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Innovation, competitiveness and growth without R&D? Analysis of corporate R&D investment – A country approach: Italy

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1. Introduction

The objective of this *Policy Brief* is to analyse the status of private R&D investment in Italy based on recent evidence and to indicate possible policy actions to boost private R&D investment.

Why is business R&D investment relevant? The literature¹ broadly reports that engaging in R&D can help firms to innovate and increase productivity, and to improve or create new products² and markets, thus ensuring competitiveness and growth³, and leading to both private and social benefits⁴.

However, despite the known benefits, in Italy, the innovation system has long suffered from underinvestment in R&D compared to the EU average, in particular from private investment (Action Institute, 2013). Despite several studies in the literature supporting this diagnosis (e.g. Cerulli and Potí, 2012; Antonelli and Crespi, 2013); policy

actions implemented to address this during the past decade have not significantly improved the situation.

In the current analysis, we rely on microdata from an unbalanced 10 years' panel data-set (2004-2013), constructed using several waves of *The European Industrial R&D Investment Scoreboard* (European Commission, 2004-2013)⁵. Moreover, we also take into consideration other sources of quantitative and qualitative information (e.g. OECD, ISTAT, EUROSTAT, ERAWATCH Country Report – Italy, 2013, State of the Innovation Union, 2014), and recent academic literature on the topic.

In this document we argue that: i) innovation in firms without their engagement in R&D activities is not sustainable in the medium and long term; ii) the Italian R&D and innovation (and competitiveness) gap is due to 'systemic'/structural reasons, and thus targeted high quality policies are needed to address these issues; iii) such policy interventions will have little positive impact without comprehensive reform aimed at improving the innovation environment as a whole. Careful design of an 'innovation strategy' that includes support for R&D is needed. This strategy should be fine-tuned to tackle the actual specificities of the Italian economic context and its R&D-led innovation difficulties.

¹ Literature surveys on the subject include Griliches (2000) and Mohnen and Hall (2013).

² Harrison *et al.* (2014) found strong empirical evidence that innovation creates employment at firm level, especially thanks to the introduction of new products.

³ For example, Hall *et al.* (2010) showed that R&D could explain on average 20-30 per cent of the innovation process. However, considerable differences exist in firm's innovation and competitiveness returns on R&D investment, depending on the technology intensity of the industrial sector, the product portfolio and/or the life cycle (Kumbhakar *et al.*, 2012; Mairesse and Mohnen, 2005; Bosworth, 2005).

⁴ Already, Shumpeter in 1934 argued that is the achievement of profits, through entrepreneurship and innovation, that makes possible economic growth.

⁵ The combined R&D investment of the Scoreboard companies in 2013 represented approximately 88 % of the total worldwide business enterprise expenditure on R&D.

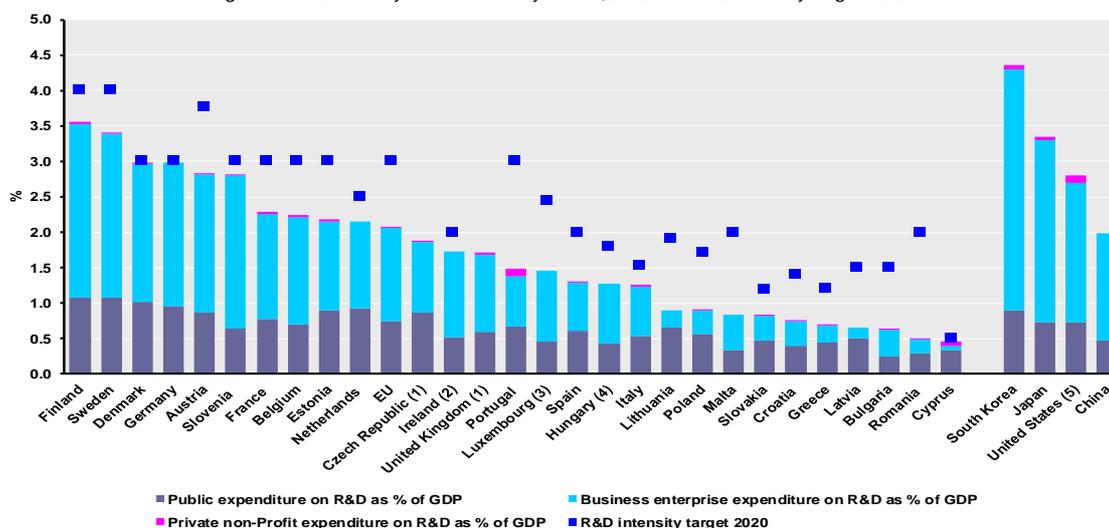
2. Overview of business demographics and research and innovation (R&I) in Italy

The preponderance of small firms is a well-known characteristic of the Italian economy. Italy leads the EU in the number of enterprises and has the second most number of SMEs among European countries. According to ISTAT data⁶, there are just over 4.4 million enterprises in Italy, but only 3 470 of those have 250 employees or more (and hence

2010, 64.1 % of Italian firms with 250 employees or more were involved in innovation, whilst this figure was 47.1 % for the 50-249 employee class and only 29.1 % for the 10-49 employee class.

One of the consequences of this reduced investment in R&D and of the low innovation activity of Italian firms is the lack of a positive and sustained growth dynamic and the low levels of international competitiveness. In fact, if we

Figure 1. R&D intensity broken down by sector, 2012 and R&D intensity targets 2020



Source: DG Research and Innovation - Unit for the Analysis and Monitoring of National Research Policies (September 2014)

Data: Eurostat, OECD, Member States

Notes: (1) CZ, UK: No R&D intensity targets have been set. For CZ a target of 1% is available only for the public sector.

(2) IE: The R&D intensity target is 2.5% of GNP which is estimated to be equivalent to 2.0% of GDP.

(3) LU: The R&D intensity target is between 2.30% and 2.60% of GDP (2.45% was assumed).

(4) HU: The R&D intensity sectoral breakdown does not add up to total R&D intensity.

