Insights

Alpha Bank Economic Research
July 2020

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Investment Drivers and Shocks' Geometry in Greece
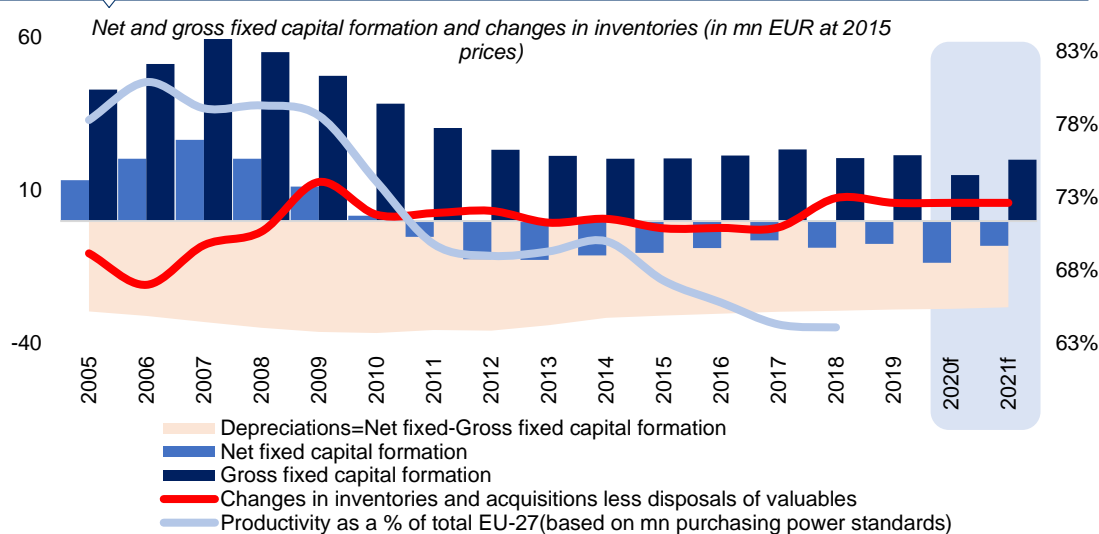
1. Introduction

During the precedented Greek economic crisis and the implementation of the Memorandum of Understanding (MoU) programmes, the severe macroeconomic imbalances were reduced, the twin deficits were drastically limited and structural reforms were advanced. As economic activity gradually recovered in 2017-2019, the rise in employment and the nominal wage supported households' disposable income and strengthened consumer confidence and consumption.

Despite the progress and the notable improvement of economic sentiment, the proportion of investment to GDP growth remained low. The crisis left an adverse legacy by causing considerable impairments on capital stock and productivity. Disinvestment hiked up and physical capital depreciation remained higher than fixed capital formation for a prolonged period, resulting in the erosion of capital stock (Figure 1). The largest component of investment reduction was due to the collapse of residential investment. Due to the degraded investment activity, labor productivity remained low and was coupled with a significant "brain-drain", which weakened human capital.

The transition towards an economy of stronger investment activity and international competitiveness still faces challenges, which have been intensified by the new crisis caused by the COVID-19 pandemic. In this context, boosting investment remains an issue for Greece, amid a highly uncertain global environment.

However, the fiscal and monetary stimulus package aimed at supporting individuals and firms in the short run, as well as the EC proposal of the generous Recovery Plan for counteracting the longer-lasting adverse economic repercussions of the new pandemic, can be considered as an opportunity to support a resurgence in investment.

Figure 1. Decreasing gross fixed capital formation, high capital depreciation and negative net investment during the previous economic crisis

Net and gross fixed capital formation and changes in inventories (in mn EUR at 2015 prices)

Depreciations=Net fixed-Gross fixed capital formation
Net fixed capital formation
Gross fixed capital formation
Changes in inventories and acquisitions less disposals of valuables
Productivity as a % of total EU-27(based on mn purchasing power standards)

Source: AMECO

In the current issue of the *Insights*, we examine the investment trajectory in Greece during the last decade and we emphasize its role in the geometry of the recessionary shock in 2009, which emerged from supply side structural damages. Due to the distinct differences between the current and the previous recession, and the divergent sources of the shocks in 2009 and 2020, we illustrate the shape of the previous crisis, by also tracing the shape of the current crisis. We next perform an empirical investigation into the determinants of private investment in Greece. This shows that factors such as corporate income taxation, the debt to GDP ratio and the interest rate have an adverse effect on private investment growth. In contrast, factors such as the GDP growth, credit growth and economic sentiment have had positive effects. Having traced the factors which affect investment, we next identify policy responses and tools that could be addressed in order to avoid a second L-shape shock and increase the steepness of the rebound. Additionally, we assess the fiscal stimulus and the anticipated "Next Generation EU" recovery package in the form of grants and loans which, combined with the NSFR 2021-2027, are expected to shift the production frontier of the economy by fostering fixed capital formation in the post pandemic-crisis era, emphasizing on a green, digital and inclusive growth.

The study is organized as follows: Section 2 analyses and compares the geometry of the shocks in Greece and presents the material differences between the COVID-19 crisis and the Greek sovereign crisis by placing emphasis on the role of disinvestment. Section 3 discusses the crisis legacy and the way capital formation gradually lapsed over the previous decade. In Section 4 we examine the determinants which affect investment, by presenting a brief literature review and a case study of differences and similarities in investment activity between European countries. With the latter, we provide a link between what theory suggests and the quantitative analysis that follows, in which we investigate the determinants of private investment growth in Greece. In Section 5, we identify how the "Next Generation EU" package and the liquidity easing can support investment resurgence after the pandemic crisis. In Section 6 we provide some concluding remarks, along with certain policy recommendations based on theory and the findings of our empirical investigation.
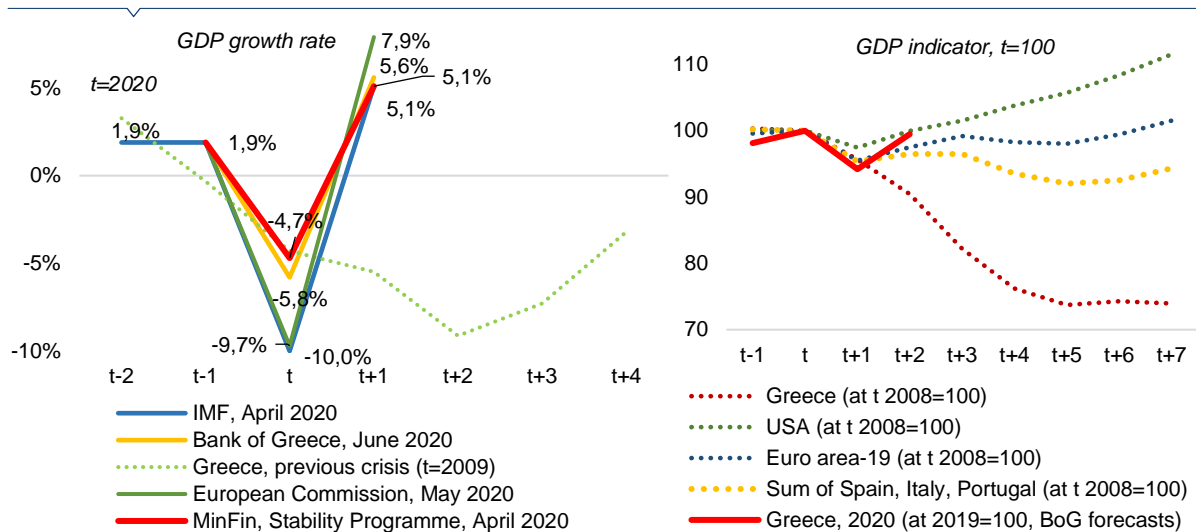
2. Comparing Shocks' Geometries: Does Investment Matter?

