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PROMOTING INNOVATION AND KNOWLEDGE-BASED DEVELOPMENT IN TIMES OF CRISIS: WHAT ROOM FOR AN ACTIVE POLICY STANCE?

Conference room paper submitted by the Secretariat

Introduction

The global economic and financial crisis, which struck after a long period of sustained stability, has radically changed economic conditions and introduced a considerable degree of uncertainty over the future. It has prompted a significant policy reaction. Beyond those areas where active intervention were most urgently needed, the crisis has also led to a wider consideration of how economic and regulatory policies should be framed to overcome systemic fragility, increase resilience to economic shocks and contribute to a sustained recovery. Innovation and knowledge-oriented policies are a critical component of any strategy that seeks to achieve these objectives in a sustainable manner. Such a role has been recognised in most anti-crisis packages in different ways.

The objective of this paper is to review some of the main problems that innovation stakeholders are facing as a result of the current crisis, the emerging trends and the possible range of policy responses. It aims to provide a background to support the debates of the substantive policy segment of the fourth session of the Committee on Economic Cooperation and Integration (CECI).

The preparation of this paper has been informed by the results of an opinion survey circulated among CECI's constituency (including members of Teams of Specialists and expert networks) in March-April 2009.¹ The answers have served to identify major concerns among participants and suggested policy responses.

¹ The Secretariat wishes to thank once again all experts who provided responses to the UNECE survey. All charts presented in the paper are based on the responses to the survey.

1 The global economic and financial crisis: The new landscape

The financial crisis reached a climax in the fourth quarter of 2008, when generalised concerns about the health of large financial institutions led to the freezing of markets and sharp falls in the value of assets. Initial government and central bank interventions sought to reduce systemic risk and provide liquidity to beleaguered financial institutions. These interventions were successful in containing the unravelling of the markets.

Although risk aversion has declined from the extreme levels observed in late 2008, the crisis has severely impaired the ability of financial institutions and capital markets to channel resources to companies. Leverage reduction, resulting in shrinking balance sheets, and growing non-performing loans continue to constrain the capacity of banking institutions to expand lending.

While a worst-case scenario has been avoided, the emerging economic and financial environment remains plagued with uncertainties. Despite all the unknowns, some clear trends can be identified:

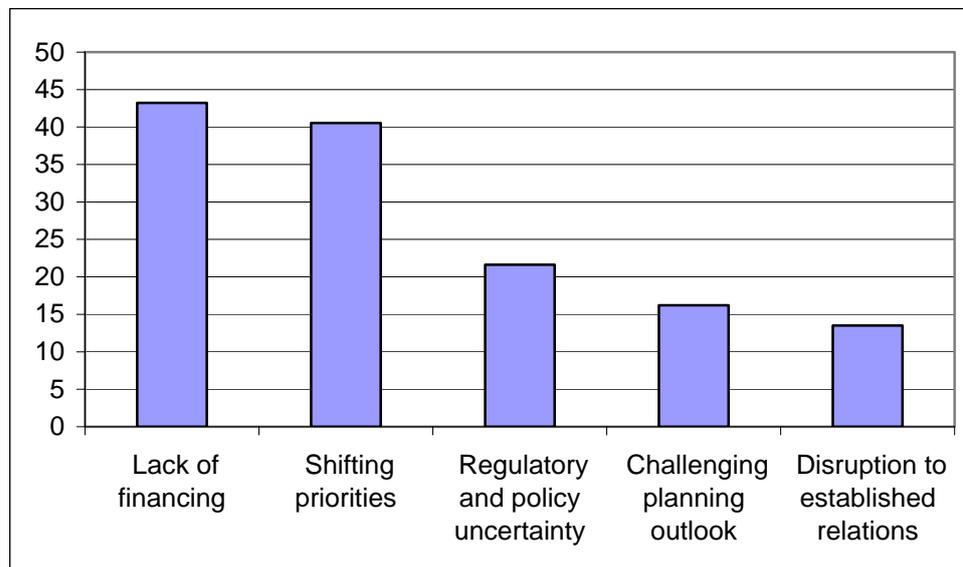
- Bleak growth prospects. Developed economies are expected to severely contract in 2009, with emerging markets being the only source of growth in the world economy. While output decline has slowed down, the timing and pace of the economic recovery remains unclear. Continued economic weakness would mean that business would face slow revenue growth. Persistent level of unemployment will lead to less adventurous consumers.
- Increased risk aversion among investors. The crisis has reduced the appetite for risk among investors, enterprises and consumers. Large institutional investors, such as pension funds and insurance companies, who are a source of funds for the venture capital industry, have been negatively affected by the crisis.

1.1 A new financial landscape

The new financial and economic conditions have exacerbated the traditional difficulties of small innovative companies in raising finance. This outcome concerns both early-stage financing of new enterprises and, more generally, the financing of small and medium enterprises (SMEs), which are a major factor of economic dynamism. Financing problems are widespread. Participants in the UNECE Survey, which include also innovation stakeholders in government agencies and academia, have clearly indicated that lack of financing is the most important challenge they face in their activities, having been identified as such by more than one third of respondents (Chart 1).

The problems of the banking sector have had immediate repercussions on the ability of SMEs to access finance, which have been compounded by late payments from clients. By contrast, early-stage companies are unlikely to obtain financing from traditional banking institutions, given the large risks associated and the lack of collateral.

