Firm Sales Dynamics after Large Shocks: Age, Size and Finance matter

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Abstract

The Greek economy lost 22% of gross output between 2009 and 2014. Using a large proprietary and representative dataset on firms covering the entire economy, we find that this crisis affected most the sales growth rates of young firms and of small firms. The observed growth differentials are explained predominantly by financial constraints at the firm level. Financial constraints have an important impact on the observed loss of aggregate gross output. This impact seems to be due more to the effect of financial constraints on young firms rather than on small firms.

Keywords: Firm growth, Greek financial crisis, firm age, firm size, financial frictions

***JEL Classification*:** E23, E32, G30

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1 Introduction

The focus of this paper is on answering two central questions. First, how does a large aggregate shock affect the sales growth of firms of different sizes and mainly of different ages? And second, what is the role of credit constraints in these differential responses? The Greek crisis that erupted in 2010 is one of the deepest and largest economic downturns experienced in a country of Western World in the post WWII era and therefore constitutes an appropriate economic laboratory to quantify the effect of large shocks on firm growth dynamics.

By employing a large proprietary and representative dataset on firms covering the entire economy for the period 1998-2014, we find that the decline in the firm sales growth rate due to crisis was about 18.4 percentage points larger in young firms than in their mature counterparts and 8.3 percentage points larger in small firms than in their large counterparts. The Greek economy lost 22% of gross output due to crisis. We document that approximately 9% (5%) of this decline was due to the differential impact of the crisis on young (small) firms. Moreover, we find that the differential impact of the crisis on young firms' growth is predominantly explained by a tightening of financial constraints at the firm level (a proportion of 55% to 58%). Similarly, firm financial constraints explain between half and two thirds of the differential impact of the crisis on small firms. In other words, we find that financial constraints have an important impact on the observed loss of aggregate gross output. Finally, we explore whether firm size and firm age operated as decelerator factors in the development of Greek enterprises before and during the crisis. Our results indicate that the empirical regularity that small and young firms grow faster than their large and mature counterparts holds for the case of Greek firms, even during the financial crisis.

2 Data

The firm-level data are proprietary and they have been obtained from the ICAP Group, S.A., a private research company which collects detailed balance sheet and income statement data for SA and Ltd companies in Greece, together with their establishment date, location and ownership status, for credit risk evaluation and management consulting. Because ICAP database is used for credit decisions, the data are carefully controlled. Our dataset contains firm-level information for approximately 53,000 Greek firms of all sectors, except for banks and insurance companies, for the time period 1998 - 2014. For this paper we use information on gross sales, gross output/revenue, total balance-sheet assets, long-term liabilities, short-term liabilities, year of establishment, NACE2 codes, firm location and the accounting depreciation flow. As far we know, it is the first time that a so large dataset is employed for the case of Greece. A natural question that might arise here is whether our firm-level dataset resembles the aggregate Greek economy. The coverage in our sample found to be consistently high. In particular, the ratio of aggregate gross output recorded in our sample relative to the same object in national level averages roughly 58 percent for the aggregate economy. This percentage is conservative because we have dropped observations with missing, zero, or negative values for gross sales. The coverage is more or less the same and in industry level. Gross output collected from Eurostat, as reported by its Structural Business Statistics (SBS). The data in Eurostat are from Census sources and represent the universe of firms.

3 The Relationship of Firm Growth, Firm Size and Firm Age

3.1 Empirical Specification and Identification

Our first objective is to explore the relationship between firm growth and firm size and age. We use a non-parametric regression approach to quantify these relationships. More specifically, we regress sales growth at firm-level on firm size and age classes. In particular, we employ the following econometric specification:

$$g_{i,t} = \beta_0 + \beta_{1,j} S^j_{i,t} + \beta_{2,k} A^k_{i,t} + \beta_{3,j,k} (S^j \times A^k)_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $g_{i,t}$ denotes the growth of firm "i" at period "t", $A^k_{i,t}$ is a categorical variable for age which receives the values 1-6 for the age groups K={1-3, 4-6, 7-10, 11-15, 16-20, 20+ years} and $S^j_{i,t}$ is a categorical variable for size which receives the values 1-6 for the size groups J={1-30, 31-60, 61-70, 71-80, 81-90, 91-100 percentiles}. For the proper characterization of growth-size (age) relationship we have to control for age (size). For this reason, we include the age-size interaction term in the model.

In the modern both theoretical and empirical literature, it has found that the firm growth process is driven by, apart from systematic factors, ex-ante firm heterogeneity and persistent ex-post shocks (Pugsley et al., 2018). Moreover, early and more recent empirical studies in firm growth considered annual autocorrelation patterns for firm growth (Coad, 2007). Therefore, we assume that the disturbance, $\varepsilon_{i,t}$, follows an exogenous first order Markov chain process[1].

An important statistical concern arises in estimating the above econometric specification from endogenous firm selection due to exit, which due to the sampling design of our data, is also accompanied by an intensive sampling bias. The vital role of this problem in the analysis of firm dynamics has been pointed out very early in the literature (e.g. Mansfield, 1962; Evans, 1987; Hall, 1987). We solve this issue by using as an extra moment condition the predicted probability of a firm remaining in the sample estimated from a first-stage sample selection model, like in Olley and Pakes (1996). Therefore, we estimate the econometric specification 1 with a dynamic panel GMM estimator using the Wooldridge (2004) moments augmented by the predicted probability instrument like in Olley and Pakes (1996).

To abstract from cyclical or secular aggregate considerations we control for year effects by including a set of time dummies d_t. Moreover, since firm size and firm age distributions vary by industry as do growth rate patterns, we control for detailed industry fixed effects (I_s). Additionally, we control for location fixed effects by employing a set of prefecture dummies (L_j)[2]. Both industry and location dummies indicate the ex-ante firm heterogeneity. Last but not least, since we seek to capture the effect of Greek financial crisis on the patterns of the firm growth, we include in the model a crisis dummy and its interaction with all the regressors of econometric specification 1. The crisis dummy receives the value 1 for the crisis period (2010 - 2014) and the value 0 for the pre-crisis period (1998 - 2009).

3.2 Estimation Results

Since model 1 is constituted by categorical variables and much more since these variables are interacted together, citing the regression coefficients would be misleading since they are fail to capture efficiently the partial effect of firm age or size on firm growth (Williams, 2012). Moreover,

[1] The assumption that firm growth follows a Markov process has been used from very early in the literature. See for example Ijiri and Simon (1967) and Champernowne (1973).

