FINANCIALISATION AND THE PORTUGUESE REAL INVESTMENT: A SUPPORTIVE OR A DISRUPTIVE RELATIONSHIP?[1]

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ABSTRACT

This paper aims to address empirically the relationship between financialisation and real investment by Portuguese non-financial corporations from 1977 to 2013. An equation to describe aggregate investment is estimated, which includes the traditional or standard variables (profitability, debt, cost of capital, savings rate and business cycle) and two further measures to capture the phenomenon of financialisation (financial receipts and financial payments). Financialisation, on the one hand, leads to a rise of financial investments by non-financial corporations, which deviates funds from real investment ("crowding out" effect). On the other hand, the pressure to intensify financial payments restrains the available funds for real investments. The paper concludes that there is a long-term relationship between all variables, and also finds evidence that the process of financialisation has hampered real investment, mainly through financial payments.

KEYWORDS

Financialisation, The Portuguese Non-Financial Corporations, Cointegration, Vector Error Correction Model, Granger Causality, Impulse Response Functions

JEL CLASSIFICATION

C22, D20, E22 and E44

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1. INTRODUCTION

Mainstream economics advocates that the financial sector plays a crucial role in boosting real investment by non-financial corporations, through the process of intermediation, which ensures a higher availability of funds, greater efficiency, an absence of market imperfections, a reduction of transaction costs, among other advantages (e. g. Orhangazi (2008a), Palley (2007), Demir (2008)).

Nonetheless, the literature on financialisation stresses that the development of finance has deteriorated real investment, through two channels, as advocated by Orhangazi (2008a and 2008b), Hein (2009, 2012), Hein and van Treeck (2010), Hein and Dodig (2013), among others. Firstly, non-financial corporations are now more engaged in financial activities, due to the incentives and pressures to generate profits in the short-term. This diverts funds from real and productive activities ("crowding out" effect). Secondly, the international financial markets increasingly require the raise of payments by non-financial corporations, which soaks funds that could be used to put in place long-term productive projects.

Against this backdrop, a small body of literature has emerged over the last years in order to test the hypothesis that financialisation has negative effects on the investment of non-financial corporations. Most of them derives and estimates behavioural equations for investment, finding statistical evidence that this phenomenon has hampered real investment (e. g. Stockhammer (2004), Orhangazi (2008a and 2008b), van Treeck (2008) and Onaran *et al.* (2011)).

This paper aims to evaluate the impact of the process of financialisation on real investment of the Portuguese non-financial corporations between 1977 and 2013, contributing to the literature in two aspects. First, it focuses on the behaviour of the Portuguese non-financial corporations, whereas the most of studies on that subject are oriented to the specificities of the USA or the UK corporations. Portugal can be seen as an economy which is less financialised than those two economies and where the main agents of financialisation are banks and not financial markets. The Portuguese financial system is a "bank-based" financial system in the terminology of Orsi and Solari (2010). Indeed, the Portuguese banks have a strong importance, sustaining the dynamism of the economy by granting high levels of credit. Second, the paper uses a Vector Error Correction Model to assess the relationship between financialisation and real investment, which allows distinguishing the short-term from long-term effects of financialisation on the level of investment by non-financial corporations.

Accordingly, we estimate an equation that describes the behaviour of the Portuguese non-financial corporations, including traditional variables (profitability, debt, cost of capital, savings rate and the business cycle) and two proxies to capture the two channels of

financialisation (financial receipts and financial payments). We estimate an aggregate investment function given our interest in studying a macroeconomic issue.

We are able to identify a disruptive relationship between financialisation and the real investment. The statistical evidence of the second channel is more vigorous than the one on the first channel, which may be associated with the structure of the Portuguese productive system, characterized by a huge amount of small and medium corporations who face more financial constrains, and with few corporations quoted in the stock market. This shows us that the deleterious effects of financialisation on the real investment of non-financial corporations also occur on smaller, less developed, less financialised and more peripheral economies.

The remainder of the paper is organized as follows. Section 2 presents a selected literature review on the relationship between the financialisation and the level of investment of the non-financial corporations. An investment equation to describe the behaviour of the non-financial corporations is built in Section 3. In Section 4, we describe the data and the econometric methodology. The main results and the respective discussion are developed in Section 5. Finally, Section 6 concludes.

2. THE RELATION BETWEEN FINANCIALISATION AND REAL INVESTMENT

It is widely acknowledged that economic growth and employment depend of the capacity to accumulate physical capital.

In this regard, mainstream economics claims that the financial sector and financial markets play a crucial role in promoting real investment by non-financial corporations. It is argued that the financial sector and financial markets facilitate the provision of funding (by channelling savings to borrowers through credit and other forms), increase the efficiency in resources allocation by screening and monitoring investments, remove market imperfections, reduce transaction costs, and provide risk management services (Orhangazi, 2008a).

Palley (2007) argues that conventional economic theory has, in fact, supported the growing importance of finance due to several reasons. Firstly, finance enhances economic efficiency since financial markets help to foresee future economic outcomes and allow economic agents to assemble portfolios with better combinations of returns and risk. Secondly, he refers to Friedman's (1953) argument that financial speculation or bubbles are stabilizers phenomena, insofar as asset prices tend to their fundamental levels. Thirdly, as finance growths financial market's outcomes improve, as the rise of traded volumes increase liquidity and minimize the manipulation of market prices. Finally, the development of finance still boosts investment by corporations when the market price of capital is higher than its replacement cost (theory of Tobin's q), which provides an indication that the capital is scarce and that are available profitable investment opportunities.

In the same vein, Demir (2009) highlights that financial liberalisation can generate a deepening of capital markets, a reduction of agency costs, a decrease of asymmetry of information and an increase of efficiency. This process could feed a transfer of domestic and foreign savings to more efficient investment projects at lower costs, playing an important role on the dynamism of investment and economic growth.

Nevertheless, the literature on financialisation typically argues that this phenomenon has hampered the real investment of non-financial corporations through two different channels, as theoretically discussed by Orhangazi (2008a and 2008b), Hein (2009, 2012), Hein and van Treeck (2010), Hein and Dodig (2013), among others.

First, it is argue that the rise of investment in financial assets by non-financial corporations diverts funds from real activities. Corporations use available funds either to invest in real activities or to acquire financial assets. Indeed, Tobin (1965) has already noted that financial investments and real investments could be perfect substitutes. So, if non-financial corporations increase investments in financial assets, they will have less funds available to

invest in other productive projects, which tends to originate a kind of "crowding out" effect on real investment. This happens because both external and internal funds are limited. It is therefore a "management's preference channel", as labelled by Hein (2009, 2012) and Hein and Dodig (2013).

In this regard, Krippner (2005) shows that non-financial corporations have become more engaged in financial activities, as demonstrated by the growing importance of financial revenues and profits to revenues and profits from productive activities. Cingolani (2012) argues that this trend show us a higher accumulation of financial rents in detriment of productive accumulation. The question that remains is: what are the reasons for this trend? Different answers can be provided. Firstly, Crotty (2005) suggested that the increase of financial investments (which also takes the form of buying financial subsidiaries or the expansion of an already existing one) was caused by shorter planning horizons of non-financial corporations. Earlier, Crotty (1990) had argued that shareholders are normally more concerned with current profitability than with the long-term expansion or, in certain circumstances, corporations´ own survival. The strong pressures (essentially by shareholders) on managers to increase returns in the short-term may lead to a larger investment on financial assets, which produce larger and more speculative returns in the short-term, rather than real investments that generate returns only in the medium and long-term and with a higher level of uncertainty (Orhangazi, 2008a and 2008b). This is commonly referred to as 'rent-seeking behaviour'. Hein (2009, 2012) and Hein and Dodig (2013) highlight the existence of a "growth-profit trade-off" at corporations' level, since orientations from shareholders are more associated with a high preference for short-term profitability and, therefore, with a low propensity to invest in real capital projects. Secondly, Crotty (2005) and Orhangazi (2008a and 2008b) argue that corporations may be trying to circumvent the decrease in profits from the real sector and the increase in the costs of external funds since the eighties. In the same fashion, Akkemik and Özen (2014) advocate that the rise of financial investments by non-financial corporations is a response to the macroeconomic uncertainty and increased risks, as well as the institutional changes at the level of corporate governance. Nevertheless, they tested econometrically these hypotheses for the Turkish non-financial corporations, finding that this channel is mainly determined by highly uncertain macroeconomic conditions, in a context where the institutional characteristics (such as close ties with the government, family ownership of the corporation, discretion of the managerial power and unionisation) do not have a statistical significance impact on financialisation.

However, some authors (e. g. Fazzari *et al.* (1988), Gertler and Gilchrist (1994) and Ndikumana (1999)) claims that higher investment in financial assets could be potentially positive and important for productive investments, especially if non-financial corporations use the returns from financial investments to finance real investments. This could be quite relevant in small corporations, which face higher financial constraints. In any case, the literature on

financialisation excludes this hypothesis, considering that there is no guarantee that non-financial corporations use these financial incomes to fund real investments. Conversely, these financial incomes will probably be re-invested in financial assets or distributed as dividends to shareholders.

The second channel through which real investment of non-financial corporations may be hampered by financialisation is related with the strong pressures on exerted over non-financial corporations to increase their payments to the financial markets in the form of interests, dividends and/or stock buybacks.

