

# **European Retail Funds as Complements or Substitutes during the 2008 Financial Crisis?**

In relation to European stock markets during  
the financial crisis of 2008

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## **Abstract**

Previous academic literature showed the tremendous impact of the financial crisis of 2008 on the financial system, and specifically the stock market. However the European asset management sector, being the second largest market in the world, was also impacted by this crisis. Economic intuition portrays not only a negative effect, but also a positive effect in the form of a safe harbour effect, in which a shift from the stock market to asset management is expected. This leads to the question of whether retail funds act as complements or substitutes in relation to the stock market in terms of price and volume. By using the NBER recession dummy and the MSCI EMU and STOXX European stock index, an interaction effect between the recession dummy and the stock market index is analysed. Special attention is given to UCITS funds and sustainable funds. The result of this paper is that funds in general still act as substitutes for the stock market rather than complements during the financial crisis of 2008. The robustness check suggests a different result for the European sovereign debt crisis.

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# Introduction

## 1.1 Introduction to the effects of the financial crisis of 2008

The financial crisis of 2008 was a worldwide financial crisis with such an impact that it is described as a ‘global financial earthquake’ (Mathiason, 2008). In a short period of only three weeks, the financial playing field changed disastrously. In the five years after the beginning of the crisis, financial institutions are still facing the negative consequences which are a direct result of the financial crisis of 2008 (Kingsley, 2012).

Central banks and governmental institutions faced challenges in order to maintain financial institutions from going bankrupt. Before the trigger of the financial crisis went off, trends in the financial market were piling up. Securitisation, a significant increase in short-term funding and global imbalances which led to cheap credit played a key role in this build-up (Brunnermeier, 2009). The trigger was the crash of the house prices in the United States. Due to a globalised financial market, the crisis spread from the United States to the rest of the world market, resulting into the world economy plunging into recession (Mishkin, 2012). Financial institutions suffered enormous losses, which triggered marginal calls and fire sales (Brunnermeier, 2009). This loss-spiral only reinforces the effect of the financial crisis. Share prices dropped dramatically. Over the period of October 2007 to March 2008, asset prices in the stock market fell by over 50 percent (Mishkin 2012). As a result, central banks needed to step in, in order to avoid illiquidity and to break down the amplifying mechanisms of the crisis. The European Central Bank, followed by the U.S. Federal Reserve, injected billions in overnight credit into the interbank market in order to ensure liquidity on this market.

## 1.2 Effect in stock market, bond market and banking sector versus asset management sector

The financial crisis had a tremendous impact on the financial sector. For the banking sector, the crisis brought financial instability (Della Posta & Talani, 2011). The confidence of the public in banks, including European banks, decreased sharply. The factual threat of this lack of trust was shown by bank-runs. The idea of failure of financial institutions required more extensive risk assessment, particularly for systemic risk. Several policy measures were taken by governmental institutions in order to mitigate the negative effects of the financial crisis. This included a shift of the role of the Central Bank as a ‘lender of last resort’ to being the ‘dealer of last resort’ (Mehrling, 2011). By aggressive action of central banks and bailouts of bankrupt financial institutions by governments, a depression was prevented (Mishkin, 2012).

However, the financial crisis of 2008 did not only have an impact on the banking system, the stock market and the bond market. It did also have an impact on the asset management sector. EFAMA (2015), the European Fund and Asset Management Association, defines asset management as ‘*the professional management and trading of securities and other types of assets to achieve a specific investment goal for the benefit of clients.*’ Therefore asset management is completely different from stock and bond market, but they do are intertwined. As these assets under management are invested, the asset managing sector provides a channel between saving and investment. For retail funds, asset managing companies pool investments of individual investors in order to let professional investors manage these funds. These pools of investment can exist of various asset classes, ranging from equity, fixed income to real estate. Retail funds is only a piece of the asset management sector. The whole asset management sector is worldwide responsible for managing EUR 50 trillion in net assets at the end of 2013 (EFAMA, 2015). According to McKinsey & Company (2014), this amount roughly represents a quarter of the total amount of worldwide financial assets. Europe is the second largest market for asset management, following the United States as market leader. The European market roughly has a third of the market share, resulting into EUR 16.5 trillion net assets. In comparison, the United States market accounts for 46% of the market share, resulting into EUR 23 trillion net assets.

Due to the fact that asset managing companies are intertwined in the financial system, and they directly and indirectly face the effects of the financial crisis, the consequences of the financial crisis also count for them. Therefore also the asset management was hit severely by the financial crisis of 2008 (Costanzo, 2011). This effect is portrayed as the ‘retraction on the financial market’ effect and is further elaborated in the literature review. Though, economic intuition portrays another possible effect, specifically for retail funds. This effect can be named as the safe harbour effect, which entails a shift from the stock and bond market to asset management. In economically difficult times, funds can be interesting for the individual investor due to the better possibilities of diversification and professional risk management. Funds would in this way act as complements rather than substitutes for stock and bond markets. This would be interesting as therefore the financial crisis would have a different impact on funds in general than on the stock markets. Also this theory will be further elaborated in the literature review.

### **1.3 Academic literature and contribution to field of research**

In previous academic literature, a focus has been given on the financial crisis itself, how it did occur and what the correct policy measures were. Generally, it is found that a financial crisis significantly negatively affects the GDP growth and its level of investment of a country (Ksantini & Boujelbène, 2014).

The effect of the financial crisis on the stock market, bond market and banking sector is already a known research field. In the research concerning the stock market, it is mostly focused upon return and volatility of United States stocks. Chong (2011) concluded a significant impact of the financial crisis on volatility but not on stock return. In another study by Manda (2010) it is shown that stock market volatility increased dramatically as share prices dropped. Another conclusion of this study was that the stock market rebounded during the post-crisis period. Concerning the banking sector, Ivashina and Scharfstein (2010) show that new loans fell dramatically. The result was a cut in liquidity offered by banks.

However, as already noticed, the asset management sector will naturally also be affected by the financial crisis. Therefore it is also interesting to look specifically at the asset management sector and to see how the effects in other financial sectors, such as the stock market, fall upon the asset management sector. In this study, the asset management sector is narrowed to European retail funds. This includes a geographic narrowing in terms of focusing on European based funds, and a content wise narrowing by looking specifically at retail funds that invest in European equity. Retail funds are aimed at the general public, namely individual investors, and characteristically have low-entry barriers (Turner, 2004). In this study retail funds are seen as open-ended funds, enabling the individual investor to easily redeem them. The precise concept of retail funds will be elaborated upon in the literature review. The reason why no fixed income funds are analysed is that even though bonds and stocks are both issued in a primary market, there is a principle difference between the secondary markets of bonds and the secondary market of stocks. Whereas stocks are traded by investors on exchanges, bonds are mostly traded over the counter (Schinasi et al., 2000). This method of trading offers no indices, only some benchmarks, and therefore no comparison is made with fixed income funds.

#### **1.4 Research question**

Therefore this research study will focus on the following research question:

*Do European retail equity funds function act as complements or substitutes in terms of price and volume in relation to stock markets during the financial crisis of 2008 and its aftermath?*

The research question therefore relates to the question of retail equity funds being substitutes or complements relative to stock markets during the financial crisis from the viewpoint of an individual investor. The main variable of interest is therefore an interaction term between the recession dummy and the stock market index. In order to find an answer to this question, the following elements will be defined. First of all European funds are defined as funds registered in Luxembourg and Ireland. As more than 99% of the funds in the used dataset have an Irish or Luxembourg domicile, only few funds are registered in other countries like Liechtenstein and Isle of Man. For currency effects, only the domicile of Ireland and Luxembourg will be consulted. Retail funds will be defined as open-ended funds, as

individual investors can enter and leave these funds freely. This definition however does allow funds with high unit or share prices. Only funds which invest in European equity large capital or European equity mid and small capital are analysed. A distinction will be made between funds which are UCITS compliant and funds which are not. UCITS regulation, which stands for the Undertakings for Collective Investment in Transferable Securities, will be covered in the literature review. Furthermore a focus will be on price and volume. Price is defined as the daily price of the unit or share of the fund in Euro. Volume is defined as the daily estimated fund level net flow, as open-ended funds can be redeemed at the fund manager. In order to compare funds with stock markets, a stock index is necessary. Because the funds are European equity funds, European indices are most suitable. The MSCI European Monetary Union All Capital Index and the STOXX Total Market Index are included in the analysis.

