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Intellectual Property and Tax Incentives: A comparative analysis of the EU and the US legal frameworks

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Abstract

This paper analyzes the use of intellectual property rights and the most common forms of tax measures to incentivize innovation and conducts a comparative analysis between the policies adopted by the US and the European Union.
The first part of the paper will focus on intellectual property rights (or IP rights), building a framework for drawing a more thorough analysis of the interaction between these rights and tax policy. Indeed, when tax policy instruments are used for purposes that differ from revenue-raising and wealth-redistribution, several criticalities arise, and a deep investigation becomes necessary to understand whether the objectives are pursued without hampering the *status quo*. The system should be looked at as a whole and several considerations should be conducted to understand whether there might be different ways to reach the same objectives more efficiently and without affecting the neutrality of the tax system. All in all, the proposed policy should be coherent with its objectives and avoid undesired effects.
The most common ways to incentivize innovation through the tax system are R&D tax credits and IP Box Regimes. This work will provide an analysis of these different innovation-oriented tax measures. The evaluation will lead to considering expenses-based tax incentives, in the form of R&D tax credits, as a better complement to IP rights in incentivizing innovation, as opposed to IP Box Regimes, whose scope somewhat overlaps with IP rights.
The last part of the analysis will compare the context and the legal framework of the European Union and the United States. In comparing those two different ways of achieving the same objective, it will formulate specific considerations on the different nature of the tax policies, emphasizing potential causes and consequences of different choices. Consequently, the paper will highlight the conclusions of the analysis.

Keywords

Intellectual Property, Tax incentives, Innovation, United States, European Union

Table of Contents

1. Introduction

Intellectual property law receives particular attention from governments and institutions, mainly because of the market failures and the positive externalities that are related to it.[1] The Musgrave model of public finance asserts that where the market is unable to achieve certain social goals that might lead to an increase in welfare, the government should intervene and try to fill the gap, for instance, through the tax system.[2]

Innovative projects can have a high social rate of return, positive externalities and spill-over effects, generating an increase in productivity, employment and economic growth. Therefore, states might want to intervene where the socially optimal amount is larger than the actual innovation-oriented investments, which is generally the case.[3] This is mainly due to the fact that externalities are not retained by the investors, but go to the advantage of the community and, therefore, they do not appeal to private investors as much as other profitable projects. Nonetheless, not all innovative projects have the same social return. Consequently, a debated topic is how to design subsidies to allocate resources more effectively.

The most common way to incentivize intellectual property is the use of intellectual property rights.[4] However, IP and innovation are not completely overlapping, and there are some areas of the innovation

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[1] See Valentine Korah, *Intellectual Property Rights and the EC Competition Rules* (Hart Pub 2006); Steven D Anderman and John Kallaugher, *Technology Transfer and the New EU Competition Rules: Intellectual Property Licensing after Modernisation* (Oxford University Press 2006).

[2] James M Buchanan and Richard A Musgrave, *Public Finance and Public Choice: Two Contrasting Visions of the State* (The MIT Press 1999) <https://direct.mit.edu/books/book/2423/public-finance-and-public-choicetwo-contrasting> accessed 5 April 2023; Paolo Arginelli, 'Innovation through R&D Tax Incentives: Some Ideas for a Fair and Transparent Tax Policy' (2015) 2 World Tax Journal 3.

[3] Charles I Jones and John C Williams, 'Measuring the Social Return to R & D' (1998) 113 The Quarterly Journal of Economics 1119; Åsa Hansson and Cécile Brokelind, 'Tax Incentives, Tax Expenditures Theories in R&D: The Case of Sweden'.

[4] See also Brian D Wright, 'The Economics of Invention Incentives: Patents, Prizes, and Research Contracts' (1983) 73 The American Economic Review 691; Joseph E Stiglitz, 'Economic Foundations of Intellectual Property Rights' (2008) 57 DUKE LAW JOURNAL 1693; M Kremer, 'Patent Buyouts: A Mechanism for Encouraging Innovation' (1998) 113 The Quarterly Journal of Economics 1137; VV Chari, Mikhail Golosov and Aleh Tsyvinski, 'Prizes and Patents: Using Market Signals to Provide Incentives for Innovations' (2012) 147 Journal of Economic Theory 781; Benjamin N Roin, 'Intellectual Property versus Prizes: Reframing the Debate' (2014) 81 University of Chicago Law Review 999.

processes that do not seem to benefit from IP rights, like for instance non-patentable innovative ideas. In these cases, the tax system might have an important role to complement IP rights.

Indeed, legal scholarship often sees IP rights, tax incentives and other forms of innovation subsidies as alternatives[5]. Tax policy, instead, can be a good complement to target those dynamics in the innovation process that are not incentivized by the generally widespread IP rights. However, tax measures need to be designed in the proper way, to avoid the waste of public money or distortions in the system. The objective of this paper is to analyze the role of tax incentives in innovation, analyzing the most common types of innovation-oriented incentives, and their interaction with IP rights.

Section 2 will focus on intellectual property rights, building a framework for drawing a more thorough analysis of the interaction between these rights and tax policy. It will illustrate the most common forms of IP rights and advance some considerations on their contribution to innovation.

Section 3 will focus on innovation-oriented tax incentives. It will describe how, when tax policy instruments are used for purposes that differ from revenue-raising and wealth-redistribution, several criticalities arise, originating some strategic challenges for policymakers. In particular, in tax incentives, it is fundamental to target the right activities, in order to have an effective and efficient tax measure. Good tax design is fundamental to understanding whether the objectives are pursued without hampering the *status quo*. Additionally, the most common ways to incentivize innovation through the tax system (i.e., R&D tax credits and IP Box Regimes) are examined in the analyses according to their policy design. Based on the targeted activities of the two types of tax measures, the evaluation leads to consider expenses-based tax incentives, in the form of R&D tax credits, as a better complement to IP rights in incentivizing innovation, as opposed to IP Box Regimes, whose scope somewhat overlaps with IP rights.

The last part of the analysis, section 4, compares the innovation contexts and the legal frameworks of the European Union and the United States. In investigating the divergences of the two systems, the

[5] Jacob Nussim and Anat Sorek, 'Theorizing Tax Incentives for Innovation' (2017) 36 Virginia Tax Review 25.

examination will underline the specific considerations on the different nature of the tax policies, emphasizing the tax cooperation and tax competition processes that are in place between the two blocs.

2. Intellectual Property Rights

Before getting to whether there is a persuasive case for innovation-oriented tax incentives, it is important to understand intellectual property rights and their role in the innovation debate. This is because in many cases, according to their design, the role of tax incentives can overlap with the role of IP rights. Therefore, the focus on intellectual property rights helps to build a framework for drawing a more thorough analysis of the interaction between these rights and tax policy.

This section will focus on providing the definition of IP rights and will describe their main characteristics, analyzing their relationship with the notion of innovation.

2.1. Definition of intellectual property rights

Intellectual property is the set of legal rights associated with intangible property that results from the creations of the mind. This includes inventions, literary and artistic works, designs and symbols, but also names and images used in commerce.[6] These legal rights are generally embedded in the legislation, interpreted by the courts and used by several actors, ranging from individual authors to multinational enterprises[7]. The main types of intellectual property, analyzed *infra*, are patents, copyright, and trademarks. However, there are also other forms of intellectual property, like, for instance, trade secrets or the right of publicity.

[6] See the World Intellectual Property Organization's website, <https://www.wipo.int/about-ip/en/> accessed 12 February 2023.
[7] On the use of architecture of IP law see Aram Sinnreich, *The Essential Guide to Intellectual Property* (Yale University Press 2019).

IP rights grant exclusive rights to either the individual or entity that is responsible for the invention, to assure that the potential economic benefits deriving from the invention are conferred to the inventor. This is a general restriction to competition that is aimed at incentivizing investments in innovative activities that would not be undertaken otherwise.

2.1.1 Patents

Patents give the inventor of a specific product or process, satisfying certain requirements, a temporary monopoly over the use or sale of such invention. The requirements for the registration of a patent are quite similar in the majority of the countries that adopt this system. Inventions usually have requirements to be accepted as patents. In many jurisdictions, including the US, inventions need to be useful, meaning that they achieve a specifically stated goal, novel, meaning that they need to be new compared to other inventions or to the general public awareness, and nonobvious, meaning that the invention should not sound obvious to a technician in the industry.