Chart 1. Perceived impact of the crisis



Note: Bars correspond to the percentage of respondents who mentioned each issue as one of the two most important impacts of the crisis on their activities.

However, specialised financial intermediaries, including both business angels and venture capital firms, have also been negatively affected, although in a less dramatic and visible fashion than banking institutions. All phases of the venture capital cycle (fundraising, investing and exit) have been negatively influenced by the new circumstances.

Business angels (high-net worth individuals who invest their own money in start-up companies) have suffered wealth losses and are in a weaker position to invest. Venture capitalists are finding more difficult to raise finance. Smaller funds are experiencing more difficulties in raising capital than larger, well-established funds, so the crisis may have an impact on the future structure and shape of the venture capital industry. The economic crisis is likely to affect the willingness of investors to take positions in venture capital as an asset class. This concerns, in particular, banks, pension and insurance companies. However, while fundraising has become more difficult, significant resources are still available for investment as a result of previous fundraising exercises. The venture capital companies that have recently closed their funds are in a relatively favourable position, as they are funded and can benefit from the opportunities emerging in this environment.

In the short-run, investors will have to pay increased attention to the management of their current portfolio of companies in the presence of cashflow difficulties in these more challenging markets for their products and services. By contrast, there will be a tendency to postpone new investments, as capital and time is tied up in existing companies.

Exit opportunities for investors have been severely reduced. Public markets remain practically shut as an exit opportunity. In the US, there were only 6 IPO exits of venture-backed companies in 2008, the lowest figures since 1997. This has left trade sales (to other investor or existing companies) as the main effective alternative for investors to dispose of their stakes in innovative start-up companies. But the environment for trade sales has also hardened, as

potential buyers are also being affected by economic difficulties. Exits appear particularly challenging for larger deals.

The adverse environment created by the crisis is likely to exacerbate the difficulties of capital markets to absorb the large number of companies that had received venture capital financing in recent years. A “crowded exit” will have a negative impact on returns, thus making further fundraising even more difficult. Exit difficulties will result in a ripple effect through the various stages of the investment cycle, driving a likely slowdown of fundraising and investment until the pipeline is cleared.

Overall, investors are being more cautious and valuations have been reduced. Historically, a strong correlation has been observed between public and private equity valuations. Lower valuations in public markets have reduced the potential price that investors can obtain when selling start-up firms to other investors or established companies. Start-ups which have received some funding may be able to raise further capital only through lower valuations that factor in the effects of the crisis.

Despite some stabilisation of financial markets since late 2008, prospects remain challenging. Investors are becoming more selective regarding the opportunities they pursue and deals are taking longer time to complete. New factors of risk are being taken into account, namely, the vulnerability of the companies to the recession.

The primary concern of investors is to support the performance of existing companies, in which substantial resources have already been invested. As the existing options narrow, the focus of attention is shifting to the ways in which performance can be improved in this portfolio, which will require additional capital contributions as the time to exit is delayed. Business angels and venture capital firms will have to support their portfolio companies for longer periods of time than they would have to do before the crisis.

Banks are not usually considered as important sources of financing for innovative companies. But now some specialised financial intermediaries may need to provide support for longer, as lending has become more difficult to access, even for companies that have already reached some development milestone.

Credit difficulties may increase the demand for equity financing as some small business, which would normally rely on loans, are pressed into seeking alternative sources of finance. This trend has been confirmed by the European Business Angel Network, which in early 2009 reported that companies that were already generating significant revenues and had traditionally no problems to tap into bank lending, were turning out to business angels to raise finance. Such a development may create additional difficulties for high-risk innovative start-ups, as competition for a limited pool of available financing increases.

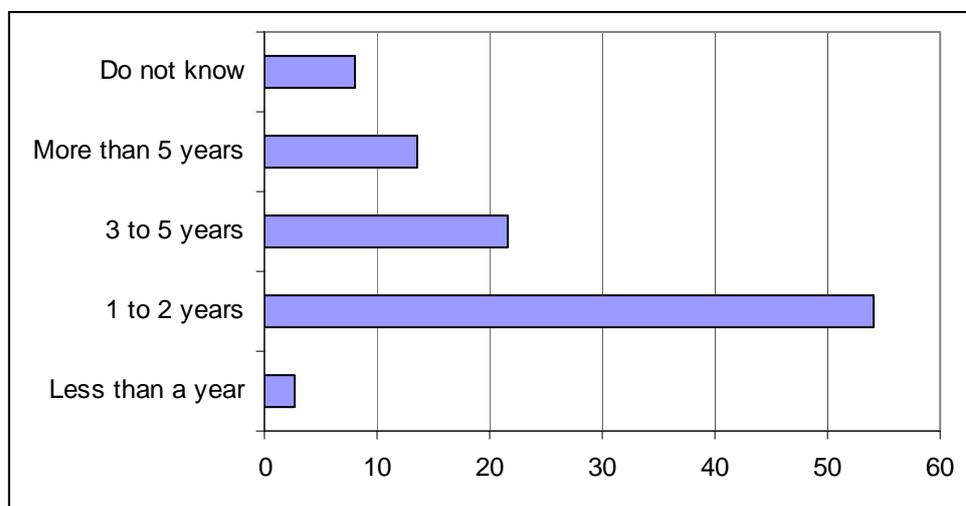
Even before the crisis, the migration of venture capital to later stages of the lifecycle of a company had posed a challenge that demanded an increased reliance on public sector funding. In the United Kingdom, which has one of the most developed systems for entrepreneurial finance in Europe, around half of all early-stage venture capital deals are supported with public money. The difficulties faced by private investors imply that governments are likely to face the challenge of becoming an increasingly important source of funding for early stage-companies. However, with less private funding available, the ability of public-private partnerships to mobilise financing will be more limited.