Greece only recently exited its previous economic crisis when the COVID-19 pandemic broke out and another recession hit the economy. Economic crises, however, vary in magnitude and duration. The geometry of shocks depends on their impact on capital formation and productivity and consequently the size of output loss. They are also characterized by the time needed for the level of output to return to its pre-crisis growth trajectory[1]. The shapes of an economic crisis can be summarized as the following four: a) a V-shape crisis, which is the less severe in terms of magnitude and duration, b) a W-shape crisis, where the rebound after the first shock is followed by another recessionary wave, consequently resulting in two recurring V-shape crises, c) a U-shape crisis, in which the rebound of the economy takes more time but is eventually achieved and d) an L-shape crisis, which usually causes a long-lasting damage in capital formation and supply, but also in labor and productivity, which at times can be permanent.

The Greek recession of 2009 was an L-shape, multi-faceted crisis and a decade later, the economy had not adequately rebounded. The crisis of the previous decade was largely driven by a drastic fall in demand, but subsequently, and perhaps primarily, by a significant damage to capital formation (Figure 2). In addition, the repercussions of the consecutive crises of the Greek economy impaired the financial sector and credit market. The banking sector was mainly affected by the large accumulation of non-performing loans, which disrupted intermediation and credit expansion and led to a more severe outcome. In the end, the L-shape crisis turned structural, with capital formation and the supply-side severely hit. The capital stock was largely degraded, as a result of the sizable credit shrinkage. Unemployment rose to unprecedented levels and productivity was acutely reduced. The GDP dropped precipitously and never rebounded to its pre-crisis level. Although the growth rate turned positive, it remained weak and the output gap was maintained.

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[1] Harvard Business Review, "Understanding the economic shock of coronavirus", March 27, 2020

Figure 2. Shock geometry and economic growth forecasts for Greece during the COVID-19 pandemic

GDP growth rate

- IMF, April 2020
- Bank of Greece, June 2020
- Greece, previous crisis (t=2009)
- European Commission, May 2020
- MinFin, Stability Programme, April 2020

GDP indicator, t=100

- Greece (at t 2008=100)
- USA (at t 2008=100)
- Euro area-19 (at t 2008=100)
- Sum of Spain, Italy, Portugal (at t 2008=100)
- Greece, 2020 (at 2019=100, BoG forecasts)

Source: Eurostat, European Commission, Ministry of Finance, IMF, Bank of Greece

In the face of the new shock caused by the pandemic, a vital question centres around what will drive its shape and what will be the role of investment in its formation. Does the fact that Greece had just emerged from its previous crisis increase the economy's vulnerability or on the contrary makes it more prepared to deal with the new challenges that lie ahead? Given these adverse economic conditions, it is difficult to answer how new investment will be attracted and how long it will take for a rebound. However, the new crisis hits the economy under fundamentally different conditions compared to those prevailing during the previous recession. The material differences between the COVID-19 crisis and the Greek sovereign crisis of the previous decade can be identified on the grounds that:

(i) the global nature of the current crisis would not entail country-specific aftershocks in terms of sovereign risk and private debt affordability,

(ii) there is now availability of sizeable and swift fiscal stimulus, whereas the previous crisis was accompanied by significant fiscal consolidation imposed by the MoU attached to the Troika bailout package,

(iii) there is availability of extensive monetary policy tools (e.g. the expansion of existing and launch of new asset purchase programs, GGB waiver), which were absent during the sovereign crisis,

(iv) there is availability of a substantial cash balance that fully covers the government debt maturities through 2022, as well as a favorable maturity schedule, which differ significantly from Greece's debt profile throughout the sovereign crisis,

(v) the continued availability of liquidity aims to support businesses provided by the EU funds and the European Investment Bank vis-à-vis the disrupted credit in 2008,

(vi) Greece has regained political stability and international support for its effectiveness in addressing the pandemic, in contrast with the polarization of the political environment after 2010

Regarding the current crisis, there are various scenarios for the depth of the recession, which all presuppose a V or in the worst case scenario a U-shape shock, with a large output drop in 2020 and a milder rebound for 2021 (Figure 2). For example, IMF forecasts a sharp decrease of 10% in GDP growth rate for 2020 and an increase of 5.1% for 2021[2], implying that despite being a V-shape crisis it will be severely costly for the Greek economy. The predictions of the European Commission report a decrease of 9.7% this year, followed by a strong rebound of 7.9% in 2021[3], whereas the Ministry of Finance

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[2] IMF, World Economic Outlook, April 2020: The Great Lockdown
[3] European Commission, Spring forecast 2020, May 2020

predicts a milder drop (-4.7%) for 2020 and a large increase for 2021 (5.1%)[4]. However, the announcement of a mild -0.9% recession in Q1 2020, along with the fiscal stimulus measures and the aid packages of the ECB and the European Commission suggest that the depth of the crisis will be manageable and Greece will endure losses that will be largely offset in the medium run.

Given that investment growth and GDP growth are strongly interconnected (Figure 3), the output rebound is expected to be followed by a surge in investment activity, after the recessionary phase of the crisis, starting from 2021. The new bet for the recovery largely depends on how quickly the economy will react, so that problems of liquidity and capital will not emerge.

