The EU in 2040: Envisioning an Inclusive Powerhouse for Innovation and Economic Growth

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Discussion paper

The EU and its leadership is often criticized as lacking a coherent long-term vision on Europe's future. Thusfar, EU policy in the area of innovation and economic growth has been primarily framed as an effort to close the so-called innovation gap with USA, South-Korea, and other countries. In this discussion paper, a group of EuroTech Universities professors in the area of Innovation and Entrepreneurship[1] address and highlight several key challenges in the transformation towards an inclusive and sustainable European economy. In the absence of a long-term systemic perspective on Europe's challenges in the area of innovation and economic growth, we propose such a perspective here.

Drawing on what is known as idealized design, we engage in envisioning Europe as it should and could be in 2040. Idealized design here thus serves to collectively define the best outcome possible, by imagining "what the ideal solution would be and then work backward to where you are today." This ensures we do not erect all kinds of imaginary obstacles, such as political and practical constraints, before we even know what the ideal is. We focus on five conditions at the EU level (in 2040) that may *enable* innovation efforts and economic growth rates in ways that other policy instruments cannot accomplish. In this respect, we believe the EU needs to move beyond its current policy frameworks in, for example, developing a creative entrepreneurial mindset among European citizens, promoting open innovation ecosystems and practices, and developing a European research area. While this type of policy may help to (somewhat) close the innovation gap with countries like the USA and South-Korea, it will never enable the EU to advance beyond this frontier. To be able to go beyond this frontier, we need to develop a unique European edge, an ideal solution that can inform and inspire EU politics and policy making.

We focus here on the following *conditions* for an inclusive and sustainable innovation-driven European economy in 2040:

- transforming the educational and research landscape, by allocating public budgets to universities that systematically connect research and education;
- creating an ideal setting for young entrepreneurs and their innovative companies, to enable a virtuous cycle of new (academic) ideas, creating start-ups, scaling them up, and demand for and supply of investment capital;

[1] The EuroTech Universities Alliance is a strategic partnership of four leading European universities of science & technology: Technical University of Denmark (DTU), Eindhoven University of Technology (TU/e), École Polytechnique Fédérale de Lausanne (EPFL), and Technical University of Munich (TUM). This discussion paper provides an expert view of a group of professors in the area of innovation and entrepreneurship, rather than represent the official viewpoint of the (boards of the) four EuroTech Universities. This paper can be freely distributed. Please cite as follows: Foray, D., et al. (2016), *The EU in 2040: Envisioning an Inclusive Powerhouse for Innovation and Economic Growth*, discussion paper, Brussels: EuroTech Universities Alliance.

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- transforming the highly fragmented landscape of national tax systems into a simple and transparent tax system that fuels rather than inhibits innovation and growth;
- crafting a well-functioning patent system and market for technology, to ensure appropriate rewards and incentives for innovators in the age of open innovation;
- building and mobilizing local innovation ecologies, especially those in less-advanced regions, through smart specialization.

These five conditions would create a European economy/society in 2040 that acts as a powerhouse for innovation and economic growth, while being inclusive towards less-developed regions and fully transparant towards investors, entrepreneurs and inventors.

1. Tertiary Education and Fundamental Research

It is widely recognized that a well-empowered and vibrant research university is the core institutional arrangement in any innovative economy. As an institution, the research university is unique in coupling research and education. Students at all levels are taught and supervised by scholars, and the latter are exposed to the energy and creativity of young students. Anecdotal evidence from each of our universities shows the central role of (teams of) students in spanning disciplinary boundaries to address new problems and in developing start-up projects with great motivation and creativity. Research universities are thus a crucial mechanism to generate externalities in the form of both human capital and basic research as "joint products" (giving rise to economies of scope and internal spillovers). This means that the two core activities – teaching and research – are mutually reinforcing and should not be separated.

What has just been said seems almost trivial, but in the case of Europe it is not. Another form of research organization – the national research institute (or laboratory) – is dominating the research landscape in many transition countries as well as in France, Germany, and elsewhere.

The importance of national research institutes in Europe is a legacy of the past, when many countries trying to 'catch up' needed to quickly launch national research programs and existing universities were too poor to accomplish central research missions. However, as these countries have been moving closer to the technology frontier, the rationale for a strong "government labs sector" is weakening and new institutions are needed. Two key problems arise from national research institutes as an institutional form. First, they break the intimate and powerful relation between research and education. Second, the presence of a large sector of national research institutes is a major obstacle for developing research universities, since the former captures a large fraction of national and EU resources devoted to the formation of human capital and research infrastructures.