1.2 Implications for innovation stakeholders

One of the important repercussions of the current global economic crisis is the strong and growing pressure on public financial balances. In any cases, significant falls in output have been unavoidable and unemployment has risen sharply in many countries. Falling tax revenues coupled with increased social protection expenditures and, in some cases, with public financial support to ailing banks, have contributed to the emergence of large public deficits, with a limited scope for improvement over the short-term. At the same time, in many countries, the private sector has been forced to improve its financial balance as harder constraints on borrowing have bitten. This adjustment has had a depressing effect on economic activity, which has required offsetting discretionary measures by the public sector, generating even higher demand for public spending.

The policy problems are exacerbated further by the anticipated prolonged negative consequences of the crisis. The UNECE survey suggests that the current crisis is not likely to be a short-term phenomenon and that its repercussions can be expected to persist for quite some time. Around one fifth of respondents thought that the effects of the crisis will be felt for 3 to 5 years, while more than 10% expressed a concern that this period could extend beyond 5 years (See Chart 1). This implies the need to engage medium-term considerations in the policy responses.

Chart 2. Expected duration of the crisis



Note: Percentage of responses to the question: “How long the crisis will be affecting your country?”

Immediate policy responses have focussed on the stabilisation of the financial system. In addition, governments have aimed to contain contractionary pressures through various measures aiming to boost private and public spending. These reactions, which are justified by the urgency of the situation, have also medium-term implications that need to be addressed.

Support to the financial system and expansive fiscal policies to offset contractionary forces are leading to a rapid increase in public debt. While the immediate focus of policy actions has been to counteract falling demand, the need for fiscal consolidation following the rapid

growth of public debt is likely to lead at some point in the future to a reconsideration of fiscal expenditures and a reduction of the fiscal space for policy manoeuvre. Against this background, structural policies, including innovation and knowledge-oriented policies will deserve an increased attention by policymakers. Interventions that seek to lift the future growth potential will strengthen resilience to economic shocks and increase the credibility of current demand-boosting policies, thus reducing concerns regarding the deterioration of the fiscal position. Looking beyond the disarray of the financial sector, which were the obvious catalyst of the current crisis, it is interesting to note that a marked slowdown in productivity growth has been observed in some developed countries in recent years.

Uncertainty regarding the pace of the recovery and the future growth drivers strengthens the case for structural reforms that boost productivity over the medium term by addressing long-term determinants of economic growth. But even under a scenario of continued sluggish economic performance, innovation and knowledge-driven development would be required to address challenges that were clearly present before the crisis, such as climate change or rapid ageing in most developed countries.

The importance of these secular trends is well appreciated by investors and entrepreneurs, despite the current economic difficulties. Thus, there is evidence that not all sectors that traditionally receive venture financing are being affected equally by the downturn. A fair degree of sector differentiation can be observed, with areas such as clean technologies and biotechnologies continuing to attract strong interest.

Despite these bright spots, it is clear that financial turmoil and economic uncertainty have tightened the constraints under which innovation stakeholders operate. The crisis has also led to a rethink of the potential contribution of innovation and knowledge-oriented policies to address current challenges. More generally, the financial crisis has prompted a reassessment of the role of the state and the market in ensuring economic stability and driving economic growth. As also clearly indicated by the results of the UNECE survey, the immediate concern of policy actions in the first months of the crisis was to ensure that lending continued to flow to small businesses, supporting them through their ongoing difficulties. This remains a common focus in most countries.

Funding problems in the private sector are likely to remain acute. The financial situation of companies and public research and development (R&D) organizations has weakened, which may lead them to reconsider their strategies. With pressing short-term concerns being dominant in a challenging economic environment and reduced earnings, future R&D will be facing a persistent threat.

Innovation activity has a cyclical character, which is closely related with the availability of financing. Difficulties in the access to finance imply that, in Schumpeterian terms, the type of creative destruction unleashed by the crisis is largely dominated by destructive forces. In such an environment, innovation takes longer to ripen and to transform itself into a growth engine.

Consequently, the innovation process in general is likely to be dominated by adaptive innovation. In the current environment, driven by risk aversion and weak, price-conscious consumer demand, companies are likely to focus on innovations that reduce costs and increase efficiency rather than on launching new products. This may result in an emphasis on process-based innovation which underlines the role of business models to derive value from technology.

Furthermore, given the difficulties faced by the private sector and a more timid attitude towards risk, the public sector can be expected to play an increasing role in the funding of

research and innovation. However, the crisis has also undermined the fiscal position in most countries. This creates additional challenges and dilemmas to policymakers and innovation stakeholders.