(5) US: (i) Most or all capital expenditure is not included; (ii) Government expenditure on R&D refers to federal or central government only.

are not SMEs). Micro firms with one to nine employees account for more than 4.0 million enterprises, and for half of all employment in the business sector. This makes the overall size average of Italian firms very small (3.9 employees, compared to 6.6 as the EU average)⁷.

The majority micro size of Italian firms has a number of major consequences for the R&I system. Such very small firms – mostly sole traders– are unable to invest significantly in R&D activities, as they are typically financially constrained and are unlikely to hire specialised employees, and thus they have low R&I development and absorptive capacity⁸.

The fact that the innovation capacity is seriously limited by firm size in Italy is also confirmed by the evidence provided by the Community Innovation Survey (CIS) data⁹: in the period 2008-

consider the period 2008-2012, the size structure of Italian firms remained unchanged, with firms of four employees or less representing between 90.2 % and 90.8 % of the total number of active firms in the country (Eurostat, 2014). If we look instead at competitiveness vis-à-vis other EU countries, Italy is ranked among the countries 'with strong but declining competitiveness', with the classification based on the last five years values of three indicators, namely, labour productivity, exports, and innovation (European Commission, 2014c).

Italy does not have a high capacity of start-up innovative firms, nor an ability to help them survive¹⁰ or grow¹¹. In the ranking elaborated by the World Bank 'Doing Business project', Italy is classified 90th for the ease of starting a new business, below countries like the UK (28) and France (41)¹². The Italian Chambers of Commerce counted (September 2014) about 2 600 innovative

⁶ ISTAT - extract from online database on 30 September 2014; data from national survey 2011.

⁷ ISTAT, 2014.

⁸ Bugamelli *et al.*, 2012.

⁹ ISTAT (2012b).

¹⁰ Audretsch *et al.*, 1999.

¹¹ Colombo and Grilli, 2010.

¹² <http://www.doingbusiness.org/>

start-ups in Italy, compared to, e.g. 2 000 in London alone and 1 000 each in Paris and Berlin in the same year. Furthermore, even though five out of six high-tech firms in Northern Italy are technology-based SMEs, it is considered that only one in six of these has a realistic prospect of growth, the rest are likely to remain SMEs¹³.

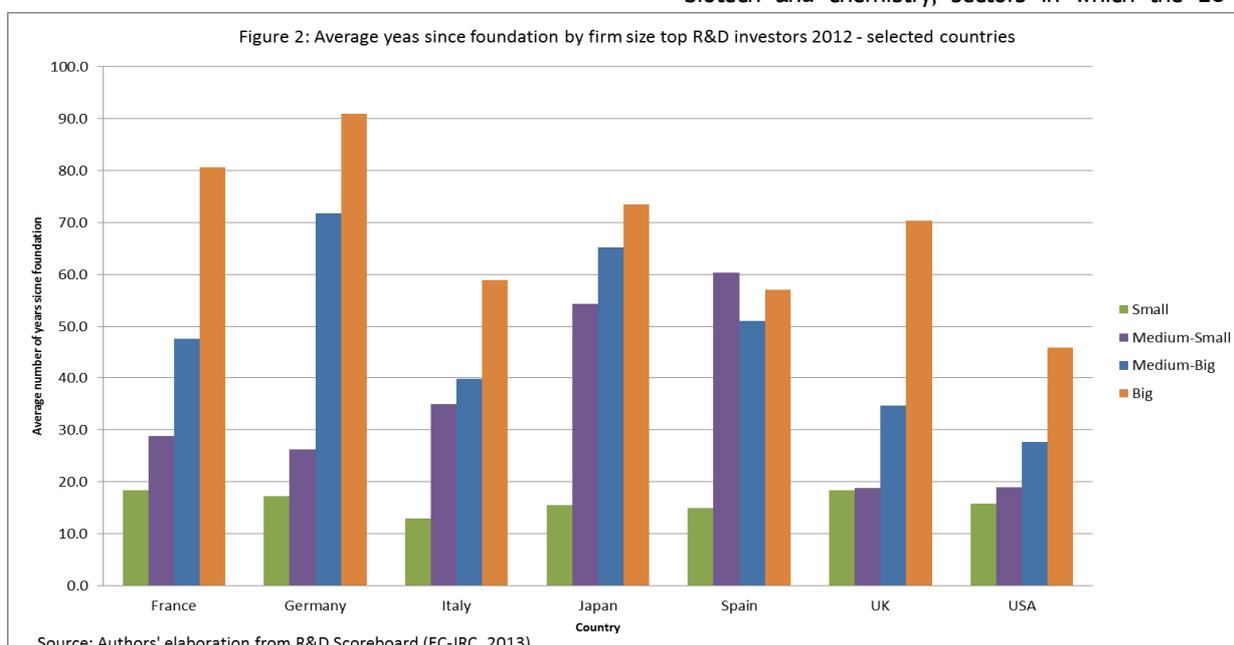
Moreover, Italian economic specialisation is mainly in low tech sectors: 14 % of Italian total Value Added (VA) is represented by textile and clothing, leather and shoes, and wood and wooden products (Pagano and Schivardi, 2003). Sectors with a high R&D intensity are under-represented in terms of their relative contribution to the total Italian VA. As a consequence, Italian R&D intensity (as a ratio of R&D expenditure to GDP) in 2012 was only 1.27, while the EU-27 average was 2.06. Business expenditure on R&D (BERD) as a share of GDP was also well below the EU-27 average in 2012: 0.69 % in Italy compared to an EU-27 average of 1.3 % (Figure 1).

Finally, the R&I system in Italy is characterised by a high concentration of R&D expenditure and employment in just four major Northern regions – Lombardy, Piedmont, Emilia Romagna and Veneto – and one Central region – Lazio¹⁴.