The way the public research sector is organized and funded in the EU is, therefore, incompatible with the logic of innovation. As a result, there is a strong policy case for designing a process that will lead to more effective institutional arrangements in science. As Europe has moved to the world technological frontier, it should invest more in research universities in order to increase its innovative potential. In a world characterized by limited resources, this must be done by transferring funds from one sector to the other, or alternatively, by merging

research universities with national research institutes – as in the case of, for example, DTU, KIT and Wageningen UR.

While the idea of allocating public resources (primarily) to universities that combine research with education is simple, its implementation is rather complex. The development of vibrant research universities is not obvious or trivial. It implies a variety of organizational and institutional innovations as well as new models for professional development of scholars. The most successful research universities are characterized by the development and deployment of very strong intangible assets — including scientific and technological knowledge but also organizational capital, user-generated (i.e. student-generated) content, and human capital. Most of these intangibles are not obvious to acquire and mobilize. Therefore, there is a strong case for cooperation and transfer of practices between the most successful research universities and emerging universities elsewhere in the EU.

2. Young Innovative Firms

More than ever in the history of innovation, the capacity of an economy to generate start-ups and new ventures as well as to facilitate their growth determines whether this economy will be part of the next technological revolution (i.e. the so-called second machine age). Market entry of new firms and exit of unproductive companies are important mechanisms in the structural transformation of the economy. While strong research universities are central to stimulating the translation of academic ideas, inventions or discoveries into actual products and services, other factors are also crucial.

Barriers to innovation for young innovative firms are well known, but not yet effectively addressed in the European context. One barrier pertains to external and internal financial constraints. A second barrier involves the appropriation of returns from innovation (discussed later). Other determinants, such as demographic change or administrative burden, also count but a recent study shows that the financial constraint is the main barrier to innovation for these firms. It is therefore crucial to ensure that enough money is available for entrepreneurs with good ideas.

Moreover, today's emerging firms need new corporate finance solutions that are different from the solutions used by established firms and also different from the solutions which were adequate to yesterday's emerging firms (e.g., in obtaining bank loans for investment in new equipment, using this equipment as collateral). In case of emerging firms in areas such as the sharing economy, creative design or supply chain management, the investment is mainly in intangibles that can be less easily used as collateral. Thus, today's emerging firms need financial instruments other than debt backed with physical assets. The US financial system has evolved more quickly to provide such tailored financing solutions to emerging firms, such as high-yield bonds, venture debt, and private equity. Europe still displays a relative underdevelopment of financial services for emerging firms (with few exceptions such as the UK and the Nordic countries). In short, while European countries have been tremendously successful at helping individuals to start-up firms (e.g. in the EXIST program in Germany), they have not been equally successful at scaling-up and supporting (potentially) high-growth ventures. As a result, many young innovative firms founded at leading universities have been relocating to other countries, preferably the US, or

have actively sought to bring actors from the US system (such as founder.org) to Europe rather than work with local partners to further develop their ideas and inventions.

With regards to exit, most successful ventures appear to be exiting via a trade sale or an acquisition, with IPOs happening only in the rarest of cases and family-owned firms being handed over to the next generation usually seeing a decrease in performance. Accordingly, future EU policy may need to provide more opportunities to incentivize technology-based acquisitions when those have the ambition to leverage and/or further develop technologies developed by small young firms.

A crucial policy issue is, therefore, to improve the EU financial sector, as a necessary condition for minimizing the access-to-finance barrier. In particular, high-risk financing and early-stage venture capital (VC) markets are pivotal and need to be reinforced. At the same time, there are reasons to believe there still might be a role for public VC programmes in addition to private VC providers. In this respect, the structure of VC investments makes them inappropriate for many ventures, for example when public procurement is critical in getting the venture off the ground. Moreover, the VC industry is limited in size: even in the US, VC firms back only a small fraction of technology-oriented business ventures. Last but not least, by awarding public VC funding to a venture, key public stakeholders signal the high quality and societal relevance of this venture, and thereby facilitate access to the next stage of funding.

