



European
Commission

ISSN 2443-8022 (online)

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DISCUSSION PAPER 108 | SEPTEMBER 2019

EUROPEAN ECONOMY



Economic and
Financial Affairs

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Luxembourg: Publications Office of the European Union, 2019

PDF ISBN 978-92-79-77445-4 ISSN 2443-8022 doi:10.2765/18180 KC-BD-18-035-EN-N

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Damiano Briguglio, Lazaros Dimitriadis, Virginia Maestri and Gianluca Papa

Abstract

Both Italy's private and public investment have been subdued since the crisis, especially in the South. Yet these are key to boosting Italy's sluggish productivity, enhancing its long-term growth potential and reducing the high public debt-to-GDP ratio. Structural weaknesses were already present before the crisis, such as the low investment in intangibles. In this respect, Italy has received Country Specific Recommendations to focus investment on innovation and research. In line with these recommendations, this paper explores drivers and barriers to investment in Italy, with a focus on intangibles. According to the analysis, tax incentives for innovation (as recently introduced in Italy) have a positive effect on investment, but other factors remain significant barriers to investment. For instance, the analysis confirms the importance of improving non-bank access to finance, consistently with the Country Specific Recommendations of recent years. Well-targeted public investment, as well as a more adequately educated workforce, are also shown to boost private investment in the long run.

JEL Classification: E22.

Keywords: Italy; investment; innovation.

Acknowledgements: We would like to thank colleagues at the European Commission: Alienor Margerit, Florian Woehlbier, Gaetano D'Adamo, Heiko Hesse, Samuel Whittaker, Francesco Rossi Salvemini, Jan In' T Veld, Peter Voigt, Anna Thum-Thysen, Martin Hallet (all ECFIN), Jean-Charles Bricongne (ex ECFIN), Roberto Martino (RTD), Simone Salotti, Diego D'Andria (JRC), Giuseppina Bitondo (GROW), Melvin Van Velthoven (TAXUD) for their useful comments.

The latest update of the data used for the analysis of this document is December 2018.

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1. INTRODUCTION

According to the European Commission⁽¹⁾, Italy's main macro-economic imbalance is due to the combination of high public debt and low productivity growth. This is in a context of high, although decreasing, unemployment (in particular among young people), an ageing population, subdued and misallocated bank lending (European Commission, 2019). The stagnation of productivity, dating back a decade before the onset of the crisis, is considered one of the main factors holding back Italy's long-term economic growth. Following the crisis, policy efforts to improve Italy's competitiveness focused on reducing labour costs. Although this strategy worked in the short-term, increasing productivity seems a more effective strategy in the long-run. Increased productivity, as well as demand factors, would contribute to economic growth, which in turn would help to reduce the public debt to GDP ratio.

Considering supply factors, capital deepening and technological progress are essential for boosting Italy's productivity and growth potential. On the other hand, improved productivity growth prospects encourage firms to invest. However, the crisis resulted in a considerable fall of private investment in Italy compared to peer countries (such as France, Germany and Spain), while its recent recovery has been particularly weak. Similarly to peer countries, Italian private investment is particularly relevant as it is around eight times the level of public investment⁽¹⁾. Public investment declined too. In a context of fiscal consolidation, cuts in public investment have often taken precedence over reducing current expenditure. Compared to peer countries, investment in intangibles was already low before the crisis. Indeed, Italy was already characterised by structural weaknesses that hold back investment and productivity growth. The weaknesses became even more relevant after the crisis because they hamper the reallocation of resources between sectors and firms (European Commission, 2017a). Therefore, the weakening in investment does not help to reverse the stagnation in Italian productivity.

Several factors contribute to defining Italian weaknesses in aggregate supply, holding back investment and productivity growth. Firstly, Italy

has a low specialisation in knowledge-intensive sectors, as well as a relatively low share of tertiary educated people, of digitalisation and considerable skill mismatches, which constrain technological progress. Moreover, Italy is characterised by a large share of SMEs and micro firms, which are strongly dependent on bank loans and have a limited capacity to innovate. Bank credit has often been misallocated to less productive firms and more traditional sectors. At the same time market-based finance, which could contribute to a more efficient allocation of capital thanks to a more thorough assessment of firms' business activity and plans, is not sufficiently developed. This combination of underdeveloped non-bank finance and firms' over-reliance on bank loans hinders more productive investment⁽²⁾.

It is therefore important to restore an adequate level of investment, while addressing structural weaknesses. Policy measures unlocking investment may also increase productivity growth. The EU launched the Investment Plan for Europe in 2014 in order to mobilise additional private investment in Member States. One year later, Italy introduced a national plan in the same vein, which mainly comprised fiscal measures, aiming particularly to boost innovative business investment. A number of measures were taken to address financial constraints and inefficiencies in the public administration. More recently, the current government is planning some measures to enhance public investment. Tackling the main bottlenecks and well-targeted policy measures are essential for boosting investment.

The paper adds to the existing literature on the theme, by looking more in depth at the drivers and barriers to private investment in the specific case of Italy. The aim is to identify the main areas for policy intervention for boosting private investment, with a focus on intangibles, which is especially relevant for Italy. The analysis is based on a time series, from the late '90s up to the first quarters of 2018, of Italian investment data and of its determinants. The analysis also checks whether

⁽¹⁾ This ratio refers to 2017.

⁽²⁾ *Study on capital misallocation and skill mismatches in Italy: the productivity conundrum*, LSE, 2016. The study was commissioned by DG ECFIN to the London School of Economics Enterprises. The study finds that relational banking may be a drag on aggregate productivity as it diverts resources from more productive firms to less productive ones.

structural breaks occurred due to the crisis. The rest of the paper is organised as follows. Section 2 presents investment trends in Italy by institutional sectors, asset type, industry and geographical area. Section 3 summarises the main initiatives taken at EU and national level to boost investment. Section 4 reviews the literature, with a focus on Italy, and describes the main investment drivers and barriers. Section 5 briefly describes the methodology used for the country-specific analysis of the drivers and barriers to private investment in Italy and the data used. The results of the econometric analysis on tangible and intangible investment are presented in Section 6. Finally, Section 7 provides some concluding comments on the main policy areas to improve in order to boost investment in Italy.

2. STYLISTED FACTS: INVESTMENT IN ITALY

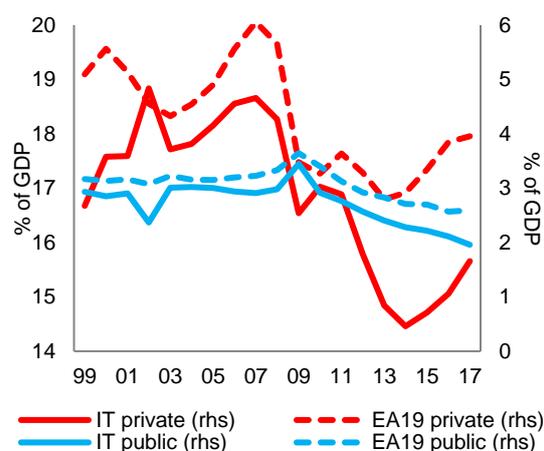
Investment fell significantly in Italy in the wake of the crisis (by 19% from 2007 to 2017), as was the case in other hard-hit euro area countries. It began to decline in 2008 and fell more sharply after the sovereign debt crisis. The crisis increased the divergence in terms of investment rates with respect to the euro area. Graph 2.2 shows the investment patterns in peer countries. At the end of the '90s, Italy had an investment rate comparable to France, but the 2008 crisis and, in particular, the double dip recession implied a considerable fall of investment in Italy and a divergence with France of 3.6 percentage points in 2017 (the gap is 2.6 with Germany and 3 with Spain). In 2017 total investment as a share of GDP was only 17.6% in Italy compared to 20.6% in the euro area, against 21.6% and 23.3% in 2007, respectively. Investment breakdowns by institutional sector, asset, industry and geographical area provide a more in-depth analysis of its composition and evolution compared to the euro area average.

By institutional sector: public and private investment

The subdued investment dynamics concern both the private and public sector. In 2007, private investment in Italy was comparable to that of France and Germany, but in 2017 it was considerably lower (Graph 2.2). Although private investment started to recover 2015 and it stands at 15.5% of GDP in 2017, it is still nearly 3 percentage points below the euro area average. In 2017, public investment which had reached its peak in 2009 (3.4% of GDP) stood at 2% of GDP, slightly lower than the euro area average

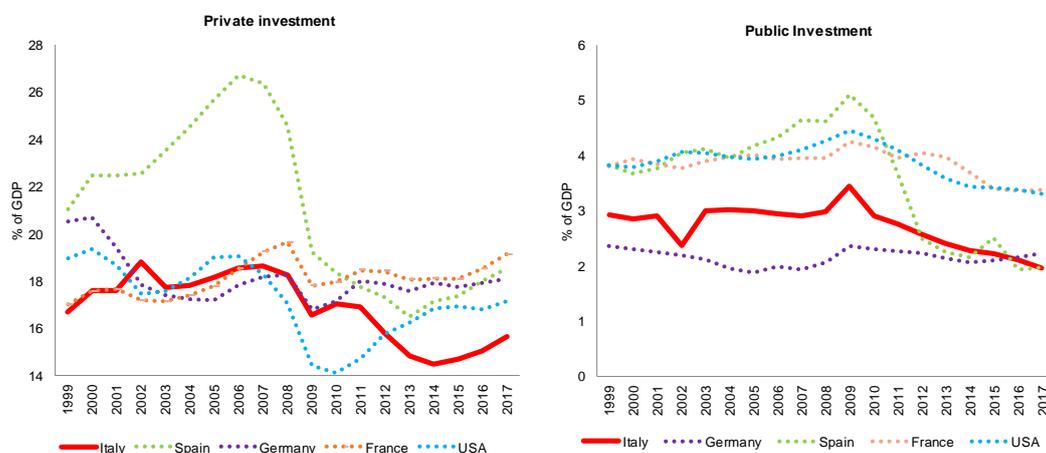
(2.6% of GDP). As graph 2.1 shows, the gap vis-à-vis the euro area is mostly driven by private sector investment.

