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Exploring Italy's Growth Challenge

A Model-Based Exercise

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Abstract

Since the mid-1990s, Italy's economic growth faltered, primarily due to sluggish productivity growth. This article investigates the root causes of the slow growth. Firstly, it benchmarks Italy over time vis-à-vis euro area and OECD countries in the area of human capital, product market regulation, taxation structure and innovation. The analysis shows that Italy's gaps in these areas have grown over the last 15 years and are particularly large for human capital. Secondly, it uses a set of stylized simulations in QUEST R&D model of the European Commission to assess the potential impact of a package of growth-enhancing reforms in these areas. The simulations show that structural reforms could boost productivity and GDP growth significantly. Important reforms are ongoing. Given the very nature and the size of the gaps, it is important that the reform momentum is maintained.

JEL classification: E17, E60, O11, O41, O47.

Keywords: TFP, productivity, Italy, structural reforms, product market competition, human capital, innovation, taxation, DSGE model.

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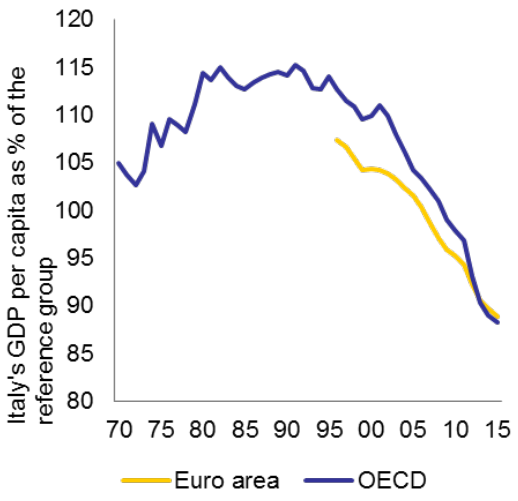
1. INTRODUCTION

Rapid post-war growth led Italy's GDP per capita above the OECD average by 1980s. However, since the mid-1990s, Italy's economic growth faltered. Over 1995-2015, Italy's GDP grew by only 0.5% per year, about 1.5pp less than Spain and 1pp less than Germany and France.

Figure 1 shows the growth turnaround and the rapid deterioration of Italy's economic position in terms of GDP per capita relative to euro area and OECD after the mid-1990s. In 1995, Italy's GDP per capita was 14% higher than the average OECD (7% higher than the average euro-area in 1996, the first year for which the data are calculated). It fell rapidly since then, to below 90% of the OECD and euro-area average in 2015.

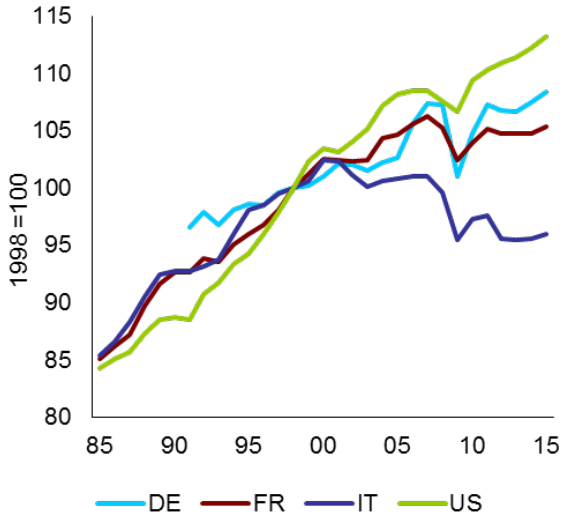
A strong deterioration of productivity growth is at the root of the turnaround. Total factor productivity (TFP) flattened out in the mid-1990s and started to decline soon after. Italy's TFP in 2015 is estimated to be below its 1995 level, while it is higher in other euro area countries and even more in the US (Figure 2).[1] Figure 3 shows the declining contribution of TFP growth to Italy's GDP growth, while labour and capital contribution remained positive, at least until the crisis.

Figure 1: **Italy's income per capita relative to OECD and euro area average**



Source: Authors' elaboration OECD national accounts data. GDP is in 2005 purchasing power standards.

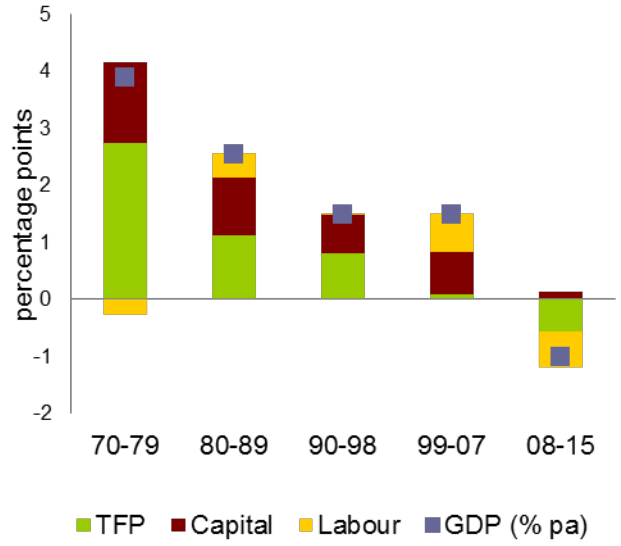
Figure 2: **TFP in Italy compared to other OECD and euro area countries**



Source: European Commission, AMECO database.

[1] Istat has recently revised its productivity statistics and reports an increase in total factor productivity of over 2009-2015 of 0.7% per annum in average (Istat, 2016). Total factor productivity growth over 1995-2015 remains however negative (-0.1% per annum). Labour productivity estimates are broadly aligned and show that Italy's labour productivity growth continues to be substantial lower than in the other major euro area countries. The key difference between Istat and AMECO estimates is in the definition of total economy, as Istat excludes public administration and real estate activities. The latter in particular implies substantial differences in the estimation of the capital stock used in the economy.

Figure 3: **Growth decomposition**



Source: European Commission, AMECO database.

This paper firstly benchmarks Italy over time vis-à-vis euro area and OECD countries in selected policy areas that are relevant to productivity and growth, notably human capital, innovation, product market regulation and business environment, and taxation. The analysis shows that Italy's gaps in these areas have grown over the last 15 years and are particularly large for human capital. Secondly, it uses a set of stylized simulation in QUEST R&D model of the European Commission to simulate the impact of a package of reforms that would close Italy's gap to the average of the three best performers in these areas, as measured by a set of structural indicators.[2] The simulations show that structural reforms could boost growth significantly. The gains are however quite limited in the short term and become substantial only after 10 years. Shifting taxation away from labour onto consumption delivers its benefits in the first five years, which would facilitate the implementation of the other structural reforms. Reform momentum has picked up recently, but the size of the gaps and the time profile of reform benefits leave no room for complacency.

The paper is organised in four sections. The rest of this section discusses the literature attempting to explain the root causes of Italy's slow growth and sets out our methodological approach. Section 2 develops the benchmarking for each structural indicator. Section 3 describes the simulation results. Section 4 discusses the policy implications of the analysis.

1.1 EXPLAINING ITALY'S SLOW GROWTH: SHORT REVIEW OF LITERATURE

Economic analyses of Italy's growth miracle had already shown the structural weaknesses of the Italian economy. Rossi and Toniolo (1996) examine the period 1950-1990 and show that that total factor productivity trends had been already declining since the early post-WWII period to the 1990s. They also show that total factor productivity growth in the 1970s and 1980s were almost completely

[2] The set of simulations are those presented in Varga J., Roeger W., and J. in 't Veld (2014), using the QUEST model and an additional simulation on the impact of reducing the financing wedge on intangible investment in the same model. The QUEST model is the global

due to economies of scale and adjustment costs. Using a measure of total factor productivity corrected for these factors, they show that TFP contribution to GDP growth turned negative already in the 1970s. They calculate that if Italy had the same levels of service sector efficiency and of corruption as the UK, it would have grown in the 1970s and 1980s by around 1pp faster than it actually did.

In the late 1990s, the difficulties in keeping the pace of its main European partners were already becoming evident. European Commission (1999), while attributing part of the early 1990s slowdown primarily to the restrictive fiscal and monetary stance adopted in the run-up to the euro, also highlights important structural weaknesses. The paper acknowledges the impressive range of structural reforms that were undertaken in the period (*inter alia*, in labour market, pension, taxation, corporate governance) but also underlines that the piecemeal approach and the delays and uncertainties in the implementation are likely to have substantially reduced the beneficial impact on the economy.

A large number of contributions have tried to identify the key factors underpinning Italy's persistent slow growth since. Larch (2004) discusses the potential negative impact on TFP growth of the 1990s labour market reforms, which, by introducing more flexible part-time and fixed terms contracts had facilitated the entry into the labour market of less productive workers (see also Sestito, 2002; Daveri and Parisi, 2015). Structural weaknesses in R&D, education and product market regulation and the growth-unfriendly fiscal consolidation in the run-up to the euro have also been highlighted (Larch 2004; Bardone and Reitano, 2009). Faini and Sapir (2005) point out that the low level of human capital and the low R&D and technological content of the Italian industrial structure may reinforce each other locking the Italian economy on a low growth path. Giordano *et al.* (2015) and Giacomelli and Menon (2013) show that public administration and justice inefficiencies hinder productivity growth (see also Gross, 2011). Lanau and Topalova (2016) find that market opening measures had a positive impact on firms' productivity in the sectors concerned and in the downstream sectors but that public sector inefficiencies have limited their impact on the ground. Other papers have highlighted the relevance of the small size of Italian firms (De Nardis, 2014; Barba Navaretti et al, 2011), the governance model based on family management (Bugamelli et al., 2012; Pellegrino and Zingales, 2014) and cronyism.

Some research has attempted to explain the slow productivity growth by resource misallocation (Hassan and Ottaviano, 2013). Gopinath et al. (2015) find evidence of increasing misallocation, which they explain by the decrease in the interest rates following the Euro adoption. Calligaris et al (2016) confirm that resource misallocation has substantially increased since 1995 with limited improvements since 2009 (see also Gamberoni et al, 2016). This increase in misallocation can account for a large fraction of the Italian productivity slowdown. It happened within different firm size classes, industrial sectors and geographical areas rather than between them. These results are consistent with earlier evidence showing that the decline of productivity growth characterised all sectors (see for instance Daveri and Antonecchia, 2015; Pellegrino and Zingales, 2014).

The literature reviewed above implies that structural reforms to improve the functioning of input and output markets and their ability to allocate resources efficiently across the economy are crucial to Italy's productivity and growth challenges. Buti (2014) provides a succinct synthesis: "the continued slowdown in productivity growth over the last two decades has been Italy's main problem, whose

dynamic stochastic general equilibrium (DSGE) model developed in the Directorate-General Economic and Financial Affairs of the European Commission for quantitative policy analysis (see also Ratto et al., 2009)

origins lie in the structural weaknesses that affect a large part of its economy and the lack of structural reforms to overcome them".

Several papers have attempted to estimate the potential benefits from structural reforms using computable general equilibrium models. A first group use stylised simulations that close the gap between the current state-of-play and that of a set of benchmark countries in selected policy areas. Forni, Gerali and Pisani (2009) find that reducing the service sector mark-up to the levels of the rest of the euro area (around 25pp reduction) would increase Italy's GDP by 11 percent in the long-run, with half of this gain accruing over the first three years. Quite similar results are obtained by Lusinyan and Muir (2013), who find that product market reforms closing half of the gap between the current mark-up in Italy and the best practices in the rest of the euro area could raise Italy's GDP by 4% in 5 years and 7.7% over the long run. More muted impact is obtained from labour market reforms that close half the gap to the best practices in the OECD. In this case, GDP would increase by only 1.8% over the long-run. They find positive policy spillovers: implementing product and labour market reforms together would increase GDP in the long term by 10.5%. Annichiarico et al (2013) find that a package of liberalisation and simplification measures, tax shift and labour market reforms that close Italy's gap vis-à-vis the EU by respectively by 1/3, 1/2 or entirely could increase GDP by respectively around 4%, 6% and 10% over 10 years. Varga and in 't Veld (2014) use structural indicators in various policy areas (products market, labour market, R&D, human capital and taxation) to simulate the impact of reforms that close EU member state gap vis-à-vis the average of three best EU performers. They find that Italy's GDP would grow by 23% over the long run (3.9% accruing already over the first 5 years), including positive spillovers from reforms in other member states. A second group of studies attempt to simulate the impact of concrete structural reforms implemented or planned in reality. Italy's national reform programme 2016 (Ministero dell'Economia e delle Finanze, 2016, p. 17) assesses that undergoing structural reforms in competition, taxation, labour market, education, justice and public administration, and access to finance would increase GDP by 8.2% relative to baseline in the long run (2.2% by 2020). European Commission (2016b) simulates the impact of a selection of reforms in labour market, competition, and public administration policy areas included in Italy's national reform programmes of 2013, 2014 and 2015 and finds that GDP would rise by 2.8% by 2035 (1.3% by 2020) relative to the baseline. The difference from the assessment in Italy's national reform programme is explained to a very large extent by the different set of reforms considered.

1.2 OUR APPROACH

We proceed in two steps. In a first step, we benchmark Italy over time vis-à-vis euro area and OECD countries in selected policy areas. Our focus is on total factor productivity growth, as the main explanatory factor at the root of Italy's slow GDP growth. Total factor productivity captures any growth that it is not explained by changes in the quantity of labour and capital used in the economy[3], i.e. any change in either the quality of labour and capital (through human capital accumulation and technological progress) or the efficiency with which they are used in the economy. We therefore consider human capital and innovation policies (affecting directly the quality of the factors) as well as the business environment and product markets regulation (which are crucial to their efficient allocation in the economy).[4] These reforms will also help unleash investment, further boosting labour

[3] *'Any kind of shift in the production function. Thus slowdowns, speedups, improvement in the education of the labour force and all sort of things will appear as technical change'* (Solow, 1957, p. 312).

