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Innovation Law and Policy in the European Union

Towards Horizon 2020

Springer

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Preface

Things almost never go as planned. This proposition is true in life at least as much as it is true in economics, politics and any time we are asked to make hard choices. Even this book did not land exactly where we had planned: a constant state of flux meant that our original plans had to be adapted to constantly changing situations. We wrote this book in the middle of a perfect storm that hit financial and economic markets in the whole Eurozone and beyond. National economies are under attack by speculators and even the overall project of a united Europe is today at risk, which has never occurred before since the foundation of the European Union. The truth is that our economies are so vulnerable that we are compelled to ask whether something should have been done or whether something wrong was actually done. As a matter of fact, as the pendulum swings between unsustainable national public debts and fears of an unprecedented economic recession, the financial crisis is uncovering how national economies in Europe are far from competitive, sound and integrated. And how getting back to growth is essential for the future of the European Union.

Against this background, this book approaches innovation not as a medicine prescribed by some doctor, and not – as in a famous song by Bob Dylan – as "shelter from the storm". To the contrary, we consider it as a structural policy, which works as a prophylaxis to prevent the sea level from rising again once the storm has passed. Every society has its own grand challenges that must be tackled through innovation and growth, irrespective of the performance of financial markets. This is not to say that innovation policy cannot do anything for the crisis: we just think that effective innovation policies would be required even if our attention were not captured by the roller coaster of our stocks, as they now are.

Today, there is widespread agreement among scholars, practitioners, industry players and policymakers that Europe is lagging behind other industrialised regions in terms of innovation, productivity and growth; as time goes by, leads become smaller and lags become larger. And as EU policymakers strive to catch up with current problems, they discover that markets are developing so quickly that any solution devised today is doomed to be incomplete and obsolete tomorrow, when it will be implemented. So far, Europe has mostly reacted to this "innovation emergency" by putting more public money on the table: but just like Sisyphus, policymakers have had to endlessly roll the boulder uphill, to watch it fall down again. Take the Lisbon

strategy, which aimed to make Europe the most competitive knowledge-based society by 2010. A decade has passed and the European Commission is working again on the same target for the next decade. A new dawn is expected, towards Horizon 2020, and countless policy actions and massive investments are expected in the field of innovation to achieve smart, sustainable and inclusive growth.

In its Communication "Reviewing community innovation policy in a changing world" in 2009, the European Commission clearly identified some bottlenecks in the framework conditions in which all players act: (a) in a number of areas the single market has not yet been completed, (b) the venture capital market is fragmented and there is low equity available, (c) there is still an incomplete framework for intellectual property rights, (d) the standard process is not yet synchronized with research results and market needs and (e) the triangle of knowledge between business, education and research needs to be further strengthened. This book moves along the main lines highlighted by the Commission and tries to provide a critical picture of the current state of innovation policy in Europe and of the legal tools that, at all levels, are harnessed by the European institutions to achieve their goals. Through the pages of this book, we observe that there is currently no well defined recipe for Europe's innovation emergency: we claim that the road to a solution requires understanding that when it comes to innovation, quality is more important than quantity, and control is as important as speed.

Chapter 1 of this book provides a general conceptual framework on innovation and describes emerging trends in what is inevitably a moving target. Chapter 2 describes EU innovation policy by illustrating past and current actions, possible directions, mistakes and ambitions. Chapter 3 focuses on three of the main pillars of EU innovation policy: the transfer of technology, standardisation and the never ending saga of a unitary patent system for Europe. Chapter 4 concludes with some critical remarks on current developments in EU innovation policy, together with suggestions on how to bring Europe back on track.

Going through the pages of this book might leave readers with the impression that innovation policy in Europe is pure chaos. Quite paradoxically, part of the responsibility for this chaos can be attributed to those who, in good faith, have formulated new policies without necessarily assessing *ex ante* their expected impact and, even more importantly, without first learning from past mistakes. As a result, initiatives have proliferated, but problems have remained the same. But an even larger part of the responsibility, we believe, should rest with politics, not with technical difficulties. If there is one possible single conclusion that can come out of this book it is that an effective innovation policy in the EU can be attained only if backed by political commitment towards the achievement of a single market. But this goal, as recently testified by the "Monti Report", is still largely an unfinished painting. Without a radical change, we predict that Europe in 2020 will be only slightly different, in terms of goals achieved, from Europe in 2011, but it will cost more. We might be wrong in our prediction and we hope so. For the time being, there are few elements that justify a more optimistic perspective. That said, in times of crisis and uncertainty policymakers cannot afford not to act; as a matter of fact, there cannot be a better way to predict the future than shaping it, to the extent possible, so that it brings prosperity

and growth to European citizens. In this book we offer some suggestions that, in our view, would lead Europe in that direction.