Graph 2.1: Private and public investment as a share of GDP, Italy and euro area



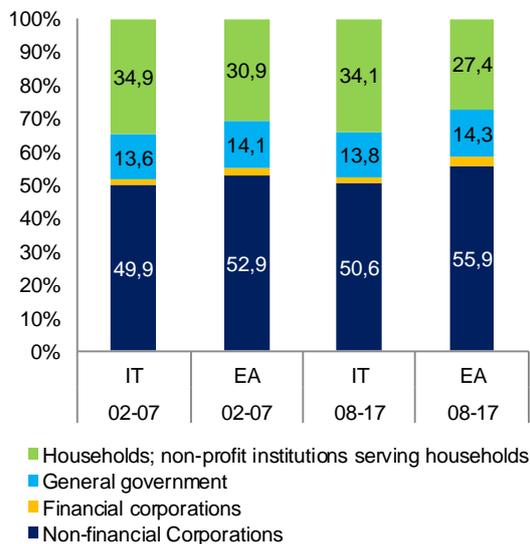
(1) Private investment is calculated as the sum of gross fixed capital formation of all sectors excluding general government. Public investment is gross fixed capital formation by general government
Source: European Commission (Eurostat)

Graph 2.2: Investment as a share of GDP, Italy and selected countries



(1) Private investment is calculated as the sum of gross fixed capital formation of all sectors excluding general government
Source: European Commission (Eurostat)

Graph 2.3: Investment composition by institutional sector



Source: European Commission (Eurostat)

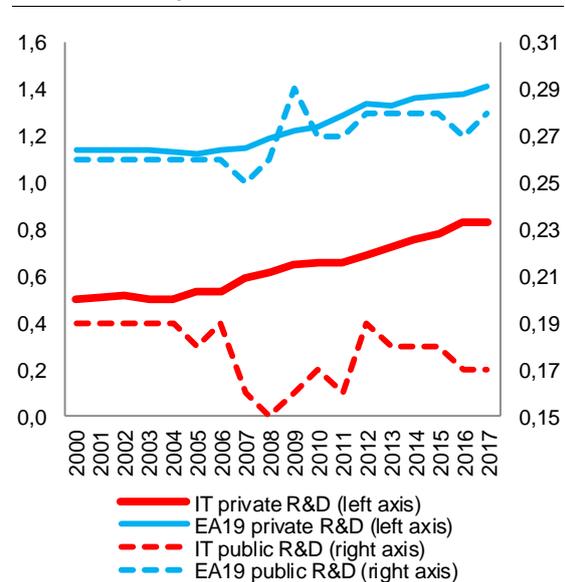
Graph 2.1 suggests opposite trends of public and private investment in Italy in most years, which does not seem to hold for the euro area, at least until 2014 when the euro area trends start behaving alike. The opposing trend was particularly marked in 2002, when the fall in public investment was mirrored by an increase in private investment. On the other side, in 2009 the fall in private investment was compensated by an expansion in public investment.

The composition of investment is skewed towards investment by households compared to the euro area (34% versus 27.4% of total investment in the period 2008-2017). The share of investment by households in total investment reduced over the crisis (from 7.7% of GDP in 2007 to 5.6% in 2017), but less than in the euro area (Graph 2.3). Investment by non-financial corporations (NFCs), instead, represent a smaller share of total investment than in the euro area and this gap increased over the crisis (corresponding to 9.6% of GDP in Italy and 12.2% in the euro area in 2017). Also general government investment in Italy continues to represent a somewhat smaller share of total investment than in the euro area (13.8% versus 14.3% in 2017). Investment by financial corporations represents also a smaller share of total investment than in the euro area, where it is nonetheless small (1.5% of total investment versus 2.4% in the euro area in 2017).

By asset: the role of intangibles

All investment assets were affected by the crisis, with construction the hardest-hit, while Information and Communication Technology (ICT) and intangible investment were more resilient, as in peer countries. Before the crisis, Italy was characterised by a larger share of investment in machinery and equipment and lower shares of investments in construction and intellectual property compared to the euro area average (Graph 2.5). After the crisis, the contributions of construction to total investment was more in line with the euro area averages (due to a relatively larger reduction of investment in construction in the euro area and a larger fall of investment in machinery and equipment in Italy), while the gap in investment in intellectual property widened (Graph 2.5 right panel). In 2017, investment in intellectual property was 2.8 % of GDP in Italy versus 4.1% in the euro area (compared to 2.5% and 3.4% in 2007, respectively).

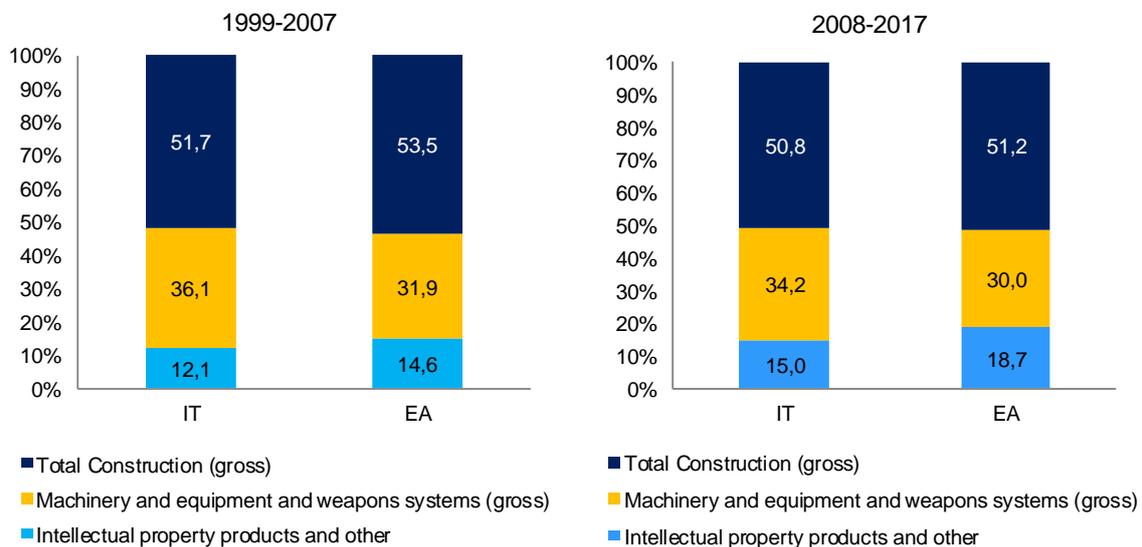
Graph 2.4: Public and private investment in R&D (% of GDP)



Source: European Commission (Eurostat)

Figure 2.4 compares the evolution of public private investment in R&D in Italy and the euro area. The figure shows that private investment in R&D steadily increased since 2000 and did not decrease during the crisis, both in Italy and in the euro area. Public investment in R&D was on a

Graph 2.5: Total investment composition by asset type



Source: European Commission (Eurostat)

declining path before the economic and financial crisis, especially in Italy. However, in Italy the level of public investment in R&D has not caught up yet with the early 2000s level, while in the euro area it has increased beyond the levels at that time. In particular, since 2008 public investment in R&D has increased more in the euro area than in Italy.

By industry: the importance of manufacturing

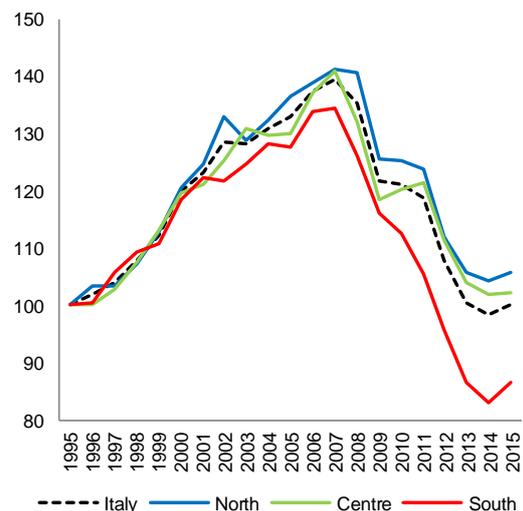
In terms of economic activity, Italy remains characterised by larger investments in manufacturing (21.2% of total investment versus 15.8% in the euro area in 2017) and smaller investments in the professional services industry (5.6% of total investment versus 9.8% in the euro area in 2017). The decline in services accounted for the bulk of the decline in total investment.

By geographical area: the South is lagging behind

The contribution of each macro-area (North/Centre/South)⁽³⁾ to aggregate investment

reflects approximately the contribution of these areas to national GDP, with the North contributing to 57% of national investments, the Centre with 20% and the South with 22% in 2015.

Graph 2.6: Total investment dynamics by macro-area



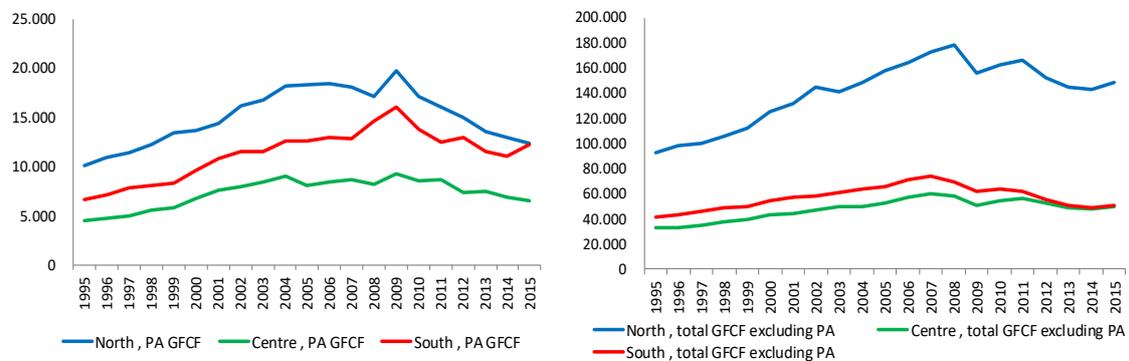
(1) Values for each macro-area are fixed to 100 in 1995

Source: ISTAT Regional Accounts

⁽³⁾ The North includes the following regions: Liguria, Lombardia, Piemonte, Valle d'Aosta, Emilia-Romagna, Friuli-Venezia-Giulia, Trentino-Alto Adige, Veneto. The Centre includes: Lazio, Marche, Toscana, Umbria. The South includes: Abruzzo, Basilicata, Calabria, Campania, Molise and Puglia.

Territorial imbalances were already increasing before the crisis and widened further afterwards, as the fall in total investment in the South was sharper than in other regions (Graph 2.6). However, in 2015 investment increased relatively more in the South, mostly due to investment in the

Graph 2.7: Investment dynamics by macro-area and industry (million of EUR)



(1) Values are reported in current prices

(2) GFCF (gross fixed capital formation) corresponds to investment; PA stands for Public Administration

Source: ISTAT Regional Accounts

public administration and transport industry, which instead kept decreasing in the North and the Centre (Graph 2.7).

