

Policy Brief

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This Policy Brief has been elaborated under the EU-funded project **PLATON+** (www.platonplus.net) which aims to:

- communicate** socio-economic research results to policy makers, Civil Society Organisations and business communities across Europe, and
- show ways** of collaboration and **bring into contact** socio-economic researchers and researchers from other disciplines.

PLATON+ Policy Briefs communicate socio-economic relevant research results and key policy recommendations in a concise and non-technical format to policy-decision makers, Civil Society Organisations (CSOs) at European, national and regional level.

This Policy Brief discusses key findings and policy implications provided by the EU-funded projects “**Dynamic Regions in a Knowledge-Driven Global Economy**” (DYNREG) and “**International research project on the competitiveness of firms, regions and industries in the knowledge based economy**” (MICRO-DYN) both funded under Priority 7 ‘Citizens and governance in a knowledge-based society’ of the 6th Framework Programme for Research (FP6-CITIZENS).

Innovation, Growth and Competiveness in a Knowledge-Driven Global Economy

Research context

Knowledge and innovative activity are important components of the growth and competitiveness of dynamic regions, namely those regions that generate and maintain high rates of economic performance. In the context of greater global interaction, the shifting trends of comparative advantage caused by the emergence of new global players have implications on growth, development, competitiveness as well as social inequality and cohesion within the European Union.

However, despite the importance of these changes there are gaps in current theories explaining the emergence and growth of dynamic knowledge economies and a lack of both qualitative and quantitative research on innovation, human and social capital and entrepreneurial clusters at different levels of the economy. Institutional theories on national and regional innovation systems, human resources and growth led by Foreign Direct Investments (FDIs), have the potential to complement existing economic growth theories and provide a framework for analysing regional growth dynamics in a knowledge economy.

This Policy Brief summarises the key research findings and policy messages of two research projects “Dynamic Regions in a Knowledge-Driven Global Economy” (DYNREG) and “International research project on the competitiveness of firms, regions and industries in the knowledge based economy” (MICRO-DYN) both funded by the European Union under Priority 7 ‘Citizens and governance in a knowledge-based society’ of the 6th Framework Programme for Research (FP6-CITIZENS).

The projects focus on:

- the factors underlying knowledge and innovation activities; and
- the internationalisation of economic activity, economic growth and competitiveness; and
- key messages on fostering innovation and growth

DYNREG analyses the growth performance of major world regions and the effects of this at a global scale, as well as the link between growth performance, innova-

- Research context
- Knowledge and Innovation Activities
- Internationalisation of Economic Activity, Economic Growth and Competiveness
- Key Policy Messages on Fostering Innovation and Growth
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tion and knowledge. Similarly, [MICRO-DYN](#) analyses the link between innovation, knowledge and job-rich growth but it focus at the micro/firm scale, analysing innovation and growth within firms and then linking these findings to labour market performance.

Knowledge and Innovation Activities

The regions of the world that have been identified within this project as future centres of economic dynamism are China, India and the European Union. Research results suggest that the determinants of this dynamism at the global scale are human capital, innovation, 'openness' of the economy, investment and infrastructure and to lesser extent institutional, legal and political factors. For future development, social-infrastructure factors are more relevant for advanced economies with capital and infrastructure more important for poorer economies. The ability of an economy to flexibly adjust along with 'openness' are also found to be important preconditions for economic dynamism.

