

Financial News and Market Panics in the age of high frequency trading algorithms

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Abstract

Whether financial news may contribute to market panics is not an innocent question. A positive answer is easily used as a legitimation to limit the freedom of financial journalists. Long-term effects of news are moreover inconsistent with the Efficient Market Hypothesis (EMH), which maintains that new information gives immediately rise to a new equilibrium. The EMH is under discussion, however, as a result of the transformation of financial markets and of financial journalism due to new economic thoughts, new communication theories, high-frequency trading and high-frequency sentiment analysis. As a case study of a market panic we show the impact of US news, UK news and Dutch news on three Dutch banks during the financial crisis of 2007-2009. To avoid market panics, financial journalists may strive for greater transparency not only on asset prices and corporate philosophies, but also on network dependencies in the worldwide financial markets.

Keywords: financial journalism; efficient market hypothesis; news effects; content analysis; financial markets; communication theories; behavioral finance

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Attack proved to be the best form of defense for financial journalist Robert Peston, who was charged of having released news reports about the financial problems of Northern Rock. The news would have caused a market panic and a run on the bank in September 2007. Peston argued before a Parliamentary committee on February 4th 2009 that Northern Rock bankers should be held accountable. The core of Peston's defense was that the BBC told small depositors what wholesale traders knew already, namely that Northern Rock was a failed bank due to mismanagement. This was a valid claim, but the research question of this article whether financial news itself could have caused the market panic was evaded. Peston's counterattack is understandable, since journalists almost never feel responsible for negative side effects ('externalities') of the news ([Fengler & Ruß-Mohl, 2008](#)). Giving in could have justified failed banks in summoning journalists to the court for libel and reputation loss. Giving in would ultimately have endangered the freedom of the press. The evaded question is intriguing nevertheless. How can a market panic be caused by relatively isolated financial journalists, who lack financial expertise as compared to their news sources ([Doyle, 2006](#); [Fay, 2011](#); [Fraser, 2009](#); [Schechter, 2009](#); [Schifferes, 2011](#); [Schiffrin, 2011](#); [Tambini, 2010](#))? How could relatively tardy BBC interpretations ever make an impact on financial markets, given the ultra speed of worldwide financial services that feed unprecedented amounts of financial numbers to automated High Frequency Trading algorithms, which had in 2007 already replaced more than half of human equity trading?

A preliminary terminological remark is that in ordinary language a distinction is made between a condition, a cause, and a booster or amplifier. In the case of a heath fire the condition may be extreme drought, the cause may be the match of a pyromaniac, and the booster could be a wind storm. In an economic crisis the condition may be extreme debts, the cause can be massive short selling by investment banks, and the booster could be a news hype. The causal impact of the news on market panics should be understood as a *booster effect* that presupposes disastrous prior conditions and moreover causation by wicked financial institutions.

First, the literature review attempts to show that news effects were indeed to be expected. The literature review interprets changes in financial journalism from an economic perspective ([Fengler & Ruß-Mohl, 2008](#)). The results section adds a quantitative case study to the fast growing body of recent research literature that demonstrates the potential of financial news to boost a market panic ([Bollen, Mao, & Zeng, 2011](#); [Casarin & Squazzoni, 2012](#); [Engelberg & Parsons, 2011](#); [Fang & Peress, 2009](#); [Mitra & Mitra, 2011](#); [Tetlock, Saar-Tsechansky, & Macskassy, 2008](#)). The case study deals with the role of the news in the fate of Dutch banks during the financial crisis of 2007-2009.

New economic thoughts, new media and financial

journalism

In the Middle Ages, economic outcomes, such as shortage of food, were consistently attributed to animated, spiritual forces, to humans or to supernatural forces. The 'modernist' idea that economic laws such as the price mechanism act as a non-animated 'invisible hand' (Adam Smith), "hinter dem Rücken der bewußten Agenten" (Karl Marx) dates from the modern era, according to Nobel prize winner Sir Alfred Hicks ([1979](#)).

The newspapers in early seventeenth century Holland were primarily financial newspapers. They reflected the 'modernist' idea by providing as facts of nature numbers about the volume of trade and the prices at geographically dispersed markets. They also provided additional news about trading spots. The information came from sailing ships and was useful in helping merchants to put out sailing ships to overseas harbors that would secure profits from local differences in demand, supply and prices. Prices could change rapidly as a result of natural disasters (e.g. floods or lengthy droughts), overproduction, wars, and so on. They could change also as a result of human intervention. Isaac le Maire, for example, owned about a quarter of the shares in the Dutch East Indies Company. In 1609 he speculated against the Company by 'short selling', thus by selling shares that he did not own yet for a low price as compared to the current price with a delivery date in the future, thereby speculating on a steep price fall before the delivery date that would enable him to buy the shares to be delivered at an even lower price. The invention of the telegraph in the nineteenth century enabled a much faster transmission of financial data ([Schiffers, 2011](#)). By 1910 stock prices in the USA were centralized, with the New York Stock Exchange as the financial nerve center. Until the 1970s radio was also used to spread price information and trade volumes. To explain the troubling banking situation to his fellow Americans, president Franklin D. Roosevelt used the radio in his now famous first 'fireside chat' on March 12th 1933, eight days after he came into office. "You people must have faith; you must not be stampeded by rumors or guesses. Let us unite in banishing fear." It helped to stop the run on the banks.

The recession of 1929-1935 and the accompanying market panics cast doubt on the invisible hand. John Maynard Keynes came to write about "animal spirits", about "a spontaneous urge to action rather than inaction, and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities." ([Keynes, 2006 \[1936\], 144-145](#)). If the animal spirits are dimmed and optimism falters, for example shortly before or after a market panic, then governments rather than markets should take the lead in restoring effective demand.

The belief in a general equilibrium established by an invisible hand returned however in the 50s and 60s when the economy flourished again. During this period of growth financial news could not regain the space devoted to it in the 30s ([Saporito, 1999](#)), which is in line with later research findings that media attention for the economy increases during recessions but drops if the economy grows ([Wu, Stevenson, Chen, & Guner, 2002](#)). The renewed belief in a general equilibrium culminated in the Efficient Market Hypothesis for financial markets ([Fama, 1965](#)),

which denies any long-term or cumulative effects of financial news.