- Utility patents cover any "*new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof*".
- Design patents cover any "*new original and ornamental design for an article of manufacture*".
- Plant patents cover new varieties of plants, discovered or bred by explorers or horticulturalists.

The protection granted by patents has generally a limited duration, which in most jurisdictions is 20 years from the filing date of the application.

2.1.2 Copyright

Copyright gives the author or the creator of a work, typically literary or artistic, a temporary monopoly over certain uses of the work. However, copyright regulation can cover also the invention of software (computer programs, databases), which stands out from the general categories that copyright law was first designed for.

Only the owner of the work has the right to reproduce the work, distribute, sell or perform it publicly, and even prepare derivative products based on it. The owner can also share with third parties the right to do those things, generally, but not necessarily, in exchange for money.

In the majority of countries, copyright protection is granted automatically, without the need for registration. However, most countries have a system in place to allow for the voluntary registration of these works. This usually helps solve disputes over ownership or creation and facilitates the transfer of rights, the financial transactions concerning the work, and even the sale.

2.1.3 Trademarks

Trademarks are signs capable of and meant for distinguishing the goods or services of one enterprise from those of other enterprises. They function as a guarantee to consumers that a good or service was produced or offered by a specific party, which means they will be responsible for the quality of the work[8].

In many jurisdictions, the legal merit of trademarks is granted even in the absence of registration, although filing an application for registration with the national/regional trademark office can help assure a higher standard of protection. Indeed, within the territorial scope of the trademark office, registration provides legal certainty and reinforces the position of the right holder, especially in case of litigation. As copyrights and patents, also trademark regulation confers an exclusive right to the use of the registered trademark. This implies also the ability to license the trademark to another party for use in return for payment. The term of trademark registration is variable (usually ten years), although it can generally be indefinitely renewed.

[8] ibid.

2.2. Intellectual property and innovation

Intellectual property is often strictly associated with innovation. However, in some cases, IP rights might not necessarily be the cause or the consequence of innovation. IP rights tend to provide an incentive to produce the protected activities, motivated by the desire to reward the authorship and by the willingness to stimulate knowledge-based activities, which might have positive externalities in the system.

When it comes to patents, it is easy to see the link with innovation. Indeed, patents, together with other variables, such as R&D investments, are generally used to approximate the level of innovation of a country. Therefore, the more patents a country has, the more innovative it is going to be considered. Nonetheless, as seen *infra*, not all patents are necessarily innovative, and innovation might also lie in non-patentable outcomes. Trademarks, on the other hand, do not seem to be related to innovation, if not indirectly in some very specific cases. When considering copyright, software-related copyright is linked to innovation in a way that reflects patenting. However, literary and artistic works do not necessarily produce the typical positive externalities that the subsidization of innovation is related to.

2.2.1. Patentable vs non-patentable outcomes

The effort put towards the achievement of innovation, which is generally represented by the conduction of R&D activities, can result in either patentable or non-patentable outcomes. Many of the issues related to the patentability of new techniques or inventions are related to how patent law is designed.

Being a restriction to competition, patenting can temporarily prevent the development of new technologies that rely on the patented product or technique. This is the argument proposed by scholars who argue that patent law should be changed.[9] Yet, it is generally assumed that in the absence of intellectual property protection, the overall level of private investment in knowledge-creating activities

[9] Michele Boldrin and David Levine, 'The Case Against Intellectual Property' (2002) 92 American Economic Review 209; Michele Boldrin and David K Levine, *Against Intellectual Monopoly* (Cambridge University Press 2008).

would be below the optimal level, because of the market failures concerning the compensation of R&D outcomes.[10]

Patents, however, do not necessarily imply innovation:[11]

- Patent law is highly complex and in continuous evolution. Patenting requires very strict specifications, and, especially in some sectors, it is rather complicated to obtain a patent for a particular technique;
- Patenting requires a detailed description of the new technique/product. Some creators are unwilling to disclose their ideas and prefer to keep them secret;
- Patentable techniques and products might meet patent law requirements and still not be innovative;
- Patenting can have a lock-in effect on the use of newly discovered innovative techniques, which might not be used to go further in the innovation process; indeed some trends in economic literature relate the increase of "research tools patenting" to a fall in innovation as it blocks the ability of science to move forward in an open exploratory way[12].

Hence, innovation might come both from patentable and non-patentable outcomes, and patentable outcomes do not necessarily bring innovation into the system.

[10] Kenneth J Arrow, 'Economic Welfare and the Allocation of Resources for Invention', *The Rate and Direction of Inventive Activity: Economic and Social Factors* (Universities-National Bureau Committee for Economic Research, Committee on Economic Growth of the Social Science Research Council, Princeton University Press 1962).
[11] Mariana Mazzucato, *The Entrepreneurial State* (Demos 2011); Boldrin and Levine (n 10).
[12] See Mazzucato (n 12); Roberto Mazzoleni and Richard R Nelson, 'The Benefits and Costs of Strong Patent Protection: A Contribution to the Current Debate' (1998) 27 Research Policy 273; Boldrin and Levine (n 10)., arguing strongly against the possibility of patent protection leading to innovation: "*patents protection is not the source of innovation, but rather the unwelcome consequence that, eventually, tames it."*

2.2.2. Considerations on trademarks

Trademarks are generally not the result of R&D and their connection to innovation is very much discussed. Historically, the trademark doctrine has been deliberately developed at arm's length from an innovation incentivization justification, as that is the remit of patent law.[13]

It happens sometimes that trademarks become indicators of innovative activity, they can signal an underlying innovation by developing a relevant brand image and create a feedback cycle of investment in future innovation. In fact, innovation can lead a company to have a good reputation, which can then translate into a more valuable trademark, which then can attract more investments for R&D and innovative activities, having an indirect positive effect on innovation. However, the role of trademarks in this process is of an enhancer, as much as a good marketing campaign would be, and it is not necessarily related to the innovation part. Indeed, trademarks could actually signal a meaningless differentiation, creating an investment bias towards the relevance of some projects.[14]

Additionally, the indefinite time lapse in which they can operate might become problematic in terms of competition, potentially inhibiting the diffusion of innovation in cases like functional trademarks.[15] Overall, trademarks are in the majority of cases not a direct outcome of innovation-oriented efforts, but rather they can be indirectly linked to innovation.

3. Tax Incentives for Innovation

The use of taxation as a tool to incentivize innovation has been discussed in legal scholarship, although not always within the framework of intellectual property law[16]. Tax incentives can be seen as an alternative or a complementary tool to the existing innovation-inducing mechanisms, mainly intellectual

[13] Dev Gangjee, 'Trade Marks and Innovation?', *Research Handbook on Trademark Law Reform* (Graeme B Dinwoodie, Mark D Janis, Edward Elgar 2021).
[14] ibid.
[15] ibid.
[16] Nussim and Sorek (n 6); Bronwyn Hall, 'Tax Policy for Innovation' (National Bureau of Economic Research 2019) w25773 <http://www.nber.org/papers/w25773.pdf> accessed 5 April 2023.

property rights and cash-based transfers. The view taken here is that tax incentives cannot substitute IP rights, but ought to be considered a different tool that can help enhance other parts of the innovation process.

This section will provide a broad understanding of how tax incentives work, highlighting the policy recommendations of good tax design that are generally associated with the use of these measures. Additionally, it will analyze the use of the most common innovation-oriented tax incentives, i.e., R&D tax credits and IP Boxes, in an attempt of understanding more clearly how these measure work and how they can interact with a system that adopts intellectual property rights.

3.1. Definition and typology

Tax incentives for innovation provide tax relief for taxpayers that are engaged in targeted innovation-related activities. They can be described as special provisions allowing for the exclusion, credit, refund, deferral or any general time-related arbitrage, or rate-reduction of tax liability.

Therefore, they can take many forms, according to the way they allow the reduction of tax liability and the triggering factor. The most widespread forms of tax incentives, applied to corporate/personal income taxes and value-added taxes, are generally the following:

- Tax holiday/Tax exemption
- Reduced Tax rate
- Investment allowance/Tax credit
- R&D tax incentives
- Super deductions
- SEZ/Free Zones/EPZ/Freeport

However, in this paper, only the main forms of tax incentives used by the US and the EU for incentivizing innovation will be analyzed.[17]

The largest benefit of tax incentives is that, when properly designed and adopted in the right situations, they can reach a specific objective quite effectively[18]. They can be used to modify the behavior of taxpayers, with the objective of correcting market inefficiencies or enhancing conducts that produce positive externalities in the system. As explained *infra*, they are also easy to adopt, as they just modify a pre-existing system, and do not require an expenditure of funds, as they are generally structured as a waiver to the otherwise incurred tax liability.