Overall, we envision EU's innovation policy in 2040 to address the economics of young innovative companies by creating appropriate incentives involving effective corporate finance solutions, a strong private VC sector, public VC programmes, and a vibrant exit market. The EU in 2040 therefore thrives on a virtuous cycle of new (academic) idea generation, development of start-ups, and demand for and supply of investment capital.

3. Transforming the Tax System

At the heart of current innovation policies used by the EU as well as governmental agencies at the national and local levels are subsidies, tax incentives, and other financial instruments. These financial incentives are (partly) intended to reduce the access-to-finance barrier outlined earlier. At a more fundamental level, however, these financial incentives reflect the image of (motivating) people to row their boat upstream. Any attempt to address the European innovation challenge therefore needs to go beyond established notions of 'innovation policy', to transform more deeply rooted conditions inhibiting innovative and entrepreneurial behavior.

A key condition here is the highly fragmented landscape of country-specific (e.g. income and value added) tax systems, which in turn sustains an enormous industry in the area of tax collection, optimization and evasion. Some of the key mechanisms of this industry are evident from, for example, the Luxembourg Leaks and Panama papers that illustrate how shell corporations are used for illegal purposes such as tax evasion and how wealthy individuals, including public officials, may keep personal financial information private. The current landscape of tax systems in the EU thus constitutes an enormous drain on the limited pool of resources available for innovation and economic growth, and as such have strong adverse effects on employment and real GDP. Moreover, the very notion of taxing income is highly antagonistic to the intrinsic value of work and economic growth in European society.

We therefore call for a European debate on the need for standardizing tax systems in ways that do not inhibit innovation and economic growth. In terms of the earlier analogy with boat rowing, the challenge is how we can redirect and align the flow of the river with the direction of our boats in ways that enhance innovation and growth, rather than trying to make the best out of rowing upstream.

For example, one promising scenario toward 2040 would be that EU countries eliminate their (personal and corporate) income taxes, including gift and inheritance taxes, to replace these with a single-rate tax on value added or consumption — also known as the transformation to a relatively simple and transparent system of output taxation. Such a system would be automatically "fair" in distributing tax among individuals (if you consume more, you pay/contribute more tax). Moreover, it would drastically simplify tax collection and thus make Europe in 2040 into the most attractive location world-wide to start and grow a new business as well as for any other kind of investment, for example in sustainable energy production and storage.

4. Ensuring Appropriate Rewards and Incentives for Innovators

The innovation landscape increasingly draws on widely distributed knowledge and open innovation processes. The transaction of technologies and other inventions among different actors has therefore become pivotal to the successful development of new products, services and (e.g. high tech) systems. Intellectual property (IP) underpins technology transfer between actors, by creating clear rights that can be transferred. This implies a well-functioning IP system, and a well-functioning market for technology, is critical to the European innovation agenda.

A well-functioning patent system therefore is a catalyst for innovation. Compared to our Asian and North-American counterparts, however, the European patent system is highly complex and fragmented. This situation creates a high level of ambiguity and uncertainty for young inventors and entrepreneurs. Although the patenting activity recorded at the European Patent Office (EPO) has experienced a dramatic increase in recent years, this increase does not necessarily reflect more innovation. Rather, in some industries, it signals the rise of 'strategic patenting' aimed at aggressively blocking business ventures pursued by others and extorting royalties where possible. This flood of patenting activity makes a complete patent clearance increasingly expensive and, sometimes, impossible—hanging over entrepreneurs like the sword of Damocles.

Although the quality of patents granted by the EPO is generally considered to be higher than at other patent offices, the rise of strategic patenting suggests that patents may still be too easy to obtain. As a consequence, the inventive step threshold required for a grant should be significantly raised. The current focus of the EPO on 'efficiency' in examining patent applications is misguided; European inventors and entrepreneurs need carefully examined patents, issued in a reasonable amount of time.

Finally, we call for a discussion of the funding and governance of the EPO. For instance, the EPO is currently financed by the fees it collects from its 'clients.' This raises a serious incentive problem, since the EPO increases its revenues when it is more lenient to applicants. This funding arrangement does not provide for an impartial examination and may actually undermine the quality of applications. A key governance problem arises from the design of the administrative council of the EPO, which is composed of representatives from the national patent

offices. This is likely to encourage the preservation of national interests at the expense of innovation and economic growth.

