The relation between mutual fund flows, stock returns and macroeconomic variables in Portugal

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Biographical Note

André Levi Gomes Santos was born in Vila Nova de Gaia, Portugal, on the 5th of May, 1988.

In 2006, he entered to Faculdade de Economia do Porto where he graduated in 2010 in Economics. In 2011, he joined the Master in Finance at the Faculdade de Economia do Porto, where he improved his knowledge and skills. It is also important to mention his participation in AEFEP between 2007 and 2009 as well as in Fep Finance Club between 2011 and 2013.

Within the professional scope, he started his career in 2010, as commercial manager in Banco Santander Totta. Since June 2013, he has been working in Sonae in planning and management control department.

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The relationship between mutual fund flows, stock returns and macroeconomic variables in Portugal

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Abstract

The financial literature provides evidence suggesting a co-movement between mutual fund flows and stock market returns (Warther, 1995; Edelen and Warner, 2001; Jank, 2012). Moreover, the literature also documents a relationship between stock returns and macroeconomic variables (Fama, 1990; Schwert, 1990).

Therefore, the main purpose of the study is to test and analyze the relations between these variables in order to verify whether both flows into equity funds and stock returns have a positive co-movement, which can be explained by a common reaction to information about future economic activity. Thus, we investigate whether mutual fund flows contain information by themselves about future economic activity, as well as verify if both mutual fund flows and stock returns are forward-looking and are able to predict the economic activity.

The aim of the study is scientifically relevant because there are no studies dealing with this subject in the Portuguese market. Besides, it is important to deepen the study of mutual funds, given the fact that, during the last decade, the mutual fund industry is having a remarkable growth.

We partly replicate Jank's (2012) study, applying it to the Portuguese market and the results are somewhat similar to his findings. We found evidence of a co-movement between mutual fund flows and stock market returns that can be explained by a common reaction to information about future economic activity. Furthermore, our results also suggest that both mutual fund flows and stock market returns are forward-looking and help to predict the economic activity as Jank (2012) concluded.

Keywords: Mutual fund flows, stock returns, future economic activity, macroeconomic variables

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Resumo

A literatura financeira apresenta evidências que sugerem a existência de um co-movimento entre os fluxos dos fundos de investimento e os retornos de ações (Warther, 1995; Edelen and Warner, 2001; Jank, 2012). Documenta também uma relação entre os retornos de ações e variáveis macroeconómicas (Fama, 1990; Schwert, 1990).

Desta forma, pretende-se neste estudo, testar e analisar as relações entre estas variáveis, de forma a verificar se os fluxos de fundos de ações e retornos de ações apresentam um co-movimento positivo, que pode ser explicado por uma reação comum a informação acerca da atividade económica futura. Assim, investigamos se os fluxos dos fundos de investimento contêm informação em si mesmos acerca da atividade económica futura, assim como, verificamos se tanto os fluxos de fundos de investimento como os retornos de ações, são preditivos e se estão aptos a prever a atividade económica.

O objetivo do estudo é cientificamente relevante, pois não existem estudos realizados acerca deste assunto no mercado português. Além disso, é importante aprofundar o estudo dos fundos de investimento, visto que, durante a última década, a indústria dos fundos de investimento tem tido um crescimento notável.

Replicamos parcialmente o estudo de Jank (2012), mas com aplicação ao mercado português e os resultados são de certa forma similares. Descobrimos a existência de um co-movimento entre fundos de investimento e retornos de ações que podem ser explicados por uma reação comum à informação acerca da atividade económica futura. Os nossos resultados sugerem também que tanto os fundos de investimento, como os retornos de ações são preditivos e ajudam a prever a atividade económica tal como Jank (2012) concluiu.

Palavras Chave: Fundos de investimento, retornos de ações, atividade económica futura, variáveis macroeconómicas.

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1. Introduction

Over the past few decades, the mutual fund industry, had a remarkable growth all over the world. By the end of 2012, in the US, the total assets in management by mutual funds amounted to 13.0 trillion dollars and the total worldwide assets invested in mutual funds amounted to 26.8 trillion dollars (ICI, 2013). Regarding the Portuguese mutual fund industry, there was only one mutual fund managing just 51 million euros in 1986. However, the growth of this industry was noteworthy, since in 1994 there were 126 mutual funds and the total assets under management was around 10.3 billion euros (14.1% of Portuguese GDP). The industry continued to grow and by the end of 2001 there were 262 mutual funds managing 21.3 billion euros, which equals 17.3% of Portuguese GDP. By the end of 2012 the number of mutual funds has not altered substiantially (268 mutual funds), although the amount managed changed to just 12.3 billion euros (7.4% of Portuguese GDP), due to the fact that in recent years we have been witnessing greater instability in the financial markets as well as dealing with one of the worst financial crises ever (CMVM, 2002; APFIPP, 2012).

The remarkable growth of the fund industry is mainly due to the fact that the mutual funds brings important benefits and advantages to individual investors. The major advantages are the advanced asset management, since the fund is managed by a professional investment manager; a reduced portfolio risk achieved through the increase of diversification; the oversight by the regulators, which endows more safety to the investment; the ability to participate in investments that may be accessible only to larger investors, since there are reduced transaction costs and the daily liquidity.

This subject is nowadays one of the more widely discussed in the financial literature, given the importance of mutual funds in the investment decisions and that is also why our study will give a special attention to mutual fund flows and investigate their relation with the stock market and also with real economic activity. By studying the mutual fund flows in particular, we are specifically investigating the behaviour of mutual fund investors, which is also a broadly studied topic.

Previous studies provided evidence about a positive co-movement between flows into equity funds and stock returns (Warther, 1995; Edelen and Warner, 2001; Jank, 2012). As a matter of fact, it seems to be a consensus in theory regarding this matter. There are some possible explanations for this co-movement, such as the *feedback-trader hypothesis*, the *price-pressure hypothesis* and the *information-response hypothesis*. However, there is no consensus concerning an explanation for this co-movement as we shall see further ahead.

In another part of the literature, Chen *et al.* (1986) declare that there is a common belief that asset prices react to economic news significantly. So, it is possible to infer that stock returns are also related to economic news, but is also important to mention that there is no clarity in theory, that this relation between macroeconomic variables and stock returns, is only in one single direction.

Thus, joining these two strands of the financial literature, we intend to investigate the relationship between mutual fund flows, stock returns and macroeconomic variables. More specifically, this study tests the reaction to new information by flows into equity funds and stock market returns (*information-response hypothesis*) as an explanation for the co-movement between mutual fund flows and stock returns. In this case we will test the reaction to a specific sort of information such as information about future economic activity.

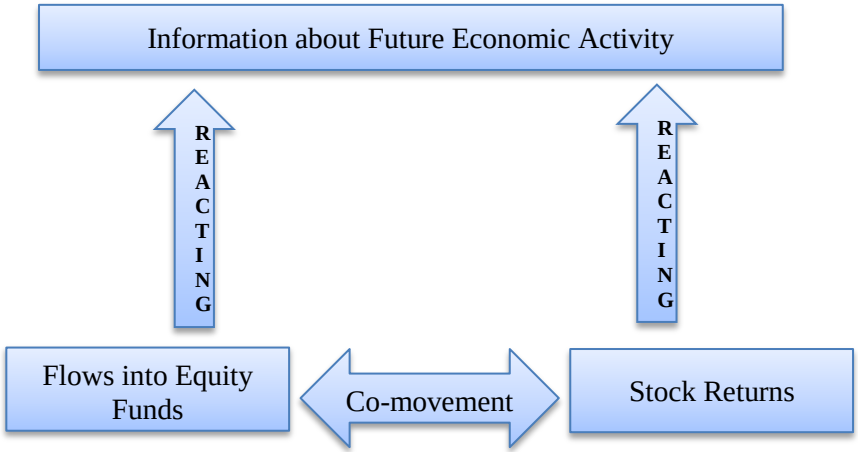

Figure 1 – Relations between flows in to equity funds, stock returns and economic activity.

One of the implications that can be tested for the *information-response hypothesis* is that, if mutual fund flows react to news about future economic activity, then mutual fund flows should contain information by themselves and should be able to help to predict the economic activity.

Therefore, the empirical part is divided in three parts, and each part have a research question that we propose to answer.

Hence, the three main research questions that we propose to answer are the following:

-Is there a co-movement between mutual fund flows and stock returns?

-Do mutual fund flows contain information by themselves?

-Are both mutual fund flows and stock returns forward-looking?

Within what is our best knowledge, there are no studies dealing with this topic in the portuguese market, because most part of the studies have been done in the U.S. market. This study allows us to explore the relationship between financial markets and the economic activity in Portugal and it could raise important questions about portfolio choice and return predictability.

The way we organize our dissertation is as follows. In chapter 2, we briefly review the relevant literature, which explores the topic about the co-movement between mutual fund flows and stock returns as well as the possible explanations for this same co-movement; we analyze the topic about the relation between stock returns and macroeconomic variables; and finally the test to the *information-response hypothesis* of Jank's (2012) research, which is the main reference to this study, given that we will partially replicate his investigation. Therefore, we are covering the similar studies that were made, the methodologies used and the main definitions that are relevant for this topic.

After this theoretical framework, we present the data and discuss the methodology used in our investigation in chapter 3. In Chapter 4, we present the results and the answers

found to our three research questions. Finally, chapter 5 contains the main conclusions of our investigation.

2. Literature Review

In the present chapter, we provide a review of the relevant literature to our study. Therefore, this section will be divided into three subsections.

In the subsection 2.1., 2.1.1. we introduce the topic about the co-movement between mutual fund flows and stock returns and the possible explanations for this co-movement. Then in 2.1., 2.1.2. we cover the main empirical studies made on the topic about co-movements between mutual fund flows and stock returns. In the subsection 2.2. we discuss the topic about the relation between stock returns and macroeconomic variables and we present the main studies. Lastly, we reserve the subsection 2.3. for Jank's (2012) article, which is the main reference for our study, and we refer to his methodology as well as his main findings, which support the theory that the positive co-movement of flows funds and stock market returns is explained by a common response to news about future economic activity.

2.1. Co-movements between mutual fund flows and stock returns

2.1.1. Possible explanations

Ippolito (1992) shows that investors invest directly in mutual funds that had a good performance in the recent years and, on the other hand, disinvest in weakly performance funds. Sapp and Tiwari (2004) also found evidence that mutual fund flows are merely answering to large recent returns of such funds.

In this study, however, we will focus on the possible relationship between mutual fund flows and stock market returns. Generally, there is a belief that there is a relation between flows into equity funds and stock returns, and there are many studies suggesting it, as we shall mention further ahead in the next subsections (Warther, 1995; Edelen and Warner, 2001; Jank, 2012).

Hence, there are three explanations for this strong relation between mutual fund flows and returns on the stock market (Warther, 1995). The first explanation is the *feedback-*

trader hypothesis, which can also be an explanation for momentum in securities market. The idea behind this concept is that sometimes investors may buy a security just because it is going up in price. When a large number of investors buy the security, their action is inducing other investors to also buy it (Delong *et al.*, 1990). In this case, market returns leads to fund flows, given that investors subscribe fund units when stock prices are rising and redeem their units when stock prices are falling, causing this co-movement.

On the other hand, there is another explanation, which states that as the fund flows increase, the demand for assets will also increase and this will obviously make stock prices to rise (Humphrey *et al*., 2009). This is the so-called *price-pressure hypothesis*, which supports the idea that fund flows leads to stock returns. It is noted that this concept of price-pressure can also be seen by studying individual stocks and changes in their index, because these changes may not contain new information, but it can motivate investors to trade the affected security and consequently put pressure in its price (Harris and Gurel, 1986). There is another aspect that fits in this hypothesis, namely investor sentiment. Behavioral Finance research is continuously challenging the efficient market hypothesis developed by Fama (1970) and has a say in this matter. One of the studies made in the field of Behavioral Finance concludes that net aggregate equity fund flow in a certain week is higher when individual investors sentiment became more bullish in the previous and current weeks, so they claim that evidence suggests that the behavior of equity fund investors is influenced not only by economic fundamentals, but also by investor sentiment (Indro, 2004). Given that investor sentiment is an important factor in the financial markets, and as the mutual funds market it is usually a place where it can be found less informed individual investors (Frazzini and Lamont, 2008), we cannot neglect the role of investor sentiment with fund flows, as well as its consequent impact in security returns and therefore, this fact can support the *price-pressure hypothesis*.
The third explanation is the *information-response hypothesis*, which declares that both fund flows and stock market returns react to new information and that is why this co-movement exists. Mutual fund investors acquire information and they will react to that information. Immediately, the market will respond to this new information revealed. The result will be prices moving in the same direction as the fund flows and therefore

the returns will be positively correlated with stock returns. Thus, the market is reacting to fund flows because of new information and not due to price pressures (Warther, 1995).

As mentioned, in these last two explanations (*price-pressure hypothesis* and *information-response hypothesis),* the mutual fund investors demand for changes in equity prices, though in the case of *price-pressure hypothesis*, fund flows are unconnected to fundamentals, while in case of the *information-response hypothesis* they are conducted by news that changes the fundamentals (Jank, 2012).

Hereafter, we review the empirical studies on this topic, focusing the methodologies, the limitations and the main conclusions.

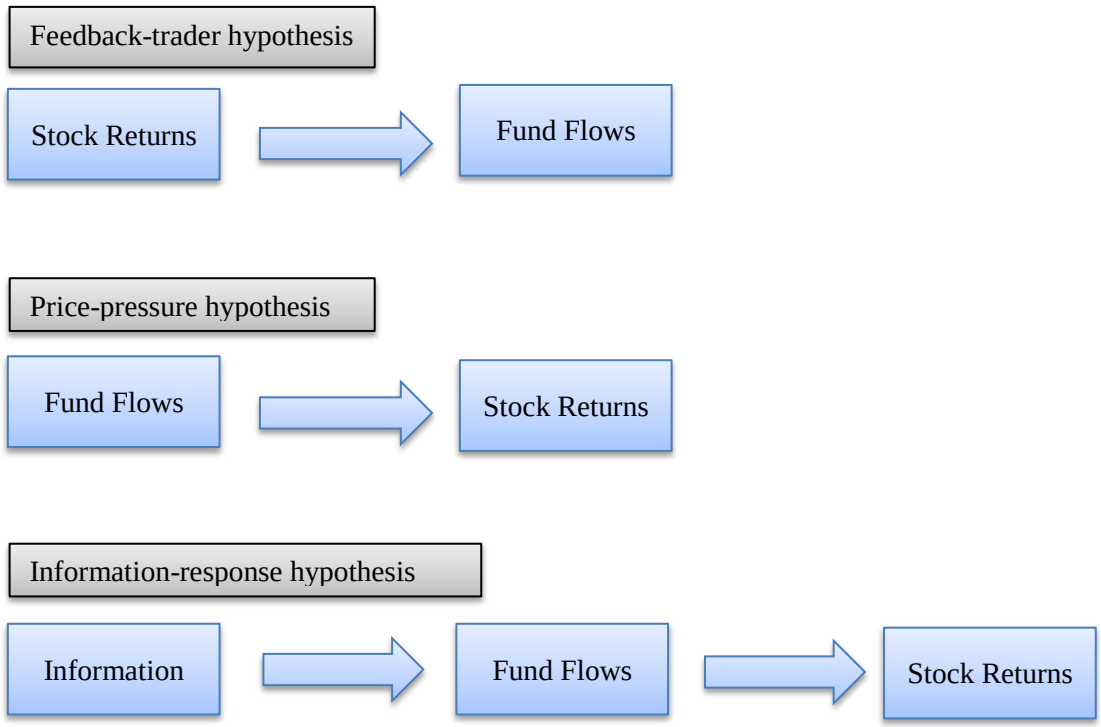

Figure 2 – Co-movement between mutual fund flows and stock returns (possible explanations).

2.1.2. Empirical studies

Warther (1995) became one of the forerunners of the studies on the relation between the security returns and the mutual fund flows by examining the correlation between net inflows and security returns. Net inflows were decomposed into expected and unexpected components, and the author used monthly data for the period of January 1984 until June 1993. He estimated the expected fund flows by regressing current flows on past flows, and unexpected fund flows comes as the residual from the expected flow regression. His results documented that unexpected mutual fund flows are highly correlated with concurrent aggregate security returns, whilst the expected mutual funds flows are uncorrelated with concurrent aggregate security returns. These results are consistent with the common belief that fund inflows and security returns are positively correlated. However, the author cannot conclude whether the reasons behind this relation are due to price pressures or information effect. Moreover, the results reject both sides of a feedback trading model, meaning that security returns neither lag nor lead mutual fund flows.

Other studies have been done on this subject and confirmed Warther's (1995) findings for the co-movement between both stock returns and mutual funds, despite the different explanations, depending on the type of fund (Fortune, 1998; Potter, 1996). As a matter of fact, more authors confirm the difficulty of finding support for just one hypothesis (Edwards and Zhang, 1998; Fant, 1999; Oh and Parwada, 2007; Remolona *et al*, 1994).

In this dissertation we are not interested in testing whether the relation between mutual fund flows and returns are homogenous across investors groups. However, James and Karceski (2006) declare that this relation is different for retail and institutional investors, taking into account that retail investors appear to be less sophisticated than institutional investors. Later, Humphrey *et al* (2009) found evidence of feedback trading in the retail market, but not in the institutional market.

Edelen and Warner (2001) also found that there is indeed a correlation between the aggregate mutual fund flows and concurrent market returns at daily frequency. Their findings indicate that the flows are reacting to returns within each trading day, or the flows are responding to the information that also led to returns within that same trading day. Thus, their conclusions are compatible with either feedback trading or a common reaction to information. The authors also acknowledge the inherent difficulty to discriminate between alternatives explanations for this co-movement. Contrary to these findings, Goetzmann and Massa (2003) found little evidence of such feedback trading supported by the results from Edelen and Warner (2001) that returns cause flows. Using high-frequency flows of funds data, for a set of large S&P 500 index funds, their main conclusions were that investor demand influences stock returns, but the opposite is not the case, so they point out that investors are more affected by risk than by performance. The authors also concluded that the investors tend not to chase positive trends in returns, although they overreact to negative returns immediately, by closing their positions in the funds.

Rakowski and Wang (2009) show that the main factors that determine the level of daily flows are the past flows, the returns, the day of the week, the month, and the fund characteristics. They conclude that mutual fund investors do not trade merely based on exogenous liquidity needs, but respond dynamically to information about a fund and lead their investments to those funds for which information is available and performance is higher, hence they found a dominant information effect in fund flows. The information-response hypothesis incorporates this dominant information effect in fund flows, given that both stock market returns and fund flows are driven by new information. Jank (2012) developed an investigation with the purpose of testing the information-response hypothesis to macroeconomic information but we will explore it further ahead with every detail.

Despite all of these studies, it is important to mention a very interesting issue, which was raised by Shiller (1998), who says that unless it is possible to prove that outflows from funds are not reinvested in equity, then it is difficult to induce that mutual fund outflows really represent changes in sentiment about the market. On the other hand, we

also do not know if mutual fund inflows come from sale of equities, or from a cash account. This issue affects all studies correlating fund flows with stock prices dynamics.

Hereafter, we focus on other part of the literature, which is the relation between stock returns and the macroeconomic variables

2.2. Stock returns and macroeconomic variables

The Efficient Market Hypothesis is one of the most important topics in the financial literature. In an efficient market, stock prices fully incorporate all available information, causing stock prices to be trading at their fair value on stock exchanges (Fama, 1970).

One can argue that if stock prices fully reflect all relevant information, the stock market should also react to macroeconomic information. The relation between the stock market and the economic activity has been discussed over the last decades by many financial researchers and we will now focus in the literature regarding the relation between financial markets and macroeconomic variables.

The financial theory presents us with some researches, which indicate that the asset prices develop inversely to the rate of inflation (Jaffe and Mandelker, 1976 ; Fama and Schwert, 1977; Fama, 1981; Pindyck, 1984). Fama (1981) tried to explain this by arguing that the negative relationship between returns of shares and inflation was a proxy of negative relationship between inflation and level of activity. Stock returns are determined by forecasts of more relevant real variables and this negative relation that was observed was caused by negative relations between inflation and real activity. This explanation is contrary to the positive relationship exposed in the Phillips curve and also to Fisher (1930) who argued that common stocks are a hedge against inflation.

Regarding the relation between stock returns and economic activity, Fama (1990) shows empirically that stock returns predicted economic activity founding that monthly, quarterly and annual stock returns are highly correlated with future production growth rates for 1953-1987. Even when variables that proxy for time-varying expected returns

and shocks to expected returns are included in the regressions, the strong positive relation between stock returns and future production growth rates is still verified. He justifies these findings with the fact that because equity prices reflect expected future cash flows, equity prices changes should predict future macroeconomic conditions. Schwert (1990) investigated the stability of relations estimated by Fama (1990) using additional 65 years of data and got the same results, which may prove that these findings are robust.

Chen *et al* (1986) stated that macroeconomic variables, that reflect the state of economy, are risks that are rewarded in the stock market and it is possible to conclude that all economic variables are endogenous in some ultimate sense. Their main findings reveal that stock returns are exposed to systematic economic news and consequently they are priced according with their exposures. He found that the growth rate of the industrial production index is most likely an explanatory factor to stock returns.

The unemployment is another macroeconomic variable, which appears to have impact in the stock market. Boyd *et al* (2001) refer that, on average, stock prices rise on bad news about the labor market during expansions, but fall during contractions in the United States of America. They add an explanation to this fact, referring that a rise in unemployment usually signals a decrease in interest rates, which is good news for stocks, but also signals future corporate earnings decreasing, which is bad news for stocks. Thus, information concerning to interest rates dominates during expansions and information concerning future corporate earnings dominates during contractions.

Birz and Lott (2011) affirm that empirical evidence in support of economic news affecting stock returns has been rather weak because the way the economic news are interpreted by the public is also relevant and has not been contemplated by the most part of the analysis. This is a very important point because as Black (1986, p.537) stated "the stock price reaction tells us only how investors think the events will affect firms, and investors' thoughts include both noise and information". Thus, according to Black (1986), without noise it would be possible to understand how some events, such as macroeconomic news, could affect firms and hence stock prices. However, the author

also refers that noise is important to the functioning of financial markets. Returning to Birz and Lott (2011) research, they examined news about GDP growth, unemployment, retail sales and durable goods and found that the news about GDP growth and unemployment significantly affects stock returns, while retail sales and durable goods are statistically insignificant. The authors also noted the difficulty of interpreting the macroeconomic releases and they point this fact as a possible reason why many previous studies did not find significant effects of news on real variables.

These empirical findings that we analyzed are also consistent with the theoretical model that Blanchard (1981) developed, which demonstrates that an increase in the money supply has a positive effect on the product and hence on the stock market, although the author mentions that one must distinguish the anticipated supply increases from the unanticipated.

Duca (2007) refers that economic theory suggests a strong link between security prices and economic activity, given that the security price is the discounted present value of the company's payout. He also studied this relation by using the Granger causality for 5 countries and data from 1957 until 2004. He found that there is a unidirectional causality between GDP and stock prices, which implies that the level of economic activity in a country can potentially depend on the stock market amongst other variables and he concludes that a large downfall in stock prices causes a similar decrease in economic activity.

Contrary to the findings of a positive correlation between stock returns and GDP growth, Ritter (2005) found a negative correlation between these two variables. He used a period of 102 years (1900-2002), for sixteen countries. The author argues that economic growth does result in a higher standard of living for consumers, but it does not necessarily translate into a higher present value of dividends per share for the owners of equity. He also states that economic growth does not matter for the prediction of future equity returns, because the only relevant variable for that purpose is the current earnings yield. A possible explanation is given by Siegel (1998), who argues that although economic growth influences positively aggregate earnings and dividends,

economic growth does not necessarily increase the growth of dividends/earnings per share. This fact can happen because economic growth requires increased capital expenditures because, in a strong economy, the interest rates may be higher.

One of the investigations made for the Portuguese market is the one from Coelho (2005), who studied the impact of inflation announcements in the stock market. He found that the impact of announcements of American inflation affect returns in US market but also in Portuguese stock market, which suggests that the markets are increasingly integrated. He also found that the reaction in the stock market is not homogeneous, depending of the agents expectations, with respect to the cycle phase in which the economy is.

Given this literature review, it is possible to conclude that the theory suggests a relation between stock returns and macroeconomic variables, although there are still some uncertainties around this topic.

2.3. Mutual fund flows, expected returns and the real economy

At this point, it is possible to conclude that the literature provides us evidence that support the positive co-movement between mutual fund flows and stock returns and it also gives us some explanations for this same co-movement. At the same time, we note that the stock returns and macroeconomic variables are related to each other. All these conclusions lead us to an article from Stephen Jank (2012). We reserve a subsection of our literature review only for this article, given that this is the main reference for our investigation and we will partially replicate his study.

The author wanted to investigate the relation between mutual fund flows and the real economy. His findings support the theory that the co-movement of flows into equity funds and stock returns is explained by a common reaction to macroeconomic news.

Firstly, he found that mutual fund flows show a contemporaneous correlation with stock returns, since the share of mutual fund flows variance explained by stock market returns

is 20.8% and the correlation between them is 0.46. Hereafter, mutual fund flows were separated into their expected and unexpected components. Market returns are correlated with unexpected flows but are uncorrelated with the expected component.