The gap between the North and the South is particularly marked for intangibles and innovation. For instance, in the North the number of employees in high-tech industries is almost twice as big (3.7% versus 2% in the South) and R&D expenditure is 1.5 times bigger (1.4% of regional GDP, compared to 0.9% of regional GDP in the South). The regional gap in the number of patents registered at the EU Patent Office per inhabitants is striking: it is 10 times higher in the North (106.8 versus 10.1 in the South (Nascia et al., 2018).

3. POLICY CONTEXT

Since the mid-2010s, policymakers at EU and national level have tried to foster investment through several measures in order to boost productivity and long-run growth. This section reviews the main policy measures taken in the last few years at EU and Italian level to facilitate investment, so as to provide a comprehensive overview of the subject.

3.1. EU LEVEL

After the economic and financial crisis, the main action at EU level to counter the drop in investment in the EU was the launch of the **Investment Plan for Europe** (so-called Juncker plan)⁽⁴⁾ in 2014. The plan had three objectives: i) to make smarter use of financial resources through the **European Fund for Strategic Investments (EFSI)**, which provides an EU guarantee to mobilise private investment; ii) to provide visibility and technical assistance to investment projects; iii) and to remove obstacles to private investment (by removing regulatory barriers to investment both nationally and at EU level). As of 2020, the plan will be replaced by the InvestEU programme, a single fund bringing together many different EU-level financial instruments. Up to February 2019, total financing under the European Fund for Strategic Investment (EFSI) in Italy amounts to EUR 9.6 billion and is set to trigger EUR 57 billion in additional investment. Italy ranks 10th (out of 28 EU countries) by total investment set to be triggered by EFSI as a proportion of GDP. Around 70% of EFSI was used to finance projects in **infrastructure and innovation** and the remaining 30% served as backing agreements with intermediary banks or funds financed by the European Investment Fund to improve **access to finance for SMEs**. Examples of EFSI-backed projects include the financing of infrastructures and SMEs, such as: a private hospital in the northern city of Treviso; a public enterprise providing water services in the southern region of Puglia; a young company specialising in designing and manufacturing wooden garden furniture.

⁽⁴⁾ For an updated description of the Plan see the Commission Communication "Investment Plan for Europe: stock-taking and next steps" of 22 November 2018.

Regional policy remains the EU's main investment policy. The EU finances investment, as part of the cohesion policy, through the **European Structural and Investment Funds**, including, for instance, the **European Regional Development Fund** and the **European Social Fund**. Italy was allocated EUR 43 billion over the period 2014-2020, with a national co-financing of EUR 31 billion. These funds cover a broad range of projects, such as for regional and urban development, and are co-managed by the EU with national and regional authorities.

In the context of the European Semester, Italy received European Council's **Country-Specific Recommendations** on focusing and better targeting investment in **research innovation and infrastructure** (in 2018 and 2019), in **education and skills**. As for investment in research and innovation, the **Europe 2020 strategy** set a target of 3% of EU's GDP to be invested in R&D by 2020. For Italy the target was set at 1.53%, but in 2017 it still amounted to only 1.35% of GDP. Italy also received country-specific recommendations to address some barriers to investments, such as to **reduce the share of non-performing loans**, the **improve non-bank finance for firms** and the efficiency of the public sector (public administration, justice system, State-Owned Enterprises).

Investment is also considered in the context of the EU's fiscal rules, the Stability and Growth Pact (SGP). In 2015, a Communication by the Commission⁽⁵⁾ clarified the implementation of this flexibility in order to strengthen the link between investment, structural reforms and fiscal responsibility. In particular, the "investment clause" was clarified. The clause allows Member States, under specific conditions (e.g. being in bad economic times), to deduct certain public investment expenditures⁽⁶⁾ from the calculation of the structural deficit. Italy benefited from this clause in 2016. An allowance for investment in road safety and for the prevention of hydrogeological risks was granted for 2019 under the "unusual events" clause.

⁽⁵⁾ See the Commission Communication on "Making the best use of the flexibility within the existing rules of the stability and growth pact" of 31 January 2015.

⁽⁶⁾ Eligible investment costs are national expenditures on projects co-funded by the EU.

Since 2011, the European Commission has provided advice to regional and national authorities on how to identify and develop their own competitive advantages. In 2015, the Ministry for Economic Development and the Ministry of Universities, Education and Research validated the national **Strategy of Smart Specialisation 2015-2020**, which identifies five national thematic areas and twelve at regional level. The five national areas are: 1) Aerospace and defence; 2) Health, nutrition and life quality; 3) Smart and sustainable manufacturing, energy and environment; 4) Tourism, cultural heritage and creative industries; 5) Digital agenda, smart communities, infrastructures and smart mobility.

3.2. NATIONAL LEVEL

In parallel to the launch of the Investment Plan for Europe and consistently with the EU policy context, Italy introduced a set of measures, in particular between 2015 and 2017, aimed at improving the business environment and boosting investment. In 2016, the Italian government approved the plan **Impresa 4.0** (previously called Industria 4.0) as part of the 2017 Budget Law to boost investment, productivity and innovation. Impresa 4.0 aimed at mobilising EUR 10 billion of private innovative investment in 2017-2018, reaching EUR 11.3 billion of private investment in R&D with a focus on technologies 4.0 and EUR 2.6 billion of early stage investments. The measures included in the national plan mostly include **fiscal incentives, access to finance and education/training**. Alongside this plan, other measures were introduced, such as to improve the **business environment and the efficiency of the public sector**. Some changes were introduced in the last few years, although they do not substantially modify this framework. Given the recent introduction of the measures, the data availability and the nature of the analysis, this paper is not meant to identify the impact of each exact policy measures. It rather tries to capture the impact of the above mentioned areas for policy intervention, namely fiscal incentives, access to finance, education, business environment and the public sector on private investment.

Taxation & fiscal incentives

The Impresa 4.0 plan mostly strengthened previously existing measures to support private investment. The majority of the measures are temporary tax incentives: super and hyper depreciation, R&D tax credit, patent box, tax credit for training, tax break for investment in innovative start-ups and innovative SMEs. The (incremental) tax credit for R&D was introduced in 2016 for investment made already in 2015. The cost of fiscal measures for 2018 could amount to EUR 4.6 billion (of which 2.5 billion for "*Iper and super-ammortamento*"; 1.2 billion for the tax credit on R&D and 850 million for access to finance measures). Most of these tax incentives were considered effective in stimulating investment decisions by a large share of firms (e.g. 62% for *super-ammortamento* and around 40% for the R&D tax credit) (ISTAT, 2018). Some of these measures were recently revised, with a general reduction in average generosity. Italy also offers direct government support to R&D. An allowance for corporate equity (ACE) was introduced in 2011, but was abolished as of 2019. In 2017, the statutory corporate income tax rate (Ires) was reduced from 27.5% to 24%. However, the implicit tax rate on corporate income remains relatively high in the EU context (European Commission, 2018). The empirical analysis on the investment barrier and drivers in Italy presented in Section 6, includes the assessment of the corporate tax burden and, more specifically, of the tax incentives for R&D used by Italy in the last decade.

Access to finance

The Impresa 4.0 plan also includes non-fiscal measures, in particular to improve the access to credit for micro firms and SMEs (such as through bank guarantees, mini-bonds, crowdfunding and peer-to-peer lending), training and technological transfer to firms. Although the measures to support access to finance have been largely used by firms, some of them did not seem to have been perceived by firms as very effective. For instance, according to ISTAT (2018), the SMEs' Guarantee Fund was considered as very or fairly effective in stimulating investment decisions by only 9% of firms, despite having overall guaranteed EUR 49 billion of loans during 2015-2017 (European Commission, 2019). "Nuova Sabatini" (a loan subsidy) was considered effective by 24% of firms (ISTAT, 2018).

In the last years, other major reforms have been adopted to revive the credit flow to firms by supporting the banking sector's capitalisation and profitability and by tackling the large stock of non-performing loans (NPLs). Regarding the latter, in August 2016 the securitisation schemes with state guarantees (GACS) became operational. In the same year, the *Patto Marciano* was adopted⁽⁷⁾. In late 2017, an enabling law to reform the insolvency framework was passed and recently implemented. In addition, a number of corporate governance reforms were adopted between since 2015 (with a few reforms now delayed and stalling) with the aim of increasing the resilience and profitability of the corporate banking system. The empirical analysis of this paper includes the impact of the Italian NPL ratio, interest rates and the weight of equity on total liabilities on investment dynamics.

Education & training

The plan *Impresa 4.0* also includes measures to support human capital, such as the creation of a national network of “competence centres” for technological transfers to firms and a tax credit for training of employees. The strategy also envisages the empowerment of vocational education. However, these measures were introduced in a context of low availability of tertiary graduates and under-financing of the higher education system, especially in Southern regions. Italy also has below EU average share of graduates in fields relevant for innovation, such as computing, science and engineering (European Commission, 2019). The empirical analysis carried out in this paper controls for the importance of the level of education of Italian employees and of skill mismatches.

Public sector and business environment

Along with financing and fiscal measures, a number of reforms were adopted to improve the Italian institutional framework, focusing mainly on public administration, business environment, the justice system and the fight against corruption.

⁽⁷⁾ The *Patto Marciano* is a private enforcement clause in credit agreements, which allows creditors to take ownership of the collateral out-of-court in case of the borrowers' default. However, due to a number of reasons, it has not been widely used so far.

The 2015 public administration reform aimed to tackle several factors undermining the efficient performance of the Italian public administration: excessively long bureaucratic procedures; unclear distribution of competences among administrations (central and local); lack of transparency and accountability of the public administration; the ineffective management of public employees, characterised by an average old age⁽⁸⁾ and widespread skills mismatch. As the reform has been fully implemented only recently, it is not possible to properly assess the actual effects on the efficiency of the Italian public administration. However, in order not to jeopardise the potential positive impact, the reform needs to be swiftly and properly operationalised.

Additional measures were adopted to improve the business environment. Between 2015 and 2017, a comprehensive set of measures meant to further simplify and speed up bureaucratic procedures for business activities and firms (“Simplification Agenda”) was also implemented. The code for public procurement and concessions was reformed in 2016. However, delays in the implementation of the reform and the recent announcement of further modifications are creating uncertainty. The empirical analysis presented in Section 6 includes the impact of some aspects of the Italian business environment on private investment.

Measures to increase the efficiency of the justice system were also adopted in the past years (2016-2017)⁽⁹⁾ as well as measures to contain litigation and strengthen procedural discipline. However, the actual impact on the judicial system seems to have been limited so far. Therefore, while some progress in reducing the backlog of cases is registered (-20% since 2014, although with relevant differences among courts), Italy is still recording excessive long proceedings. Moreover, despite the anti-corruption framework was improved in 2017 and 2018 with the revision of

⁽⁸⁾ Older employees (50 years or older) represent 50% of the total employees of the public administration in Italy and only 30-40% in peer European countries. On the other hand, younger employees (35 years or younger) are only 10% of the total in Italy and 20-25% in peer European countries.

