SIMPATIC

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Minutes of the second SIMPATIC annual conference

The Hague, 2-4 April 2014

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SEVENTH FRAMEWORK PROGRAMME

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SECOND SIMPATIC ANNUAL CONFERENCE

April 2014

The Second SIMPATIC Annual Conference was organised on 2-4 April 2013 in The Hague at CPB- Netherlands Bureau for Economic Policy Analysis and at Duth Ministry of Economic Affairs. It consisted of two and half days conference; one tax credits session, scientific macro and micro sessions and a policy panel. Keynote speeches were delivered by Bart Van Ark, Executive Vice President, Chief Economist and Chief Strategy Officer of the Conference Board and member of the SIMPATIC Scientific Advisory Committee and by Bronwyn Hall, Professor of Economics, Emerita, Professor of Economics of Technology and Innovation at UC Berkeley, University of Maastricht and UNU- MERIT and member of the SIMPATIC Scientific Advisory Committee. All sessions took place at Dutch Ministry of economic Affairs, except the tax credits session organised at CPB premises.

I was presented as well the first draft on Public R&D budgets for smart fiscal consolidation given by Reinhilde Veugelers, Prof at KULeuven (MSI), senior fellow at Bruegel and scientific coordinator of SIMPATIC. It was organised an interview with the Dutch Financieele Dagblad newspaper.

The invitation was sent out to a total number of 4,824 recipients. The event was attended by 76 participants, composed of partners, EU officials, representatives of international corporations, members of academia.

Promotion activities for the conference included:

- Dedicated banner on the SIMPATIC website

- Dedicated banner on the Bruegel website

- Promotion in the SIMPATIC newsletter

- Promotion in the Bruegel newsletters – Bruegel Update and Bruegel Update for members

- Promotion on the SIMPATIC and Bruegel Twitter accounts before and during the event

2nd SIMPATIC ANNUAL CONFERENCE

@The Hague, 2-4 April 2014

All Power Point presentations are available on SIMPATIC website (www.simpatic.eu).

MINUTES OF THE CONFERENCE

(2 April)

15:00-17:50 Tax credits: are R&D tax incentives sufficiently effective and efficient in stimulating R&D? Some pieces of evidence

Chair: ***Pierre Mohnen****, Professor, Maastricht University and UNU-MERIT*

Jacques Mairesse*, MERIT and CREST/ENSAE "Some reflections and a few results on the evaluation of R&D tax incentives"*

The presentation focused on the effects of R&D tax incentives on firm investments in R&D and provided some pieces of evidence from France.

Two aspects were considered:

1) Intensive margins (firms already engaged in R&D).

The results of these analyses are published in "The R&D Tax Credit in France: Assessment and Ex-ante Evaluation of the 2008 Reform", Oxford Economic Papers, 2013, 65 (3), p.746-766. This article presents an econometric analysis of the direct effects of the R&D tax credit (RTC) on private R&D investment and capital in France and proposes an ex ante evaluation of the major reform that has implemented, in 2008, a new regime of RTC much more generous than the previous ones. This new regime is fully based on nominal levels of R&D investment, using a 30% rate of tax reduction up to a high threshold. Since it entails significantly increased budgetary costs, it is particularly important to know whether or not it will be effective. To pursue this question this article first measures the user cost of R&D capital and estimates an error correction model of a dynamic R&D demand function on a large panel data of French firms doing R&D over the period 2000-07, obtaining a preferred estimate of -0.4 for the long run elasticity of user cost of R&D capital. The study then performs a micro-simulation of the effects of the 2008 RTC reform and compares it to a benchmark micro-simulation assuming no reform. It thus finds that the benefit-

to-cost ratio or budget multiplier —here understood as the ratio of additional private R&D expenditures to the lost tax revenue associated with the tax credit— would in the long run be about 0.8. The reform has a positive and significant effect on R&D capital and investment, which are higher in the long run by about 13% than they would have been without it.

2) Extensive margins (new firms engaging in R&D).