[2] ICAP database provides us information about the firm location among the 52 prefectures of Greece.

the dynamic nature of our model comprises the first lags of all the regressors (as a residual of the quasi-differencing process), creating some "lagged effects"[3]. Therefore following Haltiwanger et al. (2013), we present the marginal effects at means (MEMs hereafter) instead of the regression coefficients with the aid of figure 1 in order to capture properly the partial effects of both firm age and size on firm growth. Panel A displays results from growth-age relationship, whilst panel B displays the results for the growth-size relationship. Beginning with the main results in the upper panel, the plotted curve shows a clear inverse relationship between firm age and firm growth when we control for firm size. Moreover, the downward curve is much more steep for early ages (1-6 years) implying a much more strong negative age effect for young relative to mature firms. The effect declines more or less monotonically as the age of the firm increases. In general, the age effect remained negative during the crisis, although in a no clearly monotonic way. Now we turn to panel B. The panel reveals a crystal clear negative monotonic relationship between firm size and firm growth when we control for firm age. This finding lies in contrast with the seminal paper of Haltiwanger et al. (2013), in which the authors asserted that the negative growth-size relationships is vanished once we control for firm age. The negative size effect also is much stronger for very small firms (namely, for 1-60 percentiles). The same results holds for the crisis period, too. Finally, from both panels is clear that the financial crisis led to a significant decline in growth rates of Greek firms.

4 The Differential Effect of Financial Crisis

In this section, we examine whether the Greek financial crisis had a different repercussion on small relative to large and on young relative to mature Greek enterprises. To do this, we estimate the following econometric specifications, following the work of Duygan-Bump et al. (2015):

$$g_{i,t} = \gamma_0 + \gamma_1 Young_{i,t} + \gamma_2 Young_{i,t} \times Crisis_t + \gamma_3 Crisis_t + v_{i,t}^{(1)} \tag{2}$$

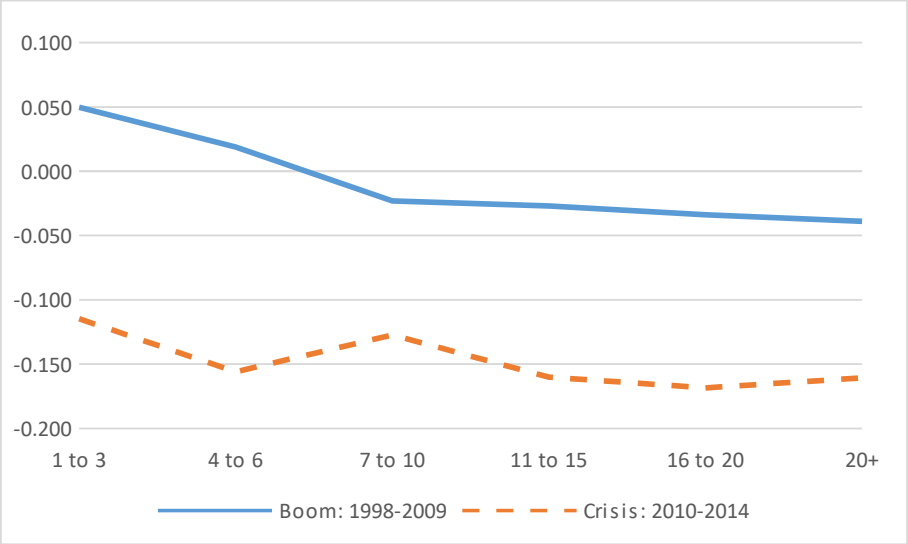
$$g_{i,t} = \delta_0 + \delta_1 Size_{i,t} + \delta_2 Size_{i,t} \times Crisis_t + \delta_3 Crisis_t + v_{i,t}^{(2)} \tag{3}$$

where $g_{i,t}$ denotes the growth of firm "i" at period "t", $Age_{i,t}$ is a dummy variable for age which receives the values 1 if a firm is young and the value 0 if it is mature, $Size_{i,t}$ is a categorical variable which receives the value 1 if a firm is small, the value 2 if it is medium and the value 3 if it is large. For the estimation of the above specifications, we follow the same estimation strategy as in the previous section.

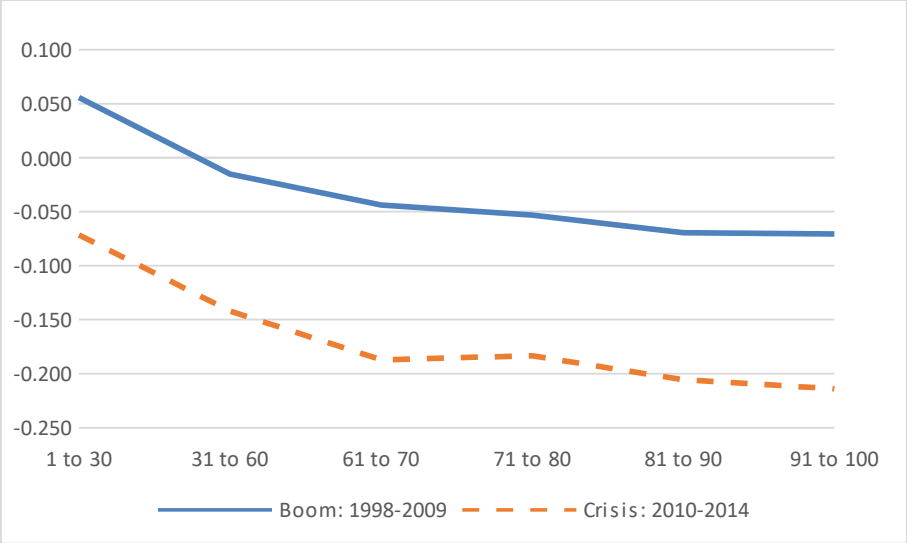
After the estimation of the above econometric specifications, we can quantify the differential crisis effect on young relevant to mature and on small relevant to large firms by computing the following double-differences:

$$\begin{aligned}\hat{\theta}_{age}^{Cr} &= (\hat{\theta}_{yng} - \hat{\theta}_{mtr})^{Cr} - (\hat{\theta}_{yng} - \hat{\theta}_{mtr})^{Bm} = \\ &= [E(\hat{g}_{i,t} \mid Young_{i,t} = 1, Crisis_t = 1) - E(\hat{g}_{i,t} \mid Young_{i,t} = 0, Crisis_t = 1)] \\ &\quad - [E(\hat{g}_{i,t} \mid Young_{i,t} = 1, Crisis_t = 0) - E(\hat{g}_{i,t} \mid Young_{i,t} = 0, Crisis_t = 0)]\end{aligned} \tag{4}$$

[3] A meticulous analysis of this issue can be found in Greene (2002), ch. 19, pp. 560-562.