⁽⁹⁾ Judicial levels for international protection procedures decreased from three to two; amicable solutions are favoured in case of medical liability and malpractice; tutors appointment procedures for the underage were streamlined;

the statute of limitations and a stronger anti-corruption authority, corruption remains a major challenge.

In 2009, a new legal instrument was introduced ("*Contratti di rete*") to facilitate the coordination of investment efforts towards innovation and competitiveness of firms. This measure was meant to support micro and SME for internationalisation and technological innovation, by offering a flexible legal instrument without imposing the constitution of an independent legal personality.

After a major wave of reforms up to 2012, a new competition law was adopted in 2017. Pro-competition reforms were meant to reduce restrictions and improve the regulation in key economic sectors (energy, banks, retail, transport, regulated professions among others). However, further efforts are still needed to remove remaining barriers to competition.

The 2017 Italian Stability Programme envisaged a Fund for investments and infrastructural development and a national solidarity pact at vertical level. The pact allows local administrations to realise investments, despite the balanced budget constraint, by using previous surpluses or by recurring to debt. The 2018 Budget Law introduced a fund for subnational governments with the aim of supporting the often weak and slow realisation of public investment at local level ⁽¹⁰⁾. The empirical analysis presented in Section 6 includes the impact of public investment in Italy and, more specifically in R&D, on private investment.

⁽¹⁰⁾ 2017 National Reform and Stability Programme.

4. LITERATURE REVIEW: FOCUS ON ITALY

A number of studies have attempted to identify the determinants of private investment in the European Union, whether cyclical or structural, and quantify their impact. European Commission (2017a) analyses recent investment developments in EU Member States and identifies the main drivers and barriers⁽¹⁴⁾. The paper finds that obviously a variety of factors determine private investment, but that these affect tangible and intangible assets differently. In particular, education and labour market regulation matter more for intangible assets, while financial and economic conditions have a stronger impact on tangible investment. It also finds that structural factors are having a larger impact in dragging business investment since the crisis.

This paper reviews the existing literature on this topic, with a focus on Italy. In order to map the existing work, we have grouped the resulting investment drivers into five broad categories: 1) economic situation; 2) access to finance; 3) public sector, regulation and business environment; 4) human capital, labour market and corporate governance; 5) taxation and innovation. Other factors, such as the country-specific specialisation in given economic activities, may be equally important, but are not discussed in the following review, as they are more relevant in cross-country analyses. This paper focuses instead on the specificities of Italy and analyses changes over time within the country.

Economic situation

In the euro area, lagged GDP growth rates explain to a large extent investment dynamics (Barbku et al., 2015; European Commission, 2017a). Negative expectations on future sales lead firms to reduce capital spending. Moreover, recessions increase economic uncertainty, adding to their negative effect on investment. Economic uncertainty seems to be one of the key factors behind the delayed recovery of the Italian economy (Bussetti et al., 2015). According to the Eurobarometer survey on Investment in EU Member States, in 2017 74% of Italian firms said “poor or uncertain economic outlook” is a moderate or major obstacle to investment, while 51% of firms mentioned “lack of stability in legislation” (a proxy for policy uncertainty) as a moderate or major obstacle to investment (European Commission, 2017b). These

results are confirmed by the 2017 European Investment Bank Investment Survey, according to which 62% of firms mentioned uncertainty about the future as a major factor impacting long-term investment decisions. However, some firms appear more willing to innovate when faced with an uncertain future (Bloom, 2014). Indeed, investment in intangibles is found to be less sensitive to the economic cycle (European Commission, 2017a). While some studies find that in Italy the demand component is the main driver of private sector non-residential investment (Busetti et al., 2015), others find structural factors to be the main drag on investment in Italy, as compared to other countries (e.g. Spain) where investment was mostly affected by output dynamics (Barbku et al., 2015). The empirical analysis presented in this paper on Italian private investment dynamics includes controls for lagged GDP growth and some indicators of uncertainty, which were nonetheless not suitable for this analysis (see Section 6).

Access to finance & misallocation of capital

A contraction in credit availability in recent banking crises led to lower business investment, especially in more financially dependent sectors such as pharmaceuticals (IMF, 2015).

After having declined between 2012 and 2015, bank credit to NFCs, has stabilised at low levels since 2016. The tightening of banks' credit standards following the economic and financial crisis (*supply* side) contributed to the decline in bank loans, with some improvement in bank's risk perception only after 2014 (OECD, 2017), when the demand for loans from NFCs also resumed (*demand* side). Despite exceptionally low bank financing costs during the ECB's accommodative monetary policy bank loans to NFCs have kept declining. The empirical analysis on Italian investment dynamics presented in Section 6 controls for the variation in interest rates. The constraints imposed by tight credit supply conditions account for around one third of the drop in investment in Italy between 2008 and 2012 (Busetti et al., 2015).

Following rapid growth during the crisis, Italy has witnessed one of the highest NPL ratios in Europe, although the ratio has started to significantly

decline since 2017. This, alongside demand factors (Angelini, 2018), contributed to tightened bank credit requirements. This might be due to the pre-crisis lower financial constraints leading to capital misallocation. This is supported by Hassan and Ottaviano (2013) who found no correlation between growth in loans and TFP growth across sectors between 1999 and 2007. However, Gamberoni et al. (2016) found that also restrictive bank lending standards and higher demand uncertainty foster capital misallocation growth⁽¹¹⁾. Credit misallocation tends to increase the failure rate of healthy firms, potentially able to repay loans, and makes non-viable firms more likely to survive. European Commission (2019) estimates show that banks' credit growth (and hence private investment) is adversely affected by NPLs especially for smaller banks, which highlights the important role of banks' asset quality. The analysis presented in Section 6 includes the impact of NPLs on Italian investment dynamics.

Smaller and innovative firms are usually constrained in obtaining bank loans by the lack of collateral and by their undercapitalisation, while access to the stock market is generally limited to larger firms. Bank financing is the prevalent form of credit in all countries, but market-based access to finance is generally more limited in Europe compared to the US and, and it is particularly constrained in Italy. For instance, venture capitalists invested about €6.5 billion in the EU in 2016 compared to €39.4 billion in the US⁽¹²⁾. Venture capital or business angels only own the largest stake in 0.4% of Italian enterprises⁽¹³⁾. Indeed, venture capital in Italy only represents 0.002% of GDP (Nascia et al., 2018) compared to 0.039% in Portugal, 0.034% in France, 0.032% in the UK, 0.025% in Germany, and 0.01% in Spain⁽¹⁴⁾. Other non-bank forms of financing, such as direct grants for R&D are considered as a way to address the limited access to finance for innovative firms. The empirical analysis of this

paper includes the impact of direct grants and a proxy of market-based access to finance on Italian private investment trends.

Public sector and business environment

Some deeper structural factors, such as regulatory bottlenecks and the business environment, might also play a role (Canton and Solera, 2016) in determining investment trends. Inefficiencies in the public sector, along with an unfavourable business environment and restrictions to competition may hamper investment. The positive effect on productivity and investment may depend on other structural aspects as a supportive institutional setting (Rodriguez & Rodrik, 1999) entailing a friendly business environment, efficient public sector and low level of corruption. According to several studies⁽¹⁵⁾, doing business in Italy remains significantly more difficult than in peer countries. The empirical analysis presented in Section 6 controls for this investment barrier. Amici et al. (2015) found that reducing the red tape stimulates entrepreneurship and improves firms' survival rate. Moreover, in 2015, the IMF estimated that if Italy increased public sector efficiency to the level of its best provinces, the productivity of the average firm would increase by 5-10 % (IMF 2015b).

The literature about the relationship between corruption and growth, mostly through investment, is controversial. Some authors argue that corruption could smooth transactions, as it could be a second-best solution with respect to inefficient bureaucracy which itself constitutes and impediment to investment (Lisciandra and Musumeci, 2015)⁽¹⁶⁾. On the other hand, corruption increases uncertainty and costs. This is particularly true when innovation is taken into account. Corruption could represent a strong barrier for potential innovators. The negative relationship between corruption and growth is shown by several cross-country studies (Lisciandra and Musumeci, 2015), while others do not find it

⁽¹¹⁾ Tighter bank lending standards refer to more restrictive financial requirements. This does not necessarily imply a more sound economic assessment of the investment projects.

⁽¹²⁾ http://europa.eu/rapid/press-release_IP-18-2763_en.htm

⁽¹³⁾ Based on the 2017 EU Commission Survey on Access to Finance of Enterprises (SAFE).

⁽¹⁴⁾ <https://rio.jrc.ec.europa.eu/en/stats/venture-capital-investments> (data refers to 2015)

⁽¹⁵⁾ The World Bank 2017 worldwide governance indicators, the 2017 World Economic Forum Global Competitiveness report and the Eurobarometer 2017.

⁽¹⁶⁾ For instance, Dreher and Gasserebner (2013) provide evidence that firms' entry to regulated markets could be facilitated by corrupt practices. Beck and Maher (1986) and Lien (1986) show that the more efficient firms are the more they can afford bribes, thus minimising their red-tape costs.

(Assiotis, 2012). In the case of Italy, Lisciandra and Musumeci (2015) find that corruption is detrimental to growth. However, the effect of corruption becomes less intense when corruption increases. Corruption can also reduce the level of public spending. Indeed, Southern regions have a lower absorption of EU funds. Moreover, fewer restrictions to product and labour market may reduce input misallocation and support productivity growth (Gamberoni et al., 2016). Overall, a more efficient public sector, along with less barriers to competition, would ease firms' decision and implementation of productivity enhancing investment.

Public investment can crowd in or crowd out private investment. In the case of crowding-out, government borrowing reduces private investment. Crowding-in occurs when public investment (e.g. in infrastructure) enhances the productivity of private investment. By analysing the period preceding the crisis, Afonso and Aubyn (2008) find that public investment in Italy had an overall crowding-out effect on private investment, but this resulted in a slight output expansion. The empirical analysis of Italian investment dynamics presented in this paper considers the impact of different types of public investment (e.g. in R&D) and with different time lags.

Human capital, labour market, corporate governance

Labour market reforms impact investment through different channels, as the reallocation of resources towards more productive activities. For example, reforms of employment protection legislation (EPL), out-of-work support and active labour market policies facilitate the reallocation of labour along with capital. Reforms broadening the scope of local/firm level negotiation may favour the adoption of efficient production models, with positive effects on productivity and wages and, via higher domestic demand, investment. Reforms of EPL have ambiguous effects on investments. Loosening EPL may induce wage moderation, increasing profits and incentives to invest. Moreover, lower adjustment costs lead firms to hire more productive workers and dismiss less productive ones, which improves allocative efficiency (i.e. total factor productivity). Yet, by reducing firms' adjustment costs, EPL reforms stimulate labour demand, implying a decline in the

optimal capital intensity (i.e. the capital-labour ratio) with negative effects on productivity (Cingano *et al.*, 2014). Thus, the effect on physical capital is unclear as less capital would be necessary in a more efficient economy. More broadly, the feasibility and effectiveness of EPL reforms need also to be evaluated in conjunction with cost-effective active labour market and training policies supporting transition of displaced workers between different jobs. The empirical analysis presented in Section 6 includes the impact of over time variations in EPL for temporary contracts in Italy on intangible investment.

The governance structure and the level of education of the employees, especially the managers, have crucial implications on firms' performance. According to Pellegrino and Zingales (2014) and Bandiera (2008) corporate governance and management skills are key to determine Italian firms' propensity to perform productivity-enhancing investment. Familism and cronyism lead to a managerial selection based mostly on loyalty and trust rather than competences and skills. This reduces firms' risk propensity and ability to exploit investment, especially in intangibles and ITC, to increase productivity. Moreover, Fabiani (2005) finds that the employees' level of education and skills also supports the quality and effectiveness of investment. The regressions presented in Section 6 includes controls for the level of education of employees, as well as for the extent of skill mismatches, specifically for intangible investment.

Taxation & innovation

The return on investment projects depends also on the effective taxation level of productive factors, which results from the statutory tax rate (e.g. on corporate income); the tax base; the source of financing (debt, retained earnings or new equity) and the type of investment (intangibles, machinery, buildings, inventory and financial assets). Moreover, tax evasion generates unfair competition among firms who evade and firms who do not, limiting firms' growth and innovation (Bobbio, 2016). Tax incentives for investment and innovation, such as tax credits, enhanced allowances, and patent boxes reduce the final tax liability. They have become increasingly important in Italy since 2007 and were further strengthened by the plan Impresa 4.0 (see Section 2). According

to survey data based on the perception of firms about Impresa 4.0 incentives (in the short-term), the over-evaluation of investment for tax purposes seems the most effective (considered as very or fairly effective by 62% and 48% for *Super* and *Iper-ammortamento*, respectively), followed by the R&D tax credit (considered as very or fairly effective by 41% of firms) (ISTAT, 2018). In general, fiscal incentives for investment may be effective in the short-term, but less in the long-term where policies aiming at stimulating demand may be more important (Bricongne et al., 2017). The impact also depends on various factors such as the size of the firm, the design of the policy and the structural characteristics of a country's economy. Tax incentives for investment in intangibles, such as those of Impresa 4.0, may increase private R&D expenditure and are easy to implement having a broad target, but are not suitable to promote strategic research programmes and to develop new areas of R&D, while direct grants have the potential to do (Nascia et al., 2018; European Commission, 2014). The empirical analysis on Italy presented in this paper includes the impact of changes in the overall corporate tax burden and, more specifically, of tax incentives for R&D which were in place in Italy before the introduction of Impresa 4.0, as well as of direct grants for R&D.

Tax incentives for innovation and investment could amplify the regional divide, considering differences in starting conditions (Cappellani and Prezioso, 2018)⁽¹⁷⁾. Indeed, two thirds of innovative firms are concentrated in one fourth of the regions, mostly located in the North (Lombardy, Veneto, Emilia Romagna and Piedmont) and Lazio. Lombardy alone has 25% of innovators, while Southern regions account for only 13% (Nascia et al., 2018). Indeed, 70% of the total amount of the R&D tax credit was used in the North and only 10% in the South⁽¹⁸⁾.

Moreover, the potential to boost investment of SMEs might be reduced by their actual use of tax incentives. SMEs are the main beneficiaries of the

R&D tax credit, accounting for 89% of total beneficiaries, although this corresponds to only 71% of the total expenditure for this measure⁽¹⁹⁾. It has to be noted that 38 large firms in Italy absorb 47% of business expenditure in R&D (Nascia et al., 2018). Large firms also perceived this measure as more effective for investment decisions than smaller ones (ISTAT, 2018).

⁽¹⁷⁾ The estimations of Cappellani and Prezioso (2018) refer to the previous R&D tax credit based on volumes (as it was between 2007 and 2011), while the Impresa 4.0 one is incremental, which may reduce the amplifying impact on regional differences.

⁽¹⁸⁾ Based on data from MEF for 2017.

⁽¹⁹⁾ Based on data from MEF for 2017.

5. METHODOLOGY AND DATA

Different empirical models may be used to investigate the drivers and barriers to investment, the two main ones being the accelerator and neoclassical models. The accelerator model explains investment dynamics by changes in the output, while the neoclassical model explains them by changes in the desired capital stock. Neoclassical models generally use a measure of desired capital stock adjusted for the real cost of capital. A further approach is a mix of the two models, as used in Barbku et al. (2015). This is referred to as the augmented accelerator model, which includes the real cost of capital (from the neoclassical model), plus other variables such as credit risk, uncertainty, cash flow. Some authors include also structural factors and refer to this approach as extended accelerator model (see for instance European Commission, 2017a). This paper follows this last approach.

Given the importance of non-economic factors in explaining investment trends in Italy, we augment the accelerator model, based on quarterly time series, with other potential explanatory factors such as real lending rates to NFCs, non-performing loans ratio, equity, profit ratio, public investment and corporate taxation denoted by DB_{t-1} (drivers and barriers):

$$\frac{I_t}{K_{t-1}} = \frac{a}{K_{t-1}} + \sum_{j=1}^N \beta_{1j} \frac{\Delta Y_{t-j}}{K_{t-1}} + \beta_2 DB_{t-1} + \delta + \varepsilon_t$$

where I is real investment undertaken by NFC⁽²⁰⁾, K is the total capital stock, and ΔY is the change in real GDP. The selection of the variables included as explanatory factors (DB) is based on the existing literature (in particular, European Commission, 2017a) and on the suitability of available data for the time-series analysis. We use up to four quarterly lags of changes in real GDP to account for the economic cycle of the past year. Past GDP growth is used as a proxy for future economic activity, consistently with the literature on this topic. The current value of GDP growth is not included to reduce endogeneity issues. For the same reason, previous value of capital stock is used to divide the economic variables used in the regression. The augmented accelerator model is

⁽²⁰⁾ As National Accounts only provide data in current prices, the series was deflated by the investment deflator for the total economy.

estimated with OLS. Standard errors in the regressions are computed according to the Newey-West procedure that corrects for possible autocorrelation of the error term.

Lags are generally used for the explanatory variables on a quarterly basis. The lags have been chosen by taking into account economic and statistical considerations. We first identified a reasonable time span between the decision to make an investment and when the investment takes place. We tested the use of different lags for each explanatory variable. Due to the limited degrees of freedom, we select only the lag which makes the most economic sense and is the most statistically significant. Consequently, lags may differ according to the variable. For capital stock and public R&D expenditure, a quarterly series was generated by interpolating linearly the annual series (dividing the total by four in case of public R&D expenditure). Other variables which were available only on an annual basis and which have economic meaning based on their annual value, such as over and under-qualification indicators and the implicit tax rate on corporate income, are assumed to remain constant for the four quarters of a given year⁽²¹⁾.

The analysis contains two sets of regressions: one for business investment and one focused on intangible investment⁽²²⁾. The regression analysis allows to assess the impact (positive or negative) and the significance of each variable on investment and, specifically, on intangible investment. It is based on quarterly time series data for Italy covering the period 1999 Q1 - 2018 Q1⁽²³⁾. In the case of intangible investment the analysis covers the period 1997 Q1 to 2018 Q1. The length of the

⁽²¹⁾ Although the approximation/interpolation of some lower frequency variables may reduce in theory the significance of their coefficients, this doesn't seem to affect particularly the quality our regressions (as the results show in the next section).

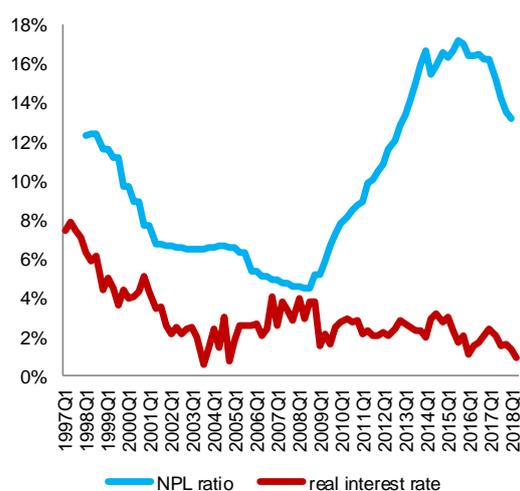
⁽²²⁾ Intangible investment corresponds to the measure recorded in National Accounts. Certain components of intangible capital, such as design, new product development in the financial industry, branding, firm-specific training and organisational capital are not included in investment as defined in National Accounts (OECD, 2017).

⁽²³⁾ Business investment corresponds to gross fixed capital formation by non-financial institution based on Eurostat data from National Account. Eurostat data on gross fixed capital formation by institutional sectors are available from 1999.

series used in the regression depends on the specification, as the series for some variables are shorter. More details on the variables used and the data sources are available in the Appendix. Most series used come from National Accounts. Financial indicators are collected from the Bank of Italy. In the case of intangible investment, additional explanatory factors are considered such as public R&D expenditure, tax incentives indices, direct grants, as well as skills mismatch.

Graph 5.1 shows the development of two important variables used in the analysis for business investment related to bank access to credit for firms, namely the NPL share of total loans and the real interest rate. The NPL ratio was relatively high in the late '90s (around 12%), decreased gradually to 4% before the crisis to increase afterwards and skyrocket to 16%-17% following the sovereign debt crisis and finally has started a notable reduction since 2017 to 9.5% in 2018 Q3. In the first quarter of 2018 the NPL ratio was still a bit higher than twenty years before (13% against 12% in the first quarter 1998). The real interest rate was very high in the mid-'90s (around 8%) and then steadily decreased until 2002, since when it has fluctuated between 1% to 3%, with slightly higher rates (4%) between 2006 and 2008.

Graph 5.1: Trend in NPLs and real interest rate (1996-2017)



(1) Real interest rate is calculated as the difference between nominal interest rate of loans to NFC (outstanding amounts) and the year-on-year change in the GDP deflator
Source: Bank of Italy, ECFIN calculations

In order to compare the relative importance of the determinants of investment, the regression analysis is supplemented by the calculation of the absolute contribution of the explanatory variables to the investment dynamics. This is based on a method that calculates the (absolute) marginal contribution of each explanatory variable to the goodness of fit (²⁴). This method reduces collinearity problems by determining the independent contribution of each explanatory variable to the response variable and separates it from the joint contribution, resulting from correlation with other variables. In our analysis this feature is particularly useful, given the high correlation among certain regressors such as the ones on financing conditions.

⁽²⁴⁾ The method used here is Shapley Value Regression which calculates the independent contribution of each regressor X to the goodness-of-fit by running all the possible combinations of regressors, doing pairwise comparisons of goodness-of-fit (i.e. R²) of any such regression with and without X and taking averages of those pairwise R² differences. For a more detailed explanation of the method see, for example, Lipovetsky, S. and Conklin, M. (2001).

6. RESULTS

6.1. DRIVERS AND BARRIERS OF BUSINESS INVESTMENT

Section 6.1 presents the results of the analysis of the drivers and barriers of general business investment in Italy, while section 6.2 focuses on the results about the determinants of intangible investment. Table 6.1.1 reports the regression results of the determinants of business investment, based on different specifications. Graph 6.1.1 reports the contributions of each explanatory factor to the dynamics of business investment in Italy (in absolute terms), before and after the crisis.

Economic situation

Lagged GDP growth significantly and positively contributes to business investment. The crisis dummy (defined as the period starting from Q4 2018) marks a significant and negative structural break. Economic factors, however, explain only 10-16% of business investment dynamics, while the rest is due to other factors (Graph 6.1.1). As discussed in Section 3, economic and policy uncertainty can also have an impact on investment, as a proxy for the expectation of future economic activity. We tried to capture this by including in the analysis indicators such as the economic policy uncertainty index (EPUI⁽²⁵⁾) and indicators based on the Commission's Business and Consumer Survey⁽²⁶⁾ (not reported). Such indicators proved to be insignificant in explaining investment dynamics in Italy and were subsequently dropped. This result does not mean that policy uncertainty does not have an impact on investment decisions (as discussed in Section 4), as it could also be that these indicators do not really capture the uncertainty which is taken into account by firms. Unfortunately, no other indicators relevant for firms are available. It is also difficult to capture the impact of uncertainty without a cross-country analysis.

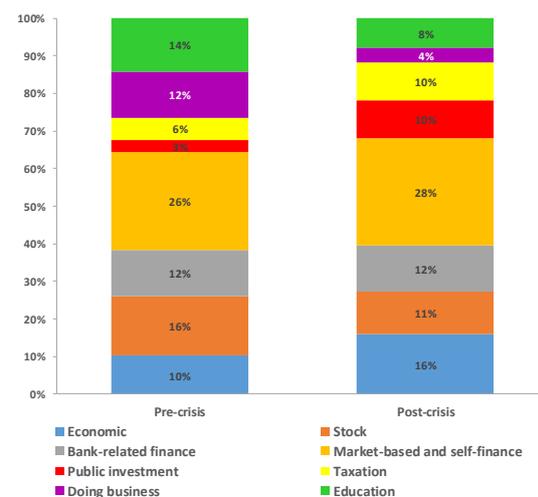
⁽²⁵⁾ This index is based on the number of newspaper articles which feature a combination of search terms which suggest the presence of economic policy uncertainty (Baker et al., 2015).

⁽²⁶⁾ These indicators approximate uncertainty with the dispersion of responses to different survey questions.

Access to finance

As for bank-related access to finance, a higher (lagged) share of NPLs significantly and considerably reduces investments. This result is very robust as the NPLs coefficient remains negative and significant in all regression specifications. Higher (lagged) real interest rates, which include increases also due to deflation, significantly reduce investment too. Variables related to bank financing (interest rate and NPLs) explain about 12% of investment dynamics in Italy (net of the correlation between e.g. NPLs and economic conditions), which is mostly due to the role played by NPLs. After the crisis, the contribution of the share of NPLs to investment is about ten times larger than the one of the real interest rate, suggesting the importance of the risk premium demanded by banks and the tightness of credit conditions. The traditional strong reliance of Italian firms on bank lending coupled with the high (although improving) share of NPLs and, perhaps, its management suggests access to finance as an important barrier to investment in Italy.

Graph 6.1.1: Contributions to business investment, before and after the crisis



(1) Economic includes lagged GDP growth and the 2008 crisis dummy

(2) Bank-related finance includes real interest rate and NPL

(3) Market-based finance includes equity

(4) Stock corresponds to the inverse previous capital stock

Source: European Commission

Regarding market-based access to finance, a higher weight of shares and equity on total financial liabilities of NFC is found to positively and significantly boost business investment. The aggregate level of past profitability of firms (as a proxy for self-financing) has also a positive and significant effect on investments. Together they contribute to explain a relatively large part of investment dynamics (26%-28%), especially after the crisis (Graph 6.1.1). Given the limited use of market-based finance in Italy, the result on equity supports the need to strengthen the use of alternative forms of finance, such as those included in the Impresa 4.0 package, in order to boost investment.

Taxation

Corporate taxation (as measured by the implicit tax rate on corporate income) has a negative impact on investment, although this is the case only in the post-crisis period. The tax burden on corporations contributes to explain more than 10% of the drag in investment after 2008 (Graph 6.1.1).

Public investment and business environment

Public investment seems to crowd out business investment in the short run, while it seems to crowd it in after two years: indeed the coefficient for public investment in the same year is negative (columns 4 of Table 1), while the coefficients of public investment with a two year lag are positive (columns 1-3 of Table 1). These results are robust to different specifications. Table A1 in the Annex reports regressions in which different time lags (8, 4 and 0 quarters before the time of the dependent variable) of public investment were included at the same time. The results of this robustness check confirm the finding on crowding-out of (general) public investment in the short-run and crowding-in the long run. A further check was performed to test the robustness of the crowding-out effect in the short-run. As the result may be driven by one particular year (2002), in which the hike of public investment was mirrored by a fall in private investment (Graph 2.3, Section 2), a dummy for this year was included as a control. In these specifications (Table A.1 in the Annex) the coefficient for public investment remains negative, but loses its significance. The importance of public investment to crowd in business investment increased after the crisis, explaining around 10%

of private investment dynamics, while only 3% before (Graph 6.1.1).

A supportive business environment (as measured by the ease of starting a business indicator of the World Bank) significantly and positively affects business investment. The relative importance of the business environment with respect to other factors was particularly large in the years before the crisis, when it explained 12% of business investment dynamics in Italy (Graph 6.1.1).

Labour market/education

The share of people in employment with tertiary education, measuring the importance of higher education, has a positive effect on general business investment (Table 6.1.1) and it can explain up to 14% of investment dynamics (Graph 6.1.1). However, this result is not robust for general business investment, as the coefficient loses its significance in other specifications, in particular when adding the business environment and corporate taxation (columns 2 and 3 in Table 6.1.1).

Table 6.1.1: Regression results for business investment

	1	2	3	4
1/Previous capital stock	33589.3*	12623,2	25443,4	38083.1***
	[17581.6]	[22956.2]	[19110.1]	[14033.7]
GDP (lag1)	0.141***	0.101**	0.177***	0.196***
	[0.0480]	[0.0416]	[0.0539]	[0.0446]
GDP (lag2)	0.178***	0,0786	0.145***	0.111**
	[0.0428]	[0.0498]	[0.0442]	[0.0535]
GDP (lag3)	-0,00943	0,0187	0,079	0,0421
	[0.0400]	[0.0509]	[0.0743]	[0.0466]
GDP (lag4)	0.229***	0.154***	0.221***	0.174***
	[0.0538]	[0.0496]	[0.0525]	[0.0638]
NPL ratio (lag3)	-0.0105***	-0.00648**	-0.0105***	-0.0137***
	[0.00276]	[0.00286]	[0.00311]	[0.00261]
Net lending rate (lag2)	-0.0162***	-0.0103**	-0.0131**	-0.0113***
	[0.00427]	[0.00403]	[0.00534]	[0.00376]
Equity (lag2)	0.00370***	0.00324**	0.00366**	0.00285*
	[0.00131]	[0.00149]	[0.00148]	[0.00165]
Profitability (lag2)	0.0182***	0.0138***	0.0194***	0.0170***
	[0.00372]	[0.00451]	[0.00260]	[0.00327]
Employed with tertiary ed. (lag2)	0.0181**	0,00259	0,0117	0.0175**
	[0.00773]	[0.00753]	[0.00748]	[0.00767]
Public investment (lag8)	0.231***	0.211***	0.155***	
	[0.0471]	[0.0363]	[0.0523]	
Public investment				-0.292***
				[0.0567]
Dummy 2008	-0.000528***	0,000418	-0.000684***	-0.000612***
	[0.000130]	[0.000559]	[0.000212]	[0.000173]
Corporate tax		0,000189		
		[0.00176]		
Crisis*corporate tax		-0.00449*		
		[0.00228]		
Doing business			0.0000670*	
			[0.0000396]	
Constant	yes	yes	yes	yes
N	69	64	57	75
R-sq	0,976	0,983	0,98	0,976
adj. R-sq	0,971	0,978	0,975	0,972
Beginning period	2001Q1	2001Q1	2004Q1	1999Q3
End period	2018Q1	2016Q4	2018Q1	2018Q1

(1) *p<0.10, **p<0.05, ***p<0.01; Newey-West s.e.

Source: European Commission

6.2. DRIVERS AND BARRIERS OF INTANGIBLE INVESTMENT IN ITALY

Table 6.2.1 reports the regression results of the determinants of intangible investment in Italy, based on different specifications. Graph 6.2.1 reports the contributions of each explanatory factor to the dynamics of intangible investment in Italy (in absolute terms), before and after the crisis.

ECONOMIC SITUATION

Consistently with the existing literature, the coefficients for lagged GDP growth are smaller and less significant than for general business investment. The contribution of the economic cycle to the development of intangible investment is less than half the contribution to general business investment (Graph 6.1.1 and 6.2.1). Similarly, the coefficient for the 2008 dummy is generally small and significant in only one specification (Table 6.2.1). This confirms the result found in previous studies and also for peer countries that intangible investment is less sensitive to developments in GDP than other investments.

Access to finance

Higher (lagged) real interest rate and shares of NPLs have a negative impact on intangible investment, although these results are generally less significant than for overall business investment. Profitability and equity have a clear positive and significant impact on investment in intangibles, as for business investment. Before the crisis, variables relating to bank-related finance (interest rate and NPLs) and to market-based and self-finance (equity and profitability) were equally important in explaining investment dynamics (14%), while direct grants for R&D had a smaller contribution (6%). After the crisis, the importance of these direct grants doubled (explaining now 12% of investment dynamics), the importance of market-based and self-finance slightly increased (Graph 6.2.1), while the impact of NPLs become considerably more important than of the real interest rate within the variable defined as bank-related finance.

Taxation

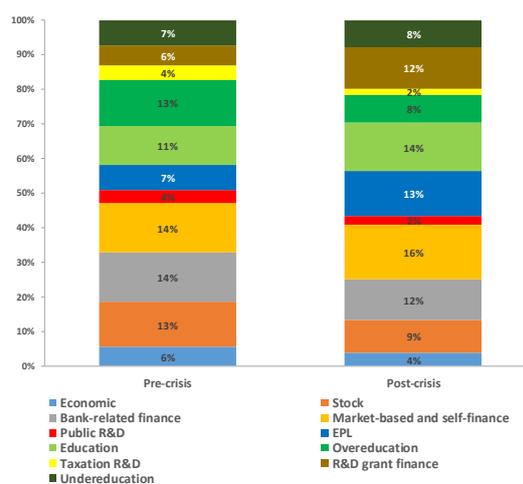
As there are specific tax incentives for innovation, we add two regression specifications (column 5 and 6 of table 6.2.1), including proxies for it (B-

index and Tax incentives for R&D in percentage of GDP ⁽²⁷⁾). Tax subsidies for R&D positively and significantly affect intangible investment (columns 5 and 6 of Table 6.2.1). However, their contribution is modest compared to other factors, explaining 4%-2% of investment dynamics (Graph 6.2.1).

Public sector investment and business environment

Public investment in R&D significantly and positively affects private investment in intangibles and contributes to explaining 2%-4% of investment dynamics. The crowding-in effect is robust in all specifications and refers to the short-run ⁽²⁸⁾ (Table 6.2.1).

Graph 6.2.1: Contribution to intangible investment, before and after the crisis



Source: European Commission

Labour market/education

The share of tertiary educated employees positively and significantly affects investment in intangibles in most specifications (Table 6.2.1). The contribution of an educated workforce increased after the crisis, explaining 14% of investment dynamics (Graph 6.2.1). As education is particularly relevant for intangibles, the analysis also includes the impact of skills mismatch. Under-

⁽²⁷⁾ See annex for more details.

⁽²⁸⁾ The regressor for public investment in R&D is not lagged. Lagged public investment in R&D (coefficient not reported) show a declining impact over time.

qualification, in particular, negatively and significantly affect investment in intangibles (Table 6.2.1), contributing to explain 7%-8% of past development trends (Graph 6.2.1).

Following the analysis of European Commission (2017a), we add a specification including a proxy for the regulation of the labour market, in particular of temporary labour contracts. More flexible temporary contracts (as measured by the EPL index for temporary contracts) have a negative impact on investment in intangibles, but the coefficient is not significant. This result may suggest that investment in intangibles could benefit

from a more stable, as well as well educated, labour force.

Table 6.2.1: Regression results for intangible investment

	1	2	3	4	5	6	7
1/Previous capital stock	16541.1*** [2926.0]	21470.1*** [4031.6]	33462.0*** [4663.9]	22433.6*** [5743.7]	29456.8*** [6220.8]	17448.6*** [5699.4]	14971.4** [6145.6]
GDP (lag1)	-0.0454** [0.0181]	-0.0187 [0.0147]	-0.00901 [0.0120]	0.0141 [0.0104]	-0.0173 [0.0132]	-0.00342 [0.0111]	0.00228 [0.0124]
GDP (lag2)	0.00912 [0.0138]	0.00688 [0.0139]	0.000426 [0.0154]	-0.0137 [0.0118]	-0.0000918 [0.0130]	-0.00717 [0.0117]	-0.0105 [0.00953]
GDP (lag3)	-0.0176 [0.0159]	-0.00902 [0.0162]	-0.00952 [0.0153]	-0.0356*** [0.0126]	-0.0228 [0.0157]	-0.0129 [0.0106]	-0.0106 [0.0120]
GDP (lag4)	0.00748 [0.0132]	0.00973 [0.0137]	0.0142 [0.0143]	0.00124 [0.0170]	0.0176 [0.0198]	-0.0141 [0.0150]	-0.00508 [0.0110]
Crisis dummy	0.0000522 [0.0000505]	0.000112* [0.0000566]	0.0000117 [0.0000336]	0.0000442 [0.0000299]	-0.0000187 [0.0000343]	0.0000364 [0.0000321]	0.00000975 [0.0000305]
NPL ratio (lag3)	-0.000198 [0.000550]	-0.000878 [0.000688]	-0.00417*** [0.000826]	-0.00270*** [0.000913]	-0.00250* [0.00146]	-0.000987 [0.000985]	-0.00345*** [0.000906]
Employed with tertiary ed. (lag2)	0.00632*** [0.00142]	0.00694*** [0.00235]	0.00732*** [0.00186]	0.00584*** [0.00114]	0.00651*** [0.00217]	0.00246 [0.00160]	0.000834 [0.00219]
Net lending rate (lag2)	-0.00418** [0.00168]	-0.0017 [0.00153]	-0.00145 [0.00131]	0.000135 [0.00106]	-0.00143 [0.00160]	0.00151 [0.00116]	0.000938 [0.00103]
Equity (lag2)	0.00178*** [0.000512]	0.00161*** [0.000468]	0.00157*** [0.000352]	0.00149*** [0.000361]	0.00153*** [0.000376]	0.00114*** [0.000406]	0.00107*** [0.000360]
Public investment in R&D		3.168*** [1.133]	2.770*** [0.815]	2.348*** [0.565]	2.919*** [0.985]	3.053*** [0.895]	3.078*** [0.775]
Underqualification			-0.00329** [0.00139]	-0.00324** [0.00155]	-0.00271* [0.00151]	-0.00206 [0.00170]	-0.00499*** [0.00127]
Overqualification			0.00551 [0.00567]	0.00564 [0.00672]	0.00334 [0.00652]	-0.00193 [0.00608]	-0.00695 [0.00643]
Profitability (lag2)				0.00507*** [0.00141]			
B-index (taxation R&D)					0.00000629* [0.00000351]		
R&D grants						0.000679 [0.00130]	
Tax incentives (R&D)						0.00298*** [0.000693]	
EPL (temporary)							0.0000539 [0.0000424]
Constant	yes	yes	yes	yes	yes	yes	yes
N	78	73	73	70	68	64	61
R-sq	0,751	0,76	0,822	0,87	0,84	0,898	0,891
adj. R-sq	0,714	0,716	0,782	0,837	0,798	0,866	0,858
Beginning period	1998Q4	1998Q4	1998Q4	1999Q3	2000Q1	2000Q1	1998Q4
End period	2018Q1	2016Q4	2016Q4	2016Q4	2016Q4	2015Q4	2013Q4

(1) *p<0.10, **p<0.05, ***p<0.01; Newey-West s.e.

Source: European Commission

7. CONCLUSION

The financial and economic crisis resulted in a stronger fall in private investment in Italy than in the rest of the euro area, which was further aggravated by the sovereign debt crisis.

Following the introduction of stimulus measures, specifically those introduced in 2015 by the Italian government, private investment started to recover, but it is still below both the pre-crisis level and the euro area average. Public investment has declined steadily and substantially (by almost one third). Unlike the trend in private investment and in peer countries, Italian public investment has not yet started to recover. The financial and economic crisis also amplified the divide between Northern and Southern regions in terms of investment rates, which was already large, especially for intangibles. These developments constrain long-term growth.

Before the onset of the crisis, Italy was already characterised by a range of structural weaknesses. These include the low level of intangible investment compared to peer countries and several barriers to investment: an inefficient credit market, a relatively low share of tertiary-educated people and an unfavourable business environment. Given the importance of identifying the main policy areas in order to boost investment, this paper tries to identify the main drivers and barriers to investment in Italy, with a focus on intangibles. The analysis finds that access to finance is a key determinant of investment in Italy, as well as adequate education of the workforce, in particular for intangibles. The analysis also finds that well-targeted public investment and tax incentives, such as those recently introduced, support private investment, although their impact is smaller than other factors.

The use of non-bank finance is found to be a key driver of investment in Italy. The analysis shows that the high level of NPLs (and possibly also their nature and how they have been managed) represents an important drag on investment, while the use of self-financing and equity have a clear positive correlation with both tangible and intangible investment. While substantive measures have been taken to address the fall in bank lending, there is scope to improve non-bank finance. The Impresa 4.0 plan includes some measures to ease access to both bank and market-based finance, most of which have been recently confirmed by the government. An in-depth assessment of this

package of measures could be useful to improve their impact, also considering that the take-up of some measures has been lower than for others. For instance, measures supporting bank financing through a public guarantee have been used more than measures trying to support other types of financing (e.g. mini-bond). This suggests that the weak use of market-based finance may be partly due to a lack of demand from firms. If so, other initiatives such as training and tutoring could be beneficial. Moreover, policy measures concerning credit to boost investment should be carefully designed to find the right balance between the economic benefit and the risk of moral hazard. The interlinkages between the misallocation of capital, persistently high NPLs and the predominance of bank lending could also be further analysed. Direct grants can also support (specific) intangible investment, by providing a source of finance to e.g. start-ups that may lack collateral or may find difficulties in having their projects assessed by traditional investors.

An adequately educated workforce is found to have a positive impact on investment, especially in intangibles. Indeed, this is the basis for boosting, managing and absorbing investment projects. However, Italy still has a low rate of tertiary education attainment, especially in fields relevant for innovation, and low tertiary education funding compared to peer countries. Italian firms are also characterised by weak managerial skills. The analysis confirms the importance of workers (and managers) having a level of education at least equal to that needed to meet the challenges of the role. For a sophisticated economy such as Italy, this means that properly supporting tertiary education is key to boosting investment.

Investment in intangibles remains subdued, although several relevant policy measures have been put in place. In the last years a set of measures was adopted to boost investment and innovation (mostly part of the Impresa 4.0 plan). The bulk of these measures are tax incentives. The analysis of previous tax incentives for innovative investment shows that, in general, they have a positive effect on intangible investment although other factors may be more important. However, the analysis also shows that the burden of corporate taxation on investment became more important as a drag on investment after the crisis. The Impresa

4.0 tax incentives (super- and hyper-depreciation) contributed to lowering the corporate tax burden. An assessment of all the Impresa 4.0 measures could also allow for a streamlining of them in order to dedicate resources to the most efficient ones, including when considering the characteristics of the firms targeted (e.g. micro firms). As some incentive-based measures can amplify the regional divide, given the difference in pre-existing conditions, complementary approaches remain important.

