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Master Thesis

Celebrity deaths and social mood:

The effect of celebrity deaths on daily stock returns

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Abstract

Psychology studies have showed that current mood can influence risky decision making. When the mood of a large part of the society (i.e. the social mood) is affected in a similar direction, this is then expected to affect the willingness of people to invest in risky assets. In this paper the death of a beloved celebrity will be used as indicator of a negative shock in social mood. Because psychological research found that people feel that they are emotionally connected with celebrities, and celebrity deaths are able to create public mourning, celebrity deaths are expected to provoke a single negative emotion in society: sadness, which is felt in the grieving process after a beloved celebrity dies. The celebrity death effect is tested on the daily returns of large cap stock indexes and small cap stock indexes of the United Kingdom, the Netherlands, and Germany. Using a sample of 443 celebrity deaths over the period 1986-2015, I find a significant positive celebrity death effect on stock returns. The celebrity death effect is best captured on the returns of small cap stocks. The size of the effect on these returns is increasing with the popularity of the celebrity in question. Furthermore, the effect is larger for 'popular' celebrities who died from a sudden death.

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1. Introduction

For several decades there are studies in the behavioural finance field that focus on the effect of the mood[1] of society on local stock prices. Mood that is broadly felt within society is called social mood. People tend to use their emotions more when making decisions in situations that are more complicated and contain a lot of information. This is better known as information overload (Shiv & Fedorikhin, 1999). Investment decisions are often complicated and risky, especially for small individual investors, which is why the role of emotions might be large in these decisions (Forgas, 1995). Using current mood while making a decision when this decision is not related to the cause of current mood is called mood misattribution, which is an example of irrational behaviour. Because current mood can affect investment decisions, a shock in social mood is expected to affect local stock prices (Zadorozhna, 2009).

In previous literature there are several different indicators used to test the effect of a negative shock in social mood on the stock market. These studies use indicators that are expected to have a negative effect on the mood of society. Bad local weather (Saunders, 1993), aviation disasters (Kaplanski & Levy, 2010), bad national sport results (Edmans, Garcia, & Norli, 2007), and terrorist attacks (Arin, Ciferri, & Spagnolo, 2008) are indicators that have been used to measure such a negative shock in social mood. All studies using these indicators found a negative effect of a negative shock in social mood on local stock returns, which indicates that when the mood of society decreases the local stock returns decrease. The results of these studies approve the reasoning of the Mood Congruence Hypothesis (MCH), which argues that a negative shock in mood causes people to shy away from risk taking.

In this study a fairly novel indicator of a negative shock in social mood will be used: the death of a beloved celebrity. In recent history there are several examples of celebrity deaths that caused a huge emotional shock in society. The death of Michael Jackson was followed by a worldwide emotional shock, public mourning, and massive media attention. After the news of Jackson's death spread, several internet sites crashed because of user overload, among them Wikipedia and Twitter (CNN, 2009). The memorial service for Jackson was broadcast live worldwide and reached an audience of approximately 1 billion people (the Vancouver Sun, 2009). Also, all over the world fans organized their own memorial services. Five fans of Jackson even won a court case against Jackson's doctor, because it was proven that they had suffered emotional damage from Jackson's death (the Guardian, 2014). Similarly, the death of Princess Diana caused an enormous shock and public grief as well. It was estimated that approximately 2.5 billion people watched her funeral, and over a million people

[1] Feelings, mood, and emotions have similar meanings in related literature and are used interchangeably in this study.

lined up along the six kilometers long route of the funeral cortege (BBC, 1997). In the month after Diana's death suicide rates increased by 17% in England and Wales compared with the same period in the previous four years. Researchers concluded that the death of a major public figure is able to influence suicidal behaviour, and linked this increase in suicide rates to the death of Princess Diana (Hawton, et al., 2000). These two examples of celebrity deaths show that the death of a popular celebrity can cause a shock that is broadly felt within society. Psychological research found that sadness is the most dominant emotion felt when someone dies (Keller & Nesse, 2005). Also, it has been found that regular people can build up an imaginary relationship with a celebrity that is so strong that they feel it is as real as any other relationship (Stern, Russell, & Russel, 2007). Therefore, when a celebrity dies people might react in the same way as when someone they know in real life would die, causing an emotional reaction to this death. When a large proportion of society is emotionally affected by the death of a celebrity this is expected to affect the willingness of society to invest in risky assets, and therefore affect stock prices. Because this is an exogenous and negative shock in the mood of society, the death of a beloved celebrity is a solid indicator for a negative shock in social mood.

This celebrity death effect was first investigated on the US stock market by Lepori (2011). In contrast to all other studies investigating a negative shock in social mood, this study finds that the death of a beloved celebrity is followed by an increase in stock returns. This result supports the Affect Management Model (AMM), which argues that people tend to take more risk after their mood is deteriorated. Because the study of Lepori finds contradicting results, it is interesting to test the celebrity death effect on other markets.

The research is divided into two parts. First, a literature research will be conducted, which will be the fundament of this study. The literature on mood and decision making, social mood, the effect of a negative shock in social mood on the stock market, and the effect of celebrity deaths on the mood of society will be critically reflected. In the second part an empirical research will be conducted to test the celebrity death effect on daily returns of large cap stock indexes and small cap stock indexes of the United Kingdom, the Netherlands, and Germany. Previous literature found that small cap stocks are more prone to investor sentiment (Baker & Wurgler, 2007). Therefore, the celebrity death effect is also investigated on small cap stocks. The time span of the research is 1986-2015. In this study we will test the null hypothesis:

-H0: *Celebrity deaths have no significant effect on stock returns*.

This null hypothesis is in line with the Efficient Market Hypothesis, stating that all investment decisions are rationally considered. According to the Efficient Market Hypothesis decisions on the

stock market are not influenced by irrational behaviour such as mood misattribution. This null hypothesis will be tested against two sets of alternative hypotheses: two alternative hypotheses that follow the MCH and two alternative hypotheses that follow the AMM. This is done because of the contradicting results between the celebrity death effect study of Lepori (2011) and the studies using other indicators of a negative shock in social mood. The first set of alternative hypotheses are HA1.1 and HA1.2, which both follow the reasoning of the MCH:

- HA1.1: *The death of a beloved celebrity induces a negative shock in social mood which results in less risk taking, followed by a decrease in returns of large cap stock indexes, ceteris paribus*.
- HA1.2: *The death of a beloved celebrity induces a negative shock in social mood which results in less risk taking, followed by a decrease in returns of small cap stock indexes, ceteris paribus.*

The second set of alternative hypotheses are HA2.1 and HA2.2, which both follow the reasoning of the AMM:

- HA2.1: *The death of a beloved celebrity induces a negative shock in social mood which results in more risk taking, followed by an increase in returns of large cap stock indexes, ceteris paribus.*
- HA2.2: *The death of a beloved celebrity induces a negative shock in social mood which results in more risk taking followed, by an increase in returns of small cap stock indexes, ceteris paribus.*

The results of our empirical research support the findings of Lepori (2011) and the reasoning of the AMM. We find a significant positive effect on daily returns of large cap stock indexes and small cap stock indexes of the UK, the Netherlands, and Germany after a celebrity dies, but the celebrity death effect is best captured on the daily returns of small cap stocks. When we divide the celebrities into a 'popular' celebrity group and a 'regular' celebrity group, based on the media attention after their death, we find a significant positive effect of the 'popular' group but no significant effect of the 'regular' group on the daily returns of small cap stock indexes. We do not find significant effects on the daily returns of large cap indexes for these groups. These results hold when we control for seasonal and daily influences and influences of recession periods. Also, when we divide the celebrity deaths into sudden and gradual deaths, we find a larger effect on the daily returns of the small cap indexes for 'popular' celebrities with a sudden death than for 'popular' celebrities with a gradual death. This indicates that when the shock effect after a celebrity dies is larger, daily small cap stock returns increase more.

In the next chapter a critical reflection of previous related literature will be given, followed by chapter 3, in which the used data and methodology for the empirical research is explained. Chapter 4 contains the results of the empirical research, and in chapter 5 these results are critically discussed.

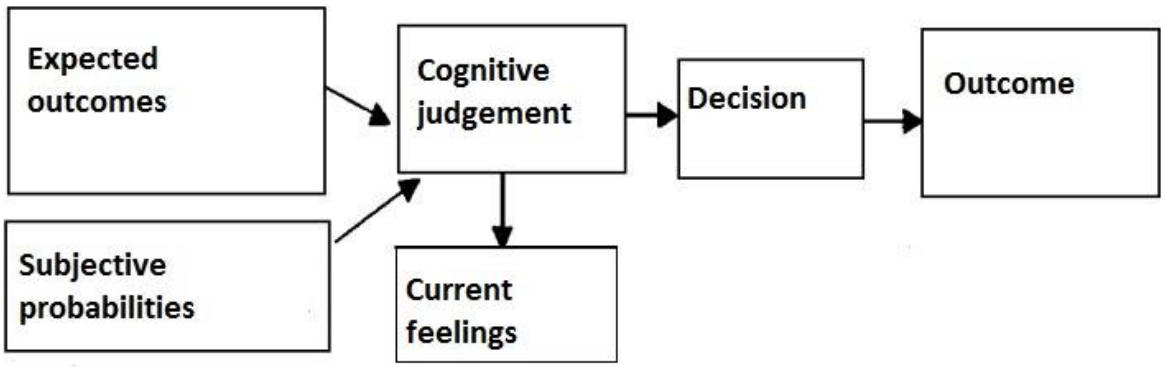
2. Literature

In this chapter existing related literature will be described. This chapter is separated in several parts. In the first part the literature on the relation between mood and decision making will be described. This is followed by an examination of the literature that describes how a shock in social mood is expected to be reflected on the stock market. In the third part an overview of several previous empirical studies on social mood and the stock market will be discussed. In the last part of this chapter there will be an examination of the effect of celebrity deaths on social mood, and an explanation why this indicator of social mood is chosen for this research.

2.1 Mood and decision making

In this section the literature on how mood can influence decision making will be explained to determine how a shock in mood can alter the decisions that you are making. Ideas of how people actually make decisions have changed a lot over time. In this section three decision making models will be described, formulated by Loewenstein *et al.* (2001). Traditional economics cling to the idea that people make rational decisions by measuring all possible outcomes. This is better known as the expected utility theory, people try to maximize their utility by choosing the outcome with the highest expected utility (Loewenstein, Hsee, Weber, & Welch, 2001). This theory is summarized in the consequentialist model shown in Figure 1. In this model the decision making process is seen as a purely cognitive process, where feelings have no influence on decision making. Meanwhile, the cognitive evaluation of all possible outcomes associated with all possible risks does have an influence on the feelings of the decision maker. The outcome of this decision making process is an efficient decision because the decision is purely rational. If every decision maker makes rational decisions, prices will reflect all available information. Therefore, this model supports the Efficient Market Hypothesis where all prices are at their fundamental values (Fama E. , 1970).

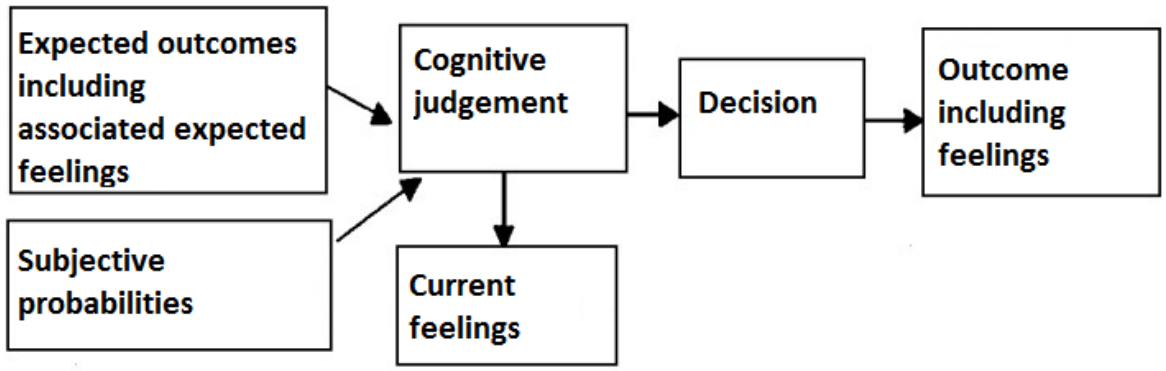
Figure 1: the consequentialist model



The consequentialist model has been criticized a lot. According to the behavioural finance school, emotions do have an influence on the decision making process, and this impact can be permanent (Barberis & Thaler, 2002). Which role feelings play while making decisions has long been studied (Lucey & Dowling, 2005). Some behavioural economists state that Keynes already supported the theory that feelings play a role in the decision making process, because he talked about animal spirits that influence human behaviour (Keynes, 1936) (Lucey & Dowling, 2005). Simon states that you first need to know which role emotions play while making decisions before it is even possible to make a model about human rationality (Simon, 1990).

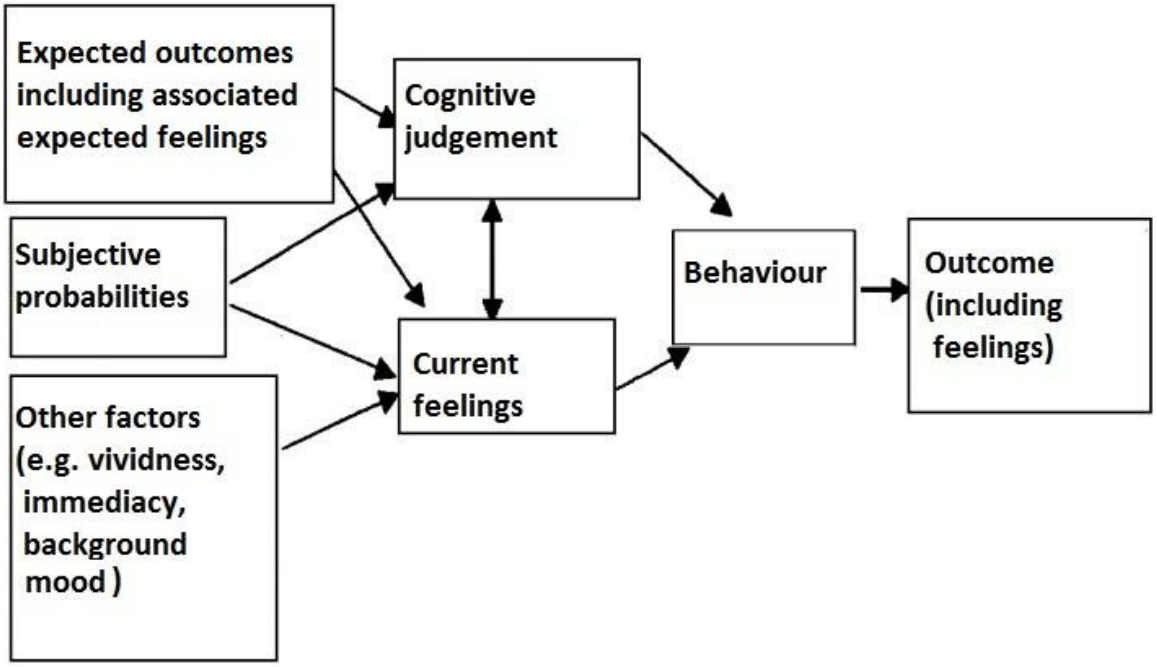
Loewenstein *et al.* describe a second model where emotions are a little more prominent in the decision making process (Loewenstein, Hsee, Weber, & Welch, 2001). This second model, called the consequentialist model with anticipated feelings, is shown in Figure 2. It differs in one way from the consequentialist model. Namely, in this second model people also consider emotions that they expect to feel when they choose a particular outcome. So now all outcomes with their expected risks as well as their expected feelings are considered, and the outcome with the highest expected utility is chosen.