The authors of this book share more than ten years of friendship and academia. Years in which the need to achieve collaboration between social sciences for both intellectual accomplishment and functional purposes has emerged with unprecedented momentum. Through our work, we have discovered that a lot more interaction with several other social and natural sciences would be needed to develop a full understanding of the patterns and directions of contemporary and future innovation. To be sure, things almost never go as planned; however, our research on innovation hopefully benefited from a bit of serendipity and brought us to land on some promising ideas.

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Andrea Renda

The book is the result of joint efforts of the authors. They co-authored Chapters 1 and 4, whereas Andrea Renda wrote Chapter 2 and Massimiliano Granieri Chapter 3.

Contents

Introduction: the new meanings of innovation

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In this section we look at the changing meaning of innovation and innovation policy. We show that the modes of innovation have shifted from traditional, single-firm patterns to systemic and collaborative patterns; from proprietary to modular and granular models; from supply-led innovation to co-innovation and user innovation; and from closed to semi-open and (almost fully) open business models. We also explain the emerging governance of innovation policy for the 21st century, by describing the role of a wide variety of actors, from businesses to small firms, entrepreneurs, angel investors, venture capitalists, universities and research institutions, government and networked individuals. At the same time, we describe the emerging eco-systemic, holistic view of innovation, the changing role of government in innovation policy and the new "credos" of demand-side innovation policy, regional innovation systems, smart cities and smart specialisation.

1.1 Everyone's talking

Around the world, governments are looking for opportunities to foster economic recovery while one of the deepest economic crises of modern times is still raging. Everywhere, innovation is evoked as the main avenue for achieving economic growth and competitiveness. For example, in his 2011 State of the Union Address, US President Barack Obama warned of a "Sputnik moment" in calling for the USA to confront international economic competitiveness and innovation policy challenges.[1] Similarly, Europe admits that it is facing an "innovation emergency": President Barroso stressed the need to speed up investment in future prosperity through new sources of growth, in particular by "supporting business and investing in the growth industries of the future like green energy, innovative start-ups and advanced manufacturing".[2] Throughout the Union, awareness of the need to shift gear to regain competitiveness is mounting: heads of large states such as Angela Merkel and Nico-

[1] See the Remarks by the President on the Economy in Winston-Salem, North Carolina, 6 December 2010, available online at http://www.whitehouse.gov/the-press-office/2010/12/06/remarks-president-economy-winston-salem-north-carolina.

[2] José Manuel Durão Barroso, Statement on the Annual Growth Survey. Joint press conference with Commissioners Olli Rehn and László Andor Brussels, 12 January 2011, SPEECH/11/7.

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las Sarkozy have recently called for boosts for economic recovery, especially through energy policy and innovation.

This comes as no surprise: economic theory is unanimous in concluding that technological innovation is a key contributor to long-term well-being. Innovation improves well-being and benefits future generations in several ways: biological innovation mitigates disease and hunger and thus contributes directly to health; innovation in communications and the organisation of information fosters educational, political and social development; innovation in smart grids leads to more efficient and sustainable energy consumption, etc. And most importantly, innovation is the engine of economic growth, which is central to increasing well-being, particularly to the extent that the fruits of this economic growth flow in some measure to the least well-off. More specifically, innovation fuels economic growth by creating new markets and reaching new productivity levels; as observed by Nobel laureate Paul Krugman, "productivity isn't everything, but in the long run it is almost everything" [64].

At the same time, innovation is a very difficult subject for public policy: it is at once a pervasive and elusive subject [89]. It is pervasive since it entails both government and private investment; it is pervasive since it permeates all areas of public policy, from tax to labour, from telecoms to energy, from competition to industrial policy, from education to intellectual property, from immigration to health and agriculture, from supply-side to demand-side policies; and also, because it requires actions at global, European, national, regional and local levels. At the same time, innovation is a very elusive subject because it is hard to define (see Sect. 1.1); and also because there is no easy mix, no one-size-fits-all solution, no recipe *bonne à tout faire* to unleash the potential of innovation in a given country. As will be argued in more detail below, when it comes to innovation policy, quality is as important as quantity, and control as important as speed. This is why every government wants innovation, but no government can be sure of how to boost its full potential.

As will be explained in the pages of this book, the greatest difficulty in innovation policy is anticipating current developments and crafting forward-looking policy actions that will not be obsolete when they finally come into force. This is a tough challenge, especially in Europe, where multi-level governance often significantly slows down the policy process. And it becomes tougher every day: looking at current developments, we see innovation accelerating, going "global" and becoming more "open". At the same time, it requires more sophisticated skills, more global collaboration between public and private players, and a more constant monitoring of societal needs.