Nonetheless, tax incentives come at a cost, which is often not easy to measure, as is the benefit. This generates several issues when assessing the tax policy. The main costs connected to the use of these measures are the loss of potential revenue, the resource allocation costs due to the potential distortions generated in the market, the enforcement and compliance costs, and the costs associated with corruption and lack of transparency, especially in developing countries[19].

3.2. Tax policy design considerations

The main objectives of a tax system are generally considered to be raising revenue, redistributing wealth, and affecting behaviors in a way that is considered to positively affect society. Tax systems, to work properly, should maintain an overall equilibrium between these factors, because some measures that target a specific objective might do so at the expense of another dimension. The most straightforward example of this is when a country, in an attempt of incentivizing a specific behavior, allows for a tax reduction for taxpayers adopting that behavior. The consequence is a reduction of the

[17] For a thorough analysis of all the forms of incentives, see Eric M Zolt, 'Tax Incentives and Tax Base Protection Issues' [2014] United Nations; United Nations, *Design and Assessment of Tax Incentives in Developing Countries: Selected Issues and a Country Experience* (United Nations 2018); Sebastian James, 'Tax and Non-Tax Incentives and Investments: Evidence and Policy Implications' [2014] World Bank.
[18] United Nations (n 18).
[19] ibid.

overall revenue collected in the system, which constitutes the cost of the policy. Therefore, the policy must be designed effectively, otherwise, the reduction in revenue becomes a waste of public money. In general, when tax policy instruments are used for purposes that differ from revenue-raising and wealth-redistribution, several criticalities arise, and a deep investigation becomes necessary to understand whether the objectives are pursued without hampering the *status quo*.

The system should be looked at as a whole and several considerations should be conducted to understand whether there might be different ways to reach the same objectives more efficiently and without affecting the neutrality of the tax system. All in all, the proposed policy should be coherent with its objectives and avoid undesired effects.

3.2.1. Objectives and targeting abilities

To function properly, tax incentives need to be well-targeted. Targeting, however, is not easy, as tax measures can cause unexpected and undesired distortions in the system, which are sometimes difficult to identify. Tax incentives can be broadly targeted, aiming at some general types of investment, or narrowly targeted, when they are designed for a specific action or sector.

When it comes to innovation-oriented tax incentives, unpacking the notion of innovation can help understand how tax incentives can target one of the specific factors that are generally associated with innovation. The most relevant factors, which will be the main object of analysis in this paper, are R&D investments and patents, which constitute respectively an input and an output of innovation. As analyzed *infra*, the way the incentive is designed affects also the stage of the innovation process in which the incentive intervenes.

Incentives should ideally aim at selecting the projects that produce the largest amount of externality in the system, as those are the kinds of projects whose monetary benefits might not necessarily attract private investments, as their effects are broadly spread over society. However, targeting these projects is difficult *per se*, and can be even more difficult when designing a tax policy, because the tax administration is not specialized enough for the task. This is especially true when there is not a comprehensive criterion that can be used as a proxy of these externalities, like for instance targeting a

specific sector (e.g., healthcare or technology). Therefore, it might be better for the tax system to intervene in a broader way, by incentivizing specific dimensions of the innovation process, rather than specific projects, leaving the latter task to other government agencies with more innovation-oriented expertise, through prizes, grants or other kinds of subsidies.

3.2.2. Principles of tax design in behavioral taxes

In this section, the most relevant dimensions of good tax design are described[20]. These dimensions are presented within the framework of innovation-oriented tax incentives, to highlight what the trade-offs are between these dimensions and provide an analogy with the use of direct subsidies provided by the State through specialized agencies.

Simplicity

Simplicity can be divided into three main concepts in this context: simplicity of implementation, administration and access.

- Simplicity of implementation

As regards simplicity of implementation, using the resources that are already in place in the tax system seems to be quite a relevant advantage, as compared to creating a government body that selects what inventions are worthy of direct subsidies from the state. Undeniably, it is easier to change a piece of the current legislation on tax incentives, like the deductible amount, rather than introducing *ex novo* a set of rules concerning direct subsidies to innovation.

- Simplicity of administration

As regards simplicity of administration, it is generally easier to administer innovation-oriented tax incentives as they leverage the already established tax system, which means that administrative

[20] See James A Mirrlees and Institute for Fiscal Studies (eds), *Dimensions of Tax Design: The Mirrlees Review* (Oxford University Press 2010); James A Mirrlees, Stuart Adam and Institute for Fiscal Studies (eds), *Tax by Design: The Mirrlees Review* (Oxford University Press 2011).

structures would already be in place. Direct subsidies would imply the realization of control structures, aimed at discerning the kinds of projects to invest in.

- Simplicity of access

For taxpayers, it would be easier to obtain incentives that leverage the current tax system, rather than having additional learning costs to understand new forms of subsidy and state investment. Nevertheless, not all tax incentives are equally easily accessible. However, firms generally need to be aware of tax compliance rules and get an understanding of the tax system anyway, therefore knowing about the tax incentives becomes more straightforward as opposed to having to hire specialists to look for public grants or other forms of direct subsidies.

Neutrality

Neutrality is quite a controversial variable to evaluate. The idea is that a neutral system is one that minimizes distortions over society's choices.[21] However, when a policy is deliberately aimed at changing people's behavior, like tax incentives for innovation, then neutrality can be considered the least distortive way to do so. This translates into a policy that reaches the same end, with the maximum amount of effectiveness and efficiency.

Effectiveness (Affecting taxpayers' behavior)

The objective to increase the targeted measure, such as the number of patents or the amount of R&D, can be reached with different levels of effectiveness. For instance, considering the cash dimension, direct subsidies constitute resources at firms' disposal and ready for use, whereas tax incentives are generally a form of debt waiver for the firm, which means that the firm might lack the cash resources to invest in these activities. Additionally, a firm must have some tax liability in order to be able to enjoy the benefit of the tax incentive, which is generally not the case for loss-making firms, as start-ups usually are. Consequently, in the example, direct subsidies seem to be a more effective way to change firms' behavior. In this case, it is possible to witness a trade-off between simplicity and effectiveness.

[21] Mirrlees, Adam and Institute for Fiscal Studies (n 21).

Therefore, the advantages of effectiveness should be weighed against the higher cost of administering the system.

Efficiency (opportunity cost)

As governments operate with limited resources, they ought to use their public budgets in the most efficient way. Even when trying to achieve a desirable objective, supposedly as the incentivization of innovation, they choose to do so over other policy objectives, which might be more impactful.

When the objective of the policy is defined, but there are different ways to reach it, the government should opt for the most efficient one. For example, did the government need to incentivize economic growth, tax incentives for innovation might not be the only way to do that. Before choosing to adopt tax incentives, the government should consider whether the same objective of economic growth could be reached through other kinds of non-tax or tax measures.[22]

Innovation-oriented tax incentives are not extremely efficient as they cannot distinguish projects with larger externalities. On the contrary, direct subsidies grant the possibility to pick research projects with larger externalities over other kinds of projects, especially because the government agencies that are responsible for overseeing these processes are generally more suitable for this job than the tax administration[23]. However, this is also a trade-off between efficiency and simplicity, as the higher efficiency of direct subsidies should be confronted with the higher cost of administration.

Fairness

Fairness concerns the equity dimension of the tax system, which should be considered as a whole and not necessarily focus on one measure. Fairness is very hard to measure, and often it is only possible to provide some general considerations concerning this dimension. With respect to innovation-oriented tax incentives, the fact that innovation affects growth and produces positive externalities in the system might make it a "fair" objective, although one could argue about the accessibility of these measures to

[22] Joel Slemrod (ed), *Tax Policy in the Real World* (1st edn, Cambridge University Press 1999) <https://www.cambridge.org/core/product/identifier/9780511625909/type/book> accessed 5 April 2023.
[23] Nussim and Sorek (n 6).

the whole population and not to specific types of individuals. In this case, not much can be said about equity and redistribution as it is hard to tell who gains from innovation-oriented incentives. Also, especially in the presence of corporate tax incentives, it is impossible to detect the link between the corporation paying fewer taxes and the distribution of wealth in the country.