Figure 2: the consequentialist model with anticipated feelings



However, in the consequentialist model with anticipated feelings there is still no role for the current feelings of the decision maker in the decision making process. Because a shock in social mood affects the current feelings of people, this model is not capable of explaining why social mood can affect the decision making of a large proportion of society. It has been empirically observed that current feelings do influence the decision making of people, even when the current feelings are not related to the decision that has to be made (Lerner, Small, & Loewenstein, 2004). In the risk-as-feelings model (figure 3), the third model developed by Loewenstein *et al.*, current feelings also affect the decision making of people.

Figure 3: the risk-as-feelings model



There are three assumptions about current feelings in the decision making process made in this model. First, just like the previous two models the cognitive judgement of all possible outcomes provokes emotional reactions. This is also supported by earlier psychological research, for example by Zajonc: *affect is elected only after considerable processing of information has been accomplished* (Zajonc, 1980, p. 151).

The second assumption is that current feelings also influence the cognitive judgement. Current feelings can affect the cognitive judgement in several ways. Current feelings can direct the attention to other characteristics of a particular expected outcome, and this can alter the optimal decision (Loewenstein, Hsee, Weber, & Welch, 2001). Also, the judgement of the expected outcomes and their probabilities can be influenced by current feelings (Figner & Weber, 2011). This is supported by an experiment of Johnson and Tversky. These researchers let half of their subjects read negative news items, and after that let all subjects estimate the number of fatalities to several death causes. The subjects who had read the negative news items estimated a higher number of fatalities for all the death causes, even when the news item was not related to the death cause (Johnson & Tversky, 1983).

The third assumption is that current feelings directly affect human behaviour. This is supported by an experiment where brain damaged patients who cannot translate cognitive information into terms that the emotional brain can understand are compared with healthy subjects while playing a card game. The patients, who could not experience emotions during the game because of their disability,

took way more risk than the non-patients. Therefore, current emotions do alter human behaviour in risky situations (Bechara, Damasio, Tranel, & Damasio, 1997).

2.2 Expected effect of social mood on the stock market

In the previous part we saw that the risk-as-feelings model can explain how current emotions may influence the decision making process. However, in the risk-as-feelings model it is assumed that current emotions have the same influence for all kinds of decisions that have to be made. Yet, in certain situations the role of current emotions is more present in the decision making process than in others. When the situation is very complex and there is a lot of information involved, people tend to make more use of their emotions while making decisions. This is because people are not capable choosing the optimal outcome in situations where they cannot oversee all possible outcomes and their risks. In these situations, there is too much information to make a cognitive decision. This phenomenon is better known as information overload (Shiv & Fedorikhin, 1999). When there is too much information people tend to use their current mood more while making a decision, even when their current mood has nothing to do with the decision that has to been made. Using your mood while making decisions when the mood is unrelated to the decision is called mood misattribution (Schwarz & Clore, 1983).

A model that contributes to the question when current emotions play a bigger role in the decision making process is the Affect Infusion Model (Forgas, 1995). In this model a distinction has been made between strategies where emotions are hardly used when making decisions, the Low Affect Infusion Strategy (LAIS), and strategies where emotions play a big role when making decisions, the High Affect Infusion Strategy (HAIS). LAIS is used for simple and familiar situations, while HAIS is used for complex situations with a lot of information involved. So when decisions are more complex, the influence of current emotions will be larger in the decision making process. Decisions on the stock market are often not simple and familiar. This is especially the case for small individual investors who make no use of a professional advisor. There is a lot of information available about all kinds of firms, and this information can change every hour. This makes the decision in which firm or fund to invest in very complex. So, according to the Affect Infusion Model it is likely that people will make big use of their current emotions when making decisions on the stock market. When the feelings of a large part of a society is affected in the same manner, it is expected that this will be reflected on the stock market. The stock market can be seen as a reflection of the collective mood of a society at any given moment (Olson, 2006). This is because decisions on the stock market can be taken almost immediately, so there is no delay between the shock in social mood and the reflection on the stock market (Nofsinger, 2005).

However, not all investors on the stock market are vulnerable to irrational behaviour like mood misattribution. There are also rational investors on the stock market who do not let their emotions influence the decisions that they make on the stock market. According to the Efficient Market Hypothesis this is why irrational behaviour cannot have a permanent influence on stock prices, because prices will always return to their fundamental value. Namely, rational investors will discover any mispricing on the stock market and will make use of arbitrage to gain a riskless profit (Barberis & Thaler, 2002). This behaviour pushes prices back to their fundamental value. On the other hand, behavioural economists state that irrational behaviour such as mood misattribution can have a lasting impact on financial markets. The reason for this is that there are limits to the use of arbitrage, because arbitrage might be risky or costly. These limits to the use of arbitrage will allow the mispricing to survive (Shleifer & Vishny, 1997) (Barberis & Thaler, 2002). Mehra and Sah (2002) support the view of the behavioural economists and state that that irrational behaviour, more specifically mood misattribution, can have lasting influence. These researchers state that there are three conditions that must be satisfied to let irrational behaviour have a lasting influence on financial markets. First, changes in mood must lead to changes in the subjective parameters of the decision maker. This means that after the change in mood the cognitive judgement of the decision maker will be influenced, or that the risk attitude of the decision maker has changed. Second, the effects of the change in mood must be widely and evenly experienced in the society. Third, the investors on the stock market must not be aware of the fact that their decisions are influenced by their mood (Mehra & Sah, 2002).

Shocks in social mood seem to satisfy these three conditions. A shock in social mood affects the mood of a large part of the society, so the change in mood is widely and evenly experienced. Furthermore, the cognitive judgement is influenced by current feelings so a shock in current feelings will change the cognitive judgement, as explained in the risk-as-feelings model (Loewenstein, Hsee, Weber, & Welch, 2001). Also, investors whose mood is influenced by this shock in social mood are probably not aware that this change in mood will change the decisions that they make, because this change in mood is unrelated to the decision they have to make on the stock market.

A relative new direction in behavioral finance focuses on which stocks are more likely to be influenced by investors' mood. It has been found that stocks with a high volatility, a low capitalization and stocks of a relative young company are more likely to be influenced by investor sentiment (Baker & Wurgler, 2007). Theoretically, this is because conducting arbitrage on these stocks is harder because of the high transaction costs and the value difficulties. In view of this information it is likely that stocks of smaller firms are more prone to a shock in social mood than stocks of large conglomerates. Therefore, a larger effect of a shock in social mood is expected to be

visible on small cap indexes than on large cap indexes. The volatility of returns of small company stocks is larger (Eun, Huang, & Lai, 2008), and the liquidity on small cap indexes is smaller (Yan, 2008). This will make mood misattribution of some irrational investors more visible because there is less volume needed to change prizes in comparison to a large cap index, and because arbitrage is even harder to pull off on stocks of smaller companies it is likely that the effect of a shock in social mood will be more visible on a small cap index.

In theory there should be a reaction on the stock market after a shock in social mood. However, there is still discussion how this will be reflected on the stock market. In this paper a negative shock in social mood will be examined, namely the effect of the death of a beloved celebrity. Why this indicator of social mood is chosen is explained in the next part, for now it is only important to know that we examine a negative shock in social mood. Celebrity deaths are expected to cause a negative shock in social mood, because sadness is the most dominant emotion in the grieving process (Keller & Nesse, 2005). There is no consensus yet about the sign of the impact of negative mood on the willingness to take risk (Lepori, 2011). There are two contradictory theories on how a negative shock in social mood will be reflected on the stock market: The Affect Management Model (AMM) and the Mood Congruence Hypothesis (MCH).

According to the AMM a negative shock in mood will result in more risk taking. There are several theories that support the reasoning behind the AMM. One of them is the Hedonic Contingency Theory, which implies that a negative shock in mood makes people think that anything they do will make them feel better. Therefore, people tend to take more risk because they think that every possible outcome will improve their current mood (Wegener, Petty, & Smith, 1995). Another framework that supports the AMM is the Mood Repair Hypothesis, which states that when people discover a negative mood they seek to 'repair' their mood again by taking more risk in order to improve their mood (Bruyneel S. D., Dewitte, Franses, & Dekimpe, 2009). People take more risk because high risk is associated with high reward, which is expected to improve current mood. The AMM is also supported by some empirical evidence. In an endowment effect experiment, lab subjects whom a sad state was induced through film clips showed a desire to change current circumstances by raising their willingness to pay and lowering their willingness to ask (Lerner, Small, & Loewenstein, 2004). It is also found in an experimental setting that subjects with a negative mood take more risk while making marketing strategy decisions (Mittal & Ross Jr., 1998) . Furthermore, a few experimental studies that are roughly the same find that subjects in a sad state tend to choose high risk options with high rewards while making gambling and job selection decisions (Chuang & Kung, 2005) (Lin, Yen, & Chuang, 2007). Also, a longitudinal study found that lottery expenditures increase when a person's mood decreases (Bruyneel, Dewitte, Franses, & Dekimpe, 2005). So, based

on AMM people will take more risk when their mood is negatively affected, which will be reflected on the stock market by an increase in prices.

On the other hand, according to the Mood Congruence Hypothesis (MCH) a negative shock in mood will reduce risk taking. This framework is also supported by several studies. For example, the Affect Infusion Model shows that negative emotions trigger pessimistic choices, which is illustrated by the already in part 2.2 explained experiment of Johnson and Tversky where subjects had to estimate the number of causalities of several death causes. People tend to overestimate risk when they are in a bad mood. Because people will be more pessimistic when they are in a negative mood, they shy away from risk. On the other hand, when people are in a good mood they will make a more positive judgement of all risks and will be more risk seeking (Johnson & Tversky, 1983). Several other lab studies produced similar results which all support the MCH (Arkes, Herren, & Isen, 1988) (Wright & Bower, 1992) (Mayer, Gaschke, Braverman, & Evans, 1992) (Yuen & Lee, 2003). The main reasoning why people in a bad mood shy away from risk is that negative emotions tend to recall negative memories, which leads to a more negative judgement because this judgement is based on negative memories (Bower, 1981).

Both frameworks are supported by several other studies, so it is not the case that one framework is right and the other framework is plainly wrong. A possible explanation for these contradicting findings is that not all kinds of negative emotions have the same effect on decision making. There are different effects for example for sadness and anxiety, although both of these emotions are negative (Raghunathan & Pham, 1999). Also, because most studies that support the two frameworks are lab studies and the external validity of lab studies is generally not high, it might be possible that subjects in the lab studies behave differently as if they would have done in a real life situation. Therefore, it is meaningful to test AMM and MCH using real world data and a specific negative emotion.

2.3 Previous studies on the effect social mood on the stock market

There have been a lot of studies conducted in the behavioural finance field which investigated the effect of social mood on stock prices. Several indicators of social mood have been used in the literature so far. A frequently used indicator of social mood is local weather. Saunders was the first researcher who used local weather to investigate the effect of social mood on the stock market (Saunders, 1993). He finds a negative effect of bad local weather, indicated by cloudy days, on New York stock prices and calls this effect the weather effect. Some other researchers found similar results on other markets. Hirshleifer and Shumway tested the weather effect on a global level, and using logistic regressions they find a negative effect of bad local weather on 25 of the 26 analyzed markets (Hirshleifer & Shumway, 2003). However, not all researchers who investigate the weather effect find a significant effect on the stock market. Kramer and Runde test the weather effect on the

German market and find no significant relation between bad weather and the stock market (Kramer & Runde, 1997). Trombley used the same data as Saunders and concludes that the weather effect is in fact not that clear and strong (Trombley, 1997).

Other indicators of a negative shock in social mood that have been used are terrorist attacks and aviation disasters. Studies using these indicators of social mood find a significant negative effect of terrorist attacks and aviation disasters on stock market returns (Arin, Ciferri, & Spagnolo, 2008) (Kaplanski & Levy, 2010). Also, bad sport results of national teams are expected to have a negative effect on social mood. It has been found that losses of national football teams have a significant negative effect on the local stock market (Edmans, Garcia, & Norli, 2007). The results of the studies in this section discussed so far all support the MCH. Namely, stock returns decrease after these events that caused a negative shock in social mood.

Using celebrity deaths as indicator of social mood is fairly novel. By my knowledge there have been two research papers that used celebrity deaths as indicator of social mood to investigate the effect of a shock in this social mood on the stock prices. Both of these studies were conducted on the US stock market. Lepori investigated the effect of the death of celebrities on the Hollywood Walk of Fame on the daily stock returns of the NYSE, the AMEX, and the NASDAQ. He analyzes a sample of 1374 celebrity deaths over the time period 1926-2009. Because the death of a beloved celebrity is expected to cause a negative shock in social mood, Lepori investigates what effect a negative shock in social mood has on the stock market. He finds that the death of 'popular' celebrities is followed by a 16 basis point increase in stock returns, so the results support the AMM. This result holds after controlling for seasonality's, economic and environmental factors and market liquidity (Lepori, 2011). This celebrity death effect has a stronger influence on stocks that are more sensitive to investor sentiment, which are high volatility stocks, high beta stocks, and small-cap stocks. However, celebrities who do not receive much media attention after their death do not affect the stock returns.

The study of Lepori (2011) contradicts the results of the studies using other indicators of social mood discussed above. Where all these studies find a negative effect on stock returns when social mood decreases, this study using 'popular' celebrity deaths as indicator of social mood finds a positive effect. Lepori does not discuss why the observed effect of celebrity deaths differ from the other indicators of social mood, although there are some possible explanations for this. First of all, some of the other indicators may also have a direct negative economic effect. Examples of indicators with possible economic effects are the effects of aviation disasters and terrorist attacks. It has been found that these events have a direct negative impact on especially tourism. Tourists evaded France and

Turkey as vacation destination after recent terrorist attacks in these countries, and because tourism is a big business for France and Turkey this directly hurt their economies (Bloomberg, 2016) (Express, 2016). Also, it has been found that aviation disasters have a direct negative effect on the air transport industry (Chance, 1987). Because these indicators also have direct negative economic effects, it might be that the effect of investor sentiment is overshadowed by the economic effects of the event. The death of a popular celebrity does not have an obvious link with the economy of a country, so it is expected that the effect on stock returns after the death of a beloved celebrity is purely based on investor sentiment. A second possible explanation is that the death of a beloved celebrity provokes a distinct single negative emotion, namely sadness. This is because sadness is the dominant emotion provoked in the grieving process (Keller & Nesse, 2005). This might be different for the other indicators. It has been found that bad weather and bad sport results have a negative effect on mood (Persinger, 1975) (Wann, Dolan, McGeorge, & Allison, 1995), but it has not been found that a specific negative emotion is provoked. Terrorist attacks and aviation disasters are more likely to provoke emotions such as fear and anger instead of sadness. Because different classes of negative sentiment may provoke different behaviour, and therefore may have different effects on the decision making process, it may be that this causes the different effects on the stock market (Raghunathan & Pham, 1999).