The high levels of indebtedness of non-financial corporations in the era of financialisation have at least ensured a growing trend in interest payments in the recent years, as recognized by Orhangazi (2008a and 2008b). Regarding shares, the managers of non-financial corporations are pressed to raise pay-out ratios in the short-term by their personal interests, but also by the pressure of shareholders. On the one hand, Orhangazi (2008a and 2008b) highlights that there is an incentive for managers of non-financial corporations to increase stock prices in the short-term (distributing a high level of dividends), because their remuneration schemes are based on the short-term evolution of stock prices. On the other hand, the author argues that the growing importance of institutional investors (who seek permanently appreciations of shares) in the international financial markets also press corporations to practice high levels of pay-out ratios. If non-financial corporations fail to realise those financial payments, this results in a fall in the value of their stocks and in a takeover.

In that sense, Lazonick and O'Sullivan (2000) and Stockhammer (2010) emphasize that the substantial rise of financial payments made by the non-financial corporations over the last three decades represent a new design of corporate governance in favour of the maximisation of shareholder value (which is commonly referred as a "shareholder value orientation"). As noted by van der Zwan (2014), this shareholder value has been emerging as 'the norm of the transformation of capitalism', increasing the dissemination of new policies and practices favouring shareholders rather than other constituents of corporations (like shareholders, managers and employees). Lazonick and O'Sullivan (2000) indicate that there has been a transformation from an orientation of profits' retention and reinvestment in corporations' growth to one of downsizing of corporate labour forces and distribution of profits to shareholders, which they call a shift from a "retain and reinvest" strategy to a "downsize and distribute" strategy.

As emphasized by Aglietta and Breton (2001) and Duménil and Lévy (2004), the low retention ratios of non-financial corporations result in a reduction of the quantity of funds available for real investments, hampering the long-term investment projects, including activities like innovation, research and development. This is the "internal means of finance channel", as called by Hein (2009, 2012) and Hein and Dodig (2013).

In contrast and as pointed by Orhangazi (2008a and 2008b), there are authors that emphasize that the rise of financial payments could favour an increase of real investment. Higher levels of financial payments, the argument goes, signal that corporations have higher levels of profitability and solvency. Thus, these corporations will probably achieve an easier access to funding at lower costs, which could be decisive for the realization of new real investments. Nonetheless, the literature on financialisation excludes this hypothesis, considering that this pressure to increase financial payments on the short-term dissuades the realization of new productive investments.

Despite the increasing amount of theoretical work on the effects of financialisation on investment, studies on the impact of that phenomenon are limited, as noted by Onaran *et al.* (2011). Nevertheless, a relatively small body of empirical literature has emerged in recent years estimating investment equations in order to assess econometrically the impact of financialisation on real investment[2]. Most of these studies find statistical evidence supporting the theoretical claim that the phenomenon of financialisation has had a negative impact on the real investment of non-financial corporations.

Accordingly, Stockhammer (2004) estimates an equation for investment for four countries (Germany, France, UK and USA) using the rentier income of non-financial corporations (interest and dividend incomes) as a proxy for financialisation. He finds strong support that financialisation caused a slowdown of capital accumulation in the USA and France, some support in the UK and none in Germany. Orhangazi (2008a and 2008b) also finds negative effects of financialisation in the USA, not only using aggregate data for non-financial corporations, but also using corporation level data to breakdown the analysis by sector (manufacturing versus non-manufacturing corporations), industry (durables versus non-durables corporations producers) and dimension (small versus large corporations). He uses two different proxies for financialisation, the financial profits (i.e. the income in the form of interest and dividends) and financial payments (interest and dividends payments and stock buybacks), in order to test the statistical significance of the two channels of financialisation on real investment. Van Treeck (2008) also concludes that interest and dividend payments had a negative effect on non-financial investment in the USA for the period between 1965 and 2004. Onaran *et al.* (2011) estimates a simpler investment functions, finding further evidence that financialisation (measured by payments of interests and dividends, i.e. the rentier income share) has caused a slowdown in investment in the USA.

The literature has focused mainly in large and highly developed economies. In what follows, we analyse empirically the role of financialisation on a smaller, less developed and more peripheral economy, the Portuguese economy.

[2] As demonstrated by Onaran *et al.* (2011) there is also some empirical work to the other components for the aggregate demand. Here, we are only focusing on investment.

3. FINANCIALISATION AND REAL INVESTMENT: AN ECONOMIC MODELISATION

As recognized by Eisner (1974), the empirical analysis of real investment is not a simple task, particularly when the decision is the pure econometric estimation of investment functions. In fact, *"[…] estimation of investment functions is a tricky and difficult business and the best posture for any of us in that game is one of humility"* (Eisner, 1974, p. 101). Davidson (2000) reiterates this idea, highlighting that investment decisions are essentially affected by exogenous "animal spirits" of entrepreneurs and, therefore, they hardly follow a stable functional expression.

Nevertheless, it is possible to find in the literature several works on the main determinants of investment decisions by the corporations. Surveying this literature, Stockhammer (2004) concludes that the main determinants of investment are capacity utilisation, the profitability and the relative cost of capital. Similarly, Orhangazi (2008a and 2008b) recognizes that there is a voluminous literature that tries to describe investment behaviour of corporations. According to this author, the traditional literature takes into account both real and financial variables, considering that there are essentially five determinants of investment, namely: profitability, output (or sales), cost of capital (or interest rates), level of debt and cash-flow (or the internal funds). In the same vein, Van treeck (2008) points to the importance of profitability and the business cycle as the main influencers of investment. Lastly, Onaran *et al.* (2011) emphasise the importance of output (capturing the accelerator effect) and profitability (as indicator of funds availability) as the major variables that influence the general investment of non-financial corporations.

In what follows, we estimate an equation where investment of non-financial corporations is a function of the traditional or standard variables: profitability, level of debt, cost of capital, savings rate and the business cycle. In addition, we will introduce two other variables, in order to control and isolate the effects of financialisation on real investment. We propose the incorporation of two different measures of financialisation, financial receipts and financial payments of non-financial corporations, in order to assess the relevance and the impact of the two channels that are expected to hamper the real investment of non-financial corporations, as described in the previous Section.

In this regard, our investment function takes the following form:

$$I_t = \beta_0 + \beta_1 P_{t-1} + \beta_2 D_{t-1} + \beta_3 CC_{t-1} + \beta_4 SR_{t-1} + \beta_5 BC_{t-1} + \beta_6 FR_{t-1} + \beta_7 FP_{t-1} + \eta_t \quad \textbf{(1)}$$

, where I is investment of non-financial corporations, P is profitability, D is the corporate debt, CC is the cost of capital, SR is the savings rate, BC is the business cycle, FR are financial receipts, FP are financial payments and η_t represents an exogenous investment shock in period t and it is a disturbance term independent and identically distributed (white noise) with null average and constant variance (homoscedastic).

Furthermore, we use lagged values for the explanatory variables (with exception of the cointegration relationship), taking into account the time lag between investment decisions and the respective capital expenditures (investment projects usually take more time than one year), the inertia (higher/lower investment normally leads to higher/lower subsequent investment) and their role on entrepreneurs' expectations[3].

On the other hand, all variables of non-financial corporations (investment, profitability, debt, financial receipts and financial payments) are expressed as ratios of the respective gross value added. We choose this technique, instead of using the variables in volume because ratios translate better the relative importance of the phenomenon of financialisation and in order to circumvent multicollinearity problems between some variables (namely between gross value added and financial receipts). Nonetheless, the utilization of ratios also allows the interpretation of the respective coefficients in terms of the percentage points (p. p.).

It is worth to note that we are proposing to estimate an aggregate investment function, similarly to Stockhammer (2004), Orhangazi (2008a), Van treeck (2008) and Onaran *et al.* (2011). Against this backdrop, Stockhammer (2004) reinforces that the analysis of results should be interpreted with some care, insofar as the theory of behaviour of non-financial corporations is supported by microeconomic fundaments, but the phenomenon that we wish to explain, i. e. the slowdown of real investment, is a macroeconomic one. This seems to have implicit the assumption of the existence of a representative corporation. In addition, the use of aggregate investment introduces some limitations on the analysis, namely overshadows both different levels of financialisation among non-financial corporations and the heterogeneity on the behaviour of the non-financial corporations by sector, industry, dimension or ownership. The macro perspective that we follow has the advantage of allowing to study if the phenomenon has a macroeconomic impact. However, if we find an effect of the financialisation variables we are unable to say if that is due to the impact of some large corporations or if is a more generalized phenomenon across all corporations. Moreover, if we do not find any macroeconomic effect of the financialisation variables, we cannot rule out that they affect a subset of corporations, which however is not enough to generate a macroeconomic effect.

Thereby, the profitability, the savings rate and the business cycle are expected to influence positively investment. On the other hand, the level of debt, the cost of capital and the

[3] Orhangazi (2008a and 2008b) still refers that the use of lagged explanatory variables allows circumventing the potential problems of simultaneity and reverse causation.

two variables of financialisation are expected to have a negative effect on investment of non-financial corporations. Against this backdrop, the coefficients of these variables are expected to have the following signs:

$$\beta_1 > 0, \beta_2 < 0, \beta_3 < 0, \beta_4 > 0, \beta_5 > 0, \beta_6 < 0, \beta_7 < 0 \quad \textbf{(2)}$$

The level of profitability tends to be positively related with investment, reflecting the demand conditions that determine the viability of projects. Firstly, the degree of profitability could affect positively investment by determining the level of internal funds available for the realization of new investments. In this regard, Stockhammer (2004) claims that Keynesians urge for the relevance of demand conditions and profitability due to their importance as a source of internal funds. Secondly, as noted by Kopcke and Brauman (2001), expectations about the future conditions are the most significant determinants of investment. However and given the uncertainty about the future, profitability and demand conditions cannot be anticipated, whereby expectations about the future are largely formed on the basis of past performance. Accordingly and as emphasized by Kuh and Meyer (1955) and Minsky (1975), past demand conditions and past profitability are the major determinants of investment instead of their expectations.