After 1965 the nature of financial news changed enormously, especially after the recession of the early eighties. First of all, a much wider audience showed an interest in financial news. The new financial news served not only a specialist function but also a generalist one ([Schifferes, 2011](#)). Financial news now appeared on the front pages of newspapers and in prime time television news magazines. New magazines targeted at 'yuppies' (young urban professionals) appeared. New television stations that broadcast financial news throughout the day proved to be viable, for example RTL7 in the Netherlands. "Who wants to watch stock prices all day? The answer? Plenty of people" ([Saporito, 1999](#)). Addressing this wider audience resulted in more popular story lines in financial news, e.g. conflict news and horse race news ([Fengler & Ruß-Mohl, 2008](#)). Conflict frames from political news could be applied in finance to news on mergers and acquisitions, and to news about competing firms and competing brands. Horse race news made major conflicts even more newsworthy (e.g. the battle between Microsoft and Apple, between Toyota and GM, or between the Chinese economy and the US economy). Mass audiences had been interested in royalty, the rich and the famous long before CEOs became TV personalities, which explains why entertainment features were now being applied to business news for a mass audience, as is documented by Doyle ([2006](#)). One of the drivers underlying the choice of major stories became whether a lay audience would recognize the players involved. "Consequently, company stories that center around the activities, enunciations and perceived failings of prominent and well-paid corporate executives feature with extreme regularity in the business pages." ([Doyle, 2006, p.438](#)). Financial analysts started being quoted "typically, in terms that are broad and highly abbreviated rather than as a means of opening up, say, a company's revenue and cost structure." The new financial journalists did not really check the expertise of financial analysts, but nevertheless they relied on them to interpret the performance of companies and of foreign economies. Financial journalists believed that financial analysts were better briefed than they themselves were, although they delivered broad and abbreviated quotes only ([Doyle, 2006](#)). As a consequence, the interests of financial analysts to attribute success to particular firms or to the economy as a whole were not checked either. These business spokesmen, however, were usually crafted well by means of all types of public relations tactics to spin a favorable story ([Henry, 2008](#)). "They set the agenda. They are the access point. They are making these people available for interviews or they don't make them available for interviews. They release information" ([Tambini, 2010, 167](#)). "Overall, the press acted more like a cheerleader as the bubble grew than like a check, like a warning light, like a critic of a set of fallacious ideas that underpinned the bubble." ([Stiglitz, 2011, p.34](#)).

The second major change was that officials became ever more prominent in the news ([Danielson & Lasorsa, 1997](#)). A new generation of CEOs came into business who realized that the best way of doing business was to make an impression on investment bankers and financial analysts, who in turn acted as the main sources of financial news, and moreover as the gateways to momentum on the stock

exchange market. Business leaders became to realize that appearances in the press and on television boosted their reputation ([Saporito, 1999](#)).

The third change is the most important one. The amount of financial information available in the financial markets increased enormously, as did the speed of diffusion by means of satellites, wire service feeds and the internet ([Schifferes, 2011](#)). The number of financial players (firms, countries, traders) in the world having access to the cloud of financial information has grown exponentially. It's impossible for traders, CEOs, financial analysts and journalists alike to get informed about all financial indicators, and moreover most information is outdated quickly. Based on this observation, economists developed the *rational contagion* hypothesis, which is also known as the *rational ignorance* hypothesis or as the *rational herd behavior* hypothesis. The hypothesis maintains that it is inefficient to gather fundamental information about assets, firms, countries or traders. Instead one should rely on price information only. In the case of worsened prospects, one should either sell immediately or rely on financial insurances (e.g. short selling, credit default swaps). As a result, computerized algorithmic trading and high-frequency trading have taken over highly technical financial decisions from human traders, with *herding* as a side-effect. The flash crash on the afternoon of May 6th 2010 in which the Dow Jones dropped 9% and recovered within the same hour, but to a lower level, is still the most bizarre example of a herding effect caused by a horse race between competing automated high-frequency trading algorithms.

Nobel prize winner Joseph Stiglitz and his associates developed several models which show that "rational" ignorance of the precise financial debt dependencies in the ultrafast worldwide financial network of firms, banks, insurance companies and countries (e.g. between Greece, French banks and Spanish banks) is not rational at all because of the negative herding effects or cascade effects ([Delli Gatti, Gallegati, Greenwald, Russo, & Stiglitz, 2009](#); [Gallegati, Greenwald, Richiardi, & Stiglitz, 2008](#)). The current regulations for financial markets do not make it easy to obtain all relevant types of network information, however. Even the new Basel III agreement is not aimed at a full provision of network information. Only top financial newspapers can afford to set free journalistic resources to dig into the strategic interactions between players in the worldwide financial arena. Susan Pulliam, Liz Rappaport, Aaron Lucchetti, Jenny Strasburg and Tom McGinty, journalists for the prestigious Wall Street Journal, for example, were able to disclose a few months after the collapse of Lehman Brothers on September 15th 2008 and the subsequent near fall into bankruptcy of Morgan Stanley, that precisely competing banks such as the Deutsche Bank, Swiss UBS AG, Citigroup and Merrill Lynch & Co had placed big bets against Morgan Stanley to ruin their competitor once and for all (front page Wall Street Journal, 24 November 2008). It was already too late, however, to punish the banks for their destructive behavior, which ultimately resulted in a free fall of all share prices in the last months of 2008. On the contrary, national governments had already spent billions of tax payers' money for bailouts to rescue their national banks and insurance companies.

Thus, the ultrafast wire services which govern both financial markets and financial news media may give rise to cascade effects (negative herding effects). The dominance of the Efficient Market Hypothesis in economics, which denies effects of financial news, prevented economists to study the nature, effects and responsibilities of financial journalism ([but see Stiglitz, 2011](#)). When the financial crisis started, financial journalists reported about fears of further collapses, while evading questions about its effects.