The EU should also play a central role in designing efficient markets for technology. The market for technology is a key mechanism of open innovation. However, such markets are plagued with failures arising from information asymmetry, lack of market thickness, and difficult-to-transfer property. Available evidence points to low transaction rates: even for inventions that the owner wishes to license to others, the probability of realizing this intention remains very low (around 5%). The problem is particularly acute in sectors where vertical disintegration gives rise to new specialized segments that are positioned upstream in the innovation chain. The obstacles to licensing impose two major types of costs: deals not done, leading to an underuse of IP; and incorrect pricing. Price signals in competitive markets are widely believed to induce behaviour towards socially optimal resource allocation. When prices are "wrong", this mechanism is absent, which might result in rather poor outcomes. To develop and sustain more efficient markets for technology, policy makers need to:

- mitigate information problems by increasing transparency through better public reporting of IP transactions, frequently providing extensive data on trade in technology, and reforming financial accounting standards for the valuation of intangibles;
- promote the standardization of contracts and market norms;
- develop the market infrastructure, including mechanisms for low-cost dispute resolution and risk insurance.

In sum, in 2040 the EU must be able to draw on a well-functioning patent system and markets for technology, to ensure appropriate rewards and incentives for inventors and entrepreneurs in the age of open innovation.

5. Smart Specialisation

Finally, the so-called smart specialisation strategy (S3) addresses especially the innovation challenges of less advanced and transition regions (i.e. their poor capabilities and ecologies) in the road towards the EU as a powerhouse in 2040. For these regions, the point is not to invent at the frontier, but rather to generate innovative complementarities in their key sectors. These complementarities may be less flashy and less overtly innovative, and yet they ultimately constitute the key to inclusive growth. S3 does, as such, not have magical properties that can transform laggards into global leaders, but a S3 might transform less advanced regions into good followers – regions capable of allocating R&D and other innovative inputs, so as to lever the growth potential of knowledge and technology developed elsewhere.

However, such an inclusive approach to innovation and growth does not only require a set of generative conditions (such as those previously outlined), but also specific capabilities and resources at the regional level. In top regions, these capabilities are provided by industrial associations, large companies and universities through spillovers arising from research and training, diffusion of technologies to suppliers, new models of IP, and other open innovation practices. These spillovers constitute the complementary capabilities that many start-ups and SMEs can draw on, even if they have not contributed to their provision. In many other regions, however, these sources of complementary capabilities have never existed or have dried up, and large holes in their industrial ecosystems

have appeared. To cite Suzan Berger, "firms are home alone": even start-ups with great innovation and generous funding cannot do it all in-house; they need suppliers, qualified workers and engineers, with expertise beyond their own. In many cases, however, the local ecosystem is too poor to provide all these capabilities.

In less advanced regions, including those undergoing major transitions, regional innovation policy therefore needs to address the whole set of capabilities required to innovate in *specific* sectors and emerging fields. In other words, a policy is needed to support the formation of local innovation ecologies: the dense network of companies, research institutions, specialised services and complementary capabilities that are mobilized to explore collectively a certain new domain of opportunities. This is the essence of smart specialisation. Here, research universities can play a central role in providing complementary capabilities, coordinating emerging activities and increasing relational density within the ecologies.

To make things even more challenging, local innovation ecosystems can only thrive if they have access to and interact with (complementary) ecosystems elsewhere, especially those with resources and capabilities that are not locally available. The rise of digital platforms and communities across Europe and beyond can facilitate this type of interaction.

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As a final note, we point at the need for more transparency and accountability in how governmental agencies at the local, national and EU level design and implement innovation and economic policy. This can be achieved in two ways: pushing towards open data and conducting policy evaluation studies in a more systematic way. Policy makers often proceed on the basis of rather casual understandings, uninformed by systematic inquiry into the interactions between innovation policy, procedures, practices and their (short-term and long-term) effects. This policy practice is no longer acceptable – if it ever was. As such, the EU must create a culture of *evidence-based* innovation policy.

Together, the generative conditions and measures outlined in this discussion paper may enable the EU to become the leading economy in the world, by capitalizing on its distributed and inclusive nature as well as exploiting its potential for breakthrough (social, fiscal, technological, and other) innovations. Evidently, each of these five conditions involves a "grand" challenge that is nonlinear in nature and cuts across many different jurisdictions. Moreover, this discussion paper is deliberately crafted to provoke a public debate on EU's future in 2040, possibly giving rise to alternative designs and visions.

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