This is an ongoing analysis using GECIR and accounting data. The econometric models will estimate the probability of starting to engage in R&D, the probability of exiting R&D, the probability of never performing R&D and the probability of continuously performing R&D. The explanatory variables of the models will include: year dummies, year of entry in R&D dummies, size classes, industry dummies, type of firm (independent, subsidiary, or head of group), age, export classes and lagged R&D indicators. One of the results of this ongoing analysis is that the probability of starting to perform R&D increased substantially starting from 2008.

Considering both types of effects in an encompassing framework should improve the estimation of both types of effects and allow to disentangle and assess the marginal costs and fixed costs of doing R&D. This comprehensive framework is currently under development.

Finally, a tentative meta-analysis of past studies on R&D tax incentives shows that the effectiveness of R&D tax credit appears to have increased over the past 30 years.

***Bas Straathof**, Programme leader, CPB "A meta-analysis of the effects of R&D tax incentives"*

This study performs a meta-analysis comparing the results from many studies on R&D tax incentives. The literature on R&D tax incentives is characterised by large heterogeneity in methods and results. Two estimation strategies are implemented: estimation of the direct effect and estimation of the user cost of capital. The results indicate that there is strong evidence of publication bias. Matching and quasi-experimental studies have more conservative estimates. Concerning firms' characteristics, the study shows that R&D tax incentives seem to have larger effect on small firms. Moreover, manufacturing and large firms show lower returns.

***John Lester**, Executive Fellow at School of Public Policy, University of Calgary, Canada "An International Comparison of Tax Assistance for R&D: Estimates and Policy Implications"*

This study presents a comparison of tax assistance for R&D in different OECD countries. Concerning the form of assistance, 18 countries provide tax credits (level: 12 countries; incremental/hybrid: 6 countries), 10 countries impose no taxation on R&D, 12 countries provide super deductions, and 5 countries provide both tax credits and super deductions. Caps are introduced in 12 countries, while thresholds are used in 2 countries. Refundability is provided for all eligible firms in 10 countries, while in only 3 countries it is available only for small firms. Some countries provide enhanced benefits for small firms (6 countries) and for young firms (3 countries). Moreover, caps and thresholds create preferences for small business in 5 countries.

Some countries are at risk of excessive subsidization: for instance, the subsidy rate can be as high as 30 or 40 percent in different countries. Excessive subsidization occurs if the benefits (knowledge spillovers from induced R&D) are higher than the costs (lower private value of the output, financing with distortionary taxation and administration and compliance). The optimal subsidy rate is equal to the spillover rate. The study provides different simulations showing how the economic benefits vary with the subsidy rate according to different parameters. Results suggest that for subsidy rates higher than 25% or 35% the net economic benefits are likely to become negative.

***Pierre Mohnen**, Professor, Maastricht University and UNU MERIT "Tax incentives and firm size: effects of R&D investment in Spain"*

This study presents pieces of evidence from Spain on the relationship between tax incentives and firm size.

The research questions that this study tries to address are: What is the elasticity of R&D with respect to its user cost and hence indirectly to R&D tax credits? What is the difference between the short-run and the long-run elasticity? Do small firms react differently from large firms? Are there differences in estimated elasticities depending on whether one uses ex-ante vs ex-post tax incentives?
Tax incentives have pros and cons. On the one hand, tax credits are simple to claim and allow firms to choose their own R&D projects. On the other hand, firms must be able to finance R&D projects up-front. Moreover, they must obtain positive taxable income in order to benefit from the credits. These two problems may be particularly severe for SMEs.

The estimation results show that the mean number of years to return to equilibrium following a shock is 5 years for large firms and 2.5 years for SMEs. Moreover, the user cost elasticity is much higher for SMEs than for large firms. Finally, the

elasticities with respect to the effective user cost are much smaller than the elasticities from the legal user cost.

This study implies that policy makers should try to increase the awareness of R&D tax incentives and decrease the complications of applying for them. Moreover, they should provide more favorable tax incentives for SMEs (since 90% of the firms are SMEs but they only get 5% of the tax incentives).