[4] Because of data restrictions, we are not able to develop parallel simulation of labour market reforms.

productivity growth. In addition, we look as well at taxation, whose impact is expected to be primarily on labour demand and supply rather than on productivity. Taxation reforms are nevertheless important for two reasons. Firstly, Italy remains one of the countries with the lowest participation rates in the EU. Tax reforms that reduce the tax burden on labour could therefore have an important growth effect. Secondly, this type of reform may bring benefits already in the short term, partly offsetting the potential costs that other reforms may entail in the short-term.

In a second step, we use the QUEST R&D model of the European Commission to simulate the impact on total factor productivity and GDP of a package of reforms that would close Italy's gap to the average of the three best performers in the policy areas identified above, as measured by a set of structural indicators. The reforms have direct consequences on external competitiveness, inflation and debt sustainability as well. These impacts are however not discussed here.

The model

The QUEST R&D model is a micro-founded DSGE model with (semi-)endogenous growth features (Jones, 1995; 2005) and incorporates nominal, real and financial frictions. It has been developed specifically to simulate the impact of structural reforms within a framework where total factor productivity is endogenous. Specifically, the model shows the following features relevant to this paper.

Firstly, it models human capital in 3 skills categories. Each category is represented by the share of 25-64 years old with: up to lower secondary education (low skill); with upper secondary or tertiary education in humanities and social sciences (medium skill); and with tertiary degree in science and technology (high skill). Each category is attributed a different level of efficiency reflecting the existing wage differentials in the Italian labour market (calibrated on European Labour Force Survey data). The shares of these categories in the total labour force are not endogenous and thus do not react to changes in relative wages.

Secondly, it includes a separate R&D sector, in addition to the standard final goods production and intermediate goods production sectors. The R&D sector is high skill intensive and produces patents that are then licensed to the intermediate production sector, which in turn introduces innovation. The limited sectoral differentiation does not allow studying the impact and evolution of the low-tech vs. high tech industry sector, which would be important in the Italian case. However, the separate modelling of the R&D sector, notably in interaction with the exporting sector, allows studying how innovation react to changes in the structure of incentives and skill levels and how this is reflected in productivity, employment and output.

Thirdly, it allows for imperfect competition in product markets with price mark-ups, thereby allowing simulating the impact of product market reforms through mark-up changes.

With regard to public finances, public expenditure is kept constant as a share of (potential) GDP. If a shock involves an increase of expenditure that is not self-financed through the consequent increase in output or not counterbalanced by other measures, the gap will be financed by labour taxes.

The model includes Italy, the rest of the euro area and the rest of the world, to take into account international trade patterns and spillovers effects. It has been calibrated specifically for each country and it therefore takes into account the specific characteristics of each national economy.

2. BENCHMARKING ANALYSIS

2.1 HUMAN CAPITAL

Endogenous growth theories have assigned a central role to human capital, either as an accumulative factor along physical capital with effect on income per capita growth (Lucas, 1988) or steady-state level (Mankiw, Romer and Weil, 1992), or by facilitating the production or absorption of new technologies (Romer 1990; Benhabib and Spiegel 1994; Acemoglu, 2007). The complementarity between education and innovation allows for multiple equilibria, laying the conditions for a country to fall in a low-skill, low-technology trap (Acemoglu, 1997; Redding 1996; Baldwin and Wyplosz, 2012).

On the empirical side, there is robust evidence that higher education leads to higher productivity of workers at the individual level.[5] Available evidence shows that one additional year of schooling increases individual earnings by 5 to 15% consistently across a wide set of countries (among others, De la Fuente, 2003) and that higher skills is associated with higher earnings (Hanushek et al, 2015). It has been also shown that higher earnings reflect a positive impact of education on productivity (rather than a signal effect of education) and that causality runs from education to productivity (see Card, 1999 for a review). Social returns could be higher than private returns, which would warrant public intervention in education (see for instance, Krueger and Lindahl, 2001; Acemoglu and Autor, 2012, Moretti, 2004a,b, Ciccone and Peri, 2006; Brattia and Leombruni, 2009).

There is also evidence that increasing educational attainments and years of schooling have a positive impact on growth. Early cross-country testing of endogenous growth models provided very high estimates of such an impact (Barro, 1997). More recent research finds more limited impact, depending on the initial level of education (Krueger and Lindahl, 2001; Bassanini and Scarpetta, 2001) or on the distance from the technology frontier (Vandenbussche, Aghion and Meghir, 2006). Hanushek and Woessmann (2008; 2012) focus on the quality of schooling and estimate that bringing the quality of schools of all European countries to the level of Finland's would increase growth with a net present value amounting to 785% of EU current GDP. [6]

Human capital in Italy

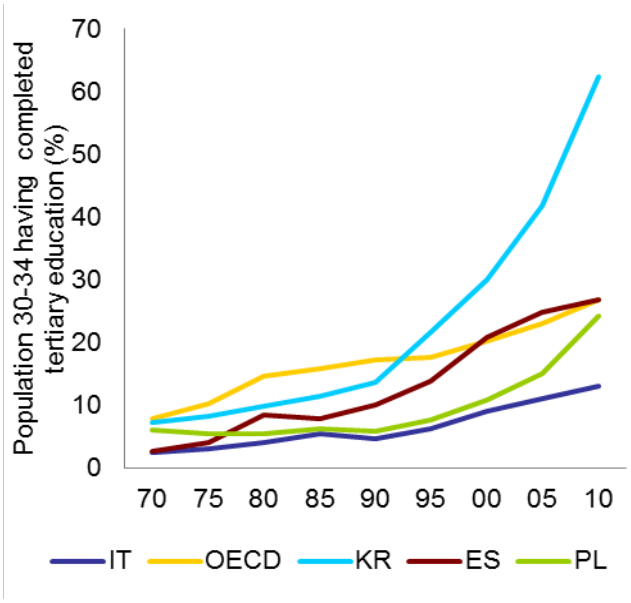
Italy faces severe human capital gaps with respect to EU partner countries (Mody and Riley, 2014). With 42%, Italy has one of the highest shares of population with only basic education (after Malta, Portugal and Spain). At the same time, Italy has also the second lowest share of population with tertiary education (after Romania). This gap also concerns young generations, implying that it will

[5] The empirical analysis discussed herewith can be divided in two strands. At the micro-level, the key tool is the estimation of so-called Mincerian equations (Mincer, 1974). Those equations explain the log of wage (at the individual level) depending on the number of years of education (plus other control variables), with the slope of the relationship giving the rate of return to schooling (under certain conditions – Krueger and Lindahl, 2001). The macro-literature is based on the estimation of cross-section or panel regressions (across countries, states, or cities) with some measure of growth over a certain period as dependent variable and a set of explanatory variables, which include a measures of the change in the stock of human capital (which would give an Mincerian equation) and/or the stock of human capital at the beginning of the period. Measures of growth vary. Most studies use GDP/GVA per capita, other GDP/GVA per worker. More recently Vandenbussche, Aghion and Meghir (2006) use TFP growth. Reference period also vary, from one year (for instance Bassanini and Scarpetta, 2001) to 20 years (recommended in Krueger and Lindahl, 2001). There is considerable variation also in the measures of human capital, mostly proxied by the enrollement rates, educational attainments or number of years in education. Differently from most literature, Hanushek and Woessmann (2008; 2012) develop a measure of quality based on test scores. Almost always, human capital, education and skills are used interchangeably. At both micro and macro level, endogeneity and identification represent important methodological challenges. They have been addressed with different tools in the literature, including instrumental variables and/or natural experiments. A thorough discussion of methodological issues can be found in Krueger and Lindahl (2001) and Moretti (2004a), the latter focusing on the estimation of human capital externalities.

take a long time to change this situation. Italy's gap in tertiary attainment rates in the population aged 30-34 has been constantly growing since 1970s to reach a difference of more than 13pp vs. OECD average in 2010 (Figure 4). The difference is striking with respect to countries such as South Korea, Spain and Poland, which saw a substantial increase in their tertiary attainment rates over time. Furthermore, in Italy the number of tertiary graduates in maths, science and technology per 1000 people aged 20-29 is 13.2 vs. an EU average of 17.1 (2012, Eurostat data), with an increasing gap in recent years. The low educational attainment does not seem to be compensated by on-the-job training, as training offered by private enterprises is also low relatively to other EU countries (Confindustria, 2014).

The OECD PIAAC survey (OECD, 2013a) of skills in the adult population corroborates the above evidence.[7] Italy ranks at the bottom in literacy skills (Figure 5) and it is just above Spain in numeric skills. Figure 5 also shows that the difference between the average skills of 16-25 year-old and the average skills of 45-54 year-old is smaller than in other countries with similar level of skills in the whole adult population. This contrasts sharply with the experience of South Korea, for instance, where older people have lower scores than Italy's, but the young generation are close to the top. Skills of the younger are improving faster relatively to older generations also in eastern European countries such as Poland. The OECD PIAAC survey also provides data on skills by level of education. Italy underperforms the OECD average at all levels (below upper secondary, with upper secondary and with tertiary education). Particularly worrying is the gap for tertiary educated, whose mean (literacy) scores are in line with those of people with secondary school degree in Finland, Japan, Australia and the Netherlands.

Figure 4: **Tertiary Attainment rates in population below 35**



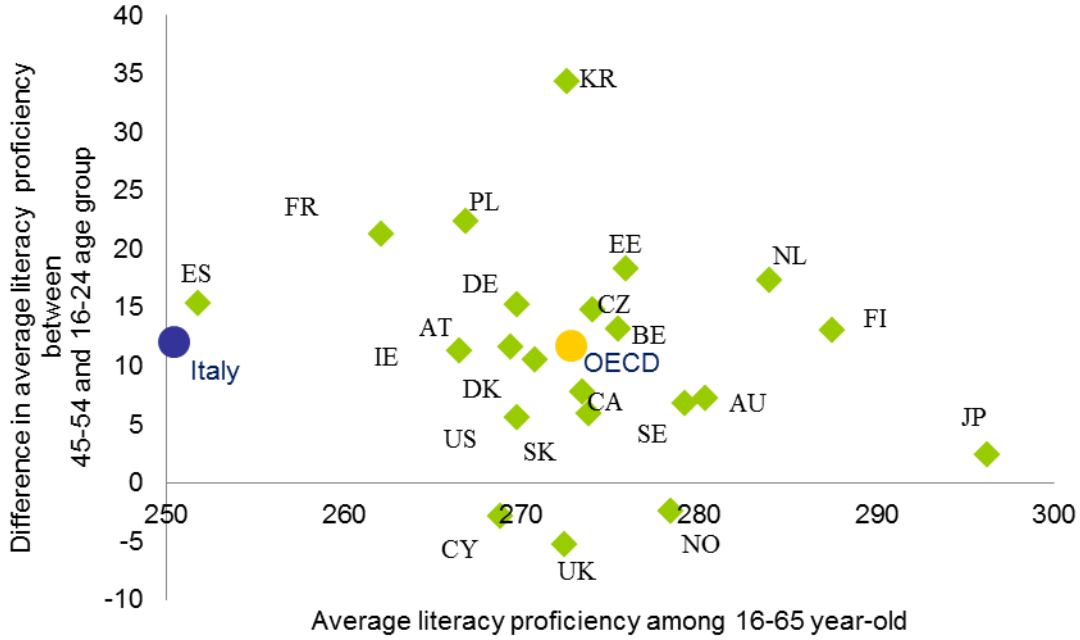
Source: Authors' elaboration on Barro and Lee 2.0 (2014) data. http://www.barrolee.com/

Note: KR refers to South Korea

[6] Present value is calculated for a child born in 2012 (i.e., up to 2090) with a discount rate of 3%.

[7] The Survey of Adult Skills is an international survey conducted in 33 countries as part of the Programme for the International Assessment of Adult Competencies (PIAAC). The survey assesses literacy and numeracy skills as well as the ability to solve problems (but Italy did not participate to this third domain). For each country, 5000 adults aged 16 to 65 were interviewed. The design of the survey should ensure cross-country validity. Reported data are from the Italy country note: http://www.oecd.org/site/piaac/Country%20note%20-%20Italy%20%28ITA%29.pdf.

Figure 5: **Adult literacy skills**



Source: Authors' elaboration on data from OECD PIAAC Survey of Adult Skills 2013 (OECD, 2013a).

Note: For non-EU countries the country codes used are the following: AU for Australia, CA for Canada, JP for Japan, KR for South Korea, NO for Norway, and US for United States

An in-depth analysis of the drivers underlying Italy's persistent gap vis-à-vis other countries in educational attainments and skills is beyond the scope of the paper. However some factors can be highlighted.

