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**Monitoring and analysis of policies
and public financing instruments
conducive to higher levels of R&D investments
The “POLICY MIX” Project**

Country Review Italy

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Introduction and Policy mix concept

The policy mix project

This report is one of the 31 country reviews produced as internal working papers for the research project “Monitoring and analysis of policies and public financing instruments conducive to higher levels of R&D investments” (Contract DG-RTD-2005-M-01-02, signed on 23 December 2005). This project is a research project conducted for DG Research, to serve as support for policy developments in Europe, notably in the framework of CREST activities. It does not form part of the ERAWATCH project, but the working documents are made available on ERAWATCH webpages for the purpose of steering a debate on the policy mix concept.

The “Policy Mix” project is run by a consortium of 7 partners:

- UNU-MERIT (The Netherlands), consortium leader
- Technopolis (The Netherlands)
- PREST – University of Manchester (United Kingdom)
- ZEW (Germany)
- Joanneum Research (Austria)
- Wiseguys Ltd. (United Kingdom)
- INTRASOFT International (Luxembourg).

Each country review is produced by an individual author, and provides expert’s view on the policy mix in the country. This report is not approved by the Commission or national authorities, and is produced under the responsibility of its author.

The role of country reviews is to provide an exploratory analysis of the current policy mixes in place in all countries and detect the most important areas of interactions between instruments as well as new modes of policy governance that are particularly adapted (or detrimental) for the building of policy mixes. They provide analytical material for the analysis of the policy mix concept and its implementation in Europe. This material will be used as background for further reports of the project and for the construction of a tool for policy-makers (to be made available in late 2007 and 2008).

The policy mix concept

The country reviews are based on the methodological framework produced by the consortium to frame the “policy mix” concept. They have been implemented on the basis of expert assessments derived from the analysis of National Innovation Systems characteristics and policy mix settings, using key information sources such as Trendchart and ERAWATCH reports, OECD reviews, and national sources, among which the National Reform Programmes.

In this work, the “policy mix for R&D” is defined by the consortium as: **“the combination of policy instruments, which interact to influence the quantity and quality of R&D investments in public and private sectors.”**

In this definition, policy instruments are: “all programmes, organisations, rules and regulations with an active involvement of the public sector, which intentionally or unintentionally affect R&D investments”. This usually involves some public funding, but not always, as e.g. regulatory changes affect R&D investments without the intervention of public funds.

Interactions refer to: “the fact that the influence of one policy instrument is modified by the co-existence of other policy instruments in the policy mix”.

Influences on R&D investments are: “influences on R&D investments are either direct (in this case we consider instruments from the field of R&D policy) or indirect (in that case we consider all policy instruments from any policy field which indirectly impact on R&D investments)”.

Structure of the report

The report is structured along the following questions.

First, in section 1, and in order to place the policy mix in context, the general challenges faced by the National Innovation System (NIS) are analysed by the expert. The view is here not restricted to the challenges with regard to raising R&D investments, but rather encompasses all the conditions that directly or indirectly affect the functioning of the NIS and R&D expenditures. These context conditions are very important for the discussion of the relevance of the policy mix later on.

Second, the stated main objectives and priorities of R&D policy in the country are spelled out in section 2, as well as their evolution over the last ca. five years. This discussion is based on White Papers and official documents, i.e. on published policy statements. The reality of these objectives compared to actual working of policy instruments will appear in section 5.

The third section provides an expert assessment and critical analysis of a possible gap or convergence between the NIS challenges and the main policy objectives and priorities stated before.

Section 4 presents the policy mix in place, following the above definition, i.e. policy instruments affecting R&D activities in the private and in the public sector, either directly for instruments from the R&D policy domain, but also indirectly for instruments outside the R&D domain which are of particular relevance to R&D activities. A typology of instruments is used, to categorise the R&D-specific and non-R&D specific instruments. A short description of each instrument is provided: aim, nature, target group, budget.

Then, section 5 discusses whether there is a gap between the main policy objectives and priorities stated in section 2, and the instruments in place. This is done by

comparing the set of objectives with the set of instruments at work. When individual evaluations of programmes or policy instruments are available, their results are used if they shed light on contribution of these instruments towards the policy objectives.

Section 6 discusses the orientation of the policy mix, indicating priorities amongst various possible routes to increase R&D investments. Policy instruments are categorised under 6 different routes according to their relevance, and this categorisation is followed by a discussion on the range of instruments affecting each route, missing instruments, routes that are not addressed by instruments, possible redundancies or overlaps, etc.

Section 7 provides another view on the policy mix, focusing on the relative importance of each types of instruments. The aim is to get a picture of the policy mix, the balance between (sets of) instruments, and the relative weight between them.

From section 8 onwards, the review turns to the crucial question of policy governance. That section discusses the emergence of the policy mix through examination of the following question: how did the set of R&D policy instruments arrive? What is the rationale behind them, what was the driving force behind their establishment, and how is this evolving recently. A crucial question relates to the existence of some consideration of possible interactions when establishing new or suppressing existing instruments. The section tries to establish whether the policy design process is incremental or radical, analytical or non-analytical. From this, that section discusses if the policy mix is a “construct” or an “ex post” reality.

The next section, section 9, focuses on the governance of the system of R&D policy instruments take place. It examines the key question of interactions, i.e. whether there is a form of co-ordination between R&D policy and policy instruments from outside the R&D domain, and the existing mechanisms that favour or hinder such interactions.

The final section, section 10, deals with the core question of the policy mix concept: it endeavours to discuss interactions between policy instruments to affect R&D expenditure. The section discusses possible positive, neutral and negative effects of R&D policy instruments; both within the R&D policy domain, but also with instruments from other policy domains. In most cases, this takes the form of hypotheses rather than hard evidence.

Feedback welcome

Feedback on this report is gladly received. Individual country reports will not be updated but discussion on policy mixes is welcome during the timeframe of the study (2006-2008). Please send your comments to:

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1 National Innovation Systems Challenges

The National Innovation System (NIS) of Italy is subject to a number of challenges, the four most important being:

- creating a research and innovation friendly environment, specially for SMEs;
- improving the human capital base for research and innovation, i.e. to increase the educational attainment and improve the skills of the population;
- improving funding opportunities for research innovation, especially with respect to SMEs.
- strenghtening technology transfer between public research and business and accelerating the transfer of new basic research findings to the market place.

Creation of a research and innovation friendly environment, especially for SMEs

One of the main challenges faced by the Italian system is the creation of an environment favourable to R&D and innovation. In practical terms this means the following:

- an increase in the amount of funds (both public and private) allocated to R&D activities: the Italian government still devotes an insufficient amount of public funds to sustain research and development and the amount of private funding is almost inexistent. Although some signs of improvement have been recorded both in public and private funding over the last five years the situation is still unsatisfactory/disappointing.
- the establishment of a system based on “meritocracy”, ensuring that are the “best” (firms, researchers, projects, universities) the ones that receive the (scarce) resources: this has been an often-cited pitfall of the Italian system that is calling for an urgent intervention by the majority of the NIS’ stakeholders.
- the introduction of a sound evaluation system: the lack of an evaluation culture in policy making has characterised the Italian system over the past years. Only recently some signs of improvement in this field have been registered and policy makers are becoming progressively aware of the need to evaluate results of the policy measures in place.
- the reinforcement of the incentives to foster R&D within SMEs: this is also a key challenge for the country as the lack of R&D and innovation within SMEs (that represent 98% of the Italian industrial fabric) is one of the reasons for the drop in competitiveness of the Italian industry.

