

CEMI letter 2010

Foreword*

Our society is entering the era of crises and grand challenges – climate change, food, water, and health. Intense innovation by the business sector in developed economies may be the best way, perhaps the only way, to meet these challenges. There is better understanding of the processes of innovation than existed 50 or 25 years ago, thanks to the legendary work by Hayek, Chandler, Nelson, Griliches, David, Freeman and a few others and also to the detailed and meticulous empirical works of modern academic teams such as CEMI.

But looking to business innovation as a means to meeting those challenges to governments may seem a paradox, since the world's critical "challenges" are not to develop Facebook, build more amazing cell phones, etc. The paradox is resolved once we realize that commercial and industrial innovation increases productivity and thus income, which increases the tax base and brings in the extra tax revenue required to meet the challenges. Also if the right incentives are set up (so that for instance the price system reflects truly the future scarcity of commodities) then the business sector by itself will play a major role in bringing new and innovative solutions to the market. So the business sector will not only generate more revenues through innovation but also specific innovative solutions.

On the other hand, commercializing new technologies requires substantial funds and time and entails strong levels of risk and uncertainty. It is far easier and safer to make money from other kinds of investments than from investing in the development of new processes or products. The latter can produce the biggest gains but it also results in an outside share of losses. Like all other economic actors attending to their incentives, innovative entrepreneurs must weigh the prospects for an envisioned innovation against the prospects of developing relatively known and relatively safe projects. And innovative financiers have to consider the returns on alternative uses of their capital. So, in most cases, given this great uncertainty and risk, their temptation is to shun or at least treat with caution investments aimed at achieving innovation.

This is why a modest degree of policy intervention to facilitate innovation is likely to be insufficient. Two recent setbacks raise new difficulties that must be overcome if business sectors are to regain enough dynamism – or "innovativeness" – to make it feasible for our societies to meet our grand challenges. First, there is the weakened state of the financial sector. That has made it difficult for small firms to obtain finance for investment projects, innovative and uninnovative alike. Second, there appears to have been decline in economic dynamism over very nearly the entire decade. We cannot assume that, when the recession ends, American and European dynamism will return to the "old normal."

All these issues – some quite well defined, some others simply puzzling – are on the top of CEMI agenda. I wish you a nice reading and hope to meet you in 2011.

(*Partially quoted from Dominique Foray and Edmund Phelps, 2010, Innovation in turbulent time, a report prepared for the World Economic Forum)



Prof. Dominique Foray
Director of CEMI



Project and Research results

Topic 1 - R & D and Innovation Economics and Policy

Measuring smart specialization Dominique Foray, Stéphane Lhuillery

The concept of smart specialization – which has been developed by P.A.David, D.Foray and B.Hall, is becoming rather quickly a highly visible policy concept. It has been adopted as a key instrument of the 2020 growth strategy of Europe and initial steps have been taken to develop a "smart specialization services" platform at the European Commission. The issue addressed is whether there is a better alternative to a policy that spreads that investment thinly across several frontier technology research fields, some in biotechnology, some in information technology, some in the several branches of nanotechnology, and, as a consequence, not making much of an impact in any one area. A more promising strategy appears to be to encourage investment in programs that will complement the country's other productive assets to create future domestic capability and interregional comparative advantage. Our current project involves a pilot study based on existing statistics to demonstrate that smart specialization is measurable and that aggregate statistics can be produced.

Partners : P.A.David, B.Hall, DG Region, IPTS, OECD

Structuring a policy response to Grand Challenges (international seminar)

Dominique Foray

CEMI has organized a first seminar at Swissnex (Cambridge, MA), gathering a number of international experts to discuss the new models of technology policy which are needed to respond to

the so called Grand Challenges. The premise of the Seminar was that this is a good timing for revisiting the old “mission-oriented policy” rationale and design. Increasing the rate of innovation is not enough; we do not necessarily want to increase the rate randomly in the system but in certain domains and sectors such as climate change or health - such areas where the centrality of R&D is emerging as a solution to structural problems. Thus the central question that the Seminar addressed is how to increase some kind of command-control on the direction of innovation while not attempting to impose predefined technologies, freezing or petrifying competition and finally dissipating the extraordinary power of a free market economy in boosting large numbers of experiments in a decentralized way.