Figure 3. The L-shape of the Greek economic crisis: a multi-faceted crisis, with investment and GDP growth largely correlated
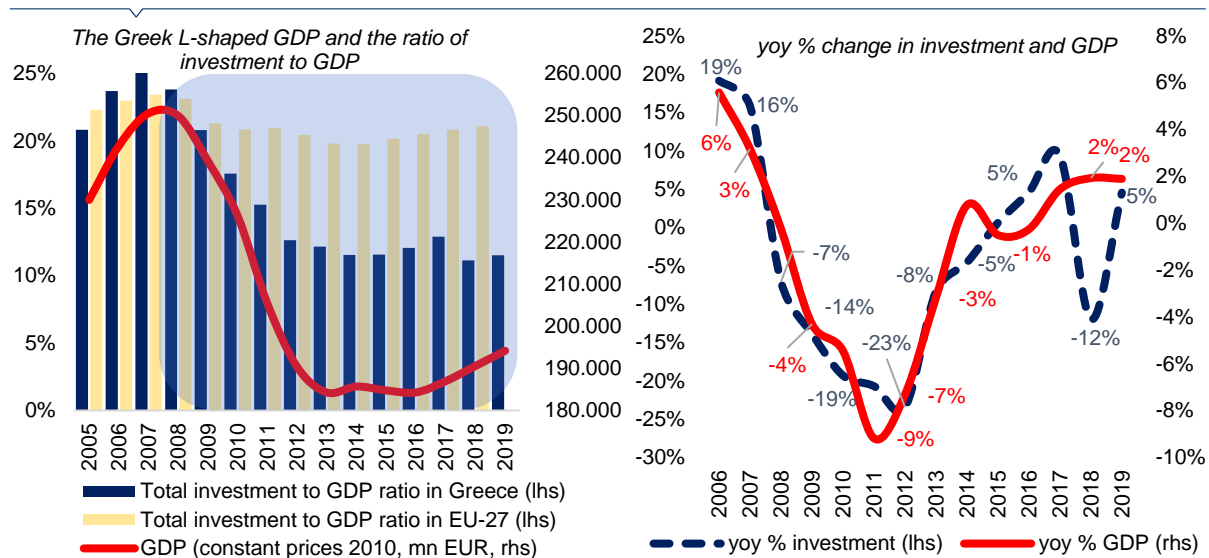
Source: ELSTAT

3. The Crisis Legacy: How Capital Formation Gradually Lapsed Over the Previous Decade

Before the 2020 pandemic outbreak, Greece's economy was on a recovery path, growing by 1.9% in 2018 and 2019. The economic growth was attributed to exports and government spending in 2018, but also to the rise of gross fixed capital formation by 4.6% yoy in 2019, which reached €22.3 billion (2010 constant prices). Moreover, after seven years of consecutive falls, investment began to gain ground in 2015, although in 2018 it subdued by 12%.

Investment activity never adequately recovered in Greece. Gross fixed capital formation dropped from 26% of GDP in 2007 to 11,5% in 2019, recording the most significant fall among EU economies (Figure 4). Cumulatively, during the decade 2009-2019, investment shrunk by 55%, equal to a c. EUR 26.8 bn loss. The main reasons behind this heavy toll were: a) the excessive cost of capital due to the high risk-premium and the subsequently high interest rates, which resulted in very low borrowing rates, b) the political and social uncertainty surrounding the already gloomy economic landscape and c) the low demand and decreased consumption. Since 2011, the depreciation rate remains higher than gross fixed capital formation, implying a gradual erosion of the capital stock. Although investment has recorded a slight rebound, capital depreciation[5] remains large and therefore net investment is still negative.

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[4] Ministry of Finance, Stability Program, April 2020
[5] Capital depreciation is defined as the consumption of the physical capital, which is equal to net minus gross fixed capital formation

The largest reduction in gross fixed capital formation share of the GDP (10.1 percentage points) was attributed to the contraction in residential investment, which regressed from 10.8% in 2007, to 0.8% of GDP in 2019, cumulatively falling by 90% in the decade 2009-2019. Residential construction was a key driver of economic growth before the recession of the previous decade. Noticeably, although it stood at 41% of gross fixed capital formation in 2005, it declined to 30% in 2010 and it subsequently shrank to 5% in 2017 (Figure 5). In 2019, residential investment gained ground and surged by 12% yoy, contributing by 7% to total gross fixed capital formation. This improvement during the last year was in tandem with the recovery in the real estate market and the accelerating trend in housing prices. However, the positive momentum in real estate is expected to be halted in 2020, as a result of the reduced supply due to the pandemic lockdown, and revive again in 2021, as the economy is anticipated to reboot.

Figure 4. GDP components-expenditure approach and evolution of investment as a % of GDP
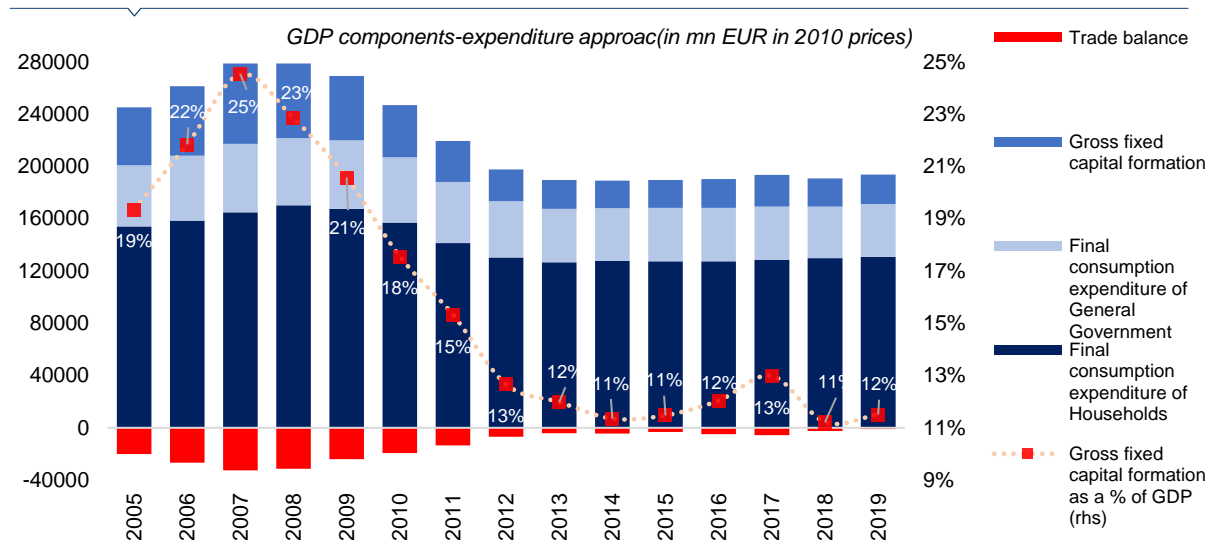
Source: ELSTAT