The level of debt is expected to be negatively related with the investment of non-financial corporations. Indeed, high levels of debt could be a symptom of financial fragility, which restrain the realization of new investments in the medium and long-term. Note that higher levels of indebtedness could signal that managers and shareholders are losing control of their corporations, reflecting therefore a higher risk of losing their autonomy. Nevertheless, Orhangazi (2008a and 2008b) suggests that two relations of opposite signs can exist between debt and investment of corporations. On the one hand, if the level of debt is perceived (by managers, by banks or by the international financial markets) as safe, the rise of debt could have no effect, or even have a positive effect, on investment through the increase of available funds. One the other hand, if the level of debt is perceived as unsafe, the rise of debt has a negative effect on investment, because future profits of the corporation could be insufficient to repay existing debt, increasing the possibility of bankruptcy.

The investment also depends negatively of the respective cost of capital (traditionally measured by the level of real long-term interest rates). The argument is that the investment ultimately depends of the funding or opportunity costs.

Additionally, the savings rate is expected to be positively related with investment. The argument is that a higher savings rate will increase the available funds to banks and financial markets, which is crucial to ensure their intermediation function and the provision of funding (by channelling savings from lenders to borrowers through credit and other forms of financing).

On the other hand, the business cycle is expected to be positively related with investment. This positive relationship between the business cycle and the level of investment rests on the Keynesian argument around the acceleration principle. The accelerator theory postulates that a rise in the economic activity accelerates capital accumulation (investment), whilst a decrease in the economic activity exacerbates capital depletion (disinvestment). Indeed, it is widely recognized that most of corporations denote a higher willingness to invest in periods of rapid growth than during downturns. In fact, Bonfim and Neves (2001) confirm that the Portuguese investment is strongly procyclical in relation to the respective business cycle, albeit demonstrating a higher level of volatility when compared with output. These features are also corroborated by Lopes (2003) for the European Union and the USA. In addition, Sørensen and Whitta-Jacobsen (2005) point to the existence of two stylized facts of business cycles related to the behaviour of investment, which are visible in most economies. First, investment is strongly positively correlated with the GDP. Second, investment is often more volatile than the GDP, being the most unstable component of aggregate demand.

Finally, the variables of financialisation are expected to be negatively related with the investment of non-financial corporations, as discussed in the previous Section. In fact, the rise of financial receipts could restrain real investment, insofar as non-financial corporations will probably use this income to make further investments in financial assets rather than invest in real activities (the “crowding out” effect). If corporations get more income from financial markets, this leads them to invest further in financial investments. On the other hand, the rise of financial payments should also constrain real investment of non-financial corporations, through the reduction of available funds to finance that investment.

4. DATA AND METHODOLOGY: THE ECONOMETRIC FRAMEWORK

4.1. DATA

In order to analyse the relationship between financialisation and the Portuguese real investment, we collect annual data between 1977 and 2013, constituting a total sample with thirty-seven observations. This is the period and the frequency for which all data are available, which are adequate to undertake the study for two reasons. On the one hand, the phenomenon of financialisation became more preponderant in Portugal during the nineties (Lagoa *et al.* (2013)). On the other hand, the investment of corporations is a long-term decision (investment projects usually take more time than one year), and therefore annual data it is likely to capture the determinants of real investment than higher frequency data.

Turning now to the definition of the data used, we use the gross fixed capital formation of non-financial corporations divided by the respective gross value added to describe the investment of non-financial corporations. Note that the ratio between these two variables is usually known as the investment rate of non-financial corporations. These two variables were collected from the Portuguese National Accounts (at current prices and in million of euros), available at *Instituto Nacional de Estatística*.

We use the gross operating surplus[4] of non-financial corporations divided by the respective gross value added as a proxy of profitability. Indeed, the ratio between these two variables is commonly referred as the profit share of non-financial corporations. These two variables were collected from the Portuguese National Accounts (at current prices and in million of euros), available at *Instituto Nacional de Estatística*.

The level of current debt used here was the net lending/ net borrowing[5] of non-financial corporations divided by the respective gross value added. These two variables were also collected from the Portuguese National Accounts (at current prices and in million of euros), available at *Instituto Nacional de Estatística*.

We use the real interest rates (deflated by the GDP deflator) from AMECO database in order to measure the cost of capital of non-financial corporations. We use the short-term real interest rate between 1977 and 1984 and the long-term real interest rate in the following years,

[4] According to the Eurostat, "gross operating surplus can be defined in the context of national accounts as a balancing item in the generation of income account representing the excess amount of money generated by incorporated enterprises' operating activities after paying labour input costs. In other words, it is the capital available to financial and non-financial corporations which allows them to repay their creditors, to pay taxes and eventually to finance all or part of their investment".

[5] The net lending/ net borrowing of non-financial corporations is the difference between current savings (plus capital transfers) and the respective investment. According to the OECD, "it reflects the amount of financial assets that are available for lending or needed for borrowing to finance all expenditures – current, gross capital formation, non-produced non-financial assets, and capital transfers – in excess of disposable income".

insofar as the long-term real interest rate is only available in the period of 1985 onwards[6]. We chose to use this strategy, instead of using only the short-term real interest rates, since investment is a long-term decision and therefore is more dependent of long-term interest rates.

The variable of savings rate corresponds to the gross savings of households in percentage of the respective disposable income, available on PORDATA database[7].

We apply the traditional variable of gross domestic product to describe the evolution of business cycle and the trend of the aggregated demand as a whole. This variable was collected from the PORDATA database (at current prices and in million of euros) and it deflated using the GDP deflator (2006=100), also available on PORDATA database. After that, we calculate the respective annual growth rate.

The financial receipts correspond to the sum of interests and the distributed income of corporations (where dividends are included) received by non-financial corporations and we divided them by the gross value added of non-financial corporations. These variables were collected from the Portuguese National Accounts (at current prices and in million of euros), available at *Instituto Nacional de Estatística*.

The financial payments correspond to the sum of interests and the distributed income of corporations (where dividends are included) paid by non-financial corporations and we divided them from the gross value added of non-financial corporations. These variables were also collected from the Portuguese National Accounts (at current prices and in million of euros), available at *Instituto Nacional de Estatística*.

Table 12 in the Appendix contains descriptive statistics of the data and Table 1 presents the corresponding correlation matrix between all variables. The most important finding is that the highest correlations occur between investment and savings rate and investment and the business cycle. These are precisely two variables that are expected to have a positive effect on investment. Surprisingly, the level of profitability is negatively correlated with investment. The remaining four variables (debt, cost of capital, financial receipts and financial payments) are also negatively related with investment, which could signal that they can have a negative effect on investment of non-financial corporations. This also seems to confirm our hypothesis that the process of financialisation has hampered real investment, through the two mentioned channels.

Additionally, it is worth to note that the absolute values of all correlations are lower than 0,8, which is crucial to outwit the existence of severe multicollinearity between the variables of our model (Studenmund, 2005). The only exception occurs between profitability and debt, which could make it hard distinguish from one another the effects of these variables

[6] According to the AMECO database, the real interest rates are obtained by the difference between the nominal interest rates and the inflation rate measured by the GDP deflator. The short-term interest rates corresponds to the 6-months deposits interest rates and the long-term interest rates corresponds to the weight average of public and private bonds over five years.

[7] Please see http://www.pordata.pt/.

on investment. Nonetheless, the existence of severe multicollinearity could be rejected, since the values of all Variance Inflation Factors (VIF) are less than the traditional ceiling of 10 for each variable (Table 13) (Kutner et al. (2005)). The only exception occurs with the dependent variable of debt, but even so the respective VIF is not so much higher than 10.

Table 1 – The correlation matrix between variables

	I	***P***	***D***	***CC***	***SR***	***BC***	***FR***	***FP***
I	1							
P	-0,338**	1						
D	-0,554***	0,859***	1					
CC	-0,560***	0,659***	0,610***	1				
SR	0,148	-0,592***	-0,493***	-0,390**	1			
BC	0,476***	-0,108	-0,065	-0,344**	0,392**	1		
FR	-0,378**	0,447***	0,377**	0,591***	-0,702***	-0,502***	1	
FP	-0,076	-0,518***	-0,619***	-0,134	0,511***	-0,317*	0,002	1

Note: *** indicates statistically significance at 1% level, ** indicates statistically significance at 5% level and * indicates statistically significance at 10% level

4.2. METHODOLOGY

Our methodology involves six stages. First, we carry out unit root tests. The analysis of unit roots is always crucial, insofar as many macroeconomic series violate the assumption of stationarity (Nelson and Plosser, 1982). In that situation, the variance is infinite, shocks are permanent and the autocorrelation between different series is close to one, which tends to originate spurious results that are counterproductive to the standard inference procedures. In this regard, we apply the traditional unit root tests, in order to conclude about the order of integration of each variable[8]. We apply the conventional augmented Dickey and Fuller (1979) (ADF) test and the Phillips and Perron (1998) (PP) test.

Having done that, and if all variables are non-stationary in levels and stationary in first differences, i. e. integrated of order one, we test if there is a cointegration relationship between them. Engle and Granger (1987) postulate that a linear combination of two (or more) non-stationary variables can be stationary. Thus, the non-stationary variables are called to be cointegrated. In this regard, the stationary linear combination of variables is the cointegration equation and represents the long-term relationship between the variables. Against this backdrop, we employ the methodology proposed by Johansen (1991 and 1995), in order to conclude about the existence of cointegration relationship between our variables, through the Trace test and the Maximum Eigenvalue test.

