

## *Executive summary*

The increasing importance of knowledge-based capital, both for competitiveness and to address socio-economic challenges, benefits those countries with strong public research and the ability to effectively use research findings to innovate. It therefore becomes ever more important to understand how public investments in research can generate the greatest impacts on innovation. This report provides fresh evidence regarding those impacts, and explores policy tools implemented across OECD countries to support science-industry knowledge transfer.

### *What are the impacts of science-industry knowledge transfer on innovation?*

Assessing the impact of public research on innovation is a complex task given the variety of channels through which knowledge transfer unfolds (e.g. academic spin-offs, collaborative research, patenting and licensing of university inventions, academic consultancy, networking) and their relative importance across science fields and industry sectors. Additional methodological challenges arise, including accounting for factors shaping knowledge exchange such as the industry context and, most importantly, establishing causality relations. Impacts are also likely to be diverse across different research institutions when it comes to status, mission, research specialisation and quality. More investment in building the right samples of data at micro level and using the best tools are necessary to fully understand knowledge transfer dynamics and their impacts on innovation. A combination of different methods and data sources is necessary for any such assessment.

The report provides new evidence on various formal and informal channels of knowledge exchange, including jointly filed patents of higher education institutions (HEIs) and public research institutes (PRIs) with industry; the impact on local innovation of proximity to HEIs and PRIs; student and researcher start-ups; and graduate mobility in social sciences. The evidence presented shows that HEIs and PRIs increasingly engage in “knowledge co-creation” with industry, as reflected by the growth in jointly filed patent applications. Academic spin-off activities are another way for research to contribute in important ways to innovation, as shown by data for student and researcher start-ups. Graduate mobility in social sciences is another key contributor to innovation, particularly for some disciplines and industry sectors such as information and communication technologies (ICT).

In addition, exploration of the causal implications of public research institutions for innovation, based on the geographic location of HEIs and PRIs, points to a positive impact on local industry patenting.

### *What policy instruments are implemented to support knowledge transfer?*

OECD countries have implemented a variety of financial, regulatory and “soft” instruments to boost knowledge exchange between science and industry. A taxonomy presented in this report offers a comprehensive overview of 21 policy instruments, characterised by their targets, the channels they address, and whether their orientation is supply or demand side. Financial instruments include R&D and innovation grants, tax

incentives with a focus on collaboration, and financial support to recruit PhDs or postdoctoral students. Regulatory instruments include intellectual property (IP) rights regime, regulations regarding the creation of spin-offs by researchers, and sabbaticals and mobility schemes for researchers. Soft instruments include awareness building, networking events, and the development of guidelines, standards and codes of conduct.

Emerging policy approaches to knowledge transfer include support for science-industry knowledge co-creation (i.e. the joint creation of knowledge by industry, civil society and research by means of joint labs, joint research projects, etc.); the creation of intermediary organisations that help match supply and demand for new technologies (e.g. R&D centres for science-industry collaboration, business incubators, etc.); the use of new forms of open digital innovation enabled by digital platforms; and the development of new programmes to support spin-offs.

### *What is the impact of the policy mix and governance mechanisms?*

When governments add new policy instruments for knowledge co-creation, digital innovation, and academic spin-offs, the impacts of these instruments depend not only on their own features (which vary across countries) but also on the other policies in place. Different policy instruments may reinforce and complement each other when implemented simultaneously, but could also result in contradictions (if one decreases the effectiveness of others) and excessive complexity (if implementing too many instruments results in confusion for target groups, or increased operational difficulties and administrative costs).

