11. INNOVATION

Innovative activity, a crucial component of economic growth, is less intense in Italy than in the leading advanced economies, above all in the private sector. R&D spending, an important measure of the resources deployed for innovation, is also lower, far from the objective of 3 per cent of GDP set by the European Commission in its Europe 2020 growth strategy. The gap in the propensity to patent is even wider.

There are several factors in this lag. Innovation is impeded, even more than by their specialization in traditional products, by firms' small size and largely family-based management model. Share capital, preferable to bank loans for financing businesses with uncertain results and pronounced information asymmetries, is less common than in other countries. The allocation of resources to the most innovative enterprises is held back by the institutional and regulatory framework.

Some 40 per cent of R&D spending is public. The scientific output of public research compares fairly well with that of other countries, even though Italian universities do not rank particularly high internationally. Despite some recent progress, public-private partnerships remain underused. Government incentives for R&D and business innovation have delivered modest results. Their effectiveness has been impaired by the piecemeal nature of interventions, regulatory instability, and uncertainty over disbursement timeframes.

Italy's innovation gap

The proportion of GDP spent on R&D is lower in Italy than in the leading European countries: in 2011 it came to 1.3 per cent, against an average of 1.9 per cent in the EU and 2.8 per cent in Germany. Private-sector spending is particularly low by international standards (0.7 per cent, compared with 1.2 and 1.9 per cent respectively), while the public-sector gap is narrower (0.5, as against 0.7 and 0.9 per cent).

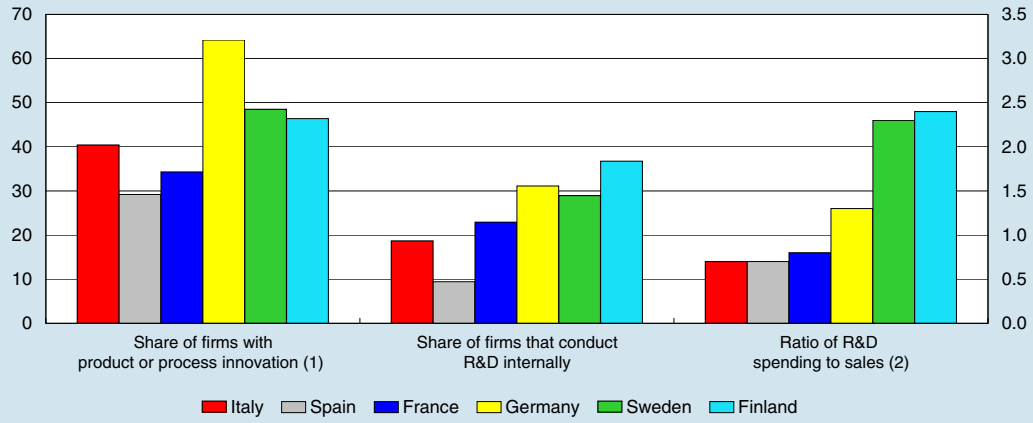
Turning to the private sector, Italy's backwardness stems both from less frequent engagement in R&D by firms and from lower spending on it. According to Eurostat's Community Innovation Survey (CIS) for the three-year period 2008-10, the share of firms that invest in R&D is 18.7 per cent, as against 22.9 per cent in France and some 30 per cent in Germany and Scandinavia (Figure 11.1). As a proportion of sales, R&D expenditure amounted to 0.7 per cent in Italy, around half as much as in Germany and less than a third as much as in Finland and Sweden.

The data on R&D expenditure may underestimate the true extent of innovation efforts, especially where small firms that frequently innovate without officially recording any outlay are predominant. In all countries, the share of firms that allocate resources to

new products and processes exceeds the share of those that invest in R&D: in Italy this reaches 40 per cent, at least on a par with the other leading countries except Germany. However, firms that realize innovations but do not conduct formal R&D activity have significantly lower patenting capacity than those that do, a smaller share of turnover from innovative products, and lower productivity. The contribution of innovative activity to firms' growth potential is accordingly diminished.

Figure 11.1

R&D innovation indicators by country (1)
(per cent)



Source: Eurostat, Community Innovation Survey, 2008-2010.
(1) Includes firms that are currently innovating or have abandoned or suspended innovation. – (2) Right-hand scale. For Germany, 2006-08 data.

In 2010, there were 7.4 applications filed with the European Patent Office for every 100,000 inhabitants in Italy, far less than in France (13.5), Germany (26.7) or Sweden (30.8). For brands – and industrial designs in particular – the gap is smaller. Overall, unlike the other main advanced countries Italy is a net importer of technology not incorporated in physical goods.