3. Closer analysis of corporate R&D investment by Italian firms

We used several waves of *The European Industrial R&D Investment Scoreboard*¹⁵ (European Commission 2004-2013) to carry out the analysis of Italian corporate R&D investment at a firm-level¹⁶. Italian firms represent a small part of the world's top R&D investors, not only in numerical terms (only 30 firms in the top 2 000, and 46 firms in the top EU top 1000), but also as a percentage of the total company R&D expenditure registered on the R&D Scoreboard in 2012 (1.6 %). Two firms alone – Fiat¹⁷ in the Automotive & Parts sector, and Finmeccanica in the Aerospace & Defence sector – represent 60 % of all R&D investment of the Italian firms included in the EU top 1000 Scoreboard ranking (edition 2013). It is worth noting that these 46 firms invested in R&D in 2012 a total of EUR 9.1 billion, which accounted for 84.3 % of the total Italian BERD for the same year (EUR 10.8 billion).

There is a very low dynamicity of new entries of Italian firms on the R&D Scoreboard, especially in the high-tech sectors. Additionally, it is worth noting that there are no Italian firms in sectors like biotech and chemistry; sectors in which the EU



¹³ European Commission, 2003.

¹⁴ This reflects the historical pattern of industrialisation and the polarised economic structure of the country, with four regions in the south – Sicily, Calabria, Puglia and Campania – eligible for EU Convergence/Objective 1 policies (ERAWATCH Country Report – Italy, 2013).

¹⁵ This Scoreboard collects data on the top private R&D investors worldwide. Focusing on the biggest world investors in R&D, our data suffers from some limitations (e.g. big firms are more represented than SMEs). For a detailed description of the methodology and limitations of the data, see European Commission (2013a, pp 77-79).

¹⁶ The R&D Scoreboard data are drawn from the companies' annual audited accounts. The database contains economic and financial data of the world's top companies, ranked by their investments in research and development (R&D).

¹⁷ Fiat has controlled Chrysler since July 2011. In the 2012 edition of the Scoreboard (it refers to the 2011 data), Fiat's data also included Chrysler's financial data.

performance is particularly strong compared to the US and Japan.

More detailed quantitative information is reported in the tables and figures in the Annex.

With regards to the internationalisation of R&D, Italian firms' investment in R&D abroad is marginal, and represents only around 5 % of the total private investment in R&D (Evangelista *et al.*, 2002; Cozza, 2010). Also, high R&D intensity exports decreased from 9 % of total exports in 2000 to 6.8 % of the total in 2010 (Ambrosetti Club, 2013). More recent data (July 2012-July 2014) show an enormous imbalance between inward and outward investment in R&D and related activities, respectively, by foreign and Italian companies (see data on inward and outward investments in Table A4 in the Annex).

Comparing Italian firms in the ranking of top R&D private investors with other top R&D spenders located in selected OECD economies, and by looking at their R&D investment growth rates during the last eight years (2004-2012 – see Figure A1 in the Annex), we can see a growth trend for Italy (both in average and absolute terms), illustrating a similar growth path to other large countries (like the US and Germany). Focusing only on the absolute R&D expenditure in 2012, Italian firms are positioned below firms located in the US, Germany, France and Japan, but above firms located in Spain and the UK. A possible reason for this is the difference in the industrial structure of the countries where the R&D Scoreboard companies are located. Some countries are characterised by the presence of high-R&D intensity sectors, while others have an industrial structure centred on more low-R&D intensity sectors.

Looking at firm size¹⁸ in 2012, in all the countries analysed the majority of top R&D-investing firms were medium-large or large firms. It is interesting to note that in countries like the UK and the US there is a consistent percentage of small and medium-small firms investing significantly in R&D. While the Italian small companies investing in R&D are the smallest ones compared to the seven countries analysed (see Figure 2).

Comparing firms also from an age point of view, European countries have a higher percentage of 'old and big firms' among the top R&D investors compared to the US. Italian firms are positioned in the middle; they are on average (across all size

categories) younger than German firms and older than US firms (see Figure 2). There seems to be two different models: Germany and Japan on the one side with many older firms (still spending considerably on R&D), and the UK and the US on the other side, with many young firms operating alongside old firms (thus lowering the average age). The analysis of corporate R&D investment by Italian firms confirms their very high concentration in a few Northern and central regions (see Table A5 in the Annex for details).

4. Further inputs from literature and analytical considerations

Current literature on the relevance of R&D to a firm's performance is controversial if the firms and their sector/industry heterogeneities are not taken fully into account¹⁹. However, as Bosworth (2005) and Vaughn (2014) highlighted (among others), R&D has several important roles.

The first major role of R&D is the development of fundamental knowledge or 'enabling technologies'. This also improves the ability of a company to innovate using inventions produced by others

The second important function of R&D is to provide support to manufacturing, customers, and business management. R&D organisations are often the repositories of technical know-how.

The third major function of R&D is to develop and implement new technologies.

In reality, all of these R&D roles are interrelated. R&D pooled (e.g. from abroad) could be at least as important for innovation and productivity as a company's own R&D. Achieving the right balance of the different R&D roles is critical to the success of companies.

But, why should policymakers aim at more R&D in general, and in Italy in particular? Given the role played by competitive innovation-led enterprises in the economy (i.e. the return in terms of economic and social benefits), policy initiatives typically do not aim at raising the level of private R&D per se, but aim at making R&D investment more effective and at overcoming possible barriers to innovation, and hence aim to promote economic and social prosperity by achieving a knowledge-intensive economy and society (Pessoa, 2007; Jones and Williams, 1998).

Investigating Italy, both Bugamelli *et al.* (2012) and Istat (2012a) argued that, when comparing BERD within the EU by taking into account the industrial structure – in terms of both sectoral

¹⁸ In our own definition of groups according to different sizes: <250 = 'Small' (SMEs), <1 000 = 'Medium-Small (Quite Large)', <10 000 = 'Medium-Big' (Large), >10 000 = 'Big' (Largest).

¹⁹ See footnote 2.

breakdown and average size – of each Member State, Italian firms do not actually underperform in undertaking R&D activities vis-à-vis other EU businesses. This would suggest that the low level of R&D investment by Italian businesses is consistent with the low needs for innovation projects usually undertaken by a limited number of the Italian enterprise²⁰.