(a) Relationship between Firm Growth and Firm Age



(b) Relationship between Firm Growth and Firm Size

Figure 1: Relationship between Firm Growth and Firm Age and Size

Note: In this figure, we investigate the role of firm age and firm size in firm growth before and during crisis. The cited average marginal effects were obtained by the estimation of econometric specification $g_{i,t} = \beta_0 + \beta_{1,j} S^j_{i,t} + \beta_{2,k} A^k_{i,t} + \beta_{3,j,k}(S^j \times A^k)_{i,t} + \varepsilon_{i,t}$. We compute marginal effects of firm size (age) from that model holding the age (size) distribution of sales constant at the sample mean. We included time, industry and prefecture fixed effects in all cases. We assumed first-order Markovian disturbances. Firm size is defined as the logarithm of gross sales in period t-1, deflated by the Producer Price Index - PPI. Firm growth is defined as the difference $\Delta ln S_{i,t}$ where $S_{i,t}$ denotes the deflated gross sales of firm i at period t. Age categories are defined in years, whilst size categories are defined in percentiles of the sales distribution. All coefficients found to be significant at 1 percent significant level.

$$\hat{\theta}^{Cr}_{size} = (\hat{\theta}_{sml} - \hat{\theta}_{lrg})^{Cr} - (\hat{\theta}_{sml} - \hat{\theta}_{lrg})^{Bm}$$
$$= [E(\hat{g}_{i,t} \mid Size_{i,t} = 1, Crisis_t = 1) - E(\hat{g}_{i,t} \mid Size_{i,t} = 3, Crisis_t = 1)]$$
$$- [E(\hat{g}_{i,t} \mid Size_{i,t} = 1, Crisis_t = 0) - E(\hat{g}_{i,t} \mid Size_{i,t} = 3, Crisis_t = 0)] \quad (5)$$

where $\hat{\theta}$'s are the MEMs as they are produced by the estimation of models 2 and 3.

In Table 1 we present the estimates for the two expressions. The decline in sales growth rate of Greek firms due to crisis was about 18.4 percentage points larger in young firms than in their matures counterparts and 2.7 percentage points larger in small firms than in their large counterparts.

	(a)	(b)	(c)
	$\Delta lnS_{i,t}$	DHS-All Firms	DHS-Continuers
$\hat{\theta}^{Cr}_{age}$	-0.184***	-0.236***	-0.184***
	(0.035)	(0.014)	(0.012)
$\hat{\theta}^{Cr}_{size}$	-0.085***	-0.086***	-0.043***
	(0.008)	(0.008)	(0.007)

Notes: In this table, we investigate the differential effect of the Greek financial crisis on young relative to mature firms and on small relative to large firms. To do so, we compute the double difference between the marginal effects of mature and young (or large and small) firms on firm growth, between the boom and the crisis periods, based on the estimation results of econometric specifications 2 and 3. A firm is "mature" if its age is larger than 5 years and "young" otherwise. A firm is "small" if it is size is below the 6th decile of the size distribution, "medium" if its size is between the 6th and the 9th deciles and "large" if its size belongs to the 10th decile of the size distribution. "Logarithmic" and "DHS" denote the logarithmic ($\Delta lnS_{i,t}$) and the David, Haltiwanger and Schuch's ($^{(S_{i,t}-S_{i,t-1})}/_{0.5(S_{i,t}+S_{i,t-1})}$) definitions of firm growth respectively. $S_{i,t}$ denotes the gross sales of firm "i" in year "t", deflated by the Producer Price Index (collected from the OECD Database). By defining firm growth as the logarithmic difference of firm size we restrict our sample to only continuing firms. By employing the DHS definition for firm growth we include in our analysis both the entering and the exiting firms. *, **, *** denote statistical significance at the 10, 5 and 1 percent level respectively. Standard errors are in parentheses. Standard errors are clustered by firm and calculated according to Delta Method (Dorfman, 1938).

Table 1: Differential Effect of Greek Financial Crisis

5 The Role of the Financial Constraints during the Crisis

In order to disentangle the role of the financial constraints in the differential crisis effect we documented in Section 4, we extend the analysis of the previous Section to include not only the difference between small and large firms (or young and mature) in the "pre-crisis" and the "crisis" periods but also the difference between the high- and low- financially constrained sectors. That is, for each regression equation 2 and 3 we include as extra regressors the dummy variable high-EFD

and its interactions with the other regressors of the each econometric specification. The idea is that the differential effect of the Greek financial crisis was more severe in high-EFD sectors. After the estimation of the two aforementioned econometric specifications, we can quantify the contribution of FCs in differential crisis effect by computing the following triple-differences:

$$\begin{aligned}
&\hat{\theta}^{FC}_{age} = [(\hat{\theta}_{yng} - \hat{\theta}_{mtr})^{Cr} - (\hat{\theta}_{yng} - \hat{\theta}_{mtr})^{Bm}]^{High} - [(\hat{\theta}_{yng} - \hat{\theta}_{mtr})^{Cr} - (\hat{\theta}_{yng} - \hat{\theta}_{mtr})^{Bm}]^{Low} = \\
&= \{[E(\hat{g}_{i,t} \mid Young_{i,t} = 1, Crisis_t = 1, high - EFD = 1) - E(\hat{g}_{i,t} \mid Young_{i,t} = 0, Crisis_t = 1, high - EFD = 1)] \\
&- [E(\hat{g}_{i,t} \mid Young_{i,t} = 1, Crisis_t = 0, high - EFD = 1) - E(\hat{g}_{i,t} \mid Young_{i,t} = 0, Crisis_t = 0, high - EFD = 1)]\} \\
&- \{[E(\hat{g}_{i,t} \mid Young_{i,t} = 1, Crisis_t = 1, high - EFD = 0) - E(\hat{g}_{i,t} \mid Young_{i,t} = 0, Crisis_t = 1, high - EFD = 0)] \\
&- [E(\hat{g}_{i,t} \mid Young_{i,t} = 1, Crisis_t = 0, high - EFD = 0) - E(\hat{g}_{i,t} \mid Young_{i,t} = 0, Crisis_t = 0, high - EFD = 0)]\}
\end{aligned} \tag{6}$$