In the other research paper that uses celebrity deaths as indicator of social mood, the focus is on the effect of sudden celebrity deaths on the US stock market. However, this research does not find a significant effect (Chen, 2011). Unfortunately, no more information is available about this research, because this research paper is not obtainable.

2.4 Celebrity deaths and mood

As stated before, it is meaningful to test the two contradicting theories about the reaction on the effect of a negative shock in social mood on the stock market, the Affect Management Model (AMM) and the Mood Congruence Hypothesis (MCH), using real world data and a specific negative emotion. The negative emotion where we focus on in this study is sadness, generated by the grieving process after the death of a beloved celebrity. In this part an explanation about why celebrity deaths are used as indicator of a negative shock in social mood will be given.

In this part of the literature review the focus lies on the reaction of society to celebrity deaths. An extensive review about the literature on what a celebrity is, what the relation between the public and celebrities is, and how the public reacts to a celebrity death will be given. This part will explain why celebrity deaths are a solid indicator for a negative shock in social mood, and therefore useful for this research.

2.1.1 Celebrities

The celebrity phenomenon emerged in the United States in the second part of the 20th century and was fueled by the emergence of mass media and capitalism. Soon after, the celebrity culture spread out across other Western countries (Kurzman, et al., 2007). The celebrity culture developed itself in most western countries during the 1980's, mainly caused by the introduction of commercial television (Marshall & Redmond, 2015). With the introduction of commercial television, daily showbizz news programs largely replaced weekly gossip magazines, which made it possible to follow the everyday life of the celebrities. During the beginning of the 21st century the celebrity culture extended even more, assisted by the introduction of social media (Cashmore, 2006).

Celebrities can be seen as a new status system (Kurzman, et al., 2007). According to Weber, status is a social hierarchy and several status groups are distinguished by a specific social estimation of honor (Weber, 1946). Unlike earlier status groups[2], celebrities are dealing with reputation (Hurst, 2005) and the construction of audiences (Marshall, 1997). Celebrities are especially dealing with these matters because they are actually a product of capitalism. Celebrities are being sold in a competitive capitalist market, and how valuable they are depends on the organizational structure that sells them and the ideologies that they promote (Hurst, 2005). Therefore, reputation and the construction of audiences is especially important for celebrities. The private life of a celebrities will often attract more attention from the public than their professional life[3]. The professional life of celebrities often causes the initial

[2] There is a big difference between an older status group similar to modern celebrities, traditional heroes as military leaders or religious figures, and modern celebrities. Where heroes are distinguished by their achievements, celebrities are distinguished by their image (Boorstin, 1961). Boorstin gives an example about a best-seller book to explain this phenomenon. He calls a best-seller "the celebrity among books'. This best-seller book is primarily known for its well-knownness. Lots of people decide to buy this book because many others already bought this book, not because of the content or the literary skill of the author (Van Krieken, 2012).

[3] Although most celebrities have emerged through sports or the entertainment industries, their fame does not depend on their professional achievements in these industries. Some celebrities are not necessarily famous because they did great things or possess great qualities, but simply because they are a product of the mass media. This is the biggest difference between celebrities and heroes according to van Krieken (2012): a hero created himself where a celebrity is created by the media. Celebrities appear to have replaced the role of heroes and are the new role models for a large part of society (Braudy, 1986).Therefore, the modern celebrity may claim no special professional achievements, except for attracting the public's attention (Turner, 2013). The biggest example of this are reality stars like the Kardashians.

public attention, but once they are established celebrities their professional achievements are irrelevant for their fame.

Because celebrities can be seen as a specific high status group, society gives certain privileges to celebrities. According to Kurzman et al (2007), we can distinguish four different kinds of privileges that are obtained by celebrities. First, celebrities obtain normative privileges. This involves the imitation of celebrities by other people. Celebrities are considered as role models and a lot of people want to be just like them. This is why celebrities are often used in advertising campaigns. Second, celebrities are given economic privileges. Think of the high wages that celebrities receive. The world's 100 highest paid celebrities received approximately five billion dollar, which is more than the GDP of Belize, Gambia and Bhutan combined (Forbes Media LLC, 2016). Third, celebrities are faced with legal privileges. Celebrities have special publicity rights to protect their brand names and to profit from publications with their name in it (Kurzman, et al., 2007).

The fourth privilege is the interactional privilege of celebrities, and this privilege is the most important one for this paper. We do not only spoil celebrities with normative, economic, and legal privileges but we also give them a special treatment in the way we socially interact with them. Celebrities have several specific privileges in the way we, as society, admire them and how we look up to them. The foremost form of interactional privilege is attention (Kurzman, et al., 2007). The relation between regular people and celebrities will be further explained in the next part.

2.1.2 Relation between regular people and celebrities

Celebrities make up a large part of an average day of most people. It has been found that people in the UK spend on average 8 hours and 41 minutes on media devices a day. This is even more than the average amount of sleep, with 8 hours and 21 minutes (Daily Mail, 2015). Since the second part of the 20th century there is a huge supply of celebrity-focused magazines that report about the private life of all 'hot' celebrities. Also, the TV industry in Western countries offers more and more TV shows that are mainly focused on the private lives of celebrities (Kurzman, et al., 2007). That people spend a lot of time on media devices can be demonstrated by the ever-growing media industry. The media industry consists of several segments, among others TV and video, consumer magazines, newspapers, and music. The total consumer spending in Western Europe in the media industry was around US $300 billion in 2014, and is predicted to increase yearly with 2.4% until 2019 (McKinsey & Company, 2015). In the UK the entertainment and media industry is expected to grow at an annual growth rate of 3% over the next five years to be worth US $68.2 billion (PWC, 2016). One of the effects of so much media use is the growing importance of media figures for the average person (Giles & Maltby, 2004).

However, for a lot of people all these media sources are still not sufficient. With the emergence of the internet there are countless websites purely created to keep everyone up to date with the latest news about any celebrity. It is found that ordinary people look up additional information about the private lives of celebrities for vicarious happiness. This means that people receive pleasure from the well-being of the celebrities who they follow (Leets, de Becker, & Giles, 1995). Billions of people spend a considerable amount of time following celebrities in TV shows, on the internet, and in the magazines. Because there are so many sources that follow the lives of celebrities, there is a huge demand for celebrities. This results in the large amount of celebrities nowadays, where most of them are 'famous for 15 minutes' (Gamson, 2000). The internet contributed a lot to this phenomenon, because all information about the celebrities is shared so quickly (Choi & Berger, 2010).

The adoration of celebrities is more focused on their wealth and success than on their professional achievements and their integrity (Harris, 2011). Also, not only our attention goes to the celebrities we adore. Many people follow the lives of celebrities who they actually do not like, because they love to hate that particular celebrity (Van Krieken, 2012). Because regular people know far more about celebrities than celebrities know about them, it makes celebrities seem superior to them. When a celebrity takes the time to communicate with regular people, we consider ourselves honored. This is even the case when the contact was unpleasant (Kurzman, et al., 2007).

Because regular people know so much about celebrities' private lives, they develop an imaginary friendship with them. In this friendship the celebrities can be seen as 'intimate strangers'. This imaginary friendship is a para social relationship, which means that the relationship is one-sided and fans feel that a specific celebrity is talking directly to them (Rubin, Perse, & Powell, 1985). This para social relationship is able to develop to a state where people consider the celebrity as their real friend (Stern, Russell, & Russel, 2007). Although these relationships are just imaginary, people tend to perceive them as real. Therefore, people get emotionally involved with celebrities as they would with real friends (Hall & Reid, 2009). Even if someone never met a particular celebrity in real life, this person can still sense that the relationship with this celebrity is real because he knows so much about this celebrity (Stever, 2010). Another reason why people feel that they are emotionally connected with a celebrity is because they can identify with a specific celebrity. Identification can be seen as the first emotional tie with another person (Freud, 1922).

Because people may feel that they are emotionally connected with a celebrity, they perceive their relationship with the celebrity as any other relationship with family or friends. Many people even feel that they know a celebrity better than their relatives or their neighbor (Gibson, 2007). So, given that celebrities have an enormous appeal to regular people, that people look up to celebrities, and that

regular people feel that they are emotionally involved with celebrities, it is entirely possible that the death of a beloved celebrity will emotionally affect people.

2.1.3 Public's reaction to celebrity deaths

Mourning is a natural human reaction when a loved one passes away. The grieving process starts immediately after the loss, and sadness is the most perceived emotion during this process (Keller & Nesse, 2005). The emotional peak is directly after the loss, and the intensity of this feeling declines over time (Malkinson, 2001). So, the death of a loved one provokes a negative shock in mood of grieving people. Obviously, this grieving process is expected to occur when you lose someone that you have known in real life. However, it is also possible that you are emotionally affected by the death of someone who you never met. The media reports everyday about death, whether it is because of war, disease, or natural disasters. However, celebrity deaths are of a different order. The death of a popular celebrity is able to attract and hold the attention of an entire society. The media anticipates on this and makes headlines and stories about celebrity deaths to profit from them (Gibson, 2007).

Celebrities can strongly emotionally affect us during their lives, but are able to do this as well after their death (Van Krieken, 2012). As stated earlier, regular people often consider their relationship with a particular celebrity as if it is real. However, their contact with celebrities is so restricted that this makes them see celebrities as some kind of fata morgana. Once it is proved by their deaths that celebrities are in fact just as real as we are, we experience the moment of greatest intimacy with them (Harris, 2011). Therefore, when a celebrity dies this is one of the moments where the strongest emotional connection is felt.

Deaths of meaningful celebrities are capable to create a mourning society. All kinds of unrelated people feel connected with each other because they share the same feeling for the deceased celebrity. All these strangers have in common that they can identify with the celebrity, and they all feel the same emotional connection with this celebrity (Gibson, 2007). This creates a feeling of unity in society. Nowadays the development of modern communication technologies, like social media, took away the time and travel issues to share feelings with other people across the globe (Choi & Berger, 2010). This stimulated the visibility of public grieving after the death of a popular celebrity. Often, the funeral or the memorial service of significant celebrities are filmed and can be followed by all fans across the world. This makes it possible for fans to share their feelings with strangers with the same adoration while watching the last moments of their beloved celebrity (Gibson, 2007).

Only celebrities who receive enough media attention after their death will create public mourning. We cannot mourn people whom we do not know that they are death, so it is important that there is ongoing media attention after the death of a celebrity. This will only happen if the relevant celebrity was popular and meaningful to the society. Public mourning has a short period of strong emotional reaction, and after this short period the emotional reaction will quickly decrease. The climax is at the main event, which is usually the funeral or the memorial service (Gibson, 2007).

2.1.4 Evidence for public mourning after celebrity deaths

In the previous part it is shown that it is theoretically possible for the deaths of beloved celebrities to create public mourning. This part will show that there in fact is some evidence that significant celebrity deaths are followed by public mourning, and hence affect social mood.

Some major examples of celebrity deaths that shocked large populations across the world are the deaths of Elvis Presley, Princess Diana, and Michael Jackson. When popular celebrities like these pass away it often occurs that all kinds of people within a society lay flowers, light candles, or show other forms of grief at a significant location. Princess Diana's funeral was watched by many people with such an emotional intensity, and because people knew that they were watching the funeral with millions of other people who shared the same feeling this had a huge impact on people's souls (Gibson, 2007). After the death of Michael Jackson an immense outpouring of public grief arose across the globe, recorded by countless Tweets in the hours after it was revealed that the King of Pop died. The sentiment of these Tweets was negative and tons of people reacted as if someone they personally knew past away (Kim & Gilbert, 2009). That celebrity deaths excite a lot of reactions is supported by a research where a new event detection method, by means of analyzing Twitter data, is conducted. This research showed that celebrity deaths are the fastest spreading news on Twitter, above other events like natural- or aviation disasters and sport- or political events (Petrović, Osborne, & Lavrenko, 2010).

There is some more empirical support for the literature described above. It is found that celebrity deaths tend to be followed by an increase in suicide rates, in particular when the celebrity died by suicide (Cheng, Hawton, Lee, & Chen, 2007). This supports the theory that people tend to imitate and identify with celebrities, as well as that celebrity deaths cause a negative shock in mood (Hawton, et al., 2000). Also, the prices of celebrity souvenirs tend to increase after their death. This is partly due to the increased public interest in the celebrity, which is mainly driven by the media attention after the death of a celebrity (Matheson & Baade, 2004).

The literature described in this chapter gives theoretical support and some empirical evidence on the effect of celebrity deaths on social mood. According to the literature the death of a popular celebrity is able to induce a negative shock in social mood, by causing a collective mourning. More specific, the death of a beloved celebrity is expected to provoke a specific negative emotion in society, namely sadness. Celebrity deaths affect many people in a society. Also, the news of celebrity deaths spreads very quickly, even quicker than some other social mood indicators like aviation disasters and sport results. This makes celebrity deaths a solid indicator of a negative shock in social mood.