- Recent results from the empirical and theoretical literature suggest that [earning, agglomeration and interrelatedness are key factors in the development of the economy in general, and at a smaller scale the economic development of specific places and regions](#). Particularly these factors can invoke positive or negative 'lock-in'. This provides a rationale for research activities to be spatially concentrated and emphasises the importance of being able to retain a skilled and educated labour force. Establishing networks of individuals in a firm, networks between clusters of firms and knowledge institutions are shown to greatly benefit dynamic growth and convergence patterns. Case studies into these innovative clusters, such as the Irish software cluster, offer insights into mechanisms of selection and adaptive learning.
- [Human capital is an important factor driving the output growth in Information and Communication Technology \(ICT\) industries](#). For countries with a higher human capital accumulation, the number of ICT-producing, manufacturing and ICT-using service industries grew relatively faster. This suggests that education policy aimed at human capital improvement is likely to be complementary to policy supporting the diffusion of ICT. The path of ICT diffusion varies across firms, industries and regions, consistent with the theory of new technology diffusion, where innovations are firstly and more easily adapted by workers with a high skill level. [The speed of ICT diffusion is found to be related to firm characteristics such as size, 'age', skill intensity, exposure to foreign markets and proximity to early adopters of ICT in the same region](#). The relationship between human capital and ICT adoption again indicates complementarity. Another aspect of human capital that is important in the knowledge economy is the level of education of inventors: [highly educated inventors operate within geographically wider research networks than their comparatively less well educated peers](#). This result holds after controlling for type of research and mobility of inventors.
- In Europe in relation to the location of knowledge production, a strong threshold effect exists as knowledge spillovers develop locally in the top 1% of regions in the specific technological field of invention. This suggests that [a critical mass of firms, institutions and people working in related activities](#)

is needed at regional level. In the globalised knowledge economy another important factor is the global migration pattern of well-educated people. The migration pattern is an important aspect in regional development and innovation. With the USA still being the world's most attractive location for science and academia, other dynamic regions must look to increase their attractiveness for location of students and scholars from the established and emerging markets in order to develop an 'innovative capacity'. For these 'mobile knowledge workers' successful development strongly depends on international experience and integration within the particular community. These features of migration strengthen innovation by encouraging 'brain circulation'.

- Education is geographically correlated due to the dynamics of knowledge and skill diffusion as well as the effect of educational structures which are set nationally. Therefore, because of interregional linkages, geographical location and proximity are important for the human capital performance of regions. However, systemic differences exist between urban and rural European regions as well as between northern and southern European regions, setting spatial limits on the spread of externalities, as positive externalities will not spread across regions with systematic differences in human capital systems. These spatial patterns in human capital have been shown to be persistent over the period of time of the study of the projects.
- Involvement of firms in international markets boosts the likelihood of a firm becoming a successful innovator. Firm productivity and export decisions are closely related to innovation activity. The causality is found to run from exporting to innovation and not vice versa.
- The increases in the telecommunication infrastructure have enhanced R&D investments but did not affect the accumulation of physical or human capital. This example shows the importance of infrastructure investments in the transition to a knowledge-based economy. It also highlights the complementarities between infrastructure investments, R&D and human capital. The productivity of firms in advanced regions can be further advanced by means of investment in infrastructure. However, the growth effects of infrastructure investments depend on factors such as intellectual property rights, industrial and innovation policy and the level of tertiary education.

Internationalisation of Economic Activity, Economic Growth and Competiveness

- Openness to trade with emerging economies is found to be on average positively related to the performance of European manufacturing firms. Thus, a deeper international integration should result in a faster rate of productivity growth. Rising imports of intermediate goods to domestic firms is the major contributor to this firm-level performance gain and so the benefits of trade do not only accrue to the domestic consumers. This foreign technology incorporation into firm's products is a form of 'firm innovation' that allows firms to become more competitive without needing public incentive programmes.
- The increasing availability of foreign intermediates on the global market has also had an impact on the value added that can be exported by members of the EU. This has implications for the specialisation patterns of European countries and implies that past policies in this area should be reconsidered. Industrial policies aimed at specialisation in high-tech sectors miss the fact

that countries can specialise successfully in low-tech sectors as the means by which products are produced and the value created for international markets are important factors in the sectors' viability. Existing policies can lead to a loss in comparative advantage in sectors that are advanced from the perspective of value added.