The attraction of flexible solutions to cope with uncertainty and the need to reduce the amount of resources committed, given the unfavourable economic situation, has increased the appeal of the open innovation model, which is presented in the next section.

2 Innovating in turbulent times: emerging innovation models

2.1 Open innovation and collaborative networking

The timing of the current global economic and financial crisis coincides with an ongoing major paradigm change in innovation models and practices, especially in large-scale mature companies. In recent years, the systems of knowledge production in modern industries have been transforming towards distributed systems, with a variety of new organizations, in particular users, becoming involved in the innovation process.

This new collaborative mode of innovation where firm outsiders (such as users) become as important as firm insiders (producers) contributes to the improvement of technologies, reduces the dependency on suppliers and promotes universal interoperable technologies. Accordingly, the term “open innovation” became associated with the purposive exchange of knowledge (including innovative ideas, as well as possible innovative solutions to specific problems) by an innovating firm with the outside world seeking to accelerate internal innovation.

The paradigm change in the model of innovation associated with open innovation and collaborative networks emerged and is still most pronounced in the ICT related sectors. Among the important agents in this process are the so-called ‘knowledge communities’, which cut across the boundaries of conventional organizations (businesses, research centres, public and government agencies, etc.) and members of the former are at the same time employed by the latter.

Such communities based on collaborative networking are quite common in software development where sophisticated software users with a need for better solutions – rather than proprietary software developers – have been among the leading innovators. However, such communities may and do develop in other industries as well as in sectors such as health and environment. Their key feature – and novelty – is that new ideas and methods do not necessarily originate in suppliers. Instead, outsiders such as users, customers, partners in R&D, etc. interact in the design and building of innovative products for their own use and freely reveal their design to others. Others then replicate and improve the innovation that has been revealed, and freely reveal their improvements in turn.

Three other conditions are important:

- at least some users should have sufficient incentives to innovate;
- at least some of these innovators must have an incentive to reveal voluntarily their innovations; and
- innovators are able to diffuse innovation at low cost.

Another specific feature is that the collaborative mode of open innovation is more often to be found in mature, rather than early stage, companies. There are many reasons for this including the fact that radical innovation in such companies can disrupt existing markets and be

commercially damaging. Also, by reverting to open innovation, mature companies seek to expand the accessible pool of innovative ideas beyond their own internal resources. Ultimately, this is a strategy to stay competitive in the increasingly competitive global marketplace in which other competitors also apply similar strategies.

Collaborative open innovation can deliver enhanced customer experience, productivity gains and, hence, sustained business growth and profitability. Productivity gains arise from the so-called “turbo-charging” in-house R&D, by sourcing in complementary innovations. This operation mode allows a company to harness not only the creativity, knowledge and skills its own R&D department, but also to tap into the creativity, knowledge and skills of customers, suppliers, research organizations and even other companies.

The new models of innovation emphasize collaborative relations (between firm insiders and outsiders or between the innovating firm and other firms) as a source of competitive advantage. This requires from firms the ability to develop specific skills and put in place strategies that explicitly incorporate this interaction to achieve superior innovation performance. As a word of caution, “collaborative innovation” should not be confused with the one-way relation of outsourcing (buyer-supplier) and its associated narrow emphasis on costs.

The medium that makes it possible to operationalize the open innovation model is cheap global ICT-based communication. The collaborative mode of innovation – implying mass daily communication and exchange of huge amounts of information – was technologically infeasible in the pre-internet era. Therefore, it has been the advance in the most revolutionary innovation of our epoch – the worldwide web – that has paved the way for the revolutionizing of the modes and models of innovation.

In particular, ICT technology has expanded the outreach of global head-hunt by companies innovating through open innovation models to its current frontier, namely to the whole global internet-connected population. Consumer-targeting open innovation ventures can potentially mobilize the whole worldwide populace of actual and potential consumers into a joint collaborative innovative effort. The emergence of such mass collaborative networks involved in common “joint ventures” is an important recently emerging characteristic of the open innovation models.

2.2 The economic and policy implications of open innovation

The crucial factor behind a successful open innovation collaborative network is to motivate as many as possible outsiders with the necessary knowledge and skills to participate in the network and to contribute their innovative ideas and solutions to the “joint venture”. *De facto*, the open innovation model implies that outsiders submit their innovation inputs voluntarily and, as a rule, without direct financial compensation. Moreover, participating in the open innovation collaborative network implies some direct costs to the participants such as the time they invest in developing their ideas, other opportunity costs, communication costs, etc. Ultimately, outsiders take on themselves parts of the development/investment costs of the innovation.

What can – and does – motivate outsiders to participate in open innovation models?

There is no simple and single answer to this question and most likely a multitude of factors must be in place for this to happen. One of them may be the strength of the inventor’s creative push that might make the inventor ready to sacrifice some potential benefits for the sake of seeing the invention materialize. But there are more prosaic factors as well. The open

innovation models may offer outsiders (such as users, customers, partners in R&D) various indirect possibilities to share the potential benefits of the innovation produced through the collaborative joint venture. For example, outsiders may contribute to developing bits and pieces of the joint venture but may benefit from free access to the final product as such.