### **1.5 Structure of thesis**

In this study there will first be a focus on theory. In the literature review the concept of financial crisis and the concept of (collective) funds will be introduced. Within the theory of funds, a special focus will be given towards the UCITS regulation. Afterward the two described effects will be portrayed. The first effect is the retraction on the financial market, similar to the stock markets. This entails a decrease in volume and price as a result of the financial crisis. Secondly the so-called safe harbour effect is introduced, which entails a shift from the stock markets to the asset management by individual investors as a result of the financial crisis. By being a complement rather than a substitute, an increase in volume and price would be expected. Both theories describe an effect of the financial crisis towards European retail funds. In the end of the literature review multiple hypotheses will be expressed in order to be able to test the given intuition. In the data section, the data from the Morningstar database will be introduced, along with all the variables necessary for this study. In the methodology the panel data regression used for the results will be explained. The main results will be interpreted and finally a conclusion of these results will be made, including limitations and suggestions for further research.

# Literature Review

## 2.1 The concept of financial crises

Financial crises are a complex concept within the field of economics. It is widely debated whether crises are inherent to the system of capitalism. In history, different economic schools proclaimed different ideas of causes of financial crisis. Within bourgeois economists, theory reveals that every crisis is the result of a different cause (Clarke, 1994). This cause could be an external shock which disrupts the general equilibrium, or an internal shock which prevents the general equilibrium framework to fully function (Duman, 2014). The bourgeois viewpoint differs from the viewpoint of classical economists and those following Keynes. They believe that the cause of a crisis is insufficient regulation and policy, which is a failure from institutions providing this guidance (Clarke, 1994). Therefore the solution to a crisis is found in reforms, to change regulation and policy in such a way that mismanagement in the private market is prevented. Whereas the Keynesian school suggests state intervention to reform the economy and bring economic stability, neo-classical economists claim that state intervention only creates more problems due to market functioning imperfectly (Resnick and Wolff, 2010). State intervention will only block markets from recovering, therefore they should be left alone in order to heal themselves. Finally the Marxist theory of crisis describes the necessity of a crisis as inherent to the system of capitalism (Clarke, 2014). In this view, periods of crises are typically associated with a declining rate of profit. Following, economists used Marxist theories of crisis to analyse them further. Paul Sweezy used the tendency for the rate of profit to fall as the definition of a crisis, Otto Bauer explained crises through over-accumulation, Friederich Engels in terms of overproduction, Rosa Luxemburg in the sense of under-consumption and Rudolf Hilferding in terms of disproportionality (Duman, 2014).;

Mishkin (2012) describes the concept of financial crises in his book 'The Economics of Money, Banking and Financial Markets' as 'major disruptions in financial markets characterized by sharp declines in asset prices and firm failures'. The disruption happens in the information flow of the financial market. As a result, friction will occur which consequently will lead to the financial market not functioning properly.

Mishkin (2012) suggests that a financial crisis can be divided into three stages. Stage one is the initiation stage. The cause of the financial crisis lies in the initiation stage. A cause could be 1) mismanagement of new types of financial products introduced by financial innovation, 2) asset-price booms and bust which entails asset-price bubbles above fundamental economic value, or 3) a general increase in uncertainty caused by failures of major financial institutions (Mishkin, 2012). Stage one is followed by stage two: the banking crisis. In stage two the economy has been affected by the triggers of stage one.

Due to a declining economy and unrest, the balance sheets of financial institutions shrink. If this will lead to a negative net worth, bankruptcy follows. Because of the fear of bankruptcy, a bank-run might occur. If multiple banks fail simultaneously, a bank panic will take place. At last stage three will arise, which is the debt deflation stage. Because of the decline of asset prices and therefore the deterioration of the balance sheet, the relative value of the debt on the balance sheet will increase. The result of this is a high debt burden for the company, which again worsens the position of the company.

This three stage theory about financial crises by Mishkin (2012) clearly describes the effects towards the financial systems. Evidently the most obvious effect is the deterioration of the balance sheet which is a result of declining asset prices. This decline in asset prices is only increased by fire sales (Brunnermeier, 2009).

## **2.2 The concept of retail funds**

The idea of a fund starts from the thought of an individual lacking 1) the amount of capital needed in order to make a balanced portfolio investment and 2) the professional expertise which is necessary in order to successfully start and maintain a balanced portfolio with the corresponding risk (Russel, 2007). The solution to the posed problem is a collective investment scheme, also known as investment funds or pooled funds. In this way, a fund is seen as a ‘vehicle’ which enables the pooling of assets by a group of investors. (Turner, 2004). For this to work, the group of investors must have the same investment objective, known as a common investment objective. This common investment objective can differ per fund by, for example, the required return on investment and the corresponding risk to this return. The common investment scheme can be created by a professional financial company, which will manage the fund in return for a fee. This solves the expertise problem.

Retail investor funds are funds which aim at the general public (Turner, 2004). This means that not only institutional investors, but also individual investors can invest in such funds. A characteristic of retail funds is accessibility through low entry barriers, which requires only small amounts of investment capital.

An important distinction within funds is open-ended versus closed-ended funds. Open-ended funds are funds which have a variable amount of capital in issue (Russel, 2007). This means that the amount of capital depends on the amount of shares or units bought by investors. Essential to this fund category is the ability to sell back the shares or units to the fund manager. Closed-ended funds have a finite amount of capital in issue. In this category shares or units cannot be sold back to the fund manager, and therefore in order to buy or sell these shares or units they have to be traded with other investors. Investors will



thus depend on other investors to trade their shares or units on a common market. Open-ended funds are therefore attractive for individual retail investors because of the combination of funds and liquidity.

The use of collective investment schemes brings benefits to individual retail investors but might also come with disadvantages. Turner (2004) distinguishes eight advantages and five disadvantages of using funds as a retail investor. The advantages are:

- 1) Economies of scale benefits which can be achieved by the pooling of individual investments into one large investment fund.
- 2) Diversification possibilities, which is the process of spreading investments in order to mitigate investment risk (Turner, 2004). This is possible for the retail investor through the pooling of investments, and therefore diversification can be achieved with only a relatively small amount of individual investment capital.
- 3) Specialist investment expertise, as funds can be managed by professional portfolio managers. This is also only possible due to the pooling of investments, as otherwise professional managers would only be interested in providing services to individual investors with enough capital to invest. Especially the expertise of professional risk management within funds becomes available for the individual investor. This is relevant because this expertise could control the damage during the phenomenon of a crisis, and therefore you would expect relatively smaller losses.
- 4) Eliminate administration, which can even be an advantage for individual investors which have enough investment capital to invest on their own, but do not want the administration and record keeping that comes with individual investing.
- 5) Regulated status. Not all funds fall under specific fund regulation, but many do and this may result into extra investor protection. An example is the UCITS regulation, which will be introduced in the next paragraph.
- 6) Access to foreign markets. Funds may provide opportunities to foreign markets which would not have been possible as an individual retail investor, due to for example the transaction costs of dealing in such markets.
- 7) Access to product which would not have been possible with the individual investment capital. An example of such a product is a hedge fund which requires large investment capital.
- 8) Tax efficiencies that are possible due to the location of the fund (the domicile).

The disadvantages of investing in a fund as a retail investor may be:

- 1) Costs of managing an investment fund, such as the management fees. These costs decrease the benefits of the economies of scale as discussed earlier.
- 2) Lack of control. As the individual investors do not manage the fund, individual investors have no say in instruction what to buy or sell. Therefore involvement with their investments is difficult.
- 3) No guarantees. Just like the investment market, funds do not provide guarantees of return. For guarantees, the saving account is a safer option.
- 4) Tax inefficiencies, as the return of funds can lead up to double taxation.
- 5) Lack of depositor insurance/protection. Some regulated funds enjoy such protection, but most funds do not know something like a depositor insurance scheme as known in the banking sector. Therefore individual investors will not be insured for the losses when the fund management company goes bankrupt. As the banking sector does know such a protection in the form of a depositor insurance scheme, where often deposits up to 100,000 are covered, investing in a fund as an individual retail investor brings more risk. However this risk depends per jurisdiction thanks to regulation.

Typically, funds are differentiated according to the asset classes in which the funds invest or in which it invests the majority of its capital (Turner, 2004). This choice for one or multiple asset classes will influence the return of the fund, including the risk.