However, such arguments do not contradict, but on the contrary reinforce, the need for policy intervention to promote change of the Italian structure, by among other things, increasing the number and size of R&D performers. As shown by other benchmarking countries performing much better in terms of business R&D investments and competitiveness (such as Germany), there is a crucial contribution of R&D performing SMEs (which hold the capacity to growth) and of large companies operating in medium-high and high R&D intensive sectors (able to shift market/sector segmentation).

In sum, this is why Italian policy makers should aim at having more "R&D-related innovation" and not mainly (only) base companies' competitiveness and economic growth on "non-R&D-based innovation". In fact, evidence shows that the proportion of corporate sales revenues allocated to commercially oriented R&D is one of the principal indicators (if not the main one) of subsequent sales growth performance relative to competition over 5–10 year periods (Franko, 1989)²¹.

The specific characteristics of the Italian firms' demographics described earlier and of the industrial structure (i.e. the specialisation in traditional and lower R&D intensity sectors), is accompanied by (and in great part due to) exogenous business environment conditions, which hardly favour the emergence and growth of R&D-intensive firms. Such an environment is characterised by difficulties in accessing financial sources for R&D (e.g. public subsidies, venture capital and private equity), together with difficult market conditions (finance²², employment, reduced

demand), and an unfavourable institutional and regulatory framework²³ for business innovation (Bugamelli *et al.* 2012; ERAWATCH Report 2013; Moncada-Paternò-Castello *et al.*, 2014). As some authors point out, part of the reason why there is a traditional low level of R&D investment in R&D by enterprise could be due to the low offer of scientific and technical skills by the Italian labour market (Rossi, 2014).

In such circumstances, unless change is implemented, the Italian productive system will continue to face ever greater difficulties, both to compete globally with producers based in countries with low labour costs and to find and defend new market niches (Moncada-Paternò-Castello *et al.*, 2006).

In fact, reversing its current private R&D investment path can help Italy to succeed further in competing globally²⁴. The overall system of innovating without R&D²⁵ is not sustainable in the long run, especially if Italian firms only favour innovation buy-ins (i.e. firms' absorption of R&D and innovations done by others, e.g. in the textile industry). The strategy for moving forward is thus either to rely on a continuous race of comparative price advantages via cost reductions and productivity increases in order to increase the export of low-/medium-tech goods and services, or to increase the capacity of competing in knowledge intensive sectors. While the first strategy has serious limits in a globalised economy and presents serious risks of internal demand depression and rising inequalities in income, the second one offers the possibility to harvest higher margins for business and broader societal benefits.

Appropriate framework conditions and adequate support should therefore be established to favour business R&D investments in knowledge intensive sectors, both from existing companies (of all sizes) and from emerging new ones. Companies in medium- and low-R&D intensity sectors would also benefit from the establishment of an adequate

²⁰ According to ISTAT, only 31.5% of the Italian firms with 10 or more employees have introduced at least one product or process innovation between 2008 and 2010 (ISTAT, 2012a)

²¹ His study summarised the major changes over the period 1960–86 in the shares of world markets of the world's leading American, European and Asian corporations based in 15 major industries.

²² Between 2012 and 2013, loans for business decreased in Italy by 4.6 %. Since 2007, the percentage of accounts uncollectible tripled, reaching 22 %. About a third of company failures are due to the lack of loans for business rather than the lack of competitiveness (European Commission, October 2013). This is a symptom of the long overdue problems of access to finance, rather than more

recent problems derived from the 2008-9 crisis.

http://europa.eu/rapid/press-release_MEMO-13-909_en.htm

²³ Firms in Italy face the highest fiscal burden in Europe, 65.8 % of revenues. (PWC/World Bank, 2014)

²⁴ Italy in the Global Competitiveness Index 2014–2015 is ranked 49th overall (out of 144 countries) - 106th for firm-level technology absorption, 39th for innovation capacity and 35th for firms' spending on the R&D sub-indexes (World Economic Forum, 2014).

²⁵ As noted in the past by Colombo and Lanzavecchia (1996), some Italian economic actors are reluctant to invest in fields with a low likelihood of the creation and growth of a considerable number of new Italian firms. However, doing so could lead to them investing money in research more useful for foreign firms than for Italian ones.

business environment that favours the absorption of the R&D results produced in other sectors.

In this aspect, Italy could learn from both the German and the US models: in Germany, many large and old firms have been able to develop and absorb R&D and technology, and to diversify and/or shift dramatically their core business towards more knowledge intensive activities. This has allowed many firms to survive and grow, even during the latest financial and economic downturn, e.g. Siemens. In the US, there is an outstanding dynamics of the creation and destruction of firms, many of them in high-tech sectors (the US has a very large base of high-R&D performing SMEs). This has resulted in the emergence in just a few years of many global leaders in new knowledge-intensive sectors (e.g. Google and Facebook). This phenomenon is accompanied in the US by a number of large traditional companies behaving similarly to their German counterparts.

According to a recent study by Bonaccorsi and Perani (2014), in Italy, there are a disproportionately higher number of *occasional* corporate R&D investors versus the number of *continuous/systematic* ones (i.e. firms performing R&D for at least three consecutive years). The less frequent (*occasional*) corporate R&D performers are small firms and are usually attempting to play catch up in a process which is most likely influenced by exogenous factors (external sources of funding, options for tax reliefs, low cost of R&D inputs, etc.) and features a remarkable cyclicity. Furthermore, the same authors argue that most R&D support policies in Italy have actually reinforced the R&D infrastructures of large and persistent performers (those which would have invested in R&D anyway), largely neglecting the need to reduce the fixed costs which make it difficult for *occasional* performers (mostly small firms) to develop their projects on a continuous basis.

5. Implications for policy

Malerba (1993) already pointed out the 'dual' nature of the Italian industrial system, with a small set of big firms capable of performing R&D and a large group of small firms not investing in R&D. The key question then was: what could policymakers do to favour an upturn of this structural situation?