Discussant: ***Frédérique Sachwald****, Head of the Business R&D Unit, French Ministry of Higher Education and Research*

The direct and fiscal support to business R&D has increased considerably in France starting from the years 2000s (especially after 2007). Analogously, the number of benefiting firms has considerably increased. Considering both direct and indirect financing to R&D, in 2010 SMEs received €1.9bil (47.5% of total R&D expenses), intermediate size firms €1.7bil (25.8% of total R&D), while big enterprises €3.9bil (23.2% of total R&D). The study "*Evaluation de l'impact des aides directes et indirectes à la R&D en France*" by Lhuillery, Marino and Parrotta will be published in 2014 and will present an evaluation of the impact of tax credits on firms' R&D. Considering the period 2004-2009, this study finds that a 1€ support in the form of tax credit corresponds, on average, to a firm expense of 1.03€ in R&D.

(3 April 2014)

9:00-13:00 SCIENTIFIC WORKSHOP 1

9:00-10:50 The endogenization of technical change in simulation models: State of the art and improvements

Chair: ***Paul Zagamé****, Director, SEURECO*

Boris Le Hir*, Senior Researcher, SEURECO and* ***Pierre Le Mouël****, Senior Researcher, SEURECO "R&D, ICT and Innovation: A new frame by NEMESIS"*

This presentation showed the improvements in simulation models to allow for endogenous technical change. The approach introduced in NEMESIS can be summarised by two key functions (at the sectorial level): the production of new ideas (as a function of the stock of knowledge) and the production of final output. Two difficulties emerge with this approach. First, knowledge externalities are specific

to sectors and have an inter-sectoral and international scope. It follows that it is necessary to build detailed knowledge spillovers matrices. Second, a specific approach for the service sectors should be designed, as there is no R&D for most service sectors.

In NEMESIS, product and process innovations have different impacts both on the demand and on the supply sides: the impact of product innovation is always positive, while the impact of process innovation can be either small or negative.

ICT and intangible assets are also important aspects that should be represented in simulation models. Intangible assets include: computerized information (softwares and databases), innovative properties (scientific and non-scientific R&D) and economic competencies (brand equities, organization,..). Despite their importance, most intangibles are not considered in national accounts: only investment in software is included in GDP, while R&D investments will be included soon.

Innovation in the ICT sector creates the scope for large scale strategic complementarities: innovation by ICT producers creates new technological (and organizational) opportunities for ICT users; in turn, innovation by ICT users increases the incentive for ICT innovation and benefits other users.

It follows that it is important to include ICT and intangibles in order to take into account innovation in all sectors. In particular, innovation in industrial sectors can be reflected by R&D investments, while innovation in service sectors is rather reflected by other intangibles.

A considerable obstacle for this analysis concerns data availability, as R&D and software investments are not available for every country and data on investments in organizational capital are poor. Moreover, quality adjustment increases the empirical difficulty.

***Leonidas Parousos**, Senior Researcher, ICCS "Two factor learning curves of power generation technologies: implementation in GEM-E3-RD"*

The GEM-E3-RD model is a global model with endogenous growth induced by technological progress. Technological progress is driven by two learning processes: the learning by doing curves measure how much the capital costs of a given technology will be reduced due to its increased adoption; the learning by research curves measure how much the capital cost of clean technologies will be reduced due to increased R&D expenditures.

The model includes an endogenous representation of global trade for low and zero carbon technologies (including inter-sectoral and intrasectoral spillover effects) and a detailed representation of the energy system (transport sector, power generation, energy consumption of households, energy efficiency).

The GEM-E3-RD model can be used to assess different pathways towards decarbonisation. The key research question with this respect is: can the EU economy get First Mover Advantage from pioneering strong climate action? First mover advantage is meant here as the possible trade and growth benefits stemming from technological leadership in technologies required to implement transition to a low carbon emitting economy.

The simulation results show that the first mover advantage can develop if three conditions are met: 1) the European internal market is sufficiently large and unified to allow for achieving a large part of learning by doing potential for clean energy technologies; 2) ambitious GHG emission reduction targets are eventually adopted by other regions of the world thus allowing the development of a large market for such technologies; 3) spillovers are sufficiently small or at least delayed to enable the retention of competitive edge for a period of time.

***Karen van der Wiel**, Program Manager Education, CPB "Work in progress: The relationship between public R&D spending and growth"*

This study reviewed the cross-country evidence on the relationship between public R&D spending and GDP growth. In general, the literature found both negative and positive estimates of the effects of government financed GERD on GDP growth and TFP.