Investment in transport equipment (including ship) recorded a substantial increase of 29% in 2019, although during the decade 2009-2019, it lost cumulatively 59% of its value. Moreover, investment in ICT equipment, critical to businesses and necessary for the reviving of the physical capital and productivity, also rose by 2.3% in 2019, remaining on an upward trend for three consecutive years. Overall, ICT investment was cumulatively reduced by 44% during the decade 2009-2019. Machinery equipment and weapons systems also retained their positive yoy momentum for third year in a row in 2019, reaching 2%. Out of all investment basic products, machinery equipment and weapons systems recorded the second lowest cumulative fall, equal to -28% in the decade 2009-2019.
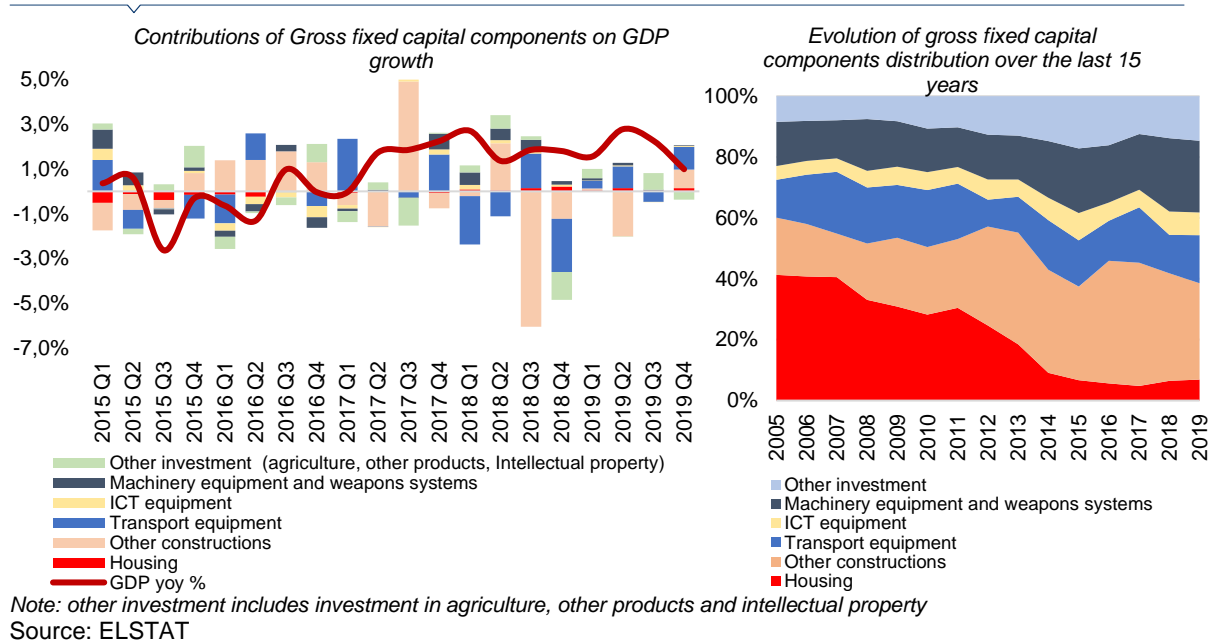
Other investment - in agriculture, intellectual property and other products -exhibited the lowest fall during the same period, equal to -20%, whereas its yoy increase for 2019 reached 11%. Non-residential construction on the other hand was reduced by 6% yoy in 2019 and by 36% cumulatively in the decade 2009-2019. This sizable downscale reflects, among others, the substantial delays in the restart of major construction projects that had been put on hold during the previous crisis.

In terms of per quarter contribution to GDP growth rate, real estate contributed by 0.2% in the fourth quarter of 2019, investment in other construction by 0.8%, while transport equipment had the largest contribution, equal to 1% (Figure 5). On the other hand, investment in ICT equipment and machinery equipment and weapons systems had a neutral effect in the fourth quarter GDP growth rate, whereas other investment (agriculture, intellectual property and other products) negatively contributed by -0.4%.

Public investment, mainly funded by the Public Investment Budget (PIB) and usually related to large construction and infrastructure projects, such as roads, schools, hospitals, etc., also came to a halt

during the crisis. Public investment is found to have multiplicative effects on the economy, by also fueling private investment activity[6]. Public investment was subdued in the previous years, mainly because of the primary surplus target overshooting. This resulted in the under-execution of public investment projects, which adversely affected growth and decelerated the closure of the investment gap.

Figure 5. Contributions of gross fixed capital components on GDP growth and their distribution evolution as a % of total investment

Note: other investment includes investment in agriculture, other products and intellectual property
Source: ELSTAT

4. The Main Determinants of Investment Activity in Greece

4.1. What the Literature Suggests

The investment accelerator theory proposed by Clark (1917) is among the first investment theories. It assumes that the desired capital stock is proportional to output and thus investment depends on output growth. In addition, the flexible accelerator theory assumes that lags in the capital stock also affect current investment (Eisner and Strotz, 1963; Ekland, 2013).

According to the Keynesian theory, the level of investment depends positively on the marginal efficiency of capital -the expected rate of profits- and negatively on the interest rate -or else the cost of capital. Changes in income do not affect investment in the short run but only in the long run (Keynes, 1936; Ekland, 2013). Fischer (1930) thought of the marginal efficiency of capital as the internal rate of return. Both views of Keynes and Fischer argue that investment is made until the present value of the expected future revenues at the margin is equal to the opportunity cost of capital or equally when the expected rate of investment equals the discount rate (Baddeley, 2003). Additionally, the neoclassical theory treats investment as a maximisation process for firms to reach their optimal capital stock (Fischer, 1930, Hayek, 1941; Roos and Von Sjeliski, 1943; Roos, 1948).

Jorgenson's user cost model (1963) falls under the neoclassical theory of investment. His theory also introduces the depreciation rate and capital gains / losses associated with changes in capital price. Firms invest to the point that the marginal product of capital equals its user cost, which is the total cost to the firm of using one more unit of capital (Gould and Waud, 1973). Brainard and Tobin's Q-theory (1977) is also based on profit maximisation, by also implying that investment is affected by the market value of assets and their replacement costs.

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[6] The literature finds evidence of both a crowding-in and a crowding-out effect of public on private investment (Gjini and Kukeli, 2012; Afonso and Aubyn, 2008).

Empirical studies tend to confirm that fixed investment and output are positively and highly correlated (Georgakopoulos et al., 1995; Meyer and Kuh, 1957; Song et al., 2001; Jorgenson,1971; Griliches and Wallace, 1965; Ligthart, 2002; Molocwa et al., 2018). Acosta and Loza (2005) find that shocks in aggregate demand, but also in exchange rate and trade liberalisation, determine private investment decisions in the short run. Bosworth and Kollintzas (2002) concluded that Greece's weak growth during the period 1970-1995 can be partly attributed to the deteriorating capital formation, although they argue that the most crucial factor was the sharp decline in multi-factor productivity.

Various studies have confirmed the negative and statistically significant relationship between investment and interest rates (Petraki and Kottis, 1996; Bischoff, 1971; Kosma, 2015; Michaelides 2005), which is occasionally inelastic (Evans, 1967; Anderson, 1964; Mayer, 1968). However, other studies have shown that the interest rate plays a minor role as a determinant of investment spending, whereas output and cash flows have a much larger economic impact (Gilchrist and Zakrajsek, 2007). Profitability is found to positively and strongly affect investment (Bosworth and Kollintzas, 2002; Dornbusch and Fischer, 1990; Allen, 1987; Romer, 1996). Michaelides et al. (2005) confirm the positive relationship of investment, output and profitability.

Empirical investigation has additionally shown that investment is also determined by factors such as technological progress, institutions, tax policies and availability of finance and credit. Technology advancements reduce the cost and prices of capital goods and thus increase investment on an aggregate level (Jones, 2009). On the contrary, an increase of corporate income tax raises the user cost of capital and consequently its marginal product and thus reduces the amount of physical capital (Jones, 2009; Molocwa et al, 2018). Limitations on investment funding have also been documented as significant determinants, especially for small and medium-sized companies, which do not have access to the financial markets and depend on bank credit (Loungani and Rush, 1995).

For Greece, it has been shown that there is a positive and statistically significant relationship between the investment rate and changes firms' credit (Kosma, 2015). Risk and uncertainty and consequently expectations play a fundamental and distinguishable role in investment determination. Moreover, the ratio of external debt to GDP is another investment driver, which negatively affects investors' expectations and increases uncertainty over future policies (Chirinko and Schaller, 1995; Acosta and Loza, 2005).

4.2 Factors Affecting Private Investment in Greece: An Econometric Approach

This section investigates and quantifies the investment determinants in Greece. The factors have been chosen based on the theoretical, as well as the empirical literature. In our econometric specification, the dependent variable is the growth rate of private gross fixed capital formation, denoted as I_t (in 2010 constant prices). Our sample consists of quarterly data spanning from 2001 Q2 to 2019 Q4[7]. Among the other factors we investigate, we diverge from the existing literature by also employing the Economic Sentiment Indicator (ESI) as an independent variable[8].

The seven explanatory variables of our model specification are:

- *Private investment growth rate with one period lag (I_{t-1})*: this variable represents the potential persistence of private investment growth, which is based on 2010 constant prices.
- *Gross Domestic Product growth rate (y_t):* this variable is based on 2010 constant prices and it is expressed with a 2-period lag, i.e. the GDP growth rate six months ahead.
- *Real interest rate (r_t):* this variable is calculated by subtracting the Harmonised Index of Consumer Prices (HICP) inflation rate from the nominal long-term interest rate, as expressed by the 10-year Greek Government bond yield. This variable is also expressed with two period lags.

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[7] Although some variables are available since 1992 Q2, our final data sample starts from 2001 Q2 because the debt to GDP ratio is not available earlier.

[8] In the Appendix, we present the scatter plots of private investment growth with selected variables (Figure A1).

**Box 1. Investment spending in European countries: Differences and Similarities**

Between 2009 and 2019, the investment to GDP ratio decreased sharply in Greece, by 9.4 pps, reaching 11.4%, being the lowest among European countries. Investment per capita is the second lowest in Greece, after Bulgaria, standing at EUR 1,582 mn in 2019 (Figure 6). Moreover, the business investment ratio as a % of GDP is the lowest (5.7% in 2018) among European countries, followed by that of Cyprus (6.3%). Greece also exhibits the second lowest household investment to GDP ratio (2.4%), after that of Ireland (2.4%). The government investment to GDP ratio stood at 5.6% in 2008, ranked 4th among European countries, whereas a decade later, it reached 3%, ranked 18th and having dropped below the European average (3.6%). In 2018, Hungary and Cyprus exhibited the highest government investment to GDP ratio, which stood at 5.8% for both countries. Cyprus also recorded the second highest household to GDP ratio in 2018, after Finland.

Contrary to Greece, the investment to GDP ratio increased by more than 22 pps in Ireland in the decade 2009-2019, reaching 43%, with the second highest ratio being that of Hungary, which stands at a much lower level (29%). Ireland also exhibits the highest investment per capita ratio (EUR 30,755 mn in 2019) and the highest business investment to GDP ratio (19%), combined with a record high GDP growth rate and the strongest economic sentiment among EU countries.

The drivers for investment vary among European countries. For example, low corporate income taxation can partly explain the rich investment activity in countries such as Ireland, Hungary, Czechia or Finland, but it cannot explain the relatively lower investment to GDP ratio in Bulgaria or Cyprus. Although the two countries exhibit very low corporate income tax rates (10% and 12.5%), they also record relatively low investment to GDP ratios (18.3% and 19.1% in 2019), while Bulgaria also records the lowest investment per capita ratio.

In conclusion, although investment is affected by factors such as the GDP growth rate or the corporate income tax rate, there are other, mainly institutional drivers, which are difficult to quantify but can have a vital impact on a country's investment activity. These include, among others, the consistency of policymaking, the level of corruption and the effectiveness of the judicial system.

Figure 6. Investment per institutional sector, investment per capita, investment as a % of GDP and corporate income tax rate

Source: Eurostat
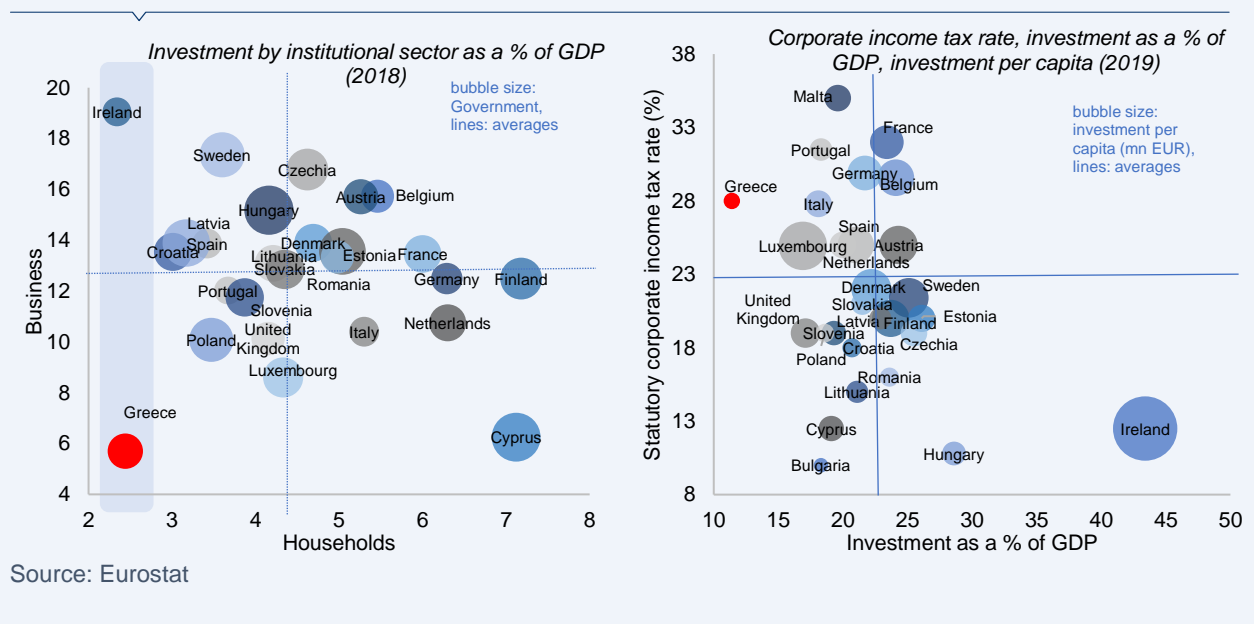
- *Corporate income tax rate (τ_t)*: the series is taken from the OECD tax database and comprises the statutory corporate tax rate in Greece[9]. The variable is expressed with four period lags.
- *General government gross debt to GDP ratio (b_t)*: we express this explanatory variable in the estimated equation with one period lag.
- *Economic Sentiment Indicator (u_t)*: we employ the Greek ESI of DG-ECFIN/European Commission as an explanatory variable in our equation specification.
- *Real credit growth of the private sector (c_t)*: this series is taken from the Bank of Greece and is deflated by using current prices credit growth minus the HICP inflation rate.

The GDP series, the gross fixed capital formation, the government debt, the HICP and the ESI are taken from Eurostat /European Commission databases. The credit financing of the private sector is taken from the Bank of Greece, the statutory tax on corporate profit from the OECD and the 10-year Greek Government bond yields from Bloomberg. All series are controlled for stationarity, by applying both the Augmented Dickey-Fuller and the Phillips-Perron unit root tests. The variables y_t and I_t are stationary without being differenced. All other variables become stationary when expressed in first differences. We estimate the following dynamic equation by applying the OLS methodology, with robust standard errors:

$$I_t = a_0 + a_1 I_{t-1} + a_2 y_{t-2} + a_3 \Delta r_{t-2} + a_4 \Delta \tau_{t-4} + a_5 \Delta b_{t-1} + a_6 \Delta u_t + a_7 \Delta c_t + e_t \qquad \text{(eq. 1)}$$

The term Δ expresses the first differences, a_0 represents the constant term, $(a_0 \dots a_7)$ denote the coefficients of the explanatory variables and e_t stands for the disturbance term. The results are shown in (Table 1). Our findings are consistent with what theory suggests[10]. The modelled independent variables explain almost half the variability of the dependent variable. The results indicate that all explanatory variables are statistically significant[11].

Private investment growth in Greece is shown to be positively affected by its one period lag, but due to the relatively low magnitude of the estimated coefficient, this persistence is negligible. GDP growth also positively affects private investment growth, implying that the upward (downward) phase of the business cycle will lead to higher (lower) private investment growth after six months. The relationship between the economic sentiment and the dependent variable is also positive. Higher levels of the ESI suggest more optimism and thus enhanced business and consumer confidence, which can boost investment incentives and lead to higher private investment growth. Credit growth is the fourth variable that positively affects private investment growth, suggesting that financial intermediation can play a significant and supportive role in investment activity.

On the contrary, the debt to GDP ratio negatively affects the dependent variable, denoting that a faster increasing public debt compared to GDP growth is associated with a declining investment activity. Corporate income taxation also adversely affects private investment growth, implying that a higher corporate income tax rate and thus capital cost limits incentives to invest. The interest rate is the third variable with a negative effect on the dependent variable, suggesting that a higher real interest rate leads to a higher cost of capital, which in turn decreases the incentives to invest.

Apart from the determinants we examine in this empirical analysis, there are additional and mainly institutional factors that also affect investment but are difficult to quantify in time series regressions.

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[9] The statutory corporate income tax rate "*shows the headline tax rate faced by corporations and can be used to compare the standard tax rate on corporations across jurisdictions and over time*" (OECD)

[10] We also perform a variety of post-estimation tests in order to ensure the validity of our results. In specific, we examine for:
- Heteroscedasticity by applying the Breusch-Pagan-Godfrey test
- Serial Correlation by applying the Breusch-Godfrey LM test
- Normality of the residuals by applying the Jarque-Bera statistic
- Proper model specification by applying the Ramsey RESET test
- Stability of our estimates by applying the CUSUM test

The tests' results show a) no evidence of heteroscedasticity or serial correlation, b) normality of the residuals and c) stability of the estimated coefficients. Finally, the Ramsey RESET test suggests that our model is well-specified.

[11] The variables' statistical significance varies and is indicated by the number of asterisks below Table 1.

These factors include structural competitiveness, political corruption, bureaucracy or the level and quality of democracy (Bertelli and John, 2013; Ajide, 2017). For example, when a country exhibits high levels of corruption and low levels of structural competitiveness, then these raise the operational costs and thus increase uncertainty, hampering investment activity. Furthermore, the economic and social conditions created as a result of the new pandemic crisis comprise an example of how an unexpected, random factor can also subdue growth and thus investment. The boost to unlock structural competitiveness and combat investment hampering triggered by the lockdowns due to COVID-19 is to provide incentives under the appropriate funding and fiscal stimulus. This is the subject of the next section, in which we identify the sources of investment funding under the new pandemic regime.

Table 1. Determining Investment Spending in Greece

Dependent Variable: Private investment growth	
Estimation Method: Least Squares with heteroscedasticity and autocorrelation robust standard errors	
Sample: 2001Q2 - 2019Q4	
Number of observations: 75	
Variable	**Estimated Coefficient**
a_0	-0.916 (1.353)
I_{t-1}	0.229* (0.126)
y_{t-2}	1.304*** (0.369)
Δr_{t-2}	-1.462** (0.609)
$\Delta \tau_{t-4}$	-1.044** (0.430)
Δb_{t-1}	-0.435** (0.167)
Δu_t	0.621* (0.319)
Δc_t	1.763** (0.765)
Diagnostics	
Adjusted R-squared	0.458
F-statistic (Probability value)	0.000
Durbin-Watson statistic	2.092

Notes:
(1) The number of stars ($*$) denotes the significance level: $***$ p-value < 0.01, $**$ p-value<0.05 and $*$ p-value<0.1
(2) HAC robust standard errors are shown in parentheses.
Source: Own estimations

5. Raising and Channelling Funds: A Sectoral Approach under 2020 Fiscal Stimulus and the "Next Generation EU" Package

The uncertainty induced by the COVID-19 pandemic necessitated a timely response by policymakers in order to avoid a) the steepening of the epidemic curve with extended human losses, b) a substantial output contraction and c) an uncontrolled impact on investment and the business environment. The economic lockdown imposed on March 2020 was backed by expansionary, proactive fiscal policy measures. These aimed to smooth its adverse impact on the short-term domestic economic outlook, support businesses and employees and help the country to emerge from the lockdown with a sense of growing optimism.

The stimulus package of the Greek government's fiscal and liquidity measures and the additional EU funding (such as the SURE program) is estimated at EUR 24 bn. These measures include employment

and business protection schemes, leverage of loan guarantees, suspension of tax obligations, such as VAT cuts and deferrals of social security liabilities. The measures provided by the European support mechanisms, include a) the EC SURE program, which aims to support employment and provide a special unemployment benefit to around 120,000 seasonal employees until September and b) guarantees from the EIB to support hard-hit small and medium-sized enterprises. Moreover, Greece will be eligible to use the Pandemic Crisis Support credit line, with favourable terms established by the ESM, under the requirement to support domestic financing of direct and indirect healthcare, cure and prevention related costs due to the COVID-19 crisis. In addition, the 3.5% primary surplus target for Greece will no longer be applied.

Moreover, the European Commission has proposed a recovery package which includes a reinforced long-term EU budget for 2021-2027, which will amount to c. €1.1 tn (European Commission, 27/05/2020), as well as a new Recovery Plan titled "Next Generation EU". The latter is an additional funding instrument which will be repaid over a long period of time (between 2028 and 2058) through future EU budgets. The European funds contain sizable investment, equity repair and sovereign financing needs (Verwey, Langedijk and Kuenzel, 2020). Greece is expected to benefit from the EC proposed Recovery Plan of EUR 750 bn, with an amount estimated at c. EUR 32 bn or 18% of its GDP. Out of these funds, which are anticipated to substantially improve the medium-term prospects of the Greek economy, c. EUR 22.5 bn will be in the form of grants and EUR 9.5 bn in the form of loans. According to the EC, the Recovery package is made available in order to support the country's growth prospects and improve the combination of low investment and high debt.

The recovery of investment will be also supported by the Public Investment Programme, as well as the National Strategic Reference Framework 2021-2027 (NSRF), which is expected to grant EUR 20 bn. The Greek government has announced that the funding from all the above programmes, including NSRF and the Next Generation EU, will be allocated to boost investment mainly in four pillars: a) green economy transition, b) infrastructure, c) digital transformation and d) skills development and training.

Figure 7. Gross fixed capital formation in major economic sectors as a % of total investment, yoy % in 2017 and annual average growth rate for the decade 2007/2017
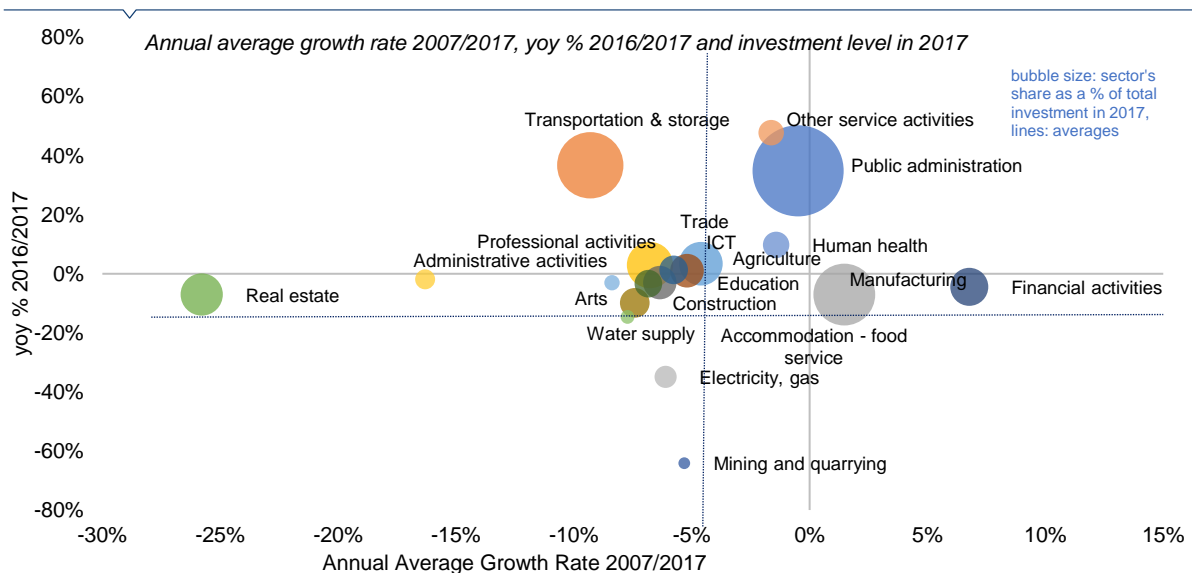
Source: Eurostat

Funds are expected to be allocated to the digital transition of public administration. It is worth pointing that among the economy's sectors, public administration is currently the largest in terms of its investment share (25.6% of total investment in 2017, from 10.6% in 2007) (Figure 7). For a digital transformation in public administration, but also economy wide, investments should be channelled in broadband networks,

high-speed broadband, open wireless, fibre optic and 5G networks. On the green economy front, emphasis should be placed on the promotion of investments with low carbon emissions, as well as on the transition to clean energy, circular economy and climate change adaptation. Funds allocated in infrastructure should also address issues on transport, aimed at developing a secure and cohesive high-quality rail transport system and ensure accessibility and optimal use of transportation means, such as highways, seaports, ports and airports. Investment funds should also be devoted to spatial interventions and sustainable urban development, with a priority to enhance integrated, social, economic and environmental local development, cultural heritage, tourism, public space renovation and security in rural and coastal areas. Regarding skills development, emphasis, among others, should be placed on investments that promote the interconnection of scientific research with the market, the enhancement of businesses' competitive environment and the strengthening of SMEs' innovation capacity.

6. Concluding Remarks and Policy Recommendations

This study outlines how investment activity evolved in Greece over the last decade and explores its momentum before and after the COVID-19 pandemic era. We concluded that the L-geometry of the 2009-2016 recession has been determined to a great extent by the fact that fresh investment was lower than capital depreciation for a long period after the initial shock. Although investment spending has shown signs of recovery, its further expansion is not expected before 2021 due to the new economic crisis induced by the pandemic. However, although it is anticipated to push the Greek economy into a deep recession in 2020, the new crisis is vastly different from that of 2009 in both shape and duration, and thus it is not anticipated to have long-lasting effects.

Exploring its driving forces in Greece, we find that investment activity is inseparably related to economic growth. To examine the relationship between private investment growth and its main drivers, we employ a time-series estimation with quarterly data ranging from 2001Q2 to 2019Q4. Our empirical findings indicate that GDP growth, economic sentiment and real credit growth have a positive and statistically significant impact on private sector investment growth. Conversely, the real interest rate, corporate income taxation and the debt to GDP ratio adversely affect private investment growth.

In the aftermath of the COVID-19 outbreak, the Greek government applied various fiscal measures, such as the coverage of social security contributions and the postponement of tax obligations, to combat the recession and mitigate temporary liquidity problems. Although necessary, these measures per se are not adequate to increase investment, the surge of which is related to further actions targeting a) the support of the drivers' evolution highlighted in Section 6 and b) the assessment of other, mainly institutional and not easily quantifiable factors. Specifically, to incentivise investment, the measures activated should be based upon these broad factor categories.

Empirically, creditless investment growth is rare. In the post COVID-19 era, we expect positive credit growth to be significantly supported by state guarantees, an additional element that differentiates the current crisis from the previous one. Furthermore, the COVID-19 related fiscal support measures, the available European Recovery Plan and the NSRF funds, supported by banks' co-financing, can also provide the appropriate stimulus to regain businesses confidence and reboot investment activity. Finally, the further reduction of the large stock of non-performing exposures and the cleaning up of banks' balance sheets is a sine qua non condition for future re-financing.