$$\begin{aligned}
&\hat{\theta}^{FC}_{size} = [(\hat{\theta}_{sml} - \hat{\theta}_{lrg})^{Cr} - (\hat{\theta}_{sml} - \hat{\theta}_{lrg})^{Bm}]^{High} - [(\hat{\theta}_{sml} - \hat{\theta}_{lrg})^{Cr} - (\hat{\theta}_{sml} - \hat{\theta}_{lrg})^{Bm}]^{Low} = \\
&= \{[E(\hat{g}_{i,t} \mid Size_{i,t} = 1, Crisis_t = 1, high - EFD = 1) - E(\hat{g}_{i,t} \mid Size_{i,t} = 3, Crisis_t = 1, high - EFD = 1)] \\
&- [E(\hat{g}_{i,t} \mid Size_{i,t} = 1, Crisis_t = 0, high - EFD = 1) - E(\hat{g}_{i,t} \mid Size_{i,t} = 3, Crisis_t = 0, high - EFD = 1)]\} \\
&- \{[E(\hat{g}_{i,t} \mid Size_{i,t} = 1, Crisis_t = 1, high - EFD = 0) - E(\hat{g}_{i,t} \mid Size_{i,t} = 3, Crisis_t = 1, high - EFD = 0)] \\
&- [E(\hat{g}_{i,t} \mid Size_{i,t} = 1, Crisis_t = 0, high - EFD = 0) - E(\hat{g}_{i,t} \mid Size_{i,t} = 3, Crisis_t = 0, high - EFD = 0)]\}
\end{aligned} \tag{7}$$

In Table 2 we present the estimates for the two expressions. $\hat{\theta}^{FC}_{age}$ implies that the relative (young versus mature) impact of the crisis on sales growth is 3.8 percentage points larger in industries with high financing needs. Similarly, $\hat{\theta}^{FC}_{size}$ shows that the relative (small versus large) impact of the crisis on sales growth is 3.7 percentage points larger in industries with high external financial dependence.

	(a)	(b)	(c)
	$\Delta lnS_{i,t}$	DHS-All Firms	DHS-Continuers
$\hat{\theta}^{FC}_{age}$	-0.038**	-0.112***	-0.103***
	(0.017)	(0.019)	(0.017)
$\hat{\theta}^{FC}_{size}$	-0.037***	-0.037***	-0.022**
	(0.013)	(0.012)	(0.011)

Notes: In this table, we investigate the the role of the financial constraints in the differential effect of the Greek financial crisis on young relative to mature firms and on small relative to large firms. To do so, we compute the triple difference between the marginal effects of mature and young (or large and small) firms on firm growth, between the boom and the crisis periods, between the highly and lowly financially constraints firms based on the estimation results of augmented econometric specifications 2 and 3. A firm is "mature" if its age is larger than 5 years and "young" otherwise. A firm is "small" if it is size is below the 6th decile of the size distribution, "medium" if its size is between the 6th and the 9th deciles and "large" if its size belongs to the 10th decile of the size distribution. We construct an industry-level measure for external financial dependence, which was originally proposed by Rajan and Zingales (1998), following the procedures described in Cetorelli and Strahan (2006). In particular, we define external financial dependence (EFD hereafter) as the proportion of capital expenditures financed with external funds. After constructing the EFD ratio for each firm, we use the median value for all firms in each 4-digit NACE2 category as our measure of external finance needs for that industry. Finally, we separate all sectors in the economy into composite sectors of high - and low - EFD, which are defined as those above and below the median external financial dependence measure, respectively. For our analysis, we create a dummy variable "high-EFD" which receives the value 1 if a sector is highly financially constrained and 0 otherwise. "Logarithmic" and "DHS" denote the logarithmic ($\Delta lnS_{i,t}$) and the David, Haltiwanger and Schuch's ($^{(S_{i,t}-S_{i,t-1})}/_{0.5(S_{i,t}+S_{i,t-1})}$) definitions of firm growth respectively. $S_{i,t}$ denotes the gross sales of firm "i" in year "t", deflated by the Producer Price Index (collected from the OECD Database). By defining firm growth as the logarithmic difference of firm size we restrict our sample to only continuing firms. By employing the DHS definition for firm growth we include in our analysis both the entering and the exiting firms. *, **, *** denote statistical significance at the 10, 5 and 1 percent level respectively. Standard errors are in parentheses. Standard errors are clustered by firm and calculated according to Delta Method (Dorfman, 1938).

Table 2: The role of the FCs in the Differential Effect of Greek Financial Crisis

6 Aggregate implications of the Greek financial crisis and of financial constraints

Following the approach of Chodorow-Reich (2014) and Siemer (2019), we can use the estimates in sections 4 and 5 in order to obtain the aggregate implications of the financial crisis and of the financial constraints, respectively, assuming a partial equilibrium.

The aggregate implications of the financial crisis can then be calculated by comparing the sales evolution in the (fitted) data with the sales evolution in a counterfactual in which we assume that the crisis affected small firms in the same way as large firms. To determine the aggregate contribution of FCs to crisis we compare the sales evolution in the (fitted) data with the sales evolution in a counterfactual in which we assume that the crisis affected small high-EFD firms in the same way as large high-EFD firms.

Table 3 reports the relevant results. First of all, our sample gives almost the same quantitative reduction in gross output as the data in aggregate-level, a fact that implies that our firm-level dataset resembles at a large extent the aggregate Greek economy. The differential effect on small firms account for about 2 to 5 percent of the decline in gross output due to the crisis. Meanwhile the effect on young firms accounts for about 9 to 12 percent of the overall gross output decline. Also, we find that financial constraints constituted an important contributor to the documented decline of aggregate gross output due to the differential crisis effect either on small relative to large or on young relative to mature firms. In particular, approximately the 56 percent of the decline in gross output due to the differential crisis effect on young relative to mature firms and approximately the half of the observed loss of aggregate gross output due to the differential crisis effect on small relative to large firms stemmed from financial constraints.