Improving educational attainment and skills of the population

Another important challenge is related with the educational attainment and skills of the population. This is a critical challenge for the country as an inadequate average level of skills and know-how puts a strong break to R&D and innovation. At high school and university, the number of students in scientific/technological subjects (although slightly improving since 1998) is still very low and the percentage of the population with higher education is one of the lowest in the EU. The situation at post-graduate level, notwithstanding the existence of a pool of highly qualified researchers,

is characterised by: (i) low number of researchers¹ (i) high average age of researchers; (ii) the relationship between public and private researchers is highly biased towards the former; (iii) unbalanced relationship between researchers and clerical/administrative staff and (iv) gap between the researcher and the market.

Improving innovation financing (banking system and venture capital), specially for SMEs

SMEs' limited access to funds is another key challenge for the Italian system as increasing global competition calls for investments in innovation. Shortage of finance has been recognised as one of the main factors that hinder innovation and Italy is particularly badly placed in this field. Until very recently the theme of finance for innovation has been largely neglected. The Italian capital market is inefficient, slowing down the growth of companies through the introduction of third-party capital. The reform of the banking system and the reform of the public incentive system - that foresees the active participation of the private banks in the system of access to credit - have not yet led to an increased capacity to establish adequate bank-business relationships, thus hindering innovation capacity and the growth of SMEs. In the Italian financial system, which is closely associated with the banking sector, steps must be taken to re-draw the rules these institutions apply to assess the viability of innovative projects, in order to combine the current rating methods based on financial and balance sheet performance with forms of technological rating; this would allow greater scope for solutions in which banks become shareholders in innovative firms and to increase the popularity of venture capital. Venture capital is another area where Italy is performing badly.

In addition to these challenges specific to the Italian NIS, some generic challenges have emerged in recent years which concern all industrialised countries and which may have long term impacts on economy and society, including the NIS. Among these global challenges, the following are particular relevant to NIS:

- Globalisation
- Aging of Society
- Climate Change
- Change to knowledge society

Globalisation

Globalisation and increasing competition in world markets is posing a threat to the Italian economy given the vulnerability to global price competition of traditional national products such as textiles, clothing, footwear, wood/furniture/household products, light mechanical engineering and agricultural/industrial products, which are manufactured by small family-run companies. The loss of competitiveness of the Italian productive systems calls for the design and implementation of industrial policies capable to counteract the system's weaknesses due to: (i) a specialisation centred on sectors that are exposed to fierce competition from the newly industrialised countries and (ii) the small size of firms, which holds back the introduction of

¹ Number of researchers in Italy in 2003 was 66.000 of which 40.000 public and 26.000 private.

innovative processes and technological progress, necessary to compete in the global market.

Aging of Society

A rapid process of population aging is currently underway in Italy and is more pronounced than in most other EU and OECD countries. Italy currently has the highest old-age dependency ratio² among OECD countries after Sweden. It reached almost 30% in 2000 and will more than double by 2050³. These demographic trends are likely to result in slower long-term economic growth and will put increased strain on public expenditures that are already high. Exacerbating these problems is the fact that the Italian pension system is particularly expensive. If it is also true that innovative and original ideas are more likely to come from young people and that individuals manifest the greatest innovation capacity until the age of 45 (in average), this may have negative consequences on productivity and innovation. In addition, as an OECD study reveals⁴, the level of educational attainment for older workers is very low in Italy, compared with their younger counterparts. Furthermore, older workers engage in much less job-related training than younger ones.

Climate change

The Kyoto protocol has posed a challenge to industrialised countries to limit CO₂ emissions that are the responsible for the eminent change in the world's climate. Italy should see this challenge as an opportunity to develop a new model based on eco-innovation and on scientific and technological research in the field of environment. Some initiatives like the first "Ecoforum 2006" held in Rome in November 2006 titled "*The environment is innovation*" are trying to raise awareness and bring together the environment, enterprises and the financial sector, but there is still a lot to do in this field.

Change to knowledge society

The knowledge-based economy is a complex and broad phenomenon made up of different dimensions and aspects. There are three major trends that underpin the contemporary knowledge-based economy:

1. the emergence of new Information and Communication Technologies (ICT) and the Information Society;
2. the rise of the "service economy";
3. new requirements for, and approaches to, knowledge, in "learning organisations".

There are other features of current developments that also bear on the knowledge-based economy, such as globalisation, which increases the need for change and performance by the firms or the nations, and innovation, which triggers growth and wealth for a society.

Structural and cyclical factors differentiate the Italian economic system from its main international partners. These factors strongly influence the diffusion of ICT and must

² Number of individuals 65 and over as a proportion of population aged 20-64).

³ Source: OECD (2004) Report: "Ageing and Employment policies: Italy".

⁴ OECD (2004) Report: "Ageing and Employment policies: Italy".

be taken into consideration if public policies aimed at favouring the diffusion of ICT are to be effective. The main structural factors are the following:

- Predominance of small and medium-sized enterprises. The average size of these enterprises (3.6 employees) is the lowest in the EU. More than 98% of Italian firms have less than 20 employees. SMEs in Italy currently do not have major demands for highly-qualified personnel, but the challenge of global competition means that they need to achieve greater critical mass and improve innovative capacity. This requires a major contribution in key activities including: research and development, technology, consulting, support for internationalisation, logistics, etc.
- The importance of business districts. Since the 1990s, the phenomenon of aggregation and localisation of small businesses into business districts has increased noticeably. This form of economic organisation has influenced the dynamics of employment, innovation and product development and ICT use. In order to face global challenges, some Italian districts are switching from a “traditional district model” (headquarters and manufacturing facilities in the same geographic area) to a “new value chain model” (headquarters in Italy, manufacturing facilities in areas or countries with lower labour costs), adopted by North East district textile and shoe manufacturers.
- Specialisation in sectors that are not R&D - and innovation-intensive, and are less likely to have high rates of ICT uptake. The Italian industry has a high share of mature/traditional sectors.
- A fragmented ICT sector. High technology sectors have a low impact in the Italian economy and the ICT industry is dominated by small firms. Small size impacts negatively on R&D and investment, particularly in a period of falling prices, declining revenues and narrowing margins on products and services.

Overall, the uptake and use of ICTs in business has been somewhat slow in Italian business, with more advanced uptake being led by large firms. This is in part due to the structural factors mentioned above combined with the recent cyclical slowdown. Despite these factors, the telecommunications infrastructure is good, the growth of the Internet and broadband has picked up and computerisation is spreading despite the recent poor economic performance and government budget constraints.