Then, the author mentions that the information-response hypothesis has two main implications that he intended to test: variables that predict the economic activity should be related to mutual fund flows; and if mutual fund flows react to news about future economic activity, then mutual fund flows should predict the real economy.

In order to test the first implication, he used predictive variables as proxies for macroeconomic news and noted whether there was a co-movement of flows and first differences of these predictive variables. According to some authors the dividend yield is often used to predict the equity premium (Fama and French, 1988; Campbell and Shiller, 1988; Fama and French, 1989; Goyal and Welch, 2003). Thus, Jank (2012) argues that a higher dividend yield predicts higher market excess return, because when the times are riskier, prices are low in relation to dividends, which causes a higher dividend yield. Therefore the author concludes that news about riskier times can be captured by changes in dividend yield. If fund investors react to this news, then fund flows should be related to changes in dividend yield. Following the same reasoning that a higher equity premium means riskier times, the author relies on literature and finds more predictive variables positively correlated with equity premium such as default spread, term spread and consumption-wealth ratio.

So, under the information-response hypothesis, the mutual fund investors react to macroeconomic news. Consequently, fund flows should be related to changes in these variables and we should observe a co-movement of first differences of these variables and fund flows. Thus, an increase in dividend yield, default spread, term spread and consumption-wealth ratio should be accompanied by outflows in the mutual funds.

Jank (2012) explains that under the information-response hypothesis, news about riskier economic times are reflected in those predictive variables, and the mutual fund investors and other investors, reduce their equity holdings, responding to this news about riskier

times and those investors who are willing to hold equity in riskier times are compensated by higher expected returns. The author also refers that his results will support the conclusion that mutual fund investors are less willing to hold equity in poor economic times. His findings are coincident with the fact that mutual funds provide a low cost access to equity market (Fama and French, 2002), which permit some less sophisticated investors to participate in the stock market, who are probably more affected by economic contractions and sell stocks when they notice that there is bad news about the economy.

After running regressions of mutual fund flows on its lag, concurrent stock returns and first differences of predictive variables, the results were consistent with his theoretical framework. Stock market returns explains about 40.8% of the variation of unexpected mutual fund flows and predictive variables explain up to 51.7% of the variation of unexpected mutual fund flows. Individualizing the results for each variable, the author found that an increase in dividend yield and consumption-wealth ratio, which signals riskier times, is associated with outflows from mutual funds. For an increase in T-bill rate, which indicates a lower equity premium and implies less risky times, the author observed higher inflows. Default spread and term spread becomes statistically insignificant in the regression. The author concludes that mutual fund investors have poor market timing ability, since they are less willing to tolerate risk in riskier times and in equilibrium they should get lower expected returns.

In order to perform a test to the second implication of the information-response hypothesis, the author also investigated whether mutual fund flows contain macroeconomic information by themselves. Four variables were chosen as measures for economic activity such as GDP growth, industrial production growth, consumption growth and labor income growth. He used a bivariate vector autoregression (VAR) model of mutual fund flows and macroeconomic variables. For all four variables, the results were the same, ie, mutual fund flows contain statistically significant information about the macroeconomic variables but the macroeconomic variables does not contain information about mutual fund flows. This result was supported by the Granger causality F-test.

Lastly, the author ran a forecasting regression for the four macroeconomic variables above mentioned on its four lags and then he added lagged market returns and/or mutual fund flows. He concluded that both stock returns and mutual fund flows contain partly redundant information about future economic activity and that is why the co-movement between them exists. Furthermore, he found that both variables are forward-looking and are able to help predict the economic activity.

Given this literature framework, we want to partially replicate Jank (2012), in order to give an answer to our three research questions. In the next chapter we describe our variables as well as the methodological steps that we followed.

3. Data and Methodology

In this chapter we intend to present the data used in this study as well as the methodology adopted. Therefore, we will present the data and the respective sources in subsection 3.1. In subsection 3.2., we will show the followed methodological steps in order to perform our investigation.

3.1. Data

Eight variables are considered in this study, namely, mutual funds flows, stock market index, and the following macroeconomic variables: Portuguese, German and American GDP growth; as well as, industrial production growth, consumption growth and unemployment rate growth for Portugal. The time interval data covers twelve years from 2000:Q2 to 2012:Q2. In all variables we use its growth rate, so that we can get stationary time series, in order to perform properly our study. Data on aggregate flows into equity funds are provided by APFIPP (Associação Portuguesa de Fundos de Investimento Pensões e Patrimónios) and we calculated quarterly net flows as new subscriptions minus redemptions at the rate of total market value of the previous quarter using the total amount managed provided by APFIPP. The reason of being measured quarterly, relates to the fact that the macroeconomic information is only available quarterly. The proxy for the Portuguese market return is the PSI-20 index, which we obtained in Nyse Euronext. The main measure for Portuguese economic activity is the GDP growth, which was obtained in INE (Instituto Nacional de Estatística). Moreover, we will use other three variables, also obtained in INE: industrial production growth, consumption growth and unemployment rate growth, which can be used as measures for the state of economy. We will include in our study the German and the American GDP growth, obtained in the OECD stats, given that the Portuguese market is increasingly influenced by the foreign markets. So, we decided to include in our investigation the largest economy in Europe and the largest economy in the world, according to the IMF (International Monetary Fund).

Basically, this is the data required to implement the methodology presented in the subsection below.

3.2. Methodology

Our empirical study will be structured in four parts. In the first part, we will investigate the stationarity of the time series under study and we will analyze the descriptive statistics. In the second part we will test the existence of a co-movement between mutual fund flows and stock returns. In the third and the fourth part, we will test two implications of the information-response hypothesis as an explanation for the co-movement between mutual fund flows and stock returns. This hypothesis states that both fund flows and stock returns are driven by new information and in this study we will test this reaction for information about future economic activity. One of the implications that can be tested for this hypothesis is that if mutual fund flows react to news about future economic activity, then mutual fund flows by themselves may contain information about economic activity. The other implication is that mutual fund flows along with stock returns should be forward-looking (i.e., should be able to help to predict the economic activity).

Thus, firstly, we want to investigate the possible relation between mutual fund flows and stock market returns, so we will follow Warther (1995) and Jank (2012) and we will run a regression of mutual fund flows on its lag and stock market returns in order to verify if there is any kind of co-movement between them and in which direction, so that we can answer the first research question.This test is equivalent to the one which is displayed in table 2 from Jank (2012).

Secondly, we want to study the relationship between mutual fund flows and economic activity. Thus, once again following Jank (2012), we want to investigate if mutual fund flows contain information by themselves. This is one implication of the information-response hypothesis test for macroeconomic information. In other words, we want to perceive if mutual fund investors react to news about future economic activity, and if so, the economic condition should be worse after outflows and better after inflows,

because the mutual fund investors will subscribe units of participation after good news and liquidate their units after bad news. So, in order to investigate these dynamic relationships we will use the concept of causality introduced by Granger (1969), through the bivariate vector auto regression (VAR) approach. The VAR is a statistical model used to capture the linear interdependencies among multiple time series and in this model each variable has an equation explaining its evolution based on its own lags and the lags of all the other variables in the model. With this concept of causality, we run a test, to observe whether one variable contains information about the other one. In other words, we will observe if lags of mutual fund flows provide statistically significant information about future economic activity or vice versa and consequently we are answering to the second research question. This test is similar to the test performed by Jank (2012) in the table 6 of his article.

Finally, we will follow Ludvigson (2004) and Jank (2012) methodology, by running several regressions of variables that proxy for economic activity on its four lags and lagged market returns and/or flows. In these regressions, the baseline model is the macroeconomic variable regressed on its four lags. Then, we include the lagged market returns and/or flows and we observe the increment of adjusted R^2, which is the percentage point augmentation of adjusted R^2 concerning the baseline model. If the increment to the adjusted R^2, from adding the lagged market returns and/or flows is 1 percentage point, the regression with the new variables included predicts about 1 percentage point more of the variation in the next quarter's macroeconomic variable, than do the baseline model predictive indicators. Thus, the purpose of this model is to observe if the lagged market returns and flows, provide additional information to the baseline model, and if so, we can conclude that these two variables can really help to predict economic activity in addition to its lagged values. The equivalent test from Jank (2012) can be observed in the table 8 from his study.

In the next chapter we will describe the main results provided by the methodology presented in this last chapter.

4. Empirical Results

We divided this section into four subsections. In 4.1. we will analyze the descriptive statistics of the variables and test the stationarity of the time series. In 4.2. we present the results for the test of the co-movement between mutual fund flows and stock returns. In 4.3. we show the results of the Granger causality test through the VAR model to capture whether mutual fund flows contains statistically significant information about macroeconomic variables. In 4.4. we present the results for the test of the joint forecasting ability of market returns and fund flows.

4.1 Unit Root Test and Descriptive Statistics

Firstly, we investigated the stationarity of these variables because many economic time series are non-stationary due to stochastic trends and this fact may cause spurious relationship between variables. Therefore, we use the Augmented Dickey-Fuller (ADF) test (1981), which is a test for a unit root in a time series sample. The more negative the t-statistic value, the stronger the rejection of the hypothesis that there is a unit root at some level of confidence. Thus, one can observe that we reject the null hypothesis, which is $X(t)$ is non-stationary at a 1% significance level for all variables. The results of the ADF unit root test are described in table 1.

Table 1

ADF Unit Root Test Results

This table displays the Augmented Dickey-Fuller (1981) test of net flows into equity funds at the rate of total market value of the previous quarter, stock market returns, GDPPt is the Portuguese GDP growth, GDPGer is the German GDP growth, GDPUSA is the USA GDP growth, Unemployment is the Portuguese growth in unemployment rate, consumption is the Portuguese consumption growth and IP is the Portuguese industrial production growth.

Variable	T-statistic	Probability
Flows	-4.140387	0.0106
Returns	-5.510501	0.0002
GDPPt	-6.415609	0.0000
GDPGer	-4.293516	0.0070
GDPUsa	-4.375791	0.0056
Unemployment	-6.624081	0.0000
Consumption	-5.326437	0.0004
IP	-5.421512	0.0003

Using non-stationary time series data produces unreliable and spurious results. It can also lead to a poor analysis and to errors in forecasting. So, it is required the transformation of the time series data so that, it becomes stationary. However, our results demonstrate that we are able to advance in our investigation with these variables, since we reject the null hypothesis for all variables, which means that the time series are stationary. Therefore, there is no need to transform any of the variables.

Table 2 shows the descriptive statistics, such as the mean, standard deviation, kurtosis, skewness and autocorrelations, for the variables under investigation. First of all, it is clear that the standard deviation of the fund flows and stock returns are higher than the macroeconomic variables, standing in line with theory, which states that financial markets tend to be more volatile than the economy. Regarding the mean, the fund flows and stock returns have negative means, whilst the macroeconomic variables have

positive means except the industrial production growth. The distribution of fund flows is peaked, while the distribution of stock returns seems to be flat in comparison with the normal distribution. Apart fund flows and unemployment, all variables present a negative skew, which indicates that the tail on the left side of the probability density function is longer than the right side. Taking into account the autocorrelations, it is clear that each series is positively autocorrelated at lag one, especially in the case of fund flows, which have the highest value. This autocorrelation pattern suggests that an inflow is likely to be followed by another inflow and an outflow by another outflow.

Table 2

Descriptive Statistics

This table displays the summary statistics of the variables under study. The summary statistics include the mean, standard deviation, kurtosis, skewness and autocorrelation.

Variable	Mean	Std. Dev.	Kurtosis	Skewness	Autocorrelations for lag					
					1	2	3	4	5	10
Flows	-0.0116	0.0491	3.6637	0.2908	0.448	0.274	-0.047	0.011	-0.090	-0.139
Returns	-0.0147	0.1098	2.2459	-0.1059	0.175	0.173	-0.031	-0.026	0.072	-0.132
GDPPt	0.0006	0.0085	3.3960	-0.0774	0.153	-0.029	0.151	0.063	-0.099	0.107
GDPGer	0.0030	0.0093	11.871	-2.2084	0.433	0.159	0.101	-0.106	-0.221	-0.161
GDPUSA	0.0042	0.0068	7.5829	-1.4909	0.455	0.301	0.041	0.037	-0.067	-0.037
Unemployment	0.0241	0.0044	3.9001	0.8938	0.080	-0.054	0.061	0.273	-0.122	-0.008
Consumption	0.0004	0.0102	5.4668	-1.6512	0.332	0.112	0.213	-0.028	-0.022	-0.026
IP	-0.0283	0.0312	2.4240	-0.2497	0.212	0.348	0.191	0.078	-0.018	-0.215

Table 3 presents the correlations between mutual fund flows, stock returns and the six macroeconomic variables under study. One can observe a robust co-movement between mutual fund flows and stock returns, given that the correlation coefficient between these two variables is 0.672 and it is statistically significant at the 1% level. Actually, this result seems to indicate that there is in fact a co-movement between these two variables.

Table 3

Correlation Matrix

Table 3 displays the correlations between the variables under study.

	Flows	Returns	GDPUsa	GDPGer	GDPPt	Unemployment	Consumption	IP
Flows	1.0000							
Returns	0.672***	1.0000						
GDPUsa	0.375***	0.295**	1.0000					
GDPGer	0.289**	0.143	0.522***	1.0000				
GDPPt	0.506***	0.312**	0.254*	0.360**	1.0000			
Unemployment	-0.433***	-0.343**	-0.111	-0.1353	-0.395***	1.0000		
Consumption	0.541***	0.438***	0.394***	0.2001	0.345**	-0.6044***	1.0000	
IP	0.368***	0.168	0.113	0.1626	0.2382*	-0.0946	0.0195	1.0000

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

There are other variables with a visible correlation with fund flows, such as GDP Pt (0.506) and Consumption (0.541). It is also interesting to note that all correlations involving the fund flows are statistically significant. There are other variables which show a strong correlation between themselves, especially consumption and unemployment (-0.644), whereas in this case it is a negative correlation. Industrial Production only has a statistically significant correlation with fund flows and the Portuguese GDP. Moreover, most of the variables are correlated with each other and the sign of the correlation coefficient is always positive between all variables except the unemployment variable, which has a negative correlation coefficient with all other variables, being in line with the evidence, since in economic downturn, consumers reduce their spending, suppliers reduce their production and the result is that fewer people are employed.

4.2 Relationship between mutual fund flows and stock returns

As previously mentioned, we want to test the co-movement between mutual fund flows and stock returns. In order to achieve this, we will follow Warther (1995) and especially Jank (2012) by running a regression of mutual fund flows on its lag and stock market returns. The results are consistent with Warther's and Jank's findings as can be observed in Table 4.

Table 4

Mutual fund flows and stock market returns

This table displays the results from regressions of mutual fund flows on past flows and market returns. In this table is also presented the simple and adjusted R^2 in percent. White heteroskedasticity-consistent t-statistics are in parentheses.

	Dependent Variables		
Sample: 49 observations	Flows (t)	Flows (t)	Flows (t)
	(1)	(2)	(3)
Constant	-0.007	-0.007	-0.003
	(-1.026)	(-1.331)	(-0.746)
Flows (t-1)	0.462***		0.402***
	(3.494)		(4.342)
Returns (t)		0.300***	0.289***
		(5.851)	(6.539)
R^2	20.7%	45.2%	61.7%
Adjusted R^2	19.0%	44.1%	60.0%
p-value	0.001	0.000	0.000

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

In regression (1) we find that mutual fund flows are modeled by an AR (1) model. This model has an adjusted R^2 around 19%; the coefficient of the first lag is 0.462 and is statistically significant for a 95% significance level. Finally, is also important to mention that the Ljung and Box (1978) Q-statistic is unable to find any autocorrelation in the residuals, which means that any observed correlations in the data results from

randomness of the sampling process. If the randomness assumption was not valid, then we would have to use a different model.

Hereafter, we run a regression (2) of mutual fund flows on stock market returns and we verify that, in fact, there is a relation between these two variables, since stock market returns explains around 44.1% of mutual fund flows variance. In the regression (2), the adjusted R^2 is higher than the adjusted R^2 of the regression(1), which further reinforces the indication of a positive correlation between mutual fund flows and stock returns as previously observed in the correlation matrix. The coefficient of stock market returns is 0.300 and it is statistically significant for a 99% significance level. The economic meaning of the coefficient estimate implies that for every 0.3% up move in stock returns, there is an associated 1% shift inflow in relation to the market capitalization of the previous quarter of the fund flows. With this second regression, we are not proving that mutual fund flows are caused by stock returns, as stated by the feedback-trader hypothesis, but we are just measuring the dependence between these variables, given that a regression of stock returns on mutual fund flows have exactly the same adjusted R^2 of 44.1%.

In the last regression, we include both one period lagged fund flows and stock returns, being that these variables are able to explain 60.0% of the mutual fund flows' variance and the coefficients are substantially similar to those observed on regression (1) and (2). Therefore, we add these two explanatory variables and it seems that we achieve a more accurate model that can better explain the mutual fund flows variable.