1.2 Defining innovation

One easy way of defining information is "the process by which individuals and organizations generate new ideas and put them into practice" [101]. Alternative definitions that have been frequently used in past decades are market-focused and customer-oriented, such as "a process by which value is created for customers through public and private organizations that transform new knowledge and technologies into profitable products and services for national and global markets"[3] or "creating or improving goods, services, or methods of production" [99]. However, today these definitions appear too narrow, especially if one observes the peculiar dynamics of innovation today and their likely evolution in the coming years. An authoritative scholar in this field, Joseph Schumpeter, used to define innovation much more broadly, as "the introduction of new goods (...) new methods of production (...) the opening of new markets (...) the conquest of new sources of supply (...) and the carrying out of a new organization of any industry" [92]. Industrial economists tend to define innovation in terms of productive and dynamic efficiency, i.e., the ability of a society to push the efficiency frontier outwards by finding new ways to use existing resources, or creating new resources that can be added to the production mix.

Overall, there seems to be growing consensus on the fact that innovation, however defined, does not relate only to new products that come into the marketplace. Innovation may well occur in market processes and products, but also outside the marketplace, including among end users and without any need for a research and development (R&D) process.

Against this background, defining and capturing innovation becomes even more difficult today, as markets and forms of exchange change continuously, often departing from the traditional chain of innovative activities, which took place mostly in universities and big public or private labs. Today, the most diverse forms of exchange are emerging on the planet, most often based on reciprocity, not on markets (think about open-source software, at least in its purest form). In addition, innovation takes place inside and outside firms, through new mechanisms of collaboration such as "open innovation" chains and innovation hubs. Moreover, users can be innovators just as easily as big entrepreneurs: some markets require large R&D investment, others only a good dose of creativity and luck; industry clusters are moving online and becoming global – they do not need geographical proximity and rather they seek complementarities and synergies. Finally, the boom of data availability observed in the past few years – the so-called "big data" age – opens entirely new windows of opportunities for designing innovative products and anticipating societal needs, which in turn disrupt our models of innovation policy [73].

What's more, since the direction all these new trends are taking is largely unknown and unpredictable, designing policy actions to stimulate tomorrow's innovation be-

[3] This is the definition given by the Alliance for Science & Technology Research in America.

comes even more difficult, if not preposterous. To be sure, old-style regulatory approaches such as traditional industrial policy and command-and-control regulation cannot fit the multi-faceted nature of today's innovation. Sceptics and agnostics even push themselves to observing that innovation has become impossible to define: you just know it when you see it. A similar definition would lead to the impossibility of crafting a full-fledged innovation policy. This would be really a pity, since whatever definition we adopt, it remains clear that a high rate of innovation can lead to higher standards of living by contributing to the creation of markets, jobs, wealth and economic growth.

The absence of a commonly accepted definition of innovation makes innovation policy – i.e., the art of promoting innovation – one of the most difficult jobs on earth, and also one of the most thrilling. In our view, adopting a clear definition of innovation and its role in modern economies is essential for the design of smart, sustainable and inclusive innovation policies. Our definition encompasses two major concepts: (a) the creation of new (or the efficient reallocation of existing) resources (b) which contribute to progress. The first, *ontological*, element of innovation is approached in the broadest possible sense, leaving space for user-generated innovation, automated innovation, industrial R&D projects, public investment, etc. The second, *teleological* element simply states that a new product is to be considered innovation only to the extent that it contributes to social welfare in the long run, without depriving society of resources that could have been more usefully allocated elsewhere. In a nutshell, innovation's main features are allocative efficiency and progress [85].

Given this broad view of innovation, it goes without saying that there is no "one-size-fits-all" recipe for innovation that holds under every sky, in all sectors of the economy and in all countries. Those that propose recipes of this sort are simply charlatans, just like those that have offered rocket science solutions for economic growth before the oil crisis of the early 1970s and the sub-prime mortgage crisis in 2007. In this book, we will limit ourselves to providing our view of the main drivers of innovation, as well as the main ways in which innovation can contribute to progress.

1.3 The economics of innovation

In this section, we offer some preliminary clarifications of the economic concepts used in this book. The reader should not be alarmed by an overload of economic terms: by dealing with this at the beginning of the book, we will not have to return to technicalities at a later stage. Readers who are already familiar with economic concepts can skip this section and go to Chapter 2.