- **Foreign Direct Investment (FDI) flows to China have been complementary and have fostered synergies with all other recipient countries.** Generally, the effect is different for vertical and horizontal FDIs. Countries that attract mainly horizontal FDIs adjust better to competitive pressure from China as firms locate to access a market, while for vertical FDIs, due to the presence of cost advantages, competition from China is significant, in particular in labour intensive sectors.
- **Spillovers from FDI exist both within and across complementary manufacturing sectors.** Spillovers within sectors occur when foreign firms operate in traditional labour intensive manufacturing sectors, while spillovers across sectors occur when firms operate in high tech manufacturing sectors, as seen from productivity analysis of Eastern European firms. There is however a large degree of variability across countries in terms of absorptive capacity for the benefits from spillovers this variability is consistent with the technology gap hypothesis. Countries with a high skill level absorb innovations and new technologies more easily than countries with a low skill level.
- FDI induced spillovers are not automatic and FDI promotion policies and incentives to foreign firms should be carefully planned to facilitate potential benefits. **The potential to benefit from spillovers is conditioned on specific factors, such as technology intensity of foreign firm's products and the size of indigenous firms.** The spillovers are increasing in the size of the technology gap between the host and recipient country. This is an important consideration in the cost of firm attraction policies.
- **FDI spillovers also have a regional context in that they may enhance the aggregate regional Total Factor Productivity.** This effect is independent of the sector and implies that spillovers are driven by regional channels and so FDI promotion should be implemented at a regional level.
- **Immigration and trade are found to be complements with the size of the complementarities dependant upon the size of the existing immigrant community and its origins.** The European Union is not yet believed to be at the point where immigration and trade are effectively substitutes, particularly in the case of exports. When immigrants enter a country, due to labour market effects they drive down the cost of producing goods in the sectors they work in reducing the need to import these goods from outside the country.
- **The location choice of R&D multinationals in the European Union countries is driven on average by the size of demand in the market, number of existing R&D firms, technological development, flexibility of the local labour market, financial development and physical infrastructure.** The location choice of multinationals in the ICT sector is an increasing function of the size of demand, agglomeration economies, and technological development, flexibility of labour markets and information and technology infrastructure. Meanwhile, the **region's GDP per capita** appears to be another attractive factor for these firms, even though the determinants of location differ between Western Eu-

rope and Central/Eastern Europe: firms prefer regions with high GDP per capita in Western Europe and regions with low GDP per capita in Eastern Europe. Finally, a high **unemployment rate** decreases the attractiveness of regions in Western Europe and increases the attractiveness of regions in Central and Eastern Europe. For example, US multinationals in the ICT sector were found to be insensitive to labour costs while EU multinationals responded to this factor negatively.

- **Foreign acquisition of domestic firms has a positive and significant effect on labour productivity but there is little evidence for an effect on Total Factor Productivity.** These effects vary across industries with foreign ownership leading to higher productivity in the office in the electrical machinery and computer services industries and lower productivity in the renting of machinery and equipment industry.

Key Policy Messages on Fostering Innovation and Growth

- **Subsidisation of R&D activities in past periods enhances the probability that firms engage in innovative activity in future periods.** This indicates that a general framework for innovation-promoting policies would be beneficial and should include measures such as R&D subsidies, tax credits for R&D expenditures, promotion of knowledge transfer between research institutions and business and support for start up high-tech companies. In advanced economies this R&D investment can have the effect of making investment in infrastructure more effective. Meanwhile, human capital investment policies are not only an important factor of economic growth but also key in supporting R&D intensive areas of the economy and . Investment in human capital resources supports significantly the contribution to value added.
- **The competitiveness of industries when competing internationally must be sustained by dynamic interaction between, national, regional and sectoral innovation systems.** There may not, however, be strong enough incentive for firms to engage in this type of interaction and so policy may be needed to encourage and facilitate these kinds of international networks. Public investment in important components of this system, such as support agencies and universities can strengthen the system. There is a role for policy in coordinating the networks of interaction between these agencies and between sector-specific innovation policies, industrial policies and national level policies. When firms interact in a research activity, small and large firms have different competences, thus small firms should be encouraged to focus on research while large firms on development.
- The literature on public policy and technology diffusion points to **failure of markets in providing satisfactory distribution of the benefits of ICT across firms, industries, space and time.** This is due to imperfect information, market structures and externalities in adoption. Policy could be used to prevent digital divide from becoming established, while policy to encourage firm interaction should complement, as interaction encourages diffusion of technology.
- **Policies that enhance access to knowledge, facilitate its distribution and raise the potential to create new knowledge and are important elements in furthering economic and social cohesion across Europe.** Knowledge not only has a sizable private benefit, in terms of improved labour market performance, but