In this study the reduced-form analysis of GDP per capita growth failed to find a significant effect of government financed GERD. Different explanations can be provided for this lack of significance. For instance, the public good nature of knowledge could imply that the returns are mostly international rather than national. Another explanation might be that perhaps a large chunk of government financed R&D goes into 'unproductive' activities. A final explanation could be that national accounts are not able to adequately represent the "value of science".

A follow-up question to this analysis is: how do choices for methods and data influence the estimate of returns to public R&D spending in terms of growth? An ongoing analysis will try to answer this research question.

11:05-13:00 Jobs and Innovation: Employment effects of innovation in services

Chair: **Metka Stare**, Associated to the Institute for Economic Research (Ljubljana)

***Joze Damijan**, Senior Research Fellow, Institute for Economic Research (Ljubljana) "Impact of Innovation in Services on Employment and Skill Upgrading"*
***Bettina Peters**, Deputy Head, Dept. of Industrial Economics and International Management, ZEW Center for European Economic Research "The influence of technological and non-technological innovation on employment growth in European service firms"*
***Elena Huergo**, Head of the Department of Economic Analysis, Complutense University of Madrid "Innovation and employment in Spanish manufacturing firms"*
*Discussant: **Rinaldo Evangelista**, Professor, University of Camerino (Italy)*

During this panel the discussion focused on the relationship between employment and innovation. As noted by Prof. R. Evangelista, this is an old debate that has not reached conclusive answers so far. Innovation has been placed at the heart of the Europe 2020 strategy for smart, sustainable and inclusive growth and job creation. However, the theory suggests a dual effect of innovation on employment: a displacement effect or a compensation effect.

Therefore, understanding how innovation relates to employment by looking at the data becomes important because different kinds of innovation may lead to different effects across industries, and the effects might be different in times of crisis.

The panel discussion tried to delve into the details of this question.
J. Damijan started by presenting two papers in which the authors analyse the impact of innovation on employment and skill composition. Their papers provide evidence supporting the idea that employment effects in services are fairly similar to manufacturing, but the impact on skill upgrading is substantially lower in services. Also, they show that Chinese import competition in manufacturing had no negative impact on employment, but promoted skill upgrading instead.

B. Peters showed that product innovation stimulates employment, with the result holding across countries, sectors, industries. Apart from a few exceptions, new products are not produced with less labour than old products. This effect is smaller with service innovation and larger in manufacturing. As for process innovation, there might be negative effects (displacement) and/or positive effects (compensation), but the evidence is weak. Organisational innovation has effects that differ across sectors.

In some sectors like the financial services, the effect is negative. In others, like high-tech services, there is no impact on employment.

E. Huergo presented a paper by F. Rojas in which the effects of the crisis on the innovation-employment relationship in Spanish manufacturing are investigated. In the paper, the author showed the existence of two periods with different effects of product innovation on employment. While there is a positive effect on employment before the crisis, the effect is reversed during the crisis, with process innovation maintaining its displacement effect. As the production of old products may be linked to a greater proportion of permanent workers, the chance of them being fired is low even after a decrease in the firms' sales, and this might at least partly explain the results.

From a policy perspective, the focus of innovation policies should not lay only on promoting performance, but also on employment growth and skill composition. The creation of an innovation-friendly environment for service firms is also seen as a necessary policy measure, as innovation in services has largely been neglected.

13:30-14:30 Lunck Talk

Chair: ***Guntram Wolff****, Director, Bruegel*

Reinhilde Veugelers*, Scientific Coordinator of SIMPATIC, Bruegel "Presentation of a policy brief on Impact of RTD policies: learning from the past, can we do better?"*
Discussants: ***Bertholt Leeftink****, Director- General Enterprise and Innovation, Dutch Ministry of Economic Affairs;* ***Laura van Geest****, Director, CPB*

The dangerous cocktail of high debt and low growth in the EU calls for smart means of fiscal consolidation. The key question is: Are public R&D expenditures on R&D an area of smart fiscal consolidation? The literature shows that because of the high societal benefits from R&D beyond private returns, driving long-term growth, public investment/support for R&D is a good candidate for smart fiscal consolidation.