Fairness is related to all the other dimensions, as the more effective, simple, efficient and neutral a tax policy is, the fewer resources are used for the stated objective, and the more resources are at disposal of the country to redistribute wealth or intervene in other policy areas to the benefit of the community. Additionally, a measure that is less distortive and more effective can be considered fairer, as it would be unfair to advantage certain actors over others for no reason.

Stability

Stability concerns the ability of a tax system to be sustainable enough not to need changes too often, as taxpayers should not chase a great deal of tax legislation. They should rather be able to rely on the tax system to remain unmodified unless it really needed an update due to specific circumstances.

Tax incentives might not be extremely stable, as they activate some mechanisms that require continuous changes in the legislation. In particular, some dynamics related to tax avoidance and international tax competition make some countries want to change their tax incentives to make them more attractive, as other countries adopt similar incentives, whereas, at the same time, makes some other countries want to make them stricter, to reduce the possibility of abusing the law. Direct subsidies might generate similar dynamics, although the supervision of a government agency might make them less subject to abuse.

3.2.3. Tax competition and coordination

One of the reasons that lead countries to adopt innovation-oriented tax incentives is international tax competition. Some countries wish to attract foreign investments through advantageous tax policies. Indeed, in the globalized economy, states do not compete for the provision of a “take-it-or-leave-it package” but also over specific tax rates, particular regimes for determined assets, and various

benefits.[24] As a defensive mechanism against tax competition, countries forcefully choose to adopt similar kinds of incentives, in order to protect their national investments. This process leads to an overall decrease in taxes levied on mobile capitals and corporate taxation, often referred to as "race-to-the-bottom".[25] In the case of IP Boxes, this was a quite clear reaction, especially within the European Union.

Nonetheless, when a country incentivizes innovation, especially involving positive externalities, an opposite phenomenon kicks in. Indeed, in the context of international spillovers, some countries might be better off free-riding other countries' innovation-related efforts. The problem with the externalities that derive from innovative products is that they cannot be measured and that they can have positive effects also on other countries, despite the revenue-related effort being put in by only one country. Similarly to what happens amongst firms investing in innovative activities, this can create a disincentive for countries to adopt innovation-related incentives as other countries might benefit from them at their expense.

This happens also with environment-oriented efforts, where some countries might free-ride the effort of other countries in reducing pollution by imposing stricter regulations and environmental taxes on their businesses. However, there is a fundamental difference between the incentives and the disincentives. In tax competition, countries that have innovation-oriented incentives or green incentives attract more businesses and foreign investments. Therefore, there is a double positive effect to adopting these kinds of measures – the positive externalities but also the competitive position in attracting businesses and investments. This is probably the reason why many countries now seem to be competing on these measures, like what happened with the US Inflation Reduction Act 2022, which heavily increased the budget for green incentives and the EU's immediate response via the Green Deal Industrial Plan.

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[24] Tsilly Dagan, *International Tax Policy Between Competition and Cooperation* (Cambridge University Press 2018).
[25] See Michael P Devereux and Simon Loretz, 'What Do We Know About Corporate Tax Competition?' (2013) 66 National Tax Journal 745..

Therefore, it is clear how national policies are often internationally influenced and do not come from univocal reasons.[26] In some cases, they might come from competitive efforts, whereas in other cases they might be the consequence of some sort of coordination. This latter case includes what gets decided in some international policy *forums*, such as the G20 or the OECD, or even by supranational bodies, which can set specific policy objectives that lead to the adoption of specific measures. The main example of this is the European Union, which in the context of innovation incentives often sets some levels of desired R&D activities that EU countries should reach.[27]

3.3. Policy analysis of the most common forms of incentives

There are several ways to incentivize innovation through taxation. The main distinction, which will constitute the *fil rouge* of this section, regards whether the incentive is "expenses-centered" or "revenue-centered".[28] Both expenses-centered and revenue-centered policies aim at incentivizing *input* activities and *output* activities of innovation. However, in doing so, one kind of policy, the expenses-centered, is based on the first phase of the innovation process, which is the moment in which private companies use their resources to invest in research and development. The other kind of policy, the revenue-centered, is based on the last phase of the process, which is the exploitation of the possible outcome of the R&D activities.

3.3.1. Expenses-centered incentives (R&D Tax Credits)

Expenses-centered incentives are mostly represented by R&D tax credits, although they do not only consist of tax credits (however, the analysis will refer to the whole category as "R&D tax credits").

[26]Arginelli (n 3); Carlo Garbarino, 'Tax Transplants and Circulation of Corporate Tax Models' (2011) 2 British Tax Review 159.
[27] For example, the Europe 2020 Strategy had the long-standing objective for the EU countries to devote 3% of their GDP to R&D activities. Even the proposal for the CCCTB had a super-deduciton R&D expenses.
[28] This is a derivation of the very helpful distinction between *input* and *output* research activities operated by Arginelli (n 3). The analysis opts for this *expenses/revenue* differentiation because both kinds of measures are aimed, to some extent, at incentivising both input and output activities but they do so in different ways.

These kinds of incentives are conceived as a way to intensify firms' possibility to deduct R&D expenses. The most common ways they are designed are generally:

- Enhanced deductions;
- Accelerated depreciation/amortization;
- Tax credits.

3.3.2. Revenue-centered incentives (IP Boxes)

Revenue-centered incentives can be generally identified with IP Boxes. They are designed as a tax reduction on the revenues obtained by the exploitation of intellectual property.

According to the country of adoption, IP Boxes can target various kinds of intangibles, normally patents, designs and models, secret formulas and processes, know-how, software, copyrights and trademarks[29]. However, the scope that is approved by the OECD Action 5[30] is narrowed down to a specific set:

- Patents, broadly defined;
- Copyrighted software;
- In certain circumstances, and only for small and medium enterprises, other IP assets that are non-obvious, useful and novel.

3.3.3. Policy Analysis

In the attempt of conducting a policy analysis of the two most common forms of innovation-oriented tax incentives, this section takes into account the most relevant diverging features of the two policies. In particular, it focuses on the targeted input and output activities of the two measures, on the empirical evidence that emerges from economic literature, and on the ease of administration.

[29] For an extensive analysis of the main IP Box regimes, see Lisa Evers, Helen Miller and Christoph Spengel, 'Intellectual Property Box Regimes: Effective Tax Rates and Tax Policy Considerations' (2015) 22 International Tax and Public Finance 502.
[30] OECD, *Action 5: Agreement on Modified Nexus Approach for IP Regimes* (OECD 2015).

Targeted input activities

As the objective of innovation-oriented tax incentives is the enhancement of private-sector innovative activities, it is fundamental to analyze whether the two policies are designed to successfully do so.

In the attempt of understanding the potential targeting of genuine R&D investments, considered as inputs of the innovation process, it is possible to identify three main types of R&D activities that can be conducted by a firm, according to their prospective success:

- Unsuccessful R&D;
- R&D that would have been successful with more funds to invest;
- Successful R&D.

Among these three categories, a policy designed with the scope of enhancing innovation through R&D activities in the private sector should mainly target the second category, namely R&D which would have been successful with more funds available. The public budget invested in unsuccessful R&D is wasted. Public investments in R&D that would be successful anyway might be considered a non-efficient investment as they do not increase the number of successful activities and, supposedly, innovation. In this latter case, there might be a reason for subsidizing this kind of activity as a prize. Nonetheless, IP rights are generally in the system to grant the creator of the successful project the right economic return from the investment.

R&D tax credits indistinctly target all kinds of R&D activities, whereas IP Boxes indirectly target only successful R&D activities, which were able to result in the exploited IP.[31] Even if they theoretically provide a behavioral incentive to private firms to increase their effort towards R&D that might be successful with more funds, IP Boxes do not grant the financial resources to behave accordingly. Additionally, it is important to notice that the role of IP rights is already to provide an incentive of this kind, as successful R&D can be patented or copyrighted, which grants the owner the economic

[31] The same view is expressed by Evers, Miller and Spengel (n 30).

enjoyment of the output. In this context, the roles of IP Boxes and IP rights seem to overlap, whereas R&D tax credits seem to be a better match for incentivizing all kinds of innovation inputs.