Partners : D.C.Mowery and R.R. Nelson, *Research Policy*
Support: Swissnex, FNS



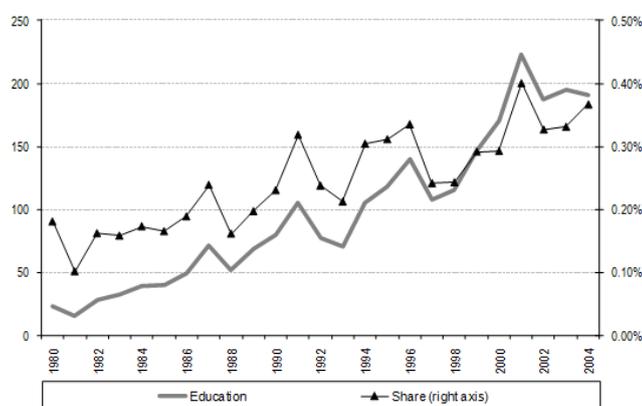
Innovation in public services: a cure to the Baumol's disease? Dominique Foray, Stéphane Lhuillery, Julio Raffo

Many years ago, William J. Baumol introduced an interesting distinction between the so called “progressive” and “non-progressive” sectors within the economy. Non-progressive sectors – essentially services – involve the sectors in which productivity growth is limited, very sporadic and far smaller in magnitude than what is happening in the progressive part of the economy (manufacturing). Our starting hypothesis is that the place of any particular activity in the classification is not only a manifestation of the activity's technological structure as a sort of exogenous condition; it is also the result of a lot of drivers ranging from the history of firms, organizations and innovation capacities in a particular sector of a particular country to proactive policy programs trying to address specific issues within the non-progressive sectors. Our main objective is therefore to identify the micro-foundations of the transitions towards the progressive part of the economy.

We develop case studies on :

- the emergence and development of a tool- industry in the sector of instructional technologies (figure below)
- the impact of medical technology diffusion on health care costs

Partners : Karine Lamiraud (UNIL & ESSEC)



Evolution of education-related technologies

The economic fundamentals of research evaluation (what are the basic problems?)

Dominique Foray

Research is multi-dimensional; several categories of “clients” are potentially interested but on different dimensions of merits. This raises two problems for evaluation :

- a) is referred in the literature as attention management problem: some research outputs never reach the “right people” and so some important information about quality are never generated. These “right people” are external (obviously citizens and politicians but also scientists of other disciplines).
- b) is referred as information aggregation problem because the information generated by the members of external groups is dispersed and is about different dimensions of merit of the project (scientific, societal, political).

The activity in 2010 has focused on laboratory experiments to address the key problems in developing a tool that measures research quality, which is finding a way to aggregate dispersed information in several dimensions in ways that are informative on the underlying quality of research. The goal was to set up an experimental world with these features and then to experiment with a series of aggregation procedures.

Partners: R.Lalive (UNIL), C.Zehnder (UNIL), S.Chassang (Princeton)
Support from the ETH Board

Innovation in turbulent times

Dominique Foray

The current economic downturn has created challenges for advanced economies to continue increasing its living standards along a path of growth through innovation and knowledge creation. While the urgency for an innovation agenda has not changed, the economic context has changed the nature of the debate and the strategic and policy challenges to support technological change and innovation are huge in the current economic environment. These challenges are reviewed in this project which has been presented and is currently developed at the Global Agenda Council of the World Economic Forum.

Partners : E.Phelps
Support from the GAC Innovation of the World Economic Forum

New Perspectives on the Evaluation of Public R&D Funding

Marianna Marino

The incomplete appropriation of the returns to R&D that arises inevitably leads to a deficient level of R&D investment. The role of public policy is then to propel private R&D investment to a social optimal level. An overall assessment of public grant support to R&D activities should evaluate not only the advisability of public support, but also its modulation, an equally important aspect, yet under-studied in this literature. The aim of our analysis is precisely to make a step toward this ultimate goal, proposing to investigate the modulation of public support by means of the continuous treatment evaluation scheme. Together with the categorical treatment evaluation scheme, it allows to identify marginal effects and potential optimal amount of public funding.

Partners: P. Parrotta (UNIL and Aarhus University), D. Sala (University of Southern Denmark)

Does Labor Diversity stimulate (Innovative) Firm Formation?