3. Data and Methodology

In this chapter the data and the methodology that is used for the empirical research will be described. By means of this empirical research the null hypothesis H0: *Celebrity deaths have no significant effect on stock returns* will be tested against two sets of alternative hypotheses: two alternative hypotheses that follow the Mood Congruence Hypothesis (MCH) and two alternative hypotheses that follow the Affect Management Model (AMM). The first set of alternative hypotheses are HA1.1 and HA1.2, which follow the reasoning of the (MCH):

- HA1.1: *The death of a beloved celebrity induces a negative shock in social mood which results in less risk taking, followed by a decrease in returns of large cap stock indexes, ceteris paribus*.
- HA1.2: *The death of a beloved celebrity induces a negative shock in social mood which results in less risk taking, followed by a decrease in returns of small cap stock indexes, ceteris paribus.*

The second set of alternative hypotheses are HA2.1 and HA2.2, which follow the reasoning of the (AMM):

- HA2.1: *The death of a beloved celebrity induces a negative shock in social mood which results in more risk taking, followed by an increase in returns of large cap stock indexes, ceteris paribus.*
- HA2.2: *The death of a beloved celebrity induces a negative shock in social mood which results in more risk taking, followed by an increase in returns of small cap stock indexes, ceteris paribus.*

To test the effect of a negative shock in social mood on stock prices the markets of the United Kingdom, the Netherlands, and Germany will be analyzed. These markets will be analyzed to find out if there is a visible reaction on the stock market after the deaths of celebrities. The United Kingdom is especially chosen because of its tabloid culture and its large entertainment industry (PWC, 2016). Because of sample size reasons the Netherlands and Germany are also added to the research. These markets are chosen mainly because they have a similar celebrity culture as the United States (Turner, 2013). Testing the celebrity death effect on markets that are similar to the United States is particularly relevant because Lepori (2011), who found the celebrity death effect on the US stock market, stated that future studies on the celebrity death effect should be in countries were celebrities have the same status and adoration as in the United States. The markets of the UK, the Netherlands, and Germany are excellent examples of such a market. All of the chosen three markets are western developed countries, similar to the United States. It is important that we investigate

developed markets just like the US, because the celebrity culture is especially dominant in developed countries (Cashmore, 2006). As the literature review showed, when celebrity culture is dominant in society, it is possible that the death of a celebrity may affect the stock market. Just as in the US, in all of these three countries there have been celebrity deaths that induced a huge emotional reaction by society. Think of the deaths of Princess Dianna in the UK, Pim Fortuyn in the Netherlands and Robert Enke in Germany. Because of the above reason the effect of celebrity deaths on the markets of the UK, the Netherlands, and Germany will be investigated.

We will regress multiple models on two different dependent variables: daily returns of large cap stocks and daily returns of small cap stocks. The large cap stocks will be represented by the FTSE 100 for the British stock market, the AEX for the Dutch stock market, and the DAX for the German stock market. These are all indexes of companies with the highest market capitalization on the concerned stock exchanges. The data of these indexes is extracted from DataStream. Because previous literature has found that smaller stocks are more prone to investor sentiment (Baker & Wurgler, 2007), the effect of celebrity deaths will also be investigated on small cap indexes. The FTSE Small Cap Index represents the UK, the AScX represents the Netherlands, and the SDAX represents Germany. These are all index of small market capitalization firms on concerned stock exchanges. Like many other financial studies, the daily returns of all these indexes will be measured.

The time span of our research is 1986- 2015. However, for the Netherlands and Germany there are some limitations to the data, so not the whole research period can be used for investigating the celebrity death effect in these countries. The AScX was only founded in 2005, although DataStream, the source that is used for all financial data, provides data of the AScX starting from July 2000. DataStream extended the AScX by combining historical data of the equity funds that are included in the AScX. Also, the SDAX was only founded in 1999. Therefore, no financial data of the small cap indexes of Germany and the Netherlands is available before respectively 1999 and 2000. Besides the limitations of the financial data, there is also no database available of public searchable national German and Dutch newspapers before 2000. Because we want to proxy the popularity of the celebrities by the number of newspaper articles that mention their names in the week after they died, we need sources that provide searchable data of widely read national newspapers. For Germany and the Netherlands this data is only available from 2000 onwards. A detailed explanation on how we will proxy the popularity of the celebrities will be given later on in this chapter. Because of the limitations of the data for the Netherlands and Germany, only celebrity deaths in the UK can be analyzed for the full research period. Therefore, celebrity deaths that took place between 1 January 1986 and 31 December 2015 in the UK, 1 January 2000 and 31 December 2015 in Germany, and 1 July 2000 and 31 December 2015 in the Netherlands will be added to the research.

To give an indication on how large our sample size should be to find an effect that is comparable to the research of Lepori (2011) a power test is run. With a power test you can determine how large the sample size should be to be able to detect an effect, if this effect exists. Because Lepori found a 16 basis point increase in stock returns, and we want to know how large our sample size should be to find a similar effect, we use a null effect size of zero and a difference in effect size of 16 basis points for our power test. Furthermore, we use a testing power of 80% and a significance level of 5%, which are common choices for conducting a power test. The standard deviation of the stock returns is represented by the standard deviation of the FTSE 100 between 1986 and 2015 is used, which is 0,011. Using these numbers, the power test measured that a sample size of 371 is large enough to find an effect of 16 basis points.

The data of celebrity deaths will be extracted from several online sources. Several classes of celebrities will be considered, for example artists, actors, influential politician, beloved royalties and famous sport athletes. Both national celebrities and globally recognized international celebrities will be considered, as the death of both could be expected to have an impact on the mood of society. The collection of national celebrities is conducted using several sources. First, in line with Lepori (2011), we use an equivalent to the US "Hollywood Hall of Fame" for each country: in the UK this is the Avenue of Stars, for the Netherlands this is the Walk of Fame Europe, and for Germany this is the Boulevard der Stars. Unfortunately, this source only provides a limited selection of celebrity deaths in the chosen research period, and focuses mostly on TV personalities and artists. So, several additional sources are used to find additional celebrities with varying backgrounds, for example national sport- and music awards, websites listing the most famous people per country, etc. In total 107 British celebrities, 75 Dutch celebrities, and 62 German celebrities whose deaths coincided with the study period were selected for this study.

In addition to national celebrities, a number of deaths of worldwide known international celebrities were added. For example, the deaths of Michael Jackson, Whitney Houston and other globally famous celebrities who are expected to induce a worldwide emotional reaction after they die, including in our countries of interest. Data about international celebrity deaths were extracted from several online sources, for example lists of the 'most shocking celebrity deaths' as found on http://www.hollywood.com. Also, the three most popular celebrities with a date of death in a particular year on IMDB Starmeter, found on http://www.imdb.com, were selected for each year in the research period. Because we investigate the effect of the deaths of international celebrities on the stock markets of the UK, the Netherlands, and Germany the effect of the death of an international celebrity between 2000 and 2015 is included three times in the sample: one time for each of the three countries of interest. For the total research period there are 94 international

celebrities added. However, because for Germany and the Netherlands there is only data available from 2000 onwards, there are only 53 international celebrities available for the German market, and 52 international celebrities for the Dutch market. When we combine the national stars and international stars per country, we have 201 celebrities for the UK market, 127 celebrities for the Dutch market, and 115 celebrities for the German market. This gives us a total of 443 celebrity deaths we can use for this research. This is higher than the minimum amount of celebrities we needed to find a similar result as Lepori, given the outcome of 371 from the power test we conducted. For a list of all celebrity deaths that are used as well as the sources used to select them, please see Table 1 until Table 4 in the Appendix.

Because the research of Lepori (2011) showed that the deaths of 'popular' celebrities significantly affect stock prices while 'regular' celebrity deaths do not, a distinction will be made between 'popular' celebrity deaths and 'regular' celebrity deaths. As a proxy of popularity the number of times that a celebrity's name is mentioned in national newspapers in the week after his/her death is used. Data on publications of UK newspapers were extracted from LexisNexis Academic (The Guardian, The Times) and http://www.ukpressonline.co.uk (Daily Express). The newspapers that were used for the Netherlands are de Telegraaf, de Volkskrant, and het Algemeen Dagblad, provided by LexisNexisAcademic. For Germany die Welt, die Tageszeitung, and the Frankfurter Rundschau were used, also provided by LexisNexis Academic. These are all widely read national newspapers that are available for the research period. The average number of news articles per celebrity in the UK is 27, in the Netherlands 26, and in Germany 14. However, we use the median to split the celebrities into the two groups. In the UK the median is 11, in the Netherlands 8, and in Germany 4. All celebrities with a number of articles in which they are mentioned in the week after their dead that is equal or lower than the national median will be classified in the regular celebrity group. All celebrities that have a number of articles that is higher than the national median will be classified in the popular celebrity group. This method divides all celebrities in two almost equally sized groups: 214 'popular' celebrities and 229 'regular' celebrities. Please see Table 5, Table 6 and Table 7 in the Appendix for an overview of the two groups per country.

The methodology used in this research to test the celebrity death effect is similar to the methodology of Lepori (2011). Ordinary Least Squares regressions will be used to analyze the effect of celebrity deaths on the stock returns of the large cap indexes and the small cap indexes. The dependent variable is the pooled daily return of the large cap indexes and the small cap indexes of the three countries of interest. We pooled the data by listing the daily returns of each national large cap index and each national small cap index below each other, resulting in a pooled large cap daily return variable and a pooled small cap daily return variable.

At first we will test the effect of all celebrity deaths included in this research, represented by the Total-dummy variable in equation (1). This Total-dummy variable takes a value of 1 on days that a celebrity died, and 0 otherwise. Also, a lagged return variable is added to this model to control for serial correlation because current returns might be determined by their past level.

$$(1)\ R_t = \alpha_t + \beta_1 Total_t + \beta_2 R_{t-1} + \varepsilon_t$$

Because according to previous literature only celebrities who receive a lot of media attention after their death are able to create public mourning, and Lepori (2011) found that the more media mentions celebrities received in the week after their died the more the stock returns after their death increase, we want to test the effect of media attention on the stock returns of the large cap and the small cap indexes. Therefore, we added a Media variable to the regression, which is shown in equation (2). The standardized number of media mentions a celebrity received in the week after he or she died are measured for this Media variable. Because we investigate the celebrity death effect in three different countries, the amount of media attention differs per country. In the UK the average number of articles is 27, in the Netherlands 26, and in Germany only 14. Therefore, we standardized the number of articles using the mean and standard deviation per country. This is done per country because when you standardize using the mean and standard deviation of the whole sample, the standardized number of articles especially in Germany would be very low because of the higher means in the Netherlands and the UK. Because you might argue that the lower number of media mentions in Germany is caused because Germans are less interested in celebrities, which might lower the celebrity death effect, also regressions are run with a media attention variable that is standardized using the mean and standard deviation of the whole sample size. On the day a celebrity died the Media variable equals the standardized number of articles this celebrity received in the week after he or she died. On days that no celebrity died the Media variable equals zero. Also, a lagged return variable is added to control for serial correlation.

$$(2)\ R_t = \alpha_t + \beta_1 Total_t + \beta_2 Media_t + \beta_3 R_{t-1} + \varepsilon_t$$

Next, the celebrities are divided into the three dummy variables that are shown in equation (3). The celebrities are divided into a particular dummy based on their popularity. The first two variables are the Popular- and the Regular-dummy variables, which represent the ‘popular’ and the ‘regular’ celebrity groups introduced above. The Popular-dummy variable equals 1 if a ‘popular’ celebrity died on this day, and 0 otherwise. The Regular-dummy variable equals 1 if a ‘regular’ celebrity died on this day, and 0 otherwise. The third variable that is added to the equation is the Superstar-dummy variable. Ten celebrity deaths with the highest amount of media attention will be selected, and a dummy variable will be added to test the effect of these ‘superstars’. This variable equals 1 if one of

these ten celebrities died, and 0 otherwise**.** Please see table 7 in the Appendix for the ten 'superstars'. Again, a lagged return variable is added to the model to control for serial correlation

$$(3)\ R_t = \alpha_t + \beta_1 Popular_t + \beta_2 Regular_t + \beta_3 Superstar_t + \beta_4 R_{t-1} + \varepsilon_t$$

In the three equations explained above α is the constant and ε is an error term. There will be controls for seasonal and daily effects that may affect the mood of investors by adding Day-dummy variables and Month-dummy variables. For each working day of the week and each month of the year a dummy is created, that equals 1 on that particular day or in that particular month, and 0 otherwise. To prevent collinearity, one of the Day-dummy variables and one of the Month dummy variables will be omitted. For the Day-dummy variables this will be Wednesday and for the Month-dummy variables this will be March. Also, there will be controls for the effect of recession periods by adding a Recession-dummy variable that equals 1 in periods were there was a recession in one of the three countries of interest, and 0 otherwise[4]. The celebrity death effect might decrease because people are less interested in celebrities in recession periods because they are distracted by all the economic news and stress. On the other hand, you can argue that the celebrity death effect might increase in recession periods because people in general are sadder already because of the bad condition of the economy in their country caused by the recession. Because recession periods might alter the celebrity death effect we controlled for this by adding the Recessions-dummy variable. The interaction effect between recession periods and the effect of celebrity deaths on stock returns will be analyzed by multiplying the Recession-dummy variable with the celebrity death dummy variables.

In the additional analysis some alternative regressions will be run to test the celebrity death effect. Alternative time periods that represent the grieving period will be tested because there is no consensus in the literature about the length and the climax of the grieving period after someone dies. Also, celebrities will be distinguished by the suddenness of their deaths.

[4] The Recession-dummy variable equals 1 in periods where the quarterly real GDP growth is negative a for a minimum of two successive quarters, which is the common definition of a recession. For the UK this is: 1990 Q3-1991 Q3, 2008 Q2-2009 Q2. For the Netherlands this is: 2008 Q3-2009 Q2, 2011 Q4-2012 Q1, 2012 Q3-2012 Q4. For Germany this is: 2002 Q4-2003 Q1, 2008 Q2-2009 Q1, 2012 Q4-2013 Q1 (OECD, 2016).

4. Results

In this chapter an overview of the results of the empirical research will be given. The analysis is divided into two parts. The first part is the main analysis, where OLS regressions will be run to test the established hypothesis. The second part is the additional analysis, and in this part some other time periods that represent the grieving period will be used and a distinction between sudden deaths and gradual deaths will be made to test whether there is a difference in the effect of celebrity deaths when the death is unexpected.

4.1 Main analysis

In the main analysis of this research regressions are run on the three equations discussed in the methodology chapter to test the effect of celebrity deaths on the stock markets of the UK, the Netherlands, and Germany. In all regressions that are run the dependent variable is the daily return of the large cap stock indexes or the daily return of the small cap stock indexes. The independent variables of interest in the regressions that are run are the dummy variables that represent the celebrity deaths. These are the variables: Total dummy, a variable that represents the deaths of all selected celebrities, Popular dummy, a variable that represents the deaths of celebrities with a higher than median number of news articles mentioning them in the week after they died, Regular dummy, a variable that represents the deaths of celebrities with a lower than or equal to median number of news articles mentioning them in the week after they died, and Superstar dummy, a variable that represents the ten celebrities with the highest amount of media attention. These dummy variables take a value of 1 on calendar days on which a celebrity who is associated with the particular dummy died, and a value of 0 otherwise. This is done because some literature shows that the grieving process starts immediately after someone dies and that the intensity of the emotions felt in this process declines over time (Keller & Nesse, 2005). In the additional analysis also other time periods to represent the grieving period are used.

The results of all regressions are shown in tables, each table contains the results of the regressions that are run on one of the three equations formulated in the methodology chapter. We will first discuss the results of the regressions that are run on equation (1):

$$(1)\ R_t = \alpha_t + \beta_1 Total_t + \beta_2 R_{t-1} + \varepsilon_t$$

In these regressions the independent variable of interest is the Total-dummy variable, which represents the deaths of all celebrities used in this research. The results of the regressions run on equation (1) are shown in Table 1. First a regression is run on the returns of the large cap indexes and the returns of the small cap indexes without any control variables added. The results of these two regressions can be found in the first column of Table 1. On both the returns of the large cap indexes

and the returns of the small cap indexes the Total-dummy variable shows a significant positive effect. The size of the effect is similar on both markets. The coefficient is significant on a 10% level for the large cap indexes and on a 5% level for the small cap indexes. The lagged return variable is significant on a 1% and shows a large positive coefficient for both indexes. This indicates that current returns are positively affected by past returns.