Therefore, R&D tax credits seem to more effectively target what the system might need, especially if they are refundable as they might help R&D that is unsuccessful for lack of funds even more than non-refundable R&D incentives. However, it might be useful for further research to understand the level of wasted government resources in unsuccessful R&D.

Table 1. Targeted input activities

INPUT ACTIVITIES	Unsuccessful R&D	R&D unsuccessful for lack of funds	Successful R&D
R&D Tax Credit	✓	✓	✓
IP Box	✗	✗	✓

Targeted output activities

Although it is generally assumed that incentivizing R&D is already a desirable policy objective, it might be useful checking also the effects that these measures have on the output activities, to get an idea of what happens next. We can identify three kinds of output activities, according to their patentability and level of innovation:

- Patentable innovative outcomes;
- Non-patentable innovative outcomes;
- Patentable and non-patentable non-innovative outcomes.

Then we have another category, which is not an output activity of R&D but is still in the scope of certain tax incentives:

- Other non-R&D outcomes (like trademarks).

It would be ideal for a policy to target only innovative outcomes, but it is extremely complex to operate a distinction, even at a theoretical level. On the other hand, subsidizing non-R&D outcomes is certainly out of the policy scope.

R&D tax credits indirectly target all the outcomes, except for the non-R&D one, although, as seen *supra*, in some cases they might even have positive effects on trademarks, although this is out of the scope of the tax measure. IP Box regimes tend to mainly target patentable outcomes, but the way they work heavily depends on their policy design. Before OECD recommendations on their design[32], they tended to enhance also the use of non-R&D outcomes, which made them an extremely inefficient policy.

IP rights already tend to incentivize all these outcomes, except for the non-patentable innovative outcomes, which might be, for instance, trade secrets or know-how. When these outcomes are the result of R&D, then R&D tax credits do indirectly incentivize them.

Table 2. Targeted output activities

OUTPUT ACTIVITIES	Patentable innovative outcomes	Non-patentable innovative outcomes	Non-innovative outcomes	Non-R&D outcomes (e.g., trademarks)
R&D Tax Credit	✓	✓	✓	✗
IP Box	✓	*	✓*	*
* depending on how it is designed				

Empirical evidence

In order to fully understand the economic efficiency of tax incentives, it is important to consider their effects according to the empirical analyses that have been conducted in economic literature.

Empirical evidence shows there is a positive effect of R&D tax credits on private R&D activities.[33]

$$R\&D = \underset{+}{f(tax\ benefit_{R\&D})}$$

[32] OECD (n 31).
[33] Irem Guceri and Li Liu, 'Effectiveness of Fiscal Incentives for R&D: Quasi-Experimental Evidence' (2019) 11 American Economic Journal: Economic Policy 266; Nick Bloom, Rachel Griffith and John Van Reenen, 'Do R&D Tax Credits Work? Evidence from a Panel of Countries 1979–1997' (2002) 85 Journal of Public Economics 1.

However, there are still some uncertain features, such as the heterogeneous responsiveness and elasticity of R&D tax incentives, cross-country differences, the effects on productivity and the composition and location of R&D.[34]

As regards IP Boxes, the tax reduction on the exploitation of IP and intangibles does not necessarily relate to an increase in R&D activities. [35]

$$R\&D = \overset{f(tax\ benefit_{IP})}{?}$$

Nonetheless, when adopted IP Boxes were advertised as a way to increase the levels of R&D investments as they would create an incentive for firms to invest more based on the expected reward. There is mixed empirical evidence on the actual effects of IP Boxes. In general, current analyses face the following problems when analyzing IP Boxes:

- Identification issues: some variables are difficult to measure. For example, recent economic literature[36] uses the number of patent applications, grants, and highly-skilled employment to measure innovation, even though they are inaccurate proxies;[37]
- When estimating the effects of IP Boxes, it is difficult to disentangle the desirable increase in IP investments from profit-shifting[38].

Ease of Administration

The notable advantage of R&D tax credits is that they are easy to implement and administer, as they make large use of what is already deductible for tax purposes and modify the way it is deducted,

[34]Guceri and Liu (n 34); Boris Lokshin and Pierre Mohnen, 'Do R&D Tax Incentives Lead to Higher Wages for R&D Workers? Evidence from The Netherlands' (2013) 42 Research Policy 823.
[35] Annette Alstadsæter and others, 'Patent Boxes Design, Patents Location, and Local R&D' (2018) 33 Economic Policy 131; Shannon Chen and others, 'The Effect of Innovation Box Regimes on Income Shifting and Real Activity' [2019] SSRN Electronic Journal <https://www.ssrn.com/abstract=3486428> accessed 5 April 2023.
[36] See Tobias Bornemann, Stacie Kelley Laplante and Benjamin Osswald, 'The Effect of Intellectual Property Boxes on Innovative Activity & Effective Tax Rates' [2018] SSRN Electronic Journal <https://www.ssrn.com/abstract=3115977> accessed 5 April 2023.
[37] It is useful to see the correlation between IP Boxes and these factors, but they do not necessarily approximate innovation in the system.
[38] IP Boxes can result in aggressive tax competition and lead to a decrease in tax revenue. See Rachel Griffith, Helen Miller and Martin O'Connell, 'Ownership of Intellectual Property and Corporate Taxation' (2014) 112 Journal of Public Economics 12.

generally enhancing it, or changing the timing. Tax administrations witness a slight change in the rules that are already in place, which does not create much of a burden. Although R&D deductions are enhanced, this should not lead to an excessive increase of the usual audits that tax administrations conduct on corporate expenses, except for the fact that there might be abusive behaviors from taxpayers trying to use make other expenses figure out as R&D. However, it can be stated that they do not add a great deal of complexity to the already complex system, as abuses and audits occur anyway.

As opposed to this scenario, IP Boxes are quite difficult to administer. Despite what could seem like a simple tax reduction on the use of specific intangibles, there are several difficulties in the administration of such a tax advantage.

The first difficulty concerns the objective scope of the IP Box. Only certain specific kinds of intangible assets can enjoy the tax reduction. Therefore, tax administrations have the task to check whether the intangible assets exploited by the firm fall within the scope of the tax policy. This is a costly task both when operated *ex-ante* and *ex-post*. The second difficulty is the determination of the amount of revenue that can enjoy the reduction. Externalized IPs imply the payment of royalties, which can be considered the revenue deriving from the IP. For internalized IPs, the amount of revenue that is related to the use of the IP must be unraveled. Additionally, IP Boxes that are in line with OECD recommendations contemplate a further passage, which is aimed at determining the amount of this IP revenue that can be associated with the R&D activities (i.e., the "nexus")[39]. These specific calculations are typically conducted together with the tax administration, in an advanced tax ruling. The one-by-one analysis by the tax administration makes the application of IP Box regimes rather burdensome.

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In light of the policy analysis, expenses-centered incentives, in particular in the form of refundable R&D tax credits, might be a better complement to IP rights for boosting innovation-related activities.

[39] OECD (n 30); the "modified nexus approach" includes a further passage.