The Efficient Market Hypothesis (EMH)

The EMH (Fama, 1965) is the straightforward expression of the “modernist” view that price information suffices in financial markets. The worldwide financial assets market can indeed be seen as the most perfect materialization of a market which relies on price information only, at least before the introduction of high frequency sentiment trading algorithms ([Mitra & Mitra, 2011](#)). The EMH maintains that there is no dependence in series of successive price changes of stocks. Price changes, which can be obtained by differencing the absolute values of the prices, follow a random walk pattern, which is to say that knowledge of the history of the steps thus far does not help at all to predict the direction of the next step.ⁱ It is precisely the eagerness of stock market traders to make use of prophesying knowledge that will result in such a random walk. Suppose, for example, that there is reliable news suggesting that the price of a specific share will rise next week. Of course this news will immediately result in an increased demand and in an increase of the share price. What will happen next week will once again become unpredictable. Precisely reliable prophecies will always turn out to be self-denying prophecies.

Empirical studies confirmed the EMH ([Malkiel, 2003](#)). Textbooks in economics, including the textbook with FED banker Ben Bernanke as an author ([Bernanke & Frank, 2006](#)), consider the EMH as one of the cornerstones of economics. The seminal review study on the media and financial markets by Schuster ([2006](#)) also lends much credit to the EMH. The reviewed studies show that news in the mass media is usually either already discounted in prices or quickly priced in after dissemination. Many news items do not provoke any unusual price movements. Sporadic overreactions to media coverage give rise to subsequent corrections ([Schuster, 2006](#)). Recently a cross-sectional study of German stocks also showed that the media mirror markets rather than mold markets ([Scheufele, Haas, & Brosius, 2011](#)).

Behavioral evidence against the EMH

The EMH is nevertheless at odds with what is believed by financial analysts, who take hours to study the latest newspapers, the latest news feeds, and the latest reports provided by all types of companies. “It is widely believed that news events dominate the markets on any given day.” ([Goonatilake & Herath, 2007, p.53](#)).

It’s also at odds with studies that label themselves as ‘behavioral economics’ or

'behavioral finance'. Especially negative news in (relatively) good times is shown to negatively affect share prices ([Conrad, Cornell, & Landsman, 2002](#)). In the case of negative news about a firm this risk premium entails that share prices will drop even more than might have been expected when traders were able to fully trust that with the latest disclosure of negative news the full cup of negative news had been passed already ([Veronesi, 1999](#)).

Many studies show that the tone (also labeled as tenor, direction or sentiment) of economic news, e.g. whether the economy is going up or down according to the news media, affects consumer confidence with a delay of at least one month ([Alem, Brakman, Hoogduin, & Kuper, 2008](#); [Hollanders & Vliegthart, 2011](#); [Wu et al., 2002](#)), although news media coverage does not always have this effect. For example, this effect was not observed in Japan during its lost decade ([Wu, McCracken, & Saito, 2004](#)). Other studies show that political variables also predict consumer confidence both in the short and the long run ([de Boef & Kellstedt, 2004](#)). News on the economy also affects government popularity ([Shah, Watts, Domke, Fan, & Fibison, 2009](#)).

The euro-dollar exchange rate, which is once more at the center of debates in the international debt crisis of recent years, was seen to be susceptible to the tone of the news as well ([Prast & de Vor, 2005](#)). The euro-dollar exchange rate depended more on political news than on economic news, and more on news about the dollar, than on news about the euro ([Prast & de Vor, 2005](#)), which suggests that financial markets perceived the euro during its first year as a peripheral currency. The City in London rather than Frankfurt or Paris became the center for the trade in euros, although the UK kept the pound sterling.

Unlike earlier studies ([Schuster, 2006](#)), most recent studies on the impact of news on markets are based on a large-scale automated content analysis of newspaper reports to measure sentiments in news reports. These studies clearly violate the EMH by showing news effects on financial markets ([Bollen et al., 2011](#); [Casarin & Squazzoni, 2012](#); [Engelberg & Parsons, 2011](#); [Fang & Peress, 2009](#); [Mitra & Mitra, 2011](#); [Tetlock et al., 2008](#)). High frequency sentiment trading algorithms are employed already, although the current software for automated sentiment analysis is still pretty much based on elementary techniques like word lists counts, named entity recognition and boolean combinations rather than on smart combinations of syntactic parsing, knowledge representation, logic and semantic web technologies. Reacting on the basis of sentiment trading algorithms to online news is much faster than waiting until financial decision-makers and financial analysts have incorporated the news into their mindset ([Groß-Klußmann & Hautsch, 2011](#); [Mitra & Mitra, 2011](#)). The use of high frequency sentiment trading algorithms implies by definition that nowadays the news does affect financial markets. Here we add to this recent literature a study on the impact of doomsday news on the stock exchange rates of Dutch banks.

The EMH and communication theories

The reason why the EMH is not only dubious from an empirical point of view but also from a theoretical point of view has to do with the nature of financial news. The EMH would presumably hold in the case of completely *reliable* news that told the full story at once, but financial news as we know it is often partly unreliable, one-sided, unbalanced, inconsistent with prior knowledge, preliminary, outdated, PR spin and at the very least incomplete. Therefore financial traders will wait for follow-up news to gain more information before making decisions. Communication theories deal with the effects of these types of imperfect information.

Perceived source credibility is one of the most powerful explanatory variables in communication research ([Severin & Tankard, 2005 \(5th ed.\)](#)). Trust in the news is vested in trust in the news sources. Negative news that affects the credibility of firms may have a long-term sleeper effect on share prices, since untrustworthy firms will be less often used as news sources. Moreover, the news audience will discount the remaining news reports in which they are quoted. Prior to the financial crisis that started in July 2007, financial analysts employed by banks, hedge funds, accountancy firms and insurance companies were quoted rather uncritically in the financial news. “Most business journalists were enjoying the upward spiral as much as the investment bankers and analysts whom they counted among their best contacts and lunch companions.” ([Fraser, 2009, p.80](#)). But after rapid drops in share prices, bankruptcies and bailouts they became far less attractive as authoritative news sources.