Gross Output Losses: 2009-2014	
Total gross output decline (aggregate data)	23%
Total gross output decline (firm-level data)	22%
Share due to differential effect on young firms ($\Delta lnS-$continuers)	9%
Share due to differential effect on young firms (DHS - continuers)	9%
Share due to differential effect on young firms (DHS - all firms)	12%
Share due to differential effect on small firms ($\Delta lnS-$continuers)	5%
Share due to differential effect on small firms (DHS - continuers)	2%
Share due to differential effect on small firms (DHS - all firms)	4%
Share due to differential effect on young high-EFD firms ($\Delta lnS-$continuers)	5%
Share due to differential effect on young high-EFD firms (DHS - continuers)	5%
Share due to differential effect on young high-EFD firms (DHS - all firms)	7%
Share due to differential effect on small high-EFD firms ($\Delta lnS-$continuers)	3%
Share due to differential effect on small high-EFD firms (DHS - continuers)	1%
Share due to differential effect on small high-EFD firms (DHS - all firms)	2%

Notes: The table reports the fraction of total gross output losses due to the differential effect of the financial crisis on small and young firms. Aggregate data has been obtained from OECD. By defining firm growth as the logarithmic difference of firm size ($\Delta lnS_{i,t}$) we restrict our sample to only continuing firms. By employing the David, Haltiwanger and Schuch's $((S_{i,t}-S_{i,t-1})/0.5(S_{i,t}+S_{i,t-1}))$ definition for firm growth we include in our analysis both the entering and the exiting firms.

Table 3: Aggregate Implications of Greek Financial Crisis

7 Conclusions

Using the Greek financial crisis that erupted in 2010 as a laboratory, we bring new evidence to bear on the question of whether, and how, the response of firms to aggregate shocks might be related to firm size and age. We find that this crisis affected most the sales growth rates of young firms and of small firms. The documented growth differentials are explained predominantly by financial constraints.

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Wage bargaining in the era of financialization: a time series analysis in Greece, 1995-2013

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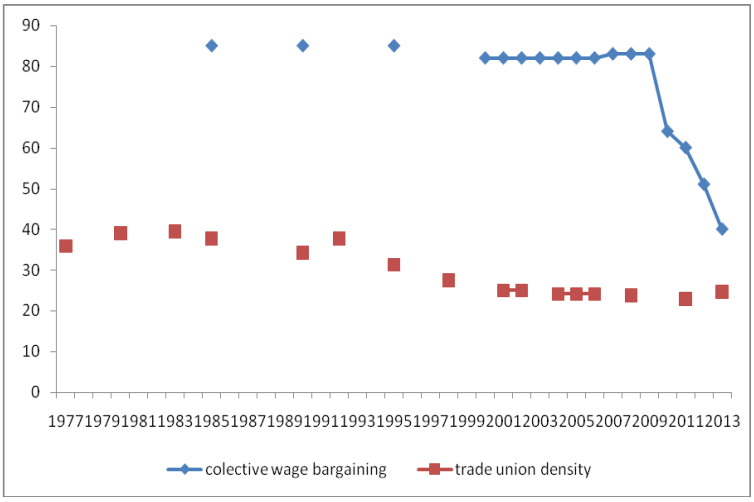
This paper reviews the link between financialization and the changes in wage bargaining in Greece. This paper analyzes, both empirically and theoretically, three paths of financialization that could affect labour market institutions: the role of household debt in decreasing workers willingness to bargain, the increased competition on financial markets and shareholder value orientation as an exit option of firms that depress the bargaining power of the employees, and the financial payments of non-financial firms that give motives to the firms to reduce real wages.
The time series analysis for Greece for the time period from 1995 until 2013 found that household debt and debt to surplus ratio of non-financial firms is negatively correlated with the wage bargaining coverage. Moreover, collective wage bargaining strongly corresponds with minimum wage.

1. Introduction: the development of wage bargaining in Greece

The growth of industrial relations had a delayed start in Greece since labour legislation started taking shape only at the beginning of the twentieth century and stimulated after the Second World War (Koukiadis, 2009). However, the "boom" in industrial relations in the Greek labour market started in the 1970's with the aim of accommodating conflict-based industrial relations and social movements (Ioannou 2012). This process resulted the establishment of a strong Employment Protection Legislation. However despite that and the fact that Greek economy was growing fast with an average GDP growth of 2.6% (1989-2009) trends in industrial relations in Greece changed since 90s. Trade union density continued to fall since 1995 but wage bargaining coverage was relative high until 2010 (Diagram 1).

Diagram 1. Collective wage bargaining and trade union density in Greece, 1977-2013



Source: OECD Statistics

The literature in labour economics and industrial relations offers a set of explanations for the alternation of industrial relations and wage bargaining in Greece. The most researchers emphasize on the role of economic crisis and the reforms that refers in the Memoranda since May 2010 (Law 3845/2010) that it was targeting on a lower public expenditure and a more attractive environment for business by cutting public investment and public sector wages (Dedousopoulos,2013;Koukiadaki and Kokkinou, 2016). However, in this paper we will not research this predominantly thesis. Rather we research if the regime of financialization in the economy acted as an obstacle for a centralized wage bargaining in Greece. We consider that financialization acted in the Greek economy before the economic crisis and spill over into the industrial relations and wage bargaining in the Greek labour market in an informal manner. The paper is structured as follows: Section 2 analyses the theoretical context and summarizes the empirical studies about functional wage bargaining related to financialization regime. In Section 3, the econometric method is outlined, variable definitions and data sources are discussed, and also econometric results are presented. The conclusion is presented in Section 4.