The factors responsible for Italy's innovation lag reside in several features of the private productive and financial system and in the difficulty the public sector has in creating a propitious institutional and regulatory climate for innovation and in directly supporting innovative activity.

The characteristics of the productive and financial system

Specialization. – The propensity for R&D and innovation is markedly uneven among sectors: it is strongest in technologically advanced manufacturing and lowest in the sectors where unskilled labour and low-value-added products feature more heavily.

Italy's sectoral bias towards traditional and low-tech products goes only part of the way to explaining the innovation lag in this country: if Italy had the same sectoral composition as Germany, say, the gap between the two countries in terms of the share of manufacturing firms that engage in R&D would narrow by around 10 per cent.

The level of innovation in Italy is lower in all sectors, but it varies widely among firms. According to our analyses, even within the same manufacturing sector, the firms

that are most exposed to competitors in countries where production costs are lower have done most to innovate.

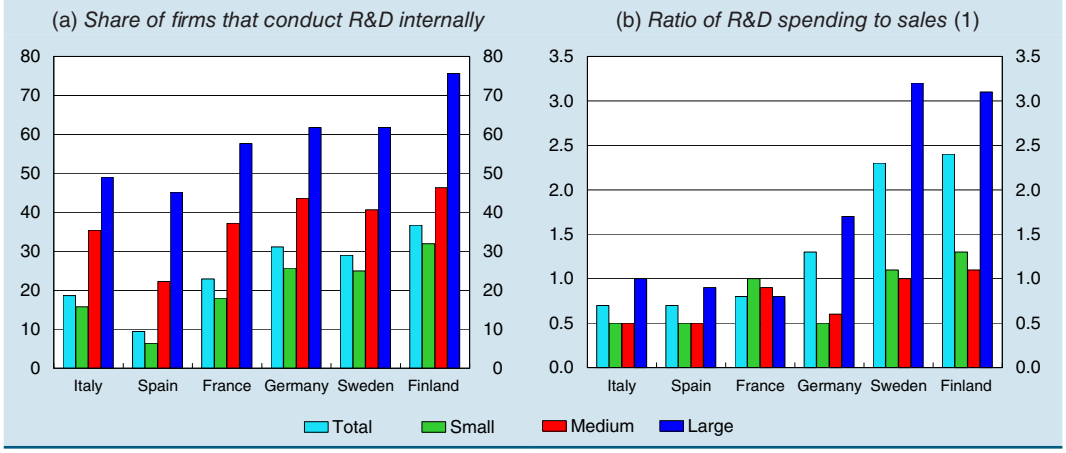
Firm size. – According to the CIS, in all the leading European countries the proportion of firms that conduct internal R&D increases with size: in Italy it is 15.8 per cent for firms with 10-49 employees, 35.4 per cent for those with 50-249 employees, and 49.1 per cent for the largest firms (Figure 11.2). As size increases, so does the share of firms having launched innovative projects, R&D spending in proportion to sales, and the capacity to reach agreements for cooperation on innovative activities with other firms and above all with universities and the public sector.

The smaller the firm, the harder it is to sustain the high fixed costs associated with starting innovative projects. The lower propensity of small and medium-sized enterprises to export further reduces the incentive to invest in innovation that stems from the possibility of spreading these costs over a larger volume of sales. It is estimated that the expansion of foreign demand has a positive effect on the patenting ability of Italian manufacturing firms, in particular the largest and most productive.

The small size of firms, a distinctive feature of the Italian manufacturing system by comparison with other countries, is a more important factor than sectoral specialization in limiting innovative activity. Almost 30 per cent of the difference between Italy and Germany in the share of manufacturing firms with R&D is attributable to the different size structure of firms.

Figure 11.2

R&D indicators by country and firm size
(per cent)



Source: Eurostat, Community Innovation Survey, 2008-2010.
(1) For Germany, 2006-08 data.

Ownership and managerial structures. – Family-run firms play a greater role in the Italian economy than in the other main European countries. Based on a survey conducted by the EFIGE research project (European Firms in a Global Economy), wholly family-owned and managed firms make up 59 per cent of the total in Italy, as against 18 per cent in France and 22 per cent in Germany. These firms have a lower-than-average propensity to engage in R&D. The essential coincidence of the firm's

capital with that of the proprietor family can lower the willingness to undertake risky projects.

A relatively old entrepreneurial class also acts as a brake on innovation: according to EFIGE the share of business owners aged over 64 is 22 per cent in Italy, as against 9 per cent in Germany and 5 per cent in France.