The current global economic and financial crisis seems to serve as a nourishing ground instigating firms to revert more and more often to open innovation collaborative models. The factor that seems to have been acting as an amplifier and accelerator of this trend is cost. Apart from the merits outlined above, when compared to traditional innovation models, open innovation has the unbeatable advantage of low cost to the leading innovating company. In fact, as the development/investment costs of the innovation are shared and distributed within the collaborating network, the leading innovating firm only takes on itself a fraction of what it would have had to take if the same innovation were to be developed internally. De facto the lead firm mostly acts as an entrepreneur in steering the joint venture towards a desirable end.

It is this obvious cost advantage that – in times of crisis, when most firms face cash flow problems – seems to have given such a strong push to the proliferation of open innovation collaborative models.

Of course, not everything in reality is as simple as it may seem. Open innovation collaborative models are often faced with and have to overcome a range of practical and legal problems. Probably the most serious among them is associated with intellectual property rights or, more generally, with securing the appropriability of knowledge-related investments. Open innovation is often (though not always) a direct challenge to one of the traditional policy approaches to secure appropriability associated with the legal protection of the intellectual property rights of innovating entrepreneurs, e.g. through patents or trade secret.

For example, freely available open source software made available for further development of application software is the direct opposite of protected proprietary software codes. Publishing a patentable invention for the purpose of stimulating the development of a range of related innovative byproducts through collaborative networking is exactly the opposite strategy to in-house development of patent protected products.

In this case policy and regulation seem to be falling far behind real life developments. A number of aspects of the open innovation models and the ways they function may fall into grey territories in terms of traditional policy and regulatory approaches. Moreover, open innovation collaborative networks are truly global phenomena, trespassing and ignoring national boundaries and their legal and regulatory frameworks.

De facto, the reality of open innovation collaborative models breaks some traditional policy schemes grounded on assumptions that imply more traditional modes of innovation. One of the key paradigmatic novelties of the open innovation model is that it challenges and, in fact, refutes, possible priors regarding the sequencing of the innovation process and the related causal relationships.

Open innovation based on a mass collaborative network which involves key innovation stakeholders allows for different types of process sequencing such as collaborative work in parallel or the conduct of a simultaneous multidimensional innovation process. In view of this, innovation linkages and stakeholder relationships that are accepted as central in other innovation models may lose at least some of their importance. Accordingly, policies targeting such linkages or relationships may lose some of their relevance, at least with respect to open innovation models.

By contrast, other types of policies and policy interventions, some of which are still not viewed as central in innovation policy, may gain in importance. Thus efficient networking and partner connectivity is a key ingredient of successful open innovation models. This is an obvious area, where public policy can do more and better, by establishing an environment which is conducive to networking and connectivity and by providing advisory and counselling services to this effect.

3. The role of innovation and knowledge-oriented policy in times of crisis

3.1 The expectations for policy responses

Given the overall economic and financial landscape that is taking shape during the crisis, it can be expected that despite a common trend towards a more active presence of the public sector in innovation activities, countries are likely to give a different weight to innovation policies depending on their different starting points. In countries where innovation policies are well established and R&D is high, anti-crisis packages have explicitly included an innovation component, often with a particular focus, such as green technologies. In countries where R&D is low, anti-crisis measures have not generally addressed innovation-related structural issues. A recent OECD review of policy packages warns that these varied reactions may result in a widening of the existing differences between better performing countries and the rest.

Sectors that are still attracting significant innovation financing, such as those related to climate change mentioned earlier, reflect a medium-term outlook that goes beyond the fog of uncertainty created by the current economic turmoil. But these are areas where the public sector plays a leading role, setting the regulatory framework and creating the demand; in short, defining the markets. This has important implications for the understanding of innovation policy, reinforcing the view that sees it as a cross-cutting dimension of sectoral policies, such as energy or environment. These dynamics also underline the fact that the role of the public sector in fostering innovation through the current crisis goes well beyond the provision of finance to offset the weakness of the private sector. It also encompasses leadership and guidance for other innovation stakeholders, providing a map of the future that is credible enough to become a guide for action.

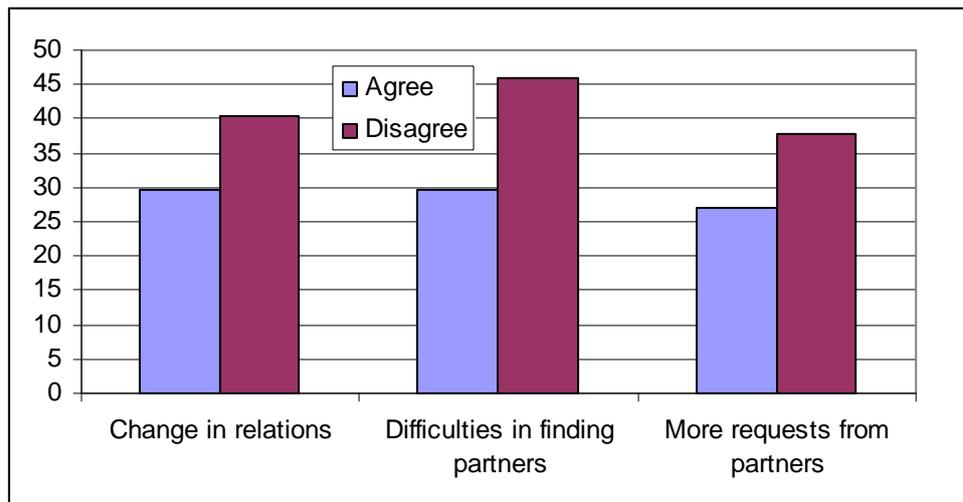
Also, in view of the hardening of budget constraints, one obvious expectation is to raise the effectiveness of public innovation and knowledge-oriented policies, in terms of achieving more and better outcomes with less public funds spent.²