The third step is the estimation of our model, using a Vector Autoregressive Model (VAR) if variables are stationary in levels, or a Vector Error Correction Model (VECM) if

[8] The order of integration is the number of unit roots contained in the series or the number of differencing operations that it necessary takes into account to make the series stationary. In fact, if a non-stationary series must be differentiated d times to become stationary, it is said that is integrated of order d or $I(d)$. Thus, a stationary series is integrated of order zero or $I(0)$ and so on.

variables proved to be integrated of order one and simultaneously cointegrated[9]. VAR models were introduced by Sims (1980), given the need for structural modelling the relationship between several variables. VAR models treat all endogenous variables in the system as a function of the lagged values of all of the endogenous variables in the system. Mathematically, a VAR model with k endogenous variables can be represented by:

$$y_t = A_1 y_{t-1} + ... + A_p y_{t-p} + \mu + u_t \quad \textbf{(3)}$$

, where y_t is a k vector of (and stationary) variables, A_i is a matrix $k \times k$ of coefficients (or parameters) to be estimated, p is the number of lags of each variable, μ is a vector of k constants and u_t is a vector of k innovations that may be contemporaneously correlated but are uncorrelated with all of the right-hand side variables (u_t is a disturbance term independent and identically distributed (white-noise)). VECM is a restricted VAR for non-stationary variables that are known to be cointegrated, which can be re-written as:

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \mu + u_t \quad \textbf{(4)}$$

This model allows modelling the short-term dynamic relationship between all variables using their differences but adjusting it towards their long-term equilibrium. Here, Π and Γ are the matrices containing the long and short-term information, respectively, such that:

$$\Pi = \sum_{i=1}^{p} A_i - I \quad \textbf{(5)}$$

$$\Gamma_i = -\sum_{j=i+1}^{p} A_j \quad \textbf{(6)}$$

The long-term matrix Π can also be written as $\Pi = \alpha\beta'$, where α measures the speed of adjustments of the variables towards the equilibrium and β is the long-term coefficients or the cointegration matrix.

Some diagnostic tests will be applied in the fourth stage, in order to assess the robustness and adequacy of our results. We will employ the autocorrelation LM test, the normality test of residuals and the stability test.

Then, we run the Granger causality tests. The analysis of the Granger (1969) causality allow us to determine if the current value of a certain variable y can be predicted by its past values and by the lagged values of other variables x.

[9] Note that if variables are non-stationary but cointegration does not occur, we should also use VAR models by differentiating all variables.

Finally, we proceed with the analysis of impulse response functions, in order to determine the short and long-term effect of an isolated shock in each variable. The impulse response functions give us an indication about the short and long-term effect in all endogenous variables if there is an isolated shock on one of them. Effectively, the impulse response functions trace the effect of a one-time shock on current and future values of the endogenous variables. It complements the findings obtained with the Granger causality analysis.

5. EMPIRICAL RESULTS AND DISCUSSION

First of all, we analyse the presence of unit roots. In this regard, plots of our seven variables (Figure 2 to Figure 9 in the Appendix) already seem to indicate that all variables are non-stationary in levels. We also employ the ADF test and the PP test (Table 2 and Table 3, respectively). We conclude that for all seven variables the null hypothesis that the variable contains a unit root cannot be rejected at the traditional significance levels by both tests. The only exception is the variable of cost of capital, for which the null hypothesis of non-stationarity is rejected by the PP test. However, the null hypothesis is not rejected by the ADF test, which is more suitable in the case of finite samples. Indeed, Davidson and MacKinnon (1999) report that the PP test performs worse than the ADF test in the case of finite samples. Then, we carried out the same two unit root tests taking into account the first differences of the variables, in order to conclude if the differentiated series are already stationary. For all differentiated variables, we reject the null hypothesis by both tests. So, our variables are non-stationary in levels but stationary in first differences, i. e. they are all integrated of order one.

Table 2 – *P-values* of the ADF unit root test

Variable	Level			First Difference		
	Intercept	***Trend and Intercept***	***None***	***Intercept***	***Trend and Intercept***	***None***
I	0,007	0,022*	0,305	0,006*	0,032	0,001
P	0,344*	0,616	0,917	0,000	0,002	0,000*
D	0,403	0,651	0,098*	0,000	0,000	0,000*
CC	0,006	0,006	0,195*	0,000	0,000	0,000*
SR	0,700	0,870	0,256*	0,000	0,001	0,000*
BC	0,145	0,617*	0,032	0,001	0,002*	0,000
FR	0,172*	0,097	0,625	0,015	0,066	0,000*
FP	0,015	0,712*	0,161	0,002	0,040	0,000*

Note: The lag length were selected automatically based on the AIC criteria and * points the exogenous variables included in the test according to the AIC criteria

Table 3 – *P-values* of the PP unit root test

Variable	Level			First Difference		
	Intercept	***Trend and Intercept***	***None***	***Intercept***	***Trend and Intercept***	***None***
I	0,238*	0,394	0,344	0,016	0,078	0,001*
P	0,021*	0,182	0,890	0,000	0,002	0,000*
D	0,363	0,582	0,097*	0,000	0,000	0,000*
CC	0,006	0,005*	0,004	0,000	0,000	0,000*
SR	0,714	0,335*	0,393	0,000	0,000	0,000*
BC	0,147	0,105*	0,036	0,000	0,000	0,000*
FR	0,219*	0,360	0,618	0,003	0,015	0,000*
FP	0,233*	0,377	0,514	0,005	0,028	0,000*

Note: * points the exogenous variables included in the test according to the AIC criteria

After that, the lag length is determined according to the different information criteria and considering an unrestricted VAR. Table 4 contains the number of lags suggested by each information criteria. Note that a number of lags between zero and two were considered, because

with a higher number of lags the unrestricted VAR does not satisfy the stability condition since at least one root of characteristic polynomial is outside the unit circle (Lütkepohl, 1991), as demonstrated by Table 14 in the Appendix. There is no concordance between the information criteria, some pointing for an optimal lag of two and others pointing to one. We choose two lags, taking into account that FPE and AIC are a better choice than the others criteria in the case of small sample sizes (sixty observations and below), as stressed by Liew (2004).

Table 4 – Values of the information criteria by lag

Lag	LR	FPE	AIC	SC	HQ
0	n. a.	1,3e-25	-34,6	-34,3	-34,5
1	261,1*	2,4e-28	-41,0	-37,8*	-39,9*
2	77,5	2,3e-28*	-41,6*	-35,6	-39,6

Note: * indicates the optimal lag order selected by the respective criteria

Then, we apply the methodology developed by Johansen (1991 and 1995), in order to assess if there is a cointegration relationship between our variables. As indicated in the previous Section, Johansen uses two different statistics, the Trace test and the Maximum Eigenvalue test, in order to determine the number of cointegration relationships. Now, we use only one lag to run this test, as it is realized in first differences. In addition, we should select the deterministic trend on the cointegration equation. Thus, we first conduct the Johansen test considering all assumptions, as demonstrated in Table 5.

Table 5 – Number of cointegration relations by type of model specification (at 5% significance level)

Data trend *(Test Type)*	**None** *(No intercept No trend)*	**None** *(Intercept No trend)*	**Linear** *(Intercept No trend)*	**Linear** *(Intercept Trend)*	**Quadratic** *(Intercept Trend)*
Trace test	1	2	3	3	3
Maximum Eigenvalue test	1	1	1	2	2

Note: AIC criteria selects the fourth model (the level data and the cointegrating equations have linear trends) and suggests an unrestricted VAR with three lags, but SC selects the second model (the level data have no deterministic trends and the cointegrating equations have intercepts) and confirms an unrestricted VAR with one lag

The results are contradictory, not only in relation to the optimal number of lags, but also regarding the deterministic trend specification. As noted by Brooks (2008), these conflicting results could be attributed to the relatively small size of our sample. Nonetheless, our results do at least suggest that our seven variables are cointegrated, independently of model specification. Indeed, the number of cointegration relations is always higher than zero and less than the number of variables for any model specification, either by Trace test or by Maximum Eigenvalue test.

As such, we can proceed with the VECM estimation, but before that we need to determine the number of lags, the deterministic trend specification and the number of cointegration relations to include in the respective estimation. AIC criteria selects the fourth

model (the level data and the cointegrating equations have linear trends) and suggests an unrestricted VAR with three lags, but SC selects the second model (the level data have no deterministic trends and the cointegrating equations have intercepts) and confirms an unrestricted VAR with one lag.

Regarding the optimal number of lags, we maintain the conclusion provided by the AIC criteria for the reasons explained above, which selects an unrestricted VAR with two lags (three lags is not possible, since the VAR does not satisfy the stability condition). On the other hand, the SC criteria selects an unrestricted VAR with only one lag, which is compatible to a VECM without lags and therefore lesser interesting for this analysis. In relation to the deterministic trend specification, we will consider the choice of SC criteria, which selects the second model, insofar as the majority of our eight variables do not appear to have a significantly trend in levels (Figure 2 to Figure 9 in the Appendix). Under these circumstances, the Trace test points to the existence of three cointegration relationships, whilst the Maximum Eigenvalue test points to only one. We will consider one cointegrating vector, because some authors advert that in the case of conflict between these two tests, the Maximum Eigenvalue should prevail for inferences because it is more reliable in small samples (e.g. Johansen and Juselius (1990), Gregory (1994), Dutta and Ahmed (1999), among others).