A consistent tax policy and lower corporate income taxation is also necessary. Greece exhibits the 6th highest corporate tax rate among European countries, higher than that of its neighboring countries, such as Bulgaria or Cyprus. In relation to the tax policies and in addition to the measures that have been legislated so far, such as the unified property (ENFIA) tax cut by 22% on average since 2019, there are further measures included in the 2020 State Budget. These include the reduction of (i) the corporate tax rate from 28% to 24%, (ii) the dividends taxation from 10% to 5%, (iii) the personal income tax rate from 22% to 9% for annual income below EUR 10,000 and (iv) social security contributions for full-time employees. The suspension of building activity VAT and real estate transactions goodwill tax for 3 years

also aims to improve business sentiment and attract private investment. However, tax cuts are more effective when they are perceived as permanent by economic agents.

As shown in the empirical analysis, the economic sentiment indicator is a positive and statistically significant investment driver. In the second half of 2019 and before the current crisis, business expectations and consumer confidence were supported by political stability and a pro-growth policy agenda. After the outbreak of COVID-19, escalated uncertainty is reflected, among others, in economic sentiment indicators. However, economic sentiment in Greece recorded the lowest fall among European countries as a result of the successful front-loaded lockdown measures, which led to a flatter epidemic curve, and a prompt fiscal policy response.

The cost of funding for the Greek state, firms and banks is a driver of great significance for the investment dynamics, as it determines the lending rates. Before the outbreak of the new crisis, the continuous fall of the Greek government bond yields reached record low levels. This downward trend, despite the excessive debt-to-GDP ratio, was attributed to the favorable features of the country's debt profile, which included i) adequate cash reserves, covering the country's financing needs for more than two years, ii) a small ratio (17%) of Greek government debt held by private bondholders, c) a large (91%) debt stock held at fixed interest rates, implying low vulnerability to interest rate shocks d) a very long maturity of Greek debt compared to other countries (on average 21 years) and e) a projected debt-decreasing snowball effect over 2019-2020, as a combination of the expected accelerating growth rate and the country's lower borrowing cost before the crisis. Moreover, amid the 2020 crisis, the Greek state bonds are to be included in an emergency asset purchases program worth EUR 1.3 tn launched by the ECB and the Eurosystem, which commenced conducting purchases under the Pandemic Emergency Purchase Programme (PEPP) on 26 March 2020 and includes a waiver of the eligibility requirements for securities issued by the Greek Government. The inclusion of the Greek Government bonds in the PEPP is expected to increase confidence, compress the cost of borrowing for the Greek state, banking system and private sector and thus foster investment momentum. Apart from the ECB's monetary policy response to the COVID-19 pandemic, lending rates are also anticipated to follow a downward trend due to the competition of Greek banks for high quality corporate lending.

Finally, to secure investment growth, it is fundamental to minimize bureaucracy and create an environment which fosters entrepreneurship and structural competitiveness. In this context, the promoted reforms should also touch upon non-economic factors, such as reducing the delays and backloads of judiciary cases, by placing emphasis on contract enforcement.

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Appendix

Figure A1. Some stylized facts on private investment growth and selected variables
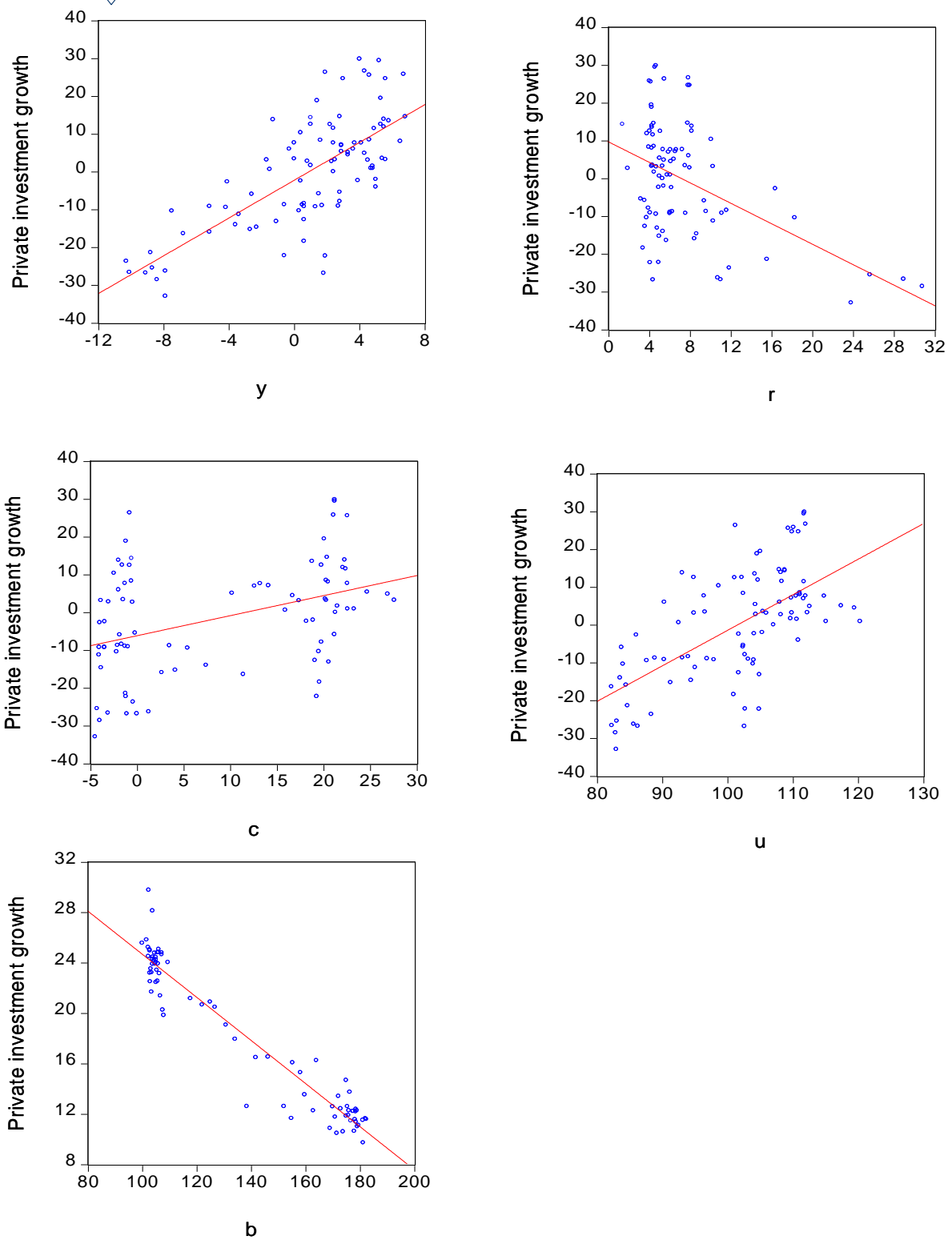
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