Table 1: OLS regressions on equation (1)

	Without controls		**Daily and seasonal controls**		**Recession controls**	
Dependent var.:	Large cap	Small cap	Large cap	Small cap	Large cap	Small Cap
Intercept	0.0001778	0.0002316	0.0000783	0.0003228	0.0001592	0.0004163
(p>t)	(0.089)*	(0.001)***	(0.847)	(0.217)	(0.696)	(0.113)
Total dummy	0.0014401	0.001184	0.0015397	0.0012402	0.0014462	0.0012322
(p>t)	(0.064)*	(0.018)**	(0.047)**	(0.013)**	(0.079)*	(0.020)**
Lagged return	0.0974423	0.1581551	0.0965338	0.1527207	0.0963556	0.1517332
(p>t)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Day	-	-	X	X	X	X
Month	-	-	X	X	X	X
Recession	-	-	-	-	-0.0007278	-0.0008282
(p>t)					(0.032)**	(0.000)***
Recession * Total	-	-	-	-	0.000891	0.0000875
(p>t)					(0.723)	(0.957)
Observations	16039	16039	16039	16039	16039	16039
R^2	0.0131	0.0252	0.0148	0.0309	0.0151	0.0317

* Significant on a 10% level ** Significant on a 5% level ***Significant on a 1% level

To control for daily and seasonal influences, we added a Day-dummy variable and a Month-dummy variable. The results of these regressions are shown in the second column of Table 1. Adding daily and seasonal controls does not change the results by much. Again, the Total-dummy variable shows a significant positive effect on both indexes. This time it is significant on a 5% level for both the large cap indexes and the small cap indexes. Also the lagged return variable still shows a positive significant coefficient on a 1% level. Because we want to control for the potential influence of recession periods we added a Recession-dummy variable and a Recession interaction variable as well. The results of this regression are shown in the third column of Table 1. Recession periods have a significant negative effect on the stock returns of the large cap- and the small cap indexes, but they

do not influence the celebrity death effect. The interaction between the Recession dummy and the Total dummy shows a positive coefficient, but this coefficient is not significant for both dependent variables. Again, the Total dummy shows a significant positive coefficient for both indexes. It is significant on a 10% level for the returns of large cap indexes and significant on a 5% level for the returns of small cap indexes.

The results of the regression on equation (1) support the findings of Lepori (2011) and the Affect Management Model. The coefficient of the Total-dummy variable is positive and significant for both the large cap and the small cap indexes, also when we control for daily and seasonal influences and influences of recession periods. This indicates that investors in the UK, the Netherlands, and Germany take more risk after a celebrity dies, which follows the Affect Management Model.

To investigate the effect of the popularity of a celebrity on the celebrity death effect we added a Media variable in equation (2):

$$(2)\ R_t = \alpha_t + \beta_1 Total_t + \beta_2 Media_t + \beta_3 R_{t-1} + \varepsilon_t$$

This Media variable contains the standardized number of articles celebrities received in the week after their dead. We chose to standardize this number using the mean and the standard deviation of the number of media mentions per country, as explained in the methodology chapter. The results of the regressions with this Media variable included are shown in Table 2. For the results of the regressions with a standardized number of articles using the mean and the standard deviation of all three countries combined, please see Appendix Table 8.

Again, first a regression is run without adding any control variables. Results of the regressions on both the dependent variables are shown in the first column of Table 2. The Media variable shows contradicting coefficients for the large cap indexes and the small cap indexes: for the returns of the large cap indexes the coefficient of the Media variable is negative and for the returns of the small cap indexes the coefficient is positive. However, the Media variable does not show a significant coefficient for both dependent variables. The results of this regression suggest that Media variable does not capture the effect of a higher number of media mentions, which is a proxy for the popularity of the celebrity. The coefficients of the Total-dummy variable are similar to the previous regression. The coefficient is significant on a 10% level for the large cap indexes and significant on a 5% level for the small cap indexes. Also the lagged return variable shows a significant positive coefficient on a 1% level. Again, we control for seasonal and daily influences. The results of these regressions are shown in the second column of Table 2. Adding the Day- and Month dummy variables does not change the results by much. Only the Total-dummy variable is significant on a 5% level for the returns of the large cap indexes now. The coefficients of the Media variable remain roughly the

same, and are still insignificant. Controlling for recession periods also does not have a big influence on the outcomes. The results of the regressions with added recession controls are shown in the third column of Table 3. Again, the coefficients of the Media variable stay about the same and are still insignificant. The coefficient of the Total-dummy variable is now significant on a 10% level for the returns of the large cap indexes, and significant on a 5% level for the returns of the small cap indexes.

Table 2: OLS regressions on equation (2)

	Without controls		**Daily and seasonal controls**		**Recession controls**	
Dependent var.:	Large cap	Small cap	Large cap	Small cap	Large cap	Small Cap
Intercept	0.0001778	0.0002316	0.0000779	0.000323	0.0001588	0.00004166
(p>t)	(0.089)*	(0.001)***	(0.848)	(0.216)	(0.697)	(0.112)
Total dummy	0.0014416	0.0011818	0.0015435	0.0012378	0.0014506	0.0012296
(p>t)	(0.064)*	(0.018)**	(0.047)**	(0.013)**	(0.078)*	(0.020)**
Lagged return	0.0974306	0.1581595	0.0965379	0.1527257	0. 0963597	0.1517378
(p>t)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Media	-0.0000392	0.0000569	-0.0000955	0.0000587	-0.000095	0.0000553
(p>t)	(0.953)	(0.895)	(0.886)	(0.891)	(0.887)	(0.898)
Day	-	-	X	X	X	X
Month	-	-	X	X	X	X
Recession	-	-	-	-	-0.0007278	-0.0008282
(p>t)					(0.032)**	(0.000)***
Recession* Total	-	-	-	-	0.0008857	0.0000905
					(0.725)	(0.955)
Observations	16039	16039	16039	16039	16039	16039
R^2	0.0131	0.0252	0.0148	0.0309	0.0151	0.0317

* Significant on a 10% level ** Significant on a 5% level ***Significant on a 1% level

The results of the regressions on equation (2) suggest that the celebrity death effect does not become larger when a celebrity receives more media mentions in the week after he or she dies. This is not in line with the findings of Lepori (2011), who found that 'popular' celebrities do affect stock returns while 'regular' celebrities do not.

Another way to find out if more popular celebrities induce a larger shock on stock returns after they die in comparison with less popular celebrities is to divide the celebrities into three groups, based on the number of media mentions they received in the week after they died. This is done by adding a

Popular-dummy variable, a Regular-dummy variable, and a Superstar-dummy variable in equation (3):

$$(3)\ R_t = \alpha_t + \beta_1 Popular_t + \beta_2 Regular_t + \beta_3 Superstar_t + \beta_4 R_{t-1} + \varepsilon_t$$

All celebrities who received a higher than median number of media mentions in the week after they died are represented by the Popular-dummy variable, and all celebrities who received an equal or lower than median number of media mentions in the week after they died are represented by the Regular-dummy variable. Furthermore, the ten celebrities with the highest number of media mentions are also represented by the Superstar-dummy variable. The regression that are run on equation (3) are shown in Table 3.

Again, we start with a regression on both the dependent variables without adding any control variables. The results of these regressions are shown in the first column of Table 3. These regressions show interesting results, because we do find a significant difference between the Popular-dummy variable and the Regular-dummy variable for the small cap indexes but we do not find a significant difference between these two dummy variables for the large cap indexes. The coefficient of the Popular-dummy variable is positive and significant on a 5% level for the daily returns of the small cap indexes. Also the coefficient of the Popular-dummy variable is more than 2 times as large as the coefficient of the Regular-dummy variable for the daily returns of the small cap indexes. Although the coefficient of the Popular-dummy variable is roughly the same for the daily returns of the large cap indexes, it is not significant here. The coefficient of the Regular-dummy variable is not significant for the daily returns of both indexes, although it is remarkable that the coefficient is more than 2 times as large for the returns of the large cap indexes. Where all earlier celebrity death dummy variables showed a positive coefficient, the coefficient of the Superstar-dummy variable is negative for both the returns of the large cap indexes and the returns of the small cap indexes. Although this coefficient is not significant, this is a remarkable finding. The results of these regressions indicate that the returns of the small cap indexes are affected by the death of a ‘popular’ celebrity and are not affected by the death of a ‘regular’ celebrity, which supports the findings of Lepori (2011). However, for the returns of the large cap indexes no significant difference between ‘popular’ and ‘regular’ celebrities can be found. Where the Total dummy variable showed a significant positive coefficient for the returns of the large cap indexes, the Popular-dummy variable and the Regular-dummy variable do not show significant coefficients.

When we add the seasonal and daily control variables the results remain similar to the previous regressions except for one variable. The Regular-dummy variable now shows a positive coefficient that is significant on a 10% level, where it was insignificant before. This contradicts the results of

Lepori (2011) and the results of the regressions on the daily returns of the small cap indexes, where 'popular' celebrities have a significant positive on the returns but 'regular' celebrities do not.

Table 3: OLS regression on equation (3)

	Without controls		**Daily and seasonal controls**		**Recession controls**	
Dependent var.:	Large cap	Small cap	Large cap	Small cap	Large cap	Small Cap
Intercept	0.0001781	0.0002315	0.0000728	0.0003196	0.0001543	0.0004144
(p>t)	(0.088)*	(0.001)***	(0.858)	(0.221)	(0.705)	(0.114)
Popular dummy	0.0015482	0.0017272	0.0016489	0.0017869	0.0017323	0.0020641
(p>t)	(0.177)	(0.019)**	(0.150)	(0.015)**	(0.151)	(0.008)***
Regular dummy	0.001648	0.0007736	0.0017685	0.0008278	0.0014662	0.0005912
(p>t)	(0.120)	(0.258)	(0.096)*	(0.226)	(0.196)	(0.418)
Superstar dummy	-0.0042302	-0.0009793	-0.0045715	-0.0009663	-0.0045179	-0.0022222
(>t)	(0.255)	(0.683)	(0.219)	(0.687)	(0.264)	(0.394)
Lagged return	0.0974819	0.1582191	0.0965915	0.1527847	0.0963412	0.1516885
(p>t)	(0.000)***	(0.000)***-	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Day	-	-	X	X	X	X
Month	-	-	X	X	X	X
Recession	-	-	-	-	-0.0007313	-0.0008367
(p>t)					(0.032)**	(0.000)***
Recession * Popular	-	-	-	-	-0.0009997	-0.0028351
(p>t)					(0.798)	(0.260)
Recession * Regular	-	-	-	-	0.0025565	0.0021052
(p>t)					(0.429)	(0.311)
Recession * Superstar	-	-	-	-	0.0001656	0.0087186
(p>t)					(0.987)	(0.188)
Observations	16039	16039	16039	16039	16039	16039
R^2	0.0132	0.0253	0.0148	0.0309	0.0152	0.0320

* Significant on a 10% level ** Significant on a 5% level ***Significant on a 1% level

However, when we control for recession periods the coefficient of the Regular dummy variable is insignificant again for the daily returns of both indexes. The Popular-dummy variable for the small cap returns remains positive, and is after adding the recession controls significant on a 1% level.

Recession periods have a significant negative effect on the returns of both indexes, but recession periods do not significantly affect the effect of one of the celebrity death variables.

The results of the regressions on equation (3) partly support the results of Lepori (2011). The daily returns of the small cap indexes are significantly affected by the deaths of 'popular' celebrities, also when we control for daily and seasonal influences and the influences of recession periods. However, the daily returns of the large cap indexes are not significantly affect by the deaths of 'popular' celebrities. In one of the regressions even the Regular-dummy variable shows a significantly positive coefficient where the Popular-dummy variable does not. Therefore, we can only find a significant effect of 'popular' celebrity deaths on the daily returns of small cap indexes. This can be explained by the reasoning that small cap stocks are more prone to investor sentiment, as explained in the literature review (Baker & Wurgler, 2007).

By means of the regressions we run, the null hypothesis can be rejected because there have been significant effects of the celebrity death dummy variables found, even when we control for the daily and seasonal influences and influences of recession periods. We cannot accept the first set of alternative hypotheses because after controlling for daily and seasonal influence and influences of recession periods all celebrity death effect variables with a significant coefficient showed a positive effect. This is not in line with the MCH. The celebrity death effect is best captured on the daily returns of the small cap stock indexes, the Total-dummy variable is positive and significant on a 5% level and the Popular-dummy variable is positive significant on a 1% level for this variable. Therefore, we can accept alternative hypothesis HA2.2. The celebrity death effect is less obvious on the returns of the large cap stock indexes. Although the Total-dummy variable is positive and significant for both dependent variables, there are only significant effects found on the daily returns of the small cap indexes when we make a distinction between 'popular' and 'regular' celebrities. Also the coefficient of the Total-dummy variable is significant on a lower critical value for the returns of the large cap stock indexes. The results of the regressions on the small cap indexes run in this section support the findings of Lepori (2011) and the reasoning of the AMM.

4.2 Additional Analysis

In this part two alternative types of regressions are run. First, some more regressions are run with other time periods that represent the grieving period after someone dies. Second, regressions are run where the celebrities are distinguished by the suddenness of their death.

At first, we altered the time periods that represent the grieving period after a celebrity died. Because there is some disagreement about the length and the climax of the grieving period after a someone dies, some other time periods to represent the grieving period are used for the next regressions.

Where in the main analysis all celebrity death dummy variables took a value of 1 at the calendar day a celebrity died and 0 otherwise because some literature stated that the climax of the grieving period is felt immediately after someone dies (Keller & Nesse, 2005), now the celebrity death dummy variables take a value of 1 for some other time periods that represent the grieving period after someone dies. The first alternative grieving period that is chosen is the calendar day that a celebrity died, the event day *t*, and the first day after this, *t+1*. This is done because it is not known at which time the news of the death of a celebrity is spread. Therefore, it is possible that sometimes the news of the death of a celebrity is only known at the first day after the celebrity died. The second alternative time period used is the event day *t'*, and the next four working days, until *t'+4*. Here *t'* represents a working day instead of a calendar day. This is based on the theory that that the grieving period last longer and its climax is at the main event, which is usually the funeral or the memorial service (Gibson, 2007). Because a funeral normally take place within a week after someone dies, this time period is chosen.