is also in the public interest. Attention should be given to 'within region' educational inequalities, which are the most prominent type within Europe, rather than 'between region' and 'between country' inequalities.. It is also possible that low human capital regions surrounded by other similar regions can remain in a low human capital trap. In contrast, regions surrounded by high human capital regions and with low inequalities have a greater probability of reaching a higher state of endowment. These educational inequalities tend to be higher in rural regions.

- **Inequality levels need to be controlled to allow sustainable economic growth as inequality limits development beyond a certain point.** This can be achieved through collaboration and bargaining at different levels of society between all members. The benefits of investment in social capital for communities include better health performances, improved child welfare, lower crime rates and improved government efficiency. Social capital has also been linked to improved productivity and income. Local policies in the areas of education, family support, community services, sport and arts and communication services could be significantly improved if they included a social capital element.
- **Inflation and long-run productivity growth are negatively related as inflation generates long run real effects due to a link between nominal and financial frictions to a firm's qualitative investment portfolio.** Inflation increases the cost of corporate insurance against productive but risky projects and so affects a firm's technology choice. Therefore, economies with higher inflation will exhibit lower Total Factor Productivity (TFP) growth in the long run. This represent an attractive policy option for emerging economies as it is an inexpensive option that would encourage TFP catch up.
- **Countries' institutional and organisational forms have an impact on sustainable value creation and innovation. The limitations of self-monitoring and diversity suggest a need for international governance to enhance sustainability in value creation and innovation.** This governance needs to be aligned to corporate and national governance programmes to be successful. Political and social instability, business cycles, monetary austerity and low domestic profit share are factors that lead to capital flight from an economy. Political stability and a healthy economic environment should be encouraged. Within the firm an appropriate organisational culture and business model can enhance innovation.
- **Innovation performance differs by culture, level of development, sector and country.** Policy on innovation at a European level should therefore be differentiated to make them more effective. Small countries have a distinct advantage in devising and implementing strategies to align FDI and cluster activity to in relation to their comparative advantage. This must be done with caution as in small countries there are higher incentive for and payoffs to corruption.