In the current economic environment, with private agents becoming more conservative in their decisions, finance-related measures may be insufficient to stimulate innovation. By contrast, various policy measures that seek to encourage open innovation may have a greater effect in terms of the effectiveness of policy. In addition, measures that target the demand for innovation, including through the use of public procurement, but also through selective targeting of various components of the demand for innovative activity, can be a necessary complement to offset the weakness of private demand.

² The effectiveness of policy is usually measured by comparing the inputs (public resources) with the outcome of policy and the degree to which it meets its objectives. Effectiveness is closely intertwined with the notion of efficiency which relates the inputs (resources) with the outputs of a process.

In analysing the possible policy responses to the crisis, one has also to take into account that many traditional channels for the diffusion of innovation have been disrupted by the crisis. Around one third of respondents to the UNECE survey report significant difficulties in finding partners and note important changes in traditional relations (Chart 3). As business failures spread through the economy and innovation stakeholders revise their strategies in view of the new economic circumstances, established partnerships (both formal and informal) may be eroded.

Chart 3. The impact of the crisis on the relations with key partners



Note: For each issue, the chart shows the percentage of respondents who strongly agree (values 1 or 2) or disagree (values 4 and 5) with the statement proposed.

In a highly interconnected world, there is an obvious international dimension to these partnership relations. A distinctive feature of the current downturn has been its highly synchronised character, as globalization and the close links between the world economies have spread the crisis through various channels.

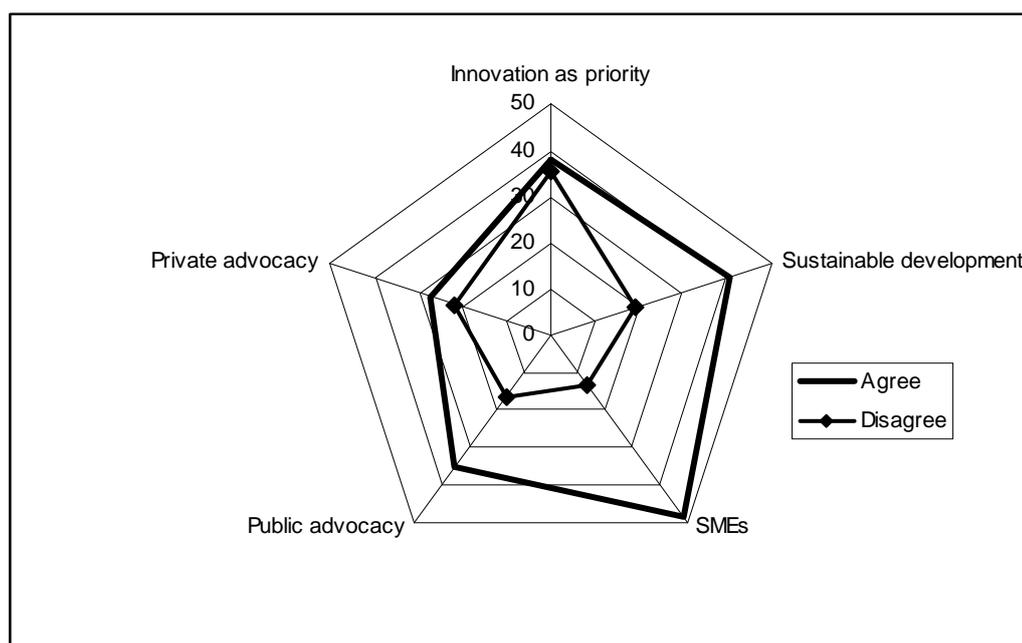
Thus the crisis has been accompanied by a massive contraction in trade. By February 2009, OECD trade turnover was down by around one third on an annual basis. This fall has negative implications for innovation, given the existing relation between exports and innovation. Financial dislocations, resulting in reduced coverage and increased export insurance price, have contributed to the disruption of international trade and supply chains.

3.2 Actual and desirable policy responses

The UNECE survey confirms that policy responses to the crisis have included an important innovation component in most countries. However, the answers to the questionnaire also suggest that, at least in early 2009, the reaction has been rather unequal (See Chart 4). Around 35 % of respondents stated that the priority assigned to innovation in public policies had not changed at all or very little. This is a share almost equivalent to those that were strongly or very strongly in agreement with the perception that innovation policy is receiving a higher priority. This apparent divergence is consistent with the disparity of policy answers reviewed by the OECD which has been mentioned earlier.

The deeply disruptive nature of the current crisis has heightened concerns about economic stability. The systemic nature of the of the dislocation observed in the financial system and the fragility posed by global macroeconomic imbalances, which have been dramatically underlined by the virulence of the crisis, have added to the growing attention that issues such as climate change are receiving. Sustainable development has emerged as an important policy priority, a perception that is widely shared among the respondents of the UNECE survey, which shows little dissent on this issue.