2. Theoretical context and literature about wage bargaining and financialization

2.1 How does financialization affect functional wage bargaining?

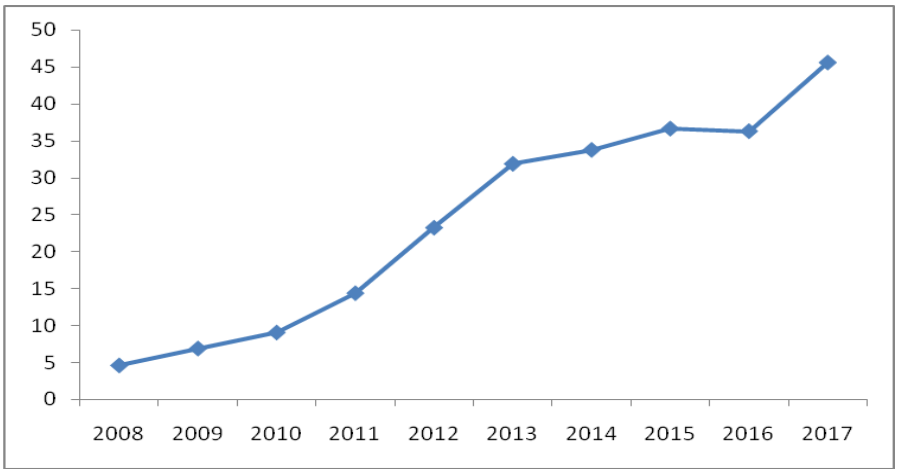
Most advanced economies have experienced a rapidly growth in their financial activities. This phenomenon is described as financialization or financial regime economy. While there is not a single definition of financialization the most used is the one from Epstein (2005: 3), according to that definition "...financialization means the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of domestic and international economies."

Financialization brings important changes in the economy in both macroeconomic and microeconomic level. During the latest thirty years, a high financial regime has existed against the real economy, as a consequence, there is a consistent flow of income from the real sector to the financial sector. This changed the functional distribution of income as the profits rose relative to employee's compensation (Palley 2013). Post-Kaleckian/Post-Keynesian literature found important results in the contribution of financialization to wage stagnation and inequality (Dunhaupt 2016;Kohler *et al.* 2016) Moreover, there has been a shift in the wage share from workers to managers (Appelbaum and Hunter 2004). Also, there were important changes in investment behavior and the firms shifted from the long term investment plans to short-term capital gains. Financialization changed the behavior of consumption since the debt-financed consumption was promoted with the use of various financial instruments such as credit card debt and home equity lending. As a consequence, the household debt-income ratios and the corporate debt-equity ratios was substantially increased (Hein 2013). The ongoing process of financialization has contributed in an indirect way to labor market into labor market reforms. Specifically, the shareholder value orientation and the short-termism investment behavior has weakened the bargaining power of workers. Also, the liberalization and globalization of finance and trade have contributed to the deregulation of labour market and the weakening of trade unions (Hein 2013)

Greek economy has a pecuniary behavior during the financialization era. Even if the Greek economy is not considering a vast financialized economy there are no doubt that the main channels of financialization are present. Despite the data limitation we can argue that the household debt has been substantially enlarged since 90's (Diagram 3) and the nonperforming loans have been taking a form of a bubble in the last decade (Diagram 2) and the same holds for the debt to surplus ratio for the non financial institutions (Diagram 4). Moreover, the bank leverage ratio is quite strong and larger than the average one in Eurozone specially after 2004 (Diagram 5).

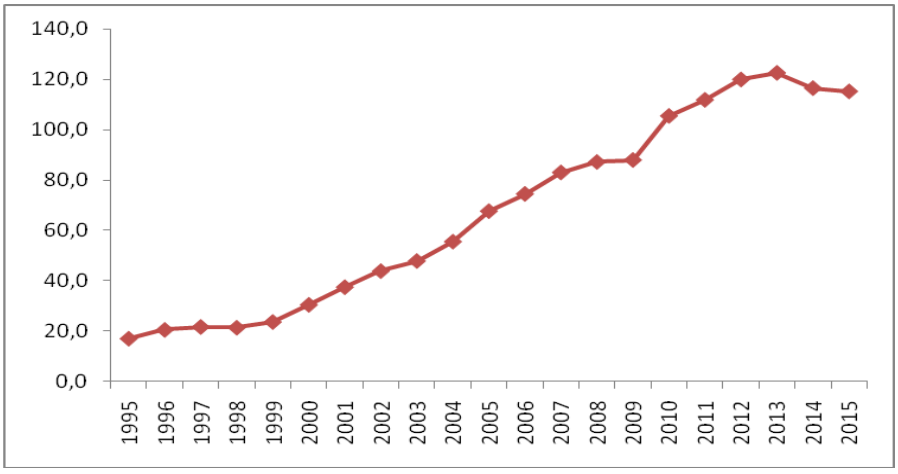
In the next subsections we will analyze how these channels of financialization contribute to the erosion of collective wage bargaining.

Diagram 2. Nonperforming loans in Greece, 2008-2017



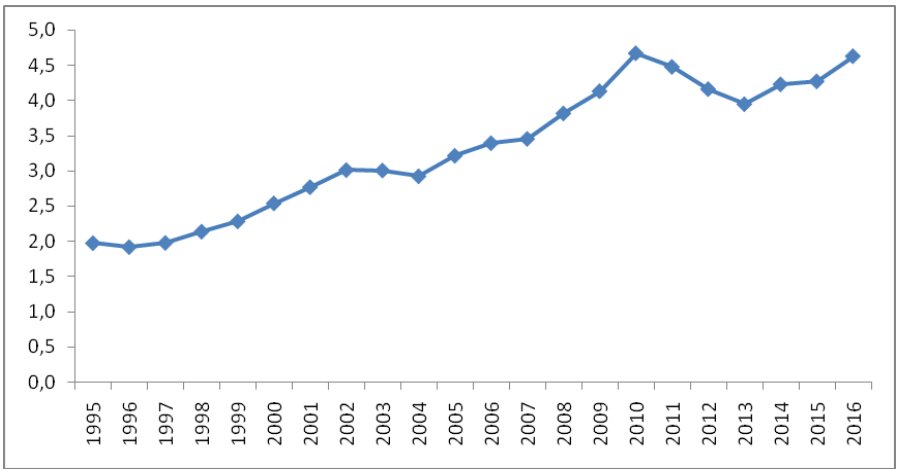
Source: Word Bank

Diagram 3. Household debt in Greece as a percentage of disposable income, 1995-2015