2 Objectives and priorities of R&D policy

The main priorities of R&D policy in Italy can be summarised in the following points:

- The adoption of a strategic, long-term vision in the way to conceive and design R&D policy and its instruments: in the past, the government did not pay much attention to R&D and therefore coordinated, structured and continuing interventions were missing in this field. Policy intervention was mainly focused on traditional production factors rather than on the research front. Recently, the government has become progressively aware of the need to invest on R&D and innovation as the only way to improve competitiveness and growth and therefore, the implantation of this “new culture” has become a priority for the country.
- The selection of key priority areas/themes for research on which to invest all the efforts and resources: as part of the awareness process regarding the importance of stimulating R&D in the country, the government’s attempt is to identify strategic areas, sectors and poles to be strengthened and supported to create excellence and to be used as the “pulling factors” of the economy.
- The support to / (sponsorship of) technology transfer and the reinforcement of the interactions among the main players of the R&D system (i.e. universities, research centres, SMEs, banking system): given the Italian industrial structure-characterised by a fragmented universe of micro and small enterprises- and the existing gap between research and the market, the government’s priority is to intensify the cooperation and favour the creation of partnerships between enterprises and other actors (higher education research organisations, public/private research centres, chambers of commerce, industry association etc.). This priority is often cited in the Italian jargon with the sentence: “*fare sistema*”.

R&D policy objectives at national level are “formally” outlined in a “National Research Plan”, in which the strategic lines of action are illustrated in detail. These are complemented and reinforced by other documents such as the Financial (Budget) Law, the “Italian Action Plan for ICT Innovation in Enterprises”, the “Competitiveness Decree” of 11 March 2005, the National Reform Programme (PICO) or the recently approved Bersani’s Decree of October 2006.

The **National Research Plan** for the years 2005-2007 foresees 3 main strategic lines of action:

1. reinforcement of the scientific base of the country, looking for excellence, merit, internationalisation, economic growth and human capital valorisation.
2. strengthening the technological level of the Italian productive system to maintain competitiveness, focusing on 10 strategic industrial research programmes involving also the participation of universities and research centres.
3. support active participation in EU programmes and in international agreements.

To achieve these objectives, several instruments, programmes and measures have been approved.

The “**Competitiveness Decree**” of 11 March 2005 reinforced the research and technological development objectives already foreseen in the National Research Plan. The priority objectives stated in the decree are:

- (i) an increase in R&D expenditure in strategic industrial sectors involving firms, universities and research centres;
- (ii) investments in human capital, especially young researchers and specialised staff;
- (iii) public support to start-up creation and
- (iv) the accomplishment of the ten major research strategic programmes⁵ foreseen in the National Research Plan.

The **second action plan for ICT innovation in enterprises** aimed at fostering the adoption of ICT by enterprises (especially by SMEs), was launched in 2005 with the objective to:

- Increase innovation in the ‘made in Italy’ sectors through the use of ICT to stimulate competitiveness.
- Implement a policy of support for the development of selected high-tech sectors.
- Improve the functioning of the Italian business system, turning it into a fertile environment for research, technological development and innovation.
- Facilitate technology transfer from public research centres to enterprises.

In order to achieve these objectives, the Plan has been articulated in a set of 5 lines of action (1) Digital innovation governance; 2) Transversal measures; 3) Direct sector interventions; 4) Actions in southern regions; and 5) improving public administration services) with the corresponding intervention measures.

The **Italian National Reform Programme** (PICO⁶) highlights five priorities to boost output growth and employment:

- (i) Extending the area of free choice for citizens and companies (by opening up energy and services market);
- (ii) Granting incentives for scientific research and technological innovation;
- (iii) Strengthening education and training;
- (iv) Upgrading infrastructure and
- (v) Protecting the environment.

The second priority of the National Reform Programme is specifically dedicated to the promotion of scientific research and technological innovation and follows the directions and the initiatives outlined in the 2005-2007 National Research Plan. Throughout its mandate, the government has continuously stressed the importance of:

- technology transfer as one of the most important tools for achieving economic growth in the long-term;
- digital technologies and their use for innovation in terms of process and product (which is particularly true for the Italian economy, given its productive structure, and more specifically for SMEs);

⁵ human health; pharmaceutical industry; bio-medical industry; advanced systems in textiles, instruments; motor industry with low environmental impact; aeronautics; telecommunications, agro alimentary and transports

⁶ Piano per l’Innovazione, la Crescita e l’Occupazione

- creating and strengthening the networks of relations and co-operation between universities, laboratories and enterprises.

Lately, the newly established centred-left government led by Romano Prodi has endorsed two documents: the Bersani's decree and the 2007 Financial/Budget Law.

The **Bersani's decree** (named after the Ministry of Economic Development) has been designed to allow interventions in the field of industrial innovation. In particular, the most important lines of action refer to:

- the enhancement of the competitiveness of the productive system
- the realisation of industrial innovation projects
- the creation of a Fund for Competitiveness and Development⁷
- the creation of a Fund for Scientific and Technological Research (FIRST⁸)
- the creation of a Fund for Enterprise Financing⁹
- the reorganisation of the support system to enterprises
- IPR (patents) regulation

Many of the actions/measures presented in the Bersani's decree can be found in the **2007 Financial/Budget Law** of 27 December 2006 with specific details and the allocation of funding (e.g. 1 billion € and 1,2 billion € have been allocated to the Fund for Competitiveness and Development and to Fund for Scientific and Technological Research respectively for the period 2007-2009; 300 million € have been allocated to the Fund for Enterprise Financing for the same period).

Regarding the response of policy to the more general challenges, as far as **globalisation** is concerned, one of the priorities of the industrial policy is to support traditional successful sectors such as textile, clothing, footwear by promoting the "Made in Italy" brand and the "Italian concept", while incentivating the internationalisation processes of SMEs and the creation of networks to connect public and private research to enterprises. The challenge of an **aging society** should be tackled by launching training and long-life learning programmes that assist older workers in getting familiar with the new Information and Communication Technologies but a comprehensive plan in this field has not been implemented yet. As for **climate changes**, at present, a coordinated and integrated plan in the environmental sector is missing but scientific research and technological development in this field are supported by the FISIR¹⁰ ("Special Research Integrating Fund") which finances strategic interventions included in the National Research Plan. In this framework, the FISIR co-finances the strategic programme on "Sustainable Development and Climate changes"¹¹ whose objective is to perform simulations, diagnosis and forecasting of climate changes. Moreover, a special chapter on environment has been introduced in the latest Financial Law. Last but not least, the promotion, diffusion and use of **ICT** have become a top priority on the government agenda. The government has taken numerous measures to improve the situation, in spite of funding difficulties and budget constraints. As a matter of fact, the former

⁷ Fondo per la competitività e lo sviluppo

⁸ Fondo per gli investimenti nella ricerca scientifica e tecnologica

⁹ Fondo per la Finanza d'impresa

¹⁰ Fondo Integrativo Speciale Ricerca

¹¹ "Sviluppo sostenibile e cambiamenti climatici"

Berlusconi's government made the following statement that is also being followed by the current government: *“The Italian Government is committed to making Italy a leader in the digital age, modernising the country through the widespread use of new information and communication technologies in both the public and private sectors and boosting its competitiveness by accelerating the spread of the online economy and developing a model of the information society based on innovation and knowledge that improves the quality of life and prevents exclusion”*.

3 Coherence between NIS challenges and R&D objectives and priorities

The challenges of the Italian R&D system mentioned in section 1 are widely recognised and shared by the Italian government and by the rest of the NIS stakeholders and, on the basis of these challenges, the government tries to design its political agenda and the strategic lines of intervention. Therefore, in principle, we could affirm that, overall, there is coherence between the challenges identified and the government's political agenda to cope with them. However the "problem" arises when the policies are "translated" into specific measures and instruments. It is here when the Italian government plan appears like a sum of fairly positive but un-coordinated measures, lacking overall consistency and interdependency among the single measures.

Although the government seems to have clearly defined objectives, when policies are implemented, the overall policy framework lacks coherence. Various measures are introduced at different times by different responsible government institutions; several instruments remain inoperative due to the lack of funding; potentially interesting measures are introduced in one year but suspended the year after, incentives that should support SMEs are in practice used by large firms, etc; the result is that the overall policy package is not always consistent and objectives are not carefully considered in their long-term effects. A further element in the policy setting is the devolution of authority and fragmentation of responsibilities, which complicates decision-making and potentially reduces national impacts of policies.

An example that could be cited is related to the development of ICT in Italy. As it has been said in the previous section, the former government of Berlusconi was clearly aware of the strategic importance of ICT to the Italian economy, and it therefore decided to make ICT diffusion and adoption a policy priority. This new priority for ICT led to the formation of the Ministry for Innovation and Technologies to strengthen and focus policy co-ordination. However, the tasks of the Ministry were far from simple, particularly because of severe budgetary constraints. As a consequence, many planned projects have been deferred or scaled down, reducing the potential impact of the new policies and programmes.

4 Composition of the policy mix for R&D

Institutional funding for R&D to public research organisations

The Italian Ministry of University and Research (MIUR) finances the public research and academic institutions through two major funds:

- **Ordinary Fund for Higher Education (FFO):** it is the main Fund through which the Italian Government provides financial resources to Universities on annual basis. The FFO covers expenditures for teaching and research activities through lump sum budgeting. The Fund is made up of two components: one is automatically assigned; the other is attributed according to quantitative parameters.
- **Ordinary Fund for R&D (FOE):** it is the Fund to support Public Research entities under the MIUR control. The resources are allocated to projects that are in line with the National Research Plan objectives. The budget allocated is foreseen on an annual basis through the financial law that establishes areas, domains and themes of intervention.

Other Ministries (Health, Agriculture, Productive activities, Cultural Heritage, etc.) provide institutional funding for non-university public research institutes that are under their control (more than 70 organisations).

Project-based funding for public research organisations and for enterprises

The strategic guidance for R&D at country level is provided since 2000 by the National Research Plan (NRP), which establishes priorities for the national research and strategic criteria to allocate national resources. Within the set guidelines, the major public funding programmes for R&D, handled by the Italian Ministry of University and Research, are the following:

- **PRIN (Research Programmes of National Interest):** to finance on an annual basis specific academic research projects. These projects are co-funded by the Universities, according to a variable percentage that is fixed at the publication of the call. Projects themes, programmes and methods are freely chosen by the projects proponents.
- **FIRB (Basic Research Investment Fund):** it is a Fund to support basic research activities aimed at boosting scientific and technical knowledge. The Fund, under the MIUR responsibility, is also aimed to strengthen major research public and private infrastructure and to support clustering of highly qualified scientific centres.
- **FISR (Special Integrative Fund for Research):** it finances specific actions of strategic interest of different public administrations (Environment, Transport, etc.), according to the guidelines set by the National Research Plan.

- **FAR (Fund for Applied Research):** it provides financial support to industrial and pre-competitive research projects carried out by enterprises in cooperation with universities to develop new products/processes. The Fund for Applied Research acts through thematic calls or automatic interventions and foresees a financial support through grants and repayable loans.

- **PON:** it is an Operative Programme at national level, co-funded by Structural Funds. The PON for “Scientific research, Technological development and High Education” handled by MIUR, addresses research programmes in Southern Objective 1 regions and aims at structural changes within the larger strategy of the Development Plan for the *Mezzogiorno*. Within the framework of the PON, the **PIA (Integrated Aids Package)** instrument allows for the submission of a single multi-annual development research plan. A single application allows support for pre-competitive research and industrial development. This instrument unifies, integrates and simplifies the existing procedures, making financing more accessible for the eligible companies.

- **FIT (Fund for Technological Innovation):** it is a Fund managed by the Ministry of Productive Activities (MAP) to finance research activities linked to technological innovation. It has been created to strengthen industrial research and related technological development with a view to enhance the ability of enterprises to turn knowledge and technologies into products, processes and services with increased added value. The Fund is presently managed through thematic calls and foresees for each funded project a mix among grants, easy terms financing and bank credits. Among the calls recently launched under the FIT scheme, some are worth to be mentioned here:
 - **Incentives for medium and high-tech enterprises.** This measure provides support for pre-competitive development initiatives by small or start-up companies and research centres operating in the industrial (including craft enterprises producing goods), agro-industrial or transport fields. The projects to be funded can be developed in cooperation with universities and public research centres. The projects are funded through loans with favourable conditions, corresponding to 60% of total costs, and 25% under the form of grants. The minimum funding per project is 1 million Euro and the maximum is 3 million Euro. The available resources for the call are 50 million euros.
 - **Funds to sustain Innovation and Technology Development in Enterprises.** This initiative finances process innovation to facilitate pre-competitive development research and innovation projects, with the aim to introduce digital innovation programmes in the critical/strategic processes of enterprises. The instrument addresses clusters/consortia of enterprises (predominantly SMEs) with the aim of reinforce clustering processes and "district"-oriented approaches. The funds allocated to this initiative amount to 270 million Euro, distributed through a new financing mix: 10% grants, 80% loans at low interest rates (0,5%) and the remaining 10% loans at market interest rates.
 - **Priority Technology Areas.** The call foresees a budget of 180 million Euro for pre-competitive research activities aimed at developing product or process innovation in 5 specific areas, i.e. advanced materials, chemicals, biotechnology, mechanics and environment are financed through this measure.

- **High Technology Poles.** This initiative finances the establishment of 36 high-tech poles in specific sectors: telecommunications, automation, aerospace, electronics and transport. The funds allocated to this initiative increased from 360 million Euro (initially planned) to 616 million Euro. The aim is to foster the creation of high-tech poles that bring about radical product innovation through the use of digital technologies and that are able to compete in international markets. This instrument tends to favour the formation of clusters of big enterprises, SMEs, research centres in sectors where product innovation through digital technologies is the key to success.

Table 1: Policy mix for R&D in Italy

Policy categories	Policy instruments: short description and target group
R&D Domain	
R&D policy generic	Ordinary Fund for Higher Education (FFO) Ordinary Fund for R&D (FOE) PRIN (Research Programmes of National Interest) PON PIA (Integrated Aids Package)
R&D policy sectoral	-
R&D / Innovation policy – Linkage	Technology Transfer Pilot projects in less favoured regions Technology Vouchers
R&D / Innovation policy – IPR	
R&D specific financial and fiscal policy	FIRB (Basic Research Investment Fund) FAR (Fund for Applied Research) FISR (Special Integrative Fund for Research) FIT (Fund for Technological Innovation): <ul style="list-style-type: none"> - Incentives for medium and high-tech enterprises - Funds to sustain Innovation and Technology Development in Enterprises - Priority Technology Areas - High Technology Poles High-Tech Funds for SMEs Tecno-Tremonti Guarantee Fund for SMEs - Special section on Digital Technologies Support for the promotion and the development of new innovative enterprises
R&D specific education policy	
R&D specific employment policy	
Finance Domain	
Financial and fiscal policy	Tax relief for patent registration Tax incentives to non residential researchers
Macroeconomic policy	
Human Capital Domain	
Education policy	Reform of the Education and Vocational Training system (Law 53/03) Support to Science Degrees (Law 170/03 and Ministerial Decree 05/08/04)
Employment policy	Reform of the Labour Market (Legislative Decree 276/03)
Innovation Domain	
Innovation policy generic	Code for Digital Administration (Legislative Decree 82/05) Public connectivity system (Legislative Decree 42/05)
Innovation policy sectoral	
Other policy areas	
Industry policy	Code on Industrial Property (Legislative Decree 30/05) Implementation of IT Platforms in strategic sectors Fund for enterprises financing
Trade	
Defence	FREMM Frigate Project (PICO) EUROFIGHTER Project (PICO)

Consumer protection	
Health and safety	Advanced ophthalmological research project
Environment	Fund to promote sustainable development (Law 388/00 + Law 488/01) 30% of PA supply form recycled materials (Ministerial Decree 30/03) Development of a biomass research centre (2003) Grants to SMEs for EMS development (2001) Hidrogen project (FISR 2001 + MATT 2001) Solar Thermodynamic projects (2001-2004)
Regional development	
Competition	Fund for Competitiveness and Development (Financial Law)
Social security	Secure interoperability for national citizens identification systems project

5 Coherence between main policy objectives and priorities, and policy instruments

As mentioned in Section 3, “problems” arise when the policies are “translated” into specific measures and instruments. Despite the fact that the government seems to have clear objectives, when policies are implemented, the overall policy framework lacks coherence. As already mentioned, various measures have revealed unsuitable to pursue the objectives declared, leading to a policy package that is not always consistent and coherent. To cite an example, the incentive package originally conceived to stimulate research and innovation within small and medium-sized firms is used by large enterprises rather than by SMEs; the administrative/bureaucratic burden in terms of eligibility, access conditions, delays in the publication of calls, evaluation of proposals and the effective provision of funds to the beneficiaries together with the uncertain continuity of measures have discouraged the use of these instruments by SMEs. Another example is the latest reform of the public incentive system that, rather than favouring, penalises SMEs in the access to credit. Also changes in legislation (e.g. increases and decreases in the tax on patents registration) certainly do not contribute to the creation of a climate of confidence.

Another example is the theme of finance for innovation that, although present in the current debate, is still often overlooked in the national policy agenda in practical terms, and effective measures responding to the challenge are missing. Also the development of venture capital in Italy has remained in a declaration of good intentions: a high-tech fund for SMEs was launched in 2005 but it never became operative due to the shortage of funds. Several interesting initiatives have been launched but their scope is limited at regional level (e.g. “Early stage” fund in Tuscany, “Ingenium” in Emilia Romagna, “Next” in Lombardy, etc). The same applies to the valorisation of human capital: the National Reform Programme- PICO devotes a chapter to “strengthening education and training of human capital” and contains a wide-ranging action plan to support the reform of both the educational and vocational training system as well as the university system but clear indication of timetables, quantitative targets, monitoring and evaluation practices is missing. Moreover, the limited amount of funds set aside to implement the measures and projects to improve education suggests that there is no proper match between the actions proposed and the resources allocated.

Revision and rationalisation of policy instruments process have often been claimed at different levels to better coordinate objectives and instruments, and to improve intervention modalities and allocation of resources, procedures and organisational aspects. Some attempts are being made in this but additional efforts are still required to further progress towards a more effective incentives system that should be based on:

- the concentration of resources on a limited number of efficient and effective instruments (coherence of objectives and effective selection mechanisms)
- the concentration on objectives that can positively affect territorial gaps, SMEs dimension growth, internationalisation

- the specialisation of measures and a more balanced mix between automatic and “upon-selection” instruments
- the introduction of simplified procedures also through a more restricted pool of managing entities

The review process should involve the whole incentive system, at national and regional level, to avoid overlapping and duplication of interventions, to render the allocation and management of resources more efficient and to develop more effective actions in a coordinated framework of policies.

6 Policy mix instruments and target groups

The Italian R&D policy mix addresses various categories of actors operating in the national economic system. R&D funds managed by the Ministry of Research mainly target universities, public research centres and agencies to perform basic and fundamental research in national strategic sectors (FFO, FOE, FIRB, etc.). Some supporting schemes (such as FAR) that are relevant for private companies and SMEs, have registered in the last years a substantial increase in their participation. However, a general uncertainty on funding schemes continuity and effectiveness, due to the unstable overall Italian public finance situation that in many cases put constraints to the available R&D measures financing, has often discouraged the participation of small companies that are not able to undertake the projects risk and make a long-term investment planning in a continuous changing rules environment.

Many incentives and instruments have been set up under the industrial policy guide that directly address innovation and industrialisation investments (i.e. FIT). Also in this case, the system has gone through reforms that have brought changes in the funding schemes rules, modifying interest and measures effectiveness among the target groups.

Attention to new categories of actors, such as high-tech start ups, has only recently received more attention by the general policy mix and new measures have been conceived to address innovation finance and risk capital needs. A recent orientation of the R&D policy is gradually targeting poles and aggregations of entities (e.g. technology districts, poles of excellence, competence centres, etc.) that may play a major role in the process of national economic system consolidation and in the national scientific knowledge and research excellence growth.

It is worthwhile noting that, despite the original conception of the instruments towards target groups, the beneficiaries who apply for the different measures varies according to the measure/instrument typology. The national incentives for R&D and innovation are usually provided for medium-size investments programme, while regional measures are most suitable for small-size projects involving mainly SMEs (usually belonging to the services sector). Another differentiation lies in the type of instrument. If they are “general” instruments (often managed through automatic incentives), they are usually more utilised by SMEs (also micro companies); if they are focused and selected instruments (that foresee evaluation procedures for the project approval), they usually regard bigger investment programmes applied for by big-medium companies. A final comment regards the geographical dimension of projects that register a major participation of large to medium companies in the Central-North of Italy and a smaller dimension in the South of the country¹².

¹² Source: Relazione sugli interventi di sostegno alle attività economiche e produttive. Ministero delle Attività produttive, Luglio 2005.

Table 2: Policy instruments and broad routes to increase R&D investments

Policy categories	Policy instruments	ROUTE 1: promote establishment of new indigenous R&D-performing firms	ROUTE 2: stimulate greater R&D investment in R&D- performing firms	ROUTE 3: stimulate R&D investments in firms non- performing R&D	ROUTE 4: attract R&D- performing firms from abroad	ROUTE 5: increasing extramural R&D carried out in cooperation with public sector	ROUTE 6: increase R&D in public sector
R&D Domain							
R&D policy generic	FFO FOE PRIN (Research programmes of national interest) PON – PIA (Integrated aid package) Firms participating in international R&D programmes	X ^{b)} X	X ^{b)} X	X ^{b)} (X)	X ^{b)} X		X X X
R&D policy sectoral							
R&D / Innovation policy – Linkage	Technology Transfer Pilot Projects Technology Vouchers	[X] ^{a)} [X] ^{a)}	[X] ^{a)} [X] ^{a)}	[X] ^{a)} [X] ^{a)}	[X] ^{a)} [X] ^{a)}	X X	X X
R&D / Innovation policy – IPR							
R&D specific financial and fiscal policy	FIRB (Basic research investment fund) FAR (Fund for applied research) FISR (Special integrative fund for research) FIT: Incentives for medium and high- tech enterprises FIT: Innovation and technology development in enterprises FIT: Priority technology areas FIT: High technology poles High-tech Fund for SMEs Tecno-Tremonti (tax incentive) Guarantee Fund for SMEs - Special section on Digital Technologies	X X X ^{a)} X X X ^{c)} X X ^{a)}	X X X ^{a)} X X X ^{c)} X X ^{a)}	(X) (X) (X) ^{a)} (X) (X) X ^{c)} (X) X ^{a)}	X X X ^{a)} X X X ^{c)} X X ^{a)}		X X X X X

	Support for new innovative enterprises	X					
R&D specific education policy							
R&D specific employment policy							
Finance Domain							
Financial and fiscal policy	Tax relief for patent registration Tax incentives to non-residential researchers	X	X	(X)	X		[X]
Macroeconomic policy							
Human Capital Domain							
Education policy	Reform of the Education and Vocational Training system (Law 53/03) Support to Science Degrees (Law 170/03 and Ministerial Decree 05/08/04)						
Employment policy	Reform of the Labour Market (Legislative Decree 276/03)						
Innovation Domain							
Innovation policy generic	Code for Digital Administration (Legislative Decree 82/05) Public connectivity system (Legislative Decree 42/05)						
Innovation policy sectoral							
Other policy areas							
Industry policy	Code on Industrial Property (Legislative Decree 30/05) Implementation of IT Platforms in strategic sectors Fund for enterprises financing					X	
Trade							

Defence	FREMM Frigate Project EUROFIGHTER Project						X X
Consumer protection							
Health and safety	Advanced ophthalmological research project						X
Environment	Fund to promote sustainable development (Law 388/00 + Law 488/01) 30% of PA supply form recycled materials (Ministerial Decree 30/03) Development of a biomass research centre (2003) Grants to SMEs for EMS development (2001) Hydrogen project (FISR 2001 + MATT 2001) Solar Thermodynamic projects (2001-2004)						X
Regional development	Mezzogiorno Development Plan (MDP) 2000 2006	X	X	X	X	X	X
Competition	Fund for Competitiveness and Development (Financial Law)						
Social security	Secure interoperability for national citizens identification systems project						X

a) Size restriction

b) Restricted to specific regions

c) Age restriction

X: target group and eligible for funding

[X]: target group but not eligible for funding

(X): not primary target group, but eligible for funding

7 Balance within R&D policy mix

Though it is extremely difficult to rank different instruments and funding schemes since which address different targets, are based on different types of intervention modes, and have different potential levels of impact on the national economy and on the R&D overall status improvement, a highly tentative effort is made to provide a list of the likely relative importance of the R&D policy instruments in place in Italy.

The criteria used are a) overall contribution to increase private R&D expenditures, b) impact on specific aspects of the NIS or R&D performers, c) public attention/attention by policy makers, d) volume of public funding involved, and e) beneficiary of a shift in public funding.

Table 3: Assessment of ‘importance’ of R&D policy instruments

Instruments	Funding per year (*)	Criteria				
		a	b	c	d	e
FFO			XX	XX	XX	
FOE			XX	XX	X	
PRIN (Research programmes of national interest)	2.15m (2003)		XX	XX	X	
PON – PIA (Integrated aid package)	Over 1,000m (2000-2006)	X	X	XX		
Firms participating in international R&D programmes	n.a.	X				
Technology Transfer Pilot Projects	2.3m (2005)	X				
Technology Vouchers	(**)	X				
FIRB (Basic research investment fund)	212m (2005)		XX	X		
FAR (Fund for applied research)		X	XX	X		
FISR (Special integrative fund for research)	144.6m (2000-2003)		X	X		
FIT: Incentives for medium and high-tech enterprises	50m (2006)	XX	X	X		
FIT: Innovation and technology development in enterprises	270m (2006)	XX	X	X		
FIT: Priority technology areas	180m (2006)	X	XX	X		
FIT: High technology poles	616m (2006)	X	X	X		X
High-tech Fund for SMEs	100m (not assigned yet)	X	X	X		
Tecno-Tremonti (tax incentive)	n.a.	XX	X	XX		
Guarantee Fund for SMEs - Special section on Digital Technologies	160m (2005)	X	X	X		
Support for new innovative enterprises	n.a.	XX	X	X		
Tax relief for patent registration	n.a.	X	X			
Tax incentives to non-residential researchers	n.a.	X	X			
Reform of the Education and Vocational Training system (Law 53/03)	0					
Support to Science Degrees (Law 170/03 and	8.5 (up to 2005)					

Ministerial Decree 05/08/04)						
FREMM Fregate Project (PICO)	225 (2006-2008)					
EUROFIGHTER Project (PICO)	150 (2006-2008)					
Advanced ophthalmological research project	0					
Fund for Competitiveness and Development (Financial Law)	1.1 b (2007-2009)					
Fund for enterprises financing	300m (2007-2009)					

(*) Figures are provided in million euro as resources allocated to the last call.

(**) This is a measure managed at regional level. Available resources for each call vary from one region to another.

8 Emergence of R&D policy mix

The set of R&D policy instruments currently in place in Italy is the result of a major “cultural” and political change that took place by the end of the ‘90s that assigned a major strategic role to scientific and technological policy, acknowledging the crucial role of research for the future development of the country. It is in fact during this period when the National Research Plan is drafted ensuring coordination with the rest of the national policies; when the reform of the public research entities takes place and when the new instruments to finance basic and applied research in enterprises are designed.

The public support system for R&D in Italy is based on a funding scheme of direct aids to enterprises. The system is articulated into a large number of measures adopted at national and regional level. In recent years the role of regional policies has increased, especially in less favoured areas, mainly as support to innovation and technology transfer initiatives. The current set of measures available is the result of a reform action launched in 1997, still in progress, that achieved a key milestone in 1998, with the introduction of the National Research Plan (PNR) as the strategic guideline for the national research system.

The public support system is based on “bottom-up” direct funding schemes - open submission procedure allowing submission of proposals without specific deadlines - , or “top-down” procedures - through calls with specific requirements, objectives, and deadlines for submission - (although in recent years the system is witnessing a shift from bottom-up to top-down procedures). In addition, fiscal incentives have been also introduced (tax credit and tax reduction on investments). The whole scheme is under revision in order to create a more balanced and effective intervention model.

The overall funding scheme of direct aids to enterprises foresees a total number of 380 operational instruments¹³ of which: 51 are national measures (9 specifically for R&D and Innovation), 14 are “decentralised” to regions (2 specifically for R&D and Innovation), and 314 (14 specifically for R&D and Innovation) have a regional nature (they are applied and managed by regions through regional laws). Despite the huge number of measures, however, 80% of national resources for enterprises are concentrated on 10 major instruments and 95% of resources for “decentralised” instruments are allocated to 8 measures. Out of the €46 billion allocated to enterprises in the period 2000-2004 through the different operating instruments, 21.8% addressed R&D and Innovation objectives (22.9% of resources allocated on national instruments, 31% allocated to “decentralised” instruments and 3.1% supplied through regional measures). A peak in 2002 and a declining trend in 2003 and 2004 have been registered due to a decrease in resources allocated on some major instruments (FIT and PIA Innovazione). Incentives for R&D and Innovation have mainly concentrated in the Centre and Northern regions (65.6%).

¹³ Data for 2004

Among the supporting measures for R&D and innovation, the major instruments are the Fund for Research (FAR)¹⁴ and the Fund for Technological Innovation (FIT)¹⁵. Since 2001, the simplification of these instruments has contributed to a significant increase in the number of projects for industrial research and technological innovation. However, the positive trend has been interrupted due to the closure of submission procedures that occurred since December 2002 for the FAR (excluding projects involving Objective 1. areas for which the suspension started in March 2004) and since January 2003 for the FIT, owing to a lack of financial resources, that were not integrated by annual appropriate provisions in the Financial Laws of the last years.

An important reform of the public incentives system started in 2005. The reform concerns the mix of instruments to access public funding and the introduction of private banks in the public incentive system. The reform introduces a new financing mix consisting of: grants plus credits at low interest rates plus credits at market interest rates to be given by the private banks. The novelty of the reform is the presence of private banks and the need to comply with the conditions applied by the private banking sector in order to obtain the credit. Failure to comply with these requirements will also imply automatic exclusion to opt for public grants. With this measure, the government is trying, not only to involve the private banking sector in the financing of innovation, but at the same time to implement a system based on merit (“merito creditizio”) to avoid malfunctioning in the allocation of public funds that might have occurred in the past. The consequences of this reform have yet to be seen but a first and important consideration has to be made regarding its effects on the access to credit by SMEs and micro-enterprises as the requirements/conditions imposed by the private banks may not be easily fulfilled by these type of enterprises that may see their chances to access funds for innovation further reduced.

A drawback of the system is that review exercises have been rarely put in place in the past for the re-design of existing measures or for the development of new instruments. Some attempts have been made more recently to generate policy learning processes and to review existing measures on the basis of feedback on previous experience. This is the case of the reforms of the public incentives system (mainly the FIT fund) and the Law 488/92 which occurred in the last year. Both reforms have been conducted on the basis of an evaluation of the previous year’s implementation (e.g. the Report on incentives system in the period 2000-2004 produced by the Ministry of Productive Activities) and the consultation of major stakeholders (mainly representatives of industrial associations). Some major requirements emerged from this appraisal which have been taken in the re-design of the instruments: (i) more rigorous selective processes for projects approval; (ii) a more rewarding system which takes into consideration innovativeness and feasibility of the proposed investment programmes; (iii) access to private financial resources to support the foreseen investments.

¹⁴ put in operation through the Legislative Decree 297/99

¹⁵ implemented through Law 46/82

9 Governance of the policy mix

Until the general elections of April 9-10 2006, the ministries involved in R&D policy in Italy were: the Ministry of Economy and Finance (MEF), which has a crucial role in deciding the availability of resources and the allocation of the National Budget; the Ministry of Education, University and Research (MIUR), the Ministry of Productive Activities (MAP), the Minister for Innovation and Technology (MIT) and, to a lesser extent, other Ministries such as the Ministry of Environment and the Ministry of Health.

The two Ministries that play a major role in R&D policy (besides the Ministry of Economy and Finance) are the Ministry of Education, University and Research (MIUR) and the Ministry of Productive Activities (MAP). The role of the Minister for Innovation and Technology (MIT) is focused on the coordination, steering and encouragement of actions by other public administrations to foster the implementation of the Information Society in the country.

The Ministry of Education, University and Research (MIUR) has played, since 1989, a key role in the formulation of R&D policy. The Ministry is in charge of the coordination and supervision of universities and public research institutes. It proposes and adopts annual and multi-year programmes for R&D, at general and sectoral levels and is also responsible for the three-year National Research Plan. A large part of the public funding for R&D is under MIUR's responsibility. The Ministry also supervises a large number of research organisations (e.g. the CNR (National Research Council)). The new government elected in May 2006 split the MIUR into two ministries, i.e. a Ministry of Education and a Ministry of University and Research.

The Ministry of Productive Activities (MAP), which recently changed its name into Ministry of Economic Development, shares the responsibility for R&D and innovation policy along with the Ministry of Education, University and Research. One of its main roles in R&D policy is to finance the Fund for Technological Innovation (FIT) which promotes strategic industrial research by supporting pre-competitive R&D activities as well as firms' participation in international R&D programmes, and by providing special funds for R&D in the aircraft and naval sector. In addition, the Ministry of Productive Activities also oversees the research carried out by specialised agencies (e.g. ENEA, the National Agency for New Technologies, Energy and Environment).

The Ministry for Innovation and Technology (MIT), renamed as Ministry for Public Function and Innovation, was established in 2001 and, as stated above, it is in charge of stimulating, co-ordinating and directing government actions related to the development of ICT in the country. The Ministry is supported by the Department of Innovation and Technology (DIT) whose mission is to co-ordinate policies directed to the development of the information society and those related to the application and access of information and communication technologies for the public administration, the citizens and the enterprise sector.

Coordination takes place through an important policy formulation committee called CIPE¹⁶ (Inter-ministerial Committee for Economic Planning). CIPE is a high-level committee in charge of coordinating and planning the economic policy of the country¹⁷. CIPE is the highest level of S&T policy co-ordination and its role for research policy became more effective after a special section dedicated to research and education was created during the last decade. Among its functions, CIPE is in charge of evaluating the Economic and Financial Planning Document (DPEF)¹⁸ before its approval by the Parliament. The DPEF, drafted by the Ministry of Economy and Finance, is the national document of economic and financial planning which is passed yearly by the Parliament. The DPEF defines the major strategic guidelines and the general economic strategies of the country, including the policy measures to foster Scientific Research and Technology, and the annual allocation of financial resources devoted to R&D. This fundamental policy and planning document assigns Italy's intervention priorities for the coming year plus the general identification of policy measures to be undertaken in the following three years. Even if it is not specifically focused on research, all subsequent R&D and Innovation planning measures are modelled upon it.

CIPE is also responsible for the approval of the National Research Plan¹⁹ and the evaluation of its implementation, together with the coordination of other research activities and the allocation of funds. The National Research Plan is prepared by the Ministry of Education, University and Research (MIUR) and is the document where the strategy and the objectives of the Italian public research system are set out in a three-year basis²⁰.

The National Research Plan is based on a previous document - also prepared by the MIUR: the Science and Technology policy guidelines²¹. These guidelines are defined after a wide consultation and consensus among the actors of the Italian research system: the scientific community, universities, public research bodies, enterprises and trade unions. The strategic choices set out in the latest document, the 2003-2006 Science and Technology (hereafter S&T) Guidelines derive from the analysis of the Italian research system and from the identification of its strengths and weakness (analysis carried out at central level by MIUR), as well as from the evaluation of the opportunities for research in the international scenario. The 2003-2006 S&T Guidelines provide a precise framework of priorities for national research in order to foster the position of the country and develop excellence in the most promising and added value technological areas. On the basis of these guidelines, the National Research Plan for the years 2005-2007 was approved by the CIPE and presented by the Minister of Education in March 18th 2005. For the elaboration of this edition a larger number of key actors than in the past have been consulted and a variety of opinions, feedback and suggestions have been collected from all actors and institutions of the Italian R&D system as well as from EU institutions.

¹⁶ CIPE: Comitato Interministeriale per la Promozione Economica

¹⁷ CIPE's board members are: the President (the President of the Council of the Ministers), a vice-President (the Minister of Economy and Finance), a secretary (the vice-Minister of Economy and Finance) and other Ministers whose presence is necessary to deploy the overall industrial and economic policies.

¹⁸ Documento di Programmazione Economico Finanziaria (2005-2008)

¹⁹ PNR: Programma Nazionale della Ricerca.

²⁰ The coordination and programming of the Italian scientific research system is disciplined by Law 204/98

²¹ Linee guida per la politica scientifica e tecnologica del Governo.

The new government is stressing the importance of coordination among national policies and, following this line, the Ministry of Economic Development (headed by Mr Bersani) is calling for active collaboration and teamwork among the three Ministries: Ministry of Economic Development; Ministry of University and Research (headed by Mr Mussi) and Ministry for Public Function and Innovation (headed by Mr Nicolais) to ensure efficiency and effectiveness of the forthcoming policy interventions.

Unfortunately, policy evaluation is still a key weakness in the policy implementation process. Although some evaluations exercises are carried out by several institutions and under different forms²², they are limited to monitoring or auditing rather than to proper evaluations that systematically assess the results and provide feedback for policy making. A proper mechanism that systematically evaluates the results, while providing feedback for the allocation of resources, is still lacking in Italy likewise a specific body where gaps in the policy system can be addressed.

The new government is aware of the situation and there are some signs of improvement such as a trend towards increasing consultation with the national innovation players in the design of policy measures and support instruments, and the creation (approved in the 2007 Financial Law) of the National Agency for the Evaluation of University and Research²³ to evaluate the results of the research activities carried out by Universities and research centres.

²² The Ministry for Education, Universities and Research (MIUR) is responsible for the evaluation of R&D carried out by public institutions and agencies. The Ministry for Productive Activities (MAP) in collaboration with the Ministry of Economy and Finance (MEF) and the Ministry for Education, Universities and Research (MIUR) publishes an annual report on the instruments used to sustain the economic and productive activities (“*Relazione sugli interventi di sostegno alle attività economiche e produttive*”). At regional level, some positive signs towards evaluation practices have emerged in the last few years in several regions (e.g. Campania, Emilia Romagna).

²³ ANVUR: Agenzia Nazionale della Valutazione Università e Ricerca.

10 Interactions among policy instruments in place

Since no analyses of interactions among research policy instruments in Italy are available, one depends on theoretical reasoning about likely positive, neutral or negative effects of the co-existence of the various R&D policy measures.

Among a number of R&D policy instruments, one could expect a positive interaction effect as a result from a kind of “succession effect”: This will occur when a programme stimulates R&D activities in a specific group of actors, or in a specific field, or of a specific type, which is a kind of precondition for the effective working of another instrument. This may be illustrated by the following example: An increase in institutional funding for universities or other public research institutions (FFO, FOE) in association with institutional reforms that promote the transfer orientation of these institutions (e.g. through the technology transfer pilot projects or the technology vouchers) will produce a higher potential, including a better quality, of spin-off projects. A programme that assists such projects (such as the Support for New Innovative Enterprises) will work more effectively and produce a higher number of promising spin-offs. This may positively influence programmes that provide early stage funding for technology enterprises (such as the High-tech Fund for SMEs). If these programmes produce a higher number of high-tech start-ups, technology programmes (such as the Priority Technology Areas or the High Technology Poles programmes within FIT) or programmes that support R&D co-operation with public research (such as the Incentives for Medium and High-tech Enterprises programme) will profit from a larger and better prepared target group, allowing them to focus on high-quality projects and thus generate higher leverage effects. If these programmes are successful in creating new technologies, programmes that focus on support for commercialisation and market introduction of new technologies (such as the Guarantee Fund for SMEs in the field of digital technologies) will have premises to be successful. A similar effect may be postulated in case of programmes that stimulate enterprises to enter into R&D activities, or conduct R&D in a more intense, more effective or more sophisticated way (which could partially be the case with the FAR programme and substantially with the Tecno-Tremonit tax incentive programme), thus preparing these enterprises for more challenging R&D activities typically to FIT programmes.

There are potential negative effects, too. These may occur for example between two programmes that are substitutive in nature (in terms of the type of R&D activity they address), but one programme offering more attractive conditions for the beneficiaries. Such a situation might be the case between the tax incentive programme (which offers only a small subsidy ration, though involving little compliance costs) and the various R&D grant programmes for enterprises such as FAR, the FIT programmes, or the Support for New Innovative Enterprises (which may offer higher subsidy ratios, but imply additional transaction costs for developing project proposals and reporting to the funding agency). A negative effect will occur as long as one type of programme is clearly more attractive than the other, which will consequently diminish the demand for the unattractive one. A negative effect - with respect to the effectiveness of the measures - may also occur in case that receiving direct grants raises the enterprises' total volume of R&D expenditures, and thus the amount of the tax credit. This will

raise the costs of the tax credit without any additionality effect stemming from the tax incentive measure.

Another type of negative effects concerns the R&D orientation that is associated with a specific R&D policy instrument. PRIN funding to universities, for instance, involves typically basic research activities which are evaluated against the number of publications in international, top-ranked refereed journals. Research that can be successful in this respect is often little application oriented in nature, and thus of little relevance to most enterprises. Increasing PRIN funding may shift research activities of public research institutions towards pure scientific research and make them a less attractive, or even less qualified partner for R&D co-operation with enterprises. This may negatively affect all programmes that focus on such types of R&D activities, e.g. co-operative programmes of the FIT. The same holds true in the opposite case of increasing funding for application-oriented research, may reduce the capacities for pure scientific research at public institutions, and consequently the demand for pure research grants - or at least the quality of the proposals submitted.

A similar case is with institutional funding: increasing this source of finance is likely to reduce engagement of public research institutions in acquiring funding from third parties. Higher institutional funding, on the other hand, may increase the scope and quality of research, which may be advantageous for some other programmes such as technology programmes or programmes that support new innovative enterprises, since it increases the quality of research conducted in public institutions. Increasing funding for public research institutions through project-based programmes may have negative effects on the level of institutional funding: since public budgets are under pressure, increased availability of project-based funding may be used as an occasion to cut institutional funding.

This points to a likely interaction between financial R&D policy instruments and reforms at public research institutions: Since the latter intends to increase external co-operation and raise competitive research, reforms tend to support the effectiveness of project-based R&D programmes by putting pressure on public research institutions to make more use of these funds and to engage more seriously in this type of research, including transfer activities to enterprises.

An extremely difficult area of likely policy mix effects concerns the interaction of R&D policy instruments and other policy areas. Only for some instruments, some potential effects can be identified more or less clearly. One example is general corporate taxation and the working of tax incentives. The higher corporation taxes are, the more effective is an R&D tax exception. In the field of macroeconomic policy, there are some speculations on how interest rates, inflation, public debt and public spending structures, wage policy etc. may affect R&D expenditures, but no robust findings on the policy effects exist. What is quite clear is that a dynamic macroeconomic environment, i.e. raising demand for goods and services will spur investment decisions, including decisions to invest into R&D. Los corporate taxes will increase the internal funds of enterprises available for investment and could thus raise R&D investment. Whether there is a positive net effect on R&D expenditures will depend on the way the government deals with reduced tax income out of corporate taxes. If this would result - in the most simple and extreme case - in equivalent cuts of public R&D budgets, the net effect will surely be negative. If

reduced tax income is compensated by higher taxes from other sources or by debt or by savings in not R&D-related public expenses, net effects could be positive. This example should just illustrate that simple policy mix conclusions can not be derived in this area.

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