Overall, public expenditures in the EU on R&D have increased in nominal terms between 2007 and 2012, although since 2010 there is a downward trend. Public R&D spending relative to GDP reached a top of 0.79% in 2009, but declined since, back to its pre-crisis level of around 0.7%. Compared to overall public expenditures the share of R&D related expenditures trended upward between 2007 and 2009 but started to decline somewhat since. The share of R&D in total public budget currently stands at 1.4% in 2012, which is a small decline from 2007 (1.5% in 2007).

Despite this aggregate pattern, there is great heterogeneity among the trends of the individual countries. Overall, innovation leaders tended to increase their expenditure in R&D while innovation laggards cut their budgets during the crisis, thus increasing the divide between the two groups.

The EU budget for R&I (both FP funds and parts of the Structural Funds) complements the national budgets available for R&D. As this holds especially for innovation lagging countries with lower own public R&D budgets and high fiscal consolidation pressure, the EU budget serves as mechanism to ease the public R&D divide in Europe.

The analysis on effectiveness of public R&D, although far from perfect, provides as yet no case against the treatment of public support for R&D investment as a pivotal part of smart fiscal consolidation, particularly in view of the potentially substantial, albeit long-term, social rates of return from R&D investments in excess of the private rates of return. Public investments in R&D conditional on being targeted to areas of high social returns, be them in the form of subsidies or taxes, should be on the radar of smart fiscal consolidators.

However, ex ante and ex post evaluations to assess whether interventions are well targeted and effective should be more systematically implemented. Moreover, complementary framework conditions need to be assessed and properly reformed when needed.

Some policy recommendations can also be proposed for the EU. First, the effectiveness of its own budgetary RTDI instruments (H2020 and the RTDI Structural Funds) needs to be properly evaluated ex ante and ex post, using state of the art evaluation methodologies. This evaluation should not only consider the additionality of public R&D funding with private R&D investment, but also the additionality with national public R&D funding. In addition, the effectiveness of the investments in increasing growth and jobs should be evaluated. Second, the EC should improve its analytical capacity underpinning the country specific recommendations with respect to public R&D interventions. Third, the “investment clause” exemption for national co-investment of structural funds should be executed, at least the RTDI component of it. This clause, proposed in summer 2013 by the EC, allows member states that are in deep recession, but that have budget deficits below the three percent of GDP threshold and that respect the public debt reduction rule, to temporarily deviate from the fiscal targets of the Stability and Growth Pact (SGP), to the extent of the national co-funding of EU-funded investments.

14:30-15:45 POLICY MACRO PANEL. Policies for growth - state of the art, key challenges and suggestions for policy action

Chair: ***Reinhilde Veugelers****, Scientific Coordinator of SIMPATIC, Bruegel*

Dirk Pilat*, Deputy Director, Science, Technology and Industry, OECD Directorate for Science, Technology & Industry (via Skype)*

The discussion covered three main points:

1) Investment in knowledge-based capital.

Investment in knowledge-based capital is growing in importance and accounts for over half of all business investment in several OECD countries. Such investments are often key to creating value and enabling differentiation. To enable the development of investments in KBC, policies to strengthen framework conditions are essential. Indeed, well-functioning product, labour and capital markets and bankruptcy laws that do not overly penalise failure can raise the expected returns to investing in KBC. Other policy improvements are required in areas such as the IPR system. Moreover, strategies to develop skills to cope with the new knowledge-based environment are required.

2) R&D tax credits and direct support.

Countries differ in the mix of innovation policies with most OECD countries increasingly relying on R&D tax incentives, and to volume based or hybrid R&D tax credit schemes. Both direct support measures and R&D tax incentives have a positive effect on R&D and innovation outcomes, but evidence on their impact on productivity growth is less clear-cut. Notably, support to R&D might slow down productivity growth in a country if they favour incumbents relative to startups**.** Therefore, the design of the policy is essential to avoid unintended consequences. In particular, more generous R&D tax incentives tend to benefit incumbent firms, leading to a less dynamic distribution of firm growth (in more R&D intensive sectors). R&D tax incentives might be primarily subsiding incremental innovations amongst incumbents, as opposed to new to the market innovations associated with young entrepreneurial firms

3) Young firms, entrepreneurship and experimentation.