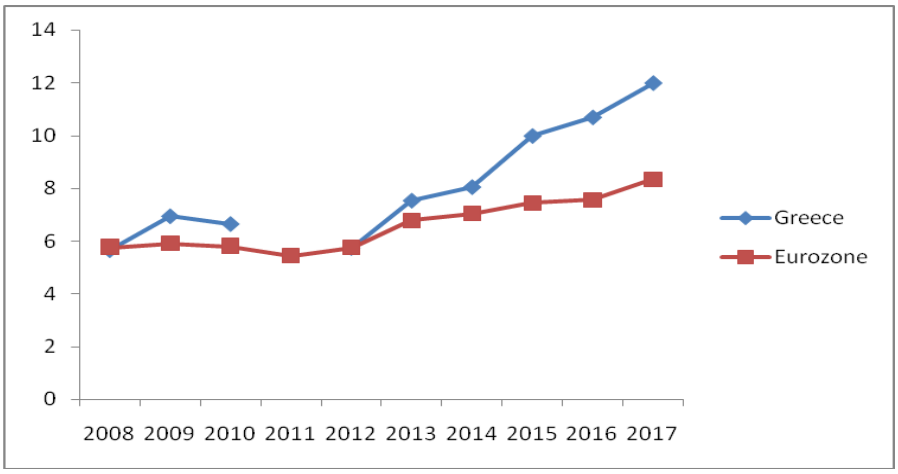
Source: OECD Statistics

Diagram 4. Non-financial firms debt/surplus ratio in Greece, 1995-2016



Source: OECD Statistics

Diagram 5. Leverage Ratio in Greece and Eurozone, 2008-2017.



Source: Word Bank

2.2 The contribution of the increased competition in financial markets, the shareholder value orientation and the exit options of capital in wage bargaining

Financial liberalization that happened in OECD countries since the 80's and 90's leaded to higher capital mobility. Moreover financialization offers a wide exit options of capital with the use of different payment methods like money-market funds (Guttmann 2017). The extended exit options of capital have a negative impact to the bargaining power of the workers. Furthermore financial globalization that measured as foreign assets plus foreign liabilities, has worsening the bargaining power of workers and has contributed to the decline of wage share (ILO 2008).

Moreover literature emphasize on the effect that the rise of shareholder power has on investment strategies of the firms. Lazonick and Sullivan (2000) argue that the investment behavior has shifted from the "retain and reinvest" to "downsize and distribute". Firms have changed their focus from the long term investment behavior to short-term capital gains (Stockhammer 2009; Dallery 2009). The process of securitization and the increased trading of financial assets has affected the internal organization of production (Bryan *et al.* 2009;Sotiropoulos and Lapatsioras 2014). The negative effect that the shareholder value orientation have on wage bargaining coverage has been shown from Darcillon (2015) with the use of a panel data calculation for 16 OECD countries.

2.3 The contribution of the increased financial payments of non-financial firms to the bargaining power of workers

Financial payments of non-Financial companies have considerably grown during the years of financialization (Kohler *et. al*. 2016)

Kaleckian theory of competition assumes that firms are operates in oligopolistic environments (Kalecki 1969) and they put their prices regarding the unit cost plus a mark-up.

In the case that firm is facing a permanent increase of interest and dividend payments then in order to finance its investment will take the decision either to

increase the mark-up or to decrease the unit labour cost (Hein and Van Treeck 2010). If the mark-up is elastic with respect to interest and dividend payments, a rise in overhead costs will decrease the wage share. This bring more barriers to the wage bargaining process since the workers loose bargaining power. On the other hand, the pressure for decreasing the labour cost cause the decrease of wage bargaining power of the workers because they decrease the demand for labour in the productive sector by the downscale of the investment plans.
In this direction several empirical works have attempt to show the impact of the increased interest and dividend payments in the income distribution. Hein and Schoder (2011) found significant result in Germany and USA from 1963 and 2007 for the impact of interest payments to profit shares. Alvarez (2015) founds negative effects of the interest payments on the wage. Dunhaupt (2016) is measure the interest payments for non-financial organizations for 13 OECD countries for the period 1986-2007 and finds a negative statistically impact of dividends payments.

2.4 The household debt and the consumption culture

The rising of the household debt has gained the attention of the researchers after the financial crisis. Mainly the literature has argued that as the wage share declines the workers try to maintenance their consumption level through debt (Barba and Pivetti 2009; Stockhammer 2015).
Bryan et al. (2009) and Barba and Pivetti (2009) argue that working class indebtedness may affect working class power. This view referred to Cultural Political Economy literature and argues that financialization construct new identities and interests of the workers and through this process has been introduced a different culture regarding the labour market institutions (Langley 2007)
Other researchers present the concept of "financial vulnerability", that refers to the inability of the households to cover their basic consumption needs (Anderloni *et al.* 2012). Anderloni *et al.* (2012) link the impact of financial vulnerability with class consciousness and bargaining power. Debt makes workers more financially vulnerable and this affect negatively their wage bargaining power.

3. Variables, data sources and econometric method

3.1. Regression equation, variable definitions and data sources

In this paper we test three arguments on financialization and wage bargaining. We estimate the following equation:

$$Bargaining_t = c + b_1 FIN_t^{Household} + b_2 FIN_t^{Turnover} + FIN_t^{Debt} + b_5 Min_t + e_t$$

where subscript t stands for time period and e_t the error term. The wage bargaining coverage is explained by three financialization indexes that depict the household debt ($FIN_t^{Household}$), the competition in the capital market ($FIN_t^{Turnover}$) and the financial payments of non-financial firms (FIN_t^{Debt}). In addition, we control labour market institutions with minimum wage to average wage (Min_t). We follow Kohler *et al.* (2016) for the financialization indexes. The dependent variable is the wage bargaining coverage that includes the collective wage coverage as the percentage of all wage

earners with the right to bargain, taken from the OECD database. We use three variables that indicate financialization. The household debt to disposable income in order to describe the impact that the debt has to workers' bargaining power, taken from the OECD database. The turnover share ratio that indicates the total shares traded in one period divided by the average market capitalization of this period, to account for the competition on the capital markets, provided by the IMF database. Regarding to account the financial payments of the non-financial firms we use non-financial firms debt to surplus ratio. This ratio indicates indirectly the financial liabilities of a non-financial firm. The variable is taken from the OECD database. We also use the Min_t, the minimum to average wage (Kaitz index) to account for the interaction of the labour market institutions, also taken from the OECD database. We expect that the financialization indexes have negative impact on wage bargaining coverage and will have negative sign in the equation. On the other side the Kaitz index is expected to have positive sign since the labour market institutions are interacted positive each other.