Marianna Marino

A growing literature is investigating the relationship between the nature of the departure firms and transitions to entrepreneurship

by former employees. It may include elements capturing not only the organizational features (already under study) of the previous employer but also the labor diversity that distinguishes it. In fact, besides the own work experience, the coworkers' characteristics could provide broader spectrum of perspectives, useful to the future entrepreneur in understanding how to manage her company. Specifically, we are interested in evaluating whether and eventually to what extent the level of diversity characterizing the coworkers' cultural background, education and demographics affects the individual propensity to establish a new firm.

Partners: P. Parrotta (UNIL and Aarhus University) D. Sala (University of Southern Denmark)

Topic 2 - University-Industry Relationships and Access to Knowledge

Scientific research in companies

Markus Simeth, Julio Raffo

The boundaries of the formerly distinctive worlds of science and technology become more and more porous. In this respect, the engagement of universities and public research institutions in commercial activities like academic patenting is relatively well understood. However, the reverse perspective of companies engaging in the production and dissemination of scientific research has received less attention in scholarly literature so far. This dissertation project aims to fill in this gap by providing empirical evidence. In a first part of the project, central motivations of firms behind contributions to Open Science are examined, using firm level information and matched scientific publication data. The results show that scientific contributions of firms not only result of firm internal forces but represent also concessions to academic partners in order to enhance knowledge exchanges. Moreover, evidence is found that the overall openness of sectors is influential for the firms' decision making process. Going beyond these drivers, the impact of scientific abilities to certain stakeholder groups is subject of the second project part.

Partners: G.Von Krogh, S.Haefliger (ETHZ)

FNS Grant n° 100014_125513

CERN

Stéphane Lhuillery, Stefano Baruffaldi

CERN is an international organization researching high energy particle physics, which requires specific and very expensive instruments such as particle accelerators. The results are widely disseminated within the scientific community. The CEMI research project aims to assess the impact of CERN in science and technology. At the scientific level, we investigate if researchers visiting CERN or working on data from CERN have specific profiles and if their academic performances are better than researchers who do not benefit from the same opportunities. On the business side, we similarly explore the impact of CERN on scientific and technological performances of companies involved worldwide as goods and/or service providers on CERN projects.

Topic 3 - Innovation for Development

Technology transfers towards the least developed countries : the Lausanne Group

Dominique Foray, Viviana Munoz Tellez

The Lausanne Group (LG) has been created to explore the problem of technologies transfer focused on the Least Developed Countries. We observe that many practices that work quite well in the case of technologies transfer towards middle income economies simply do not work in the case of the least developed countries. This situation is unfortunate, as we strongly believe that the trans-

fer of technologies towards these countries to support domestic entrepreneurs, provides at least one part of the solution to alleviate poverty. The LG involves academic scholars, practitioners and policy makers with a unique motivation to better understand the complexity and difficulties of technology transfers towards the LDCs, to try to generate a new conceptual model and to create a coalition of stakeholders in Switzerland in order to start experimenting this model.

Partners: U. Scheuermeier, L.von Wattenwyl and Seco

Support: Seed Money-EPFL

Product Development Partnerships for Neglected Diseases

Viviana Munoz Tellez, Dominique Foray

New discovery and development of drugs for neglected diseases is needed. This research explores the new model of public-private collaboration to address the market failure of suboptimal R&D for neglected diseases. Governments and philanthropic donors are providing funding to non-profit organizations, known as Product Development Partnerships (PDPs), that in turn coordinate and leverage the R&D skills, expertise and resources of private and public sector in a portfolio of collaborative R&D projects were responsibility and risk is shared. We aim to understand whether PDPs is an efficient mechanism in the economics of R&D for neglected diseases.

Partners: South Center

Topic 4 - Indicator, data and methods for empirical research

User friendly tools for patent data

Stéphane Lhuillery, Julio Raffo

CEMI is a lead user of patent data, especially those collected by EPO (such as PATSTAT). This growing database of about 80 million patents is cumbersome for researchers and students. CEMI has thus developed tools to facilitate the access and use of the database. For the access, CEMI completed the network access of PATSTAT within the College of Management of Technology. Researchers and students can now access directly to patent data from their computer, even from home. This access is offered via various interfaces such as STATA, Access, Excel or any SQL client. The user can thus develop its SQL queries using the software with which he is most familiar. Concerning the usability of PATSTAT, a major obstacle faced by users is the matching of firm id or scientist id with the PATSTAT data on applicants or inventors. CEMI has developed software named "MrJotI". This software makes it easy for users to apply different filters and algorithms required to identify patents from a list of names and/or addresses. CEMI hopes also that this tool will be an opportunity for future developments, both in terms of matching algorithms and the types of documents or mapped fields (abstract, full text, scientific articles ...). Soon, MrJotI services will allow all EPFL researchers and students to match their datasets with PATSTAT and other resources on line.