As already is mentioned when discussing the advantages for investing in a fund, regulation can play a vital role. However regulation is different for funds, based on their domicile. As this research study focuses on European funds, a focus will be given on European regulation. In Europe, the European Commission introduced the Undertakings for Collective Investment Schemes (UCITS). The UCITS directive originates from 1985 and aims to harmonize regulation concerning collective investment schemes across member states (Moloney, 2008). In such a way, it would be easier for funds to market their product in other European member states. However the UCITS directive brings more than only improving distribution possibilities of funds within member states. Roughly the UCITS directive stipulates which securities UCITS funds are allowed to invest in, the disclosure of information to investors and how shares or units can be bought or sold (ALFI, 2012). Because of the specific regulation regarding investor protection, UCITS funds are attractive for the individual investor.

## UCITS History

The original directive of 1985 is known as UCITS I and the goal of this directive was to create a common market for funds within all member states (Anderberg & Bolton, 2006). The common market should entail only funds that fulfil four criteria: 1) the objective of the fund is collective investment in transferable securities only. 2) The capital necessary for the fund must be raised through public offering of units or shares. 3) The units or shares must be subscribable and redeemable of fund assets, expressing the fund should be open-ended. 4) Comply with specific diversification limits and investor protection regulation. By setting these four criteria, the European Commission not only aims to make UCITS funds accessible, but also to harmonize regulation across member states and to guarantee investor protection. The choice for open-ended funds is therefore logical, as it typically concerns individual investors as well. Investor protection was achieved by introducing strict diversification limits, capital and methods of disclosure requirements, which will be elaborated upon when discussing investor protection.

Later, the European Commission amended the original directive by introducing UCITS III (Anderberg & Bolton, 2006). The UCITS III amendments consisted of the management directive and the product directive. The main objective of UCITS III was to extend the UCITS directive from only transferable securities to include also other financial assets (Moloney, 2008). This included an extension of the concept of eligible assets to invest in. The management directive aimed at providing more flexibility to UCITS fund managing companies for the limitations originating from UCITS I. The product directive was more content wise and made sure UCITS fund managers could employ more diverse strategies. The investment restrictions were eased and this increased the appeal of UCITS funds (Anderberg & Bolton, 2006).

The UCITS IV directive followed after, after being approved by the European Parliament in January 2009 (Parker, Stretch & Price, 2009). Whereas the amendments in the UCITS III directive focused mostly on investment restrictions, UCITS IV focused on managerial aspects. It included five changes: 1) The smoothing of the notification process of funds in member states in order to speed up cross distribution. 2) The possibility of using master-feeder structures in UCITS funds. 3) Introduction of a management company passport. 4) The facilitation of merging funds. 5) Replacement of the simplified prospectus by a key investor information document (KIID). The changes are focused on optimizing procedures and possibilities in order to improve the performance of UCITS funds (Parker, Stretch & Price, 2009).

### UCITS Investor Protection.

As the primary goal of the UCITS directive is not only to harmonize regulation across member states but also to facilitate investor protection, regulation regarding investment policy of UCITS funds was introduced. Two concepts which ensure investor protection is investment restrictions by defining eligible assets and investment limits in order to ensure diversification (Moloney, 2008). First of all the UCITS directive defines the eligible assets in which UCITS funds managers can invest in. In this way UCITS funds were restricted in investment opportunities that fell beyond the scope of transferable securities. Whereas the original directive was exceptionally restrictive, the definition of eligible assets was broadened in the UCITS III amendments (Moloney, 2008). This included the possibility of money-market instruments. The second concept which brings investor protection are the investment limits. The UCITS directive entails risk-spreading rules in order to ensure diversification within UCITS funds. Risk diversification is achieved by limits to investments by the UCITS funds, such as the 5-10-40 rule (Parker, Stretch & Price, 2009). The 5-10-40 rule constitutes that only a maximum amount of 10 percent of the net assets of a UCITS fund are allowed to be invested in securities from an individual issuer, and that investments which are above 5 percent of the fund's net assets in securities from an individual issues are not allowed to make up more than 40 percent of the portfolio of the UCITS fund (ALFI, 2012). Due to this regulation, a different effect for UCITS-compliant funds will be expected.

### **2.3 Retraction on the financial market**

This section and the section to come try to theoretically describe a possible effect of the financial crisis on the performance of European retail funds. First of all it is important to analyse whether there will be an effect at all, and afterwards whether the sign of the effect is positive or negative. The first theory which will be discussed is a theory of decrease in price and volume. This economic theory would suggest that during a financial crisis, the price of certain assets and its volume would decrease. Due to the decrease in price, volatility would increase. The effect of the financial crisis on retail funds could be theoretically analysed by looking at the effect of the financial crisis on the stock- and bond market.

As previous academic literature showed, the financial crisis of 2008 had impact on the whole financial sector. Economy wide, the financial crisis had a significant negative impact concerning GDP growth and the level of investment (Ksantini & Boujelbène, 2014). Specifying the stock market, prices of stocks sharply declined and volatility rose (Chong, 2011). This sharp decline was the result of a misbalance between demand and supply of stock and a lack of trust in the financial sector in general. However this effect in volatility and price does decay.

An effect of the financial crisis on retail funds would be expected because of the principle idea of funds investing in different types of assets. Due to the fact that they invest in markets which are affected by a financial crisis, as shown by previous academic literature, they will directly be affected by this sharp decrease in prices and an increase in volatility. This direct effect immediately deteriorates the position of funds, decrease their value and thus price. As daily price decreases, the volatility in the sense of standard deviation would increase.

For individual investors, another possible cause could be found for a decrease in price relating to volume. Due to the state of crisis, individual investors would be expected to invest less. Individual investors act differently from institutional investors, especially during a crisis (Turner, 2004). Not only does the crisis directly impact the investment capital of the individual investor, it is also common that risk aversion may play a role for individual investors in considering in which assets to invest and whether to invest at all (Cohn, Lewellen, Lease & Schlarbaum, 1975). The result of this would mean lower demand for these investments. There is a flight out of the financial market in general, including funds. This is a retraction of the financial market. As volume is affected, and followed by the law of supply and demand, this indirect effect will additionally decrease the price of a unit or share of the fund. Along, volatility would increase.

A different effect could be expected because of regulation. The previous discussed UCITS regulation will be the example portrayed in this paper. As UCITS regulation entails specific diversification regulation, the UCITS funds have a reputation of relatively 'spread and safe' investments (ALFI, 2012). This is of course in their own category of asset classes and risk profile. However this investor protection is attractive to the individual investor, especially in times of crisis. It could therefore be expected that UCITS funds could be affected less by the circumstances described above.

#### **2.4 Safe harbour effect**

The previous section discussed the retraction of the financial market as a result of the financial crisis of 2008, resulting into a decrease in price and volume. This effect would be relatively similar to the stock- and bond market. In this section a different effect will be portrayed, which could contradict with the effect described in the earlier section.

The role of the asset management sector brings another viewpoint to financial crisis, especially for the individual investor. During the state of a financial crisis, it would be expected that individual investors invest less in fund like structures, which is discussed above. However due to the preferred diversification possibilities funds offer, a second effect could be identified. This safe harbour effect is seen as a

substitution effect from the stock- and bond market to asset management, and in particular to retail funds. Individual investors look for even more diversification possibilities in difficult times and therefore you would expect an increase in price and volume due to higher demand in funds. Individual investors in this way seek the diversification possibilities that open-ended funds offer (Turner, 2004). This higher demand comes from a substitution effect, where more investors want to invest in a typically more 'safe' fund rather than volatile stock- and bond markets. Therefore individual investors fly to a 'safe harbour'.

Part of this safe harbour effect could be a flight towards 'sustainable funds'. In the last decade, the concept of responsible investing began to arise. The financial crisis was seen as an opportunity for responsible investing and therefore an opportunity responsible investing funds (Moulds, 2014). It is therefore interesting to see whether sustainable funds act differently compared to general funds during a period of crisis.

## **2.5 Related financial concepts**

It is essential to introduce financial concepts used in the data and methodology section according to literature. Relating to the section of open-ended funds, the market price of a fund is the unit or share price at which you can redeem these units and shares (Investment Company Institute, 2007). This price is known as the net asset value (NAV price). This differs along time during the trading day, but this price can be based daily (as an average).