Not all SMEs are equally important to job creation and growth: net job creation is provided by young firms. However, growth of young firms is a challenge in many OECD countries. Entrepreneurs need flexibility to experiment with business models.

Policies are important to foster the contribution of young firms to employment and productivity. In particular, it is important to allow for experimentation (by reducing the barriers to the entry, growth and exit), to avoid policies that favour incumbent firms, to strengthen the innovation system for young and innovative firms and to complete the European internal market (in order to allow firms to scale more easily across borders).

***Luc Soete**, Rector Magnificus of Maastricht University "(In) consistencies between MS and European research, innovation and social cohesion policies: macro-economic challenges"*

The discussion touched different interesting topics:

- MS under the strongest budgetary pressures appear to have 'consolidated' their public spending most in areas where cuts in public spending raised the least immediate opposition but affected growth primarily in the long term (Technopolis/IDEA).
- In the current debate the value of "science" or research remains limited to the purely economically measurable value, i.e. GDP growth. This is and remains, however, a significant underestimation. Science is a much broader concept and restriction to economcially measured value is actually increasingly unjustified.
- The issue about the international overlap in research and scientific activities is not sufficiently considered: we witnessed more or less a doubling of scientists and engineers over the last 10 years, with still same output opportunities.
- The euro-crisis has brought about a research and innovation divide within the EU likely to perpetuate itself. We witness the emergence within the EU of "*submerging*" economies (Paul Collier) with the crisis affecting their long term capacity to invest in human resources and R&I and as a result a brain drain of their most talented youngsters to the rest of Europe or abroad.
- Officially the heterogeneity of Europe's regions requires more place-based smart specialization strategies (S3) tailored for regions that reflect their absorptive capacity and regional characteristics. Less research-intensive regions should enhance the innovation capacity of domestic firms with a focus on the promotion of growth and new jobs. Prioritised investment in education and training to deliver social inclusion and an absorptive capacity for innovation outputs is essential to underpin measures to stimulate Research and Development and innovation investments in all types of regions but even more so in regions in receipt of ESIF.

16:00-16:35 Keynote Speech- *Bronwyn Hall, Professor of Economics, Emerita; Professor of Economics of Technology and Innovation at UC Berkeley; University of Maastricht and UNU-MERIT "Innovation and Productivity"*

Prof. Hall started her keynote speech by making some preliminary observation on what innovation is and what is not. Innovation is the first attempt to put a new product or process into practice, and R&D is only one of its inputs. For example, if a supplier uses R&D to make better products, the customers will perceive an effect even without their own R&D.

In Europe, the more general innovation spending (IS) has a markedly different composition across countries. Compared to R&D, is more strongly associated to process innovation than to product innovation, and is also a better predictor of innovation probability.

Prof. Hall noted that the determinants of innovation can be found in the supply side as well as in the demand side, and in the institutional environment. For example, the cost of capital is an important determinant of innovation in that the uncertainty and risk associated to R&D affect the required rates of return to R&D to obtain financing, and these can be especially high for SMEs and new firms. In order to reduce the cost of capital, policies such as R&D tax credits, subsidies and grants can be undertaken, with mixed evidence on their results.

Venture capital is also a determinant of innovation on the supply side, and so are people, with education and immigration policies being key. The public research sector also play a role, as some innovation relies on scientific knowledge that is often the output of publicly funded research. A final point of analysis is on the interactions between universities and industry. A recent survey showed that patents are not the best information source according to industry, and there is evidence that local university research matters for local firms.

A question was asked to Prof. Hall as to how high the private return to publicly financed research can be before it is too high. Prof. Hall replied that it is too high when it is higher than the cost of capital, which varies across countries and sectors. In fact, if the private return is higher than the cost of capital, then the firm would have invested anyway because the investment would have been profitable. However, since the cost of capital is hard to measure and the firm only has an expectation of the return, then it sometimes happens that the private return is

higher than the effective cost of capital. The idea behind a tax credit is that it can benefit projects of which a centralised authority could not think.