The political target should be to improve the competitiveness of Italian enterprises by fostering more business R&D-related innovation, together with continuing to develop firms' capacity to innovate by absorbing R&D/innovation done externally (e.g. by performers adopting R&D 'à la

carte), and further strengthening firms' already good performance in non-R&D-based innovation²⁶. This would result in an 'innovation policy strategy' which would include specific measures to support the R&D efforts of enterprises that really need it, in the presence of market failures.

If we look at national policies, Italian government funding of business R&D has been characterised by very low figures compared to its EU competitors. This has been aggravated by very strong cuts in the years 2006-11: a decrease of almost 50 % in government support through direct funding and from tax incentives (OECD, 2013 – see also Figure A6 in the Annex)²⁷. This calls for a stronger commitment from the central government to provide more support to the funding of research and innovation, as a well-recognised growth-enhancing public investment (Annual growth survey 2014, European Commission, 2013d). In this advocated governmental undertaking, full care should be given to the efficiency and effectiveness (quality) of the investment in R&I (European Commission, 2014e).

However, much more than just funding is needed to address the weaknesses of the national research and innovation system in Italy, including urgently addressing some of the areas where priority actions are needed most, as largely highlighted by the most relevant and recent work of the European Commission²⁸, namely, human capital; R&D intensity and specialisation of firms; size distribution of firms; territorial inequalities; and institutional and framework conditions. These areas cover a broad spectrum of structural aspects and require a comprehensive policy mix.

In this context, and based on the previous analysis, we point to a series of specific priority policy actions aimed at stimulating the level of business R&D investment, both through the broadening of the population of R&D investing firms and a deepening of the efforts of the existing ones. These suggestions should be modulated according to more specific innovation and socio-economic targets (e.g. finding a balance between R&D-related and non-R&D-related innovation;

²⁶ Italy tends to perform better on *indicators* of non-R&D-based innovation. For example, it leads in design (OECD, 2012).

²⁷ There is a lack of a long-term strategy on tax credits for business R&D incentives in Italy. In fact tax credits for 2007-2009 had come to an end in 2011, but the new exercise had not yet been launched.

²⁸ ERAWATCH Country Report 2013 (European Commission 2014a), 2013 Small Business Act Fact Sheet – Italy (European Commission, 2013b); Research and Innovation Performance in EU Member States and Associated Countries (European Commission, 2013c); Report on 'Market Reforms at Work' – Italy (European Commission 2014d).

promoting the green economy) and should be fine-tuned to tackle the actual specificities of the Italian economic context and its R&D-led innovation difficulties.

Below we present a number of recommendations that Italy could consider as policy actions to address the R&I issues.

A. Set up of a long-term strategy for stimulating private R&D and Innovation. Italy is one of the few OECD countries which does not have a clear and coherent innovation strategy that links research, employment, education and industrial development policies. The implementation of such a strategy should be done: under the framework of the relevant European policy agenda, namely the broad Europe 2020 strategy²⁹ for employment and growth, by the establishment of a European Research Area, with a commitment to the European research and innovation agenda (Innovation Union), and by implementation of the Smart Specialisation concept established in the context of the new European Structural and Investment Funds³⁰. Some good examples can be found in other countries (e.g. in Germany, the 'High-tech strategy'; or in The Netherlands, the so-called Dutch top-sectors policy). Possible strategic directions to consider are to focus on key sectors, on job skills (availability and needs)³¹ and on geographical areas to leverage territorial inequalities (e.g. to look at lessons from the success of *Silicon Valley* or the failure of *Etna Valley*). Overall, it is suggested to set up a stronger quality assessment (*ex ante* and *ex post*) framework for R&I policy (e.g. in Finland, 'Takes' practice').

B. Provide support for the R&D-led growth of SMEs. Direct and indirect incentives for doing R&D in high-tech and medium high-tech sectors should be put in place, *especially for small-medium and young firms* (e.g. a mix of tax exemptions for R&D and a SBIR³² (US)-like programme for Italian innovative SMEs). Coordination and better synergy between regional, national and transnational programmes, including EU programmes, and

funding should be ensured. There is also a need to go beyond the actual measures (e.g. 'Decreto Crescita 2.0'³³) to support innovative SMEs, e.g. by focusing on 'industrial' firms, and favouring cooperation between SMEs in R&D investment. Under this framework, it would be prudent to launch a pilot test³⁴, e.g. to provide 5-10 % tax credits for investment in R&D (with a generous ceiling for the maximum amount of investment) implemented in house by SMEs or in cooperation with other innovative SMEs in one or two sectors of economic activities. Help could also be provided to Italian SMEs to develop their own R&D/technological capacity by involving large national and foreign direct investments from multinational companies, e.g. by using an instrument similar to *The Irish National Linkage Programme*³⁵. Finally, SMEs could be provided with automatic access to funding: with *ex post* evaluation implemented to check for the proper use of the incentive received³⁶.

C. Improve bilateral R&D and innovation activities and the capacity for technology and knowledge transfer between Public Research Organisations (PROs)/universities and firms,³⁷ and also improve firms' R&D absorption capacity. This would imply putting in place company tax credits for investment in R&D projects performed by universities and PROs, with a requirement that firms' involvement must include a set minimum percentage of research activities performed by PRO or universities³⁸ – or, as an alternative, to transfer a percentage of the PRO/universities budget to firms, as 'R&D Vouchers' (like the European Commission's ICT Vouchers scheme for SMEs, or the R&D Vouchers scheme in The Netherlands). Also, there should be better access to improved public R&D infrastructure and the creation of shared platforms

²⁹ 'Horizon 2020 Italia' already connects the Italian strategy to the thematic priorities (Societal Challenges) of H2020. The weak side is its implementation.

<https://www.researchitaly.it/uploads/50/HIT2020.pdf>

³⁰ http://ec.europa.eu/research/regions/index_smart

³¹ Avoiding shortage of skills and improving research quality of research for increasing graduates' employability (Royal Netherlands Academy of Arts and Sciences, 2013; Ciriaci and Muscio, 2014), thus satisfying the needs of firms.