In terms of public spending in education, Italy spends on education around 4.1% of GDP (2014, Eurostat). This percentage has been decreasing since the early 1990s, and it is now 0.8pp lower than EU average. Half of the gap is in tertiary education (Italy spends 0.3% of GDP vs. 0.8% on average in the EU), implying that spending on primary and secondary education is broadly in line with the EU average. A key problem of the primary and secondary education system is the limited career prospects for teachers, which, coupled with relatively low salaries compared with other high-skilled professions, may make it difficult to attract the best-qualified graduates into the teaching profession. The results in terms of quality of schooling are mixed. Italy's 15 year-old pupils scored below the OECD average in reading and science and around the OECD average in mathematics.[8] The average performance in mathematics has indeed constantly improved since 2006, while it did not change significantly in science and reading. Italy fared quite well in the 2011 TIMSS & PIRLS studies on 10 years old, by the International Association for the Evaluation of Educational Achievements (IEA), suggesting that the quality of primary education is relatively high (European Commission, 2013). For tertiary education, the key issue relates to the ageing and declining number of teaching staff. Teaching staff decreased by 17% over 2008-2014 and the average age is 52. A further 17 % of 2013 staff (i.e. almost 9300 people) could retire between 2014 and 2018. Support for students is also low. Only 8 % of first-cycle students receive a public grant, one of the lowest proportions in the EU and a quarter of eligible students do not

[8] Italy's performance in mathematics and science has been improving, particularly between 2006 and 2009. Furthermore, national data mask important regional differences, with northern regions in line with (or slightly above) EU average and southern regions lagging behind.

receive a grant due to lack of available funding. Across all education levels, work-based learning is not sufficiently developed. Only 10.4 % of upper secondary students participated in traineeships (alternanza scuola-lavoro) in 2014-2015, although this figure has been on an upward trend in the last few years, and Higher Technical Institutes for vocational training at tertiary level remain a niche provider of education (6000 students in 2014).[9]

A crucial problem seems to be related to private incentives to invest in education, which appear to be lower for Italy than for other developed countries. OECD (2015a) estimates that in Italy the internal rate of return to investment[10] for both a man or a woman attaining tertiary education with respect to someone with upper secondary education is 9.5%. This compares with an internal rate of return of 15.5% and 12.1% respectively for a man or woman on average for the 21 EU countries covered by the study. Internal rates of returns are lower-than-average also for men and women attaining upper secondary education over those with primary and lower secondary education (for men 7.1% in Italy vs. 14.5% on average in the EU and for women 9.0% in Italy vs. 11.0% in the EU). The average OECD estimates are consistent with available micro-econometric evidence from Mincerian equation showing that an additional year of education in Italy increases earnings by about 5% (Fiaschi and Gabbriellini, 2013; Hanushek et al, 2015), which is at the low end of the 5% to 15% reported in the literature (see the discussion above). This figure has been quite stable over the last 20 year, while rising in most countries (Brunello, Comi and Lucifora, 2000).[11] McKinsey (2013) finds that in Italy returns to human capital are lower than in other European countries (except Spain)[12]. De la Fuente (2003) finds that the gross Mincerian return to education in Italy is 7.9%, just below the average of 8.05% for the thirteen EU countries considered. Hanushek et al (2015) calculate return to skills using OECD PIAAC results. They find that for prime age workers (35-54) in Italy an increase in numeracy skills by one standard deviation is associated with some 13% wage increase (vs. 18% on average for the 23 OECD countries covered). Only Nordic countries show lower returns to skills than Italy. For the latter, the paper shows that their lower-than-average returns to skills are explained by their flatter-than-average wage distributions. This is not the case for Italy.

Low returns to skills and education may reflect the bias of the Italian economy towards small firms and low-technology sectors, in turn sustaining lower human capital accumulation and thus slower technological progress than in other countries (Faini and Sapir, 2005; Johansson and Olaberria, 2014).

The situation however seems to be particularly worrying for the educated young, which suggests that additional mechanisms are at work that lower the incentives for the youngest generations to pursue education. For instance, Hanushek et al (2015) find that in Italy an increase in numeracy skills of one-standard deviation leads to an increase in wages for entry-age workers (25-34) of only 9.1%, 12.3pp lower than for exit-age workers (55-64). For the whole set of countries considered this difference is only 4pp. Furthermore, in Italy the skill premium for entry-age workers is aligned with that of prime-age workers (35-54), while for the whole set of countries the latter is aligned with that of exit-age

[9] For an extensive review of Italy's education system, see EC (2016a).

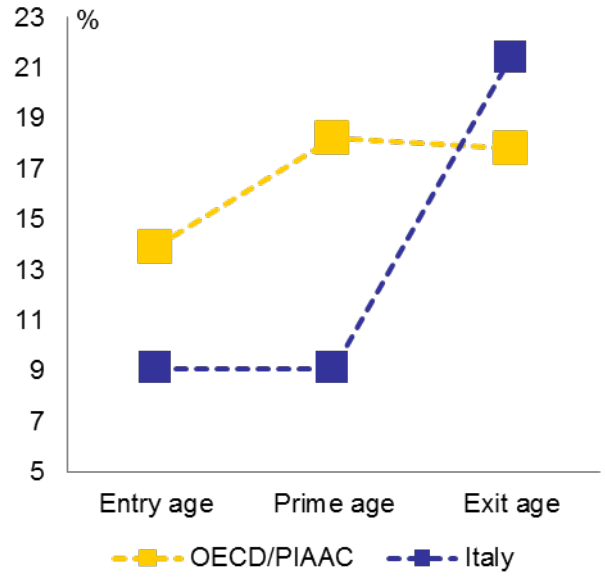
[10] The internal rate of return is the (hypothetical) real interest rate equalising the costs and the benefits related to the educational investment.

[11] It is however unclear how much lower private returns could explain Italy's low attainment rates. For instance, both OECD (2015a), Glocker and Steiner (2011) and de la Fuente find even lower return to education for Sweden (explained by the flat distribution of earnings), one of the countries with the highest tertiary attainment rates in Europe. Glocker and Steiner (2011) explain this puzzling evidence by the fact that the barriers that could prevent to go to university are practically absent in Sweden, where there are no tuition fees and no pre-entry selection.

[12] The returns are calculated by individual component (human capital, physical capital and knowledge capital) with growth accounting. The incremental value in GVA driven by each component is divided by the cumulative investment in the component net of depreciation (McKinsey, 2013, Exhibit 11, footnote 1). With this methodology, returns to human capital in Sweden are very high (see footnote above).

workers (Figure 6). In addition, while in most countries the employment rate of the 25-29 year-olds increases with the educational attainments, this is not the case in Italy (Montanari *et al*, 2015). As a result, already before the crisis, the emigration of highly qualified people was high and not compensated by the arrival of high-qualified foreigners or of returning Italians.[13] The situation has substantially worsened after the crisis (European Commission, 2016a, Box 2.4.2).

Figure 6: **Return to skills by age**



Source: Hanushek et al (2015).

Note: Only changes that are statistically significant are reported.

Rosolia and Torrini (2007; 2016) find that real entry wages declined since the early 1990s, resulting in increasing wage and life-time earnings differentials across age cohorts. This is attributed to the successive reforms of the labour market that generated a dual market where the burden of adjustment was borne only by (young) new entrants. They also find that this effect was stronger for the more educated young than for the less educated. Figure 7 confirms that the wage differential between the old (31-60 years old) and young workers (19-30 years old) remained fairly stable until the mid-1980s and then increased substantially. As a result, the monthly remuneration of older workers was 34% higher than for younger workers in 2013, up by 17pp from 1987. Figures 8-10 show that the increase was much sharper for the workers with tertiary education (36pp) than for those with secondary education (17pp) or with only compulsory education (11pp).

[13] Italy tertiary migration rate was 9% in 2010, higher than in the other large EU countries such as Spain (2%), France (5%) and Germany (8%). Data are from Brücker H., Capuano, S. and Marfouk, A. (2013), Education, gender and international migration: insights from a panel-dataset 1980-2010, mimeo, data downloaded at http://www.iab.de/en/daten/iab-brain-drain-data.aspx on 30/10/2014. The emigration rate for country i and education level l is calculated by dividing the expatriate population from the country i and level of education l by the total native-born population of the same country and level of education (p. 16, box 3). The share of tertiary educated in total immigrant population

Figure 7: **Wage differential between old and young workers in Italy – Full sample**

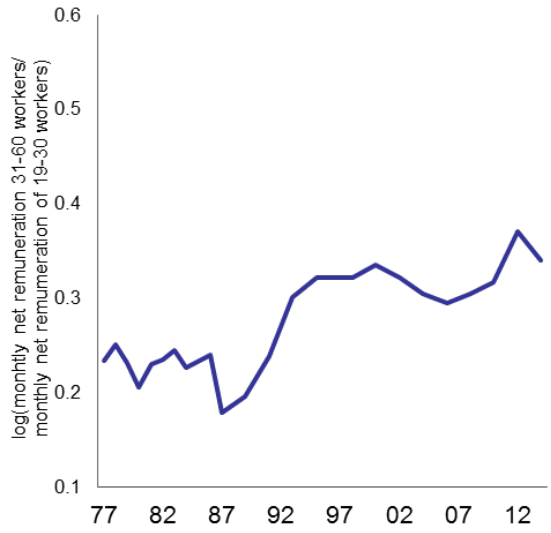


Figure 8: **Wage differential between old and young workers in Italy – Compulsory education**

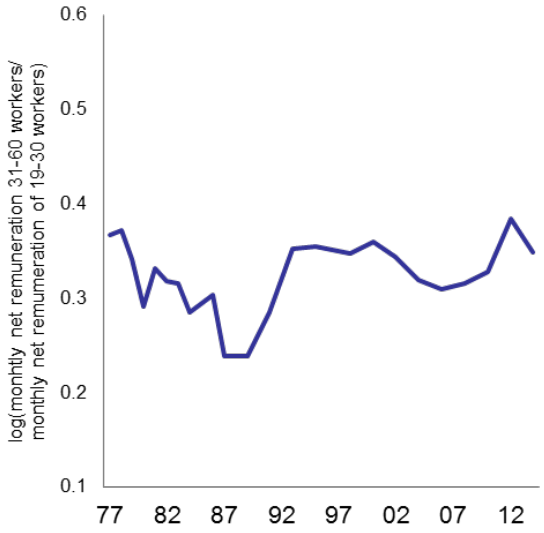


Figure 9: **Wage differential between old and young workers in Italy – Secondary education**

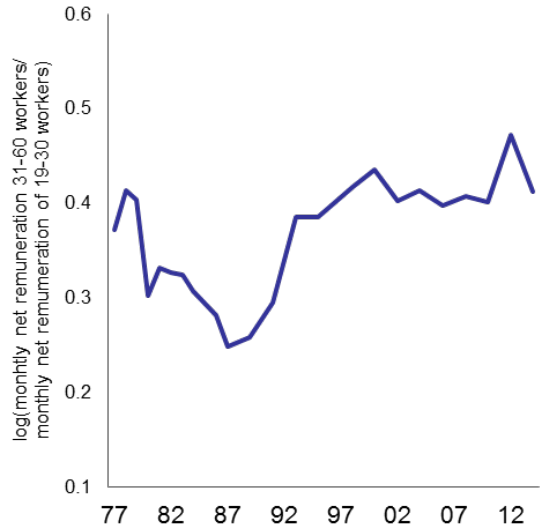


Figure 10: **Wage differential between old and young workers in Italy – Tertiary education**

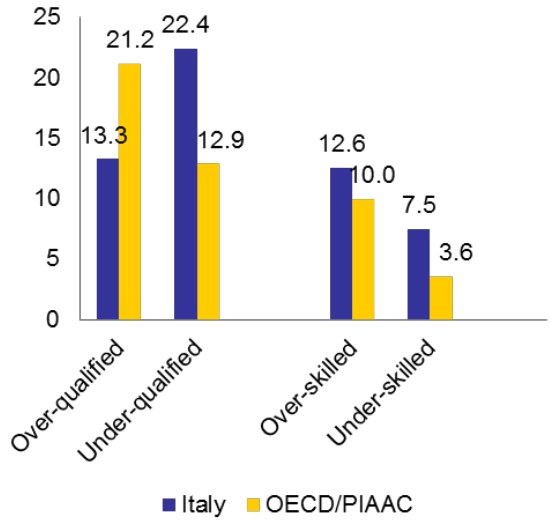
Source: Author's elaboration on Survey of Household Income and Wealth (SHIW) micro-data, Bank of Italy. The Survey was revised in 1987. Net monthly remuneration is calculated as the ratio of YLM: Employee income net of taxes and compulsory contributions over MESILAV: Number of months of the year in which the individual worked.

The difficulties encountered by young graduates are corroborated by existing evidence on vertical mismatches in the Italian labour market, i.e. the degree to which jobholders are either under- or overqualified with respect to the requirements of the job position held. According to OECD (2013a), Italy has a share of workers that are over-qualified for their job (13%, see Figure 11) lower than for the OECD/PIAAC countries in average (21%), but it has the highest share of under-qualified workers (22%). This implies that the number of jobs for graduates is lower than it would be in the absence of

(15 years old and above) was 12.2% in 2005, lower than in any other OECD country apart from Austria (11.3%) and Poland (11.9%). The (weigthed) OECD average was more than double (24%). See OECD (2008), p. 82-83, Table 3.1.

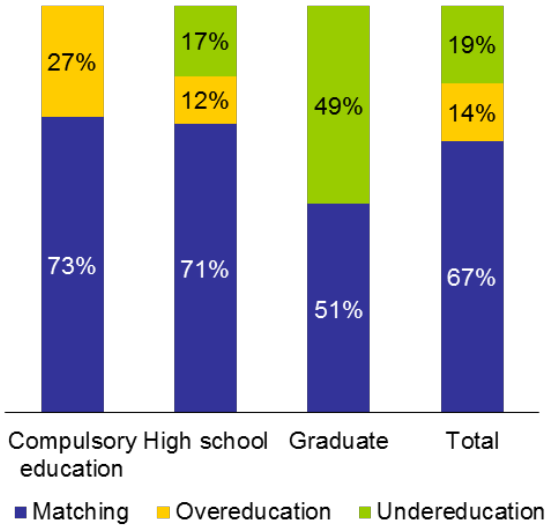
mismatches. Similarly, in terms of numeracy skills, mismatches are higher in Italy than in the OECD/PIAAC countries both in terms of over-skilling (12% vs. 10%) and under-skilling (7.5% vs. 3.6%). Similar results hold for literacy mismatches. To our knowledge, data are not available to analyse vertical mismatches by age. Intuitively, the rigidities on the labour market that protected the wages of older generation may also explain such mismatches, with incumbents maintaining their position despite the fact that their educational attainment and skills are lower than what would be required from a new entrant. Available data for the public administration point to this direction. Figure 12 compares the education that would be required from new entrants in the public administration to the actual educational qualifications of the incumbent jobholders. Particularly interesting is the column for graduates: around half of the positions that would require a degree are occupied by jobholders with lower qualifications. Since the required qualification is a legal requirement for those enrolling to new competitions, the mismatch suggests that these jobs are held by older workers who entered the public administration through earlier competitions (European Commission, 2016a).