We will regress all three equations again using these alternative time periods. The results of the regressions on equation (1) are shown in Table 4. In the first column the results of the original regressions of the main analysis are shown, where the Total-dummy variable takes a value of 1 at event day *t,* and 0 otherwise. In the second column the results of the regressions using the first alternative time period are shown, where the Total-dummy variable takes a value of 1 at event day *t* and *t+1,* and 0 otherwise*.* In the third column the results of the regressions using the second alternative time period are shown, where the Total-dummy variable takes a value of 1 at event day *t'* until *t'+4,* and 0 otherwise/

When we use a time period of *t* and *t+1* to represent the grieving period after a celebrity died instead of a time period of *t,* the coefficient of the Total-dummy variable is smaller for both the dependent variables. Also, now the Total-dummy variable does not show a significant coefficient for the large cap stock returns, and is only significant at a 10% level for the small cap stock returns where it was significant on a 5% level.

When we use a grieving period represented by the day a celebrity died and the next four working days, *t'* until *t'+4*, the coefficient of the Total-dummy variable is smaller when we compare it to the original time period of *t* too. Also, the coefficient for the large cap stock returns is now insignificant. The coefficient for the small cap stock returns remains significant on a 5% level. Recession periods have no significant influence on the celebrity death effect, no matter what time period to represent the grieving period is used.

In Table 5 the regressions with the altered time periods on equation (2) are shown. In these regressions not only the Total-dummy variable is altered, but also the Media variable. Now the Media variable equals the standardized number of articles celebrities received in the week after they died on event day *t* and *t+1* for the first alternative time period, and on event day *t'* until *t'+4* for the second alternative time period. The Media variable equals 0 on days that are not subject to a grieving period.

Table 4: OLS regressions on equation (1)

	t		***t* and *t+1***		***t'* until *t'+4***	
Dependent var.:	Large cap	Small cap	Large cap	Small cap	Large cap	Small Cap
Intercept	0.0001592	0.0004163	0.0001705	0.000414	0.0001247	0.0003709
(p>t)	(0.696)	(0.113)	(0.676)	(0.115)	(0.761)	(0.159)
Total dummy	0.0014462	0.0012322	0.0002526	0.0006226	0.000475	0.0005276
(p>t)	(0.079)*	(0.020)**	(0.662)	(0.094)*	(0.143)	(0.011)**
Lagged return	0.0963556	0.1517332	0.0963335	0.1513869	0.0962675	0.1511871
(p>t)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Day	X	X	X	X	X	X
Month	X	X	X	X	X	X
Recession	-0.0007278	-0.0008282	-0.0007553	-0.0008652	-0.0007597	-0.0009106
(p>t)	(0.032)**	(0.000)***	(0.027)**	(0.000)**	(0.034)**	(0.000)***
Recession * Total	0.000891	0.0000875	0.0015013	0.0013905	0.0005254	0.0008528
(p>t)	(0.723)	(0.957)	(0.438)	(0.264)	(0.622)	(0.951)
Observations	16039	16039	16039	16039	16039	16039
R^2	0.0151	0.0317	0.0149	0.0317	0.0150	0.0320

* Significant on a 10% level ** Significant on a 5% level ***Significant on a 1% level

The Media variable remains insignificant when we use a time period of *t* and *t+1.* The Total-dummy variable is now insignificant for both the returns of the large cap indexes and the returns of the small cap indexes, where it was significant on a 10% level for the large cap indexes and significant on a 5% level for the small cap indexes when we used a time period of *t.* The Media variable is positive and significant on a 10% level for the returns of the small cap indexes when we use a time period of *t'* until *t'+4*. This indicates that the stock returns of the small cap indexes are affected more positively by celebrity deaths the more numbers of articles a celebrity received after his/her death. This result contradicts the results of all other regressions that are run with the Media variable included, in every

other regression the coefficient of the Media variable is insignificant. Also the results of the Total-dummy variable have changed when we use this time period. The coefficient of this variable is now smaller for both indexes when we compare it to the regression where the time period of *t* is used. Also the coefficient for the large cap indexes is now insignificant. Recession periods have no effect on the celebrity death effect in every regression.

Table 5: OLS regressions on equation (2)

t		***t* and *t+1***		***t'* until *t'+4***		
Dependent var.:	Large cap	Small cap	Large cap	Small cap	Large cap	Small Cap
Intercept	0.0001588	0.00004166	0.0001723	0.0004157	0.0001297	0.0003754
(p>t)	(0.697)	(0.112)	(0.673)	(0.113)	(0.751)	(0.154)
Total dummy	0.0014506	0.0012296	0.0002361	0.0006071	0.0004609	0.000515
(p>t)	(0.078)*	(0.020)**	(0.683)	(0.103)	(0.155)	(0.014)**
Lagged return	0. 0963597	0.1517378	0.0962911	0.1514217	0.0962066	0.1510282
(p>t)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Media	-0.000095	0.0000553	0.0004105	0.000387	0.0003714	0.0003337
(p>t)	(0.887)	(0.898)	(0.383)	(0.201)	(0.175)	(0.059)*
Day	X	X	X	X	X	X
Month	X	X	X	X	X	X
Recession	-0.0007278	-0.0008282	-0.0007553	-0.0008651	-0.00076	-0.0009111
(p>t)	(0.032)**	(0.000)***	(0.027)**	(0.000)***	(0.034)**	(0.000)***
Recession* Total	0.0008857	0.0000905	0.0015003	0.0013894	0.0005629	0.0008865
	(0.725)	(0.955)	(0.438)	(0.264)	(0.597)	(0.196)
Observations	16039	16039	16039	16039	16039	16039
R^2	0.0151	0.0317	0.0150	0.0318	0.0152	0.0322

* Significant on a 10% level ** Significant on a 5% level ***Significant on a 1% level

In Table 6 the results of the regressions with the alternative time periods for equation (3) are shown. In these regressions all three celebrity death dummy variables, the Popular-dummy variable, the Regular-dummy variable, and the Superstar-dummy variable, take a value of 1 corresponding to the time period that represents the grieving period that is used. When we used a time period of *t* the Popular-dummy variable was positive and significant on a 1% level for the returns of the small cap indexes and it was insignificant for the returns of the large cap indexes. The coefficients of the Regular-dummy variable and the Superstar-dummy variable were insignificant for the returns of both

markets. When a time period of *t* and *t+1* is used the coefficients of the Popular-dummy variable are almost twice as small as they are when we use a time period of *t.* Also, the coefficient of this variable is now only significant on a 10% level for the returns of the small cap indexes. The coefficients of the Regular-dummy variable and the Superstar-dummy variable are again insignificant for the returns of both indexes

Table 6: OLS regression on equation (3)

	t		***t* and *t+1***		***t'* until *t'+4***	
Dependent var.:	Large cap	Small cap	Large cap	Small cap	Large cap	Small Cap
Intercept	0.0001543	0.0004144	0.0001658	0.0004153	0.0001269	0.0003751
(p>t)	(0.705)	(0.114)	(0.684)	(0.114)	(0 757)	(0.154)
Popular dummy	0.0017323	0.0020641	0.0008412	0.0009685	0.0004934	0.0004694
(p>t)	(0.151)	(0.008)***	(0.315)	(0.072)*	(0.270)	(0.103)
Regular dummy	0.0014662	0.0005912	-0.0002819	0.0002208	0.00038793	0.0005127
(p>t)	(0.196)	(0.418)	(0.725)	(0.669)	(0.372)	(0.067)*
Superstar dummy	-0.0045179	-0.0022222	-0.0008908	0.0015022	0.0003711	0.0013062
(>t)	(0.264)	(0.394)	(0.786)	(0.476)	(0.849)	(0.299)
Lagged return	0.0963412	0.1516885	0.0962606	0.1513763	0.0962752	0.1510388
(p>t)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Day	X	X	X	X	X	X
Month	X	X	X	X	X	X
Recession	-0.0007313	-0.0008367	-0.0007555	-0.0008645	-0.0007613	-0.0009096
(p>t)	(0.032)**	(0.000)***	(0.027)**	(0.000)***	(0.033)**	(0.000)***
Recession * Popular	-0.0009997	-0.0028351	-0.0004669	0.0003887	0.0002939	0.0007456
(p>t)	(0.798)	(0.260)	(0.876)	(0.840)	(0.856)	(0.476)
Recession * Regular	0.0025565	0.0021052	0.0034311	0.0019815	0.0008343	0.0008725
(p>t)	(0.429)	(0.311)	(0.184)	(0.233)	(0.542)	(0.321)
Recession * Superstar	0.0001656	0.0087186	-0.003472	0.0032865	-0.0023132	0.0017479
(p>t)	(0.987)	(0.188)	(0.734)	(0.618)	(0.741)	(0.698)
Observations	16039	16039	16039	16039	16039	16039
R^2	0.0153	0.0320	0.0150	0.0319	0.0151	0.0321

* Significant on a 10% level ** Significant on a 5% level ***Significant on a 1% level

When we use a time period of *t'* until *t'+4* the coefficients of the Popular-dummy variable are about four times smaller than when we use a time period of *t.* Also, now the coefficient of the Popular-dummy variable is insignificant. Although we found a positive and significant Media variable using this time period, the coefficient of the Regular-dummy variable is positive and significant on a 10% level. This is remarkable because the positive and significant Media variable indicates that when a celebrity receives more media attention after his/her death the effect on stock returns would be larger. Therefore, these results should be read with caution. Another interesting findings is that the coefficient of the Superstar-dummy variable is about three times the size of the coefficient of the Popular-dummy variable for the returns of the small cap stock indexes. Although this coefficient is insignificant due to the small sample size of the Superstar-dummy variable, this indicates that the effect might be larger for celebrities who received an extraordinary amount of media attention. Again, all coefficients of the recession interaction variables are insignificant for all time periods that are used.

It seems that the grieving period represented by the time period of *t,* which is used for the regressions in the main analysis, captures the celebrity death effect the best. The results of the regressions run using this time period are the most constant, and show the largest coefficients for the Total-dummy variable and the Popular-dummy variable. The regressions with the two alternative time periods show less consistent and sometimes contradicting results. Also the coefficients of the Total-dummy variable are insignificant for the returns of the large cap indexes when we use these alternative time periods, where it is significant when we use a time period of *t.* Because the grieving period represented by the time period of *t* captures the celebrity death effect the best, our results indicate that the climax of the grieving period is directly after someone dies.

This might be because this is the moment that the shock in society that is created by the death of a beloved person is the largest. We will investigate this shock effect some more in the next part of the additional analysis, where we distinguish the celebrity deaths by their suddenness. Because sudden deaths are more unexpected, these deaths are expected to create a larger shock. It has been found that violent and sudden deaths contribute to a more severe grief response (Kaltman, 2003). This might cause sudden deaths to have a larger effect on stock returns than gradual deaths. Because of this reasoning we divide the deaths of all celebrities used in this research into two groups: sudden deaths and gradual deaths. Lethal accidents, sudden cardiac arrests or lethal strokes, suicides and murders will be labeled as sudden deaths. All other deaths will be labeled as gradual deaths. Dividing the celebrities results in a total of 121 sudden deaths and 322 gradual deaths. In equation (4) the earlier used celebrity death dummy variables are replaced by a Sudden-dummy variable and a Gradual-dummy variable. The Sudden-dummy variable equals 1 on calendar days on which a

celebrity died from a sudden death, and 0 otherwise. The Gradual-dummy variable equals 1 on calendar days on which a celebrity died from a gradual death, and 0 otherwise.

$$(4)\ R_t = \alpha_t + \beta_1 Sudden_t + \beta_2 Gradual_t + \beta_3 R_{t-1} + \varepsilon_t$$

In Table 7 the results of the regression on equation (4) are shown. The results of the regression with the daily returns of the large cap indexes as dependent variable are shown in the first column, and the results of the regression with the daily returns of the small cap indexes as dependent variable are shown in the second column. In these regressions all control variables are added. The Sudden-dummy variable shows a positive but not significant coefficient for both dependent variables. The Gradual-dummy variable shows a positive coefficient that is significant on a 10% level for the small cap indexes. For the large cap indexes the coefficient of this variable is positive but insignificant.

Table 7: OLS regressions on equation (4)

Dependent var.:	Large cap	Small cap
Intercept	0.0001588	0.0004148
(p>t)	(0.697)	(0.114)
Sudden dummy	0.0014748	0.001589
(p>t)	(0.328)	(0.102)
Gradual dummy	0.0014344	0.001084
(p>t)	(0.141)	(0.084)*
Lagged return	0.0963478	0.1516701
(p>t)	(0.000)***	(0.000)***
Day	X	X
Month	X	X
Recession	- 0.0007278	- 0.0008283
(p>t)	(0.032)**	(0.000)**
Recession* Sudden	0.0015933	0.0017517
(p>t)	(0.731)	(0.557)
Recession* Gradual	0.0006037	-0.0005912
(p>t)	(0.839)	(0.758)
Observations	16039	16039
R^2	0.0151	0.0318
* Significant on a 10% level	** Significant on a 5% level	***Significant on a 1% level

However, these results might be influenced by the fact that there are almost three times as many gradual deaths as there are sudden deaths. This has the consequence that there are more 'popular'

celebrity deaths in the gradual death group than in the sudden death group. Because the Popular-dummy variable showed a significant effect on the returns of the small cap stock indexes in the main analysis, and the Regular-dummy variable did not, it is not surprising that the Gradual-dummy variable shows a significant coefficient on this dependent variable and the Sudden-dummy variable does not. To control for this, the celebrities are divided into four groups: 'popular' celebrities with a sudden death, 'popular' celebrities with a gradual death, 'regular' celebrities with a sudden death, and 'regular celebrities with a gradual death. In this way it is possible to see if the effect of a 'popular' celebrity death on stock returns is larger when this death was sudden. This division results in 63 'popular' celebrities with a sudden death, 58 'regular' celebrities with a sudden death, 151 'popular' celebrities with a gradual death, and 171 'regular' celebrities with a gradual death. In equation (5) each group is represented by a dummy variable that takes a value of 1 if on a calendar day on which a celebrity corresponding to this group died, and 0 otherwise.

$$(5)\ R_t = \alpha_t + \beta_1 SuddenPopular_t + \beta_2 SuddenRegular_t + \beta_3 GradualPopular_t + \beta_4 GradualRegular_t + \beta_5 R_{t-1} + \varepsilon_t$$

The SuddenPopular-dummy variable represents the 'popular' celebrities with a sudden death, the SuddenRegular-dummy variable represents the 'regular' celebrities with a sudden death, the GradualPopular-dummy variable represents the 'popular' celebrities with a gradual death, and the GradualRegular-dummy variable represent the 'regular' celebrities with a gradual death.

In Table 8 the results of the regressions run on equation (5) are shown. Again, the results of the regression with the daily returns of the large cap indexes as dependent variable are shown in the first column, and the results of the regression with the daily returns of the small cap indexes as dependent variable are shown in the second column. The coefficients of all celebrity death dummy variables are insignificant for the returns of the large cap indexes, which was expected because no significant effect of 'popular' or 'regular' celebrities was found in the main analysis on these returns.