³² Small Business Innovation Research (SBIR) program <http://www.sbir.gov/about/about-sbir>

³³ Full text available (in Italian) at <http://www.gazzettaufficiale.it>

³⁴ See Moncada-Paternò-Castello (2011).

³⁵ For a short description, see OECD and The World Bank (2014), Box 2.1, page 39.

³⁶ Often in large R&D support programmes, where project proposals need months to be evaluated (*ex-ante*) and payments need years to be finalised, we hardly find any SMEs applicants.

³⁷ See also *XI Netval Report* (2014); Ambrosetti Club (2013); and Runiewicz-Wardyn (2013).

³⁸ Or vice versa: as in the 'Plan Estatal de Investigación Científica y Técnica y de Innovación 2013-2016' in Spain.

for technology transfer, including accompanying support measures, such as extending the number of internships in firms by graduates and post-doctorates.

D. Improve job market flexibility for scientists. Some initiatives have already been put in place by the Italian government; however, these are hampered by limitations in the resources available and in the temporary nature of the jobs offered (European Commission, 2014a).

E. Stimulate demand-driven innovation. This concerns policy initiatives such as public Pre-Commercial Procurement (PCP) and Public Procurement of Innovation (PPI)³⁹, and e-governance.

F. Improve the legal framework, strengthen the rule of law, reduce the bureaucratic burden and improve government effectiveness. There is a considerable reform work needed to be implemented in Italy, i.e. administrative simplification (including procedures to set up start-ups), towards achieving continuous improvement in various areas to create the right environment for R&I businesses to succeed, such as the reduction of administrative costs, lowering the minimum capital requirements for limited liability companies, tempering the insolvency procedures, further simplification of the IPR system, and strengthening the evaluation system for research and innovation projects and policy measures⁴⁰. A recent study shows that higher bureaucratic barriers are not only associated with lower business entry dynamics (i.e. business birth rate) in Italy, but also estimates that the implementation of the reforms in Italy can have a significant positive impact on business entry dynamics (European Commission, 2014e).

³⁹ In 2012, Italy assigned more than €150 million to pre-commercial procurement. It will be deployed in Southern Italy with the support of structural funds (European Commission, *ERAWATCH* Report, 2014a). Moreover, the higher risks related to these purchases are covered by a special risk-sharing facility established in cooperation with the European Investment Bank (European Commission, 2014a).

⁴⁰ See also Gros, 2011, Veugelers 2014, European Commission 2013c, and 2014e.

G. Address territorial inequalities of public support towards private R&D investment. A positive shift towards rebalancing present territorial inequalities in the Italian polarised economic structure – also taking into account the asymmetries with regards to the different capabilities of the local stakeholders – could also be realised by the efficient investment in private R&D and innovation in those Italian regions which do not feature on the high-intensity knowledge map and in which currently businesses hardly benefit from public support.

The aforementioned policy actions⁴¹ in points A to F could, in part, endorse such a territorial scope and convergence into regional/local R&D and innovation policies. One of the ways to achieve this that can certainly be promoted here is the full exploitation of opportunities available under the European regional development funds (ERDF)⁴², through e.g. the *Smart Specialisation* approach (European Commission, 2014f)⁴³.

In conclusion, from the available evidence on business R&D investments in Italy, both from official statistics and from the company data of the top R&D investors, as well as from recent literature, we can see that there has been little change over the last decade in the structural features and trends, which have led to low levels of R&D investment and business dynamics of Italian enterprises. There is therefore a critical need to step up public intervention to help promote a shift towards an industrial structure more amenable for a high level of activity in high-tech sectors, better capacity for innovation absorption from other sectors, and better framework conditions to allow the business sector and society at large to fully benefit from a more knowledge-based economy.

⁴¹ Also, here the key objectives of policies to support R&D and innovation at the regional level have to be made explicit and, more importantly, have to be consistent with the specific context in which the resources are going to be spent. The quality (efficiency and effectiveness) of policy intervention has to be assured.

⁴² For example, it encompasses 'Strengthening research, technological development and innovation' or 'Enhancing the competitiveness of small and medium-sized enterprises' as objectives to deliver EU 2020

⁴³ See also Smart Specialisation Platform: <http://s3platform.jrc.ec.europa.eu/home>

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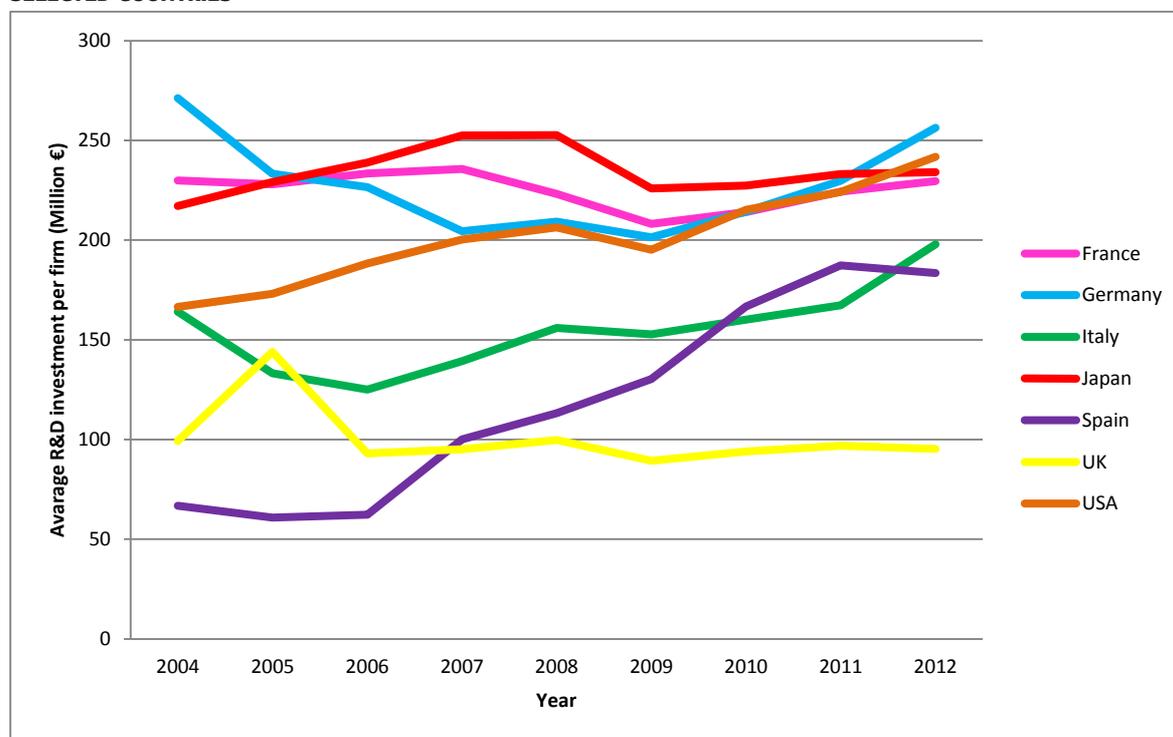
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Annex: Figures and Tables