3.2 Econometric method and results

We estimate the equation for Greece for 1995 until 2013 using time series analysis. Our series are somewhat short, and we have to be concerned for autocorellation. We make unit root tests for the variables and we make them stationary on first differences, while or the collective bargaining index we took the second differences in order to become stationary (Appendix A). Unfortunately, we cannot perform a VECM approach due data limitation and we perform both an OLS (Table 2) and ARIMA regressions (Table 4). We proceed to a Johansen cointegration test (Table 1) and we found up to three cointegration relations. Durbin Watson statistic that lies in the indeterminate area. However, we obtain a Breusch-Godfrey LM test for autocorrelation (Table 3)

Table 1. Johansen tests for cointegration

Trend: constant Number of obs = 9

Sample: 2003 - 2011 Lags = 1

rank	parms	LL	eigenvalue	Trace statistics	5% critical value
0	5	-69.623826	.	549.9441	68.52
1	14	78.561795	1.00000	253.5729	47.21
2	21	186.77131	1.00000	37.1538	29.68
3	26	199.21128	0.93699	12.2739*	15.41
4	29	204.70028	0.70470	1.2959	3.76
5	30	205.34824	0.13410		

Table 2. Estimation output for OLS regression

Variable	Coefficient	t-stat	P-value
Constant	4.95**	2.11	0.088
$FIN_t^{Household}$	-0.53***	-2.02	0.099
$FIN_t^{Turnover}$	0.036	0.66	0.541
FIN_t^{Debt}	-18.15*	-3.32	0.021
Min	249.46**	3.11	0.027
Adj.R^2	0.85		
DW (5,10)	1.88		

Note: *,**,*** indicate statistically significant at 1%, 5% and 10% significant level, respectively.

Table 3. Breusch-Godfrey LM test for autocorrelation

Lags(p)	Chi2	df	Prob> chi
1	2.077	1	0.1495

Ho: no serial autocorrelation

Table 4. Estimation output for ARIMA regression

Variable	Coefficient	z-stat	P-value
Constant	3.27	0.69	0.491
$FIN_t^{Household}$	-0.744***	-2.98	0.003
$FIN_t^{Turnover}$	0.016	0.45	0.653
FIN_t^{Debt}	-3.45	-0.52	0.605
Min	71.7	0.53	0.599
ARMA (L1)	0.74	1.70	0.088

Note: *,**,*** indicate statistically significant at 1%, 5% and 10% significant level, respectively.

According to the results of OLS estimation the financialization variables for household debt and debt to surplus ratio have the expected sign and are statistically significant. However, the financialization variable for share turnover ratio has not the expected sign and is not statistically significant. The Kaitz index is statistically significant and has the expected sign. We obtain Breusch-Godfrey LM test for autocorrelation (Table 3) and we found that there is no serial autocorrelation. Moreover we obtain an ARIMA regression and we found that the ar(1) component is statistical significant. However, only the financialiation indicator for household debt is statistically significant and has negative sign.

4. Conclusion

This article provides new evidence about the connection between wage bargaining, a central labour market institution and finnacialization. Financialization is understood as the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of the domestic and international economies (Eipstein,2005). Due, to the theoretical analysis we examine three channels through that financialization is interpret to wage bargaining. Moreover, we conduct an empirical analysis with the use of time series for Greece for the time period from 1995 until 2013. Our evidence supports the Cultural Political Economy approach regarding the Greek economy and the changes that the debt-financed consumption has on the behavior of the workers. Moreover, there are strong evidence that the increased financial payments of the Non-Financial Firms has negative results on the wage bargaining.It is also well stated that the financialization index for the increased competition in financial markets that we use it as a sign for the exit option of capital, fail to be statistically significant and to have the desired sign. This may reflect the peculiar financialization process that the Greek economy has followed. In any case, we may consult another index in later research.

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Appendix

Table A1. Unit root tests for FIN^{Debt}

Augmented Dickey-Fuller test for unit root Number of obs = 18

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Va;ue
Z(t)	-2.010	-4.380	-3.600	-3.240

MacKinnon approximate p-value for Z(t)=0.5960

Table A2. Unit root tests for First Difference of FIN^{Debt}

Augmented Dickey Fuller test for unit root

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Va;ue
Z(t)				

MacKinnon approximate p-value for Z(t)=

Table A3. Augmented Dickey-Fuller test for unit root for $FIN^{Turnover}$

Number of obs =13

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-2.284	-4.380	-3.600	-3.240

MacKinnon approximate p-value for Z(t)= 0.4428

Table A4. Augmented Dickey-Fuller test for unit root for $FIN^{Household}$

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.685	-4.380	-3.600	-3.240

MacKinnon approximate p-value for Z(t)= 0.7572

Table A5. Augmented Dickey-Fuller test for unit root for Bargaining

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.158	-4.380	-3.600	-3.240

MacKinnon approximate p-value for Z(t) = 0.9188

Table A6. Augmented Dickey-Fuller test for unit root for Min

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-2.289	-4.380	-3.600	-3.240

MacKinnon approximate p-value for Z(t) = 0.4398

Table A7. Augmented Dickey-Fuller test for unit root for D1. Bargaining

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-2.231	-3.750	-3.000	-2630

MacKinnon approximate p-value for Z(t) = 0.1953

Table A8. Augmented Dickey-Fuller test for unit root for D2.Bargaining

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-5.945	-3.750	-3.000	-2630

MacKinnon approximate p-value for Z(t) = 0.0000

A9. Phillips-Perron test for unit root for D1.Min

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(rho)	-27.752	-17.200	-12.500	-10.200
Z(t)	-6.534	-3750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.0000

A10. Phillips-Perron test for unit root for D1.FIN^{Debt}

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(rho)	-15.242	-17.200	-12.500	-10.200
Z(t)	-3.297	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.0150

A11. Phillips-Perron test for unit root for D1.FIN^{Household}

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(rho)	-13.285	-17.200	-12.500	-10.200
Z(t)	-2.895	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.0459

A12. Phillips-Perron test for unit root for D1.FIN^{Turnover}

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Z(rho)	-16.758	-17.200	-12.500	-10.200
Z(t)	-4.314	-3.750	-3.000	-2.630

MacKinnon approximate p-value for Z(t) = 0.0004