Within financial markets, volume is a key indicator for the liquidity of the market. However, as this study concerns open-ended funds, funds can be redeemed to the fund manager. Volume can therefore also be seen as somehow a difference in fund size, namely inflow and outflow (Morningstar, 2016). Fund level net flow is therefore a proxy in this study for volume.

The NBER recession dummy is named after the National Bureau of Economic Research, based in the US. It is common in the field of financial crisis to use sets of dummy variables to indicate whether at that time a financial crisis was present (Ksantini & Boujelbène, 2014). The recession dummy is country or continent specific. Rather than defining a recession as two consecutive quarters of declining real GNP growth, the NBER defines a recession for this dummy as a more recurring period of a decline, and goes beyond only looking at GNP by including total output, income, unemployment and the level of trade (Issler & Vahid, 2006).

## 2.6 Hypotheses

The aim of the hypotheses is to see whether European retail funds act as complements or substitutes in relation to stock markets during the financial crisis of 2008. Therefore the following hypotheses will be tested and analysed in this research paper:

**Hypothesis 1:** On average, ceteris paribus, the price of funds is complementary during recession periods in relation to the stock market price. In practical terms this relates to a positive interaction term between the stock market index and the NBER recession dummy in a regression in which price is the dependent variable.

**Hypothesis 2:** On average, ceteris paribus, the fund level net flow is complementary during recession periods in relation to the stock market price. In practical terms this relates to a positive interaction term between the stock market index and the NBER recession dummy in a regression in which fund level net flow is the dependent variable..

**Hypothesis 3:** On average, ceteris paribus, UCITS funds are impacted differently during a crisis in relation to non-UCITS funds. In practical terms this relates to the interaction term between UCITS funds and the NBER recession dummy.

**Hypothesis 4:** On average, ceteris paribus, sustainable funds are impacted differently during a crisis in relation to non-specifically sustainable funds. In practical terms this relates to the interaction term between sustainable funds and the NBER recession dummy.

# Data

## 3.1 The Morningstar Database

In order to test the hypotheses formed in the literature framework, data is necessary. For asset management, the Morningstar Database is the optimal database due to its extensive data collection and number of data points. The Morningstar Database is available for students in the Erasmus Data Service Centre.

## 3.2 Variables

To perform a methodological approach which results into answering the research question, the following variables are essential. Each variable will be introduced and defined. In some cases, the use of a proxy is necessary. The variables which originate from the Morningstar database will be defined according to the definition used by Morningstar in order to avoid differences between definitions or calculations.

Originally, 4533 funds fall within the category of funds specified for this study. In total, available data was gathered of 1326 funds, of which 1146 have a Luxembourg domicile and 180 entail an Irish domicile. This leads to a total of 1,986,348 observations. However some funds included missing data, for price and/or volume. Roughly when more than 10% of the data was missing, the fund is not included. The reason for this is that for these funds, not simply some days are missing but multiple months in a row. Funds are also removed when interpolation is not possible, when for example the first or last months of the time period is missing. For price are removed 46 funds in Luxembourg and 6 funds in Ireland. This relates to 68,908 and 8,988 observations. For volume are removed 330 funds in Luxembourg and 52 funds in Ireland. This relates to 494,340 and 77,896 observations. This leads to a total of observations used in this study of 1,908,452 for price and 1,414,112 for volume.

Descriptive statistics of each variable can be found in the appendix. The following variables are consulted in this research study:

1) Name. The name of the fund is key to differentiating different funds. Each fund will constitute the different data points and the name of the fund will differentiate different funds from each other. In order to differentiate funds also in statistical software, a variable named unit identifier is created in which each fund is given an unique id number.



2) Domicile. The domicile is the location where the fund is registered (Morningstar, 2016). Therefore the domicile of the funds will be used in order to specify the European focus of this study. In the introduction already is mentioned that only funds with Luxembourg or Ireland as a domicile are taken into account, as this accounts for more than 99% of the cases. As this study focuses on European retail funds, the funds specified in the database are offshore open-end funds (and are not U.S. registered funds). In order to enable the usage of country-fixed effects, a country identifier is created according to domicile. In this country identifier, '0' stands for Luxembourg and '1' stands for Ireland.

3) UCITS. This dummy variable indicates whether the specific fund is UCITS compliant, relating to the UCITS regulation introduced in the literature review. If the fund is UCITS compliant, the value of the variable is '1', if it is non-compliant it is '0'. This variable is used in order to differentiate the effect between UCITS compliant funds and non-UCITS compliant funds.

4) Global Category. In this variable Morningstar indicates the category of funds. This global category differentiates many types of different funds, which is a more specific categorisation than the variable 'broad global category', in which only equity, fixed income and money market are relevant. Global stands for the differentiation of funds along many categories. The reason for choosing the more specific categorisation lies in the following reason.

A problem could arise when testing whether the NBER recession dummy of the euro area impacts the European retail fund, when the retail fund which does has a domicile within the euro area invests outside the euro area. In It could be that the fund has a domicile and is listed in for example Luxembourg, but it invests in the US, China or India. Therefore the corresponding European NBER recession dummy would be not suitable because of the different effect across the world.

To correct for this effect, this research study will only focus on two global categories:

1) Europe Equity Large Cap, this global category is defined by the portfolios investing in equity securities which have are European based. The funds in this category invest in equity stocks that belong in the top 70% of the capitalization of European equity market (Morningstar, 2013).

2) Europe Equity Mid/Small Cap, which is a global category that just like Europe Equity Large Cap invests mostly in equity securities which are European based, but focuses not on large-cap stocks but on mid-cap and small-cap stocks of the capitalization of the European Equity Market (Morningstar, 2013)

At last this reasoning of appropriating the asset classes with the explaining variable also explains why a further specification of using country-specific NBER recession dummy variables, as the funds in the categories described above do invest across Europe and therefore this effect should be taken into account.

5) Daily price. The daily price of units or shares of offshore open-end funds is defined in the Morningstar Database as Net Asset Value (NAV) price for the fund as of the performance date (Morningstar, 2016). This variable acts as a proxy for the price of a fund. It is calculated on a daily basis and is found in the historical price and return data section of the Morningstar database. The daily price is in the euro currency and therefore there is no currency effect present between different funds.

Also within daily price, missing values should be taken into account. In the cases where some data is missing, but this problem could be solved by interpolation, the missing values are calculated according to this formula: 
$$:= \frac{y_{t+1} + y_{t-1}}{2}$$

6) Estimated fund level net flow. The estimated fund level net flow is defined in the Morningstar Database as aggregated share-class based flow or if not available the difference in fund size (Morningstar, 2016). It is therefore an indicator for the difference in fund size. In this way, the estimated fund level net flow works as a proxy for the volume of a fund. The estimated fund level net flow is calculated on a daily basis. This variable is found in the historical cash flow data section of the Morningstar database.

Within this variable there were missing values. After removing funds with overall missing data as described earlier, some funds only had some days missing. For these days of which value is set, the value 0 is given. It is therefore assumed that the net flow is 0, so the level of assets remains the same.

7) NBER Recession Dummy. The NBER recession dummy is a dummy indicating whether at the specific date there is a recession or not. This NBER recession dummy is defined according to the chosen location. For this research study, the euro area set of NBER recession dummy will be used. In this way, the problems proposed in the description of which global categories are analysed, would be prevented. The recession indicator from peak to trough on a daily basis is used. This specific set of dummy variables can be downloaded from Fred Economic Research. The NBER recession dummy acts as the explaining variable for this study.

A graph of the original NBER recession dummy and its values can be found in the appendix. In order to differentiate the financial crisis of 2008 and the European sovereign debt crisis, which is related as one of the causes is the aftermath of the financial crisis of 2008, two NBER dummies are created. NBER1 takes the value of 1 during the financial crisis and in absence the value of 0. NBER 2 takes the value of 1 during the European sovereign debt crisis and in absence the value of 0. In this way, the two crises can be differentiated. Graphs of both dummy variables can be found in the appendix.

8) MSCI European Monetary Union All Capital Index. This index is an European market capitalization weighted index stock index concerning equity, operated by Morgan Stanley Capital International (MSCI, 2016). This specific index provides a measurement of the performance of equity across the European Economic and Monetary Union (EMU). It relates to stocks of both large capital as mid capital. The reason why the index of the EMU is used rather than the European version, is because of currency. As the MSCI indices are portrayed in local currency, the standard European index is not denoted in euro (MSCI, 2012). Even though a euro denoted version is available, this index misses two months of the chosen time period. Therefore the EMU index is preferred.