Figure 11: **Skills and qualification mismatches in Italy vs. OECD/PIAAC countries**



Source: PIAAC survey in OECD (2013a), National report, p. 54. Figure from EC, 2016a.

Figure 12: **Vertical mismatches in Italy's public administration**



Source: Data are from ARAN calculation on RGS – IGOP data and refer to 2013. Figure from EC, 2016a.

2.2 FINANCING R&D AND INNOVATION

The economic literature puts some emphasis on R&D and innovation as key drivers of technological progress and increases in productivity and income. Two generations of endogenous growth models emphasising the role of R&D can be identified. In the first generation of models (Romer, 1990; Aghion and Howitt, 1998), the level of R&D affects the pace of technological change (and therefore of economic growth). In the second generation (Jones, 1995), the level of R&D only affects the level of GDP at steady-state (growth rates are however boosted in the transition). This second class of models is called semi-endogenous (QUEST R&D is based on this class of models).

The empirical literature confirms that R&D activity (at the national and international level) has a positive effect on total factor productivity (see for instance Coe and Helpmann, 1995) and on technological progress itself (Bottazzi and Peri, 2007). The literature also provides some evidence that social returns to R&D spending exceed private returns, which would justify public efforts to boost

R&D spending (Roeger, Varga and in't Veld, 2008).[14] McKinsey (2013) show that higher R&D investments are correlated with higher TFP growth, which suggests that spillovers from research into broader economy are taking place.[15]

The problem of financing innovation – or more broadly the development of knowledge-based capital,– often through R&D, has been extensively discussed in economic literature (Hall, 2002; Hall, 2009).

The uncertain returns over a relatively long time horizon, winner-takes-all effects, information asymmetries and the absence of collateral imply that equity is more adequate than debt for financing innovation (among many, see Hall, 2002; Hall, 2009). Empirical evidence confirms that innovative firms favour equity capital to debt (Hall, 2002) and this also holds for Italian firms (Magri, 2007; Bank of Italy, 2013).

Over time, several solutions have been developed to tackle the problems related to the external financing of innovation and to mitigate the constraints related to internal financing. Venture capital and funds from business angels – two specific forms of private equity – constitute the main private-sector solutions to the problem of financing innovation, in particular for small and start-up firms. Next to the private-sector solution of venture capital and business angel networks, governments in most advanced economies have taken measures to increase the availability of funds for innovative undertakings (e.g. government equity-finance programmes such as direct public venture-capital funds or co-investment funds) and/or to lower the cost of capital established by the market (e.g. with tax subsidies) (Hall, 2009).

In case specialised risk-capital alternatives are absent or insufficiently developed, entrepreneurs would only tend to embark on R&D projects when they are characterised by a high level of internal funds or high cashflow levels (Magri, 2007; Bugamelli et al., 2012). This would result in suboptimal R&D spending which, in turn, will hold back growth. More broadly, a consistent body of literature shows that the degree of financial development is not only the consequence but also a driver of growth. The literature shows that corporate finance is crucial for the emergence and growth of the new companies, also beyond the technological sector discussed in this section (see Philippon and Véron, 2008 for a policy-oriented summary of literature).

Financing of R&D and innovation in Italy

Italy's gap in R&D and innovation is large and persistent. Looking at the input side, Italy's business R&D spending is 0.74% of GDP (2014, Eurostat), around half of the average in the euro area and among the lowest in the OECD. Since 2000, it increased by 0.25pp, only slightly more than the euro area (0.21pp). Looking at the output side, Italy’s share in the global number of triadic applications is 1.3% (2013, OECD), a share that remains well below that of France and Germany (respectively 4.6% and 10.2%). The slow pace of technology innovation and absorption is also shown in the persistency of the country’s specialisation in low-to-medium technology sectors and failure to grasp the benefits of ICT (Faini and Sapir, 2005; European Commission, 2014; Pellegrino and Zingales, 2014).

Italy’s industrial specialisation and the small size of its firms play certainly a role in explaining Italy’s low R&D activity (Bank of Italy, 2013). At the same time, several indicators show that the Italian

[14] See Sveikauskas (2007) for a review.

[15] See McKinsey (2013), Exhibit 6, p. 13

firms may be more constrained in obtaining funds for innovative R&D projects than companies in other European countries.

The financial structure of Italian firms in general is characterised by a higher incidence of bank debt than in other euro-area and Anglo-Saxon countries (66% in 2012, compared to 50% and 30% respectively). This bias towards (bank) debt can also be observed in Italian companies with innovative activities. While internal funds remain the largest source of R&D financing, in Italy bank debt covers almost 10% of R&D spending vs only 3% in Germany and 1% in the United Kingdom (Bank of Italy, 2013). Italian (innovative) firms' higher dependence on bank debt is especially problematic in the context of the weak growth and constrained credit which makes banks more risk-averse (Magri, 2007). The debt bias reflects *inter alia* the dominant role of banking in financial intermediation, the relatively high share of Italian firms that are wholly family-owned which might imply reluctance to give up control through equity issuance, and the underdevelopment of equity capital markets in Italy, in particular the venture capital market.

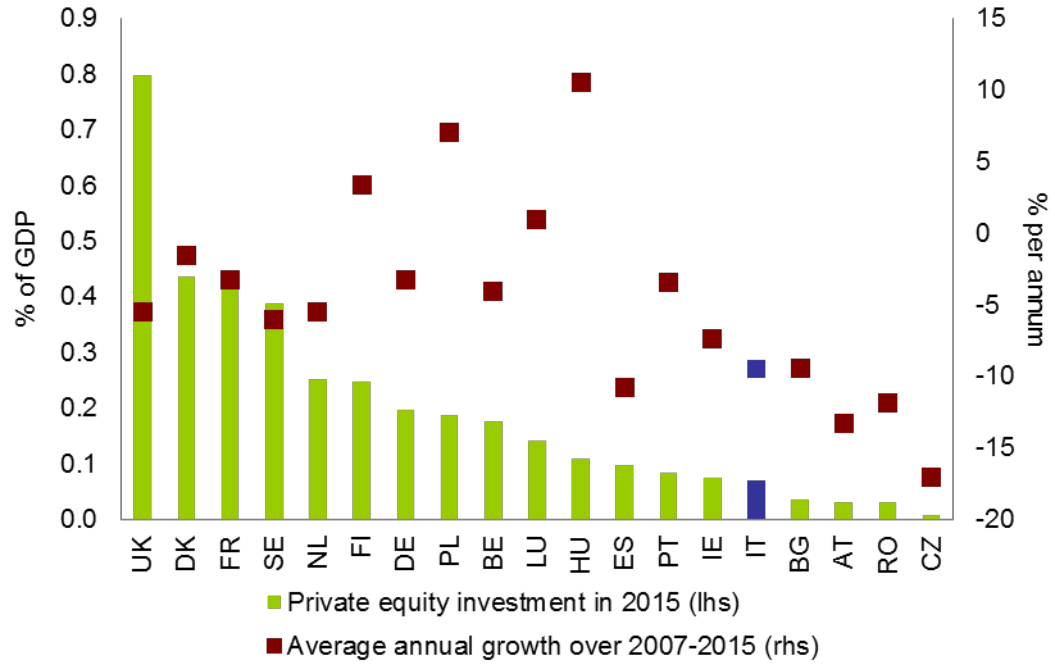
The underdevelopment of Italian (equity) capital markets is apparent from international rankings. According to the World Economic Forum (2012) indicators, Italy ranks among the lowest for stock market capitalisation to GDP, financial access for firms, venture capital availability, ease of access to loans and ease of access to credit. The availability of private equity venture capital is particularly low: it represents only 0.002% of GDP (2015, Eurostat), a fraction of the share in other European countries (Figure 13 and Figure 14). Furthermore, venture capital in Italy is characterised by fragmentation (Magliocco and Ricotti, 2013) and is particularly underdeveloped for the early-stage finance segment in which risk capital could contribute the most to closing existing funding gaps (Bugamelli et al, 2012).[16] The business angel sector in Italy has experienced rapid growth in recent years, but given the size of the Italian economy, the number of business angel networks is still low compared to international standards (Bank of Italy, 2013). Survey-based evidence from Italy indicates that venture capitalists in Italy consider bankruptcy legislation, the tax environment and the limited development of pension funds as potential investors as the main obstacles to the further development of the venture capital market in their country (Bank of Italy, 2009).

Finally, public support to private investment in R&D is also more limited than in other European countries. In 2013, Italy spent only 0.05% of GDP in total for direct government funding to business R&D and tax incentives to R&D. This compares with 0.08% in Germany, 0.10% in Spain and 0.37% in France. [17] Furthermore, while efforts to rationalise incentives for firms have been ongoing since 2012, resources are often spread across a relatively large number of firms, intervention categories and national and regional decision-making centres, which reduces their effectiveness (Bank of Italy, 2013).

[16] On this point, Italy seems to be in line with the rest of Europe where transactions involving large firms and medium-sized firms in their expansion phase (often leveraged buy-outs) tend to absorb a larger share of resources than deals involving innovative start-ups, compared to for example the United States (Bank of Italy, 2009).

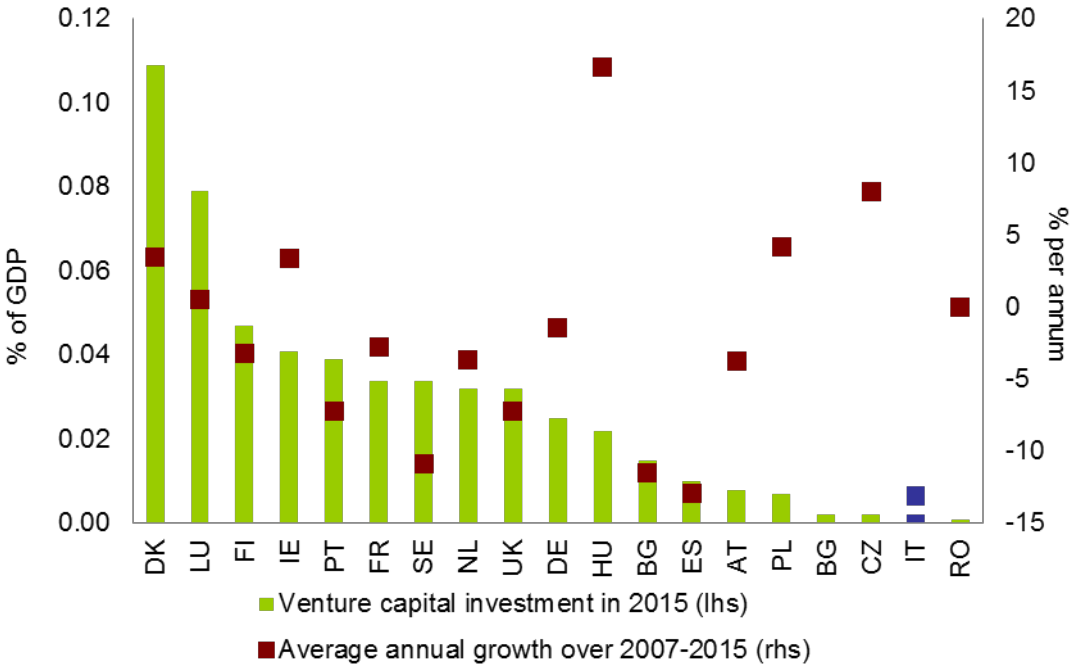
[17] Data are from OECD (2015b).

Figure 13: **Private equity investment, 2015**



Source: European Commission, Eurostat. Data are not available for some EU countries.

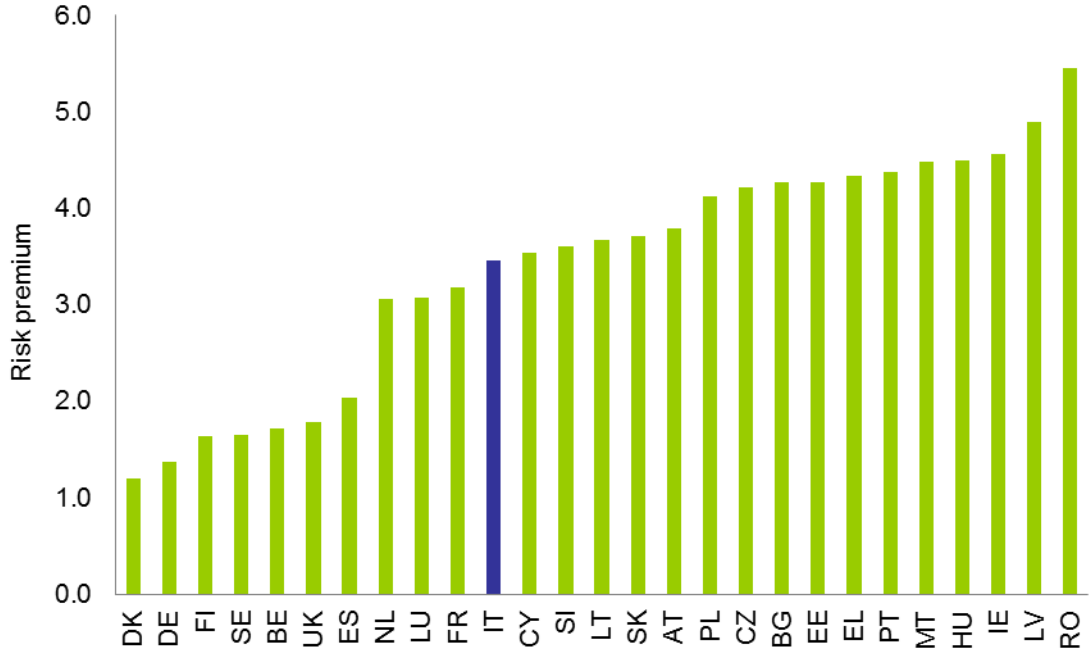
Figure 14: **Venture capital investment, 2015**



Source: European Commission, Eurostat. Data are not available for some EU countries.