A1) AVERAGE R&D INVESTMENT PER FIRM (ABSOLUTE VALUES) 2004-2012 FROM THE R&D SCOREBOARD - SELECTED COUNTRIES



Source: European Commission, R&D Scoreboard 2004-2013

A2) SECTORAL R&D INVESTMENT OF ITALIAN FIRMS FROM THE R&D SCOREBOARD - ABSOLUTE VALUES (€ MILLION)

Sector	Year									
	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Aerospace & Defence	1453.7	1746.0	1891.0	2013.0	1819.7	1964.0	2007.6	1995.6	1853.2	
Automobiles & Parts	1322.5	1605.6	1538.4	2033.8	2271.0	1951.8	2206.5	2481.1	3626.0	
Banks		141.0	150.0	173.2	278.7	275.9	465.8	503.4	614.0	
Construction & Materials			51.3	66.3	73.1	78.2	75.8	70.7	67.3	
Electricity	20.0	23.4	22.0	29.0	79.2	101.2	111.5	117.3	154.6	
Electronic & Electrical Equipment	23.9	55.3	91.8	100.4	109.9	103.1	107.2	131.8	130.0	
Fixed Line Telecommunications	139.0	180.0	133.0	122.0	704.0	842.0	698.0	611.0	602.0	
General Industrials	20.0	6.9	6.5	6.9	7.3	25.1	30.2	39.3	62.1	
Health Care Equipment & Services	54.0	49.7	57.1	63.5	62.2	65.6	75.0	70.1	75.5	
Household Goods & Home Construction		43.8	41.0	67.9	64.7	71.7	65.9	76.0	66.4	
Industrial Engineering	43.0	62.9	94.2	826.5	810.0	694.0	786.4	870.7	1015.4	
Industrial Transportation		21.2	21.4	36.0	59.7	47.4	49.0	55.7	72.7	
Media					7.4	10.0	7.3	8.2	8.6	
Oil & Gas Producers	257.0	202.0	222.0	208.0	216.0	207.0	221.0	191.0	211.0	
Personal Goods			21.0	36.2	45.3	146.9	144.9	152.0	160.4	
Pharmaceuticals & Biotechnology	99.6	125.1	147.2	170.3	194.4	229.2	247.5	259.1	306.6	
Software & Computer Services	12.5		0.4	0.8		9.4		5.8	7.3	
Travel & Leisure			15.9	33.9	62.5	62.4	54.8	58.8	72.2	
Grand Total	3445.2	4262.7	4504.1	5987.5	6865.1	6875.4	7363.7	7697.5	9105.2	

Source: European Commission, R&D Scoreboard 2004-2013

A3) SECTORAL R&D INVESTMENT OF ITALIAN FIRMS FROM THE R&D SCOREBOARD - AS A PERCENTAGE OF THE GLOBAL ANNUAL TOTAL

Sector	Year									
	2004	2005	2006	2007	2008	2009	2010	2011	2012	
Aerospace & Defence	12.9%	13.2%	13.7%	12.9%	11.6%	12.9%	12.5%	11.8%	10.2%	
Automobiles & Parts	2.1%	2.4%	2.2%	2.8%	3.0%	3.0%	3.1%	3.2%	4.3%	
Banks	0.0%	9.5%	7.7%	5.0%	5.7%	5.3%	7.0%	6.1%	7.7%	
Construction & Materials	0.0%	0.0%	1.5%	1.8%	1.8%	1.6%	1.3%	1.1%	1.0%	
Electricity	0.8%	1.0%	0.9%	1.0%	2.5%	3.4%	3.3%	3.9%	5.3%	
Electronic & Electrical Equipment	0.1%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	
Fixed Line Telecommunications	2.1%	2.6%	1.8%	1.5%	8.2%	9.6%	8.0%	7.3%	7.2%	
General Industrials	0.1%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%	0.2%	0.4%	
Health Care Equipment & Services	1.0%	0.8%	0.7%	0.7%	0.6%	0.7%	0.7%	0.6%	0.6%	
Household Goods & Home Construction	0.0%	1.2%	1.1%	1.7%	1.5%	1.7%	1.5%	1.7%	1.4%	
Industrial Engineering	0.4%	0.5%	0.7%	4.9%	4.2%	3.8%	3.8%	3.7%	4.0%	
Industrial Transportation	0.0%	5.9%	6.4%	8.0%	12.4%	10.4%	9.0%	9.3%	9.3%	
Media	0.0%	0.0%	0.0%	0.0%	0.4%	0.5%	0.3%	0.3%	0.4%	
Oil & Gas Producers	6.5%	4.3%	4.0%	3.1%	2.6%	2.6%	2.5%	2.0%	2.2%	
Personal Goods	0.0%	0.0%	0.7%	1.2%	1.4%	4.4%	4.1%	4.0%	4.0%	
Pharmaceuticals & Biotechnology	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	
Software & Computer Services	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Travel & Leisure	0.0%	0.0%	1.3%	2.1%	3.6%	3.8%	3.3%	3.3%	3.5%	
Grand Total	1.4%	1.6%	1.6%	1.9%	2.0%	2.1%	2.1%	2.1%	2.3%	

Source: European Commission, JRC-IPTS - R&D Scoreboard 2004-2013

A4) ITALY: INWARD AND OUTWARD CORPORATE INVESTMENTS (July 2012 to July 2014)

	Capex (€ million)	Jobs (number)
Inward RDDT	332.1	1 190
Outward RDDT	88.7	474
Inward Manufacturing*	959.5	2 077
Outward Manufacturing	10 715.9	52 613

Source: European Commission, JRC-IPTS elaborated from © fDi Intelligence dataset (Financial Times Ltd 2014).