Hence, we are able to answer the *first research question*, by stating that we found a co-movement between mutual fund flows and stock returns, not only due to the correlation found between both variables, but also because of evidence provided by the regressions performed, since the stock returns variable adds explanatory power to the AR (1) model of mutual fund flows. These results are consistent with the previous literature, which provided evidence of contemporaneous relation between fund flows and stock market returns (Warther, 1995; Edwards and Zhang, 1998; Edelen and Warner, 2001; Goetzmann and Massa, 2003; Oh and Parwada, 2007; Jank, 2012).

However, after these tests it is not possible to conclude what can explain this phenomenon, given that there are several explanations for this co-movement, as we mentioned before in the literature review.

4.3 Mutual fund flows and economic activity

In the previous subsection, we found evidence in favor of a co-movement between mutual fund flows and stock returns, which is in line with the theory. There are several explanations in the literature for this co-movement, such as the feedback-trader hypothesis, the price-pressure hypothesis and the information-response hypothesis as we have mentioned in the literature review chapter. So, once again, following Jank (2012) we want to test the information-response hypothesis as an explanation for the co-movement, which we found, between mutual fund flows and stock returns. According to this author, the information-response hypothesis has two main implications: First, variables that predict the economic activity should be related to mutual fund flows; second, if mutual fund flows react to news about the future economic activity, then mutual fund flows should be able to predict real economic activity.

In this section we want to test whether mutual fund flows react to news about future economic activity and if this fact is verified, we should observe that mutual fund flows contain information by themselves. Putting it another way, if mutual fund investors react to news about future economic activity, the economic conditions should be worse after outflows and better after inflows, because mutual fund investors are reacting to good news by subscribing units of participation and reacting to bad news by liquidating their participations in funds.

With the aim to investigate this issue, we follow the methodology of Dash and Kumar (2008) and Jank (2012). So, we employ the concept of causality introduced by Granger (1969), through the bivariate vector auto regression (VAR) approach. As the authors pointed, Granger causality does not mean true causality, ie, it only states that one variable contains information about the other. Thus, we study the causality between mutual fund flows and economic activity measures such as GDP growth from Portugal,

Germany and USA; Consumption growth, Industrial Production growth, and Unemployment rate growth in order to answer the second research question, ie, if mutual fund flows contain information by themselves.

Hence, the purpose of this test is to observe whether lags of variables that measure economic activity provide information about future mutual fund flows, or whether lags of mutual fund flows provide information about future economic activity. In order to choose the appropriate lag length in a VAR model we have followed the Hannan-Quinn information criterion (HQ) with 10 lags included. The lag length selected was one lag and it is the same lag chosen by Jank (2012), even though the information criterion used was different.

The results in Table 5, demonstrate that mutual fund flows contain information about the German GDP growth, whereas German GDP growth does not contain information about the mutual fund flows. This result is supported by the Granger causality F-statistic, because the p-value is 0%. We can also note that for the German GDP growth equation, all independent variables are statistically significant, whilst in the case of flows equation only the lagged value of flows is statistically significant. The lagged flows' coefficient is positive, which suggest a positive relation between the lagged flows and the German GDP growth.

Table 5

VAR (1) of Mutual fund flows and German GDP growth

This table displays the results of a VAR (1) model of mutual fund flows and German GDP growth. The table also presents a Granger causality test. In column (1) is presented the Granger causality F-statistic testing whether German GDP Growth causes mutual fund flows and in column (2) whether mutual fund flows causes German GDP growth. T-statistics are in parentheses.

Sample: 48 observations after adjustments	Dependent Variables	
	Flows (t) (1)	GDP Ger (t) (2)
Constant	-0.004	0.003***
	(-0.580)	(2.662)
Flows (t-1)	0.508***	0.100***
	(3.662)	(4.528)
GDP Ger (t-1)	-0.825	0.281**
	(-1.143)	(-2.434)
Granger causality F-statistic	1.306	20.501
p-value	0.2531	0.000

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

In table 6, the results are identical to those just mentioned above. We can conclude that mutual fund flows contain information about the Portuguese GDP growth, whilst the Portuguese GDP growth does not contain information about the mutual fund flows. This result is supported by the Granger causality F-statistic. We can also note that the only statistically significant variable for both equations is the lagged flows, whereas the lagged Portuguese GDP growth never is. The lagged flows' coefficient is positive suggesting a positive relation between the lagged flows and the Portuguese GDP growth.

Table 6

VAR (1) of Mutual fund flows and Portuguese GDP growth

This table displays the results of a VAR (1) model of mutual fund flows and Portuguese GDP growth. The table also presents a Granger causality test. In column (1) is presented the Granger causality F-statistic testing whether Portuguese GDP Growth causes mutual fund flows and in column (2) whether mutual fund flows causes Portuguese GDP growth. T-statistics are in parentheses.

Sample: 48 observations after adjustments	Dependent Variables	
	Flows (t) (1)	GDP Pt (t) (2)
Constant	-0.007	0.002
	(-0.992)	(1.290)
Flows (t-1)	0.474***	0.071***
	(3.071)	(2.634)
GDP PT (t-1)	-0.140	-0.044
	(-0.156)	(-0.281)
Granger causality F-statistic	0.024	6.942
p-value	0.876	0.008

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

In table 7, we present the results of a VAR (1) model for mutual fund flows and the USA GDP growth. In this case, the results also suggest that mutual fund flows contain information about the Portuguese GDP growth whereas the Portuguese GDP growth does not contain information about the mutual fund flows. This result is supported by the Granger causality F-statistic, since it is statistically significant at the 1% level for the USA GDP growth equation as the p-value documents. We can also note that for the USA GDP growth all variables are statistically significant, which we also found in Table 5 for the German GDP growth. The lagged flows' coefficient is positive, suggesting a positive relation between the lagged flows and the USA GDP growth.

Table 7

VAR (1) of Mutual fund flows and USA GDP growth

This table displays the results of a VAR (1) model of mutual fund flows and USA GDP growth. The table also presents a Granger causality test. In column (1) is presented the Granger causality F-statistic testing whether USA GDP Growth causes mutual fund flows and in column (2) whether mutual fund flows causes USA GDP growth. T-statistics are in parentheses.

Sample: 48 observations after adjustments	Dependent Variables	
	Flows (t) (1)	GDP USA (t) (2)
Constant	-0.007	0.002***
	(-0.899)	(2.864)
Flows (t-1)	0.457***	0.043**
	(3.143)	(2.409)
GDP USA (t-1)	0.093	0.341***
	(0.090)	(2.719)
Granger causality F-statistic	0.008	5.802
p-value	0.928	0.016

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

In table 8 we present the results of a VAR (1) model for mutual fund flows and the Industrial production growth. The results suggest that industrial production growth does not contain information about the mutual fund flows whereas mutual fund flows might contain information about industrial production growth. We can observe from the p-value that the Granger causality test is statistically significant at the 10% level for the industrial production growth equation. However, in this case the results are not so clear, since the F-statistic is smaller than in the previous models for the Portuguese, German and USA GDP growth. Furthermore, any of the independent variables is statistically significant, in the industrial production growth equation. This means that the lagged flows variables do not add explanatory power to the industrial production growth

equation. As a matter of fact, in this VAR (1) model, the only statistically significant variable is the lagged flows in the flows equation.

Table 8

VAR (1) of Mutual fund flows and Industrial Production growth

This table displays the results of a VAR (1) model of mutual fund flows and industrial production growth. The table also presents a Granger causality test. In column (1) is presented the Granger causality F-statistic testing whether industrial production growth causes mutual fund flows and in column (2) whether mutual fund flows causes industrial production growth. T-statistics are in parentheses.

Sample: 48 observations after adjustments	Dependent Variables	
	Flows (t) (1)	Ind. production (t) (2)
Constant	-0.008	0.004
	(-1.200)	(0.847)
Flows (t-1)	0.409***	0.164
	(2.803)	(0.727)
Ind. production (t-1)	0.209	0.113
	(0.918)	(0.727)
Granger causality F-statistic	0.843	2.701
p-value	0.358	0.100

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

Table 9 documents the results of a VAR (1) model for mutual fund flows and the unemployment rate growth. In this case the results are inconsistent with the previous variables, which we analyzed. The results suggest that neither the industrial production growth contain information about the mutual fund flows nor the mutual fund flows contain information about industrial production growth. This conclusion is supported by the Granger causality test. Furthermore, the constant is the only independent variable,

which is statistically significant, in the unemployment rate growth equation. This means that the lagged flows variables do not add explanatory power to the unemployment rate growth equation.

Table 9

VAR (1) of Mutual fund flows and Unemployment rate growth

This table displays the results of a VAR (1) model of mutual fund flows and unemployment rate growth. The table also presents a Granger causality test. In column (1) is presented the Granger causality F-statistic testing whether unemployment rate growth causes mutual fund flows and in column (2) whether mutual fund flows causes unemployment rate growth. T-statistics are in parentheses.

Sample: 48 observations after adjustments	Dependent Variables	
	Flows (t) (1)	Unemployment (t) (2)
Constant	-0.007	0.002***
	(-1.108)	(3.021)
Flows (t-1)	0.482***	-0.015
	(3.235)	(-1.002)
Unemployment (t-1)	0.491	0.011
	(0.302)	(0.066)
Granger causality F-statistic	0.091	1.005
p-value	0.762	0.316

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

Finally, table 10 documents the results of a VAR (1) model for mutual fund flows and the consumption growth. The results are similar to the unemployment rate growth. The results suggest that neither the consumption growth contain information about the mutual fund flows nor the mutual fund flows contain information about the consumption growth. This conclusion is supported by the Granger causality test.

Table 10

VAR (1) of Mutual fund flows and Consumption rate growth

This table displays the results of a VAR (1) model of mutual fund flows and unemployment rate growth. The table also presents a Granger causality test. In column (1) is presented the Granger causality F-statistic testing whether unemployment rate growth causes mutual fund flows and in column (2) whether mutual fund flows causes unemployment rate growth. T-statistics are in parentheses.

Sample: 48 observations after adjustments	Dependent Variables	
	Flows (t) (1)	Consumption (t) (2)
Constant	-0.008	0.001
	(-1.296)	(0.471)
Flows (t-1)	0.363**	0.0356
	(2.293)	(1.002)
Consumption (t-1)	0.861	0.241
	(1.154)	(1.47)
Granger causality F-statistic	1.331	1.049
p-value	0.249	0.306

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

Hence, we conclude that the direction of the relation between mutual fund flows and all proxies of economic activity is unclear and is not in line with the results obtained by Jank (2012), given that the author found a consistent pattern, in which mutual fund flows contain information about economic activity, but the reverse does not occur.

The author also found that in the economic activity equation, lagged flows are significant for all proxies of economic activity, while in the fund flow equation lagged economic activity is insignificant

In table 5, 6 and 7, the results show that mutual fund flows contain information about the German, the Portuguese and the USA GDP growth but these macroeconomic

variables do not contain information about mutual fund flows, which is in line with Jank's (2012) findings. The results in table 8 are unclear, since the Granger causality test suggests that the industrial production growth contains information about mutual fund flows and the mutual fund flows do not contain information about industrial production growth, however, the lagged flows variable is not statistically significant in the industrial production growth equation. In table 9 and 10, the results show that neither mutual fund flows contain information about unemployment rate growth and consumption growth, nor these macroeconomic variables contain information about mutual fund flows.

Although, we do not find a consistent pattern in the Granger causality test results for all variables that measure economic activity, we can conclude that mutual fund flows contain information about future economic activity, since we found evidence in favor. We also acknowledge that there may be certain variables, which were not included in our analysis, that are better explained by mutual fund flows than the unemployment rate growth and the consumption growth, which showed no results in favor of the fact that mutual fund flows contain information about future economic activity.

Hence, the *second research question*, which is also one of the implications for the information-response hypothesis, was answered affirmatively, given that mutual fund flows contain information by themselves. In this subsection we investigated the information about future economic activity and Table 11 summarizes the Granger causality test results for each variable and its indication to the implication for the information-response hypothesis that we are investigating. In other words, if mutual fund flows contain information about a given variable, this means that the test for the given variable provides evidence for the information-response hypothesis.

Table 11

Summary of Granger causality test

This table displays the summary of results for the Granger causality test results for each variable and the respective evidence for the information-response hypothesis.

Variables	Evidence for information-response hypothesis
GDP Ger	Yes
GDP Pt	Yes
GDP USA	Yes
Industrial Production	Unclear
Unemployment	No
Consumption	No

4.4 Mutual fund flows, market returns and economic activity

In the previous subsection we investigated whether mutual fund flows contain information about real economic activity and the conclusion is that mutual fund flows contain information about some variables that proxy for economic activity. Therefore, if mutual fund flows contain information about economic activity, then mutual fund flows should be able to help to predict the economic activity, which is other implication of the information-response hypothesis that we are studying and the purpose of this section is to perform that investigation.

Thus, following by Ludvigson (2004) and Jank (2012), we perform several regressions of the variables used in the previous section, that proxy for economic activity, on its four lags and lagged mutual fund flows and/or market returns. The four lags are chosen by the authors and since we are partially replicating Jank's (2012) study, we will follow his methodology. In these regressions, the baseline model is the macroeconomic variable regressed on its four lags. Then, we include the lagged flows and/or market returns and we notice the increment of the adjusted R^2, which is the percentage point (pp) increase over the baseline model. Table 7 displays the results of these forecasting

regressions; however the baseline model results are not descripted due to reasons of concision. Therefore, we report the flows and returns coefficients, as well as the incremental adjusted R^2. In table 12 we present the results of the forecasting regression of Portuguese GDP growth.

Table 12

Mutual fund flows, market returns and Portuguese GDP growth

This table displays the results of a forecasting regression of Portuguese GDP growth. The baseline model of the forecasting regression includes four lags of the dependent variable. The incremental adjusted R^2 is the percentage point increase over the baseline model, which includes only lagged values of the dependent variable. White heteroskedasticity-consistent t-statistics are in parentheses.

Sample: 49 observations	Dependent Variable – GDP PT		
	1	2	3
Flows (t-1)	0.080***		0.070**
	(4.853)		(2.265)
Returns (t)		0.035***	0.004
		(3.319)	(0.326)
Incremental Adj. R^2	24.2pp	18.5pp	22.5pp

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

The results presented in table 12 indicates that mutual fund flows and stock returns help to predict the Portuguese GDP in addition to its lagged values, since when the fund flows and the stock returns are added to the baseline model, the adjusted R^2 increases. It can be observed that the incremental adjusted R^2 is 24.2pp for the fund flows addition and 18.5pp for the stock returns addition. Moreover, both regression coefficients are statistically significant at a 1% level. When both variables are included together, we notice a reduction in regression coefficients as well as in significance for both variables,

being that the stock returns' regression coefficient is not even statistically significant.

Table 13 documents that mutual fund flows add explanatory power to the baseline model of the German GDP growth, but the stock returns have a more significant impact, since the adjusted R^2 increases in 13.8pp, whereas in the fund flows it increases in 5.0pp. The regression coefficients are statistically significant when the variables are included individually. When both variables are included together, the regression coefficients values are lower and lose the statistical significance.

Table 13

Mutual fund flows, market returns and German GDP growth

This table displays the results of a forecasting regression of German GDP growth. The baseline model of the forecasting regression includes four lags of the dependent variable. The incremental adjusted R^2 is the percentage point increase over the baseline model, which includes only lagged values of the dependent variable. White heteroskedasticity-consistent t-statistics are in parentheses.

Sample: 49 observations	Dependent Variable – GDP Ger		
	1	2	3
Flows (t-1)	0.051**		0.043
	(2.095)		(1.446)
Returns (t)		0.034***	0.004
		(3.028)	(0.298)
Incremental Adj. R^2	5.0pp	13.8pp	3.12pp

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

In table 14 we observe that mutual fund flows add explanatory power to the baseline model of the USA GDP growth, leading to an increase of the adjusted R^2 in 7.4pp. Furthermore, the regression coefficient is statistically significant. On the other hand, the stock returns' regression coefficient is not statistically significant and the incremental

adjusted R^2 reaches only 1.5pp. Once again, when both variables are included, the regression coefficients are not statistically significant, but the incremental adjusted R^2 is 7.9pp, which is higher than the inclusion of the fund flows or the stock returns alone.

Table 14

Mutual fund flows, market returns and USA GDP growth

This table displays the results of a forecasting regression of USA GDP growth. The baseline model of the forecasting regression includes four lags of the dependent variable. The incremental adjusted R^2 is the percentage point increase over the baseline model, which includes only lagged values of the dependent variable. White heteroskedasticity-consistent t-statistics are in parentheses.

Sample: 49 observations	Dependent Variable – GDP USA		
	1	2	3
Flows (t-1)	0.041**		0.019
	(2.009)		(0.784)
Returns (t)		0.012	0.013
		(1.440)	(1.250)
Incremental Adj. R^2	7.4pp	1.5pp	7.9pp

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

Table 15 documents that fund flows add explanatory power to the industrial production's baseline model. The fund flows variable is statistically significant at the 5% level and the incremental adjusted R^2 reaches 8.2pp. The fund flows variable alone has the highest incremental adjusted R^2 and the highest statistical significance, since when stock returns alone are included the incremental adjusted R^2 is 1.1pp and when both variables are included the incremental adjusted R^2 is 6.2pp. Moreover, the only variable in this table which is statistical significant is the fund flows, in regression (1) when the fund flows alone are included.