Hence, we run a VECM considering one cointegrating vector and the second specification model. Now, we conduct a set of diagnostic tests, in order to assess if the model is adequate. We apply three different tests and the respective results are presented in Table 6. For the autocorrelation LM test, we cannot reject the null hypothesis of no serial correlation of residuals up to one lag, since the respective *p-value* is higher than the conventional significance levels. The conclusion is the same for a higher number of lags. In relation to the normality test, we do not reject the null hypothesis of normality of residuals, insofar as the respective *p-value* is higher than the traditional 1% significance level. However, the null hypothesis that the residuals are normally distributed is rejected to a higher significance levels, which is not considered very serious because the central limit theorem seems to guarantee the normality of residuals, since our sample has more than thirty observations. Indeed, Hendry and Juselius (2000) recognizes that the normality assumption is seldom satisfied in economic applications, which does not invalidate the global robustness of our estimations as well as the respective statistical inference procedures. Finally and in relation to the stability, we conclude that there are seven eigenvalues or unit roots (Table 15 on Appendix). It means that the estimated VECM is stable, insofar as the difference between our eight variables and the respective seven eigenvalues equals to one (Lütkpohl and Krätzig, 2004). Concisely, the estimated VECM passes in all tests and does not suffer from any econometric problem, which confirms that the model is well specified.

Table 6 – Diagnostic tests for VECM estimations

Test	*P-value*
Autocorrelation LM test (up to one lag)	0,601
Normality test (Jarque-Bera)	0,037
Stability (AR root) test	Seven eigenvalues

We choose the variable of investment as the normalising one, given our interest in studying the relationship between this variable and the remaining ones. The long-term relationship between investment and other seven variables can be found in Table 7, whilst the short-term relationship is presented in Table 10.

Table 7 – The long-term estimations of investment

Variable	P_{t-1}	D_{t-1}	CC_{t-1}	SR_{t-1}	BC_{t-1}	FR_{t-1}	FP_{t-1}	β_0
I_{t-1}	1,490***	-0,442***	-1,066***	0,528***	0,499***	1,140***	-0,221***	-0,425***
	(0,135)	(0,061)	(0,101)	(0,154)	(0,131)	(0,206)	(0,073)	(0,069)
	[-11,019]	[7,213]	[10,542]	[-3,432]	[-3,816]	[-5,547]	[3,022]	[6,204]

Note: Standard errors in ( ), t-statistics in [] and *** indicates statistically significance at 1% level

In the long-term, all variables are statistically significant, since the absolute value of the t-statistic of each one is higher than 2,326 (the critical value of the t Student distribution at 1% significance level (one-tailed)). Additionally, all coefficients have the expected signs, with exception of financial receipts. Indeed, the level of profitability influences positively investment of non-financial corporations in the long-term, which may suggest that profits are used to finance new investments. Alternatively, a larger profitability rate can also indicate that future projects will also be profitable. A 1 p. p. increase in profitability rises investment by about 1,5p. p.. The level of debt influences negatively the investment of non-financial corporations. A 1 p. p. rise in debt decreases investment by around 0,4 p. p. This indicates that indebtedness could be limiting the capacity of non-financial corporations to obtain further funding, which constrains the respective investment. At the same time, this illustrates that a higher level of indebtedness may be being exclusively used to repay the existing debts rather than to realize new investments. As expected, the cost of capital exerts a negative impact on real investment: a 1 p. p. increase in the cost of capital reduces investment by about 1,1 p. p.. The savings rate is a positive determinant for investment. A 1 p. p. increase of savings rate by households lead to a rise of investment by 0,5 p. p.. The business cycle is also positively related with the investment of the Portuguese non-financial corporations, in accordance with the acceleration principle. In fact, a 1 p. p. increase in the economic activity rises investment by around 0,5 p. p., which shows that investors denotes a higher willingness to invest in periods of economic growth and confirms that investment is procyclical in relation to the business cycle. Surprisingly and contrary to the predictions of the literature on financialisation, the financial receipts are a positive determinant to the investment in the long-term. A 1 p. p. increase in financial receipts increases investment by around 1,1 p. p.. This seems to illustrate that the investment in financial

activities has not significantly divert funds from real activities, excluding the hypothesis of "crowding out" effect. In addition, this could mean that the returns of financial investments are used to finance real investments, rather than to fund further financial activities or financial investments. Nonetheless, this apparently contradiction with the literature on financialisation could be explained by the strong importance of small and medium corporations in Portugal that face high financial constraints and therefore are more dependent of any income to realize new investments. Simultaneously, the small number of Portuguese corporations quoted in the stock market could also explain this result, since these corporations end up having fewer funding sources. Finally, financial payments have a negative impact on real investment, in accordance to the predictions of the literature on financialisation. A rise of 1 p. p. in financial payments decreases investment by about 0,2 p. p..

It is worth noting that if we had chosen the fourth model (the level data and the cointegrating equations have linear trends), as proposed by the AIC criteria, the results would be quite similar. All variables remained statistically significant and maintained the expected signals on the long-term, also with exception of financial receipts.

Table 8 presents the estimates to the error correction terms, which measure the adjustment to the long-term equilibrium. The most important finding is that the coefficient of investment is the only one that is statistically significant at a 5% level and exhibits a negative value, confirming that this variable contributes for the convergence to the long-term equilibrium and it makes sense to be an endogenous variable. In practice, the negative coefficient of investment points that a deviation from the long-term equilibrium in one period is automatically corrected in the next period in about 29%. Moreover, only the error correction terms of profitability, debt, savings rate and financial payments are statistically significant. At the same time, it is interesting to note that the adjustment of profitability and savings rate to the long-term relationship contribute to correct the respective disequilibrium, given its positive values. Furthermore, the error correction terms of cost of capital and financial receipts suggest that these two variables also contribute for the correction of the disequilibrium in the long-term relationship, albeit do not have statistical significance.

Table 8 – The error correction term estimations

Variable	ΔI_t	ΔP_t	ΔD_t	ΔCC_t	ΔSR_t	ΔBC_t	ΔFR_t	ΔFP_t
Error	-0,287**	0,275*	0,963*	-0,053	0,207*	-0,118	0,041	0,542*
Correction	(0,168)	(0,168)	(0,607)	(0,295)	(0,161)	(0,209)	(0,130)	(0,401)
Term	[1,700]	[1,635]	[1,586]	[-0,180]	[1,290]	[-0,566]	[0,314]	[1,350]

Note: Δ is the operator of the first differences, standard errors in ( ), t-statistics in [], ** indicates statistically significance at 5% level and * indicates statistically significance at 10% level

We can still perform the likelihood ratio tests applying parameter restrictions on the error term estimations, in order to assess if there is any evidence that some of variables can be

weakly exogenous. A variable is said to be weakly exogenous if its error term correction is equal to zero, which means that this variable does not respond to the discrepancy from the long-term equilibrium (Enders, 2003). Table 9 presents the respective results, where it was tested the hypothesis of weak exogeneity for each variable individually. At the traditional significance levels, the null hypothesis of weak exogeneity cannot be rejected for all variables. In that sense, all of our eight variables can be considered weakly exogeneous.

Table 9 – The weak exogeneity tests

Error Correction Term	Chi-square	*P-value*
ΔI_t	2,675	0,102
ΔP_t	2,434	0,119
ΔD_t	2,607	0,106
ΔCC_t	0,039	0,843
ΔSR_t	1,603	0,205
ΔBC_t	0,350	0,554
ΔFR_t	0,107	0,744
ΔFP_t	1,653	0,199

Note: Δ is the operator of the first differences

In the short-term, there are only four variables which are statistically significant in explaining investment by non-financial corporations: the lagged investment, profitability, the level of debt and savings rate. The lagged investment is a relevant determinant to the contemporaneous investment, which demonstrates a higher level of persistence and inertia of this macroeconomic variable (current higher/lower investment normally drives to higher/lower investment in the future). As expected, profitability and savings rate continue to influence positively investment in the short-term and debt also exerts a negative effect on the level of investment. The remaining variables are not statistically significant at conventional significance levels, albeit hold the expected signs which exception of financial receipts. Note that all signals of the short-term estimates are equal to the signals of the long-term estimates. This reveals that the reaction of investment of the Portuguese non-financial corporations to these variables is similar either in the long-term or short-term.

Table 10 – The short-term dynamic

Variable	ΔI_{t-1}	ΔP_{t-1}	ΔD_{t-1}	ΔCC_{t-1}	ΔSR_{t-1}	ΔBC_{t-1}	ΔFR_{t-1}	ΔFP_{t-1}
ΔI_t	0,193*	0,283**	-0,145*	-0,042	0,370*	0,068	0,423	-0,182
	(0,137)	(0,161)	(0,099)	(0,131)	(0,236)	(0,158)	(0,347)	(0,162)
	[1,404]	[1,751]	[-1,456]	[-0,317]	[1,567]	[0,432]	[1,219]	[-1,118]

Note: Δ is the operator of the first differences, standard errors in ( ), t-statistics in [], ** indicates statistically significance at 5% level and * indicates statistically significance at 10% level

Then, we perform the Granger causality tests, which measure how past changes on one variable (with all other variables constants) affects investment in the short-term. Table 11 exhibits the respective results. At 10% significance level, the investment is also Granger caused by profitability. For the remaining variables, the null hypothesis of non-causality is not rejected.

Against this backdrop, we can assert that the contemporaneous investment of the Portuguese non-financial corporations is only affected by the past values of profitability.