The regression with the returns of the small cap indexes as dependent variable shows some interesting results. Where in the previous regression the Gradual-dummy variable showed a significant coefficient and the Sudden-dummy variable did not, now both the SuddenPopular-dummy variable and the GradualPopular-dummy variable show positive coefficients that are significant on a 10% level. The SuddenRegular-dummy variable and the GradualRegular-dummy variable both show an insignificant coefficient. This result indicates that the result of the previous regression was influenced by the imbalanced proportion of 'popular' celebrities between the Sudden group and the Gradual group.

Table 8: OLS regressions on equation (5)

Dependent var.:	Large cap	Small cap
Intercept	0.0001563	0.0004125
(p>t)	(0.702)	(0.116)
Sudden Popular dummy	0.0004585	0.0025821
(p>t)	(0.832)	(0.063)*
Sudden Regular dummy	0.0024392	0.000644
(p>t)	(0.246)	(0.634)
Gradual Popular dummy	0.0018602	0.0016579
(p>t)	(0.187)	(0.068)*
Gradual Regular dummy	0.0010466	0.0005636
(p>t)	(0.436)	(0.514)
Lagged return	0.0962902	0.1516579
(p>t)	(0.000)***	(0.000)***
Day	X	X
Month	X	X
Recession	-0.0007276	-0.0008284
(p>t)	(0.032)**	(0.000)***
Recession* Sudden Popular	-0.0013797	0.0007359
(p>t)	(0.825)	(0.855)
Recession* Sudden Regular	0.0056155	0.0027278
(p>t)	(0.415)	(0.538)
Recession* Gradual Popular	-0.000644	-0.0041871
(p>t)	(0.894)	(0.180)
Recession* Gradual Regular	0.0014646	0.0016557
(p>t)	(0.697)	(0.494)
Observations	16039	16039
R^2	0.0152	0.0320
* Significant on a 10% level	** Significant on a 5% level	***Significant on a 1% level

Another interesting result is the difference between the coefficients of the SuddenPopular-dummy variable and the GradualPopular-dummy variable. The coefficient of the SuddenPopular-dummy variable is almost 10 basis points larger than the coefficient of the GradualPopular-dummy variable. This result indicates that the effect of the death of a 'popular' celebrity is larger when this death was sudden. This supports the reasoning that sudden deaths create a larger shock effect and a severe grief response, and therefore result in a larger effect on daily stock returns.

5.Conclusion

In this research a fairly novel indicator of a negative shock in social mood is used, namely the death of a beloved celebrity. Because psychological literature found that people feel that they are emotionally connected with celebrities, it is possible that the death of a celebrity causes the same emotional reaction as the death of a relative or close friend does. The emotion that is most dominant in the grieving process after you lose someone is sadness. If a large proportion of society is emotionally affected by the death of a celebrity, this is expected to have a negative effect on social mood. Previous literature has found that a negative shock in social mood is able to influence the local stock market. However, there are contradicting results. Studies using local weather, sport results, terrorist attacks, and aviation disasters as indicators of social mood all find all find a negative effect of a negative shock in social mood on stock returns. These results support the Mood Congruence Hypothesis (MCH), which states that people shy away from risk when their mood deteriorates. The study of Lepori (2011) using celebrity deaths as indicator of a negative shock in social mood found a positive effect on US stock returns, which supports the Affect Management Model (AMM). The AMM states that people tend to take more risk when their mood deteriorates. Because this study with celebrity deaths as indicator of social mood finds a different effect on stock returns it is interesting to test the celebrity death effect on other markets besides the US. In this research we tested the celebrity death effect on the stock returns of the UK, the Netherlands, and Germany.

Our results support the results of Lepori (2011) and the AMM. The celebrity death effect is best captured on the returns of small cap indexes. Where the results of the regressions with the daily returns of the large cap stock indexes as dependent variable are inconsistent and less clear, the results of the regressions with the daily returns of the small cap indexes are consistent and in line with the results of Lepori (2011) and the AMM. The coefficient of the Total-dummy variable is significant on a lower critical value for the returns of the small cap indexes than for the returns of the large cap indexes. Also, there is a significant difference between the ‘popular’ group and the ‘regular’ group for the returns of the small cap indexes, where this is not the case for the returns of the large cap indexes. This result is not surprising, since the literature review showed that small cap stocks are more prone to investor sentiment. Small cap stocks tend to be harder to arbitrage, for example because they have higher transaction costs. This causes that mispriced stocks are not pushed back to their fundamental values (Baker & Wurgler, 2007). Another reason why small cap stocks are more prone to investor sentiment is that these stocks are more difficult to value, which makes valuation mistakes and biases more likely because it is harder to find out the true value (Baker & Wurgler, 2007).

We find a significant coefficient of the Total-dummy variable, which represents all celebrities incorporated in this research, on both the daily returns of large cap stock indexes and small cap stock indexes. This coefficient is 0.0014 and significant on a 10% level for the large cap indexes and 0.0012 and significant on a 5% level for the small cap indexes. These results hold after adding seasonal, daily, and regression controls. Also, after dividing the celebrities into a 'popular' and a 'regular' group, we find a significant coefficient for the Popular-dummy variable on the daily returns of the small cap stock indexes. This coefficient is 0.0021 and significant on a 1% critical value. We do not find a significant coefficient for the Regular-dummy variable on the daily returns of the small cap indexes, and we do not find significant coefficients of both the 'popular' and the 'regular' group variable for the daily returns of the large cap indexes.

Our results contradict the results of most of the studies investigating the effect of a negative shock in social mood on the stock market. Where studies using local weather, sport results, terrorist attacks, and aviation disasters as indicators of social mood all find all find a negative effect of a negative shock in social mood on stock returns, we find a positive effect on daily stock returns. There are a few possible explanations for this. First of all, some of the indicators used in previous studies might not only have an effect on social mood, but also have a direct economic effect. For example, aviation disasters and terrorist attacks have a direct negative impact on the tourism sector. These economic effects might overshadow the effect of a negative shock in social mood. Also, the indicator we use for a negative shock in social mood, the death of a beloved celebrity, provokes a single negative emotion in society, namely sadness. This is the emotion that is dominant in the grieving process after someone dies. Because not all negative emotions have the same effect on human behaviour, there might be different effects on the stock markets for different negative emotions. Bad local weather and bad national sport results have not been found to provoke a single negative emotion, although it is found that they deteriorate social mood. Aviation disasters and terrorist attacks are more likely to provoke emotions as fear and anger in society, instead of sadness. Because different indicators of social mood might provoke different negative emotions, this might explain the contradicting effects of a negative shock in social mood on stock returns found in previous literature.

Another interesting result of this study is that the effect of the death of a 'popular' celebrity is larger when this celebrity died from a sudden death. The coefficient of 'popular' celebrities with a sudden death is 0.0026 for the daily returns of the small cap indexes, where the coefficient of 'popular' celebrities with a gradual death for this dependent variable is 0.0017. Both coefficients are significant on a 10% critical value for the daily returns of the small cap indexes. Sudden and violent deaths have been found to have a more severe grieving period (Kaltman, 2003). This result indicates that when

the shock effect after a ‘popular’ celebrity death is larger, people are more emotionally affected by the death which increases the effect on stock prices.

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7. Appendix

Table 1: UK celebrities

The sources that are used to select the deaths of celebrities between 1986-2015 in the UK are shown in the first column. In the second column the selected British celebrities are shown.

Source	Celebrities
Biography[5]	Andy Gibb, Laurence Olivier, Daphne du Maurier, William Shockley, Roald Dahl, A.J.P. Taylor, Peggy Ashcroft, Benny Hill, James Hunt, John Osborne, Ida Lupino, James Herriot, Peter Cook, Mary Leakey, Princess Diana, Denise Levertov, A.L. Rowse, Quentin Crisp, Barbara Cartland, George Harrison, Dudley Moore, John Entwistle, Bob Hope, Francis Crick, John Stephen, Alistair Cooke, Alan Bullock, Herbert Brown, Joan Aiken, Cicely Saunders, John Mills, Syd Barret, Anita Roddick, Alan Ball, Michael Evans, Paul Raymond, Paul Scofield, Natasha Richardson, Alexander McQueen, Malcolm McLaren, Amy Winehouse, John Barry, Christopher Hitchens, Robin Gibb, Davy Jones, Roy Bates, Tony Scott, Vidal Sassoon, Jon Lord, Richard Dawson, Anna Wing, Margaret Thatcher, P.D. James, Richard Attenborough aka Baron Attenborough, Patrick Macnee, Christopher Lee
Avenue of Stars[6]	Cary Grant, Alec Guinness, Rex Harrison, Peter Ustinov, Cilla Black, Frankie Howerd, David Frost, Peter O'Toole, Alan Whickler, John Gielgud, Maurice Gibb, Richard Wright, Eric Sykes, Harry Secombe, Thora Hird, Paul Eddington, John Thaw, Margot Fonteyn, Freddie Mercury, Richard Briers, Alan Bates, Pete Quaife, Les Dawson, Spike Milligan, Ernie Wise, Nigel Hawthorne, Elizabeth Taylor, Dirk Bogarde, Alicia Markova, Yehudi Menuhin, Ronnie Barker
IMDB Starmeter[7]	Audrey Hepburn, Oliver Reed, Richard Harris, Andy Whitfield
BBC Sports Personality of the Year Award[8]	Christopher Chataway, Pat Smythe, Gordon Pirie, Jim Laker, Nat Lofthouse, Don Thompson, Bobby Moore, Henry Cooper, Beryl Burton, George Best, Richard Meade, John Curry, Barry Sheene, Alex Higgins, Collin McRae, Bobby Robson

[5] http://www.biography.com/people/groups/born-in-united-kingdom
[6] https://en.wikipedia.org/wiki/List_of_stars_on_the_London_Avenue_of_Stars
[7] http://imdb.com/chart/starmeter
[8] https://en.wikipedia.org/wiki/BBC_Sports_Personality_of_the_Year_Award

Table 2: Dutch celebrities

The sources that are used to select the deaths of celebrities between 2000-2015 in the Netherlands are shown in the first column. In the second column the selected Dutch celebrities are shown.

Source	Celebrities
Walk of Fame Europe[9]	Drs. P., Herman Brood, Conny Vandenbos, John Kraaijkamp sr., Johnny Hoes, Joop Doderer, Jos Brink, Luc Lutz, Marten Toonder, Mary Dresselhuys, Pia Beck, Piet Romer, Pieter Lutz, Rita Reys, Rijk de Gooyer, Theo Olof, Wubbo Ockels, Anton Geesink, Arie van Vliet, Cees van Dongen, Coen Moulijn, Faas Wilkes, Fanny Blankers-Koen, Rie Mastenbroek, Rinus Michels, Tonny van Ede, Wim van Est, Albert West
Artists with a Wikipedia page[10]	Armand, Anja van Aavort, Rudi Carell, Alexander Curly, Willem Duyn, Herman Emmink, Bobby Farrell, Tol Hansse, Andre Hazes, Antonie Kamerling, Sugar Lee Hooper, Arne Jansen, Wim Koopmans, The Lau, Robert Long, Harry Muskee, Benny Neyman, Jetty Paerl, Maarten van Roozendaal, Teddy Scholten, Ramses Shaffy, Hermien Timmerman, Cees Veerman, Mariska Veres, Bram Vermeulen
Bekende Dode Nederlanders[11]	Appie Baantjer, Thea Beckman, Paul Biegel, Boudwijn Buch, Pim Fortuyn, prins Friso, Theo van Gogh, Bart de Graaff, Ernst-Paul Hasselbach, Koningin Juliana, Gerrie Knetemann, Frans Molenaar, Albert Mol, Harry Mullisch, Jan Wolkers, Joost Zwagerman
Dutch Sports Personality of the Year[12]	Geertje Wielema, Eef Kamerbeek, Henk Nijdam, Peter Post, Atje Keulen-Deelstra, Willy Stahe

[9] https://nl.wikipedia.org/wiki/Walk_of_Fame_Europe
[10] https://nl.wikipedia.org/wiki/Lijst_van_Nederlandse_artiesten
[11] http://www.bekendedodenederlanders.com/
[12] http://www.olympischsporterfgoed.nl/homepage

Table 2: German celebrities

The sources that are used to select the deaths of celebrities between 2000-2015 Germany are shown in the first column. In the second column the selected German celebrities are shown.

Source	Celebrities
List of Germans[13]	Heidi Kabel, Horst Bucholz, Hans Clarin, Evelyn Hamann, Inga Abel, Inge Meysel, Harald Juhnke, Kristina Söderbaum, Horst Tappert, Rudi Carrell. Herbert Dreilich, Rolf Köhler, Anneliese Rothenberger, Paul Kuhn, Johannes Rau,
Boulevard der Stars[14]	Frank Beyer, Vicco von Bulow, Bernd Eichinger, Hildegard Knef, Wolfgang Menge, Ulrich Mühe, Brigitte Mira, Peter Przygodda, Luise Rainer, Otto Sander, Jan Schlublach, Werner Schroeter, Billy Wilder
German Sports Personality of the Year[15]	Herbert Klein, Marga Petersen, Annemarie Buchner, Karl Kling, Fritz Thiedemann, Gerhard Hertz, Christel Justen, Erika Zuchold
Germany's Sport Hall of Fame[16]	Helmut Bantz, Max Schmeling, Alfred Schwarzmann, Harry Valérien, Fritz Walter, Berthold Beitz, Gustav Killian.
ZDF: Die 100 Groβten Deutscher[17]	Regine Hildebrandt, Helmut Schmidt, Marion Gräfin Dönhof, Beate Uhse, Helmut Rahn
Death by suicide[18]	Max Grieβer, Hannelore Kohl, Jürgen Möllemann, Lothar Baier, Jennifer Nitsch, Edwin Noël
Passed Away Filmstars[19]	Vadim Glowna, Gunther Kaufmann, Hellmut Lange
Jung Gestorbenen[20]	Dirk Bach, Christoph Slingensief, Robert Enke
Deutscher Schallplattenpreis[21]	Albert Mangelsdorff

[13] https://en.wikipedia.org/wiki/List_of_Germans
[14] https://de.wikipedia.org/wiki/Boulevard_der_Stars
[15] https://en.wikipedia.org/wiki/German_Sportspersonality_of_the_Year
[16] https://en.wikipedia.org/wiki/Germany%27s_Sports_Hall_of_Fame
[17] http://www.klartextsatire.de/kultur/100besten-liste.htm
[18] http://www.augenblicke-zwischen-leben-und-tod.de/t363f58-Liste-bekannter-Personen-die-sich-selbst-toeteten.html
[19] http://www.verstorbene-filmstars.de/filmstars-kategorien.php?lKategorie=Land&lStaat=Deutschland
[20] https://www.taschenhirn.de/geschichte/jung-gestorben/
[21] https://de.wikipedia.org/wiki/Deutscher_Schallplattenpreis

Table 4: International celebrities

The sources that are used to select the deaths of international celebrities between 1986-2015 are shown in the first column. In the second column the selected international celebrities are shown.