The financial system. – The high degree of risk and the information asymmetries associated with innovative activity mean that firms' internal resources are the primary source of financing of R&D. When firms require external financial resources, recourse to debt capital is limited by the amount of assets eligible as collateral, which is lower among innovative firms, and by moral hazard problems, stemming from the borrower's economic interest in using the funds for riskier investments than those envisaged by the lender. For banks, a firm's reputation can make up for insufficient information on its investment plans, as the importance of long-term relationships with firms shows: it is estimated that an increase in the duration of relationships from three to six years is associated with a better than 10 per cent increase in the likelihood of conducting R&D.

Share capital, by contrast, does not require guarantees and enables investors to benefit in full from the returns on successful innovative projects. The problem of information asymmetries is often resolved by the active presence in firms of venture capital intermediaries – investors that provide early-stage financing as well as consulting for firms in high growth potential sectors – or "business angels", private investors operating on a smaller scale with respect to venture capital funds. A good many empirical studies show how recourse to equity capital considerably increases the innovative activity of firms; for Italy, the issue of shares is found to increase the probability of R&D being conducted by around one third.

According to EFIGE, in all the major European countries over 80 per cent of R&D spending by firms is internally funded. In Italy and in France the second biggest source of financing is bank debt (slightly less than 10 per cent of R&D spending), whereas in Germany and the United Kingdom, this proportion is much lower (around 3 and 1 per cent respectively) and share capital plays a more important role.

New firms, which are often those that introduce the most radical innovations, cannot rely on long-term relationships with banking intermediaries and have greater need of external venture capital. Accordingly they suffer from the underdevelopment of the venture capital sector in Italy: the share of R&D spending financed with venture capital is 0.1 per cent, as against 0.3 per cent in France and Germany and 0.4 per cent in the United Kingdom. The business angels sector has experienced rapid growth in Italy in recent years, but an OECD study finds that the number of business angel networks is still low by international standards.

Demand and supply factors have slowed the spread of venture capital. In order to favour recourse to equity capital, since 2011 firms have been able to deduct from their income an amount equal to the return on their new share capital, currently set at 3 per cent (Decree Law 201/2011, ratified by Law 214/2011). In 2011 and 2012 tax incentives were introduced for investors in venture capital funds and in the risk capital of innovative start-ups, aligning Italian law more closely to that of the other European countries.

The role of the public sector

Regulation. – The OECD estimates that the most innovative firms tend to grow less in countries where the regulation of the business services sector is more restrictive, the legal system is more inefficient, and bankruptcy laws carry heavier penalties for firms. It is plausible that all these factors diminish innovation in Italy.

Overly restrictive regulation of the labour market can curb innovation both by hampering the redistribution of resources and by discouraging increases in production by firms that intend to undertake innovative projects, with potentially high but uncertain returns. On the other hand, stable employment relationships can strengthen incentives to build up human capital, both for firms and workers.

In Italy there is a negative correlation between the share of temporary workers in a firm's workforce, on the one hand, and the probability of taking out patents and the number of patents per firm, on the other. It is also estimated that following the adoption of Law 30/2003, (the Biagi Law), which facilitated apprenticeship contracts – longer-term than other fixed-term arrangements, with vocational training objectives, aimed primarily at young people – the number of apprentices has increased in firms in the more patent-intensive sectors, to the benefit of the number of patents and R&D spending.

Human capital supply. – In Italy the share of university graduates in the workforce is considerably lower than in the other main European countries. This may reflect a shortage of highly-educated workers, or demand that continues to favour less skilled work. Estimating a structural econometric model on data taken from sample surveys of firms and households, it can be shown that human capital supply factors outweighed demand, holding sectoral composition constant. This is confirmed by the high percentage of firms for which the shortage of skilled workers constitutes one of the main obstacles to innovation – 40 per cent according to the Bank of Italy's Survey of Industrial and Service Firms with 20 or more employees.

Public research and technology transfers. – A little over 40 per cent of R&D spending is made by the public sector (universities and public research centres). According to the available indicators, the scientific output of the Italian public research system is close to that of other major European countries, both in quantity and quality.

The institutional structure governing the public research system reflects the preponderant role of the State in policymaking and funding. However, the possibility for the numerous public research entities to undertake projects independently and the lack of any stringent coordination poses the risk of duplication and dispersion. The effectiveness of the public research system is also impaired by the limited use of results-based criteria for allocating financial resources among projects and actors (public research bodies and universities). According to the Ministry for Education, Universities and Research, in 2012 the results-based portion of the ordinary fund for research bodies and institutions was 7 per cent; for universities, the performance-based share of the ordinary fund was 13 per cent.

Public research provides only limited support to innovation in the private productive system. The CIS shows that the share of innovative firms that have cooperated

with public institutions (universities or other public entities) to conduct innovative activity is 7.6 per cent in Italy, less than in France (22.9 per cent), Germany (19.7 per cent) and Spain (16.5 per cent). The gap persists even among the largest firms. Our analyses indicate that proximity to universities of excellence favours cooperation with the university system, in particular for small and medium-sized enterprises.