Table 11 – Granger causality tests

Null hypothesis	Chi-square	*P-value*
$\Delta P_t \rightarrow \Delta I_t$	3,066	0,080
$\Delta D_t \rightarrow \Delta I_t$	2,119	0,145
$\Delta CC_t \rightarrow \Delta I_t$	0,100	0,751
$\Delta SR_t \rightarrow \Delta I_t$	2,458	0,117
$\Delta BC_t \rightarrow \Delta I_t$	0,187	0,666
$\Delta FR_t \rightarrow \Delta I_t$	1,485	0,223
$\Delta FP_t \rightarrow \Delta I_t$	1,249	0,264

Note: $\rightarrow$ means does not Granger cause and Δ is the operator of the first differences

Regarding the impulse response functions, they allow to measure how an unanticipated shock to one variable affects in a dynamic way investment. These functions allow all the variables to change and simulate how the economy will react to a contemporaneous shock in the remaining variables (with the short-term and long-term relations operating). It is important to refer that the ordering of variables could change the profile of the respective functions (Enders (2003) and Lütkpohl and Krätzig (2004)).

Hence, there are two approaches to deal with that. First, we can use the generalized impulse response functions proposed by Koop *et al.* (1996) and Pesaran and Shin (1998). The generalized impulse response functions were designed to circumvent the problem of treatment of the future through the utilization of an expectation operator conditioned by the history. Thus, the generalized impulse response from an innovation to the $y-th$ variable are derived by applying a variable specific Cholesky factor computed with the $y-th$ variable at the top of the Cholesky ordering. This method is easy to apply as no ordering of variables needs to be chosen. Second, we can apply a Cholesly decomposition, which implies that variables are ordered from the most exogenous to the most endogenous variable from a contemporaneous point of view. Here, we need the help of economic theory. But we can also use an instantaneous causality tests to guide our economic intuition. The first variable in the order should be the one that is not contemporaneously caused by the other variables. We use the instantaneous causality tests in order to investigate which variable is not contemporaneously caused by all the others together. We conclude that the investment is the only variable that is not instantaneously caused by the others (Table 16 on Appendix), insofar as the null hypothesis of zero correlation between the respective residuals cannot be rejected at 1% significance level. This seems to signal that the investment is the more exogenous variable, confirming that investment decisions and the implementation of investment projects are time consuming. Now, based on economic theory, we suggest that the next variable should be the business cycle, namely because it tends to be strongly positively correlated with investment and reacts with a certain lag in relation to the

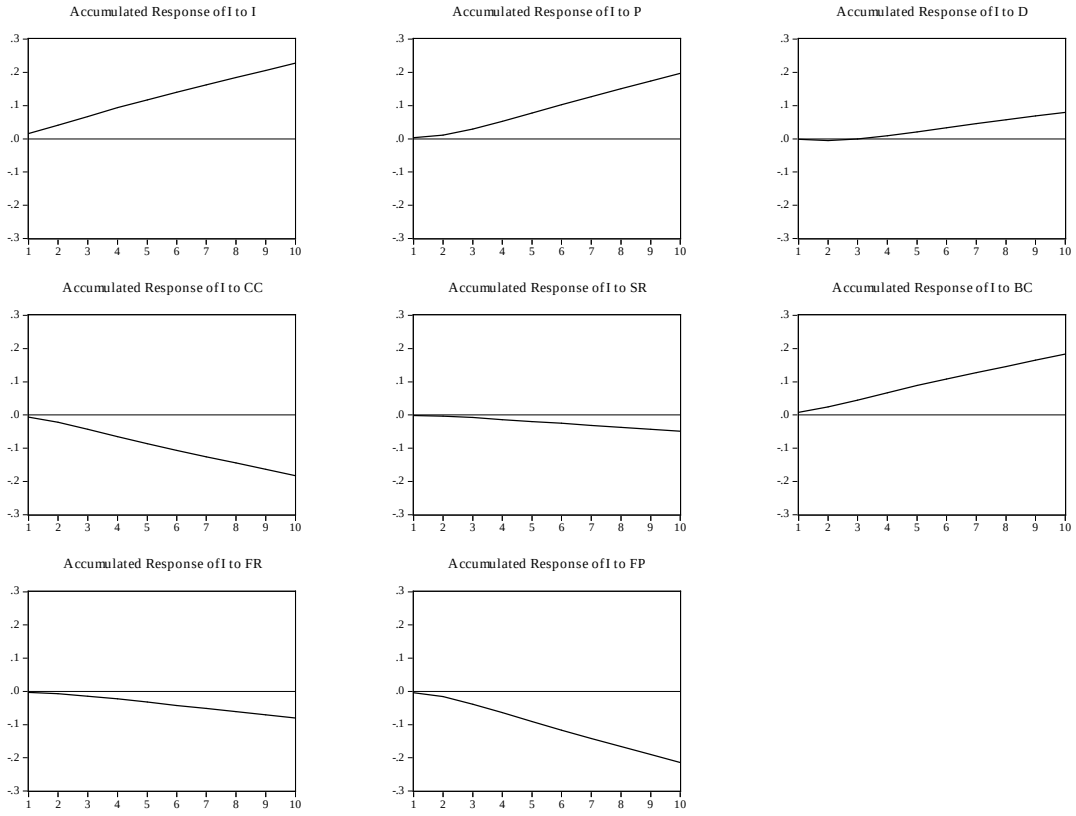
other variables. After that, we choose the variables of cost of capital, savings rate, debt, profitability and financial receipts. The last variable should be the financial payments, which are expected to be the more endogenous variable, because it is reasonable to assume that non-financial corporations only distribute dividends according to their respective profits and after receiving financial incomes.

We apply the first methodology, albeit the two approaches trace the impulse response functions quite similar, as demonstrated by Figure 1 and Figure 10 on Appendix. This shows us that the profile of the respective impulse response functions is not very sensitive to the adoption of one or another approach. The only exception is the response of investment to a shock in financial receipts, which is negative if we analyse the impulse response functions from the first approach, but positive if we analyse the second approach. Additionally, it is worth to emphasize that the profile of the respective impulse response functions would not change significantly if we had chosen other reordering in the Cholesky approach, albeit in some cases the response of investment to the variables of financialisation would change slightly.

The investment of the Portuguese non-financial corporations responds considerably to an unanticipated change in the other variables. Note that the response of investment to a shock in financial receipts is negative, confirming the hypothesis that the financial receipts have a negative impact on the Portuguese real investment. Concurrently, this reveals that the Portuguese non-financial corporations do not use these financial incomes to finance productive investments but probably to increase their engagement with financial activities, as postulated by the literature on financialisation. At the same time, there is evidence towards the "crowding out" effect arising from the greater allocation of resources to financial activities. On the other hand, the response of investment to a shock in financial payments is relatively pronounced and negative, which reinforces the arguments that pressures for financial payments decreases investment. Therefore, both channels of financialisation have a disruptive effect on investment in a dynamic way, but the negative effect of channel of financial payments is more vigorous. Debt has a small positive effect on investment, probably because it allows to finance new investment for corporations without equity. This positive effect is contrary to the long-term and short-term estimates, where debt influences negatively the investment rate of non-financial corporations. This happens because a shock in debt originates a positive effect in profitability and in the business cycle, which lead to an increase of investment. The unanticipated changes on the remaining variables have the expected impacts on investment, with exception of savings rate. Indeed, the response of investment to a shock in savings rate is slightly negative. This seems to reveal that the savings of households are being used to other purposes than to finance new investment projects by non-financial corporations. In fact and as noted by Lagoa *et al.* (2012), the Portuguese banks' credit policy has been characterized for privileging more (through higher volumes at lower interest rates) loans to private individuals (especially loans for housing

purposes) than to corporations in the last years. Additionally, this could signal that a higher level of savings involves lesser consumption by households, which can ward off the realization of new investments by non-financial corporations.

Figure 1 – Generalized impulse response functions



In conclusion, we find evidence supporting the claims that the process of financialisation has hampered the Portuguese real investment, mainly due to the channel working through financial payments. Indeed, the investment function on the long-term only shows the negative effect of financial payments. Investment also reacts to deviations from the long- term relationship involving the several variables. On the short-term, the lagged changes on financial receipts and financial payments do not seem to have an effect on investment. Finally, the dynamic response of investment to shocks in financial receipts and financial payments (combining the short and long-term responses) shows that the both channels have a disruptive effect on investment, but especially the channel of financial payments.

6. CONCLUSION

This paper aimed to analyse if there was a supportive or a disruptive relationship between the process of financialisation and the real investment of non-financial corporations in Portugal between 1977 and 2013, using aggregate macroeconomic annual data.

As opposed to the conventional economic theory, the literature on financialisation points two different ways regarding the way the growth of finance could reduce real investment by non-financial corporations. First of all, the increase in financial investments by non-financial corporations deviates funds from productive investment, originating a kind of "crowding out" effect on real investment. Secondly, the increasing pressure of the financial markets on non-financial corporations to raise financial payments in the form of interests and dividends also decreases the available funds to finance real investments.

In this context, we estimated an equation to describe the investment behaviour of Portuguese non-financial corporations, using aggregate macroeconomic data. Our investment function included the standard variables (profitability, debt, cost of capital, savings rate and business cycle) and two other variables to reflect the two channels of financialisation (financial receipts and financial payments).

After concluding that all variables are integrated of order one, we found statistical evidence supporting the existence of a cointegration relationship between them. So, we estimated a VECM, allowing the distinction between short-term and long-term effects on investment. In the long term, we are able to identify that the financial payments exerts a negative impact on the Portuguese real investment, in accordance with the literature on financialisation. Nonetheless, the financial receipts influence positively real investment. This apparent contradiction with the literature on financialisation can be explained by the existence of a huge amount of small and medium corporations in Portugal who face higher funding constrains and therefore are forced to use all incomes (even financial incomes) to realize new investment projects. On the short-term, both measures of financialisation are not statistically significant to explain the evolution of real investment. In addition, the profile of the impulse response functions (that combines the short and long-term responses) illustrates that financial receipts and financial payments has had a negative impact on real investment, but the negative reaction is more pronounced in the case of financial payments.