Figure 15 below show the financing wedge on intangible capital derived from the country-specific calibration of the QUEST R&D model. The parameter captures various factors such as underdeveloped capital markets, a risk-averse banking sector, quantity constraints on available capital etc., which are not directly modelled into QUEST. It suggests that the relative underdevelopment of Italy's capital market raise the costs of innovation, comparatively to other major countries, particularly in the euro area.

Figure 15: **Calibrated EU-27 quarterly financing wedge on intangible capital**



Source: Customised QUEST R&D model for Italy.[18]

2.3 COMPETITION AND BUSINESS ENVIRONMENT

Economic theory indicates different pathways through which strengthening competition may deliver efficiency gains (see Nicoletti and Scarpetta, 2003, for a more complete discussion). By pushing prices down and reducing mark-ups, competition forces firms to improve their efficiency in order to remain profitable. At the same time, less efficient firms have to leave the market, delivering further efficiency gains. An additional source of dynamic efficiency could come through the effect of competition on innovation. The direction of the impact is however ambiguous. On the one hand, competition increases the incentives for dominant firms to innovate so as to protect or enhance their market position. On the other hand, it reduces the rewards to entering a market or innovating thus discouraging entry and innovation. Overall, the relationship between competition and innovation is likely to be non-linear (Aghion et al, 2005).

Empirical research broadly confirms the above. Nicoletti and Scarpetta (2003) find that pro-competitive regulation is associated with higher total factor productivity in both manufacturing and services. Alesina *et al* (2005) analyse the effects of regulation on investments in three service

[18] The financing wedge on intangible capital is not based on existing data sources, but derived from the country-specific calibration of the QUEST model. It captures various factors such as underdeveloped capital markets, a risk-averse banking sector, quantity constraints on available capital etc., which are not directly modelled.

sectors across OECD countries showing that market opening reforms (in particular the reduction of entry barriers) reduce mark-ups and adjustment costs and foster capital accumulation. Griffith, Harrison and Simpson (2010) find that the market opening reforms that were associated with the Single Market Programme led to a reduction of mark-ups and to an increase of productivity. Sizeable economic gains from pro-competition product market reforms also results from a number of computable general equilibrium model simulations (including Bouis and Duval, 2011; Barnes et al, 2013).

Besides strictly defined market opening measures, broader reforms to ameliorate the business environment are essential for a smooth and efficient functioning of markets. Djankov *et al* (2006) use business regulation as a measure of institutional quality and find that a business-friendly environment is important to growth. Overall, high bureaucratic and administrative costs hinder economic growth as they have a significant negative effect on output per worker and total factor productivity (Barseghyan, 2008). Efficient legal and judicial system also matter. Countries characterised by efficient legal systems have larger firms, particularly in knowledge based sectors. This is because advanced legal systems guarantee a better protection of intangible assets. Finally, there is also evidence that poor contract enforcement results in more difficult access to credit. Better protection of creditor rights affects positively the size, the maturity and the spread on loans (Bae and Goyal, 2009).

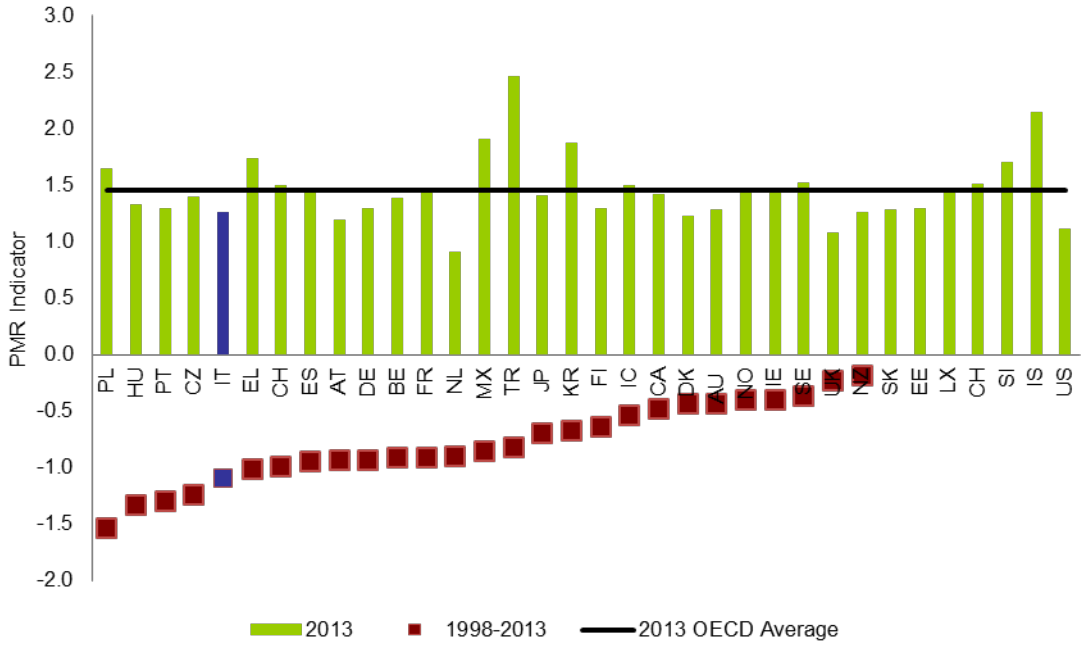
Business environment and product market reforms in Italy

Since the end of the 1990s, the OECD has been constructing a system of indicators to compare the competitive stance of product market regulation across countries (OECD, 2007, 2009, 2014).[19] It has been shown that an improvement in the Product Market Regulation indicator lead to lower mark-ups (OECD, 2007).

Italy has progressed well in terms of the Product Market Regulation indicator. In 2013 the PMR index for Italy was lower than average OECD and has decreased relatively more than in other countries since 1998 (Figure 16). Major reforms (Brandolini and Bugamelli, 2009) included the liberalisation of the energy sector (started in 1999 with the unbundling of the distribution network in the electricity sector and extended to the gas market later), some liberalisation of regulated professions (started in 1998 with important steps taken in 2006/2007 and in 2011), the (still partial) reorganisation of local public services and transports, for which a series of measures were taken in 2011 and 2013 (Bianco et al, 2012).

[19] The overall indicator (so-called Product Market Regulation index) is constructed by aggregating 18 lower level indicators, covering three domains: a) State control (measuring the extent to which government influences businesses' decisions through either direct public ownership or price control and other form of coercive regulation; b) Barriers to entrepreneurship (measuring obstacles to entry due to regulatory and administrative opacity or administrative burden on start-ups or sector-specific barriers restricting entry into the market); and c) Barriers to trade and investment (measuring barriers to foreign ownership of firms as well as tariff and non-tariff barriers to trade).

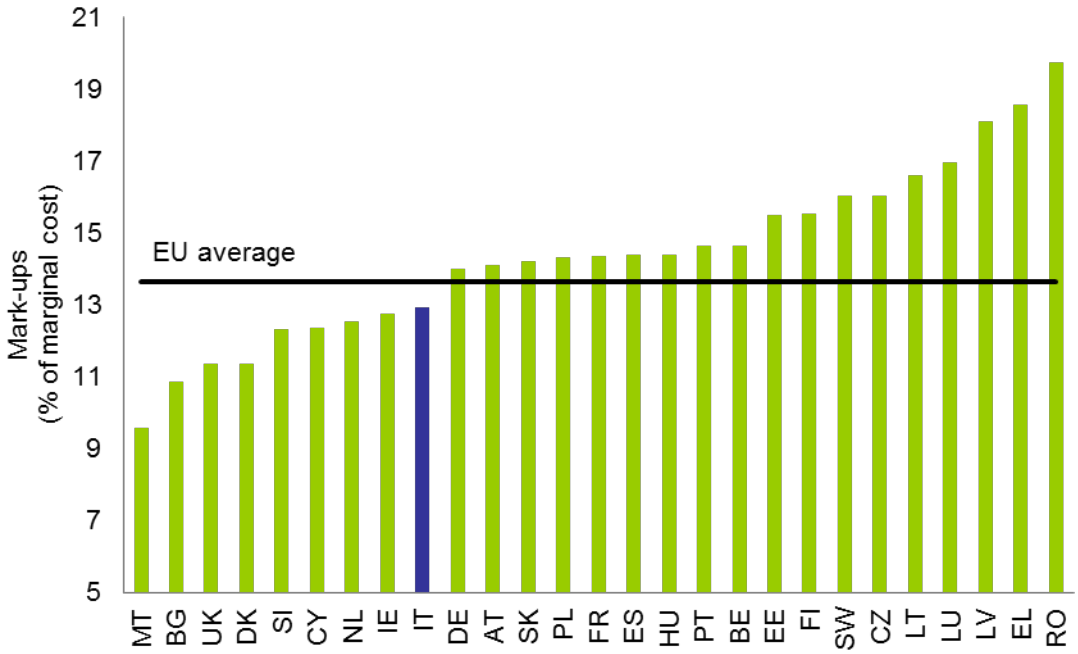
Figure 16: **Product market reform, 1998-2013**



Source: OECD, Indicators of Product Market Regulation, 2014.

Note: For non-EU countries the country codes used are the following: AU for Australia, CA for Canada, CH for Switzerland, CL for Chile, IL for Israel, IS for Iceland, JP for Japan, KR for South Korea, MX for Mexico, NO for Norway, NZ for New Zealand, TR for Turkey and US for United States. A lower value indicates that regulation is less restrictive of competition. A negative value of the change indicates that market opening reforms have been undertaken. Countries are ordered by the extent of reform in the period. The 1998 value of the indicator is not available for SK, EE, CH, SI, IS. For the US data refer to 2008 (2013 data are not available)

Figure 17: **Final goods mark ups in the EU**



Source: Thum-Thysen and Canton, (2015). There are no data for HR.

The reforms appear to bear some fruits. The average mark-up in the final good sector (which could be interpreted as the service sector) calculated over 1999-2007 is estimated at around 13% over the marginal costs, one of the lowest in Europe and below the EU average (Figure 17). Earlier estimates had shown higher mark-ups in Italy than in other European countries. For instance, Christopoulou and Vermeulen (2008) estimated that over 1981-2004 mark-ups in Italy in the market services were at 87% over marginal costs vs. the euro area average of 56% (see also Forni et al, 2009, and OECD, 2007). Since all estimations employ the same methodology (Roeger, 1995) and the definitions of the sectors are only slightly different, the decrease of the estimated mark-ups could be attributed to the different timeframe used. Using firm-level data, Lanau and Patalova (2016) find a statistically significant correlation between successive reforms that have lowered Italy sectoral PMR indicators and various indicators of performance of firms in the sector. In particular, they find that a one standard deviation reduction of the sector PMR is associated with an increase of around 3 percentage points value added growth, 10% in value added and output levels and 4% in the level of value added and output per worker of the firms in the sector. They also find a positive impact on the size and productivity of the firms in the downstream sectors that use the input of the liberalised sectors. This impact is stronger on the smaller firms. There is however still scope for further reform. Italy is among the best performers in the domain 'Barriers to entrepreneurship' but it is still lagging in the domains 'State control', particularly with regard to the 'Scope of state-owned enterprises'.[20] The OECD sectoral indicators and/or the national competition authority identify gaps also in the retail sector, transport and regulated professions and health (European Commission, 2016a).

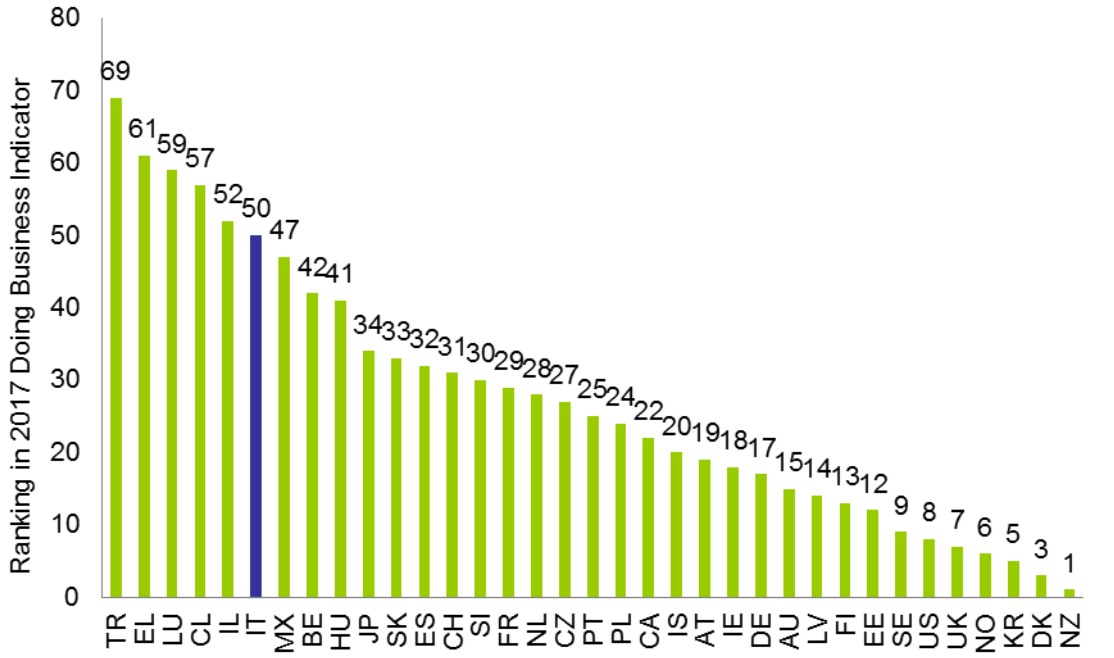
Italy has progressed less with respect to the broader issue of improving the business environment. Figure 18 below shows OECD countries ranked according to the World Bank Doing Business

[20] For a more extensive comparison of PMR indicators across-countries and over time, see OECD, 2014. Data downloadable at: http://www.oecd.org/economy/growth/indicatorsofproductmarketregulationhomepage.htm

indicator (World Bank, 2016).[21] Italy has one of the least business-friendly environment in the OECD. Out of the 189 countries covered by the index, Italy ranks 45th and performs particularly poorly on paying taxes; enforcing contracts; getting credit and dealing with construction permits; and getting electricity. Notably, the costs for starting up a business remain higher than in nearly all other OECD countries and progress over the last ten years has been less rapid than in Spain and Portugal (Figure 19).