Private investment could also benefit from well-targeted public investment and from a more supportive business environment. The impact of public investment depends on the type of investment and the time horizon considered. In recent years, Italian governments have prioritised current public spending over investment ⁽²⁹⁾. The analysis shows that a general increase in public investment could crowd out private investment in the short run (possibly due to increasing financing costs and beyond a positive expansionary effect), but it could significantly crowd in private investment after two years. This reflects the time it can take for public investment projects (e.g. in infrastructure) to be completed. However, the analysis also shows that public investment in R&D can quickly stimulate private investment in intangibles, which are also more resilient to economic shocks. The potential crowding-in effect is an important aspect to be considered when assessing different public investment projects. This, together with the potential expansionary effect of public investment, should be considered by governments when deciding how to allocate resources between current spending and investment. The business environment also contributes to explain investment trends. Despite recent reforms to improve the Italian business environment (notably in the public administration, justice and in simplification of doing business), it remains complex and insufficiently supportive, while further improvements could boost investment.

⁽²⁹⁾ The drop of public investment was persistent over the post-crisis period, even when an allowance for investment with respect to EU fiscal rules was granted.

ANNEX A

Table A.1: **Public Investment - robustness check**

	1	2	3	4
1/Previous capital stock	118,6 [16652.8]	70881.1*** [14894.8]	63779.8** [28325.0]	38564.8** [15982.0]
GDP (lag1)	0.123*** [0.0367]	0.221*** [0.0334]	0.179*** [0.0405]	0.198*** [0.0441]
GDP (lag2)	0,0119 [0.0405]	0.0925** [0.0359]	0,0348 [0.0507]	0.124** [0.0599]
GDP (lag3)	0,0386 [0.0502]	0.154** [0.0718]	0,0997 [0.0705]	0,0535 [0.0469]
GDP (lag4)	0.117** [0.0447]	0.141** [0.0562]	0.125** [0.0555]	0.186*** [0.0582]
NPL ratio (lag3)	-0.00859*** [0.00220]	-0.0212*** [0.00234]	-0.0163*** [0.00333]	-0.0139*** [0.00336]
Net lending rate (lag2)	-0.00705** [0.00325]	-0.00849** [0.00341]	-0,0063 [0.00397]	-0.0109*** [0.00389]
Equity (lag2)	0.00431*** [0.00125]	0.00338*** [0.000851]	0.00330*** [0.00102]	0,00261 [0.00170]
Profitability (lag2)	0.0164*** [0.00441]	0.0175*** [0.00242]	0.0159*** [0.00358]	0.0162*** [0.00343]
Employed with tertiary ed. (lag2)	-0.000999 [0.00584]	0.00999** [0.00433]	0,00211 [0.00516]	0.0183** [0.00794]
Public investment (lag8)	0.197*** [0.0326]	0.152*** [0.0485]	0.184*** [0.0462]	
Public investment (lag4)	-0,108 [0.0669]	-0.460** [0.185]	-0.377** [0.158]	
Public investment	-0.373*** [0.0534]	-0.899*** [0.211]	-0.842*** [0.250]	-0,257 [0.261]
Dummy 2008	0,000281 [0.000464]	-0.000531*** [0.000115]	0.00102* [0.000578]	-0.000629*** [0.000176]
Corporate tax	-0,00146 [0.00142]		0,00211 [0.00149]	
Crisis*corporate tax	-0.00392* [0.00195]		-0.00560*** [0.00192]	
Doing business		0.000104*** [0.0000268]	0,0000588 [0.0000370]	
Dummy 2002				-0,0000301 [0.000714]
Public investment*2002				0,098 [0.254]
Constant	0,00115 [0.00261]	-0.0209*** [0.00353]	-0.0150** [0.00677]	-0.00879** [0.00356]
N	64	57	52	75
R-sq	0,989	0,988	0,991	0,977
adj. R-sq	0,985	0,984	0,987	0,972
Beginning period	2001Q1	2004Q1	2004Q1	1999Q3
End period	2016Q4	2018Q1	2016Q4	2018Q1

(1) *p<0.10, **p<0.05, ***p<0.01; Newey-West s.e.
Source: European Commission

Table A.2: Variables' description

Variable Name	Variable Description	Unit	Frequency	Source	Data availability
businessGFCFratio	I(t)/K(t-1) where I is gross fixed capital formation by NFC and K is net capital stock of the whole economy (both in constant prices)	Million EUR	<i>For investment:</i> quarterly <i>For capital stock:</i> annual (interpolated to quarterly)	ISTAT, AMECO for capital stock	1999Q1-2018Q1
intangibleGFCFratio	I(t)/K(t-1) where I is gross fixed capital formation in intellectual property products excluding industries O to Q (Public administration, defence, education, human health and social work activities) and K is net capital stock of the whole economy (both in constant prices)	Million EUR	<i>For investment:</i> quarterly; the annual series for intellectual property products excluding industries O to Q has been interpolated based on the (unadjusted) quarterly shares of total gross fixed capital formation in intellectual property products* <i>For capital stock:</i> annual (interpolated to quarterly)	ISTAT, AMECO for capital stock	1996Q1-2018Q1
gdplag(i)	$\Delta GDP(t-i)/K(t-1)$ where K is the net capital stock of the whole economy (both in constant prices)	Million EUR	<i>For GDP:</i> quarterly <i>For capital stock:</i> annual (interpolated to quarterly)	ISTAT, AMECO for capital stock	1996Q3-2018Q1
NPL ratio	Non-performing loans as a share of total loans based on data from Supervisory Returns	Pure ratio	Quarterly	Bank of Italy	1998Q1-2018Q1
lending_rates	Interest rates on loans to Non-Financial Corporations, Loans Other than Bank Overdrafts, New Business <i>minus</i> year-on-year growth in GDP deflator	Pure ratio	Quarterly	Bank of Italy, ISTAT	1997Q1-2018Q1
uncertainty_BCSI	BCS industry uncertainty indicator FW-DISP	Higher values indicate higher dispersion i.e. uncertainty	Quarterly	VASICEK Borek (ECFIN)	1999Q1-2017Q2
uncertainty_BCSII	BCS industry uncertainty indicator BW-DISP	Same as above	Quarterly	Same as above	1997Q1-2016Q3

<i>uncertainty_BCSIII</i>	BCS industry uncertainty indicator IQ-DISP	Same as above	Quarterly	Same as above	1997Q1-2016Q4
<i>uncertainty_stan</i>	Economic Policy Uncertainty Index	Higher values indicate higher uncertainty	Monthly	http://www.policyuncertainty.com/	1997Q1-2018Q1
<i>equityliabilities</i>	Shares and other equity as a share of total financial instruments (liabilities) of NFC	Pure ratio	Quarterly derived from monthly	Bank of Italy	1996Q1-2018Q1
<i>profitratio</i>	Gross operating surplus of NFC as a share of gross value added	Pure ratio	Quarterly	ISTAT	1999Q1-2018Q1
<i>dummy2008</i>	Dummy variable for the post-crisis period	=1 if from 2008Q4 or later, =0 otherwise			-
<i>employedtertiary</i>	Total persons from 15 to 64 years who are employed and have tertiary education (levels 5-8)	Thousands	Quarterly	Eurostat	1998Q1-2018Q1
<i>tertiary</i>	Share of population with tertiary education (levels 5-8)	Pure ratio	Annual (assumed constant for the four quarters of a given year)	Eurostat	1996-2017
<i>tertiary2534</i>	Share of population from 25 to 34 years old with tertiary education (levels 5-8)	Pure ratio	Annual (assumed constant for the four quarters of a given year)	Eurostat	1996-2017
<i>corptax</i>	Implicit tax rate on corporate income	Pure ratio	Annual (assumed constant for the four quarters of a given year)	TAXUD, Taxation trends report 2018	1996-2016
<i>B-index**</i>	It corresponds to the implied tax subsidy rates on R&D expenditures. The tax incentives for R&D and direct grant are measured in percentage of GDP.	Higher values correspond to higher subsidies to R&D	Annual	OECD	2000-2017
<i>Tax incentives R&D</i>	Tax incentives for R&D in percentage of GDP	Percentage	Annual	OECD	2000-2015

Direct grants R&D	Direct grants for R&D in percentage of GDP	Percentage	Annual	OECD	2000-2015
publicGFCF	I(t)/K(t-1) where I is gross fixed capital formation by general government and K is net capital stock of the whole economy (both in constant prices)	Million EUR	<i>For investment:</i> quarterly <i>For capital stock:</i> annual interpolated to quarterly	ISTAT, AMECO for capital stock	1999Q1-2018Q1
creditstandards	Difussion index: Changes in bank's credit standards for approving loans or credit lines to enterprises (questions 1: past three months)	Continuous variable. The values assigned to the qualitative answers are the following: 1 = tightened considerably, 0.5 = tightened somewhat, 0 = basically unchanged, - 0.5 = eased somewhat, - 1 = eased considerably.	Quarterly	Bank of Italy	2003Q1-2018Q1
Doingbusiness	Ease of starting a business	The higher number the easier to start a business (100 is the frontier). This sub-index was chosen because of a longer series and consistent methodology across time	Annual (assumed constant for the four quarters of a given year)	World Bank	2004-2018
publicRNDdefl	I(t)/K(t-1) where I is Intramural R&D expenditure (GERD) by Government sector divided by net capital stock of the whole economy	Million EUR	<i>For R&D:</i> annual (interpolated to quarterly and divided by 4) <i>For capital stock:</i> annual (interpolated to quarterly)	Eurostat	1996-2017

<i>epltemp</i>	Indicator for Strictness of employment protection – temporary employment	Sub-indicator chosen because of adequate series length and variation. Data range from 0 to 6 with higher scores representing stricter regulation	Annual (assumed constant for the four quarters of a given year)	OECD	1996-2013
<i>overqual</i>	On-the-job skills mismatch	Discrepancies between skills of jobholder (ISCED level) and required skills for the job (ISCED-ISCO mapping by ILO(2007))	Annual (assumed constant for the four quarters of a given year)	DG EMPL	1996-2016
<i>underqual</i>	On-the job skills mismatch	Discrepancies between skills of jobholder (ISCED level) and required skills for the job (ISCED-ISCO mapping by ILO(2007))	Annual (assumed constant for the four quarters of a given year)	DG EMPL	1996-2016

* The seasonal adjustment has been conducted in Eviews using the TRAMO/SEATS methodology

** For more information on these measures (B-index, tax incentives and direct grants for R&D): <http://www.oecd.org/sti/rd-tax-stats-italy.pdf>

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