Our findings show us that the negative effects of financialisation on real investment are not an exclusive phenomenon of the most developed and financialised economies, like US and UK. Instead, it also seems to occur on smaller, less developed, less financialised and more peripheral economies, like Portugal.

In future research regarding this field, it would be interesting to analyse the statistical relevance of these two channels using data at a corporation-level, which allow us to identify the

specificities and the heterogeneity on the behaviour of the non-financial corporations by sector, industry or size, as recognized and empirically tested by Orhangazi (2008b). In this paper, we estimate an aggregate investment function, which shows us that the phenomenon of financialisation has an harmful macroeconomic impact. However, we are unable to conclude if the negative effect of financialisation occurs only in some corporations or it is generalized phenomenon transversal to all non-financial corporations. In Portugal, the main problem to apply this approach should be the availability of micro databases with the necessary information to do that. Already knowing the effects of financialisation on Portuguese non-financial corporations as a whole, it could be also interesting investigate the respective determinants (causes), following the approach developed by Akkemik and Özen (2014). Here, the measures of financialisation would be used as dependent variables. Other possible extensions of this work could be the estimation of aggregate functions to the other components of the aggregate demand, in order to evaluate the impact of financialisation on consumption and external demand, as demonstrated by Onaran *et al.* (2011).

7. REFERENCES

AGLIETTA, M. and BRETON, R. (2001), "Financial Systems, Corporate Control and Capital Accumulation", *Economy and Society*, 30 (4), pp. 433-466

AKKEMIK, K. A. and ÖZEN, Ş. (2014), "Macroeconomic and institutional determinants of financialisation of non-financial firms: Case study of Turkey", *Socio-Economic Review*, 12 (1), pp. 71-98

BECCARINI, A. (2007), "Investment sensitive to interest rate in an uncertain context: is a positive relationship possible?", *Economic Change*, 40 (3), pp. 223-234

BONFIM, D. and NEVES, P. D. (2002), "Cyclical Behaviour of the Portuguese Economy: 1953-1955", *Economic Bulletin*, Bank of Portugal, 8 (2), pp. 23-37

BROOKS, C. (2009), *Introductory Econometrics for Finance*, 2nd Edition, Cambridge University Press, New York

CINGOLANI, M. (2012), "Finance Capitalism: A look at the European Financial Accounts", Paper presented at the 9th International Conference Developments in Economic Theory and Policy, Bilbao, 28-29 June

CROTTY, J. R. (1990), "Owner-manager conflict and financial theory of investment stability: a critical assessment of Keynes, Tobin, and Minsky", *Journal of Post Keynesian Economics*, 12 (4), pp. 519-542

CROTTY, J. R. (2005), "The Neoliberal Paradox: The Impact of Destructive Product Market Competition and Impatient Finance on Nonfinancial Corporations in the Neoliberal Era", *in* EPSTEIN, G. A. (2005), *Financialisation and the World Economy*, Edward Elgar Publishing Limited, Cheltenhan

DAVIDSON, P. (2000), "There are major differences between Kalecki's theory of employment and Keynes's general theory of employment interest and money", *Journal of Post Keynesian Economics*, 23 (1), pp. 3-25

DAVIDSON, R. and MACKINNON, J. G. (1999), *Econometric Theory and Methods*, Oxford University Press, New York

DEMIR, F. (2009), "Financial Liberalization, Private Investment and Portfolio Choice: Financialisation of Real Sectors in Emerging Markets", *Journal of Development Economics*, 88 (2), pp. 314-324

DICKEY, D. A. and FULLER, W. A. (1979), "Distribution of the Estimators for Autoregressive Time Series with a Unit Root", *Journal of the America Statistical Association*, 74 (366), pp. 427-431

DUMÉNIL, G. and LÉVY, D. (2004), *Capital Resurgent: Roots of the Neoliberal Revolution*, Harvard University Press, New York

DUTTA, D. and AHMED, N. (1999), "An Aggregate Import Demand Function for Bangladesh: A Cointegration Approach", *Applied Economics*, 31 (4), pp. 465-472

EISNER, R. (1974), "Econometric Studies of Investment Behavior: A Comment", *Economic Inquiry*, 12 (1), pp. 91-104

ENDERS, W. (2003), *Applied Econometric Time Series*, 2nd Edition, John Wiley & Sons, Inc.

ENGLE, R. F. and GRANGER, C. W. J. (1987), "Co-integration and Error Correction: Representation, Estimation, and Testing", *Econometrica*, 55 (2), pp. 251-276

FAZZARI, S. *et al.* (1988), "Financing Constraints and Corporate Investment", *Brookings Papers on Economic Activity*, 1, pp. 141-206

FRIEDMAN, M. (1953), "The Case for Flexible Exchange Rates" in *Essays in Positive Economics*, Chicago University Press, Chicago

GERTLER, M. and GILCHRIST, G. (1994), "Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms", *Quarterly Journal of Economics*, 109 (2), pp. 309-340

GRANGER, C. W. J. (1969), "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods", *Econometrica*, 37 (3), pp. 424-438

GREGORY, A. W. (1994), "Testing for Cointegration in Linear Quadratic Models", *Journal of Business and Economic Statistics*, 12 (3), pp. 347-360

HEIN, E. (2009), "A (Post-)Keynesian perspective on 'financialisation'", Macroeconomic Policy Institute, Düsseldorf

HEIN, E. (2012), *The Macroeconomics of Finance-dominated Capitalism – and its Crisis*, Edward Elgar Publishing Limited, Cheltenhan

HEIN, E. and DODIG, N. (2013), "Financialisation, Distribution, Growth and Crises – Long-Run Tendencies, *FESSUD Working Paper Series nº 23*, FESSUD Project

HEIN, E. and VAN TREECK, T. (2010), "'Financialisation' in Post-Keynesian models of distribution and growth" *in* SETTERFIELD, M. (2010), *Handbook of Alternative Theories of Economic Growth*, Edward Elgar Publishing Limited, Cheltenhan

HENDRY, D. F. and JUSELIUS, K. (2000), "Explaining Cointegration Analysis: Part II", *Discussion Paper nº 00-20*, Department of Economics, University of Copenhagen

JOHANSEN, S. (1991), "Estimation and Hypothesis Testing of Cointegration Vectors in Gaussian Vector Autoregressive Models", *Econometrica*, 59 (6), pp. 1551-1580

JOHANSEN, S. and JUSELIUS, K. (1991), "Maximum Likelihood Estimation and Inferences on Cointegration – With Applications to the Demand for Money", *Oxford Bulletin of Economics and Statistics*, 52 (2), pp. 169-210

JOHANSEN, S. (1995), *Likelihood-based Inference in Cointegrated Vector Autoregressive Models*, Oxford University Press, Oxford

KOOP, G. *et al.* (1996), "Impulse Response Analysis in Nonlinear Multivariate Models", *Journal of Econometrics*, 74 (1), pp. 119-147

KOPCKE, R. and BRAUMAN, R. (2001), "The Performance of Traditional Macroeconomic Models of Businesses' Investment Spending", *New England Economic Review*, 2 (1), pp. 3-39

KRIPPNER, G. R. (2005), "The Financialisation of the American Economy", *Socio--Economic Review*, 3 (2), pp. 173-208

KUH, E. and MEYER, J. (1955), "Acceleration and Related Theories of Investment: An Empirical Inquiry", *Review of Economics and Statistics*, 38 (3), pp. 217-230

KUTNER, M. H. *et al.* (2004), *Applied Linear Regression Models*, 5th Edition, Irwin/McGraw-Hill

LAGOA, S. *et al.* (2013), "Report on the Financial System in Portugal", *FESSUD Studies in Financial Systems nº 9*, FESSUD Project

LAZONICK, W. and O'SULLIVAN, M. (2000), "Maximising shareholder value: a new ideology for corporate governance", *Economic Society*, 29 (1), pp. 13-35

LIEW, V. K. (2004), "Which Lag Length Selection Criteria Should We Employ?", *Economics Bulletin*, 3 (33), pp. 1-9

LOPES, A. F. (2003), "Os ciclos económicos nos países pertencentes à União Europeia: Breve comparação do comportamento cíclico dos estados membros", *Working Paper nº35*, Dinâmia'CET-IUL, ISCTE-IUL

LÜTKEPOHL, H. (1991), *Introduction to Multiple Time Series Analysis*, Springer-Verlag, New York

LÜTKEPOHL, H. and KRÄTZIG, M. (2004), *Applied Time Series Econometrics*, Cambridge University Press, New York

MINSKY, H. (1975), *John Mayard Keynes*, Columbia University Press, New York

NDIKUMANA, L. (1999), "Debt Service, Financing Constraints, and Fixed Investment: Evidence from Panel Data", *Journal of Post Keynesian Economics*, 21 (3), pp. 455-478

NELSON, C. R. and PLOSSER, C. I. (1982), "Trends and Random Walks in Macroeconomic Time Series: Some Evidence and Applications", *Journal of Monetary Economics*, 10 (2), pp. 13-162

ONARAM, Ö. *et al.* (2011), "Financialisation, income distribution and aggregate demand in the USA", *Cambridge Journal of Economics*, 35 (4), pp. 637-661

ORHANGAZI, Ö. (2008a), *Financialization and the US Economy*, Edward Elgar Publishing Limited, Cheltenhan

ORHANGAZI, Ö. (2008b), "Financialisation and capital accumulation in the non-financial corporate sector: A theoretical and empirical investigation on the US economy: 1973-2003", *Cambridge Journal of Economics*, 32 (6), pp. 863-886

ORSI, L. and SOLARI, S. (2010), "Financialisation in Southern European economies", *Working Paper nº 2*, Institutional Change and Trajectories of Socio-Economic Models

