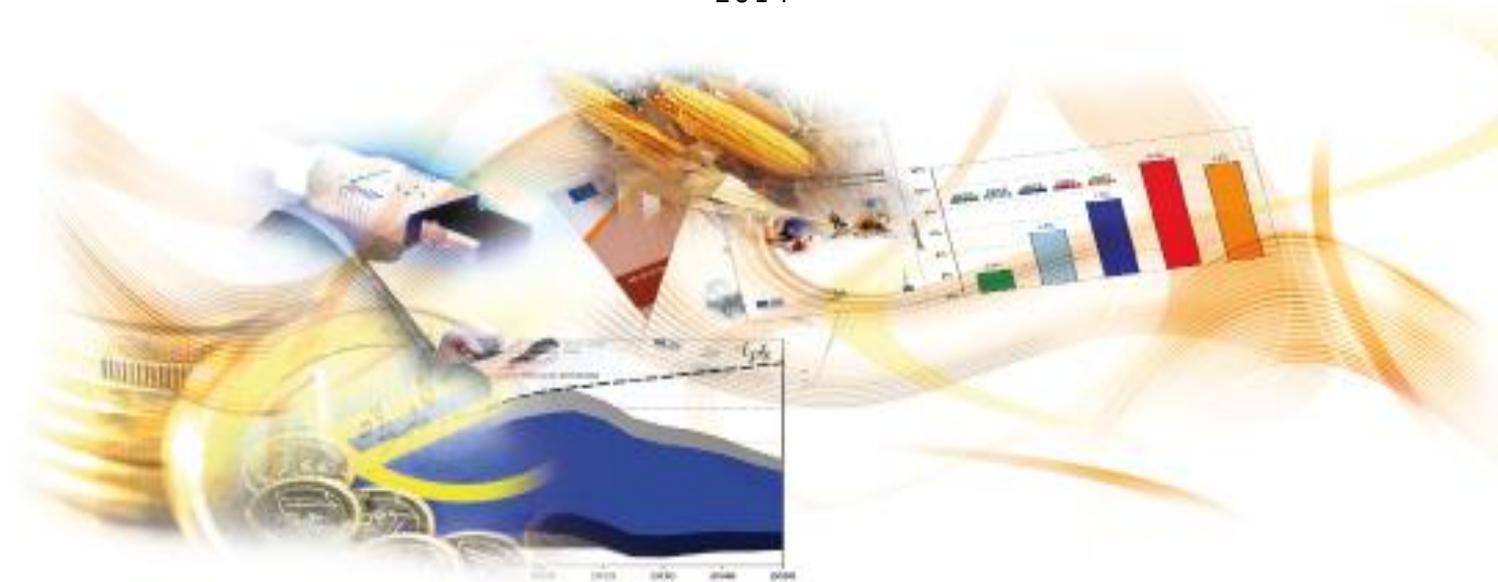


JRC SCIENTIFIC AND POLICY REPORTS

The Case of Dublin as a European ICT Pole of Excellence: Experts' Insights into Public Policies

Editor: Marc Bogdanowicz

2014



European Commission
Joint Research Centre
Institute for Prospective Technological Studies

Contact information

Address: Edificio Expo. c/ Inca Garcilaso, 3. E-41092 Seville (Spain)
E-mail: jrc-ipts-secretariat@ec.europa.eu
Tel.: +34 954488318
Fax: +34 954488300

<http://ipts.jrc.ec.europa.eu>
<http://www.jrc.ec.europa.eu>

Legal Notice

Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this publication.

Europe Direct is a service to help you find answers to your questions about the European Union
Freephone number (*): 00 800 6 7 8 9 10 11

(*): Certain mobile telephone operators do not allow access to 00 800 numbers or these calls may be billed.

A great deal of additional information on the European Union is available on the Internet.
It can be accessed through the Europa server <http://europa.eu/>.

JRC86909

EUR 26598 EN

ISBN 978-92-79-37729-7 (pdf)

ISSN 1831-9424 (online)

doi:10.2791/77912

Luxembourg: Publications Office of the European Union, 2014

© European Union, 2014

Reproduction is authorised provided the source is acknowledged.

Printed in Spain

Acknowledgements

These pages largely consist of an edited summary of a larger report authored by Professor Frank Berry, Chair of International Business and Economic Development at Trinity College Dublin.

This larger (2009) report was part of the IPTS study "The Knowledge Economy, Economic transformations and ICT in the EU25+: Regional Dynamics in the Deployment phase". Contract number: 150605-2006F1SC-IR. The full report is available at: <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=6459>

We have tried to be faithful to the original text as this report offered, in our view, a sound mix of scientific approach, documentary background and policy analysis.

The original author cannot be made responsible for any mistake or misinterpretation introduced while editing the original text for the purpose of the present report.

This summary also draws on several additional sources, usually quoted in the footnotes and listed in the bibliography.

Preface

The European ICT Poles of Excellence (EIPE) research project is a joint project of DG CNECT and the JRC Institute for Prospective Technological Studies (Project Nr 31786-2010-06). It investigated the issues of growth, jobs and innovation, which have become the main priorities of the European Union's growth strategy programme 'Europe 2020'. The overall objectives of the EIPE project are to set the general conceptual and methodological conditions for defining, identifying, analysing and monitoring the existence and progress of current and future EIPE, in order to develop a clear capacity to distinguish these among the many European ICT clusters, observe their dynamics and offer an analysis of their characteristics.

The EIPE project spanned the period between 2010 and 2013. Over this time, it developed a tool based on a database of original ICT activity indicators, which was enriched with geographical information to allow localisation and aggregation at NUTS 3 level. The tool helps to answer such questions as:

- How is ICT R&D, innovation and economic activity distributed in Europe?
- Which locations are attracting new investments in the ICT sector?
- What is the position of individual European locations in the global network of ICT activity?

The EIPE project had four main steps (see Figure 1). First, European ICT Poles of Excellence were defined. Second, a statistical methodology to identify EIPE was elaborated. Third, the empirical mapping of EIPE was performed and fourth, an in-depth analysis of five NUTS 3 regions was undertaken. This work was documented in a series of EIPE reports:

- Defining European ICT Poles of Excellence. A Literature Review,
- Identifying European ICT Poles of Excellence. The Methodology,
- Mapping the European ICT Poles of Excellence. The Atlas of ICT Activity in Europe.
- Analysing the European ICT Poles of Excellence. Case studies of Inner London East, Paris, Kreisfreie Stadt Darmstadt, Dublin and Byen Kobenhavn.
- Key Findings and Implications of the European ICT Poles of Excellence project.

Figure 1: Overview of the EIPE project

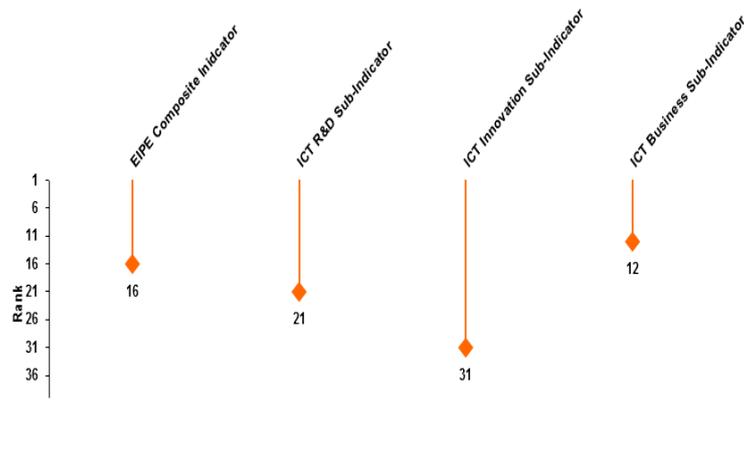
STEP	Defining European ICT Poles of Excellence	Methodology to identify EIPE	Mapping EIPE	Zooming-in at the European ICT landscape
INPUT	Literature Review Taking stock of existing initiatives and case studies	Elaboration of indicators Identification of data sources Composite indicators	4 composite indicators based on 42 indicators on ICT R&D, Innovation and Business for the whole Europe at NUTS 3 level	Detailed information on ICT activity in Inner East London, Paris, Kreisfreie Stadt Darmstadt, Dublin and Byen Kobenhavn
OUTPUT	Definition of European ICT Poles of Excellence	Methodology to identify EIPE	Atlas of European ICT activity	An in-depth analysis of 5 key ICT locations in Europe
EIPE Report	1	2	3	4

More information on the European ICT Poles of Excellence (EIPE) project can be found under: <http://is.jrc.ec.europa.eu/pages/ISG/EIPE.html>

1.2 Dublin Profile in the EIPE Ranking

Dublin (IE021) reached the 16th place among 1303 regions in Europe according to the EIPE final composite indicator ranking (Figure 2). It is surpassed by such regions as Hauts-de-Seine, Milano and Berlin. The figure also shows Dublin's position by individual sub-indicators. According to this information, Dublin comes 21st in R&D, 31st in innovation and 12th in business activity.

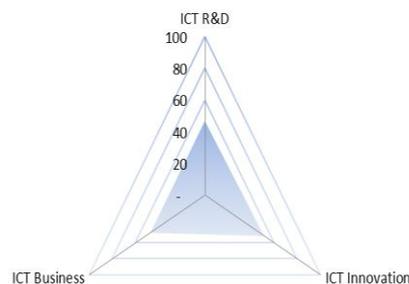
Figure 2: Dublin in the EIPE ranking by EIPE composite indicator, ICT R&D, Innovation and Business sub-indicators



Note: The graph shows the performance of Dublin in the overall EIPE ranking and the ICT R&D, ICT Innovation and ICT Business ranking. The scale represents the rank in comparison with the remaining 1302 European Nuts 3 regions. For further methodological details please refer to Annexes of the current report and to the methodological report documenting the methodology behind the EIPE ranking (De Prato and Nepelski 2013).

Its relative performance in all three domains, i.e. ICT R&D, ICT Innovation and ICT Business is depicted in Figure 3. This figure shows that Dublin's performance in ICT R&D, Innovation and Business activities is relatively balanced in comparison with the remaining 1,302 EU NUTS3 regions.

Figure 3: Performance of Dublin in ICT R&D, Innovation and Business



Note: The graph represents the performance of Dublin in the ICT R&D, ICT Innovation and ICT Business rankings. The scale represents normalized scores with maximum 100 and minimum 0. The rankings are based on the analysis of 1303 European Nuts 3 regions. For further methodological details please refer to Annexes of the current report and to the methodological report documenting the methodology behind the EIPE ranking (De Prato and Nepelski 2013).

2. The Policy Framework and the Main Public Actors

2.1 Past Roots

Dublin has seen, over the past two decades, the emergence of a cluster of export-oriented indigenous software development firms, an unanticipated by-product of the country's inward FDI-oriented development strategy of earlier years.

This substantial inward FDI in a diverse range of high-tech sectors influenced the growth of the indigenous software sector because it provided:

- a sophisticated source of early-stage demand for software,
- a repository of external contacts, and
- an incubator for managerial and sectoral experience.

In addition, the FDI focus of the authorities led to substantial improvements in the country's telecommunications infrastructure and in the scientific orientation and throughput of the educational system, which later supported the emergence of the cluster.

As the cluster matured, the new firms that spun off from it relied less and less on the demand provided in the early stages by Irish-based foreign multinational firms. Increasingly, these firms could be classified as "born global", encouraged directly by policy intervention.

To understand this trajectory, one has to look even further in the past. The severe economic crisis of 1950s spawned major policy innovations in Ireland, such as Export Profits Tax Relief in 1956, the first of Ireland's ongoing low corporation-tax policies.² In the late 1980s, the economy was subjected to a series of beneficial shocks – policy-induced and otherwise – resulting in the emergence of what was called "The Celtic Tiger". This created a virtuous circle of economic progress.³

These beneficial shocks included:

- Change in fiscal strategy in the late 1980s. Expenditure reductions rather than continued tax increases helped resolve the long-running crisis in the country's public finances. This allowed room for future tax reductions.
- In turn, tax reductions in combination with the country's newly developed 'social partnership model' of wage determination, bolstered competitiveness.
- Doubling of the EU Structural Funds in 1989 made it possible to implement the badly-needed infrastructural projects that had been put on hold as part of the change in fiscal strategy.
- The establishment of the Single Market, the increase in services offshoring and the high global corporate profitability of the era saw a huge increase in FDI flows both into and within Europe, with Ireland capturing a sharply increased share.⁴

² See Barry F. (2011). Foreign Investment and the Politics of Export Profits Tax Relief 1956, available at <http://www.tcd.ie/jiis/documents/discussion/pdfs/jiisd357.pdf>

³ A fuller account of the emergence of the Celtic Tiger era is available in Barry (1999).

⁴ Evaluation of past policies: consensus has yet to be reached on the relative importance of these various factors. Honohan and Walsh (2002) in their assessment pay little attention to the role of increased FDI inflows, while Barry (2002) – echoing some of the points made by Blanchard (2002) in his discussion of the Honohan and Walsh paper – argues that they were crucial.

The only work to attempt an empirical evaluation of a full range of factors – including education, industrial strategy, the Single Market, EU Regional Aid, social partnership and the resolution of the country's fiscal crisis – is forced to the conclusion that "the sources of the 'Irish miracle' of the last decade are not entirely clear" (de la Fuente and Vives, 1997). In the same spirit, OECD (1999) concludes that: "It would seem that there has been no 'silver bullet' – no single overriding policy that could be adopted elsewhere in order to emulate the Irish experience. Rather the breaks in trend, first around 1987 when the deterioration ceased and performance improved, and then around 1994 when the boom began, are attributable to the confluence of a series of favourable changes in the environment and other exogenous factors, as well as prudent planning and a range of policy shifts that lay the foundations for the pickup in growth. Most of the items that have contributed to the improvement are well known to other policy makers, but other

The Corporation Tax Regime

Ireland was one of the first countries in the world (along with Puerto Rico and Singapore) to adopt an FDI-oriented development strategy. Ireland's low corporation tax regime was instituted in 1956 and the effective corporation tax rate remains one of the lowest in the EU.

The Finance Act of 1984 extended the favourable corporation rate of 10% then available to manufacturing companies to data processing services and software development services.⁵ In 1987 the rate was further extended to qualifying activities carried out at the newly-established International Financial Services Centre in Dublin. In the face of European Commission pressure to harmonise rates across sectors, the government agreed in 1998 on a new harmonised rate of 12½%, to be instituted from 2003, across all sectors. The Finance Act of 2004, furthermore, established a new headquarters regime aimed at attracting international corporations to establish their regional HQs in Dublin. This has also served to attract other activities such as shared services and treasury management.

Taking fiscal policy to begin with, successive Irish governments had struggled throughout the 1980s to overcome the debt crisis that had resulted from inappropriate pro-cyclical fiscal expansion at the end of the previous decade. The attempt to close the deficit via high taxation proved unsuccessful – because it was by necessity pro-cyclical (in a contractionary direction) – and workers responded to the tax increases with higher wage demands.

A new approach was tried in the 1987-89 period, when government expenditure was reined in as an alternative to further tax increases. Rather than being pushed into recession, as many would have predicted, the economy expanded.⁶

The social partnership approach brought government, unions and employers together every three years to agree a general path for wages and working conditions over the course of the agreement. Successive governments used the process to purchase wage moderation via the promise of future tax cuts, and these tax cuts accounted for about one-third of the rise in real take-home pay from the beginning of the partnership process to the end of the export-led growth phase. This phase gave way to a construction-driven bubble in the early years of the new millennium. The architects of the partnership approach have argued that it has promoted a shared understanding of key economic mechanisms and improved relations between the parties to the agreements. The partnership period also coincided with a sharp reduction in strike activity.

EU regional aid through the Structural and Cohesion Funds increased substantially in the 1990s.⁷ It allowed the implementation of badly-needed infrastructure projects that had been postponed during the fiscal contraction of the late 1980s. Infrastructural constraints would have emerged had the new infrastructure not been brought on stream. Besides expanding the level of FDI inflows that the economy could handle, the aid would also have impacted on the type of FDI that Ireland was able to attract. The increasingly high-tech FDI inflows of recent decades rely on ready supplies of skilled labour, to which the human-resource programmes of the Structural Funds contributed.⁸

countries' situations may not be so propitious as to allow such a strong response, even to fully appropriate incentives and institutional arrangements."

⁵ The IDA commissioned a report from consultancy firm Arthur D. Little, which was delivered in 1984, which sought to identify opportunities for job creation in internationally traded services. The report suggested computer services in general and courseware in particular (Sterne, page 161).

⁶ Within a similar debate, Barry and Devereux (1995) reject the expansionary fiscal contraction hypothesis developed to explain episodes like this, concluding instead that "the factors which were working in the direction of recovery – buoyant world demand, improvements in cost competitiveness and an inflow of foreign investment in the lead-up to the Single European Market – more than outweighed the short-run contractionary effects of fiscal contraction". The competitiveness gains alluded to arose not just from the preceding sharp devaluation of the currency (in 1986) but also from the simultaneous development of the 'social partnership' approach to wage determination.

⁷ EU support may have had further indirect beneficial effects however. One that is widely recognised concerns its impact, through the introduction of rigorous evaluation procedures, on the efficiency of the overall system of public administration.

⁸ Ferreira and Vanhoudt (2002) argue plausibly that the increased throughput – especially given the vocational/technical slant of the skills provided at third level – and the sectoral (high-tech) composition of the increased FDI inflows were self-reinforcing factors that proved decisive for the Irish boom.

The Celtic Tiger era overlapped with an era of *high global corporate profitability* (which is particularly advantageous for a low corporation tax regime such as Ireland's), with increased services offshoring, and with the establishment of the Single Market. US investments in Europe increased substantially, and Ireland captured a proportionally higher share of those investments.⁹

2.2 The Main Public Actors of the Innovation System

2.2.1 Industrial Development Agency

The term “industrial policy” in Ireland refers to the actions of the Industrial Development Agency (IDA) – which is tasked with attracting foreign industry to the country – and of its sister agencies, the most important of which, for the present purposes, is Enterprise Ireland, whose remit covers export-oriented indigenous industry. The IDA is widely cited as an example of best-practice in the investment promotion field, with a well-developed “transnational strategic network” that assists the government in understanding the needs and concerns of prospective foreign firms and the potential benefits they can offer to the country.

This transnational strategic network consists of the IDA's overseas offices and its ongoing relations with the Irish-American diaspora and with foreign multi-national companies which have established operations in Ireland. Its overseas offices are tasked not just with identifying and meeting with prospective investors in the region, but also with gathering information about trends in sectors in which the agency is interested and about new emerging sectors that might warrant the agency's attention. This network guides the agency's efforts to inform and persuade the government about required legislative changes, necessary additions to infrastructure, and specific training programmes to serve the needs of targeted sectors.

The IDA has grant-giving powers and has traditionally had very substantial resources at its disposal. “In its heyday in the early 1980s”, according to Ó Gráda (1997), “the IDA (which at the time included what would later become Enterprise Ireland) accounted for 12% of all public investment and absorbed 2% of GDP. A decade later these shares had dropped to 8% and 0.6% respectively.” Even at this later stage, however, Irish state financial support to industry, in terms of euro per person employed, was some 15% above the Western EU average. As EU restrictions on state aids to industry tightened, the industrial development agencies (see the section on Enterprise Ireland below) shifted their focus from ‘capacity’ support for employment creation and fixed asset investment to ‘capability’ support in areas such as human resource development, R&D, marketing and market development, with Enterprise Ireland increasingly shifting towards owning shares in the companies it is supporting.

The IDA and the other development agencies have attained over time a substantial degree of bureaucratic, administrative and political “clout” within the policymaking hierarchy. This has given them an influence in areas not traditionally recognised as lying within the industrial promotion remit. Effectively, they can be regarded as coordinating broader changes to attract technology-intensive FDI.

One such area concerns telecommunications infrastructure. MacSharry and White (2000) recount the hostile responses of the moribund Department of Posts and Telegraphs to IDA criticisms of the state telephone system in the 1970s. The IDA eventually won the battle to have the service commercialised in 1979. A digital-based network was developed which was, at the time, one of the most advanced in Europe, enhancing Ireland's ability to capture newly emerging industries in which first-class international telecommunications, ranging from software development to call centres, customer support and data-related services, constituted a key factor.

The IDA has also had an influence on the Irish educational system. From 1978, however, the universities also became more responsive to government manpower policy objectives. The

⁹ MacSharry and White (2000) explain the latter by describing how restrictive public procurement policies on the part of the larger EU member states had disadvantaged Ireland as a location for FDI. With the outlawing of these practices within the Single Market, Ireland's attractiveness as a destination for FDI increased.

Manpower Consultative Committee was established in that year to provide a forum for dialogue between the IDA and the education system. The Irish system offers a finite number of places in most third-level courses, and while these numbers are decided by the universities themselves, they are subject to government influence given that the latter provides the bulk of university funding.

MacSharry and White (2000) provide an example of how IDA influence operated in this regard. Concerned by the looming disparity between electronics graduate outflows and IDA demand projections, the IDA convinced the government to fund a massive expansion in educational capacity in these areas. The output of engineering graduates, as a result, increased by 40% between 1978 and 1983, while the output from computer science increased tenfold over the same short period. The IDA in turn was able to use the rapidity of this response – exemplified by the immediate introduction of a range of one-year conversion courses to furnish science graduates with electronics qualifications – as a further selling point to foreign investors.

The Irish post-secondary-level system – driven by the country’s FDI-focused strategy – has produced one of the highest proportions of young people with science and engineering qualifications in the world. Ireland began by taking measures to increase the numbers of PhD students to support movement up the industry value chain. Taking the number of new doctorates (PhDs) produced per million of population as an indicator of trained researchers, around the middle of the decade, Ireland performed well in terms of numbers of doctoral graduates overall and science and also of engineering doctoral graduates. Ireland was ahead of the Netherlands, Norway, Denmark and the US.

Main Actors

Forfás is Ireland’s policy advisory board for enterprise, trade, science, technology and innovation. It was established in 1994 as an agency of the Department of Enterprise, Trade and Employment. Its policy functions are to:

- Provide independent and rigorous research, advice and support in the areas of enterprise and science policy. This work informs the Department of Jobs, Enterprise and Innovation and wider Government in its responses to the fast-changing needs of the global business environment;
- Ensure the coherence of policies across the development agencies supporting enterprise;
- Evaluate enterprise policy interventions;
- Provide research and administrative support to independent advisory groups

It is also responsible for coordinating the Industrial Development Agency (IDA), Enterprise Ireland (EI) and Science Foundation Ireland (SFI). More: <http://www.forfas.ie/>

The Industrial Development Agency (IDA) is responsible for the support and promotion of inward foreign direct investment (FDI). Its role is to attract foreign companies to Ireland. It provides set-up support and incentives for expansion and investment in innovative activities. IDA has published its strategic thinking: Horizon 2020. This strategy document articulates its view of the next decade’s significant future changes. It outlines the results of an analysis of global mega-trends, economic geopolitical changes and technology roadmaps from which IDA has outlined the goals Ireland needs to set to capitalise on the opportunities that they represent.

More at: <http://www.idaireland.com/> and at: Horizon 2020: <http://www.idaireland.com/news-media/publications/library-publications/ida-ireland-publications/IDA-Ireland-Strategy-2020.pdf>

Enterprise Ireland is the government organisation responsible for the development and growth of Irish enterprises in world markets. It works in partnership with Irish enterprises to help them start, grow, innovate and win export sales on global markets. It actively supports high potential start-ups and encourages the internationalisation of its client companies. It also focuses on regional development and promotes involvement in Business Innovation Centres. Enterprise Ireland has also played an important role in providing seed-funding for the emergence of a strong venture capital industry in Ireland. More at: <http://www.enterprise-ireland.com/en/>

Science Foundation Ireland (SFI): Science Foundation Ireland (SFI) invests in academic researchers and research teams who are most likely to generate new knowledge, leading edge technologies and competitive enterprises in the fields of science and engineering underpinning three broad areas:

- Biotechnology (BIO)
- Information and communications technology (ICT)
- Sustainable energy and energy-efficient technologies (ENERGY)

SFI makes grants based upon the merit review of distinguished scientists. It also advances co-operative efforts among education, government, and industry that support its fields of emphasis and promotes Ireland’s ensuing achievements around the world. More at: <http://www.sfi.ie/>

Before Ireland's living standards converged with those of the EU15, there was little discussion or recognition of the concept of a regional or national innovation system in the country. IDA policy was largely focused on creating the conditions necessary to attract FDI, multinational firms and to draw higher stages of the value chain to Ireland. Massive (EU-funded) development of the telecommunications system was one component of this policy. Another was focused on science and engineering-oriented third-level education.

But, rather unexpectedly, indigenous software entrepreneurs emerged as a result of these policies, and also as a result of indigenous software engineers working in foreign high-tech sectors.

The initial demand-side of this process of emergence was represented by the diverse ICT-using high-tech sectors in the Dublin region, as the customised and niche software products these sectors required were, in the early stages, largely non-tradable. Thus the indigenous software sector emerged as an unanticipated by-product of the country's focus on attracting FDI.

Once the indigenous software sector had emerged, the state agency Enterprise Ireland (EI) stepped in with support. EI support is heavily oriented towards the development of products for the export market;¹⁰ hence the transition over time from non-traded computer services to traded software products.

On the one hand, Enterprise Ireland employed part of the country's allocation of EU regional aid to bolster the availability of venture capital. On the other hand, steps were taken to facilitate the strengthening and deepening of tacit knowledge through the establishment of Science Foundation Ireland and the funding it has provided to campus-industry partnerships in ICT and the biosciences.

2.2.2 Science Foundation Ireland

Science Foundation Ireland was established in 2000. Its establishment, and the earlier launch of the Programme for Research in Third Level Institutions (PRTLII) in 1998, followed the release in 1996 of the first-ever Irish Government White Paper on Science, Technology and Innovation (STI).¹¹ The increased commitment to STI was reflected in a five-fold increase in investment in these areas in the 2000-06 National Development Plan. The PRTLII represented an initiative to support high quality basic research in third level institutions in Ireland. Its funding allocations supported the national sectoral priorities in biosciences, biomedicine and ICT and the programme has established more than twenty major research centres supported by Science Foundation Ireland as well as major programmes in human genomics and computational physics.¹²

¹⁰ Indeed the mission statement of the state agency Enterprise Ireland is "to accelerate the development of world-class Irish companies to achieve strong positions in global markets resulting in increased national and regional prosperity".

¹¹ The origins of Science Foundation Ireland lay in a Technology Foresight Exercise organised by the state agency Forfás with the very substantial participation of executives from foreign MNCs located in Ireland as well as indigenous firms. The executives were asked about how they viewed their companies' evolution over coming decades and what the Irish government could do to respond to those changes. The essence of the response was that as Ireland was no longer a low-cost manufacturing location it would have to develop more highly trained engineers and research scientists in order to become a centre for innovation, research, design and development.

The exercise proposed the establishment of a Technology Foresight Fund to promote and finance new basic and applied scientific and technological research in Ireland, and Science Foundation Ireland was established to administer this fund. The net result was the aforementioned five-fold increase in science, technology and innovation funding, the establishment of a host of joint partnerships between third-level research institutions and industry, and a US National Science Foundation-type system to support scientists and engineers working in designated fields, principally in ICT and the biosciences.

¹² Examples of campus-industry partnerships:

- The Centre for Research on Adaptive Nanostructures and Nanodevice (CRANN) - Principal industry partner: Intel Ireland Ltd; others include Hewlett Packard, Deerac Fluidics, Commergy, Magnetic Solutions and Eblana Technologies
- Lero - The Irish Software Engineering Research Centre - Industrial Partners: Analog Devices, Ashling Microsystems, Beaumont Hospital, Robert Bosch, Brightwork, IBM Ireland, Intel Ireland, Iona Technologies, KUGLER MAAG CIE, Motorola, Piercom Ltd, QAD Ireland Ltd, and Silicon & Software Systems.
- The Digital Enterprise Research Institute with Hewlett Packard as industrial partner
- The Centre for Telecommunications Value-Chain-Driven Research with Bell Labs as industry partner

2.2.3 Enterprise Ireland (EI)

State support, funded by EU regional aid, was key to the emergence of the necessary venture capital funding.¹³

As mentioned above, EU restrictions on state aid encouraged the state agency Enterprise Ireland to shift its focus from 'capacity' to 'capability' support. At the same time, in response to the recommendations of an external review by the Industrial Policy Review Group (1992, p.12) that the agency should shift from grants to equity "to meet gaps in financial markets for venture capital and seed capital", it progressively increased the proportion of support provided through equity, in the form of both ordinary shareholdings and preference shares.¹⁴ Equity participation increased from 5% of total financial supports in 1989 to 28% in 1998 (Forfás, 2000).¹⁵

The shift in emphasis towards capability development requires firms to reach agreement with the state agency on an integrated development plan before aid can be accessed. This encourages emerging firms to assess as objectively as possible their own strengths and weaknesses. The agency then customises a support package that may include helping companies to monitor markets and exploit new market opportunities, encouraging process and operations improvement and the development of better products and services through improved access to appropriate research, and promoting increased management and employee training levels.

The agency was particularly supportive of what it termed high-potential business start-ups (HPSUs), which are primarily in the software sector. HPSUs are defined as export-oriented firms that, in the case of international services, (i) are located in a product market that has grown by at least 20% in the previous year; (ii) are based on technological innovation or the exploitation of a rapidly developing market niche; (iii) are founded and promoted by experienced managers, entrepreneurs, academics or highly skilled technical graduates, either from within Ireland or returning from abroad; (iv) are deemed to have the potential to grow within two years to have annual sales of EUR1.3 million and employ 10 or more people; and (v) show clear evidence of being able to continue to grow substantially and of being in a position to fund such growth.

The agency worked intensively with such firms to ensure access to the best external management advice; it helped them to attract expertise to their boards – e.g., through appointment of experienced non-executive directors – and to build an appropriate management team; it provides support for in-company training and for product and process development through direct support for in-company R&D and through establishing technology innovation networks, and it helped them in developing contacts with private-sector financiers. Also, it did, where necessary, offer direct financial support (Forfás, 2000).

The firm-assessment process operates to rigorous standards. To be deemed eligible for funding (though with no automatic entitlement), projects seeking support must first successfully pass a formal cost-benefit analysis. Qualitative and other factors that are difficult to quantify are then taken into account in a Quality Ranking Matrix which focuses in particular on projects from well-managed innovating companies in high-growth, high-productivity export-oriented sectors.¹⁶

- The Regenerative Medicine Institute with industry partners including Medtronic Vascular

¹³ Though the fact that the basic pre-condition for the successful establishment of a state-supported VC industry had been met – i.e. that the high-tech sectors requiring VC were already in place – must be seen crucial

¹⁴ The Review Group – one of a number of periodic external assessments of the state's development agencies – recommended that the agency should become much more an "aggressive venture capitalist" and should be prepared to take stakes as high as 50-60% (IPRG, p.72).

¹⁵ Preference shares with a low coupon rate are used to provide a form of long term finance at low cost to SMEs that are unable to raise development finance from the market on similar terms. Evidence on the significant returns earned by Enterprise Ireland from dividend income, the redemption of preference shares and the sale of ordinary shareholdings in client companies is provided in Forfás (2000, Table 5.3).

¹⁶ The focus of the development agencies on export development has been criticised in some quarters as overly mercantilist. It has been pointed out in defence however that non-traded-sector firms are likely to be competing largely with each other, which would put the state in a vulnerable position, were it to support some and not others. In

Ó Riain (2004) provides further details of the hands-on approach that has operated in the case of indigenous software firms, suggesting that the mentoring programmes that pair small companies with experienced industry figures and the Enterprise Development Programme that provides one-on-one support and advice in terms of business plan development have been of particular importance. Indeed, according to Walsh (1985), the latter had been set up in 1978 partly in response to the lack of venture capital finance available at that time. The state has also provided a substantial proportion of the R&D funding for indigenous software companies and, more recently, as discussed below, of venture capital funding as well.¹⁷

As the only significant indigenous high-tech sector, computer-related activities (which in Ireland equates largely to software) attracted a relatively high proportion of VC funding.

The Irish VC industry expanded dramatically from 1994 when two major government initiatives were announced. The first was the issuing of guidelines that pension funds should place 0.08% of their assets annually into venture capital funds over the following five years. These guidelines were issued on foot of a report commissioned by the Irish Association of Pension Funds (IAPF), the Irish Insurance Federation and the Department of Finance, at the request of the Minister of Finance, which found that pension-fund investments in the domestic market were negligible in comparison with levels prevailing in the US and the UK. Since then, the proportion of new funds accounted for by the Pension Funds sector has hovered around the European average (Barry and Topa, 2008).

The second major step taken in 1994 was the establishment by Enterprise Ireland of the Seed and Venture Capital Measure (1994-1999), co-financed by EU regional aid. The programme was targeted at establishing venture/seed capital funds. Financing was provided on condition that a minimum of 50% of the capital would be privately funded. The EU and national funding amounted to a total of €44 million and this was matched at the beginning by €40 million in private investments. Returns were fed back into further investments. Although at the inception there were difficulties in securing the participation of the private sector, by 2003 a sum of €119 billion had been invested in 130 companies (Enterprise Ireland, 2002). Crucially, from a governance point of view, these VC funds are run on a purely commercial basis, with investment decisions taken solely by private-sector VC fund managers.

In 2001, the Seed and Venture Capital Fund Scheme was recommenced under the National Development Plan 2001-2006 with funds amounting to €95 million. The objective of the programme was to leverage €400 million in private funding. This had already been achieved by 2002, and by 2004, the 15 funds established under the programme had raised about €500 million and had made investments of €133 million in 75 companies (Enterprise Ireland, 2005).

Over the entire period since these government initiatives were taken in the mid-1990s, government funds as a share of total new funds in Ireland have typically been greater than is the case for Europe on average (Barry and Topa, 2008).

The Irish authorities, furthermore, have been commended for establishing a fiscal and legal framework conducive to the development of venture capital. The 2003 report of the European Venture Capital Association published an evaluation of the extent to which member countries maintained an environment which was favourable both for the demand side (venture capital investors) and the supply side (entrepreneurs) of the industry. On a scale running from 1 (most favourable) to 3 (least favourable), the average composite score for Western European EU was 2.04. Ireland achieved a score of 1.58, placing it second to the UK, which had a score of 1.2. The report highlighted as beneficial aspects of the Irish environment: (i) overall tax policy, with a low corporate tax rate and tax incentives for private individuals – including the Business Expansion and Seed Capital schemes discussed earlier – as well as R&D incentives; (ii) the most favourable

the case of software, the strong focus of the relevant agency has always been on software products, which tend to be much more export-oriented than software services.

¹⁷ State expenditure on capacity and capability support is a multiple of state investments in the privately-managed VC funds discussed below.

entrepreneurial environment in the EU, with the lowest time, cost and capital requirements for setting up private or public limited companies; (iii) the lack of restriction on pension fund investments in private equity; and (iv) the availability and optimal regulation of limited partnership funds which represent a legal structure particularly suited to venture capital funds.

Ireland's achievements in establishing a VC industry are reflected in the fact that, even though indigenous industry is less concentrated in high-tech sectors than is the case for the average Western European EU economy, venture capital investments as a share of national income have matched the Western European average.

As the cluster matured, local demand conditions became less relevant and the newer firms spun off by the cluster could be increasingly characterised as "born global".

3. Some Lessons: Serendipity, Global Reach and Governance

The emergence today of intensive ICT activity in Dublin builds upon initiatives taken sometimes several decades earlier (pro-FDI fiscal policy, educational system (Science Foundation Ireland), etc.). Among the initiatives, those taken by the *Industrial Development Agency* are considered to have played a strong role while they were neither ICT focused, nor spatially bound. Probably the most interesting and somewhat provocative conclusion is that policies have generated unexpected and unplanned positive outcomes: as stated by Professor F. Barry, a cluster of export-oriented indigenous software development firms emerged as an unanticipated by-product of the country's inward FDI-oriented development strategy of earlier years.

Today, observers consider that the best Irish indigenous software companies combine their knowledge of software architecture and design with an understanding of their customers' lines of business, differentiating their products through a combination of software technology and software functionality. This might be taken to suggest that the evolving diversity of foreign MNC firms in Ireland will continue to play a role both as entrepreneurial incubators and as sophisticated sources of early stage demand. Diversity across economic activities is conducive to innovation. It might be seen as a pre-condition.

Recent work, however, has documented the extent to which more recent firms emanating from the cluster since the mid-1990s, when the rate of new company formations in Ireland increased markedly, display the characteristics of "born globals" or 'international new ventures'. These characteristics, as identified in the recent international business, marketing and entrepreneurship literatures, include early exporting to a range of international markets and rapid establishment of overseas offices.

A particularly notable feature of this wave of software start-ups is that a significant number of them attracted venture capital funding and might therefore be characterised as following "the Silicon Valley" model of high technology development,¹⁸ nurturing from the start a majority if not all customers abroad, and probably out of Europe, winning export contracts within their first few years and having numerous international Blue Chip clients spread across a range of important vertical market segments (notably telecommunications and Internet services and banking and financial services).

The other evidence concerns their global offices. With multiple offices, these firms establish their first overseas office very early, suggesting that they had an international outlook from the outset. These overseas offices are spread across the globe with a significant presence in each of the three

¹⁸ Broadly speaking, this model entails a group of entrepreneurs creating a technology-based firm that is designed to grow rapidly. The entrepreneurs then seek to persuade venture capitalists and business angels to invest in return for an equity share in the firm, which it is hoped can later be sold on at profit via an initial public offering or trade sale (Kenney, 2000).

'Triad' markets (Europe, North America and Asia-Pacific), with North America the most common location. The main purpose of the overseas offices is to give firms a local market presence to support local customers and to help them win contracts. Several firms also use their overseas offices as a base for forming strategic alliances in key markets, particularly the US. The role of public intervention, here, is also observable with the strong and conditional "go global" requirements of *Enterprise Ireland*.

Last but not least, it is worth mentioning that governance is at stake. A sound partnership between public authorities and the private sector, and the role of social dialogue is observed as important. Same wise, standards of public governance: good practice and evaluation are seen as helpful. This pro-active approach to optimize public governance was similarly observed and underlined in IPTS earlier work about the Irish Information Society¹⁹ and hence appears as staying consistent in time in Ireland.

¹⁹ ESTO, 2003. Identifying factors of success and failure in European IST-related national/regional developments. The case of Ireland. JRC-IPTS. Sevilla, Spain. Available at: <http://is.jrc.ec.europa.eu/pages/ISG/documents/EU15-focusedSynthesisReport.pdf>

Bibliography

(Extracted from the Report of Professor Frank Berry from Trinity College Dublin, author of the original report on which these Notes are based)

Frank Barry; Michael B. Devereux (1995). The Expansionary Fiscal Contraction: a Neo-Keynesian Analysis. Oxford Economic Papers, New Series, Vol. 47, No. 2. (Apr., 1995), pp. 249-264

Barry, F., ed. (1999). Understanding Ireland's Economic Growth, London: Macmillan Press and New York: St. Martin's Press, 1999.

Barry, F. (2002). "The Celtic tiger era: delayed convergence or regional boom?" Economic and Social Research Institute (Quarterly Economic Commentary), pp. 84-91.

Barry, F., and B. Topa (2008) "A Comparative Analysis of the Development of Venture Capital in the Irish Software Cluster", in P. Phan, S. Venkataraman and R. Velamuri (eds.) Entrepreneurship in Emerging Regions around the World: Theory, Evidence and Implications, Cheltenham (UK) and Northampton (USA): Edward Elgar, 2008.

Barry F. (2011). Foreign Investment and the Politics of Export Profits Tax Relief 1956, available at <http://www.tcd.ie/iis/documents/discussion/pdfs/iisd357.pdf>

Blanchard, O. (2002) "Comment on Honohan and Walsh", Brookings Papers on Economic Activity, (1), 58-66.

De la Fuente, A., and X. Vives (1997). The sources of Irish growth, in Alan Gray (ed.), International Perspectives on the Irish Economy, Indecon, Dublin, Ireland. Also available as CEPR Discussion Paper No. 1756.

De Prato, G. and Nepelski, D. (2013) 'Identifying European ICT Poles of Excellence. The Methodology', JRC Scientific and Policy Reports – EUR 26264 EN. Seville: JRC-IPTS. Available at: <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=7020>

Forfás (2000) Enterprise 2010: New Strategy for the Promotion of Enterprise in Ireland in the 21st Century, Dublin: Forfás.

Honohan, P., and Walsh, B. (2002). "Catching up with the leaders: the Irish hare", Brookings Papers on Economic Activity, (1), pp. 1-57.

Industrial Policy Review Group (1992) A Time for Change: Industrial Policy for the 1990s, Dublin: Stationery Office.

Kenney M., ed. (2000) Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region. Stanford University Press.

MacSharry, R. and White, P. (2000). The Making of the Celtic Tiger: the Inside Story of Ireland's Booming Economy, Mercier Press, Dublin, Ireland.

OECD (1999). Economic Survey of Ireland, OECD, Paris, France.

Ó Gráda, C. (1997) A Rocky Road: the Irish Economy since the 1920s, Manchester and New York: Manchester University Press.

Ó Riain, S. (2004) The Politics of High-Tech Growth: Developmental Network States in the Global Economy, Cambridge: Cambridge University Press.

Sterne, J. (2004) Adventures in Code: the Story of the Irish Software Industry, Dublin: Liffey Press.

Walsh, M. (1985), Venture Capital in Ireland, Irish Journal of Irish Business and Administrative Research, 7, 1, 33-45.

European Commission

EUR 26598 – Joint Research Centre – Institute for Prospective Technological Studies

Title: The Case of Dublin as a European ICT Pole of Excellence: Experts' Insights into Public Policies

Editor: M Bogdanowicz

Luxembourg: Publications Office of the European Union

2014- 14 pp. – 21.0 x 29.7 cm

EUR – Scientific and Technical Research series – ISSN 1831-9424 (online)

ISBN 978-92-79-37729-7 (pdf)

doi:10.2791/77912

Abstract

The European ICT Poles of Excellence (EIPE) project is a joint research project of DG CNECT and the JRC Institute for Prospective Technological Studies. It established the conditions for defining, identifying, analysing and monitoring the existence and progress of current and future European ICT Poles of Excellence (EIPE), in order to distinguish these among the many European ICT clusters, observe their dynamics and offer an analysis of their characteristics.

A case study report investigates 5 selected EIPEs – Inner London East, Paris, Kreisfreie Stadt Darmstadt, Dublin and Byen Kobenhavn. It presents and interprets the data collected during the course of the project to understand the actual facts, context and story of each location, i.e. its R&D, innovation and business activity.

The case study report is complemented by 4 short notes, which offer the summarised views of local experts on the role played by public policies in the emergence and the sustainability of ICT activity in their region. This note is about Dublin.

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.