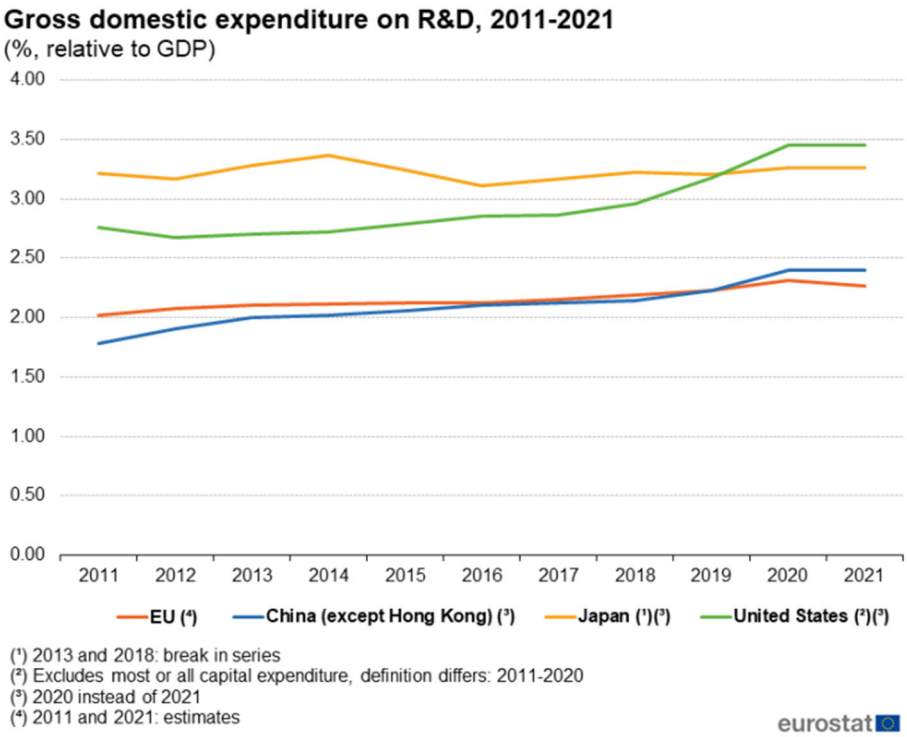
This is due to the fact that they target activities that are not incentivized by IP rights, as opposed to IP Boxes, which instead rather overlap in scope with IP rights.

However, it is important to underline that targeting these kinds of complementary activities does not necessarily lead to innovation and that further, more targeted research would be needed to fully understand the effects and the costs (i.e., the amount of revenue wasted in unsuccessful research) of these incentives. Additionally, it must be noted that both R&D tax credits and IP Boxes might be subject to abuses aimed at tax avoidance, and, therefore, their effects might also depend on the effectiveness in the country of anti-abuse legislation and the ability of the tax administration to identify and stop these cases.

4. US – EU comparative analysis on tax incentives

Both the United States and the Member States of the European Union put great value in innovation and R&D investments. In absolute values, in 2022 the US had investments in R&D activities for $791.9 billion, almost doubling the total EU absolute investments in R&D, which in 2021 amounted to €328 billion. In relative terms, amongst EU Member States, the highest R&D intensity, measured as gross domestic R&D expenditures to GDP, was recorded in Sweden (3.35%), Austria (3.22%) and Belgium (3.19%). Only six Member States reported an R&D intensity below 1% in 2021. Also when dividing by the GDP, as shown in Figure 1, the US (3.45%) still had a higher research intensity than the EU average (2.31%).

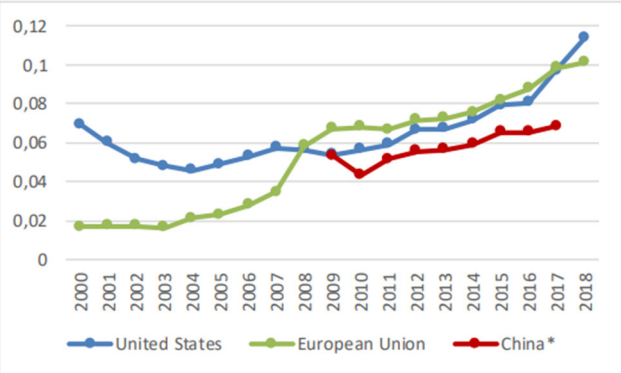
Figure 1. Eurostat gross domestic expenditure on R&D chart[40]



Tax incentives for R&D have been a very popular tool in both the US and the EU, raising steadily over the past two decades, as shown in Figure 2. In 2018, the US overtook the EU in terms of R&D tax incentives to GDP, after ten years of EU primate in this figure.

[40] Available on the Eurostat website: <https://ec.europa.eu/eurostat/statistics-explained/index.php?title=R%26D_expenditure> accessed 28 February 2023.

Figure 2. OECD – EU Parliament, R&D tax incentives as a % of GDP[41]



Source: OECD, *China data missing for 2000-2008 and 2018.

This section is dedicated to analyzing the differences between the innovation-oriented tax incentives in the EU and the US and understanding the divergences within the framework of the tax policy approach that the two blocs generally adopt.

4.1. US measures

In the United States, the largest kinds of innovation-oriented tax reductions are the expensing of research and experimental expenditures, under Section 174 of the Internal Revenue Code, and the credit for increasing research activities, under Section 41 (Research & Experimentation Tax Credit).

In order to target expenditures that are more likely to generate positive externalities and to reduce the cost of the policy, the benefit applies only to Qualified Research Expenditures (QRE), which are typically wages to employees for qualified services, supplies used in the R&D process, and contract research expenses for third parties performing qualified research.

In the Tax Cuts and Jobs Act of 2017, the US adopted several policies also to make itself a more attractive location for intellectual property. First, in line with the global trend, the US reduced its corporation tax to 21%, to be more competitive with other countries' tax rates. Additionally, it

[41] From the European Parliament Research Service, "The role of tax incentives in corporate taxation" , available at: <https://www.europarl.europa.eu/RegData/etudes/ATAG/2022/733578/EPRS_ATA(2022)733578_EN.pdf> accessed 28 February 2023.

introduced a new tax on foreign income, the Global Intangible Low-Tax Income (GILTI), ensuring that companies pay a 10.5 to 13.125% rate on income from overseas. This was adopted to assure a minimum level of taxation on IP moved outside of the US in an attempt of searching for better tax treatments. As a counterbalance to GILTI, the reform reduced the tax rate on Foreign Derived Intangible Income (FDII) to 13.125%.

GITLI and FDII are quite similar measures. GILTI uses a formulary approach to tax non-US earnings above a 10% return on assets, even when those earnings are not derived from intangibles. The assumption is that the "supernormal" returns are associated with IP or other intangibles. FDII provides a tax reduction on the income produced outside of the US, deriving from the use of US-based intangibles. It provides a special lower tax rate of 13.125%.

The FDII had been put under review by the Inclusive Framework in 2018. However, the United States has confirmed to the OECD its intention to abolish the FDII regime, which has therefore been classified as "in the process of being eliminated".

Table 3. OECD classification of IP Tax Regimes – United States[42]

Regime Name	IP Qualifying Assets	Peer Review Status	Tax Rate Under Regime	Tax rate that would otherwise apply
Foreign derived intangible income (FDII)	Assets not restricted to three allowed asset categories	Under review/ in the process of being eliminated	13.13%	21.00%

4.2. EU measures

The European Union encourages countries to invest in R&D and adopt innovation-oriented tax measures, despite understanding the potentially problematic consequences of incentives that are not well-designed on the internal market. Indeed, it is trying to coordinate the use of tax incentives in its

[42] OECD website, <https://qdd.oecd.org/data/IP_Regimes> accessed 12 February 2023.

current direct taxation-related proposals, such as the Debt-equity bias reduction allowance (DEBRA) or the Business in Europe: Framework for Income Taxation (BEFIT).

The EU often reminds Member States of its objective to increase R&D investments, in order to promote "resilience, prosperity, competitiveness, and economic and social well-being", as stated, for instance, in the document "Europe's strategy for international cooperation in a changing world".[43]

The majority of EU countries has a form of R&D tax incentives. As presented in an analysis conducted by the European Commission, in 2017 only 4 Member States did not have an R&D tax incentive whatsoever[44]. However, the shape of tax incentives varies from country to country. EU member states tend to adopt tax credits, enhanced allowances, accelerated depreciation, and targeted expense-based incentives.

As per the IP Box regimes, by 2016 12 EU Member States had introduced an IP Box in their jurisdiction. When introduced, they had some similarities in the way they worked, but also many divergences in their scopes and tax rates. After the publication of the OECD Action 5, which suggested some restrictions in the qualifying assets that IP Boxes had to allow, the EU witnessed some sort of harmonization, at least in the scope of its IP Boxes. For instance, the possibility of applying the tax reduction on trademarks was removed by all Member States. After the modifications, these regimes were analyzed by the OECD Inclusive Framework to check their level of harmfulness, as shown in table 4.

[43] Communication from the Commission to the European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions on the Global Approach to Research and Innovation COM(2021) 252 final.
[44] European Commission. Directorate General for Research and Innovation., *R&D Tax Incentives: How to Make Them Most Effective?* (Publications Office 2017) <https://data.europa.eu/doi/10.2777/976217> accessed 5 April 2023.