16:35-17:00 Keynote Speech- *Bart Van Ark, Executive Vice President, Chief Economist and Chief Strategy Officer of the Conference Board (via Skype) "Intangible Capital and the Growth of the Knowledge Economy: Can We Manage It If We Cannot Measure it?"*

The speech by Bart van Ark focused on intangible investment and capital. On one hand, since many costs of innovation are not counted as investment, the traditional capital estimates are understated. On the other hand, many intangibles are difficult to value, market, and trade.

At the same time, the share of intangible factors to market value has increased in the last decades. Additionally, investment in intangibles overtook investment in tangibles in the 1990s, and non-R&D intangibles have a relatively even distribution across sectors, while R&D is performed mainly in manufacturing.

Europe is a patchwork in terms of private-sector investment on intangibles, with some countries investing substantially more than others, with differences probably due to the sectoral structure of the economy.

Intangibles seem to lead to a combination of spillovers and complementarity effects. Not only do spillovers exist from intangibles beyond the effects of R&D, but there is evidence of complementarities between ICT intensity at the industry level and a country's intangible capital intensity. R&D has a complementarity relation with design and advertising.

Intangible investments include more than R&D, and much progress has been made on their measurement. Policy making, however, needs an adequate framework, and thus more is needed. Also, in order to completing the spillovers and complementarities picture, estimates of intangibles at the industry level are needed.

17:00-18:30 POLICY MICRO PANEL: R&D Policies - State of the art and current challenges

*Chair: **Otto Toivanen**, Professor, K.U.Leuven and CEPR*

***Vincent Verouden**, Deputy Chief Economist, DG Competition - European Commission "The new EU rules on state aid to R&D and innovation: an economic perspective"*

***Jeroen Heijs**, Management Team Directorate for Topsectors and Industrial Policy, Dutch Ministry of Economic Affairs "Challenges of evaluating complex integrated innovation policies"*
***Petri Lehto**, Head of Division at the Enterprise and Innovation Dept. of Finland's Ministry of Employment and the Economy "On evaluation of innovation policy"*

V. Verouden started the panel discussion by introducing the new EU rules on state aid to R&D and innovation, the amount of which is little less than 10 billion EUR (in 2012).
The new rules have as objectives: an enhancement of the effectiveness of aid, a limitation of distortions to trade and competition, and a prioritisation of enforcement on those cases with a significant impact on the internal market. These will go hand in hand with a greater emphasis on ex-post evaluation of the aid schemes.

J. Heijs held a presentation on the challenges of evaluating complex integrated innovation policies. If innovation is seen as a driver of growth through productivity, R&D cannot explain productivity alone, and innovation policies try to address this issue by becoming more integrated. This, however, is a challenge for their evaluation. In fact, the evaluation of these integrated programs is a challenge as the instruments that are successful with other types of policies (like with business R&D grants or collaborative R&D grants) cannot be used with integrated policy programs.

P. Lehto contributed by describing the case of Finland and its policy of innovation funding. The Finnish innovation agency Tekes conducts evaluations on most of its activities. New results of this evaluation process, however, contrast with previous results, in that they contradict the initial finding that Tekes customers had higher productivity than non-customers. Therefore, it is apparent that the picture on the effects on productivity is worse than believed. However, the evaluation stops at the 5-year mark, and does not give credit to the externalities.

(4 April)

9:00-12:00 SCIENTIFIC WORKSHOP 2

Green Innovation: To address environmental issues such as Climate Change we need more innovation. What policy instruments are needed to induce such innovation? What effect will this have on economic growth?

Chair: ***Ralf Martin****, Assistant Professor of Economics, Imperial College Business School*

Michele Peruzzi*, Research Assistant, Bruegel*
Georg Zachmann*, Research Fellow, Bruegel*
Carolyn Fischer*, Resources for the Future Centre for Climate and Electricity Policy*
Ralf Martin*, Assistant Professor of Economics, Imperial College Business School*

This panel discussion focused on the relationship between innovation and climate change. In this sense, climate policy is also related to growth policy. Since the knowledge externality affects all technologies, the question to be answered is whether or not knowledge spillovers are larger for clean technologies. If that is the case, it makes sense to focus R&D subsidies on clean technologies because they will have a larger spillover effect.