Public demand for innovation. – In the Europe 2020 strategy, the public procurement of innovative products and R&D services has become a pillar of European policies for innovation. For the provision of R&D services, the pre-commercial procedure for public tenders is activated when the contracting authority's requirements are so technologically complex that they cannot be met through the acquisition of existing goods and services. One of the underlying reasons for the pre-commercial procedure is the distribution of risk and potential benefits among the contracting authority and participating firms. Acquisition policies geared towards innovation can also facilitate the identification of appropriate solutions for the provision of public services and innovative infrastructures, an area where Italy lags behind other countries.

According to Eurostat data public sector expenditure on supplies in 2010 amounted to 16.2 per cent of GDP in Italy. Decree Law 179/2012 promotes the pre-commercial procedure for public tenders as one of the instruments available to the Ministry for Education, Universities and Research for furthering industrial research. The decree law envisages its use as part of a plan to promote major research and innovation projects in connection with the realization of the Digital Agenda; it also establishes that Italy's dedicated Digital Agency shall conduct an annual review of general government to identify problems of special social or environmental relevance that the products, services and technologies already on the market cannot resolve. Some pilot projects have been launched in Lombardy, Puglia and Valle d'Aosta.

Policies to support R&D and innovation in the private sector. – Most of the advanced economies have public policies to support R&D and innovation by private firms: tax breaks or subsidies that directly lower the costs of investment in innovation and other measures to favour the birth of innovative firms and the development of technology clusters in selected geographical areas.

The public resources that Italy allocates to the promotion of innovative activity by firms are less than in the other main European countries. According to the European Commission's State Aid Scoreboard, resources for R&D and innovation in Italy amounted to 0.03 per cent of GDP in 2011, compared with 0.05 in the United Kingdom, an average of 0.08 in the EU, 0.09 in Spain, 0.10 in France and 0.12 in Germany. In Italy these resources are distributed among a relatively high number of beneficiary firms, categories of intervention and national and regional decision-making centres.

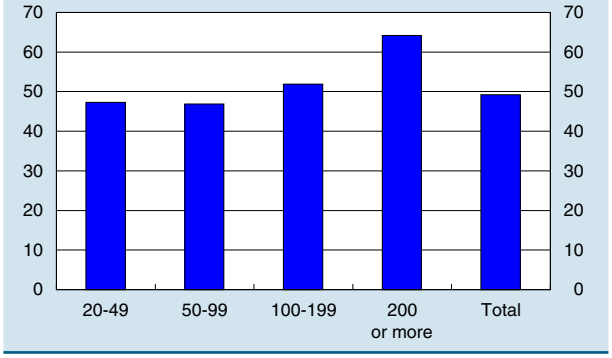
In 2012 work began to reorder, rationalize and rethink national programmes of incentives to firms, not only for research and innovation. The measures included the abrogation of some rules, the simplification of procedures and the reformulation of previous legislation.

Apart from the administrative and operational costs, incentives, if not properly designed, may fail to trigger the desired additional investment and can produce

distortions in the allocation of resources. According to the Survey of Industrial and Service Firms, around half of the industrial firms that received public aid for R&D in the three years from 2009-11 declared that they would have spent at least the same amount even without assistance (Figure 11.3). The rare empirical assessments of the effects of State aid on R&D and innovation in Italy suggest that the programmes are only moderately effective overall and appear to have been more useful in sustaining innovative activity among smaller-sized firms, those that are likely to encounter greater difficulties in accessing external financing.

Figure 11.3

Firms that would have invested the same amount in R&D without incentives, by number of employees (1)
(per cent of the firms that have been given incentives)



Source: Banca d'Italia, *Survey of Industrial and Service Firms*.
(1) Industrial firms excluding construction; data for 2009-11.

Business incubators, which in Italy are primarily public, can help to create and develop innovative start-ups. Decree Law 179/2012 provides explicit support for such incubators. In the last twenty years various measures have been taken in Italy to strengthen innovative activity through the creation and development of technology clusters, inspired in part by the experiences of voluntary agglomerations of high-tech firms. The interventions, which have benefited from public funding, aim to activate synergies among research centres, universities and private enterprises in certain geographical areas; they include policies for technology districts and science and technology parks. Analyses of the main balance-sheet items and the propensity to patent show how, overall, the "best" firms are the ones that opt to locate in a district or park; however, the competitive advantages of these firms with respect to similar ones located elsewhere do not seem to increase significantly following their entry into the cluster.