While these indicators may be partial, they can be read as a proxy for the broader weaknesses in public administration and civil justice, which has been shown to limit the impact of reform on the ground (Lanau and Petalova, 2016) and, more broadly, concur to slow down the reallocation of production factors towards most productive sectors and firms, thus hampering productivity growth.

Figure 18: **Ranking of OECD countries based on the Doing Business Indicator**

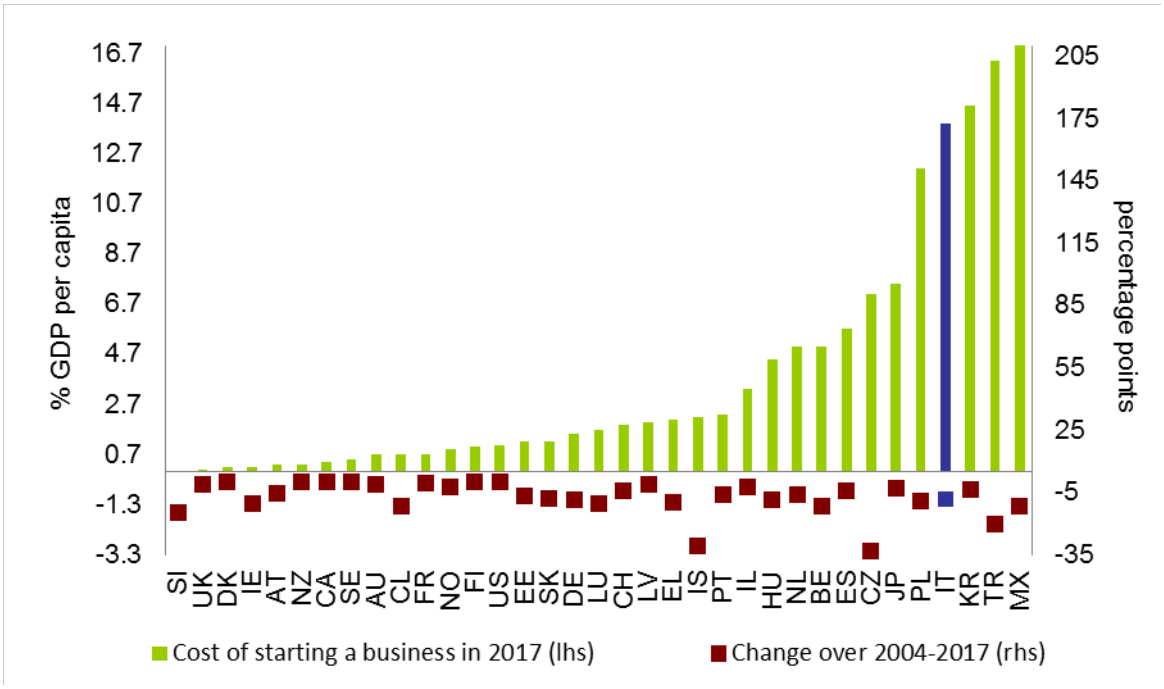


Source: World Bank Doing Business Indicator, 2016.

Note: For non-EU countries the country codes used are the following: AU for Australia, CA for Canada, CH for Switzerland, CL for Chile, IL for Israel, IS for Iceland, JP for Japan, KR for South Korea, MX for Mexico, NO for Norway, NZ for New Zealand, TR for Turkey and US for United States

[21] Data are from "Doing Business 2016: Measuring Regulatory Quality and Efficiency". Data are updated at June 1, 2015. The indicator aggregates 10 sub-indices referring to the following domains: (1) Starting a business – (2) Dealing with construction permits; (3) Getting electricity; (4) Registering property; (5) Getting credit; (6) Protecting investors; (7) Paying taxes; (8) Trading across borders; (9) Enforcing contracts; (10) Resolving insolvency. World Bank data downloadable at: http://www.doingbusiness.org/.

Figure 19: **Costs of starting a business in OECD countries**



Source: World Bank Doing Business Indicator, 2016.

2.4 TAXATION STRUCTURE

Taxes enter the allocation decisions of individuals and firms (see Feldstein, 2002 for a review) thereby affecting the static and dynamic efficiency of the economy. A body of literature has looked at the impact of the *level* of taxation (as measured, for instance, by the ratio of the overall fiscal revenues to GDP) on economic performance (Barro, 1990). Here, the focus is rather on the impact of the *composition* of taxes (ie, how the overall fiscal revenues is composed in terms of the different individual taxes, their tax bases and tax rates) considering the choice about the size of government a broader societal matter and therefore outside the scope of the paper. Arnold *et al* (2011) provide a broader policy-oriented overview of the key insights from literature by categorising taxes in the following *"tax and growth hierarchy"*.

Taxes on capital and labour income are deemed to be the most harmful to growth. Corporate income taxes enter directly the investment decisions of firms and therefore the capital/labour ratio and the pace of firm-level productivity-enhancing innovation. No-loss-offset provisions would imply that profit and losses are taxed at different marginal rates therefore discouraging risk-taking. Hajkova et al (2006) shows that high corporate taxes may have also consequences on foreign direct investment. Personal income taxes (including also social security contributions) enter work/leisure decisions and therefore affect labour supply. They also enter the education decisions, as progressivity implies that future (higher) revenues are taxed at higher rates than foregone (lower) revenues. Sometimes, return to savings (interest or dividend) are included in the tax basis, thus discouraging savings. At the low end of wage scale, high income taxes and high social benefit may encourage people to stay out of the labour force. If higher than corporate taxes, taxes on labour income may however encourage entrepreneurship and risk-taking with positive effect on aggregate growth (Lee and Gordon, 2005).

Compared to corporate and personal income taxes, property and consumption taxes are deemed to be less distortionary. Consumption taxes erode real incomes by increasing the prices of consumption goods but they have less impact on labour supply than income taxes. Also, they do not affect saving/investment decisions, provided that they are kept constant over time (Auerbach, 2006), neither production decisions, to the extent that the same tax rate is applied to all products (this is however not the case, as many exemptions and reduced rates are applied in most member states). Recurrent taxes on immovable property taxes are expected to be the least distortionary. Increasing recurrent taxes on immovable properties would shift investment from housing to productive investment, with a positive effect on growth. Compared to recurrent taxes, taxes on property transaction are more distortionary, as they discourage housing transactions and labour mobility and therefore efficiency-enhancing re-allocation of housing and labour.

Empirical evidence broadly supports the above *"tax and growth hierarchy"*. Kneller, Bleaney and Gemmell (1999) find that higher level of distortionary taxes reduces growth in a cross-section of 22 OECD countries over 1970-1995 but the result is not robust when instrumental variables are used to tackle endogeneity.[22] Arnold *et al* (2011) estimate the effect of revenue-neutral tax shift on long-run GDP per capita *level* across OECD countries over 1971-2004. They find that a 1% shift from income taxes into property and consumption taxes would increase GDP per capita level by 0.25 to 1pp in the long-run. Acosta-Ormachea and Yoo (2012) find that tax shifts towards property and consumption taxes increase growth (with a larger effect for property taxes than consumption taxes).[23] Xing (2011, 2012) argues however that the evidence supporting "tax and growth ranking" provided by both Arnold *et al* (2011) and Acosta-Ormachea and Yoo (2012) is not robust to a relaxation of the underlying assumption of cross-country homogeneity in long-run coefficients.[24] If the assumption is relaxed, he finds that a shift towards property taxes has growth-enhancing effect only for Finland, Ireland, and the UK. Other studies have looked at the growth and level impact of tax rates (rather than tax shifts as above) offering also some support to the *"tax and growth hierarchy"* (Easterly and Rebelo, 1993; Lee and Gordon, 2005).

The composition of taxation in Italy

On the basis of the tax and growth hierarchy discussed above, the structure of taxation in Italy does not appear to be growth-friendly. Taxes on production factors, which are considered to be the most detrimental to growth, are very high. Italy has the highest implicit tax rate on labour[25] (Figure 20). The rate has increased in Italy over 1995-2014, while it has decreased in the majority of the other member states. The implicit tax rate on capital income[26] is also very high, the second highest across the EU countries for which data are available (Figure 21), and it has also increased since 1995.

[22] In their definition, "distortionary taxes" include taxes on income and profits, payroll and property taxes. "Non distortionary" are considered the taxes on domestic goods and services. Both are expressed as revenue share to GDP.

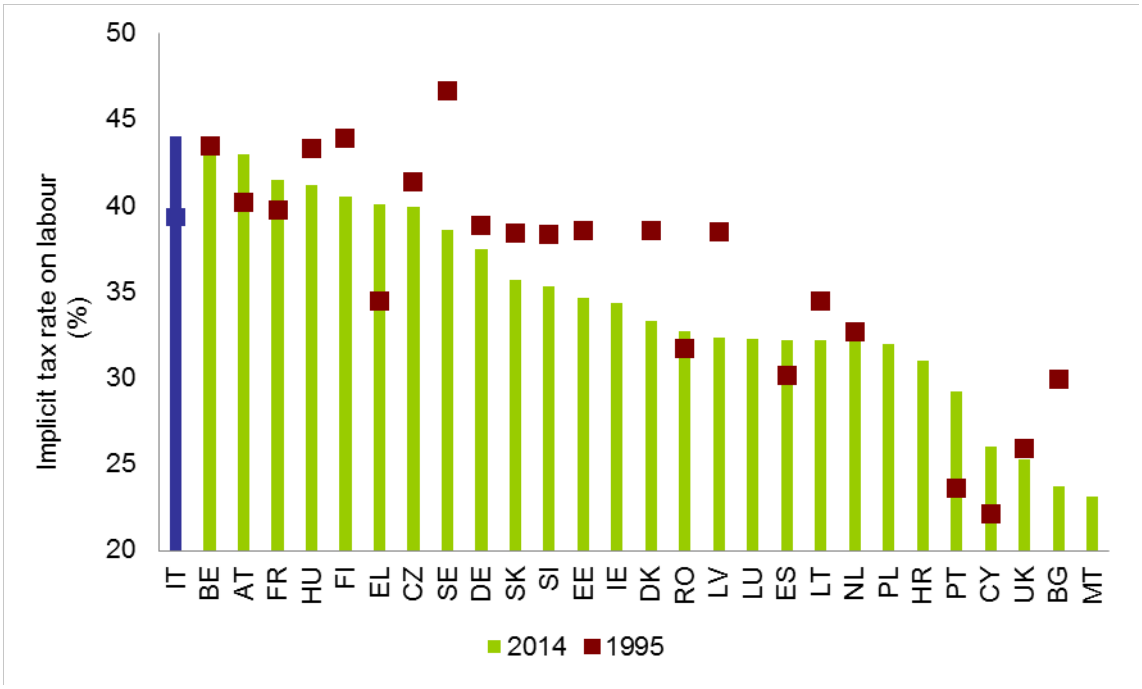
[23] While endogeneity of tax shift to income levels and (to a lesser extent) growth rates may be an issue, Acosta-Ormachea and Yoo (2012) use several techniques confirming the direction of causality from tax shift to growth.

[24] Arnold *at al.* (2011) and Acosta-Ormaechea and Yoo (2012) do not reject the assumption of cross-country homogeneity in long-run coefficients on the basis of the Hausman test. Xing (2011, 2012) contest the choice of the Hausman test given its low power and find that Wald test would reject the assumption.

[25] The implicit tax rate on labour is calculated as the sum of all direct and indirect taxes and social contributions levied on employed labour income as a percentage of total compensation of employees from national accounts.