Teaching at EPFL

- Economics of innovation – Master MTE
- Economics and management of innovation in life science – Master SV - STV
- Economics of technology policy – case studies on climate change – Doctoral School EDMT
- Publishing in management, technology and innovation – Doctoral School EDMT
- Data production and its econometric implementation – Doctoral School EDMT

Conferences

- Knowledge in Organization – a Conference at Monte Verita (Centro Stefano Franceschini) in collaboration with G. von Krogh (ETHZ)
- The need for a new generation of policy instruments to respond to the Grand Challenge – a seminar at Swissnex-Cambridge (MA), in collaboration with D.CMowery and R.R.Nelson

Main Publications

Peer-reviewed articles, chapters in books

- D.Foray: “A primer on patent and innovation”, International Management, vol.14, n°3
- D.Foray & S.Lhuillery: “Structural changes in industrial R&D in Europe and the US”, Science and Public Policy, 37(6)
- D.Foray, “Knowledge policy for development”, in Innovation and the development agenda, OECD Innovation Strategy, Paris
- D.Foray and F.Lissoni, “University research and public-private interactions”, in B.Hall and N.Rosenberg (eds.), Handbook of economics of Innovation, North Holland
- D.Foray, S.Lhuillery and J.Raffo, Le positionnement et les perspectives stratégiques des nanotechnologies en France, Etude pour la Direction Générale de la Recherche et de l’Innovation, Ministère de l’Education Nationale et de l’Enseignement Supérieur

Working papers

- M. Marino, P. Pierpaolo and S. Davide. New Perspectives on the Evaluation of Public R&D Funding , 2010.
- S. Lhuillery and E. Pfister. Do firms know the scope of their R&D network? An empirical investigation of network awareness on French survey data, 2010.
- D. Foray and E. S. Phelps. The challenge of innovation in turbulent times, 2010.
- M. Simeth and J. Raffo. What makes companies commit to Open Science, 2010.

Invited Lectures

- D.Foray, « Research, innovation and knowledge management to improve educational practices and tools », Rigor and Relevance in Educational research, National Research Council, Oslo, March 4
- D.Foray, “The economics of knowledge as becoming a strong empirical discipline”, STI Conference, Leiden, September 10
- D.Foray, “Intellectual property, innovation and the roles and contributions of universities”, 29th Conference of Rectors and Presidents of European Universities of technology, Trondheim, September 24
- D.Foray, “Translating ideas into useful policy prescriptions: difficulties and challenges”, Rate and Direction of Inventive Activities, NBER 50th Anniversary Conference, Airlie Center, September 30
- D.Foray and J.Raffo, “The emergence of tool industries: a case study”, Understanding the emergence of new industries, Turin, October 8
- D.Foray, “The need for smart specialization strategies”, Innovation in fisheries areas, European Commission, Vigo, October 19
- D.Foray, “Least developed Countries and knowledge governance”, TRIPS@10, Columbia University, New York, November 16t
- D.Foray, “Smart specialization: how should we position ourselves in the knowledge economy?”,TIP Workshop, OECD, Paris, December 14
- S.Lhuillery, “A user friendly matching software for patents”,

European Science Foundation, Madrid, December 9

- S.Lhuillery, “Cooperation, innovation and competition”, Séminaire Economie et Econométrie de l’Innovation, MSH Paris, May 7
- S.Lhuillery and K.Lamiraud, « New technologies and medical costs”, Institute for Microeconomics and Public Economics, University of Lugano, May 3

Scientific / Management responsibilities

Dominique Foray has been appointed by Commissioner Ms.Maire Georghegan-Quinn (European Commission) to be a member of the High level panel on the measurement of innovation. He is also member of the UN Economic Commission for Europe team on Innovation and Competitiveness, as well as of the advisory board of the Swiss Economic Institute (KOF-ETHZ) and the Global Agenda Council of the World Economic Forum

Dominique Foray is a member of the Swiss National Fonds (Division IV)

The team

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