News about losses instead of gains, about failures instead of successes, may invoke risky behavior ([Kahneman & Tversky, 2000](#)), for example take-overs and mergers rather than business as usual. Journalists will typically explain losses and failures as a result of conflicts and a lack of leadership. Risky behavior may be portrayed as a success in the short-run. This type of news typically hurts long-term credibility. “The more a news reader ascribes causation for a conflict to an agent, the less support is expressed for this agent’s view and the associated agenda for change,” according to recent research findings ([Knobloch-Westerwick & Taylor, 2008, p.739](#)).

Communication research shows that news consumers will discount not only news from distrusted sources, but also ‘strategic news’ about strategic and tactical moves of parties. ‘Value news’, or ‘issue news’, about their ends, goals, means and acts will not be discounted to the same degree ([Lee, McLeod, & Shah, 2008](#)). Discounting enables news consumers to choose sides. Voters, for example, will discount attacks of competing parties on their own favorite party as a sign that their own party is still on the right track ([Kleinnijenhuis, Van Hoof, Oegema, & De Ridder, 2007](#)). The same mechanism may apply if the financial news is presented as a battle between brands or companies (e.g. Apple versus Samsung).

The third-person effect entails that news consumers believe that the news has stronger effects on others than on themselves (Severin & Tankard, 2005). From this perspective, stock exchange traders are expected to sell whenever they believe that others believe crisis news. Traders who do not panic themselves would still be unwise not to sell now and buy back later. This third-person effect hypothesis is confirmed by a survey study among traders ([Oberlechner & Hocking, 2004](#)).

The two-step-flow theory of communication entails that it is not enough to publish facts to sway peripherally informed news consumers. They need interpersonal communication to assess the value of the new information. Opinion leaders in social media or in their personal environment play a role here. The most uninformed news consumers may not even pick up the news, or rely on expert advice to act upon it. Even relatively informed hobby traders in shares show a great interest in twitter and in internet discussion groups to discuss ins and outs of the available information, especially when their time horizon is short. Such deliberation takes some time, however. In short, on the basis of a variety of communication theories it is to be expected that the EMH does not hold. Effects of financial news will show up not only immediately, but also in the longer run.

Method

Case selection

For the analysis of daily shifts in financial news of financials rated on the Amsterdam stock market, three financial companies were selected: Fortis Bank, ING Bank and Aegon Insurances. ING and AEGON both had fairly strong interests in the USA. ING held a portfolio of 27 billion Euro alt A-mortgages. AEGON and, especially, ING featured often in US and UK newspapers in the context of the credit crunch because of their assets in the US. There was a risk that Fortis would run into problems because it still had to pay for a part of the Dutch bank ABN AMRO, which it took over in May 2005. Interests in the US were less strong.

As new developments in the mortgage crisis in the US became newsworthy, these three firms became associated ('framed') in Dutch news with the financial crisis (labeled 'kredietcrisis' in the Netherlands). Fortis was less visible in US and UK news as compared to AEGON and ING.

The data gathering period ran from the first week of 2007 (July 2nd) until early March 2009 (March 9th), but for Fortis only until early October, when trade in Fortis equities on the Amsterdam stock exchange was terminated as a result of the split-up of Fortis into its Belgian part, which was sold to the French bank Paribas, and its Dutch part, which was nationalized by the Dutch state. ING and AEGON survived, although the Dutch government implemented a bailout for ING and AEGON in October 2008.

Data and operationalization news impact study

Daily stock exchange rates of the three companies, as well as of the three banks in the Dow Jones 50 Industrials index (Bank of America, Citigroup and JP Morgan) were extracted from the DataStream database. As a measure of the degree to which a company was framed in the news as a potential injured company, we used AMCAT, the Amsterdam Content Analysis Toolkit ([van Atteveldt, Kleinnijenhuis, & Ruigrok, 2008](#)) to count for each day for each of the three companies the number of co-occurrences of the company with Dutch equivalents (or synonyms) for 'financial crisis' ('kredietcrisis', 'bankencrisis', 'financiële crisis'; 'recessie'). We looked separately at the even more serious problem of 'bankruptcy' ('bankroet'). We selected newspaper stories from six major Dutch national newspapers (general newspapers NRC Handelsblad, de Volkskrant, Algemeen Dagblad, Trouw, and the special-interest financial newspaper Het Financieele Dagblad).

To assess the impact of US and UK news on the fate of the three Dutch financial firms, the news from The Wall Street Journal, The New York Times, The International Herald Tribune, and The Financial Times was scanned for labels such as 'credit crisis', 'credit crunch' and 'financial crisis'. We looked separately at the even more severe news about 'bankruptcy' in articles in which one or more of the three Dutch financial giants featured.

No trade took place on Saturdays, Sundays, Christmas, New Year and Ascension Day. Saturday news, Sunday news and Monday news was attributed to Monday as the first day on which traders could act upon this news. Units of analysis amounted for ING and AEGON to 440 trading days, and for Fortis, that was split up early October 2008, to 329 trading days.

Preliminary tests were used to find an appropriate model for 'stationary' time series to explain current values from the values on previous days. Based on these tests, a straightforward regression model could be applied with the change (first-order difference) in the stock exchange rate at the close of the Dutch stock exchange market (at 17.30) as the dependent variable. Since newspapers are printed long before the market closes, we included the news of the same day, and based on the preliminary tests, also the news of the day before as variables in the regression equation.ⁱⁱ

Data and operationalization long-term analysis

To measure market sentiment in newspapers, we used the balance between hope and fear in the same set of six newspapers as before. The indicator was construed as the number of references to 'fear' and fear-related words (e.g. vrees, bevreesd, vrezen, angst*, bang*) minus the number of references to 'hope' and hope-related words (e.g. hoop, hopen, hoopvol). Daily counts were aggregated to a monthly level. To shed more light on how the financial crisis

started, we collected data for the period starting in February 2003, and ending in October 2008, the month in which the Dutch part of Fortis was nationalized. We extracted from Datastream® the AEX index which is comprised of the stock value of the 25 largest companies with a quotation on the Amsterdam stock market. Monthly data on consumer confidence in the Netherlands were obtained from the Central Bureau of Statistics ([van der Bie, 2000](#)).