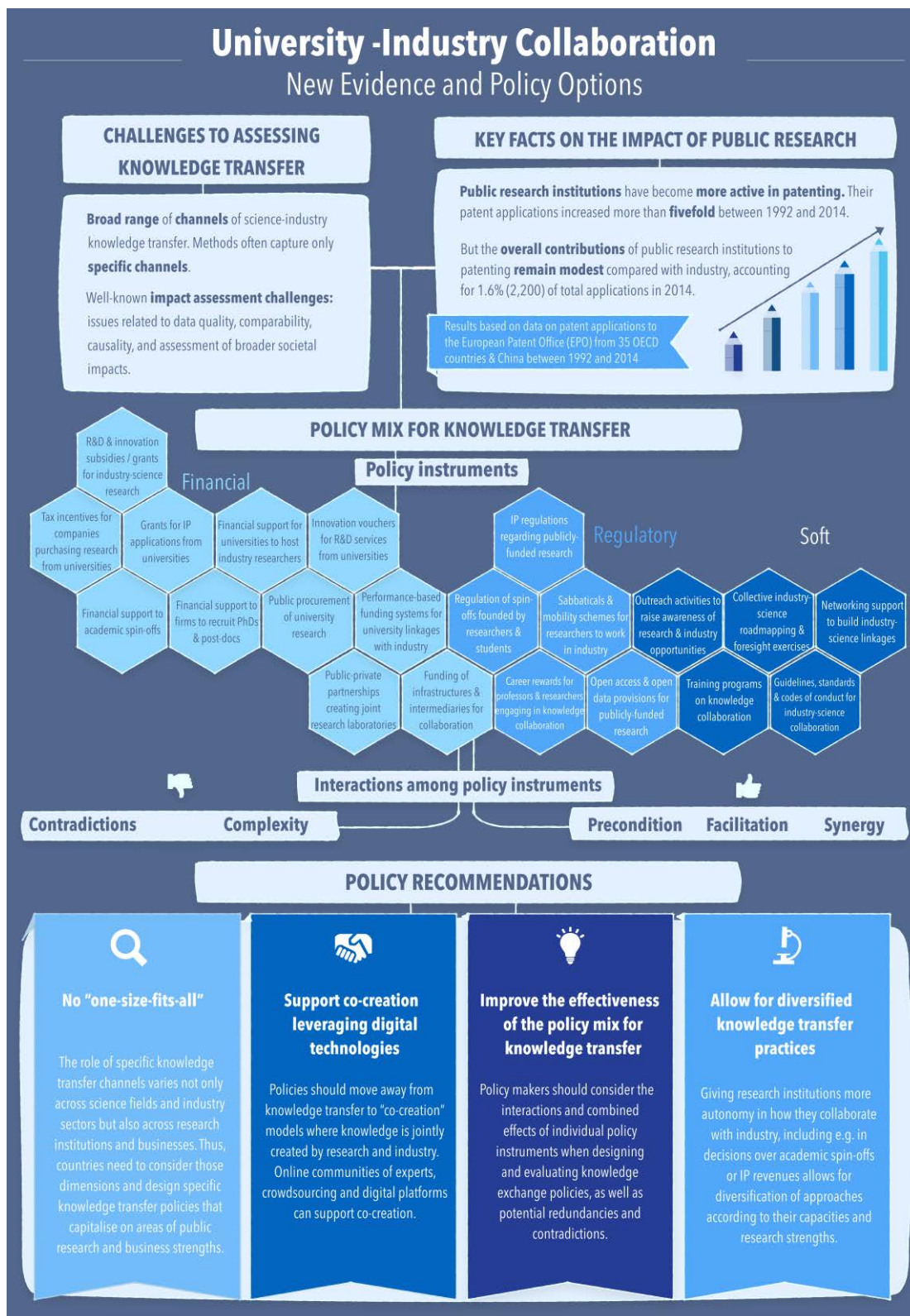
The effectiveness of combining instruments – the policy mix for knowledge transfer – also depends on the governance of public research, which is to say the institutional arrangements that govern policy action regarding publicly funded research in universities and PRIs). The new OECD Database on Governance of Public Research Policy ([stip.oecd.org/resgov](http://stip.oecd.org/resgov)), built for this project, provides evidence of key governance practices that shape science-industry knowledge transfer. These include the increasing autonomy of universities and PRIs, which allows them to deploy their own support programmes for knowledge transfer; increasing engagement on the part of the business sector and civil society in university boards and research and innovation councils; and the increasing reliance on performance-based funding mechanisms that reward universities and PRIs for their engagement with industry.

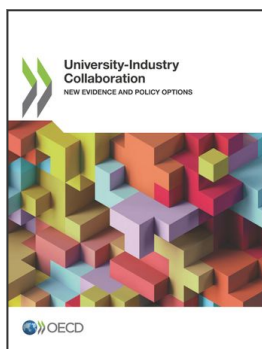
### **Key recommendations**

- *Knowledge transfer policies should be tailored and respond to specific industry and research needs*, as the relevance of different knowledge transfer channels varies across countries, science fields and industry sectors, among others.
- *HEIs and PRIs should take advantage of the opportunities for knowledge transfer offered by digital technologies*. New tools such as online communities of experts, open calls and crowdsourcing can be used to facilitate matching supply and demand for innovation.
- *Policy makers should consider interactions among policy instruments when designing and evaluating knowledge transfer policies*, strengthening the synergies and reducing potential redundancies and contradictions. Policy mixes should also be streamlined to avoid confusion for target groups of those policies and reduce implementation costs.

- *National regulations should provide HEIs and PRIs with the autonomy to organise their knowledge exchange activities, so that these are more targeted to their needs and strengths. Regulatory frameworks should also be revised to facilitate the participation of industry and civil society in governing boards of HEIs and PRIs, and to promote stakeholder consultations in the decision-making processes of these institutions.*
- *Policy makers and researchers should exploit the potential of new data sources and methodologies to assess the effectiveness of knowledge transfer policies, such as text mining. These could be combined with commonly used data sources and methodologies (e.g. patent and publications data).*

Synthesis of the report





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