Table 4. OECD classification of IP Tax Regimes – European Union[45]

Country	Regime Name	IP Qualifying Assets	Peer Review Status	Tax Rate Under Regime	Tax rate that would otherwise apply
Belgium	Patent income deduction	Patents, Software[46]	Not harmful (amended)	3.76%	25.00%
France	Reduced rate for long-term capital gains and profits from the licensing of IP rights	Patents, Action 5 Categories[47]	Not harmful (amended)	10.00%	25.83%
Hungary	IP regime for royalties and capital gains	Patents, Software[48]	Not harmful (amended)	0.00% in case of capital gains of reported Qualifying IP 4.50% in case of the benefits related to royalty income.	9.00%
Ireland	Knowledge development box	Patents, Action 5 Categories[49]	Not harmful	6.25%	12.50%
Italy	Taxation of income from intangible assets	Patents, Software[50]	Abolished	12.00% + 1.95% IRAP	24.00% + 3.90%IRAP
Luxembourg	IP regime	Patents, Software[51]	Not harmful	4.988%	24.94%

[45] OECD website, <https://qdd.oecd.org/data/IP_Regimes> accessed 12 February 2023. The following footnotes, which refer to the table, are taken from the OECD website.
[46] Qualifying assets refers to patents and supplementary protection certificates. Copyrighted computers programs (software). Plant variety rights. Orphan drugs.
[47] Qualifying assets refers to patent, patentable inventions or improvements thereto provided they are capitalized as a fixed asset. Industrial manufacturing processes may also qualify provided they are necessary accessories to the use of eligible patents and patentable inventions.
[48] Qualifying assets refers to patents and supplementary protection certificates, copyrighted computers programs (software), plant variety rights, orphan drugs.
[49] Qualifying assets refers to computer programs, qualifying patents, plant breeders' rights and supplementary certificates e.g. under Council Regulation (EC) No. 469/2009, which are the result of R&D, may qualify for relief. Qualifying patents means: any patent granted following a substantive examination for inventive step; any patent granted prior to 1 January 2016; and a patent granted between 1 Jan 2016 and 1 Jan 2017 without a full examination which is certified by a patent agent as having met the patentability criteria. Short term patents, petty patents and utility models are excluded. Marketing and brand-related IP are excluded. In order to qualify for the KDB under the third category of IP, the IP asset must be certified as patentable, meaning it meets the patentability criteria and is not yet part of the prior art at a given date, but has not been patented.
[50] Software protected by copyright, industrial patents, trademarks, designs and models, as well as processes, formulas and information relating to experience acquired in the industrial, commercial or scientific field, capable of legal protection.
[51] Qualifying assets refers to patents, utility models, supplementary protection certificates, prorogations of supplementary protection certificates, plant breeders' rights, orphan drug designations and copyrighted software.

Netherlands	Innovation box	Patents, Software, Action 5 Categories[52]	Not harmful (amended)	7.00%	20.00%-25.00%
Portugal	Partial exemption for income from patents and other industrial property rights	Patents[53]	Not harmful (amended)	10.50%	21.00%
Slovak Republic	Patent-box	Patents, Software[54]	Not harmful	10.50%	21.00%
Spain	Partial exemption for income from certain intangible assets (Federal regime)	Patents, Software[55]	Not harmful (amended)	10.00%	25.00%
Greece	Tax patent incentives	Patents	Not harmful (amended)	10.00%	22.00%
Malta	Patent box deduction rules	Patents, Action 5 Categories	Not harmful	0.00%	35.00%
Poland	IP Box	Patents, Software	Not harmful	5.00%	19.00%

[52] Qualifying assets refers to SME's certain IP derived from R&D activities for which an R&D declaration has been issued; and to non-SME's certain IP derived from R&D activities for which an R&D declaration has been issued and: 1. Patents and breeders rights 2. Applications for patents and breeders' rights 3. Software (The term software, in Dutch "programmatuur", means software as it is understood in spoken language within the social standards. The demanded innovative element of software is ensured by the aforementioned R&D declaration which is obliged to have for every taxpayer opting for the regime of the innovation box) 4. Market authorisation of a medical product 5. Extensions of patent protection 6. Utility models 7. Exclusive licence to exploit IP connected to items 1-6 8. IP connected to items 1-7, which is meant to qualify IP assets which are so closely connected to each other that it would require an unrealistically detailed level of administration by the taxpayer that the taxpayer would be engaged in a complex track-and-trace-system to monitor the costs related to the IP. IP can therefore qualify for the innovation box if they are closely related to IP mentioned in 1-7. Third Category: IP derived from R&D activities for which a so-called R&D declaration has been issued. The issuance of a R&D-declaration is done by an organization (RVO.nl) which is a part of the central government (part of the Ministry of Economic affairs). These are technological-scientific research and research to the development of new (parts of) physical products, physical processes or new technical software. The taxpayer is obliged to describe the R&D-activities that will be done. RVO.nl checks this and will judge this on its content. The judgement is done by professional, technical experts with technical knowledge and background.

[53] Only patents and industrial designs or models (utility models) subject to registration on National Institute of Industrial Property (INPI) can qualify for the regime. The industrial property rights must be granted (patented) prior to the use of the benefits under the Portuguese IP Regime. Marketing and brand related IP are excluded.

[54] Qualifying IP assets are: patents or utility models, and copyrighted software. Assets that are in process of patent/utility model application can benefit from the regime. If application is eventually rejected, the taxpayer is obliged to submit an additional tax declaration and to pay back provided benefits and relevant sanctions.

[55] Spain's partial exemption for income from certain intangible assets was inconsistent with the nexus approach for IP assets acquired from related parties for the period from 1 January 2017 to 31 December 2017 and for new taxpayers entering the regime in the period from 1 July 2016 to 31 December 2017. Qualifying assets refers to IP assets that generate income derived from the transfer or the assignment of the right to use of any patent, design or model, plan, secret formula or process or from the assignment of information concerning industrial, commercial or scientific experience. In no case shall be eligible for reduction income arising from the assignment of a right to use, of from the transfer of, trademarks, literary, artistic or scientific works including cinematographic films, or from individual rights that might be assigned such as image rights, from software, industrial, commercial or scientific equipment or derived from any other right or asset different from those mentioned in the previous paragraph.

4.3. Tax policy considerations

Despite the similar objectives, there is a substantial difference between the approaches of the US and the EU, which is deeply linked to the structural divergences between these two blocs. This is reflected in particular in their approach to the internal and external competition when it comes to tax law. Indeed, the US deals with its corporation tax at the federal level, and therefore tends to have problems with internal corporate tax competition at a minor level, especially if compared to the EU. Member States of the EU, on the other hand, retain their full autonomy on their corporate taxation decisions, despite having some forms of coordination and harmonization. Therefore, they can fully compete to attract international investments, and this creates very idiosyncratic dynamics.

4.3.1. US approach to tax competition

In international tax policy, the US has been a trendsetter on many occasions[56], including the exchange of information, through the Foreign Account Tax Compliance Act (FATCA), and, to some extent, the minimum tax, with GILTI. These policies were quite peculiar, as they were unilaterally imposed on the rest of the world, without resorting to multilateral treaties or international forums.

It must be noted that on these occasions, the US tax decisions were often triggered by the idea that US-headquartered multinational groups were not paying enough taxes in the US because of international profit shifting. Indeed, the US approach to intangibles-based tax incentives has been a form of reaction to the IP Boxes that were adopted overseas. The reduction of corporate taxation, together with the introduction of FDII and GILTI, seem to have been adopted as a defensive form of tax competition not to lose intangible assets. In a broader context, in 2020 the US also adopted some trade tariffs in response to the digital services taxes imposed by some EU countries, in particular Austria, France, Italy and Spain, but also the United Kingdom. This was justified by the fact that the digital service taxes were

[56] Rosanne Altshuler and Timothy J Goodspeed, 'Follow the Leader? Evidence on European and US Tax Competition' (2015) 43 Public Finance Review 485.

targeting mainly the US multinational technological giants, such as Google, Facebook, Apple and Amazon. Similar reactions were triggered by the EU state aid investigations on these companies.