Results

The news panic about the credit crunch

The word 'kredietcrisis' ('credit crisis') appears for the first time in its current meaning on July 21st 2007 in a Dutch newspaper article. It is an article in *Het Financieele Dagblad*, the newspaper in the Netherlands with a fairly small circulation among the Dutch population as a whole, but a wide circulation in the financial elite. One week later the word credit crisis is headline news: "beleggers vrezen kredietcrisis" ("investors fear credit crisis", *Het Financieele Dagblad*, July 28th 2007). This headline is symptomatic of much of the news in the year to come. In many of these headlines the discrete emotion of *fear* is attributed to market agents, such as investors, bankers, insurance companies, enterprises, and consumers: fear of a credit crisis, fear of bankruptcy, or fear of a general recession. More often than not, news items lapse into the generalization that this fear is omnipresent. Until March 9th 2009, the term 'credit crisis' will appear 16865 times in 10838 articles in the Dutch national newspapers that underlie this research. It's astonishing that a term that did not occur before became the label of the foremost important issue in the news in such a short time. Of course, the occurrence of the term 'credit crisis' proceeds with ups and downs, as is shown in Figure 1. After high ups and downs in the final months of 2007 and the first nine months of 2008, the fall of Lehman Brothers in the US and the fall of Fortis in the Netherlands caused an enormous increase in the usage of the word, from the perspective of which the previous ups and downs look negligible. In October 2008 in addition the word bankruptcy ('bankroet') was often used in articles about AEGON and especially about ING.

INSERT FIGURE !2

Until the first months of 2008, the credit crisis is still considered to be primarily a problem for the US financial market. But gradually journalists start applying the term more often to the Dutch financial companies with strong interests in the US market, such as ING and AEGON, although both financial spokesmen and newspapers still maintain that Dutch banks and insurance companies were not affected by subprime mortgage problems. Fortis had its own special credit problem. After Fortis had decided not to pay fully for ABN AMRO in 2007, financial analysts foresaw that it would become extremely difficult to raise the required money (e.g. by new emissions of shares) in the bear market of 2008.

As Figure 2 shows, news about Fortis and news about the credit crisis followed the same peaks and troughs. In articles about the credit crisis, Fortis would usually be mentioned, as can be seen from the close correspondence between the red and blue lines in Figure 2 from April 2008 onwards.

As a result, it was not only ING or AEGON, but especially Fortis that was being associated in a growing number of articles with the credit crisis, especially from May 2008 until the nationalization of Fortis in early October, as can be seen from Table 1, which lists the percentage of articles about ING, AEGON and Fortis in which the CC word was used as well. From the point of view of the media, Fortis had run into the biggest problems, followed by ING and AEGON.

INSERT FIGURE 2

In October 2008 ING and AEGON were connected with the credit crisis more than ever, but after reassuring bailouts by the Dutch government (10 billion euros for ING, 3 billion euros for AEGON) calm was regained gradually.

INSERT TABLE 1

Consistently associating a given enterprise with a specific problem (cf. Table 1) can be considered as 'framing'. A widely cited definition of framing is given by Entman ([1993](#)): "to frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation." (Entman, 1993). Entman would expect Fortis to not only become associated with the credit crisis as a particular problem, but also with a causal interpretation, a moral evaluation, and a treatment recommendation. Gradually, these other elements of the credit crisis frame became apparent in the news as well. In the case of Fortis, the greed expressed in wanting to take over ABN AMRO in 2007 was an obvious causal interpretation of the problem. Negative moral evaluations about the Fortis leaders Jean-Paul Votron, Maurice Lippens and Herman Verwilt accompany the story. Dutch television news portrays them as mummified dinosaurs who are incapable of answering simple questions, either from their shareholders or from journalists. Remarkably enough, advice on the best action to take was extremely scarce until September 2008. In October the Dutch press came to applaud the Dutch government who 'regained' ABN AMRO in early October 2008 from Fortis, and nationalized Fortis Netherlands a week later. Before October 2008, financial journalists had expressed time and again their fear of an even bigger crisis, instead of presenting a policy treatment to cope with the crisis.

This interpretation is suggested by chi-square tests implemented in AMCAT (amcat.vu.nl, cf. Van Atteveldt 2008), which will find words that are statistically co-occurring above chance with a key term (i.e., the 'kredietcrisis'). Words in the Dutch 2008 news that co-occurred with the 'kredietcrisis' above chanceⁱⁱⁱ most often, after discounting for their own frequency, were not only Fannie, Freddie,

Lehman Brothers and the AIG, but also Fortis, Votron, Verwilst and Lippens. The article which summarized the credit crisis best from a statistical text mining point of view appeared in NRC Handelsblad of July 19th, 2008, two months before the actual collapse of Lehman Brothers and the Belgian/Dutch bank Fortis. The headline of this article prophesized remarkably correct: “turmoil around Fortis will persevere for a while”^{iv}. The article stated that “When ABN AMRO was put on sale in April 2007, Fortis leaders Jean-Paul Votron and Maurice Lippens opted for a radical policy change, without consulting their shareholders. Combined with the swelling credit crisis, the take-over price of 24 billion euro was quite simply too high.” To put it another way, the best summarizing article of the credit crisis ‘framed’ Fortis not only as the primary *problem owner* of the credit crisis, but also with an underlying *cause* (the greediness to take over ABN AMRO) and a *moral condemnation* of Fortis’ Votron and Lippens, who had made stupid decisions. The article does not conclude with a *treatment recommendation*, however, but with a doomsday prophecy of further turmoil. Presumably not only journalists but also their news sources were unable to propose a credible policy treatment before October 2008, but without policy recommendations a news frame is incomplete ([Entman, 1993](#)), and will easily become a self-fulfilling prophecy about the escalation of the problems that are defined in the news.

Explaining short-term shifts in financial news and in financial share prices

On the basis of preliminary tests^v a basic model is presented in Table 2 in which the increase or decrease of stock market value at the close of the Amsterdam EXchange market (AEX) on a given day is dependent on the increase or decrease of the amount of news that associates a bank with the financial crisis on the same day (note that Dutch newspapers are printed before the stock market closes) and on the day before.