NOTE:

Figures based on download from FDI markets database, September 29th 2014.

All types of projects (i.e. new, expansion and co-location) are included.

*Includes a new investment of Philip Morris Int. in January 2014 to Italy (Bologna) in the tobacco industry with a CAPEX of EUR 481 353 million and 600 jobs created.

Legend:

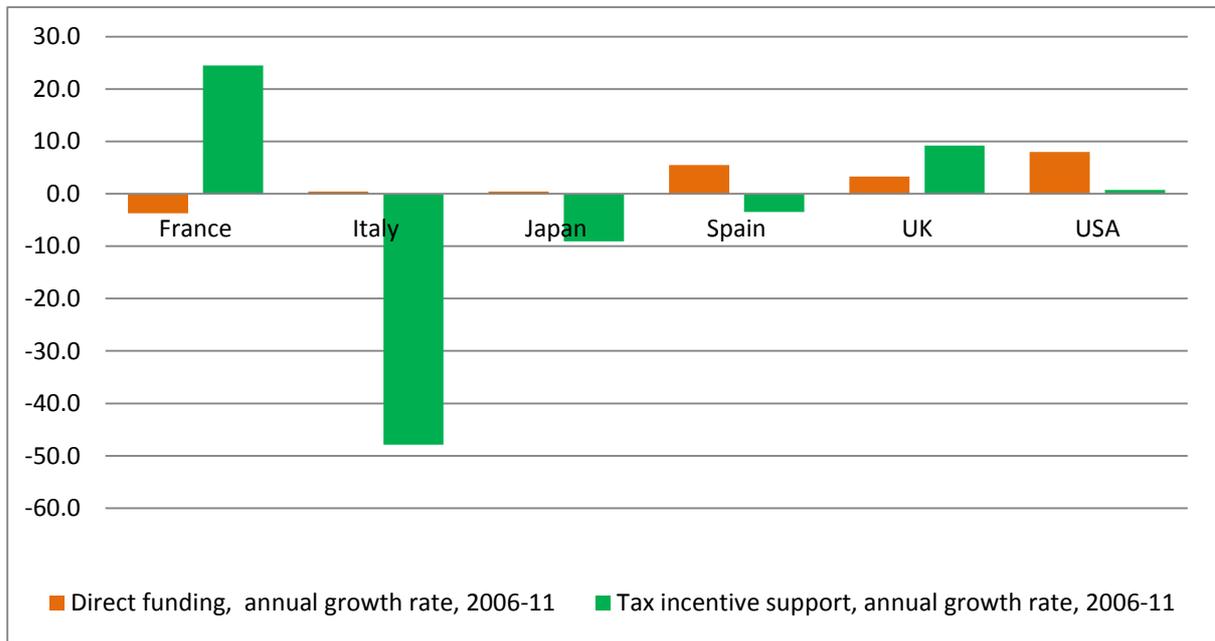
- **Inward RDDT**: Data for companies investing in Italy in design, development and testing, and research and development activities
- **Outward RDDT**: Data for companies from Italy investing in design, development and testing, and research and development activities
- **Inward Manufacturing**: Data for companies investing in Italy in manufacturing
- **Outward Manufacturing**: Data for companies from Italy investing in manufacturing

A5) REGIONAL DISTRIBUTION OF TOP ITALIAN R&D INVESTORS FROM THE THE R&D SCOREBOARD (2012)

Region	Number of firms	R&D 2012 (€ million)	R&D 2012 (as %)
Piemonte	5	4 173.5	45.8%
Lazio	9	2 931.8	32.2%
Lombardia	17	1 436.1	15.8%
Emilia Romagna	5	294.3	3.2%
Friuli Venezia Giulia	2	117.6	1.3%
Veneto	4	102.7	1.1%
Marche	2	30.5	0.3%
Toscana	2	18.7	0.2%
Grand Total	46	9 105.2	100.0%

Source: European Commission, JRC-IPTS - R&D Scoreboard 2013

A6) CHANGE IN GOVERNMENT SUPPORT FOR BUSINESS R&D THROUGH DIRECT FUNDING AND TAX INCENTIVES, 2006-11 (ANNUALISED GROWTH RATES)



Source: OECD 2013

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Abstract

The objective of this Policy Brief is to analyse the status of private R&D investment in Italy based on recent evidence and to indicate possible policy actions to boost private R&D investment. For our analysis, we rely on microdata from an unbalanced 10 years' panel data-set (2004-2013), built using several waves of the European Industrial R&D Investment Scoreboard. Moreover, we also take into consideration other sources of quantitative and qualitative information (e.g. OECD, ISTAT, EUROSTAT, ERAWATCH Country Report – Italy, 2013, State of the Innovation Union, 2014), and recent academic literature on the topic. In this document, we argue that: i) innovation in firms' without their engagement in R&D activities is not sustainable in the medium and long term; ii) the Italian R&D and innovation (and competitiveness) gap is due to 'systemic'/structural reasons and thus targeted high quality policies are needed to address these issues; iii) such policy interventions will have little positive impact without comprehensive reform aimed at improving the innovation environment as a whole. Careful design of an 'innovation strategy' that includes support for R&D is needed. This strategy should be fine-tuned to tackle the actual specificities of the Italian economic context and its R&D-led innovation difficulties.

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