Further reading

DYNREG Working Papers can be downloaded from: www.esri.ie/dynreg

MICRO-DYN Working Papers can be downloaded from: www.micro-dyn.eu

DYNREG project at a glance

Title	"Dynamic Regions in a Knowledge-Driven Global Economy: Lessons and Implications for the European Union"
Research Objectives	<p>The project analysed the growth performance of emerging dynamic regions, (China, India, SE Asia, Brazil, Russia, Central Europe), examined their shifting comparative advantages and roles in a knowledge-driven world economy and drew lessons and policy implications for the EU). Specifically, this research has contributed to an understanding of the following:</p> <ul style="list-style-type: none"> • The factors underlying growth performance, particularly the role of knowledge and innovation in fostering growth at firm, industry, region and country levels; • The role of shifting comparative advantages in the new growth regions, on patterns of world growth and development, competitiveness, inequalities and convergencekey policy implications for cohesion in the enlarged EU. • Public policies shaping the dynamic economic performance of firms, industries, regions and countries to find lessons and policy implications for the EU
Duration	1 January 2006 – 31 December 2008
Website	www.esri.ie/dynreg
Scientific Co-ordinator	Dr Iulia Siedschlag Tel. +353-1-863-2116; e-mail: julia.siedschlag@esri.ie
Research Consortium	<ul style="list-style-type: none"> • Economic and Social Research Institute, www.esri.ie, Ireland, (co-ordinator) • University of Bonn, Centre for European Integration Studies, www.zei.de, Germany • University of Thessaly, www2.uth.gr/main/index/index_en.html, Greece • University "Luigi Bocconi", www.uni-bocconi.it, Italy • Centre for International Business and Management, University of Cambridge, www.jbs.cam.ac.uk/research/cibam, United Kingdom • Free University Amsterdam, www.vu.nl/home/index.cfm, The Netherlands • University of Economics and Business Administration, www.wu-wien.ac.at/english, Austria • Free University Brussels, www.vub.ac.be, Belgium • London School of Economics, www.lse.ac.uk, United Kingdom • Institute for Economic research, www.ier.si, Slovenia
Funding Scheme	Specific Targeted Research Project (STREP) under the 6th Framework Programme, Priority 7: "Citizens and Governance in a Knowledge-Based Society" (FP6-CITIZENS)
EU Financial Contribution	€ 1.192.667

MICRO-DYN project at a glance

Title	"International Research Project on the Competiveness of Firms, Regions and Industries in the Knowledge Based Economy"
Research Objectives	<p>MICRO-DYN (stands for 'Micro-Dynamics') is an international economic research project dealing with the competitiveness of firms, regions and industries in the knowledge-based economy and the possibilities for job-rich growth in Europe. The central research objective of the project is to address in a comprehensive and methodologically coherent way some of the core driving forces of innovation, competitiveness, employment and growth in the contemporary European economy, as well as the factors underlying growth performance, particularly the role of knowledge and innovation in fostering growth at firm, industry, region and country levels. Specifically, this research aims to contribute the following:</p> <ul style="list-style-type: none"> • statistical models of individual firm behaviour allowing for firm heterogeneity, and • models aggregated at sectoral, regional and national levels to recover the behaviour of aggregate variables
Duration	1 January 2006 – 31 December 2010
Website	www.micro-dyn.eu
Scientific Co-ordinator	Michael Landesmann, Vienna Institute for International Economic Studies
Research Consortium	<ul style="list-style-type: none"> • The Vienna Institute for International Economic Studies, www.wiwi.ac.at, Austria (co-ordinator) • Centre for Economic and Strategic Research, www.cesribn.bg, Bulgaria • Departement d'Économetrie et d'Économie Politique, Université de Lausanne, www.hec.unil.ch/deep, Switzerland • Institut für Angewandte Wirtschaftsforschung e.V., www.iaw.edu, Germany • Institute of Economics, Hungarian Academy of Sciences, http://econ.core.hu, Hungary • Fondazione Eni Enrico Mattei, www.feem.it, Italy • Centre for technology, innovation and culture, University of Oslo, www.uio.no, Norway • Norwegian Institute of International Affairs, www.nupi.no, Norway • Groningen Growth and Development Centre, University of Groningen, www.rug.nl, The Netherlands • Royal Institute of Technology, University of Stockholm, www.kth.se, Sweden • Institute of Economic Research, www.iersj, Slovenia • European Economy Group, University of Madrid, www.ucm.es, Spain • Judge Business School, University of Cambridge, www.cam.ac.uk, United Kingdom • Alphametrics Limited, Royston, www.alphametrics.co.uk, United Kingdom • Center for Social and Economic Research, www.case-research.eu, Poland • L'Equipe de Recherche sur l'Utilisation des Données Individuelles, Temporelles en Economie, Université Paris XII Val de Marne, www.univ-paris12.fr/www/labos/erudite, France • National Bank of Poland, www.nbp.po, Poland
Funding Scheme	Integrated project (large scale research project) under the 6th Framework Programme, Priority 7: "Citizens and Governance in a Knowledge-Based Society" (FP6-CITIZENS)
EU Financial Contribution	€ 3.605.903