One may not only expect herding behavior triggered by the news, but also herding behavior triggered by the state of affairs on the previous day’s financial markets, although the latter violates also the EMH. For this reason two more variables are included in the model: increases or decreases in stock market value on the previous day, and increases or decreases in the stock market value of the three banks in the Dow Jones Industrials index on the previous day (note that the New York Stock Exchange closes a night before the AEX opens).

The numbers in this regression equation represent standardized regression coefficients, which are not dependent on the measurement levels of the dependent and independent variables. The sizes of standardized regression coefficients can be compared with each other within a period.

INSERT TABLE 2

The first observation from Table 2 is that share prices of AEGON, ING and FORTIS do

not behave as a random walk as postulated by the EMH. A random walk would result in no significant effects at all in the difference model presented in Table 2.

According to the random walk model implied by the EMH, we would especially not expect deviations from the previous day's stock prices to be able to be predicted from the previous day's deviations from stock prices on the day before. This is precisely what appears to be possible for each of the three financial firms. Stock prices of ING and even more of AEGON showed such a nervous zigzag pattern during the research period, that it would have been lucrative – excluding transaction costs – to gamble on a partial recovery of the stock price after each day of relapse, and to gamble once more on a relapse after a partial recovery.

Two types of news influences emerge. Changes in today's stock prices for each of the three companies react strongly to changes in the final score of the three banks in the Dow Jones the evening before (JP Morgan, CitiGroup and Bank of America). We may speculate that many stock exchange traders, either intuitively or by means of algorithmic trading, learned about this dependency of Dutch financials on US banks, thereby creating a self-fulfilling prophecy.

The financial news in the news media is also important. An increase of international news articles in which either ING and the credit crisis or AEGON and the credit crisis appear leads to a decrease of the stock market value of ING, resp. AEGON. The effect of international news is strongest for ING. Although the regression coefficients are in the same direction, the effect of international news on the stock market value of Fortis is insignificant (remember that Fortis did not invest as much in the US as AEGON and ING).

An increase in the number of articles in Dutch newspapers in which the firm is framed in the context of the credit crisis consistently leads to a drop in stock prices on the same day for AEGON and FORTIS. The stock market value of ING appears to be especially sensitive to an increase of news in which ING is associated with bankruptcy.

How can such an effect of framing in news in the Dutch language occur in global financial markets with overwhelmingly non-Dutch speaking players? A direct effect on Dutch traders occurs as soon as the overload of numbers does not give clear cues about a course of action. In that case, information from other sources, such as today's newspapers, or rumors on the market floor, start to play a role also. This direct effect may result in small negative deviations from the expected price development. The indirect spillover effect is that even slightly negative deviations will be detected by the automatic trading algorithms of global players. Every now and then such 'negative' signals, may result in massive sales of these assets by global players. In short, uncertainty may further herding and collective panics ([Harmon et al., 2011](#)). Global players engaged in massive 'short selling' against Fortis in September 2008 included hedge funds and investment funds such as Wellington Management (Boston), Highland Capital (Dallas), Tosca Fund Assets

(London) and Kynikos Associates (New York) (NRC Handelsblad, September 16th , p25). Fortis was relatively insensitive to financial news in foreign newspapers, but this did not prevent Fortis from becoming a prey for foreign hedge funds.

Thus, this case study of the fate of Dutch banks shows the share prices of the banks did not follow a random walk. Contrary to expectations on the basis of the EFM, but in line with recent studies, share prices were influenced by financial news.

Market sentiment as hope minus fears, consumer confidence and the AEX in the longer run

Figure 3 gives an overview of crisis news, consumer trust and the AEX index in the longer run (research period February 2003 - October 2008). To facilitate an easy interpretation, standardized values are plotted with a mean of zero and a standard deviation of 1.

FIGURE 3 HERE

An obvious observation from Figure 3 is that the peak in hope minus fear in financial news of April 2006 precedes both the peaks in the AEX stock market index of June 2007 and October 2007, and the peak in consumer confidence of June 2007. Apparently, the largest signs of great hope had already vanished more than a year before the start of the financial crisis. After July 2007, financial news had already become more fear-oriented than in 2003. A second observation is concerned with the strong and relatively regular oscillations around the trend for fear minus hope in financial news. Months of relative hope are followed by months of relative fear and vice versa. Oscillations around the trend for the AEX index and for consumer confidence are less strong. Both observations are in flagrant contradiction to the EMH. Sentiments in financial news that precede the markets with more than one year, and fairly regular oscillations in sentiments in financial news, go beyond the scope of any rational model. John Maynard Keynes would not have been surprised, however.

Discussion

The efficient market hypothesis (EMH) predicts that share prices will follow a random walk, which would imply the absence of news effects on market panics, and the futility of debates about the responsibility of financial journalists. Communication theories about source credibility, third-person effects and two-step-flow communication suggest that financial news may affect markets. This study about the impact of the news on share prices of Dutch financials during the credit crisis (July 2007 - March 2009) provides evidence for the latter, in line with a series of other recent studies on the impact of news on financial markets ([Bollen et al., 2011](#); [Casarin & Squazzoni, 2012](#); [Engelberg & Parsons, 2011](#); [Fang & Peress, 2009](#); [Mitra & Mitra, 2011](#); [Tetlock et al., 2008](#)). The framing of Dutch financials in the news as carriers of the credit crisis had an impact on share prices. Foreign and national newspapers both played their role in boosting the crisis. The answer to the Research Question of this article of whether financial news can boost a market panic is simply 'Yes'.

A new dimension to the impact of the news on financial markets is recently added by high-frequency sentiment trading algorithms that incorporate the news flow directly into their valuation models ([Groß-Klußmann & Hautsch, 2011](#); [Mitra & Mitra, 2011](#)). News impact may not be limited to short-term effects, however. Long-term graphs showed that hope versus fear sentiments in financial news preceded actual economic developments (stock exchange rate, consumer confidence) by a year. The long-term shift from hopes towards fears in economic news well before the financial crisis of 2007-2009 corresponded with a long term increase in herding behavior in financial markets, as measured by the co-movement of daily stock prices of firms ([Harmon et al., 2011](#)).

Studies into news effects provide cues to improve the news, although journalists are usually reluctant to acknowledge news effects, as was illustrated by BBC-journalist Robert Peston who brilliantly warded off the question of whether his news reports had caused a bank run on Northern Rock. This study showed that the news about the crisis became crisis news itself, with an overwhelming number of fear appeals and crisis words, and almost a complete lack of policy recommendations before October 2008. This type of crisis news patently boosted the crisis. A more sober, policy-oriented style of reporting supported by pro-active news sources could presumably have prevented escalation. The crisis in the news was deepened by the inability of financial journalists to find credible alternatives for the high priests of casino capitalism who had served as authoritative news sources before the crisis. Investigative financial reporting is needed to assess the source credibility of financial players through information-gathering about their financial interests and their mutual dependencies in the worldwide financial network. A greater transparency of network dependencies would result in interesting financial news with a lesser risk of news panics. To increase transparency financial

journalists should be enabled to retrieve network information about deals, dependencies and relationships between players in financial markets more easily. New regulations for financial markets are required to facilitate this.

[Lütkepohl & Krätzig, 2004](#)

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	ING	AEGON	Fortis
2007 July - December	0.19	0.34	0.26
2008 January - April	0.47	0.51	0.46
2008 May - October 10	0.47	0.38	0.49

Table 1: Associations of banks with the financial crisis according to the Dutch press

(as indicated by the proportion of articles about banks in which the credit crisis was mentioned)

Table 2: Influence of international and Dutch news on shareholder value of AEGON, ING en Fortis

	increase/decrease AEX stock market value (t) :		AEGON	ING	Fortis		
	(until March 9 th 2009)	(until March 9 th 2009)	(until October 3 rd 2008)				
increase/decrease stock market value (t-1)	-0.21	***		-0.14	**	-0.13	*
increase/decrease DOW-banks (CityCorp, BoA, JP Morgan) (t-1)	0.39	***		0.39	***	0.30	*
more / less international news about firm AND credit crunch (t0)	-0.11	*		-0.11	**	-0.05	
more / less international news about firm AND credit crunch (t-1)	-0.06			-0.20	***	-0.01	
more / less Dutch news about firm AND credit crunch (t0)	-0.23	***		0.04		-0.14	*
more / less Dutch news about firm AND credit crunch (t-1)	-0.06			0.07		0.00	
more / less Dutch news about firm AND bankruptcy (t0)				-0.16	**		
Explained variance R ² (adjusted)	0.18			0.16		0.07	

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10 (two-sided)

Table 1: Degree to which ING, AEGON and Fortis were framed associatively as 'credit crisis' (as indicated by the proportion of articles about banks in which the credit crisis was mentioned)

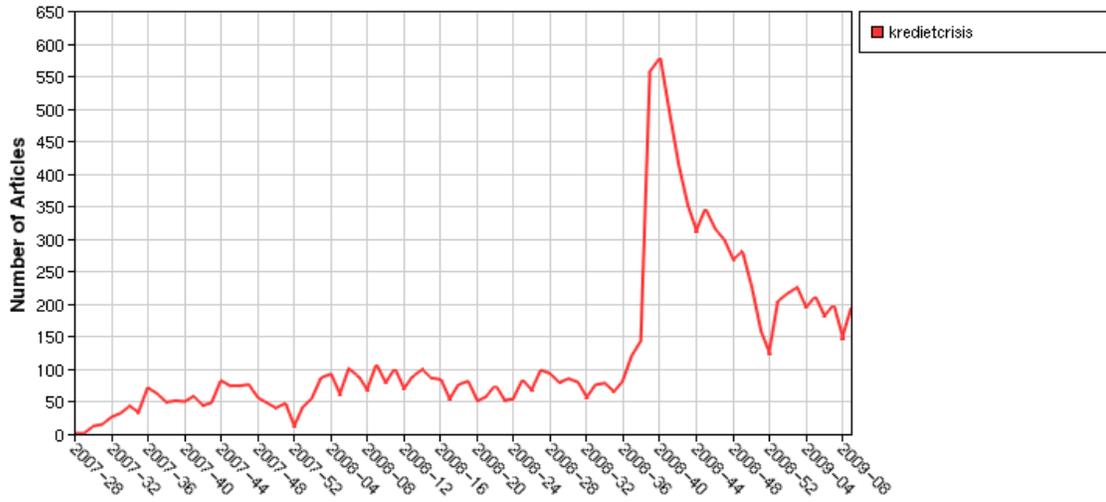


Figure 1: The 'credit crisis' in the news

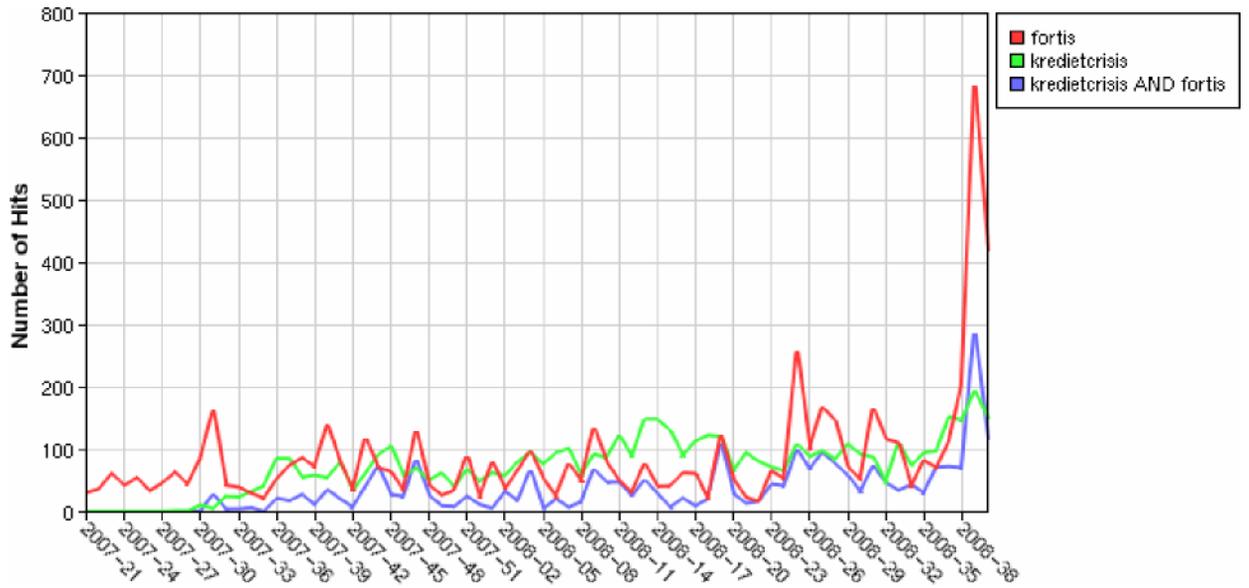


Figure 2: The ‘credit crisis’ and Fortis in the news until the collapse of Fortis (note that the apparent downturn in the last week is the artificial result of an incomplete week)

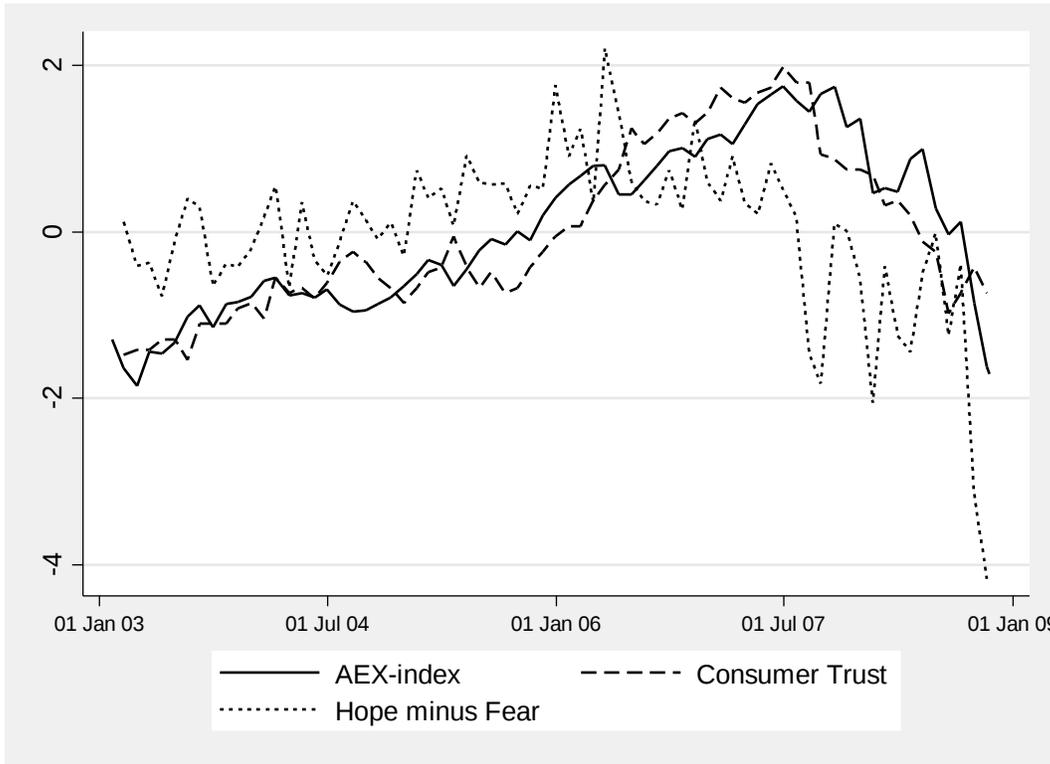


Figure 3: Hope minus fear in newspapers, consumer trust and the AEX stock exchange index (standardized z-values)

Notes

i From the perspective of time series analysis, a time series that follows a random walk is an ARIMA(0,1,0)-process, and the differenced series of changes an ARIMA(0,0,0)-series of white noise only.

ii Both Dickey-Fuller tests and ARIMA-models revealed that the variables to be included in the model were not stationary, but all exhibited a non-stationary I(1)-pattern. The ARIMA-models show that the share prices of ING, Aegon and Fortis do not behave as random walks, thus as ARIMA(0,1,0)-models, as predicted by the Efficient Market Hypothesis, but as an autoregressive model in the case of AEGON (AR(1,0,0)), or as a random walk model with drift (ING, Fortis). Models with non-stationary variables often give rise to significant effects that are actually a result of spurious correlations. Therefore it is better to estimate a difference model rather than a levels model (Hollanders & Vliegthart, 2008). Whereas in a levels model the actual values of the variables are expected to influence each other, in a difference model it is the changes as compared to yesterday that may or may not influence each other.

Schwarz' Bayesian Information Criterion revealed that the Close Prices at the Amsterdam stock exchange market at 17.30 were influenced by the news printed on the same day (in the case of morning newspapers in the night before, in the case of evening newspapers in the morning before) and by the news on the previous day. Other criteria (e.g. AIC) showed more long-term effects of the news, but to test the Efficient Market Hypothesis it is enough to show that yesterday's news may still have influence.

Based on the preliminary tests, it came as no surprise that a Vector Autoregression Model and Granger causality tests indeed showed that changes in stock exchange rates were dependent on changes in the news of today in comparison to the previous day and of the previous day in comparison to the day before that. Granger causality could also be established from AIC-estimates of the optimal lag length. Since this article concentrates on the dependence of stock exchange rates on the news, an ordinary regression equation can be used instead of a full Vector Autoregression Model.

The Vector Autoregression Model showed also strong evidence of reversed causation: especially Dutch newspapers produced more news about the involvement of the three financial companies in the financial crisis after a downturn on the stock exchange market. Foreign news on Dutch banks showed a less regular pattern.

iii Co-occurrence 'above chance' was measured as a co-occurrence that significantly exceeded the expected co-occurrence on the basis of the marginal frequencies.

iv "Onrust rond Fortis houdt nog wel even aan" was written by NRC Handelsblad journalists Egbert Kalse and Piet Depuydt. Egbert Kalse was also the first author of an insightful Dutch book with Daan van Lent on the financial crisis entitled 'Bankroet' ('Bankruptcy') that was published in April 2009.

v. See footnote 2.