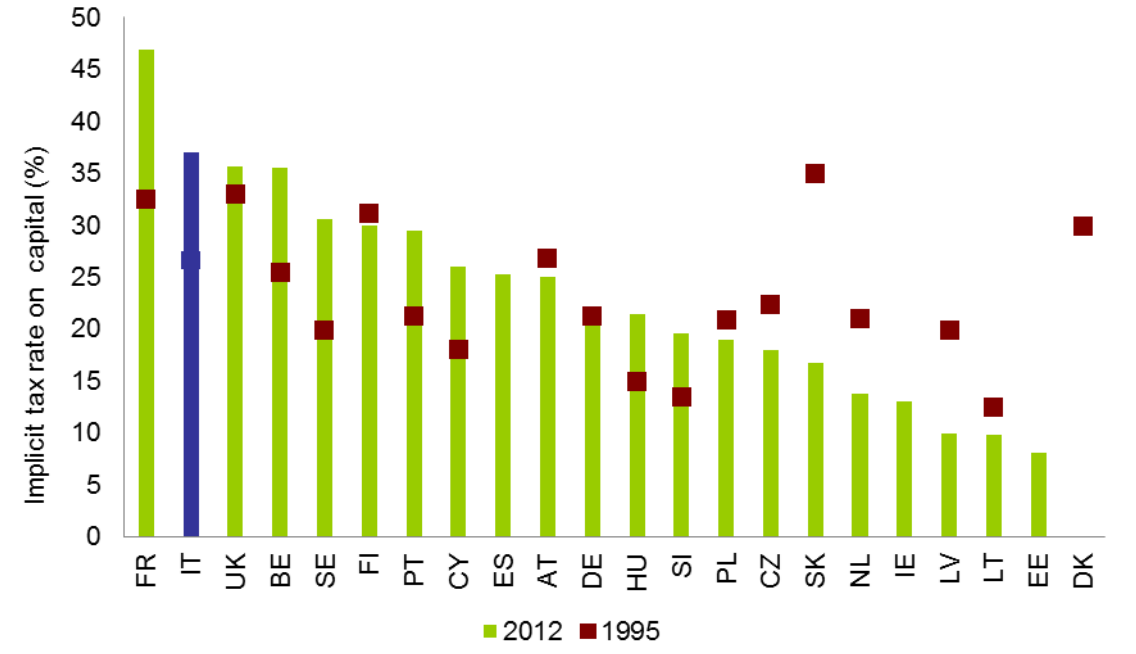
[26] The implicit tax rate on capital income is calculated as the ratio of revenues from all capital taxes to aggregate capital and saving income in the economy in the country. Capital taxes include a variety of taxes paid by both enterprises and household, including social contribution levied on self-employed, which in Italy represent a large share of total employment.

Figure 20: **Implicit tax rate on labour**



Source: European Commission. Data for 2014 are provisional.

Figure 21: **Implicit tax rate on capital**



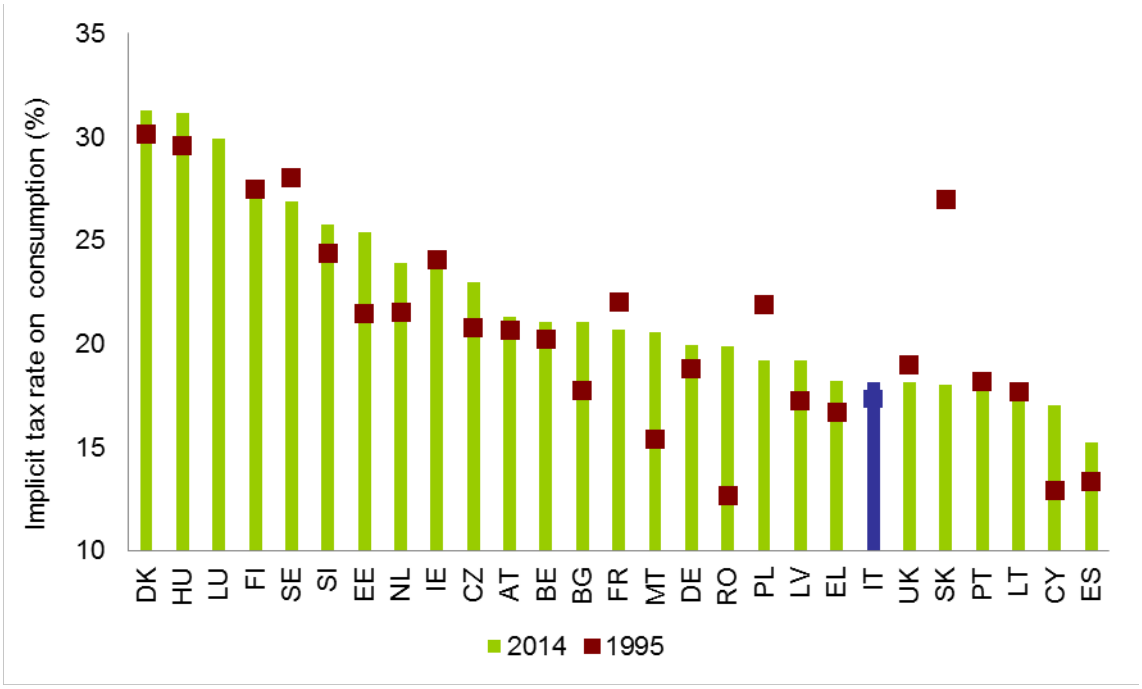
Source: European Commission, Eurostat. Data are not available for all EU countries.

Conversely, taxes on consumption, considered less detrimental to growth, are rather low relative to other European countries. The implicit tax rate on consumption (Figure 22) is the seventh lowest in the EU and it has not increased much since 1995.[27] Concerning property taxation (Figure 23), the revenues from recurrent property taxation were equivalent to 1.6% GDP in 2014 broadly in line with

[27] The implicit tax rate on consumption is calculated as the ratio of revenues from all taxes on consumption to the value of private consumption in the country. The main tax item in this category is the VAT.

the EU average. The tax on primary residences, agricultural real estate, and immovable machinery for productive use was however abolished as of 2016, with a budgetary impact estimated at some 0.3% of GDP. This would bring the revenues from recurrent taxes on property to 1.3% of GDP below the EU average. Other taxes on property (mostly on property transactions) are lower than the EU average.[28]

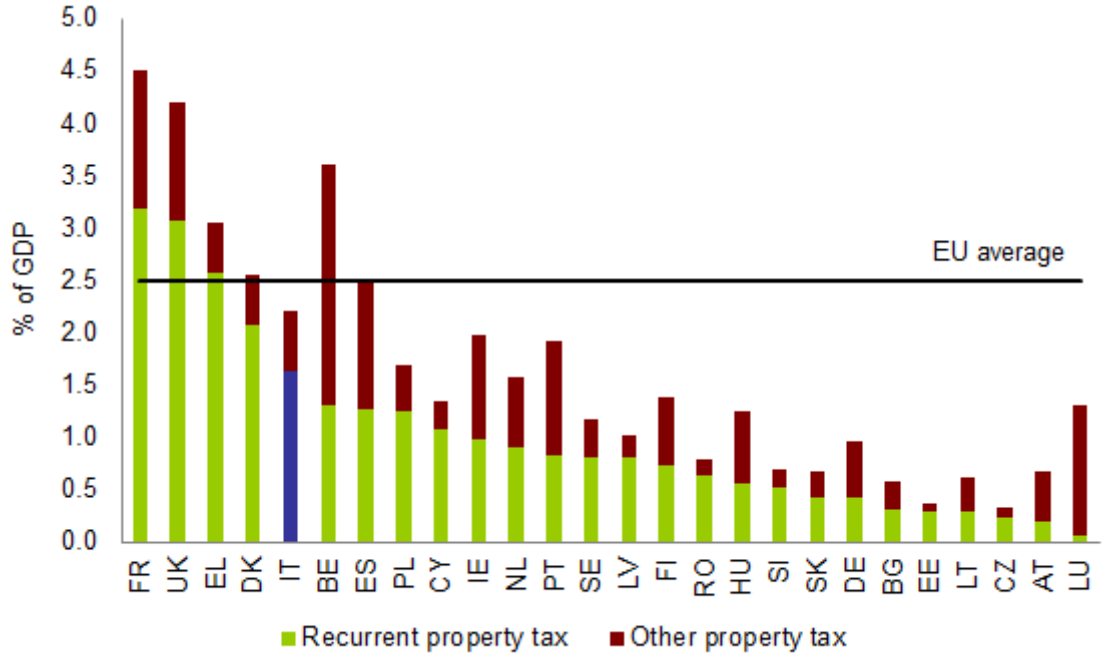
Figure 22: **Implicit tax rate on consumption**



Source: European Commission. Data for 2014 are provisional.

Figure 23: **Taxes on property (% of GDP)**

[28] Implicit tax rates are not available for property taxes. For this reason, the cross-country comparison is made on the basis of the tax revenues to GDP ratio. This indicator is likely to be heavily influenced by the rate of home ownership in the country. Since in Italy home ownership prevails over renting, a higher-than-average tax revenue to GDP ratio does not necessarily implies a higher-than-average implicit tax rate on property.



Source: European Commission. Data are for 2014 (provisional).

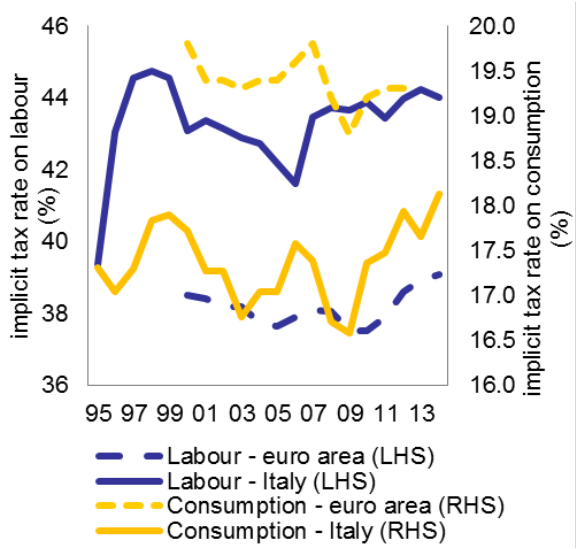
Note: Countries are ordered by revenues from recurrent property taxes as a % of GDP. 'Other taxes on property' includes taxes on net wealth, inheritance, gifts and other property items as well as financial and capital transactions. Data does not include PIT on imputed rents. No data is available for Croatia.

The EU average is weighted based on GDP

The distortionary composition of taxation is partly the heritage of previous fiscal consolidation efforts that relied heavily on labour taxation while avoiding addressing the loophole in consumption taxes. Figure 24 illustrates for instance the drastic increases of labour taxation in the run up to the euro. On the contrary, the implicit tax rate on consumption remained fairly stable until 2009 to then increase only in recent years and still remaining well below the euro area average. Figure 25 shows that the relatively low implicit tax rate on consumption is driven primarily by the extended use of VAT reduced rates and by the low VAT tax compliance. While the VAT standard rate is broadly in line with the EU average, Italy, alike Greece, shows both a higher-than-average VAT policy gap (lost revenues due to VAT exemptions and reduced rates) and a higher-than-average compliance gap (lost revenues due to non-compliance).[29] The other member states have either a higher-than-average policy gap or a higher-than-average compliance gap.

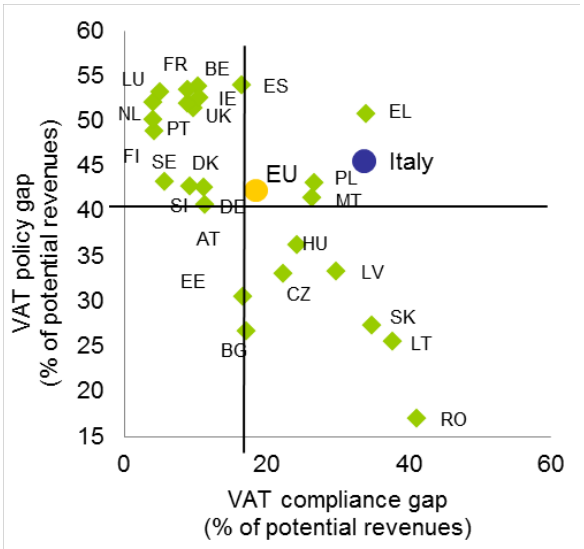
[29] Standard rates at 1 Jan 2016 are available at:
http://ec.europa.eu/taxation_customs/resources/documents/taxation/vat/how_vat_works/rates/vat_rates_en.pdf

Figure 24: **Evolution of implicit tax rates on labour and consumption over time**



Source: Eurostat. Data for 2013 and 2014 are provisional

Figure 25: **VAT - policy and compliance gap**



Source: CASE (2015), Study to quantify and analyse the VAT Gap in the EU-27 Member States, commissioned by the European Commission. Data refer to 2013.

Note: The policy gap is the difference between the actual VAT revenue and the revenue that would be raised if VAT were levied at the standard rate on all consumption with perfect enforcement. It measures the percentage of potential revenue foregone due to deliberate policy decisions (e.g., reduced rates). The compliance gap is the difference between the actual VAT revenues and the theoretical VAT tax liability according to the law. It measures the percentage of the revenue foregone due to non-compliance.

3. THE MODEL SIMULATIONS

The QUEST R&D model of the European Commission can be used to evaluate the potential impact of structural reforms in the areas discussed above. Varga et al. (2014) quantifies the effect of moving the relevant structural indicators to that of the average of the best three euro area performers, notably for the share of low (high) skilled, final good mark-ups and entry costs, R&D tax-credits, and shifting taxation from labour income to consumption. In order to capture the growth potential of unlocking the financial constraints on R&D and innovation in Italy, we complement their analysis with an additional scenario reducing the financial wedge on intangibles following the same benchmarking approach. Table 1 shows the shocks inputted in the model and the corresponding impacts on GDP and TFP over time.[30] Simulations are carried out assuming that reforms are fully credible and that agents have perfect foresight about the future implementation of the reforms.

Table 1: **Simulations results**

Stylised policy impulse			GDP effect (% deviation from baseline)			Total factor productivity (% deviation from baseline)		
	size of gap	Years	**5**	**10**	**50**	**5**	**10**	**50**
Closing the gap with the best 3 performers								
Human capital								
Decreasing the share of low skilled workers	-33.0 pp.		0.1	0.5	8.5	0.0	0.2	2.5
Increasing the share of high skilled workers	6.6 pp.		0.1	0.3	4.0	0.0	0.2	3.3
Product market								
Reducing final goods market mark-up	-0.7 pp.		0.3	0.4	1.0	0.1	0.1	0.2
Reducing intermediate firms' entry barriers	-17.8 pp.		0.2	0.8	3.2	0.2	0.9	2.0
Knowledge and innovation								
R&D subsidy	28.8 pp.		-0.2	0.2	0.9	-0.2	0.2	0.7
Financing wedge on intangibles	-8.2 pp.		0.1	0.8	4.2	0.2	1.0	3.3
Taxation								
Tax-shift from labour to consumption	-9.2 pp.		0.7	1.1	2.0	-0.1	-0.1	0.1
TOTAL			**1.4**	**4.0**	**23.8**	**0.4**	**2.4**	**12.1**
Implied increase in transitory growth rates			**0.3**	**0.4**	**0.4**	**0.1**	**0.2**	**0.2**

Source: Varga, Roeger and in 't Veld (2014) and additional QUEST R&D simulation on financing wedge.