9) STOXX Europe Total Market Index. The STOXX index is another market capitalization weighted stock index concerning equity, operated by index provider STOXX (STOXX, 2016). It relates to European equity of large, mid and small capital. This index covers 18 European countries, not only including the EMU area but also the United Kingdom and Switzerland.

### **3.3 Time periods**

The first four variables described in the previous section, namely name, domicile, UCITS and global category, are fixed and therefore do not differ over time. However, the estimated fund level net flow, daily price and the NBER recession dummy are typically variables that can add a perspective over time to the analysis. By including data points over time, the possibility of a panel data regression for results is created. The exact method of the panel data regressions is described in the methodology section.

The time period this research study focuses upon is 2008 up to and including 2013. The chosen time period can be explained by the reason of this study, namely the financial crisis of 2008. As the crisis hit Europe in 2008 and the European recession dummy turns 1 from February 2008 until May 2009, data will be used from the 1<sup>st</sup> of January 2008. The reason for not choosing an earlier moment in time is that the earlier starting point is, less data will be available. This is because of the less data collection in past years. Therefore starting earlier than January 2008 would be a burden for the number of observations.

The reason of not including 2014 is that the NBER recession dummy only holds until June 2014. Therefore 2008-2013 will be included.

As only prices are quoted on stock trading days, only trading days will be taken into account. The number of stock trading days differs for each country. In order to create a balanced panel data set, in which both Luxembourg and Irish funds exist, only trading days at which both the Luxembourg Stock Exchange and the Ireland Stock Exchange are open. This is because of the fact that the days on which funds are traded is similar to the stock trading days in the specific domicile. For the final data set this means that data is available of 1498 trading days.

# Methodology

## 4.1 Panel regression

To test the hypotheses, panel data regressions will be used. As panel data is a combination of cross series and time series, it will consist of observations on the same  $n$  entities at two or more time periods  $T$ . The advantage of panel data is that it can be a useful tool in order to eliminate omitted variable bias by analysing changes in the dependent and independent variable. The panel data set is balanced.

In order to test for multicollinearity between the variables, the Pearson correlation between variables are calculated and can be found in the provided table found in the appendix. The results only suggest a high correlation between the MSCI and the STOXX index. Because these two indices are not used at the same time, this is no problem. Therefore there is no excessive correlation between the used variables, and so no problems of multicollinearity arise.

Essentially two different regressions will be executed, in which the dependent variable differs. In the first series of regressions, daily price will be the dependent variable. The second series of regression concern net fund flow.

The regression model to be used for testing the hypothesis regarding price, will be constructed according to the standard multiple regression model. In the first series of regression, daily price will be the independent variable ( $Y$ ) and  $NBER1$  the recession dummy. As this is a dummy variable, it will be of value 0 in absence of crisis, and of value 1 when a crisis is present. The stock market index, either the MSCI EMU index or the STOXX Europe index, will be added to the regression in order to not only compare the performance of funds with stock market, but also to control for the financial market. The interaction effect between the stock market index and the  $NBER1$  dummy will be the main variable of interest. These interaction effects are generated as a variable in Stata. Thus the regression model of the first two regressions is as follows:

$$Y_{it} = \alpha + \beta_1 * NBER1_t + \beta_2 * Stock\ market\ index_t + \beta_3 * (Stock\ market\ index * NBER1) + \varepsilon_{it}$$

The regression model to be used for testing the hypothesis regarding volume, will be constructed the same way. The estimated fund level net flow will be the independent variable ( $Y$ ) and the  $NBER1$  recession dummy and UCITS variable the dummies of this regression. Also the stock market index will be added to the regression. The interaction effect will again be the main variable of interest. Therefore the second regression model is as follows:

$$Y_{it} = \alpha + \beta_1 * NBER1_t + \beta_2 * Stock\ market\ index_t + \beta_3 * (Stock\ market\ index * NBER1) + \varepsilon_{it}$$

For each series of regressions, three regressions will be run. The first regression includes robust standard errors and fund fixed effects. The second regression is a regression with clustered fund standard errors. The third regression includes clustered fund standard errors and country fixed effects. The reason of running three different regressions is to see whether these differences impact the results.

For testing whether heteroscedasticity or homoscedasticity applies, a modified Wald test is used as a command of Stata (xttest3). The result of this test is significant, meaning heteroscedasticity. As the dependent variables are likely to be autoregressive, it is important to look for possible autocorrelation. In order to test for this correlation, the Wooldridge test for autocorrelation in panel data is used. As the results are significant on a 1% significance level, autocorrelation should be controlled for. The solution to this problem is using heteroskedastic and autocorrelation consistent variance estimators (Stock & Watson, 2012).

In order to check the robustness of the results, an additional section named 'Robustness check' is created. In this robustness check, the main series of regressions are run, only the NBER1 recession dummy changes into NBER2. Therefore the regression formulas are similar except this difference in the NBER dummy. The NBER2 recession dummy stands for the European sovereign debt crisis, rather than the financial crisis of 2008. As this is a different crisis, this section tests whether the results are similar to the previous results, therefore acting as a control on those previous results.

Two extra tests will be done, concerning the UCITS hypothesis and the sustainable fund hypothesis. For daily price, 6 funds are non-UCITS compliant and for volume 5 available funds are non-UCITS compliant. For sustainability, 28 sustainable funds are available in daily price and 18 sustainable funds are available in volume. For these two extra regressions will be performed, with individual hypothesis testing the significance in individual regressions. The main variable of interest will be the interaction effect between these two variables and the NBER recession dummy, as this effect suggests a different reaction to the financial crisis by these kind of funds in relation to other funds.

This significance level is denoted as alpha ( $\alpha$ ). This means that when the found p-value is smaller or equal to alpha, the result significant is on the level of alpha (Moore et al., 2011). In this study the sign \*\*\* will represent significance on a 1% level, \*\* means significance on a 5% level and \* is significant on a 10% significance level.

When looking at the explained variation in the regression model, the adjusted  $R^2$  will be consulted. As  $R^2$  always increases when regressors are added, it is necessary to look at the adjusted  $R^2$  in order to include a deflation factor.

The Ordinary Least Squares (OLS) assumptions in a multi-regression model which should be mentioned:

- 1) Zero conditional mean. Mathematically this refers to  $E(u_i | X_j, X_{1i}, X_{2i}, \dots, X_{ki}) = 0$ . This assumption can be transformed into conditional independence as we only interpret the variable of interest and not control variables. Therefore still correlation between the error term and the control variable can exist.
- 2)  $(Y_i, X_i)$  are independent and identically distributed. This would mean specifically for this study that daily price or volume does not say anything about the future values. For financial data this is a strong assumption.
- 3) Large outliers are unlikely. The dataset does not display any sign of excessive outliers.
- 4) No perfect multicollinearity, as variables do not perfectly correlate.

In order to test the hypothesis as it is formulated, a two-sided hypothesis test will be executed. The two-sided hypothesis is more conservative than the one-sided hypothesis. The main variable of interest is  $\beta_3$ , namely the interaction effect between the NBER recession dummy and the stock market index (either the MSCI or the STOXX index). A single coefficient hypothesis test will be executed:  $H_0: \beta_3 = 0$  vs  $H_1: \beta_3 \neq 0$ . This implies using the T-statistic. Only the second regression will report Z-statistics, because of the clustered-fund standard errors there are not enough degrees of freedom to calculate the T-statistic. Whereas the Z-statistic will normally not suffice, it is the only option to report a result. Financial data is not distributed normally.

If the result is that during recession periods,  $\beta_3$  (the interaction effect) is positive, funds are complements in relation to stocks. If this beta is negative, funds are substitutes. This counts for both price and volume, as volume is a net flow.

For the two extra regressions regarding UCITS and sustainable dummies, a single coefficient hypothesis is sufficient. Therefore the following hypothesis test will be executed:  $\beta_{NBER1*UCITS} = 0$  vs  $\beta_{NBER1*UCITS} \neq 0$  and  $\beta_{NBER1*Sustainable} = 0$  vs  $\beta_{NBER1*Sustainable} \neq 0$ .

# Results

## 5.1 Main results

The main results concern the outcomes of the regressions in which the main variable of interest is the interaction term between the NBER1 recession dummy and the stock market index (either the MSCI or the STOXX index). An overview of the regression results can be found in the appendix.

