at least one day of delay. Differently from the default of the Greek debt, most of the lagged news that had an effect on the market were positive news.

Table VIII. Declaration of Mr. Draghi and Under-reaction Effects

Events	Period	Metric	Source	Lag1	Lag2	Lag3	Pos / Neg
Declaration of Mr. Draghi - End of 2013	07/26/2012 To 12/31/2013	CDS	Corriere Della Sera	-0.84% (-3.14)***			Pos
		CDS	Combined Corriere/ Sole		-0.66% (-1.65)*		Pos
		Spread	Combined Corriere/ Sole	-0.69% (-1.95)*			Pos
		FTSE MIB	Sentiment Index		0.22% (1.82)*		Pos
		Spread	Sentiment Index		-0.46% (-1.93)*		Pos
		Spread	Corriere Della Sera	0.79% (3.07)***			Neg
		Spread	Corriere Della Sera	0.97% (1.85)*			Neg

Notes: t statistics are in parenthesis. * denotes 10% significance level, ** denotes 5% and *** denotes 1%.

The last period, for which we were able to identify an effect of the lags on the endogenous variable, started with the resignation of Mr. Monti in December 2012. Also in this case, the coefficients of Lag 1 dominate, however, for the Spread and the FTSE MIB, we observe that the effect of positive and negative news for Lag 2 are statistically significant (see Table 3 below). It is noteworthy that similar to the period that started with the announcement of Mr. Draghi, the positive news account for most of the effect. This might suggest that as the crisis abated, investors accepted the regime-shifting with suspicion, as they decided to remain only moderately optimistic even in the presence of good news.

Table IX. Resignation of Mr. Monti and Under-reaction Effects

Events	Period	Metric	Source	Lag1	Lag2	Lag3	Pos / Neg
Mr. Monti Resigns – End of 2013	12/09/2012 To 12/31/2013	CDS	Corriere della Sera	-0.73% (-2.26)**			Pos
		CDS	Combined Corriere/ Sole	-0.77% (-1.73)*			Pos
		FTSE MIB	Combined Corriere/ Sole	0.37% (1.68)*			Pos
		CDS	Corriere della Sera	0.74% (2.49)**			Neg
		Spread	Combined Corriere/ Sole	-0.83% (-1.85)*			Pos
		Spread	Sentiment Index		-0.53% (-1.97)**		Pos
		FTSE MIB	Combined Corriere/ Sole		-0.36% (-2.03)**		Neg

Notes: t statistics are in parenthesis. * denotes 10% significance level, ** denotes 5% and *** denotes 1%.

To under-reaction applies the conservatism bias, which means that new information is underweighted in updating a view of the world (see Barberis, Shleifer and Vishny, 1998). Although the size of the coefficients is relatively small and therefore does not explain a large portion of the market movements, our results indicate the presence of markets under-reaction above all towards the end of the crisis. It is worth mentioning that based on our results, positive and negative news had a different effect on the endogenous variable during different periods. If an under-reaction to negative news characterized the period after the default of the Greek debt, with the announcement of Mr. Draghi, the positive news accounted for larger effects on the dependent variable. Furthermore, we do not observe signs of under-reaction at the beginning of the crisis suggesting a rather prompt investors' response to the negative news that accompanied turbulent times. This could support the notion that although investors reacted immediately to negative news at the inception of the crisis, they were only moderately confident when normal

conditions started being restored.[17] It is also possible that with the default of the Greek debt investors started "riding" losses and therefore became reluctant to sell on new negative information; the disposition effect could also explain the under-reaction to positive news after the declaration of Mr. Draghi, since investors in that instance would have tried to realize gains by selling securities and in so doing would have put downward pressure on market prices.

Overreaction

We identified markets overreaction to both positive and negative news from the beginning of the Greek Crisis in 2009 to the resignation of Mr. Berlusconi and from the declaration of Mr. Draghi through the resignation of Mr. Monti in December 2012. The table below illustrates the overreaction effect from the beginning of the Greek crisis to news from different sources. The results are consistent for CDS for the CDS, FTSE MIB and the Spread where both Lag 2 and 3 are statistical significant for both positive and negative news.

Table X. Beginning of the Greek Crisis Overreaction Effects

Events	Period	Metric	Source	Lag1	Lag2	Lag3	Pos / Neg
Beginning of the Greek Crisis - Resignation of Mr. Berlusconi	10/18/2009 To 11/16/2011	CDS	Corriere		1.10% (2.08)**	1.48% (2.83)***	Pos
		CDS	Sole			-0.91% (-2.12)*	Neg
		CDS	Sole		0.80% (2.01)**	0.82% (2.10)***	Pos
		CDS	Combined			1.58% (3.20)***	Pos
		CDS	Sentiment		0.90% (2.48)**		Pos
		FTSE	Corriere			0.285 (1.87)*	Neg
		FTSE	Corriere		-0.34% (-1.85)*	-0.49% (-2.67)***	Pos
		FTSE	Sole			0.30% (1.99)**	Neg
		FTSE	Sole		-0.32% (-2.27)**		Pos
		FTSE	Combined		0.28% (1.74)*		Neg
		FTSE	Combined			-0.66% (-3.87)***	Pos

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[17] This is in line with other studies that found that markets tend to underreact to positive news during bad times (see Veronesi 1999).

Spread	Corriere			0.85% (1.70)*	0.92% (1.87)*	Pos
Spread	Sole				-0.77% (-1.92)*	Neg
Spread	Sole			0.83% (2.24)**	0.79% (2.17)**	Pos
Spread	Combined			-0.83% (-1.92)*		Neg
Spread	Combined				1.56% (3.40)***	Pos
Spread	Combined			0.56% (1.67)*		Pos

Notes: t statistics are in parenthesis. * denotes 10% significance level, ** denotes 5% and *** denotes 1%.

Also for the period that began with the announcement of Mr. Draghi, we detected an overreaction to news with most of the effects on the dependent variable three days after their initial release. In this case, most of the overreaction was registered for negative news. An overreaction to positive news during bad times and overreaction to negative news mainly during good times is consistent with the "hedging behavior," indicated by Veronesi (1999).

Table XI. Declaration of Mr. Draghi Overreaction Effects

Events	Period	Metric	Source	Lag1	Lag2	Lag3	Pos / Neg
Declaration of Mr. Draghi - End of 2013	07/26/2012 To 12/31/2013	FTSE MIB	Sole		0.39% (2.62)***		Neg
		FTSE MIB	Sole		-0.36% (-2.64)***		Pos
		FTSE MIB	Combined			1.16% (2.87)***	Neg
		FTSE MIB	Combined		0.41% (2.36)**		Neg
		FTSE MIB	Sentiment			0.33% (2.68)***	Neg
		FTSE MIB	Sentiment			-0.24% (-1.88)*	Pos
		Spread	Sole			-0.50% (-1.87)*	Neg
		Spread	Combined		-0.84% (-2.53)***		Neg
		Spread	Sentiment			-0.67% (-2.86)***	Neg

		Spread	Sentimen t			0.48% (1.98)**	Pos

Notes: t statistics are in parenthesis. * denotes 10% significance level, ** denotes 5% and *** denotes 1%.

Based on the forgoing results, it evidently transpires that positive and negative news had a different effect on the endogenous variables during different periods and with coefficients of different magnitude. If under-reaction to negative news characterized the period after the default of the Greek debt, with the announcement of Mr. Draghi in November 2011, the positive news accounted for largest delayed effect on the dependent variables. Conversely, we recorded a prevalence of the overreaction to positive news starting with the Greek crisis and overreaction to mostly negative news after the declaration of Mr. Draghi.

Hypothesis 4: Contrary to efficient market theory, during the Italian financial crisis there were large market movements in the absence of news.

This hypothesis was tested for CDS, the FTSE MIB index and the Spread. Several studies have found that for the US stock market, many of the largest price movements occurred when there was no major news, suggesting that fluctuations in asset prices are not all attributable to changes to fundamental values.[18] We investigated this hypothesis in two different ways: 1) we identified the largest movements in either direction of the CDS, the FTSE MIB index and the Spread (measured based on two daily standard deviations above the average daily return of the specific financial metric) and tested whether for the combined coding *Corriere della Sera* and *Il Sole 24 Ore* such movements occurred in the presence of news or when news were such to be deemed neutral and therefore with theoretically no effect on capital markets,[19] and 2) we identified and analyzed just the 10 largest movements for the CDS, FTSE MIB and Spread to see if they corresponded to major news from any of the sources that we used in our study.

With respect to the largest movements, either negative or positive, the table below illustrates our results:

Table XII. Largest markets movement and news

	Total large Movements	News		No News	
CDS	67	48	72%	19	28%
FTSE MIB	133	96	72%	37	28%
Spread	66	44	67%	22	33%

News sources: *Corriere della Sera* and *Sole 24 Ore*.

Throughout the entire period, approximately 30 percent of the times, such large market movements occurred in the absence of major news in a way that is fairly consistent for CDS, FTSE MIB and the Spread.

Finally, we identified just the 10 largest market movements in absolute terms and analyzed whether they corresponded to particular pieces of news the previous day, the current

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[18] See Cutler, Poterba, and Summers (1991) and Fair (2002).

[19] Although we performed the same exercise by using only one daily standard deviation above and below the average daily return, we ultimately selected two standard deviation in order to identify truly large market movements also because during this period there was high volatility.

day or the following day. Such market movements and corresponding main news as identified in the first and second page of both Italian and foreign newspapers are illustrated in the table below.

Table XIII. Ten Largest CDS Movements and Related News

Date	CDS Change in Price	Previous Day	Current Day	Following Day	Notes
5/10/2010	-43.7%	The ECB has a plan to stop speculation, but requires austerity measures from Spain and Portugal	The ECB decides to help the state who have difficulties	The ECB intervenes in the markets with a fund of $750 billion	Strong connection with announcement of the intervention of the ECB in the markets
7/11/2011	20.3%	Danger of speculative attack	Government prepares measures against speculation	Alarm of Greek contagion	No particular connection with the news
5/6/2010	19.7%	Ministry of economics resigns on a scandal; danger of Greek contagion effect	"Guerrilla warfare" in Greece due to austerity measures	Moody's mentions risk of contagion effect for Italian depositary institutions	Strong connection with political news as related to Greece, but no obvious link with Italy other than a potential contagion effect
10/17/2012	-19.1%	Tax cuts maybe will be delayed; Strong demand for BTPs	More taxes on consumption and less on corporations	Market rally on progress in Greece and ECB promises to help Spain	The association with the news is relatively weak as the tax reform introduced only minor changes
5/25/2010	18.6%	Tax evasion is increasing; Economics reforms almost ready	Cuts to government spending and more austerity	Reforms approved and officially presented	No particular connection with the news

6/1/2010	16.0%	The President asks for clarifications regarding the reforms; government job cuts	Draghi Against tax evasion. Economic reforms are now enacted	Unemployment at 8.9%	Weak connection with news with the announcement of unemploymen t
12/1/2010	-15.9%	The European plan to help Ireland does not persuade the markets	The ECB reassures about the euro as it stand ready to buy more bonds	Spread drops and markets rise; deficit down by $11.8 billion	Strong connection with the news although the simply promise to intervene seems to hardly justify a change of 16%
2/26/2013	15.6%	Italian election, fewer voters	No clear majority as a result of the election	Markets tumble on political uncertainty	Strong connection with the results of the election
2/4/2010	15.1%	Discussion on justice reforms ("impedimento legittimo")	Parliament approves justice reform; bond auction in Portugal fails	Spanish yield scares the markets	Weak connection with the auction failure in Portugal
5/4/2010	14.3%	EU allocates $110 billion to rescue Greece; austerity measures in Greece	Ministry of Economics is indicted ; Draghi mentions other countries are in danger (similar to Greece)	Ministry of economics resigns; contagion effect as speculation attacks Spain	Weak connection with the declaration of Mr. Draghi

Source: *Corriere della Sera, Sole 24 Ore, Financial Times and Wall Street Journal.*

On average among the 10 largest market movements for the CDS, FTSE MIB and the Spread, only 43 percent of the times we were able to identify a strong connection with particular news and announcements. For the other dates, although a link might have existed, we deem it to have been not particularly strong, above all in light of the magnitude of the changes in prices of the dependent variables.[20] The dates that correspond to the largest markets movements for which

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[20] Often in the absence of clear explanations, the market's dips were justified by the media ex post as "speculative attacks."

we were able to identify important news and that overlap for the different endogenous variables include: May 10, 2010: the intervention in the open market of the ECB in support of the sovereign debt of countries that had problems (CDS, FTSE MIB and Spread); May 6, 2010: guerrilla warfare in Greece due to austerity measures (CDS and Spread) and finally, February 26, 2013: the Italian election from which no clear majority emerged (CDS and Spread).

From these results, it transpires that at the very least investors' interpretation of the news was relevant and varied significantly during this period. This is in line with a vast literature that suggests that variation in capital markets returns cannot be explained by using only measures of new information.[21] It is also possible that what the media thought was important, was not relevant to market participants (Shiller, 2005) since at times the simple fact that prices are rising or falling represent a piece of news that can be exploited by investors; also, assuming that prices are a reflection of fundamental values, even small variations in supply and demand could affect prices even in the absence of major news (Mandelbrot, 1966).

5. Concluding Remarks

In this study of the Italian financial crisis, we were able to confirm significant departures from the rational expectations and expected utility theory. Specifically, we have found evidence that during the crisis the market responded asymmetrically to news as investors reacted more strongly to bad news than good news; also, investors did not always respond aptly to new reliable information leading in some cases to market under-reaction and overreaction. Furthermore, the financial markets moved in the absence of important news although not always and not unfailingly, while major news and announcements did not always correspond to large market movements.

Across different sets of news, including the TRMI sentiment index, we observed that from the Negative Outlook on Italy by S&P in May 2011 through the resignation of Mr. Berlusconi in November of the same year, negative news had a strongest effect on Italian financial markets. In addition to observing a stronger reaction to negative news, we also noticed based on the magnitude of the coefficients that in general the investors' level of attention to news increased during the crisis. Very often, prior to the beginning of the Greek crisis, independently from the number of news or the level of Optimism or Stress, we recorded no significant effect from news or change in sentiment. Likewise, once confidence was restored, news both negative and positive, and changes in sentiment lost a substantial portion of their explanatory power. Overall, this supports the presence of behavioral biases as presumed by Prospect Theory. It follows that investors would have reacted more strongly to negative news because they valued losses and gains differently. Other explanations are however, possible since such asymmetrical market behavior could be simply justified by excessive pessimism or confirmations bias. Moreover, incorrect mental models and the inability to translate uncertainty into risk could have also been the cause of the greater attention to negative news or news in general during the crisis.

In testing the presence of anomalous reaction to new information, our results indicate the presence of overreaction at the beginning of the crisis and at the end of the crisis, while under-reaction was observed only towards the end of the crisis. This unevenness in terms of time and intensity between under-reaction and overreaction clearly illustrates that contrary to Fama's claim (1998) these phenomena did not cancel each other during the Italian crisis. It is remarkable

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[21] Niederhoffer, 1971. Cutler, Poterba and Summers, 1989.

that we do not observe signs of under-reaction until March 2012, suggesting a "disposition effect" as investors started 'riding losses' only once Greece defaulted (Fazzini, 2006).

Overall, our findings support the notion that both the efficient market hypothesis as well as behavioral approaches should be part of any financial researcher's toolset in order to understand market performance and market reaction to various events. As such, there should not be a strong division between the uses of one approach versus the other.

It is possible that in our study we either misevaluated news and / or failed to consider news that accounted for a significant portion of the asset price volatility. Moreover, it is problematic to evaluate the relative importance of news or the change in sentiments and consistently measure the relative weight of each piece of news. Although we strived to code only unexpected news as self-revealed in the newspapers articles, it was particularly challenging to understand with exactness or even probabilistically, which news were expected and which ones were already fully or partially anticipated by market participants.[22] Overall, we have investigated only a few of the behavioral hypotheses that are being developed in the research on behavioral and neuro finance; thus, a great deal of further work can be done to test other hypotheses as well as considering different and more objective ways of coding news items, different time periods, countries, and / or types of markets.

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[22] We tried to overcome some of these shortcomings by making use also of sentiment indexes. This certainly eliminated any potential bias on our side in the coding process or issues related to expected verses unexpected news.

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