Source	Celebrities
IMDB Starmeter[22]	Sterling Hayden, James Cagney, Fred Astaire, Rita Hayworth, Lee Marvin, Anne Ramsey, John Carradine, John Matuszak, Lucille Ball, Ava Gardner, Barbara Stanwyck, Joan Bennett, Michael Landon, Kevin Peter Hall, Lee Remick, Anthony Perkins, Chuck Connors, Sterling Holloway, Brandon Lee, John Candy, Cesar Romero, Burt Lancaster, Elizabeth Montgomery, Phil Harris, Dean Martin, Gene Kelly, Tupac Shakur, McLean Stevenson, Chris Farley, James Stewart, Burgess Meredith, John Derek, Akira Kurosawa, Frank Sinatra, Stanley Kubrick, Walter Matthau, Hedy Lamarr, Jack Lemmon, Anthony Quinn, James Coburn, Kim Hunter, Gregory Peck, Katharine Hepburn, John Ritter, Christopher Reeve, Marlon Brando, Ann Miller, Anne Bancroft, Pat Morita, Richard Pryor, Don Knotts, Chris Penn, Jack Palance, Yvonne De Carlo, Ingmar Bergman, Charlton Heston, Paul Newman, Patrick Swayze, Cory Haim, Leslie Nielsen, Dennis Hopper, Maria Schneider, Michael Clarke Duncan, Nora Ephron, Andy Griffith, James Gandolfini, Lisa Robin Kelly, James Garner, Grace Lee Whitney, Leonard Nimoy
25 Most Shocking Celebrity Deaths[23]	Paul Walker, Robin Williams, Heith Ledger, Michael Jackson, Cory Monteith, Whitney Houston, Brittany Murphy, Kurt Cobain, Gary Coleman, Philip Seymour Hoffman, Aaliyah, Anna Nicole Smith, Judith Barsi, Lee Thompson Young, Heather O'Rourke, River Phoenix, Bernie Mac, Selena, Steve Irwin
Biography: Top 100 Famous People[24]	Nelson Mandela, Mother Teresa, Pope John Paul II, Rosa Parks, Steve Jobs

[22] http://imdb.com/chart/starmeter
[23] http://www.hollywood.com/celebrities/shocking-celebrity-deaths-60263421/#/ms-22389/1
[24] http://www.biographyonline.net/people/famous-100.html

Table 5: Popular and Regular celebrities in the UK

In this table all British and international celebrities who received a higher than national median (11) number of media mentions in the week after they died in the British newspapers are represented by the Popular celebrity group. All British and international celebrities who received an equal or lower than national median number of media mentions in the British newspapers are represented by the Regular celebrity group.

Group	Celebrities
Popular celebrity group (97)	Laurence Olivier, Roald Dahl, Margot Fonteyn, Freddie Mercury, Benny Hill Frankie Howerd, James Hunt, Les Dawson, Bobby Moore, Audrey Hepburn John Osborne, Peter Cook, Princess Diana, Quentin Crisp, Dirk Bogarde, Yehudi Menuhin, Oliver Reed, Barbara Cartland, John Gielgud, Alec Guinness, George Harrison, Harry Secombe, Dudley Moore, John Thaw, Spike Milligan, Richard Harris, Bob Hope, Maurice Gibb, Barry Sheene, Alistair Cooke, John Mills, Ronnie Barker, George Best, Syd Barrett, Anita Roddick, Alan Ball, Colin McRae Paul Scofield, Richard Wright, Natasha Richardson, Bobby Robson, Alexander McQueen, Malcolm McLaren, Alex Higgins, Amy Winehouse, John Barry Christopher Hitchens, Elizabeth Taylor, Nat Lofthouse, Henry Cooper, Robin Gibb, Jon Lord, Davy Jones, Tony Scott, Vidal Sassoon, Eric Sykes, Margaret Thatcher, David Frost, Peter O'Toole, Alan Whicker, Richard Briers, P.D. James Richard Attenborough, Christopher Lee, Cilla Black, Fred Astaire, Kurt Cobain James Stewart, Mother Teresa, Frank Sinatra, Stanley Kubrick, Katharine Hepburn, Christopher Reeve, Marlon Brando, Pope John Paul II, Steve Irwin Anna Nicole Smith, Ingmar Bergman, Heath Ledger, Charlton Heston, Paul Newman, Michael Jackson, Brittany Murphy, Patrick Swayze, Leslie Nielsen Dennis Hopper, Steve Jobs, Whitney Houston, Nora Ephron, Paul Walker Cory Monteith, James Gandolfini, Nelson Mandela, Robin Williams, Philip Seymour Hoffman, James Garner, Leonard Nimoy
Regular celebrity group (94)	Cary Grant, Jim Laker, Andy Gibb, Daphne du Maurier, William Shockley, A.J.P. Taylor, Rex Harrison, Peggy Ashcroft, Gordon Pirie, John Curry, Ida Lupino James Herriot, Paul Eddington, Mary Leakey, Pat Smythe, Beryl Burton, Denise Levertov, A.L. Rowse, Ernie Wise, Nigel Hawthorne, John Entwistle, Thora Hird Alan Bates, Francis Crick, John Stephen, Alan Bullock, Herbert Brown, Joan Aiken, Alicia Markova, Cicely Saunders, Peter Ustinov, Don Thompson, Michael Evans, Paul Raymond, Pete Quaife, Andy Whitfield, Roy Bates, Richard Dawson Anna Wing, Christopher Chataway, Patrick Macnee, Richard Meade, Sterling Hayden, James Cagney, Rita Hayworth, Lee Marvin, Judith Barsi, Heather O'Rourke, Anne Ramsey, John Carradine, John Matuszak, Lucille Ball, Ava Gardner, Barbara Stanwyck, Joan Bennett, Michael Landon, Kevin Peter Hall Lee Remick, Anthony Perkins, Chuck Connors, Sterling Holloway, River Phoenix Brandon Lee, John Candy, Cesar Romero, Burt Lancaster, Selena, Elizabeth Montgomery, Phil Harris, Dean Martin, Gene Kelly, Tupac Shakur, McLean Stevenson, Chris Farley, Burgess Meredith, John Derek, Akira Kurosawa, Walter Matthau, Hedy Lamarr, Aaliyah, Jack Lemmon, Anthony Quinn, James Coburn Kim Hunter, Gregory Peck, John Ritter, Ann Miller, Anne Bancroft, Rosa Parks Pat Morita, Richard Pryor, Don Knotts, Chris Penn, Jack Palance, Yvonne De Carlo, Bernie Mac, Gary Coleman, Corey Haim, Maria Schneider, Michael Clarke Duncan, Andy Griffith, Lisa Robin Kelly, Lee Thompson Young, Grace Lee Whitney

Table 6: Popular and Regular celebrities in the Netherlands

In this table all Dutch and international celebrities who received a higher than national median (8) number of media mentions in the week after they died in the Dutch newspapers are represented by the Popular celebrity group. All Dutch and international celebrities who received an equal or lower than national median number of media mentions in the Dutch newspapers are represented by the Regular celebrity group.

Group	**Celebrities**
Popular celebrity group (61)	Herman Brood, Boudewijn Büch, Pim Fortuyn, Bart de Graaff, Wim van Est, Mary Dresselhuys, Fanny Blankers-Koen, Andre Hazes, Bram Vermeulen, Theo van Gogh, Koningin Juliana, Gerrie Knetemann, Albert Mol, Joop Doderer, Marten Toonder, Rinus Michels, Faas Wilkes, Robert Long, Mariska Veres, Paul Biegel, Jos Brink, Arne Jansen, Jan Wolkers, Benny Neyman, Pia Beck, Ramses Shaffy, Anton Geesink, Bobby Farrell, Antonie Kamerling, Sugar Lee Hooper, Teddy Scholten, Appie Baantjer (AC), Harry Mulisch, John Kraaijkamp sr., Johnny Hoes, Coen Moulijn, Peter Post, Harry Muskee, Rijk de Gooyer, Piet Römer, Rita Reys, prins Friso, Atje Keulen-Deelstra, Wubbo Ockels, Armand, Drs. P., Thé Lau, Frans Molenaar, Joost Zwagerman, Pope John Paul II, Steve Irwin, Anna Nicole Smith, Ingmar Bergman, Heath Ledger, Michael Jackson Patrick Swayze, Steve Jobs, Whitney Houston, Nelson Mandela, Robin Williams Philip Seymour Hoffman
Regular celebrity group (66)	Luc Lutz, Arie van Vliet, Anja van Avoort, Conny Vandenbos, Tol Hansse, Rie Mastenbroek, Hermien Timmerman, Willem Duyn, Thea Beckman, Rudi Carrell Ernst-Paul Hasselbach, Eef Kamerbeek, Pieter Lutz, Geertje Wielema, Henk Nijdam, Cees van Dongen, Tonny van Ede, Theo Olof, Alexander Curly, Wim Koopmans, Herman Emmink, Jetty Paerl, Maarten van Roozendaal, Cees Veerman, Albert West, Willy Stähle, Walter Matthau, Aaliyah, Jack Lemmon Anthony Quinn, James Coburn, Kim Hunter, Gregory Peck, Katharine Hepburn John Ritter, Christopher Reeve, Marlon Brando, Ann Miller, Anne Bancroft Pat Morita, Richard Pryor, Rosa Parks, Don Knotts, Chris Penn, Jack Palance Yvonne De Carlo, Bernie Mac, Charlton Heston, Paul Newman, Brittany Murphy Gary Coleman, Corey Haim, Leslie Nielsen, Dennis Hopper, Maria Schneider Michael Clarke Duncan, Nora Ephron, Andy Griffith, Paul Walker, Cory Monteith James Gandolfini, Lisa Robin Kelly, Lee Thompson Young, James Garner, Grace Lee Whitney, Leonard Nimoy

Table 7: Popular and Regular celebrities in Germany

In this table all German and international celebrities who received a higher than national median (4) number of media mentions in the week after they died in the German newspapers are represented by the Popular celebrity group. All German and international celebrities who received an equal or lower than national median number of media mentions in the German newspapers are represented by the Regular celebrity group.

Group	**Celebrities**
Popular celebrity group (56)	Regine Hildebrandt, Beate Uhse, Hannelore Kohl, Hildegard Knef Billy Wilder, Fritz Walter, Marion Gräfin Dönhoff, Helmut Rahn, Jürgen Möllemann, Horst Buchholz, Jennifer Nitsch, Inge Meysel, Herbert Dreilich Brigitte Mira, Max Schmeling, Albert Mangelsdorff, Hans Clarin, Harald Juhnke Frank Beyer, Johannes Rau, Rudi Carrell, Ulrich Mühe, Evelyn Hamann, Horst Tappert, Robert Enke, Christoph Schlingensief, Heidi Kabel, Vicco von Bülow Bernd Eichinger, Dirk Bach, Otto Sander, Berthold Beitz, Helmut Schmidt, Aaliyah, Gregory Peck, Katharine Hepburn, Marlon Brando, Pope John Paul II Rosa Parks, Steve Irwin, Anna Nicole Smith, Ingmar Bergman, Heath Ledger Paul Newman, Michael Jackson, Brittany Murphy, Patrick Swayze, Steve Jobs Whitney Houston, Paul Walker, James Gandolfini, Nelson Mandela, Robin Williams, Philip Seymour Hoffman, James Garner, Leonard Nimoy
Regular celebrity group (59)	Fritz Thiedemann, Alfred Schwarzmann, Gustav Killian, Max Grieβer, Inga Abel Herbert Klein, Kristina Söderbaum, Marga Petersen, Karl Kling, Helmut Bantz Lothar Baier, Edwin Noël, Christel Justen, Jan Schlubach, Rolf Köhler, Werner Schroeter, Anneliese Rothenberger, Peter Przygodda, Hellmut Lange, Wolfgang Menge, Gerhard Hetz, Harry Valérien, Vadim Glowna, Günther Kaufmann, Paul Kuhn, Lisa Otto, Luise Rainer, Annemarie Buchner, Erika Zuchold, Walter Matthau, Hedy Lamarr, Jack Lemmon, Anthony Quinn, James Coburn, Kim Hunter, John Ritter, Christopher Reeve, Ann Miller, Anne Bancroft, Pat Morita Richard Pryor, Don Knotts, Chris Penn, Jack Palance, Yvonne De Carlo, Bernie Mac, Charlton Heston, Gary Coleman, Corey Haim, Leslie Nielsen, Dennis Hopper, Maria Schneider, Michael Clarke Duncan, Nora Ephron, Andy Griffith Cory Monteith, Lisa Robin Kelly, Lee Thompson Young, Grace Lee Whitney

Table 7: List of the ten 'superstars'

In the first column of this table the ten 'superstars' are listed. Between brackets is mentioned in which country a particular 'superstar' gathered this number of articles. In the second column the number of number of articles in which each 'superstar' is mentioned in the week after their death is listed. Van Gogh and Knetemann died on the same day, so the numbers of articles of these two celebrities are combined.

Superstars	**Number of articles**
Margaret Thatcher (UK)	641
Nelson Mandela (UK)	378
Michael Jackson (UK)	359
George Best (UK)	161
Pim Fortuyn (NL)	611
Van Gogh/ Knetemann (NL)	465
Nelson Mandela (NL)	169
Robert Enke (DE)	309
Michael Jackson (DE)	90
Nelson Mandela (DE)	77

Table 8: Media attention standardized using sample mean and standard deviation

In this table the results of the regressions with an alternative Media variable are shown. For this regression the number of media mentions are standardized by using the mean and the standard deviation of the media mentions of all three countries combined. This does not change the results of the regressions, the Total-dummy variable is still positive and significant on the same critical values as for the regression with the normal Media variable. The Media variable still has no significant effect on both the dependent variables.

	Without controls		**Daily and seasonal controls**		**Recession controls**	
Dependent var.:	Large cap	Small cap	Large cap	Small cap	Large cap	Small Cap
Intercept	0.0001772	0.0002673	0.0000779	0.0003233	0.0001587	0.00004168
(p>t)	(0.090)*	(0.000)***	(0.848)	(0.216)	(0.697)	(0.112)
Total dummy	0.0014464	0.0010055	0.0015548	0.0012285	0.0014634	0.0012177
(p>t)	(0.060)*	(0.043)**	(0.043)**	(0.013)**	(0.072)*	(0.020)**
Lagged return	0.00974431	0.0862	0.0965491	0.1527223	0.0963703	0.1517347
(p>t)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Media	-0.0000341	0.0000272	-0.0000892	0.0001013	-0.0000889	0.0001001
(p>t)	(0.959)	(0.949)	(0.892)	(0.811)	(0.892)	(0.813)
Day	-	-	X	X	X	X
Month	-	-	X	X	X	X
Recession	-	-	-	-	-0.0007269	-0.0008279
(p>t)					(0.033)**	(0.000)***
Recession* Total	-	-	-	-	0.0008752	0.0001005
					(0.727)	(0.950)
Observations	16039	16039	16039	16039	16039	16039
R^2	0.0131	0.0242	0.0148	0.0309	0.0151	0.0317

* Significant on a 10% level ** Significant on a 5% level ***Significant on a 1% level