Concerning daily price, it shows that the interaction term between NBER1 and the MSCI index is not significant for all three regressions. Therefore even though the sign of the coefficient is negative, no conclusion can be drawn. The interaction term between NBER1 and the STOXX index is significant on a 1% level and the sign is negative. This specific interaction term is an independent variable and can be interpreted as the stock market index during recession periods, as the NBER is a recession dummy. A positive interaction term would therefore mean an increase in price when the NBER recession dummy takes the value of 1, and would mean complementarity of the daily price in relation to the stock market index during recession periods.

Concerning net fund flow, both the interaction term of NBER1 with MSCI and the interaction term of NBER1 and STOXX are significant on a 1% level for all three regressions. The sign of the coefficient is negative. This specific interaction term can be interpreted in a similar manner, namely that a positive interaction term would mean a positive flow streaming into the fund when the NBER recession dummy takes the value of 1, and would mean complementarity of the net fund flow in relation to the stock market index during recession periods.

For the first two hypothesis this means that both should be rejected, with the exception for the regression with daily price as the dependent variable with the MSCI index. Because of the insignificant result in the daily price regression with the MSCI index, no conclusion can be drawn. For the other results, the negative coefficient portrays substitution rather than complementarity.

## 5.2 Additional section: Robustness check

In the robustness check, the previous results are checked by changing the NBER1 recession dummy into the NBER2 recession dummy. As this dummy represents the European sovereign debt crisis instead of the financial crisis of 2008, it could shed light on whether the main variable of interest stays the same when the crisis changes. The results of the robustness check show a different perspective on the question of complements versus substitutes than previous section does.



Concerning daily price, it shows that both interaction terms between the NBER1 recession dummy and the stock market indices (MSCI and STOXX) are significant on a 1% level. The sign of the coefficients is positive, rather than negative in the previous section.

Also concerning net fund flow, both the interaction term of NBER1 with MSCI and the interaction term of NBER1 and STOXX are significant on a 1% level for all three regressions. Also these coefficients are positive, in contrary to the results found with the NBER1 recession dummy.

Both the results of the daily price regressions and the net fund flow regressions portray complementarity while the previous main results in general show a sign of substitution.

### **5.3 Additional section: UCITS & Sustainable funds**

In this section, the results of the regressions in which the interaction term between the NBER1 recession dummy and the UCITS or Sustainable dummy are discussed.

For UCITS, in the daily price regressions, it shows that the interaction term between NBER1 and UCITS is both in the MSCI and STOXX regressions significant on a 1% level for the first two regressions and is significant on a 10% level for the third regressions. However the first two regressions result into a negative coefficient, while the third regression leads to a positive coefficient. NBER1\*UCITS interaction term can be interpreted as the effect of being UCITS-compliant during a recession period on the daily price of funds. If this term is significant, UCITS funds are affected differently during recession periods.

In the net fund flow regressions regarding UCITS, the interaction term between NBER1 and UCITS is significant on a 1% level for all three regressions. This counts for both the MSCI and the STOXX index. The sign of the coefficient is in all regressions negative. This NBER1\*UCITS interaction term can be interpreted the same way as in the paragraph above, only now with net fund flow as the dependent variable instead of daily price. Therefore the coefficient shows the effect of being UCITS-compliant during recession periods on the net fund flow of funds.

Because of these results, the UCITS hypothesis should not be rejected, as in general significant results are shown. However, the sign of the coefficient is different than expected. The first two regressions lead to a negative coefficient, while a positive effect is expected according to theory in the literature review. This could be the result of a data problem because of the very few non-UCITS funds.

For the sustainable funds, in the daily price regressions, the results differ very much depending on the regression which is performed. For both the MSCI and STOXX index regressions, the first regression produces a significant result on a 1% level. The sign of the coefficient is positive. The coefficient of the second regression is also positive, however the result is insignificant. The third regression is also insignificant and produces a negative coefficient. Therefore the only significant result can be found in the first regression. The NBER1\*Sustainable interaction term can be interpreted as the effect of a sustainable fund during recession periods. If this term is significant, sustainable funds are affected differently during recession periods.

In the regressions with the net fund flow as the dependent variable, the interaction term between the NBER1 dummy and the sustainable fund dummy is significant on a 1% level for all three regressions. This counts for both the regressions with the MSCI index as well as the STOXX index. The sign of the coefficient of the interaction term is positive. Again the interpretation of the interaction term is similar to that of the daily price regression.

Concluding, the sustainable funds hypothesis for volume cannot be rejected, as all three regressions portray a significant effect. Sustainable funds have on average positive net flow compared to general funds. For daily price, rejecting or not rejecting the hypothesis is more difficult. Based on the first regression, the hypothesis should not be rejected. However the results of the second and third regression are not significant and should lead to a rejection of the hypothesis.

# Conclusion & Discussion

## 6.1 Summary of results

The results discussed in the previous section of this paper, reveal some implications. First of all, it shows that in general funds act as substitutes rather than complements in relation to stock markets during the 2008 financial crisis. Only the regression including the MSCI index for the stock market index show no significant results concerning daily price.

A second implication is that the question of complementarity versus substitution differs per crisis. Different crises therefore create different results. The robustness check shows opposite results, it shows complementarity rather than substitution. This is expressed by the positive sign of the coefficients. All interaction terms in the regressions of the robustness check are significant on a 1% level. A reason why these results could differ is the difference in impact of these different crises had. The financial crisis of 2008 would have a larger footprint on the financial market due to its worldwide impact and this could have an influence on the behaviour of the individual investor.

The third implication is that there are exceptions. In this research paper, UCITS funds and sustainable funds are analysed further. Both funds are impacted differently by the financial crisis of 2008 than general funds. For UCITS this impact is negatively. This could be explained by the fact that when individual investors switch to equity funds, these funds will invest in stocks again. Also it could be a sign that this better protection of UCITS funds comes at a cost. However for sustainable funds the interaction term means that they are impacted in a positive manner by the financial crisis, in relation to other funds that are not specifically sustainable.

The answer to the research question is therefore that in general, funds act as substitutes instead of complements during the financial crisis of 2008. However, it is important to notice that this only shows which effect dominates. It does not mean there is no safe harbour effect.

## 6.2 Limitations to the research study

There are limitations to the results explicated in the paragraph above. First of all, only available data is taken into account. As shown in the data section, especially in 2008 relatively few data is available. The more recent the year is, the more data is available. Also there is the issue of missing data within the data set. By only taking available data into account, the results could give a different conclusion.

Second of all, there is the question whether everything is controlled for. If not, there is still omitted variable bias. Whether conditional independence holds depends on whether the used European stock indices control for the financial market.

Thirdly, there is some criticism in the field of academic economic research towards using recession dummies. Other measures of financial crises seem to offer better ways of quantifying the effect of the financial crisis (Ksantinia & Boujelbèneb, 2014).

A fourth limitation to this study is the using a particular stock index to represent the stock market. As shown in the study, results could differ depending on which stock index is used.

The fifth limitation is that the results might suffer of the concept of survivorship bias. By only looking at funds which survived the financial crisis, deceased funds are ignored. Therefore there might be an overestimation of the past performance of existing funds. This could have an impact on the found results.

At last, for both sustainable and UCITS dummy, the sample of non-UCITS and sustainable funds is too small to make statistical inferences. However, because of the theoretical relevance it is still included in this paper with the just mentioned reservations. It is not possible to compare UCITS funds with institutional funds due to the endogeneity problem.

### **6.3 Recommendations to further research**

A first option could be to explore other categories of funds, thinking of bonds or money markets. As this study only focuses on funds which invest in European equity, other categories could be explored. An example could be to focus on fixed income funds. However due to the less transparent way of trading and the use of benchmarks, these other categories will be more difficult to compare,

Secondly this research study focuses geographically on Europe, while other possible close-ups are the United States or Asian funds. As already mentioned, the United States is the biggest market of asset management. Results could differ for this group. Also within the offshore funds, other domiciles could be explored. Asian funds registered in Europe are getting more popular. As there is data of over 70000 offshore funds, there are plenty of options.

At last the implications show that that different crises along time result into different results. Therefore other crises could specifically be analysed in order to see whether effects differ. However, due to data availability finding other crises is typically challenging.