Chart 4. Policy shifts through the crisis



Note: For each issue, the graph shows the percentages of respondents who strongly agree (values 1 and 2) or disagree (values 4 and 5) with the statement.

The need to develop a long-term vision and to carry out actions where the payoff is not immediate clashes with the pressing demands of a crisis situation where unemployment is a rising concern. It is therefore not surprising that support for SMEs, which has the double beneficial impact of contributing to economic dynamism and preventing further job destruction, has become a widespread area of intervention. This is supported by the results of the UNECE survey, which find a high degree of agreement among respondents on this question.

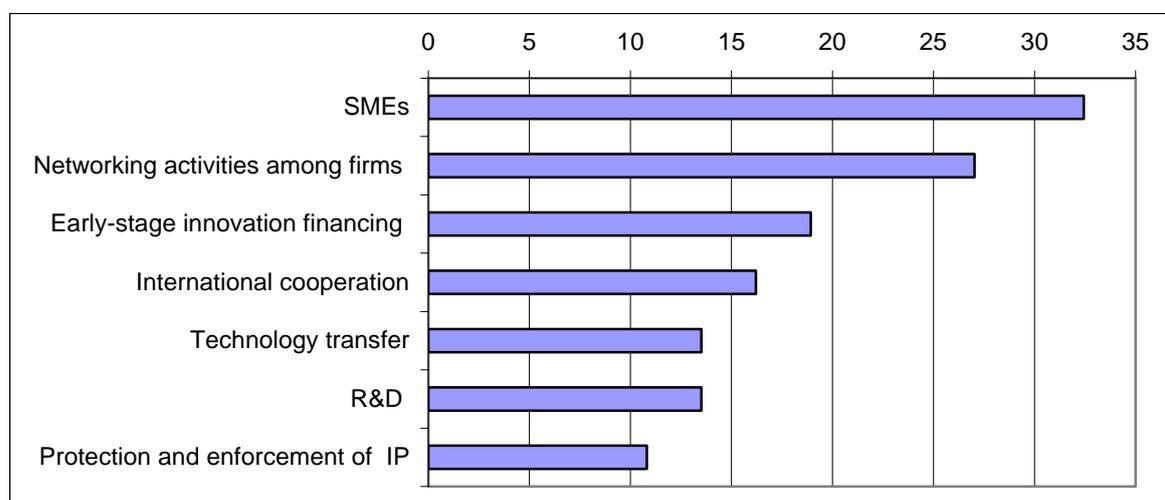
Advocacy for innovation policies as a way out of the crisis appears stronger among the public sector, according to the results of the UNECE survey. This is understandable, as the private sector is generally more concerned with interventions that have an immediate impact on alleviating its current problems. In these uncertain circumstances, the traditional role of the public sector to provide leadership and put in place a coherent framework that creates suitable conditions and incentives for private sector innovation becomes even more significant.

Opinions on the effectiveness of various innovation-related policies to overcome the crisis also reflect a preference for those interventions that have a potentially larger impact on the short-term and/or entail smaller claims on public funding. Respondents consider that actions to

support SMEs are the most useful, thus endorsing the policy priorities which have been de facto adopted in most countries (Chart 5).

Close links between companies facilitate the pooling of resources and the sharing of risks while undertaking innovative activities. Critically, they allow for better knowledge-sharing which greatly facilitates the discovery process involved in generation of new products and processes. In the current challenging economic circumstances, cost reduction and risk minimisation have obvious attractions for innovation stakeholders. The UNECE survey results clearly indicate a strong belief on the effectiveness of public support measure for networking activities among firms, which are identified as one of the two most effective measures by more than a quarter of total respondents.

Chart 5. What is to be done? Perceived most effective policy answers to the crisis



Note: Percentage of respondents that mentioned each issue as one of the two most effective policy responses to the crisis.

Other areas of interventions, such as early-stage innovation financing, international cooperation, technology transfer or R&D receive less support among participants in the survey. The answers suggest a short-term bias, with an implicit focus on immediate impact. However, it is important to bear in mind long-term considerations as well.

The contribution of higher public R&D spending or more generous incentives for private outlays to overcome the crisis is necessarily limited when compared with other areas of intervention, such as SMEs. However, despite a low impact on sustaining demand, other benefits are potentially significant. As the private sector spending tends to contract or stagnate during a recession, public support measures to encourage R&D contribute to ensure that companies are in a better position to compete once an economic recovery starts to take shape. In short, it prevents existing competitive advantages from being undermined because of insufficient R&D during a recession and limits the damage to the growth potential of the economy. R&D support can also take forms that serve to both reducing unemployment and avoiding the erosion of human capital, as research staff in private companies is seconded to public institutions or maintained in their posts thanks to various forms of public-private partnerships.

3.3 What else could policymakers do?

The overview of the possible range of possible complementary policy responses that follows draws on two key observations.

First, given the current strong constraints on resources, including public resources, it appears that in the short- to medium term, it will be difficult to significantly increase the amount of public funds to be allocated to innovation and knowledge-oriented policies in the UNECE economies; in some countries, these funds may even shrink in real terms.

Second, drawing on past experiences, public policies that have turned out to be successful and effective *ex post* have more often been those that have sought to adapt to the changing reality and not *vice versa*, namely, policies seeking to counter the changes in reality in accordance with a static welfare or societal model.

Put differently, the first observation is equivalent to the argument that at least in the short- to medium-term, within the innovation policy mix, a growing attention is likely to be given to policy measures that are less resource-intensive, i.e., they are not associated with high and rising claims on public funds. As to the second one, it can be interpreted in terms of the efforts to align innovation and knowledge-oriented policies with new emerging trends such as open innovation and collaborative networks. When combined, these two arguments imply a greater focus in the future policy mix to non-financial policy measures and instruments promoting innovation, such as the promotion of stakeholder connectivity. This is a conclusion supported by the results of the UNECE survey, as discussed in the preceding section, as participants expressed a strong belief in the effectiveness of policy measures aimed to facilitate networking among firms.

The rationale for policy intervention with respect to innovation and knowledge-oriented policies is often formulated in terms of assistance to market agents and other stakeholders to jointly achieve mutually agreed goals. A common refrain in the policy rationale and objectives is that of targeting better connectivity among agents/stakeholders. It also follows the interpretation of the entrepreneur as “constructor of connections”. As entrepreneurial innovation stakeholders only possess incomplete information, policy has a role in facilitating the flow of relevant information/knowledge to those involved in a project.

Therefore, there is scope for new functional roles for the public sector such as aligning the incentives of different stakeholders; establishing mechanisms of sharing the risks in multi-stakeholder ventures; facilitating the process of match-making between potential partners; promoting information- and knowledge-sharing in multi-stakeholder ventures, etc.

Modern knowledge-oriented policies incorporate systemic aspects and features and are as a rule mostly directed towards specific behavioural aspects such as interactions, linkages, relationships, etc. among agents and stakeholders, seeking to strengthen these or establish new ones. The systemic approach implies that all relevant stakeholders (both on the supply and on the demand side) and their interactions be addressed by the policy action.

Most non-financial policy mechanisms rely on the coordinating capacity and convening power of the state and its role in stimulating linkages between the potential key stakeholders of a project. They facilitate knowledge flows, promote risk sharing among stakeholders through knowledge sharing and also address systemic and network failures. Potential key stakeholders may be unaware of existing entrepreneurial opportunities and decoupled from other possible partners. Furthermore, market forces alone may be insufficient to bring them together and hence

the project would not materialize. A public policy intervention in systemic coordination and information sharing to reduce uncertainty and perceived risk (“information brokerage”) could help in dealing with this market-cum-systemic failure.

Examples of such public services include public efforts and interventions to facilitate networking among potential stakeholders such as providing and supporting networking facilities, assisting the dissemination of information among participants, establishing “meeting points” that facilitate contacts, networking and linkages among potential stakeholders, etc.

When applied to new phenomena such as open innovation, this implies the need to address the systemic nature of mass collaborative network, to identify the conditions for such networks to operate efficiently, and to design policy instruments that could facilitate their operation.

The so called “innovation intermediaries” are a specific type of agents that facilitate connectivity among stakeholders, help raise awareness and learning by stakeholders and contribute to better interactivity and communication among them. Innovation intermediaries facilitate the diffusion and absorption of knowledge, including tacit entrepreneurial knowledge. Innovation intermediaries can also perform a bridging function between the sources and users of innovations facilitating the innovation process or can act as systemic intermediaries facilitating the formation and maintenance of innovation networks. Public policy has a role not only in establishing public intermediaries but also in creating an enabling environment for the emergence of market-based ones.

The public service in all these cases amounts to the engineering of an information and knowledge sharing process among potential stakeholders, instigated or facilitated by the state thanks to its superior convening power. The ultimate objective is to generate and stimulate a deals flow related to new projects that would not have been in place in the absence of this public service. It also helps in achieving synergies beneficial to all participants in such new projects by sharing managerial and organizational knowledge relevant to the project and, possibly, in reducing uncertainty and perceived risk by disseminating all the available relevant information concerning the project among the stakeholders. The provision of such public services involves only marginal costs to the public sector related to the costing of the time spent by the officials engaged in organizing the information sharing effort and networking activities.

Public policy can put an increasing emphasis also on other forms of public knowledge services such as those related to the dissemination of knowledge, in particular, the diffusion of entrepreneurial and managerial knowledge and skills.

Public knowledge services are largely associated with various forms of support to the learning by entrepreneurs (especially of SMEs) which can be done through publicly funded or co-funded training programmes (e.g. through the development of centres for entrepreneurship at universities) or by helping the development of market-based training services. Another similar public service is the support to and participation in the development of institutions providing advisory and technical services for innovative entrepreneurs (such as coaching centres, consulting offices, etc.). Targeted information and partnering support to entrepreneurs, especially to SMEs, is an efficient way of addressing some forms of information externalities. Publicly supported programmes and campaigns for awareness raising among the general public are another form of such knowledge service.

It should also be pointed out that in many of these areas of policy making, especially when process-based policy instruments are involved, often there is no clear divide between

policy design and implementation; design may change in the course of implementation. In this case, the actual policy instruments emerge from a collaborative policy process, taking their final shape *ex post*, at the end of the design-cum-implementation procedure. Therefore, policy making itself may be subject to open innovation through collaborative networking.