PALLEY, T. I. (2007), "Financialisation: What it is and Why it Matters", *Working Paper nº 153*, Political Economy Research Institute, Washington

PESARAN, M. H. and SHIN, Y. (1998), "Generalized Impulse Response Analysis in Linear Multivariate Models", *Econometrics Letters*, 58 (1), pp. 17-29

PHILLIPS, P. C. B. and PERRON, P. (1998), "Testing for a Unit Root in Time Series Regression", *Biometrika*, 75 (2), pp. 335-346

SIMS, C. (1980), "Macroeconomics and Reality", *Econometrica*, 48 (1), pp. 1-48

SøRENSEN, P. B. and WHITTA-JACOBSEN, H. J., *Introducing Advanced Macroeconomics: Growth & Business Cycles*, McGraw-Hill Companies

STOCKHAMMER, E. (2004), "Financialisation and the slowdown of accumulation", *Cambridge Journal of Economics*, 28 (5), pp. 719-741

STOCKHAMMER, E. (2010), "Financialization and the Global Economy", *Working Paper nº 240*, Political Economy Research Institute, Washington

STUDENMUND, A. H. (2005), *Using Econometrics: A Practical Guide*, 5th Edition, Addison Wesley

TOBIN, J. (1965), "Money and Economic Growth", *Econometrica*, 33 (4), pp. 671-684

VAN DER ZWAN, N. (2014), "Making sense of financialisation", *Socio-Economic Review*, 12 (1), pp. 99-129

VAN TREECK, T. (2008), "Reconsidering the Investment-Profit Nexus in Finance-Led Economies: an ARDL-Based Approach", *Metroeconomica*, 59 (3), pp. 371-404

8. APPENDIX

Table 12 – The descriptive statistics of the data

	I	***P***	***D***	***CC***	***SR***	***BC***	***FR***	***FP***
Observations	37	37	37	37	37	37	37	37
Mean	0,257	0,351	-0,152	0,019	0,140	0,025	0,062	0,242
Median	0,263	0,371	-0,114	0,016	0,126	0,022	0,056	0,231
Maximum	0,311	0,405	-0,010	0,109	0,220	0,079	0,121	0,465
Minimum	0,189	0,187	-0,494	-0,083	0,070	-0,032	0,021	0,154
Standard Deviation	0,036	0,054	0,118	0,038	0,044	0,029	0,024	0,079
Skewness	-0,315	-1,390	-1,123	-0,281	0,273	0,008	0,689	1,246
Kurtosis	1,816	4,033	3,608	3,898	1,732	2,366	3,000	4,036

Table 13 – The diagnostic for multicollinearity

Dependent Variable	$R^2_{adjusted}$	**Tolerance Value**	**VIF**
I	0,703	0,297	3,367
P	0,851	0,149	6,711
D	0,914	0,086	11,628
CC	0,606	0,394	2,538
SR	0,866	0,134	7,463
BC	0,586	0,414	2,415
FR	0,777	0,222	4,484
FP	0,847	0,153	6,536

Figure 2 – The plot of investment (% of gross value added)

Figure 3 – The plot of profitability (% of gross value added)

Figure 4 – The plot of debt (% of gross value added)

Figure 5 – The plot of cost of capital (%)

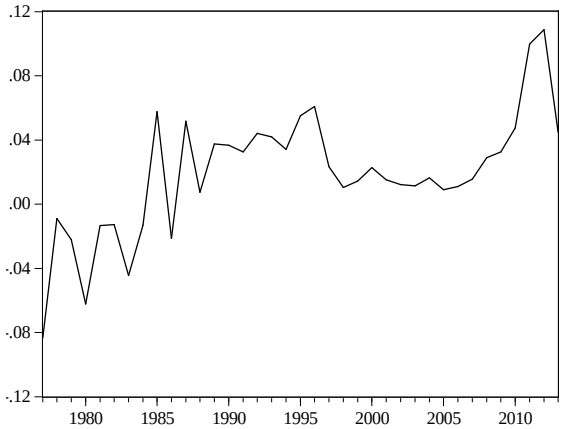


Figure 6 – The plot of savings rate (% of disposable income)

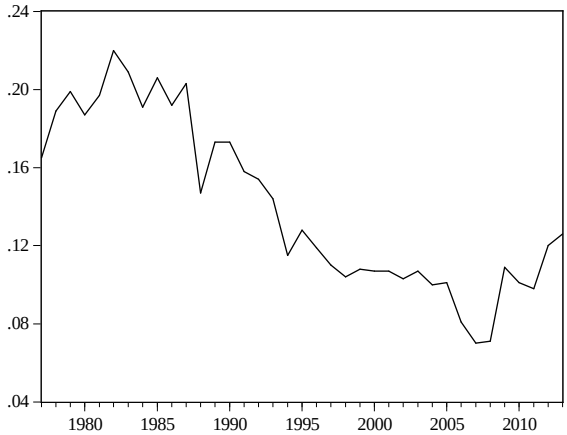


Figure 7 – The plot of business cycle (annual growth rate)

Figure 8 – The plot of financial receipts (% of gross value added)

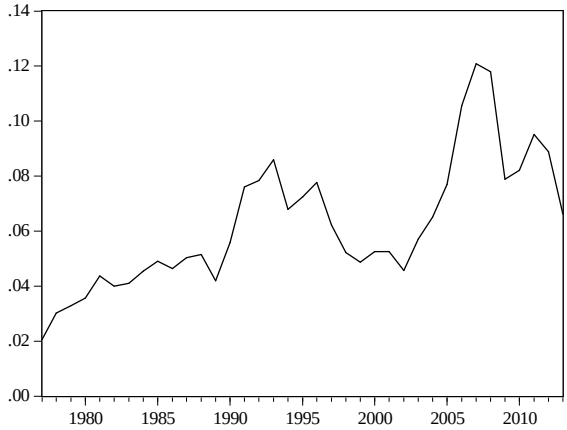


Figure 9 – The plot of financial payments (% of gross value added)

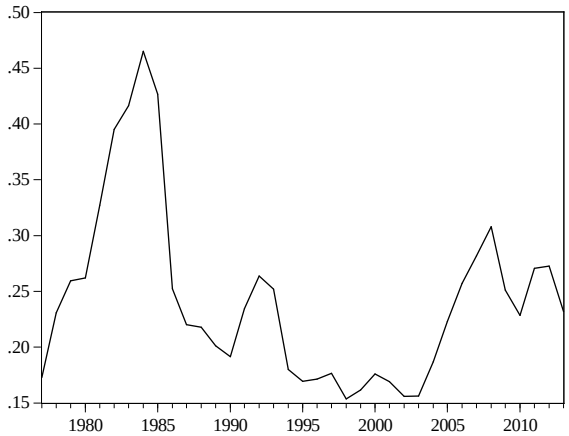


Table 14 – Inverse roots of AR characteristic polynomial (for an unrestricted VAR with three lags)

Root	Modulus
0,795 + 0,654i	1,029
0,795 – 0,654i	1,029
0,920 + 0,390i	0,999
0,920 – 0,390i	0,999
0,443 + 0,870i	0,977
0,443 – 0,870i	0,977
0,925	0,925
-0,185 – 0,904i	0,922
-0,185 + 0,904i	0,922
0,485 – 0,766i	0,907
0,485 + 0,766i	0,907
-0,674 – 0,589i	0,895
-0,674 + 0,589i	0,895
0,818 + 0,286i	0,867
0,818 – 0,286i	0,867
-0,854	0,854
0,096 + 0,833i	0,838
0,096 – 0,833i	0,838
-0,645 + 0,417i	0,768
-0,645 – 0,417i	0,768
-0,635	0,635
-0,175 + 0,607i	0,632
-0,175 – 0,607i	0,632
0,111	0,111

Note: i is the imaginary number

Table 15 – Inverse roots of AR characteristic polynomial (for the VECM estimated)

Root	Modulus
1,000	1,000
1,000	1,000
1,000	1,000
1,000	1,000
1,000	1,000
1,000	1,000
1,000	1,000
0,462 – 0,391i	0,606
0,462 + 0,391i	0,606
-0,565	0,565
-0,061 – 0,430i	0,434
-0,061 + 0,430i	0,434
-0,406	0,406
0,328	0,328
0,030 – 0,158i	0,161
0,030 + 0,158i	0,161

Note: i is the imaginary number

Table 16 – Instantaneous causality tests

Null hypothesis	Test statistic	*P-value*
P_t, D_t, CC_t, SR_t, BC_t, FR_t, $FP_t \rightarrow I_t$	15,135	0,034
I_t, D_t, CC_t, SR_t, BC_t, FR_t, $FP_t \rightarrow P_t$	143,378	0,000
I_t, P_t, CC_t, SR_t, BC_t, FR_t, $FP_t \rightarrow D_t$	71,804	0,000
I_t, P_t, D_t, SR_t, BC_t, FR_t, $FP_t \rightarrow CC_t$	49,549	0,000
I_t, P_t, D_t, CC_t, BC_t, FR_t, $FP_t \rightarrow SR_t$	36,554	0,000
I_t, P_t, D_t, CC_t, SR_t, FR_t, $FP_t \rightarrow BC_t$	31,639	0,000
I_t, P_t, D_t, CC_t, SR_t, BC_t, $FP_t \rightarrow FR_t$	28,184	0,000
I_t, P_t, D_t, CC_t, SR_t, BC_t, $FR_t \rightarrow FP_t$	73,052	0,000

Note: → means does not instantaneous cause and they were obtained in JMulTi software

Figure 10 – Impulse response functions (following the Cholesky decomposition)