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# Appendix

## Descriptive statistics:

Series of regression with dependent variable daily price

Variable	Observations	Mean	Standard deviation	Minimum	Maximum	Counts of 1 (dummy)
Unit_identifier	1,908,452	665.30	381.38	1	1326	-
Daily (date)	1,908,452	18625.98	632.64	17533	19723	-
Daily price	1,908,452	207.87	2197.84	0	98079.09	-
Country_identifier	1,908,452	0.14	0.34	0	1	260,652
NBER1	1,908,452	0.22	0.41	0	1	494,340
NBER2	1,908,452	0.28	0.45	0	1	629,160
NBER1*STOXX	1,908,452	52.35	101.52	0	322.629	-
NBER1*MSCI	1,908,452	70.46	113.27	0	283.294	-
NBER2*STOXX	1,908,452	227.25	442.69	0	1426.71	-
NBER2*MSCI	1,908,452	258.18	415.38	0	10831.796	-

Series of regression with dependent variable net fund flow

Variable	Observations	Mean	Standard deviation	Minimum	Maximum	Counts of 1 (dummy)
Unit_identifier	1,414,112	637,87	382,23	2	1326	-
Daily (date)	1,414,112	18625,98	632.64	17533	19723	-
Net fund flow	1,414,112	12018,76	9074262	-3.88e+08	3.36e+09	-
Country_identifier	1,414,112	0.14	0.34	0	1	191,744
NBER1	1,414,112	0.22	0.41	0	1	494,340
NBER2	1,414,112	0.28	0.45	0	1	629,160
NBER1*STOXX	1,414,112	52.35	101.52	0	322.63	-
NBER1*MSCI	1,414,112	70.46	113.27	0	283.29	-
NBER2*STOXX	1,414,112	227.25	442.69	0	1426.71	-
NBER2*STOXX	1,414,112	258.18	415.38	0	10831.80	-

Series of regression for UCITS/Sustainable hypothesis with dependent variable daily price

Variable	Observations	Mean	Standard deviation	Minimum	Maximum	Counts of 1 (dummy)
UCITS	1,908,452	0,995	0,068	0	1	8,988
NBER1*UCITS	1,908,452	0,219	0,414	0	1	-
Sustainable	1,908,452	0,022	0,147	0	1	41,944
NBER1*Sustainable	1,908,452	0,005	0,069	0	1	-



Series of regression for UCITS/Sustainable hypothesis with dependent variable net fund flow

Variable	Observations	Mean	Standard deviation	Minimum	Maximum	Counts of 1 (dummy)
UCITS	1,414,112	0.995	0.073	0	1	7,490
NBER1*UCITS	1,414,112	0.219	0.414	0	1	-
Sustainable	1,414,112	0.019	0.137	0	1	26,964
NBER1*Sustainable	1,414,112	0.004	0.065	0	1	-

Correlations:

	Daily price	STOXX TMI	MSCI ACI	NBER1	NBER2
Daily price	1				
STOXX TMI	0.0143	1			
MSCI ACI	0.0105	0.8638	1		
NBER1	-0.0062	-0.2688	0.0600	1	
NBER2	0.0001	-0.0763	-0.3791	-0.3318	1

	Net fund flow	STOXX TMI	MSCI ACI	NBER1	NBER2
Net fund flow	1				
STOXX TMI	0.0003	1			
MSCI ACI	-0.0124	0.8638	1		
NBER1	-0.0146	-0.2688	0.0600	1	
NBER2	0.0048	-0.0763	-0.3791	-0.3318	1

Main results tables:

Dependent variable: daily price			
	(1)	(2)	(3)
NBER1	-32.231*** (4.856)	-32.231*** (7.188)	-32.231*** (7.188)
MSCI EMU ACI	0.158*** (0.003)	0.158*** (0.049)	0.158*** (0.494)
NBER1 * MSCI EMU ACI	-0.004 (0.004)	-0.004 (0.003)	-0.004 (0.003)
Number of observations	1,908,452	1,908,452	1,908,452
Number of funds	1274	1274	1274
Adjusted R-squared	0.9763	0.0000	0.0006
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Dependent variable: daily price			
	(1)	(2)	(3)
NBER1	47.219*** (5.429)	47.219*** (13.077)	47.219*** (13.077)
STOXX TMI	0.961*** (0.0139)	0.961*** (0.275)	0.961*** (0.275)
NBER1 * STOXX TMI	-0.244*** (0.021)	-0.244*** (0.065)	-0.244*** (0.065)
Number of observations	1,908,452	1,908,452	1,908,452
Number of funds	1274	1274	1274
Adjusted R-squared	0.9763	0.0089	0.0006
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Dependent variable: net fund flow			
	(1)	(2)	(3)
NBER1	391216.600*** (73149.260)	391216.600*** (106039.000)	391216.600*** (106039.000)
MSCI EMU ACI	-298.004*** (60.912)	-298.004** (130.119)	-298.004** (130.119)
NBER1 * MSCI EMU ACI	-683.090*** (73.457)	-683.091*** (96.009)	-683.091*** (96.009)
Number of observations	1,414,112	1,414,112	1,414,112
Number of funds	944	944	944
Adjusted R-squared	0.0048	0.0000	0.0004
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Dependent variable: net fund flow			
	(1)	(2)	(3)
NBER1	1502639.000*** (82232.030)	1502638.000*** (106581.000)	1502639.000*** (106581.100)
STOXX TMI	2798.221*** (287.914)	2798.218*** (496.960)	2798.221*** (496.961)
NBER1 * STOXX TMI	-7398.003*** (346.766)	-7398.001*** (459.440)	-7398.003*** (459.441)
Number of observations	1,414,112	1,414,112	1,414,112
Number of funds	944	944	944
Adjusted R-squared	0.0048	0.0004	
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Robustness check tables:

Dependent variable: daily price			
	(1)	(2)	(3)
NBER2	-10.196* (5.452)	-10.196** (4.828)	-10.196** (4.828)
MSCI EMU ACI	0.173*** (0.003)	0.173*** (0.052)	0.173*** (0.052)
NBER2 * MSCI EMU ACI	0.036*** (0.006)	0.036*** (0.011)	0.0356*** (0.011)
Number of observations	1,908,452	1,908,452	1,908,452
Number of funds	1274	1274	1274
Adjusted R-squared	0.9763	0.0000	0.0006
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Dependent variable: daily price			
	(1)	(2)	(3)
NBER2	-14.657** (6.429)	-14.657** (6.114)	-14.657** (6.114)
STOXX TMI	0.878*** (0.012)	0.878*** (0.251)	0.878*** (0.251)
NBER2 * STOXX TMI	0.081*** (0.025)	0.081*** (0.025)	0.081*** (0.025)
Number of observations	1,908,452	1,908,452	1,908,452
Number of funds	1274	1274	1274
Adjusted R-squared	0.9763	0.0086	0.0006
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Dependent variable: net fund flow			
	(1)	(2)	(3)
NBER2	-2931643.000*** (248405.800)	-2931643.000*** (329147.500)	-2931643.000*** (329147.600)
MSCI EMU ACI	-953.223*** (38.210)	-953.223*** (115.630)	-953.223*** (115.630)
NBER2 * MSCI EMU ACI	3154.118*** (289.532)	3154.118*** (377.202)	3154.118*** (377.202)
Number of observations	1,414,112	1,414,112	1,414,112
Number of funds	944	944	944
Adjusted R-squared	0.0047	0.0000	0.0003
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Dependent variable: net fund flow			
	(1)	(2)	(3)
NBER2	-3063044.000*** (342771.900)	-3063040.000*** (431565.500)	-3063044.000*** (431566.400)
STOXX TMI	-713.629*** (158.481)	-713.629** (361.884)	-713.629** (361.884)
NBER2 * STOXX TMI	12555.14*** (1440.545)	12555.13*** (1812.367)	12555.14*** (1812.370)
Number of observations	1,414,112	1,414,112	1,414,112
Number of funds	944	944	944
Adjusted R-squared	0.0046	0.0002	0.0002
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

UCITS tables:

Dependent variable: daily price			
	(1)	(2)	(3)
NBER1	-13.234*** (4.565)	-13.237*** (4.134)	-148.721** (73.622)
MSCI EMU ACI	0.158*** (0.003)	0.158*** (0.049)	0.158*** (0.049)
NBER1 * MSCI EMU ACI	-0.004 (0.004)	-0.004 (0.003)	-0.004 (0.003)
NBER1 * UCITS	-19.086*** (0.969)	-19.084** (9.082)	117.04* (67.707)
Number of observations	1,908,452	1,908,452	1,908,452
Number of funds	1274	1274	1274
Adjusted R-squared	0.9763	0.0066	0.0006
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Dependent variable: daily price			
	(1)	(2)	(3)
NBER1	66.215*** (5.170)	66.212*** (21.530)	-69.272 (56.829)
STOXX TMI	0.961*** (0.014)	0.961*** (0.275)	0.961*** (0.275)
NBER1 * STOXX TMI	-0.244*** (0.021)	-0.244*** (0.065)	-0.244*** (0.065)
NBER1 * UCITS	-19.086*** (0.972)	-19.084** (9.082)	117.042* (67.707)
Number of observations	1,908,452	1,908,452	1,908,452
Number of funds	1274	1274	1274
Adjusted R-squared	0.9763	0.0089	0.0006
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Dependent variable: net fund flow			
	(1)	(2)	(3)
NBER1	617379.600*** (76946.620)	608084.500*** (102056.600)	554461.200*** (100258.200)
MSCI EMU ACI	-298.004*** (60.912)	-298.004** (130.119)	-298.004** (130.119)
NBER1 * MSCI EMU ACI	-683.091*** (73.457)	-683.091*** (96.009)	-683.091*** (96.009)
NBER1 * UCITS	-227367.300*** (23622.710)	-218022.700*** (45967.250)	-164113.900*** (42405.350)
Number of observations	1,414,112	1,414,112	1,414,112
Number of funds	944	944	944
Adjusted R-squared	0.0048	0.0004	0.0004
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Dependent variable: net fund flow			
	(1)	(2)	(3)
NBER1	1728801.000*** (89957.330)	1719511.000*** (119235.300)	1665883.000*** (111972.600)
STOXX TMI	2798.220*** (287.914)	2798.218*** (496.960)	2798.221*** (496.961)
NBER1 * STOXX TMI	-7398.003*** (346.766)	-7398.001*** (459.441)	-7398.003*** (459.441)
NBER1 * UCITS	-227366.200*** (23620.020)	-218027.400*** (45968.550)	-164113.000*** (42405.430)
Number of observations	1,414,112	1,414,112	1,414,112
Number of funds	944	944	944
Adjusted R-squared	0.0048	0.0004	0.0004
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Sustainable tables:

Dependent variable: daily price			
	(1)	(2)	(3)
NBER1	-32.476*** (4.864)	-32.476*** (7.366)	-30.388*** (5.994)
MSCI EMU ACI	0.158*** (0.003)	0.158*** (0.049)	0.158*** (0.049)
NBER1 * MSCI EMU ACI	-0.004 (0.004)	-0.004 (0.003)	-0.004 -83.821 (0.003)
NBER1 * Sustainable	11.185*** (0.988)	11.183 (12.724)	(71.835)
Number of observations	1,908,452	1,908,452	1,908,452
Number of funds	1274	1274	1274
Adjusted R-squared	0.9763	0.0066	0.0006
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

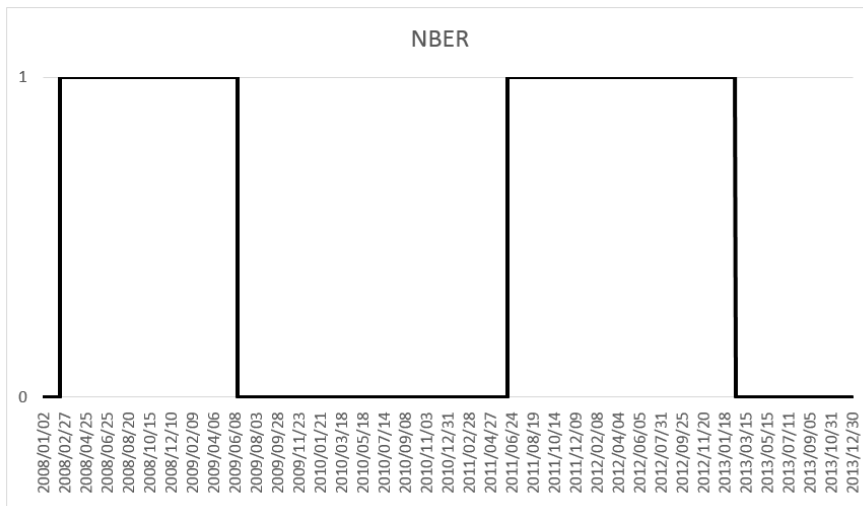
Dependent variable: daily price			
	(1)	(2)	(3)
NBER1	46.973*** (5.436)	46.973*** (12.902)	49.061*** (14.373)
STOXX TMI	0.961*** (0.014)	0.961*** (0.275)	0.961*** (0.275)
NBER1 * STOXX TMI	-0.244*** (0.021)	-0.244*** (0.065)	-0.244*** (0.065)
NBER1 * Sustainable	11.184*** (0.986)	11.183 (12.724)	-83.821 (71.835)
Number of observations	1,908,452	1,908,452	1,908,452
Number of funds	1274	1274	1274
Adjusted R-squared	0.9763	0.0089	0.0006
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			



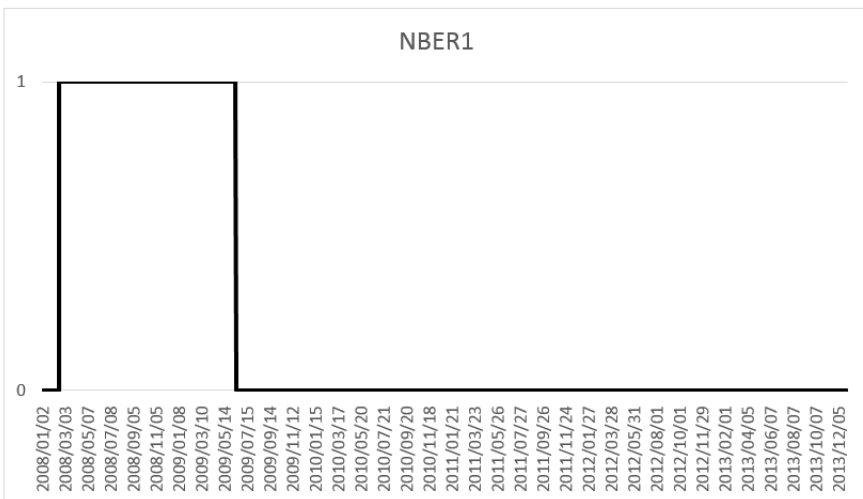
Dependent variable: net fund flow			
	(1)	(2)	(3)
NBER1	382731.400*** (73182.03)	382922.300*** (106138.000)	384013.400*** (106192.200)
MSCI EMU ACI	-298.004*** (60.913)	-298.004** (130.119)	-298.004** (130.119)
NBER1 * MSCI EMU ACI	-683.091*** (73.457)	-683.091*** (96.009)	-683.091*** (96.009)
NBER1 * Sustainable	445000.200*** (45515.690)	434986.600*** (49038.070)	377765.800*** (43190.720)
Number of observations	1,414,112	1,414,112	1,414,112
Number of funds	944	944	944
Adjusted R-squared	0.0048	0.0004	0.0004
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Dependent variable: net fund flow			
	(1)	(2)	(3)
NBER1	1494153.00*** (82188.100)	1494344.000*** (106503.300)	1495435.000*** (106651.700)
STOXX TMI	2798.220*** (287.915)	2798.217*** (496.960)	2798.220*** (496.961)
NBER1 * STOXX TMI	-7398.003*** (346.763)	-7398.000*** (459.441)	-7398.003*** (459.441)
NBER1 * Sustainable	444999.200*** (45520.700)	434992.000*** (49039.840)	377764.900*** (43190.790)
Number of observations	1,414,112	1,414,112	1,414,112
Number of funds	944	944	944
Adjusted R-squared	0.0047	0.0004	0.0004
Fund fixed effects	Yes	No	No
Country fixed effects	No	No	Yes
Clustered-fund-standard errors	No	Yes	Yes
All panel data regression are run including an intercept			

Original NBER Dummy variable:



NBER 1 (02-15-2008 until 06-15-2009) is the dummy variable which stands for financial crisis of 2008:



NBER 2 (06-15-2011 until 02-15-2013) is the dummy variable which stands for European sovereign debt crisis:

