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INNOVATION POLICIES IN THE FINANCIAL CRISIS

Introduction

The current financial crisis poses serious challenges for the design and implementation of policies and development strategies in countries that are in the process of building technological and production capabilities. The global downturn of economic activity will negatively impact investment, production and employment also in developing and catching up economies.[1] The impact of the crisis on firms' behavior and on the real economy is not neutral with respect to the characteristics of the macro- and microeconomic structure and its technological specialization. Accumulated human capacities, technological capabilities and the specialization of the production structure shape the response and the way out of the crisis of different economies.

In 2007 representatives of the OECD member countries called to develop a strategy to strengthen innovation, increasing productivity and the potential for long-term growth and development were already pressing policy objectives. The economic context has taken a dramatic turn for the worse, with the financial crisis having spread to the real economy, bringing a steep drop in growth and millions of new unemployed.

Nowadays, as the crisis continues to unfold around the globe, the development of the OECD Innovation Strategy has taken on even greater relevance[2]. Innovation

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[1] See: AMA (2008), *Did Innovation Play a Role in the Financial Crisis?* New York Times, June 12, 2008 (review of the book The Game-Changer: *How Every Leader Can Drive Everyday Innovation*, by A.G. Lafley (chairman and CEO of Procter&Gamble) and Ram Charan (author of Know-How); H. Shaoweri (2009), *Innovation is Best Way Out of Financial Crisis*, "China Daily", April 6, 2009; M. Kanerva, H. Hollanders (2009), *The Impact of the Economic Crisis on Innovation*. Analysis Based on the Innobarometer 2009 Survey, Report for MERIT, December 2009

[2] An Agenda for Policy Action on Innovation. 2009 Interim Report on the OECD Innovation Strategy, OECD, Paris 2009.

will be one of the keys to accelerating recovery and putting countries back on a path to sustainable growth. The crisis itself poses a number of serious risks and challenges to the innovation economic system. Getting the policies right is vital. Today's exceptional economic stimulus measures represent a unique opportunity for public policy to foster innovation. By providing the incentives for innovation-related investments, and accelerating activities for which barriers may have been otherwise too high, governments can help lay the foundations for a greener economy and durable growth. If this opportunity is handled effectively, countries could be reaping the benefits for decades to come.

The financial crisis which started in 2007 has triggered a global economic downturn. This has resulted in at first falling economic growth rates followed by a real economic decline in many countries. The financial and economic crisis is expected to have an impact on the innovation expenditures of firms by both limiting the availability of capital and by reducing demand for innovative products[3].

There is an emerging view that the global economy may be at a turning point, leading to a shift in paradigm. This is indeed an era of transition. The current crisis is the latest in a series of important phenomena which continue to transform modes of production and consumption and drive the search for new and more sustainable routes to value creation. Over the past decade, globalisation and the emergence of new and diverse players have continued to accelerate, opening up new markets and opportunities, but also requiring new strategies to benefit and to stay competitive. One result has been a change in the geography of innovation, with a more complex division of labour across cities, regions and countries. Changing demographics throughout the world has also been driving the need for innovation. In OECD countries, dealing with an ageing workforce calls for new responses, be they restructuring, migration, upgrading of skills or outsourcing.

Against this backdrop of transformation, the 2009 Interim Report is an important step towards developing an OECD Innovation Strategy for the 21st century.[4] It examines the contribution of innovation to growth, and to addressing key global challenges such as climate change, health, food security and economic development. It takes account of the new landscape and dynamics of innovation: the important

[3] The 2009 EU Industrial R&D Investment Scoreboard (EC, 2009c) shows that growth in R&D spending for the top 1000 EU companies has slowed down from 8.6% in 2007 to 7.8% in 2008. But despite the decline in growth performance in 2008, the full effects of the crisis on R&D spending are only expected to show up in 2009 due to a delayed effect of the crisis on R&D (and innovation). The Scoreboard data cover companies' R&D spending in the fiscal year 2008 and "[i]n the last part of this reporting period, the world economy entered into a strong financial and economic crisis... Some of the effects of the crisis are already reflected in these company results, namely on indicators such as sales, operating profits and market capitalisation. However, the full effects of the crisis, especially on R&D, tend to lag and are not yet captured in this Scoreboard" (EC, 2009c).

[4] An Agenda for Policy Action on Innovation. 2009 Interim Report on the OECD Innovation Strategy, OECD, Paris 2009.

linkages between traditional and new forms of innovation; its changing geography; and the challenges of governance. In examining these shifts, the report pinpoints the areas where the policy framework may need to be reassessed, or new policies and indicators developed. Specific attention is given to the foundations needed to enable innovation, including human capital, entrepreneurship, research institutions and universities, knowledge markets and infrastructure, among others. Analysis underway will result in a set of policy principles to harness innovation in the 21st century.

Innovation – the introduction of a new or significantly improved product (good or service), process, or method – has long been viewed as central to economic performance and social welfare, and recent empirical evidence has confirmed the links between innovation and growth.

Innovation entails investment aimed at producing new knowledge and using it in various applications. It results from the interaction of a range of complementary assets which include research and development (R&D), but also software, human capital, design, marketing and new organisational structures – many of which are essential for reaping the productivity gains and efficiencies from new technologies. These "intangible" assets have become strategic factors for value creation by firms.[5] Their role in the economy has become as important as that of tangible assets, accounting for 5 to 12% of GDP.

Better accounting of the intangible capital which drives innovation is important in furthering our understanding of the patterns and sources of economic growth. Adding it to the standard growth accounting framework changes significantly the analysis. For example, R&D expenditures and intensity have been found to have a significant effect on per capita GDP growth. And estimates for several OECD countries show that intangible investment more generally accounts for around 20 to 25% of labour productivity growth. The OECD is working with the international research and statistical community to produce a better measure of investment in innovation and its impact at the macroeconomic level

Innovation and global challenges

Just as globalisation has made the world a "smaller" place, there is an increasing realisation that many of today's pressing challenges know no borders and cannot be tackled by a single country – global challenges require collective responses. The ability to address increasingly urgent issues such as climate change, health, food security and poverty depends on stronger innovation and new forms of international

[5] Knowledge@Wharton (2008), Why an Economic Crisis Could Be the Right Time for Companies to Engage in "Disruptive Innovation", November 12, 2008, http://knowledge.wharton.upenn.edu

collaboration. Effective enabling mechanisms are needed, and the OECD is working to identify policies, frameworks, and governance mechanisms that can accelerate scientific and technological progress and diffuse innovation as widely as possible.

Different global challenges naturally call for different approaches to support scientific and technical co-operation. Nevertheless, some common strategies are emerging. These include greater involvement of the private sector, non-governmental and philanthropic organisations, and other stakeholders in the innovation process; building greater capacity for innovation in developing countries; devising new financing mechanisms which provide incentives for global and local innovations; and experimentation with mechanisms that enhance technology transfer to developing countries.

Climate change is one of the biggest challenges of our time, and one which can only be solved collectively. Innovation can reduce the economic costs of climate change by putting economies on growth paths that are less greenhouse gas-intensive. While this requires major progress in development and deployment of key technologies, there is evidence that innovation in climate change mitigation technologies is accelerating. Better use of existing knowledge and technologies, across sectoral boundaries, also offers important opportunities to address this and other global challenges.

A wide range of policy actions will be needed to mobilise innovation to address climate change. Setting a price for carbon emissions (whether through tradable permits or a carbon tax) and the provision of targeted R&D support for mitigation technologies by governments can be particularly effective in inciting innovation in climate change mitigation technologies. The concept of eco-innovation is being applied by several OECD governments as a way of meeting sustainable development objectives. More generally, in order to encourage innovation, it is important to provide a stable and long-term policy horizon for investors. This is particularly important for "breakthrough" technologies with a long planning horizon. And, in order to realise reductions in emissions in a cost-effective manner, developing countries need access to mitigation technologies and an incentive to adopt them. Ongoing work at the OECD is examining these issues.

Likewise, innovation can be better mobilised to propel development and prosperity in the poorest regions of the world. In the agriculture sector in particular, innovation can be a key driver of poverty reduction in rural economies. Policies also need to provide affordable access to communications technologies, especially broadband Internet, which is vital to accessing knowledge and can trigger local innovations, boosting rural development beyond agriculture. Improving rural productivity also requires significant investments in basic infrastructure including transportation, rural energy, and irrigation. There will be little progress without these foundations.

Stimulating entrepreneurship and facilitating private sector development in developing countries should be high on the agenda, as they can promote the autonomy needed to turn opportunity into prosperity. These are important investments, which need carefully tailored incentives and risk-sharing mechanisms supported by government. Donors can play a critical role in priority setting, but also in terms of operations and implementation. To make this happen, links between development policy and innovation policy need to be established, and coherence between the two strengthened.

In recent years, the notion of innovation has broadened. In particular, interest has grown in non-technological forms of innovation – for example organisational changes, marketing and design – and their contribution to productivity growth. This interest reflects a growing appreciation of the interaction between – and complementary nature of – technological and non-technological forms, particularly in terms of wider application and adoption of innovations.

The focus on non-technological innovation has been most prominent in the services sector, which now accounts for more than 70% of GDP in OECD countries. Indeed, empirical evidence shows that innovation in this sector takes different forms than in the manufacturing sector. Services firms innovate through informal R&D, the purchasing and application of existing technologies, as well as the introduction of new business models.

'There is a growing recognition that innovation encompasses a wide range of intangible activities, in addition to R&D. Efforts to improve measures of such innovative activity, or show that R&D needs to be supported by a complementary range of other investments, are still underway. Nevertheless, it is already clear that investment in intangibles is as important as tangible investments in machinery, equipment and buildings.

Moreover, the understanding of the innovation "cycle" has grown. The links between policies to enhance investment in the creation and application of knowledge and new technologies, and policies that provide incentives for innovation through to the tail end of the innovation cycle, e.g. in supporting demand for innovative goods and services, are increasingly recognised.

The contribution of entrepreneurship to innovation is unique. Innovation often occurs through entrepreneur's exploration of new markets, ideas and opportunities. New companies are created to exploit technological or commercial opportunities which have been neglected by more established companies and bring them to market. In 2005, half of business R&D in the United States was conducted by companies that were less than 25 years old. A policy environment that fosters the startup and growth of new firms is therefore critical to allow innovation to flourish.

Furthermore, networked innovation processes, underpinned by the spread of broadband Internet connections, enable a much larger participation in the innovation process, opening it beyond the realm of corporate R&D laboratories to users, suppliers and consumers in the public, business and non-profit sectors. Tapping into this source of ideas offers a potentially important new source of innovation and enhances the influence of market demand on innovation.

The wider range of actors now involved in the innovation process underscores the need to develop "soft skills" that equip people to work in multi-disciplinary and multi-cultural problem-solving teams. Innovation also involves the capacity to adapt, or to retrain following the introduction of radically new products and processes. Therefore, it is important to ensure that educational institutions, as well as vocational education and training programmes, equip younger people and graduates with flexible and broad skill sets to accommodate the changing nature of innovation.

Community engagement is also important in the uptake of innovation. In many countries, the public is demanding a role in decisions relating to the adoption of new technologies, particularly when these challenge strongly-held values. The backlash witnessed against new technologies such as genetically modified foods is just one example of the role and influence of communities. Early-stage engagement with the public can play a key role in the acceptance of innovations, and can influence the applications derived from new technologies.

Drivers of public attitudes towards new technologies and innovative processes – including perceptions of risks and benefits – therefore need to be understood by technology developers and policy makers.

These and other changes in the innovation process present a challenge to existing national policy frameworks, many of which remain primarily focused on strengthening public research and on providing incentives for market participants to invest in research. A shift towards fostering a wider range of innovation activities is needed. Understanding how important such new forms of innovation are, how they interact with each other, and what factors drive them is the key to developing appropriate policies.

Improving the measures of innovation is critical to provide new tools for policy making and evaluation. The OECD and the research community are working to develop a new set of indicators to examine the broader notion of innovation and its link to economic performance and growth. This will require additional collection and use of internationally comparable data at the firm level, as well as a better understanding of currently unmeasured factors in the innovation process.

Complexity of innovation processes

Just as the notion of innovation has broadened, innovation processes have become more complex and interactive. The production and commercialisation of significant innovations such as the discovery of the transistor, the invention of antibiotics or the introduction of organisational changes in the workplace has never been a simple or risk-free task. But there is a now a more explicit recognition that the process of innovation is not merely a linear progression from scientific research to discovery, to technological improvements, to finished products and diffusion.

The complexity and costs of engaging in innovation – in particular at the frontier – have risen. Increasingly, innovations are achieved through the convergence of different realms and technologies (e.g. social sciences, microelectronics, engineering and life science technologies). Such innovations promise new added value but are risky, since business models are uncertain, costs are high and new potential competitors emerge in a very fluid business environment. Thanks to decades of trade liberalisation, markets have become more globalised, opening new opportunities, as well as intensifying the level of competition. Product life cycles have also shortened or are under pressure – owing to more intense and global competition and continued technological progress. This is forcing companies to innovate more quickly and develop products and services more efficiently.

These trends have had several impacts on the innovation process. First, innovators have narrowed their focus to those elements where they believe they have a competitive advantage. While science and innovation activities still tend to cluster in particular locations or around certain institutions, other regions are increasingly emerging as a hub for innovative activity.

Second, confronted with intense global competition and rising R&D costs, companies are increasingly collaborating with external partners. The aim is to stay abreast of developments, expand their market reach, tap into a larger base of ideas and technology and get new products or services to market before their competitors. Suppliers and customers are among the most sought-after innovation partners. These networks and ecosystems are increasingly global.

As the practice of "open innovation" spreads, new forms of knowledge sharing and exchange between firms, individuals and institutions are growing. These collaborations are giving rise to "knowledge markets". Using a number of different mechanisms and platforms, buyers and sellers can pool or trade data, information, contacts and know-how.

Steering markets toward innovation and attracting outside investment also depends on an effective and balanced intellectual property regime. All of these mechanisms help to enable the use, sharing, or exchange of information and knowledge.

All of these developments call for individuals and institutions to adopt a more "open" and flexible approach to innovation, where collaboration and competition coexist in the innovation process. For governments, it implies a coherent and interdisciplinary set of policies to foster innovation.

Innovation for the creation and diffusion of knowledge

The capacity to innovate in this dynamic environment depends on many factors, including the infrastructures and institutions that support the creation and diffusion of knowledge on the one hand, and the demand for innovation on the other. On the supply-side, this includes educational institutions that support the formation of human capital, and research institutions and universities, which play a key role in the creation and diffusion of basic knowledge.

Although business funds a greater share of global R&D in comparison to government, public support for longer-term fundamental research in universities and public research organisations remains critical. It is key to developing new scientific and technological knowledge that can lead to innovations to benefit the economy and society. By nature, this type of research has a long time horizon and uncertain returns. Indeed, while business has reduced its investments in basic research over time, it continues to rely on public research for important knowledge spillovers that can trigger innovation.

On the demand side, market-based institutions, consumers, and entrepreneurship and new firm creation play an important role. But capacity for innovation also relies on linking mechanisms that help match supply and demand, as well as scientific and technological infrastructure and platforms built around general purpose technologies (GPTs), such as information and communications technologies (ICTs), and especially the Internet.

A new and potentially huge driver of innovation is emerging: the demand for processes and technologies to address environmental and sustainability challenges. The search for innovative responses in these areas is likely to grow sharply in the coming years, driving new investment and further exploration of resource and energy-efficient technologies, renewable energies, new business models and crosssectoral application of ICTs, biotechnologies, nanotechnologies, and others.

Complex market and societal needs often require multidisciplinary, innovative solutions. This calls for more systemic application and diffusion of existing innovations, but also more international and interdisciplinary research and development at the technological frontier. These developments have implications for governance, international collaboration and the mix of skills needed, as well as the costs and risks of engaging in innovative activities.

Governments not only play the role of "rule setters", but are increasingly a central innovation actor playing within those rules. Demographic pressures, burgeoning demands, higher public expectations and ever-tighter fiscal constraints mean that the public sector is seeking innovative solutions to enhance productivity, contain costs and boost public satisfaction. The "innovation imperative" is therefore equally strong for the public sector itself. Governments can also contribute to creating demand for innovation through public procurement.

Coordination of the innovation processes

In this increasingly complex and shifting landscape for innovation, developing an effective governance strategy requires coordination at the local, regional, national and international levels, across a wide range of actors and government ministries – Science & Technology, Trade, Competition, Communication, Environment, Health, Foreign Affairs, Employment and Education.[6]

Yet, achieving co-ordination and coherence is a difficult challenge. Coherence involves not only co-ordination of simultaneous policy actions, but also an evaluation of their possible interactions with policies aimed at other objectives. For example, supporting the growth of young dynamic firms require close co-ordination between innovation and entrepreneurship policies. Likewise, a closer integration of policies fostering innovation and a cleaner environment can help guide economies towards greater sustainability. In many cases, innovation policy remains compartmentalised in different departments and agencies that face obstacles to co-operation.[7]

In developing their innovation policies, governments also need to consider the need to adapt to the evolving needs of actors in the innovation process over time. Putting in place mechanisms that enable learning and policy development can help ensure that government is effective and efficient in meeting the needs of society in the field of innovation.

The challenge is therefore to adjust the way innovation policies are designed and implemented to ensure they respond to the new landscape. Changes in the way we innovate; the pace of innovation; the need for better risk management tools; the pressures of globalisation, both organisational and in governance; and the growing expectations of civil society, beg the question: are the public policy instruments in use today "right" for the job? And how can approaches be tailored to country specificities: the level of economic development, economic structure and institutional setting? A systemic but flexible strategy is needed to enable governments, firms and individuals to harness innovation for better economic and social outcomes[8].

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[6] Findings from the OECD Experts Meeting on "Innovating Out of Poverty", 6–7 April 2009.

[7] See: H.D. Gibson (2009), *Competition, Innovation and the Financial Crises at Perspective on the Current Financial Market Turmoil*, "Open Economies Review Journal", Springer Netherlands, 12 December, 2009

[8] See: R. Buderi (2008), *What Does the Financial Crisis Mean for Innovation?* Xconomists Weigh In, http://www.xconomy.com; H.D. Gibson (2009), *Competition, Innovation and the Financial Crises at Perspective on the Current Financial Market Turmoil*, "Open Economies Review Journal", Springer Netherlands, 12 December, 2009; M. Mandel (2009), *Innovation and the Financial Crisis*, Mass Technology Council, February 25, 2009.

Policy agenda

Key elements of such a policy agenda include the following[9].

1. Enhanced collaboration and knowledge exchange

Innovators today increasingly collaborate with external partners, including suppliers, customers and universities, to tap into new knowledge, expand their reach or share risks and costs. Policy can facilitate such collaboration, which is increasingly global, for example by lowering barriers to international knowledge flows and by encouraging the development of knowledge markets.

2. Stronger platforms for innovative activity

Innovation today relies on networks and institutions that support the creation and diffusion of knowledge and help link the supply of innovation to the market. The Internet and related ICTs are arguably the most important platform for innovation today, enabling flows of knowledge and linking innovators around the world. Policy needs to ensure a competitive environment for the development of these and other technology platforms, with broad access for users. Moreover, while business accounts for the bulk of investment in innovation, government support for longer-term fundamental research remains essential in creating the seeds for future innovation.

3. Policies that tap into the global system and build on local strengths

Innovation today is a global undertaking, in particular for multinational enterprises, but is built on local strengths. Drawing the benefits of the globalisation process for national and local economies requires policies that enhance the attractiveness of national and local economies for innovation, e.g. in improving frameworks conditions, strengthening universities and building local networks.

4. Policies that prepare citizens to participate in the innovation economy

In additional to traditional science and technology skills, the competencies that are needed for innovation today have widened to include management, leadership, marketing and business skills, as well as creativity and collaborative and team-working skills. Innovation today crosses borders, mixes disciplines and involves a wide range of actors. Policy makers need to ensure that education and training systems deliver the right mix of skills and competencies needed for innovation, which will require reforms in curricula, vocational training systems and adult learning.

5. Policies that foster entrepreneurship

Entrepreneurs are key players in both the supply and demand for innovation. They also help generate competitive pressures on incumbents, forcing them to innovate. Policy can foster entrepreneurship by facilitating the entry, exit and growth of firms, for example in lowering administrative and regulatory barriers, improving bankruptcy regimes and easing access to finance.

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[9] An Agenda for Policy Action on Innovation. 2009 Interim Report on the OECD Innovation Strategy, OECD, Paris 2009.

6. Policies that facilitate international co-operation and technology transfer

Innovation can play a major part in addressing global policy challenges, such as climate change, health and food security, as well as poverty. Responding to these challenges will require global solutions and stronger international co-operation. More effective mechanisms for this collaboration, and for the diffusion of innovations as widely as possible, must be developed. Co-operation in research and the development of effective solutions are among the key actions that policy can take to address these challenges.

7. Enhance the efficiency of policy

Governments have a wide range of policies in place to foster innovation. Improving the design of these programmes, e.g. in using competitive processes or public-private partnerships, can help enhance their effectiveness and increase value for money. Evaluation is essential to improve policy making, and this depends on improving the availability of data and the development of indicators that reflect the complexity of the innovation process.

8. Foster innovation in the public sector

Government is increasingly a key player in the innovation process. New approaches and new technologies, such as e-government, can help solve problems and improve how services are delivered by increasing responsiveness and improving efficiency and transparency.

9. Create the right framework conditions

The development of innovation policies needs to be supported by conducive "framework conditions" – sound macro-economic policy, competitive markets, smart regulations, openness to international trade and foreign direct investment, a supportive tax climate and a healthy financial system. Government plays an important role in setting these conditions. At the same time, the challenges for innovation policy differ across countries, and policy advice will need to be tailored to the specific needs of each country.

10. Based on good governance and strong political leadership

Given the importance of innovation for core policy objectives, and the broad range of policies needed to foster innovation, it is clear that innovation has become a central pillar of government policy. Political leadership in advancing the innovation policy agenda and good governance at all levels of government are therefore of key importance.

These broad principles will be developed over the coming year and complemented with detailed policy guidance that can help underpin the development and implementation of effective, whole-of-government policies for innovation.

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Abstract

The current financial crisis is forcing many companies to rethink their innovation strategies and their approach to technology management. The almost automatic response to the crisis has been to increase the efficiency of their innovation processes. By downsizing R&D departments, making the innovation processes more lean and focusing more on incremental innovation projects with a more secure payoff. However, while this approach may increase the performance of the company for the short term – it may also inhibit the long term performance of the company. This paper shows that governments should complement its wide range of stimulus packages to combat the economic slowdown by adopting some long-term macroeconomic measures. It has indeed adopted proactive fiscal and moderately loose monetary policies and launched large-scale investments to enable the economy to recover faster, and taken steps to push for optimization of the national economic structure. But it should ensure that its interventions to rescue the reeling market should not go against market principles. The paper ends with the principles of policy agenda prepared by the OECD which can show the possible the way out of the crisis of different economies.