1.3.1 Efficiency and its limits

As clarified in the previous section, our definition of innovation principally relies on a notion of efficiency and the creation or reallocation of resources in a way that maximises "progress". In this respect, the notion of efficiency deserves careful treatment, as it is so central to innovation. In economic theory, efficiency has always been a rather tricky concept and widely diverging views have emerged over time on what can be considered a really efficient change in a given societal context. In mainstream economics, the most widely used definition of efficiency is derived from the Paretian concept of efficiency as a situation in which no reallocation of resources can lead to an improvement in someone's condition without worsening someone else's. This concept was later operationalised in the form of "potential Pareto efficiency", or Kaldor-Hicks efficiency. According to the criterion, (independently) developed by Nicklas Kaldor and John Hicks, a change in the distribution of resources in a given society is to be considered an improvement only if it leads to an increase in total wealth, which means that the gains of those that have benefited from the change are greater than the losses of those that have been harmed by the change. This concept of efficiency as "increasing the size of the pie", which willingly disregards the distribution of the slices, has been fiercely criticised in the literature, but is still the dominant way of looking at efficiency in most policy contexts [88].

Later on in this book, we will express our firm belief that, in order to design an innovation policy that is reasonably conducive to smart, sustainable and inclusive growth, the notion of efficiency that should be adopted as an end-state of public policies should be much broader, be aimed at fundamental principles and outcomes such as "progress" and "prosperity", and encompass distributional impacts as well as the preservation of, *inter alia*, individual freedoms and opportunities.

In industrial economics, a widely used taxonomy has led to the definition of three different types of efficiency:

- "Allocative efficiency" refers to the way in which resources are allocated, and possible ways of redistributing resources in a way that would lead society closer to the efficiency frontier. Allocative efficiency is the market condition whereby resources are allocated in a way that maximises the net benefit attained through their use. A market will be allocatively efficient if output is produced by the lowest cost producers, and consumed by those most willing to pay for it and only when its value to the consumer is at least as great as the incremental cost of its production. An industry or market is allocatively efficient when the social marginal benefit of the last unit produced equals its social marginal cost [22].
- "Productive efficiency" focuses on the production process and is attained whenever a given good or service is produced by using the least possible amount of resources, i.e., output is produced at the lowest possible unit cost.
- "Dynamic efficiency" deals with the evolution of a more efficient mix of resources for the market over time and thus refers to the possibility of achieving outward shifts in the efficiency frontier over time. It relates to efficient technol-

ogy choice and timely and efficient capacity investment decisions both on the supply side and the demand side of the industry. This is why, as Joseph Schumpeter observed, "dynamic efficiency involves innovation, and innovation involves risk" [93].

One well known feature of these three types of efficiency is that it is almost impossible to achieve them at the same time. This implies that there are recurrent trade-offs, in policy terms, between static efficiency (encompassing both allocative and productive efficiency) and dynamic efficiency. As observed *inter alia* by De Soto, the traditional Pareto criteria are "tainted with a definite static character and therefore are inadequate to be applied as normative guidelines to the rich dynamics of real-life social institutions" [29]. Likewise, Pareto efficiency seems hardly adequate for the definition of an optimal, welfare-enhancing, forward-looking innovation policy. Now, the problem is: if preserving competitive markets is of utmost importance to promote static efficiency, are they also as good for dynamic efficiency? Put differently, if we cannot use Pareto efficiency (let alone Kaldor-Hicks) as a basis for innovation policy, what should the guiding light for innovation policy-makers be?

This is probably one of the most researched issues in economics, especially due to the long-lasting debate between two of the most prominent economists of the past century, Joseph Schumpeter and Kenneth Arrow, who had completely opposite views of the best market conditions that would contribute to stimulating innovation. More specifically, according to Schumpeter (1942) the organisation of firms and markets most conducive to solving the static problem of resource allocation is not necessarily most conducive to rapid technological progress. The positive effects of market power on innovation depend on two main factors [28]: (a) the expectation of some form of transient *ex post* market power is required for firms to have the incentive to invest in R&D; and (b) the possession of *ex ante* market power also favours innovation, since – especially when capital markets are imperfect – the rents from market power provide firms with the internal financial resources for innovative activities [106]. Also, a perhaps more controversial observation is that market power also leads to less uncertainty associated with excessive rivalry, which tends to undermine the incentive to invest. It is also true, in this respect, that the absence of competitive pressure might at the same time reduce an undertaking's urge to invest, leaving it in the somewhat less dynamic realm of "*x*-inefficiency".[4]

According to Schumpeter, "[t]he introduction of new methods of production and new commodities is hardly conceivable with perfect – and perfectly prompt – competition from the start. And this means that the bulk of what we call economic progress is incompatible with it. As a matter of fact, perfect competition is and always has been temporarily suspended whenever anything new is being introduced – automatically or by measures devised for the purpose – even in otherwise perfectly competitive conditions" [93, p. 105].

[4] *x*-inefficiency is defined as the difference between efficient behaviour of firms assumed or implied by economic theory and their observed behaviour in practice. It occurs when technical efficiency is not being achieved due to a lack of competitive pressure. The concept of *x*-inefficiency was introduced by Leibenstein [69].