Structural reforms that close the gap vis-à-vis the average of three best performers in the policy areas discussed above would increase GDP by 23.8% above baseline over 50 years, half of which through total factor productivity gains. Labour productivity would grow in line with total factor productivity, as sustained investment would help the capital stock to grow in line with employment. Overall, Italy would completely close the gap in GDP per capita with the OECD average shown in Figure 1. The year-on-year growth rate increases by approximately 0.4pp on average over 50 years, which corresponds to about half of the GDP growth gap that Italy has experienced vis-à-vis the euro area since 1998. Our results are broadly comparable with previous assessments. With a larger set of reform measures but closing only half of the gap vis-à-vis the average of three best EU performers Varga and in 't Veld (2014) find that Italy's GDP would grow by 23% over the long run (3.9% accruing already over the first 5 years), almost identical to our results presented above. The results from Lusinyan and

[30] Results are shown as deviation (in p.p.) from the baseline for each shock and then cumulatively. The baseline is constructed using 2012 data and exogenous TFP and population growth rates. The simulation results are not sensitive to changes in the exogenous growth rates. The total impact is given by the linear sum of the individual impacts and it is not the result of an additional simulation of all shocks at the same time. However, given the specific design of the model, the difference will be minimal (i.e., policy spillovers are not captured by the model). Reforms are introduced gradually, in particular: (i) entry costs, tax shift, R&D subsidies and financing wedge shocks are introduced linearly during the first 5 years; (ii) mark-ups are decreased by 1pp per year; (iii) skills levels are gradually increased for the young cohorts over 25 years. For all details, see: Varga, Roeger and in 't Veld (2014).

Muir (2013) and Annachiarico et al (2013) are lower (see Section 1.1) but this is mainly because their simulations focus on product and labour market reforms and do not shock human capital and innovation parameters.

In the long-term, the highest benefits would come from raising Italy's educational attainment to the best performers in the EU. This would increase the levels of GDP and total factor productivity respectively by 12.5% and 5.8% over 50 years, which represent more than half of the cumulated impact of the reforms. Because of cohort effects, however, the benefits materialise only very slowly: they are still negligible after 10 years and continue to accumulate after 50 years.

Two third of the GDP from human capital reforms gains come from reducing the share of the low-skilled in the population by 33pp. The key mechanisms are the following. Additional medium-skilled labour is employed at higher efficiency than the replaced low-skilled workers, with decreasing skill-premium to the other skill groups. With imperfect substitutability between workers with different skill levels, this results in a positive wage effect, especially for low-skilled workers. Furthermore, employment also increases significantly delivering the largest share of GDP benefits.

The increase in the share of high-skilled workers by 6.6pp has an impact also through the innovation channel. Due to the decline in the relative wages of high-skilled workers, employment in the R&D sector increases, thereby driving up the supply and down the prices of patents, which in turn fosters innovation and boosts productivity. Employment also increases but in this case, differently from the increase of the share of low-skilled workers, the biggest output gains stem through total factor productivity. It is important to note that QUEST R&D does not take into account external effects of human capital (i.e., it does not consider potential positive social impact- such as on crime or voting behaviour - that may indirectly affect the economy). For this reason, the results of the simulation are likely to be downward biased. At the same time, however, QUEST R&D does not endogenise human capital supply choices. This implies that the share of the high-skilled will not adjust endogenously to the lowering of relative wages consequent to the initial positive exogenous supply shows, which may counterbalance the previous downward bias. Overall, the direction of the bias is therefore unclear but likely to be relatively small.

Reductions of entry barriers and product market reforms have also a high potential. Reducing mark-ups by 0.7pp and entry costs as a percentage of GDP per capita by 17.8pp would boost GDP by over 4% over 50 years, with total factor productivity contributing the most part (2.2%). Increased competition forces firms to reduce prices via a reduction of mark-ups, which raises output and increases the demand for all factors of production (tangible capital, intangible capital and labour). The combination of price declines and increased factor demand yields significant benefits. Decreasing entry costs lowers the profits requirement for intermediate producers thereby stimulating the entry of new firms. The growing number of new entrants translates into higher demand for patents and increases the demand for high skilled workers. Given the semi-endogenous growth features of the model the increase in intermediate demand implies that the sector buys more patents from the R&D sector thereby boosting innovation, which lower costs further. This virtuous circle (also applying to the reduction of entry costs) magnifies the initial impact of the shocks. Gains are negligible in the first five years but accrue quite rapidly afterwards. Some previous model simulations report higher impact. In particular, Lusinyan and Muir (2013) find that product market reforms that would close only half the gap from the euro area average would increase GDP by 8.3% in the long run and Annichiarico et al (2013) find that closing the gap from the EU average would increase GDP by 4.3pp over 10 years).

This is primarily due to the fact that previous estimate of mark-ups in the service sector were higher than our estimates which are based on a more recent period (see Section 2.3).

Policy action to foster R&D and innovation is third in line. Cumulatively, the two shocks increase long-run output by 4%. Almost all gains (3.3%) are from the 8.8pp reduction of the financing wedge on intangibles. Improving access to finance for start-ups makes projects profitable and thereby stimulates entry and innovation. This suggests that financing constraints for start-up innovative companies may be an important factor preventing an increase in the R&D share. On the contrary, increasing government subsidies to private R&D offers limited growth potentials, in line with Bronzini and Iachini (2011). The time profile is similar to the first two classes of shocks. In the short-run, the reallocation of high-skilled labour to R&D reduces final goods production and it has a negative impact on growth. Gains are emerging only in the medium and long-run, mainly through total factor productivity (employment gains are quite limited, and actually slightly negative in the case of R&D subsidies).

Shifting taxation away from labour by bringing the implicit tax rate on consumption to the average of three best performers (a shift equivalent to 5.5% of GDP) could deliver 2.0% increase in GDP in the long run (in line with the impact reported in Lusinyan and Muir, 2013). As expected, the GDP gain result completely from employment increases. While the long-term impact is smaller than that of other reforms, the tax shift induces a robust increase in employment, and thus in GDP, already in the very first years.

4. POLICY ANALYSIS

Italy's sluggish growth over the last 20 years is rooted in its long-standing structural weaknesses. In fact, Italy's position relatively to other euro area and OECD countries in this regard declined continuously in this period. To reverse this process, Italy has recently embarked on a wide-ranging package of reforms to address these weaknesses and re-launch productivity and growth in the country.

First and foremost, our analysis shows that structural reforms may indeed bring very large benefits to Italy's sluggish economy. However, given the relatively large importance of reforms to accelerate human capital accumulation, the gains are limited in the short term and become substantial after 10 years. This reinforces the need for moving decisively forward, avoiding the delays, implementation gaps and piecemeal approaches that reduced the impacts of previous reforms waves (European Commission, 1999).

Secondly, the paper brings to the fore the serious gaps that Italy has in adapting its human capital and innovative potential to the challenges of a modern knowledge-based economy. Increasing the average level of education of the population is of utmost importance to the future of the country. While the political debate has focused on the level and effectiveness of public expenditure, this challenge also raises two broader issues related to private decisions about education.

The first issue is about improving market incentives for investing in education. The discussion in Section 2.1 shows that private returns to education for higher educated people are lower in Italy than in most of the other European Union and OECD countries. While this could be attributed to the basic low-to-medium-tech bias of the economy (which should be in any case considered endogenous to the human capital), the analysis shows that returns are even lower for the younger cohorts, which could be explained also by the existing duality and mismatches in the labour market. Improving the functioning of product and labour markets is therefore necessary to allocate human capital more efficiently. This would help correct market signals to individuals and firms, thereby promoting more pro-education choices. It will also contribute to lowering the high emigration rates of people with tertiary education and to fostering the immigration of high-skill people (which is currently among the lowest in the OECD) and return migration, thus shortening the time required to address human capital gaps. Since 2012, Italy has been reforming its labour market to increase entry and exit flexibility and shift the focus of the unemployment policies from protecting jobs to protecting workers. Both changes are expected to help the reallocation of labour to more productive firms and reduce the misalignments between jobs and wages that currently distort market signals for investing in education.[31] More decentralised collective bargaining could further contribute to aligning rewards to skills and productivity, within and across firms, further helping correct market signals (European Commission, 2016a).

The second issue is about improving the quality of education and endowing students with skills that are more in line with what companies would need. An important problem seems to be the insufficiently developed work-based learning. The potential of a dual system of apprenticeships, like the ones in Germany and Austria, could be significant. By allowing students to work while remaining in education and leveraging enterprises efforts to train own workers, this system would help Italy to ease the education-to-work transition, to make the skill structure of its labour force more relevant to

[31] L. 92/2012 (Riforma Fornero); L. 183/2014 (Jobs Act).

companies and to reduce skill mismatches, with positive longer term impact both on productivity and employment (particularly youth employment). A reform of the school system is underway, which also aims at strengthening vocational training.[32] In tertiary education, the ageing and gradual reduction of research and teaching staff is a problem that remains unaddressed. Funding has been recently provided for hiring up to 650 new full and associate professors as well as 850 young researchers. Although going in the right direction, these quite limited and one-off measures may not be sufficient to address the challenge.[33]

With regard to R&D and innovation, the analysis highlights Italy's strong bias towards bank financing in the corporate sector and the concomitant underdevelopment of capital (equity) markets. These characteristics would be consistent with the relatively high financing wedge on intangible investment resulting from the calibration of the model, which suggests that investing in research and innovation is relatively more costly in Italy. Our model simulations show that reducing such financing wedge on intangible could substantially foster innovation and hence boost productivity. To bring about such improvements, reforms would have to focus on diversifying the financing of firms, particularly SMEs and developing capital markets in Italy, including through cross-border transactions. In recent years, the Italian authorities have introduced several relevant measures (see European Commission 2015 and 2016a for an overview), such as introducing an allowance for corporate equity (ACE) to mitigate the debt bias in Italian corporate finance (which is starting to have some positive effects - Bank of Italy, 2016), introducing venture capital tax packages, and setting up a registry for innovative start-ups. In addition, a patent box and a new R&D tax credit scheme have been introduced in 2015 but the simulations show that increasing public R&D subsidies is not expected to deliver sizeable benefits.[34] Overall, these measures are steps in the right direction, but the sheer size of the challenge Italy faces in this area suggest that significantly more needs to be done to make a significant impact on the country's growth potential.

The paper also confirms that benefits from product market reforms are potentially sizeable. The benchmarking exercise shows that Italy has reformed its product markets in major ways over the last 15 years and that this is starting to pay off. However, it also shows that Italy has a lot of room to improve its business environment and reduce entry barriers. The model simulations suggest that such reforms would bring about rather large benefits. Additional benefits could be expected from the complementarities with labour market reforms, which have not been modelled here. In particular, the literature has shown that reforms reducing rents in the product markets would help limit any negative impact of labour market reforms on real wages and aggregate demand, and thus sustain public support for reforms. A law[35] removing certain barriers to competition in the legal professions and in the transport and insurance sectors is in discussion in Parliament since 2014.[36] Unaddressed barriers would remain however in the regulated professions (particularly legal professions), health, transport and retail sectors (European Commission, 2016a). Important reforms efforts are also ongoing to improve the functioning of civil justice and public administration and to reduce administrative burden

[32] L. 207/2015 (La Buona Scuola).

[33] European Commission (2016b) assesses that the education and labour market reforms could already increase GDP by around 2% by 2035 (0.6% by 2020). This is likely to be underestimated given that only a part of the reform measures could be modelled and simulated.

[34] Italy' R&D tax credit scheme was introduced by DL 145/2013, then modified by L 190/2014 (Stability law 2015, Art 1 para 35) and finally operationalised by DM 27 May 2015. It is for the period 2015-2019 and it is worth some 0.03% of GDP.

[35] Atto Senato n. 2085.

[36] Schema di decreto legislativo recante testo unico in materia di società a partecipazione pubblica (Atto del Governo n. 297) and Schema di decreto legislativo recante testo unico sui servizi pubblici locali di interesse economico generale (Atto del Governo n. 308).

for households and enterprises, which would reduce costs and uncertainties for businesses, facilitate reallocation of resources, and also help deliver on the ground the benefits of reforms undertaken on paper.[37]

Finally, the analysis confirms that Italy has room for significant tax shifts, which could deliver important benefits in terms of employment and output (albeit without affecting productivity significantly). While long-term gains are smaller than for other measures, such tax reforms can play an important role in producing early gains and thus facilitating the implementation of other structural reforms with gains more in the long run. Italy has recently undertaken important efforts to reduce taxes on labour. Rationalising tax expenditures and revising the outdated cadastral system as well as further improving tax compliance, as already envisaged, could help further shift the tax burden from labour onto consumption and property and make the tax system more efficient and equitable. Italy's tax policy has been traditionally characterised by frequent changes, more than it was the case in other policy areas. This introduces an additional source of uncertainty for businesses and households and therefore increases the probability of suboptimal private decisions. Reducing policy uncertainty of this type could deliver additional benefits not captured in the modelling exercise used in this paper.

[37] *Inter alia*: L. 124/2015 (riforma della Pubblica Amministrazione); Dlgs. 156/2012 (riorganizzazione degli uffici giudiziari); Agenda per la semplificazione 2015-2017.

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