However, current policy decisions in the energy market seem to favour deployment over R&D, and this might prove inefficient if similar effects could be obtained with a lower expenditure.
Therefore, it remains to be seen how to optimally correct the market failures.

The discussion started with a small detour to show a new matching algorithm to link PATSTAT, the worldwide patent database, to company databases. This could help the study of green innovation (or innovation in general) with richer data, as the patent database does not include information on the applicants other than their name. This matching algorithm could potentially be used to extract a larger amount of information for research in other fields, too, and its main advantage is its ability to take advantage of information that is only available in one of the sources to be matched. Being able to use company financial data variables when studying innovation looks like a promising prospect.

G. Zachmann started the policy discussion by questioning the current policy on renewable energy technologies. On one hand, the rationale for public renewable energy support is not unique and multiple reasons arose after past events such as Chernobyl and Fukushima, or the oil crises of the 70s. On the other hand, quick deployment of renewables is used today as the major policy to obtain large-scale, non-subsidised deployment in the future. But as RDD subsidies also have positive spillover effects, which is the best mix of policies? In the study, the authors look at the patenting level in different countries and link it to their policy decisions. Data shows that the weight and timing of deployment and RD&D support matter, and also that there are cross-border spillovers that should be taken into account when designing a policy for green energy.

R. Martin then looked into the question of measuring spillovers to see whether clean technologies create larger spillovers. In their study, the authors modeled patent citations to measure the spillovers of different types of patents, and found that clean inventions are more likely to have a higher impact and larger spillover. Indeed, evidence strongly supports the idea that clean innovations generate significantly more spillovers. This result passed a variety of robustness checks, and this can justify a support of clean technology development that goes beyond carbon pricing.

12:40-13:30 Lunch Talk- When is there enough evidence? This crucial question in Evidence Based Policy will be explored

***Jan Staman**, Director of the Rathenau Institute*

J. Staman started off his presentation by outlining the activities of the Rathenau Instituut, which encompass a wide range of topics. In his talk, J. Staman analyses the topic of evidence-based policy and politics. The view that science is ideologically neutral and can present simple facts to policymakers and politicians represents a model that no longer works. In fact, science is not always neutral and reliable, and people have increasingly started distrusting science.

Science is unable to provide information on important issues central to politics and policy making.
Some other times, there may be conflicting scientific perspectives on the same problem, but while evidence-based policy can be impossible at times, evidence-informed policy is an achievable goal.

The role of experts in this scenario is important, even though experts should know that their opinion might be used in unintended ways. Their knowledge will be used

to achieve a goal, and not to discern the truth. Experts' opinions are still just opinions, and the scientific credibility will be affected by taking a political stance. Trust can be acquired by being transparent and objective. Also, it is up to the politicians to make decisions, so experts should resist any political pressure to arrive at an unequivocal piece of advice.

13:30-17:00 SCIENTIFIC WORKSHOP 3. Micro Session. SIMPATIC research

***Pierre Mohnen**, Professor, Maastricht University and UNU-MERIT*

Along with tax incentives, R&D subsidies are an option for innovation policy, and countries have made different decisions on which policy to adopt.

There are two ways to test the effectiveness of R&D subsidies: one is to construct counterfactuals and see how the treated would have behaved had they not been treated (treatment evaluation). Another is by using structural models to estimate the effectiveness of innovation policy. The authors use this latter approach and use data from Spain, Germany, Finland, Flanders, and the Netherlands to show what the effect of subsidies is.

***Otto Toivanen**, Professor, K.U.Leuven and CEPR*

Support to R&D represents one of the largest forms of industrial support in OECD countries. However, it is not clear whether this support is effective in raising private R&D and ultimately whether it is welfare enhancing. The presentation proposed a model to conduct a counterfactual analysis, comparing activist (optimal) subsidy and tax credit policies against laissez-faire. The main conclusion of the model is that activist policies contribute to generating higher R&D and spillovers (yet, below the social first best). However, the increase in welfare (at the median) is modest.