Table 15

Mutual fund flows, market returns and industrial production growth

This table displays the results of a forecasting regression of industrial production growth. The baseline model of the forecasting regression includes four lags of the dependent variable. The incremental adjusted R^2 is the percentage point increase over the baseline model, which includes only lagged values of the dependent variable. White heteroskedasticity-consistent t-statistics are in parentheses.

Sample: 49 observations	Dependent Variable – IP		
	1	2	3
Flows (t-1)	0.200**		0.176
	(2.114)		(1.133)
Returns (t)		0.053	0.014
		(1.015)	(0.230)
Incremental Adj. R^2	8.2pp	1.1pp	6.2pp

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

Firstly, in table 16, we observe that all regression coefficients in the three regressions are negative, which reinforces the negative relation between the unemployment and stock returns/mutual fund flows. Fund flows variable alone add an explanatory power of 25.5pp to the unemployment baseline model and the fund flows variable is statistically significant at the 1% level. When the stock returns variable alone is included in the baseline model, the variable is statistically significant at the 5% level but the incremental adjusted R^2 is much lower than when the fund flows variable alone is included. When both variables are included, the regression coefficients are lower and the stock returns loses the statistical significance, whilst the fund flows variable remains statistically significant at the 1% level. Although the incremental adjusted R^2 in the third regression presents a high value, when the fund flows variable alone is included, the incremental adjusted R^2 is even higher.

Table 16

Mutual fund flows, market returns and unemployment rate growth

This table displays the results of a forecasting regression of unemployment rate growth. The baseline model of the forecasting regression includes four lags of the dependent variable. The incremental adjusted R^2 is the percentage point increase over the baseline model, which includes only lagged values of the dependent variable. White heteroskedasticity-consistent t-statistics are in parentheses.

Sample: 49 observations	Dependent Variable – Unemployment		
	1	2	3
Flows (t-1)	-0.046***		-0.0447***
	(-3.152)		(-2.735)
Returns (t)		-0.012**	-0.001
		(-2.230)	(-0.891)
Incremental Adj. R^2	25.5pp	6.8pp	23.6pp

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

Finally in table 17, we report the results of a forecasting regression of the consumption growth. Fund flows alone included in the baseline model have an incremental adjusted R^2 of 19.8pp and the variable is statistically significant at the 1% level. When stock returns are included alone, the incremental adjusted R^2 is -0.3pp and so, this is the only case where the incremental adjusted R^2 is negative. With both variables included the incremental adjusted R^2 reaches 20.3pp and is higher than the fund flows alone included, but only the fund flows variable is statistically significant at a 10% level.

Table 17

Mutual fund flows, market returns and consumption growth

This table displays the results of a forecasting regression of consumption growth. The baseline model of the forecasting regression includes four lags of the dependent variable. The incremental adjusted R^2 is the percentage point increase over the baseline model, which includes only lagged values of the dependent variable. White heteroskedasticity-consistent t-statistics are in parentheses.

Sample: 49 observations	Dependent Variable – Consumption		
	1	2	3
Flows (t-1)	0.099***		0.065*
	(3.126)		(1.774)
Returns (t)		0.015	0.02
		(1.066)	(1.302)
Incremental Adj. R^2	19.8pp	-0.3pp	20.3pp

*Significance at the 10% level.
**Significance at the 5% level.
***Significance at the 1% level.

In the present subsection we intend to test the forecasting ability of fund flows and stock market returns. The main conclusions of the analysis of our results indicates that *mutual fund flows help to predict the economic activity* in addition to its lagged values, because, when the flows are included in the baseline model, the adjusted R^2 increases. It can be seen that the incremental adjusted R^2 goes from 5.0pp to 25.5pp depending on the variable regarded, being that the lowest value is for the German GDP growth model and the highest value is for the Unemployment rate growth. Moreover, when the mutual fund flows variable is included alone, the regression coefficient is always statistically significant.

Regarding the inclusion of the stock returns variable alone, the same conclusion can be drawn, which is in line with the other investigations mentioned in the literature review (Fama, 1990; Schwert, 1990; Jank, 2012). In this case, the incremental adjusted R^2

presents a negative value for the consumption model which is -0.3pp and it reaches the maximum value of 18.5pp for the Portuguese GDP. It is also noticeable that the addition of mutual fund flows to the baseline model of each macroeconomic variable, leads to a higher increase of the adjusted R^2 than in the case of the addition of stock returns, except in the case of the German GDP, in which the opposite occurs.

When both stock returns and mutual fund flows were added to the baseline model for each macroeconomic variable, we observe that for the USA GDP and the consumption growth rate, the incremental adjusted R^2 increased in comparison with the regressions that contained the baseline model and just one of these variables (mutual fund flows and stock returns). When both stock returns and mutual fund flows were included, the regression coefficients decreased (except in the forecasting regression of USA GDP and consumption growth and for the stock returns variable), which denotes redundant information contained by both variables about future economic activity, as mentioned by Jank (2012).

Thus, the *third research question*, which is also one of the implications for the information-response hypothesis, was answered affirmatively, given that both mutual fund flows and stock returns help to predict the economic activity in addition to its lagged values, which can account for the co-movement between both variables.

5. Conclusions

Due to the growing importance of the mutual fund industry and also the importance of mutual funds in the investment decisions, its depth study is of the utmost importance. Therefore, we intend to explore the mutual fund flows and their relation with the stock market as well as with real economic activity.

The first objective of this study was to investigate the existence of a co-movement between mutual fund flows and stock returns in the Portuguese market and we found a strong positive relationship between mutual fund flows and stock returns, which provides an answer to the first research question. Our findings are consistent with similar studies (Warther, 1995; Edelen & Warner, 2001; Jank, 2012). Thus, the existence of a co-movement between these two variables seems to be consensual, regardless of the market or the period chosen for study.

Then, following Jank (2012), we investigated whether the investor reaction to information can explain the co-movement between fund flows and stock returns and in this case, we specifically tested the information about future economic activity because we consider that macroeconomic information is an important factor to weigh in the investors' decisions. This hypothesis is called the information-response hypothesis and we tested two implications of this hypothesis. The first implication is that mutual fund flows contain information by themselves. Our results have confirmed this implication: mutual fund flows contain statistically significant information about the Portuguese GDP growth, the German GDP growth and the USA GDP growth, which gives an answer to the second research question.

The second implication of the information-response hypothesis is that mutual fund flows, as well as stock returns, should be able to predict the economic activity. Our results provide evidence for the fact that both variables help to predict some of the variables that proxy for economic activity, which provides an answer to the third research question. This means that the investors sell their stocks or rescue their units of

participations in funds in riskier times of crisis and buy stocks or subscribe units of participations in funds in periods of economic growth.

However, in our study, mutual fund flows do not contain information about all variables, such as with the unemployment growth and the industrial production growth, whilst the mutual fund flows contain information about all variables in the study carried out by Jank (2012), including the industrial production growth. Furthermore, in Jank's study both stock returns and mutual fund flows adds explanatory power for all forecasting regressions, while, in our study, for the consumption growth model, the inclusion of stock returns causes a negative incremental adjusted R^2. Nevertheless, the mutual fund flows contain information about the most part of the macroeconomic variables used in our study and we provide evidence that both stock returns and mutual fund flows are forward-looking and help to predict real economic activity as well as Jank (2012) demonstrated. Hence, the information-response hypothesis for the Portuguese market seems to be confirmed by our results, which are in line with our main reference article from Jank (2012). We have also shown that the Portuguese financial markets are connected not only to Portuguese macroeconomic variables but also to foreign macroeconomic variables, highlighting the fact that markets are increasingly integrated.

Beyond all these conclusions, this investigation could be important for investors, since these results can raise important questions about portfolio choice and market timing. However, our results do not allow investors to follow a winning strategy, since the fund flows and stock returns predict the future economic activity and not otherwise.

Finally, there were several limitations inherent in this study. Firstly the research period was for twelve years only, due to availability of data and it not included phases of accelerated economic growth, as verified in previous decades, which does not allow us to draw conclusions about what happens in different economic cycles. Secondly, we did not include in our study the variables that predict real economy as well as the equity premium, such as the dividend yield ratio and the default spread, and it would be interesting to add them for future research in order to perceive their role in the

correlation between mutual fund flows and stock returns. We also consider that it would be interesting, for further investigations, to specify the flows of different types of funds and perform the same analysis which we carried out for the flows into equity funds.

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