However, at the same time, when it comes to technology and incentives, the US has quite a large level of cooperation in place with the EU. In 2020, the new EU-US agenda for global change[57] stated that the EU-US relationship "is unique and built on shared history, shared values and shared interests". The document also refers to coordination and coherence between the research investments of the EU and the US. In the context of the technological agenda, after mentioning several projects involving artificial intelligence, cybersecurity, online platforms and digital supply chain cooperation, the agenda mentions the objective of establishing fair taxation in the digital economy through innovative solutions on both sides of the Atlantic, and to strengthen trade connections and address the challenges caused by protectionism and unilateralism.

4.3.2. EU inward competition and coordination

As anticipated, in a different way from the US, the EU has primarily a problem concerning its tax competition within the internal market.

When IP Boxes obtained their popularity at an international level, they became particularly common in the European Union. They had been adopted by the Member States with the objective of incentivising technological innovation, and therefore public welfare. Nevertheless, the adoption of such regimes generated vicious fiscal dynamics, through the attraction of investments at the expense of other national economies. Particularly, criticisms were made about the profit shifting toward countries adopting favoured taxation on intangibles, often creating an exaggerated reduction or even an absolute lack of taxation on the income generated by such goods. On the occasion of the G20 of July 2013, the German Minister of Finance Wolfgang Schäuble expressed himself on this point, defining IP Boxes "*against the European spirit*" and advocating for their prohibition.

[57] Joint Communication to The European Parliament, The European Council And The Council, A new EU-US agenda for global change, JOIN(2020) 22 final.

This "beggar-thy-neighbour" kind of problem was particularly felt within the European Union, because of the rules on the European Single Market. Indeed, the fundamental freedoms can often limit the possibilities of Member States to adopt restricting countermeasures to these kinds of dynamics. In a way, they counterbalance the national sovereignty over direct taxation that Member States retain under the subsidiarity principle of the European Union, which allows them to adopt any kind of measure in direct taxation and apply any kind of tax rate.

In this context, IP Boxes were also adopted as defensive items, to protect Member States' economies. In fact, even Germany, the leading opponent in the debate on IP Boxes, considered adopting one.[58] They constituted quite an aggressive piece of tax policy, as they were trying to attract completely immovable property, which is quite easily transferrable for tax purposes. Indeed, before the OECD guidelines contained in Action 5, proposed as a compromise between Germany and the United Kingdom, there was a freefall of effective tax rates on intangible assets caused by IP Boxes, which probably led the European Commission to start investigations about the possibility of IP Boxes to represent unlawful State aid, namely the infringement of articles 107, 108, and 109 of the Treaty of Functioning of the European Union ("TFEU").[59] The reasoning of the Commission was based on the possibility of having a *de facto* material selectivity considering the distribution of the benefit *a fortiori*, verifying whether a specific characteristic, which had not been considered in the legislative intent, recurred between favoured undertakings.[60]

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[58] The German newspapers reported that the Minister of Finance Schäuble declared that taking a step back on IP Boxes would have been impossible, so Germany had to "fight the other States with their own weapons: creating a German IP Box". The scope would have been to prevent German companies from transferring their patents to foreign countries for fiscal reasons.

[59] See, for instance, Joris Luts, 'Compatibility of IP Box Regimes with EU State Aid Rules and Code of Conduct' (2014) 23 EC Tax Review 258; Chu Shi, 'IP Boxes in Light of the BEPS Project and EU Law – Part II' 56 European Taxation 371; Fabian Mang, 'The (In)Compatibility of IP Box Regimes with EU Law, the Code of Conduct and the BEPS Initiatives' 55 European Taxation 78; Ivan Zammit, 'Centralized Intellectual Property Business Model – Tax Implications of EU Patent Box Regimes' [2015] Bulletin for International Taxation 540.

[60] A previous case of selectivity analysis has been conducted by the European Commission on the Spanish IP Box, which is reported in the document C(2008)467 of 13 February 2008. This was an *ex ante* evaluation in order to comprehend the compatibility of the introduction of the Spanish IP Box with the State aid legislation. The Commission analysed the undertakings that asked to take advantage of the measure, focusing in particular on sectors and dimensions. Nonetheless, an *ex post* analysis has not been conducted, nor a verification of effective increase in R&D activities in Spain, which might be relevant according the following considerations.

In its BEPS Action 5 report, the OECD imposes some conditions on IP Box regimes to avoid harmful tax practices related to their usage, in an attempt to align their theoretical objectives and their actual effects.[61] Besides reducing the kinds of intangible assets that can benefit from the tax reduction to the ones that clearly require R&D activities,[62] Action 5 affects the way of calculating such reductions, introducing the obligation to adopt a specific nexus for the countries who intend to maintain their IP Boxes.[63] This nexus is based on the recognition of the company that conducts the activities of R&D, which must be either the same that asks for the tax benefit or a company that does not belong to the group. The reason is that companies normally prefer not to externalise their most important processes of R&D, so they will tend to transfer R&D activities to the country that adopts the IP Box.[64]

The OECD Action 5 only has the power of soft law, but it has been reinforced by the clarifications issued by the European Council, represented by the Code of Conduct Group on Business Taxation. Indeed, the Group underlined that the third principle of the code of conduct for business taxation, concerning the presence of the economic substance in every fiscal policy introduced by the Member States, in the case of IP Boxes coincides with the adoption of the nexus described by the OECD Action 5. Although the code of conduct is still an instrument of soft law, almost all Member States adopting an

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[61] OECD, *Countering Harmful Tax Practices More Effectively, Taking into Account Transparency and Substance, Action 5 - 2015 Final Report* (OECD 2015)..

[62] The major exclusion in the objective scope of IP Boxes has been the one of the brands and the other marketing intangibles in general. Brands have been a controverted topic, because although they are quite relevant among the intangible assets that a firm can hold, they are not generated by any R&D activity, and they do not contribute to any innovation. Brands were a central value driver of IP Boxes adopted by Cyprus, Italy, Luxembourg, Malta, and Hungary, before the recent changes. Italy has removed brands from its IP Box only in April 2017.

[63] Concerning the way of calculating the tax benefit, the OECD considers the "modified nexus" as equivalent to the traditional one. The modified nexus is generally more generous with the deduction but requires more restrictive conditions. See OECD (n 31). Nonetheless, to the scope of the economic analysis, there is no need to differentiate between the two, because they are applied in the same way. For further information on the modified nexus, see Peter Merrill, 'Innovation Boxes: BEPS and Beyond' (2016) 69 National Tax Journal 847..

[64] The nexus chosen by the OECD is a suboptimal solution, because it still creates some distortions. An optimal nexus would have been the geographical nexus, which allows tax deductions only for R&D activities undertaken *in loco*, in the jurisdiction that adopts the measure. Nevertheless, a geographical nexus was not conceivable in the context of the European Union, because it would have violated the freedom of establishment and the freedom to provide services, respectively contained in articles 49 and 56 of the TFEU. In such a context, the solution adopted was considered the best solution, because it did not incentivise base erosion and profit shifting. For a deeper analysis, see Lilian V Faulhaber, 'The Luxembourg Effect: Patent Boxes and the Limits of International Cooperation' [2017] Minnesota Law Review.

IP Box chose to comply with it, changing their legislation between the second half of 2016 and the first half of 2017.[65]

Member States might have perceived the danger of infringing State aid rules in case they did not adopt such a modification, especially after the Directorate General for Competition of the European Commission started investigating the undertakings that had access to the Luxembourg IP Box.[66] Therefore, the EU obtained a sort of harmonization of the IP Box regimes, in an effort to reduce the problems related to its internal tax competition.

4.3.3. EU outward competition

Due to the specific characteristics of the internal market, the EU tends to act as a coalition towards third countries. This is due to the harmonization process, that comes both from the Directives on taxation of the EU (so-called positive harmonization), and the modifications required by the Court of Justice of the European Union in cases concerning the infringement of the fundamental freedoms and other EU rules (negative harmonization).

In its outward competition, the EU tends to act on two levels. First, the EU attracts investments as a bloc, meaning that once a company is established in a Member State, thanks to the internal market it can operate in all the other EU countries as if it was a resident of those other Member States. Second, each Member State has its own policies, which can be more or less attractive to third-country investments.

At the same time, in order to protect the internal market of the European Union from distortions created by subsidies provided by third countries, the EU has adopted a new regulation called the EU Foreign

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[65] During this period, all the Member States adopting an IP Box that was not compliant with the OECD Action 5 chose either to change it or to suppress it. The only exception was constituted by France, whose IP Box did not transpose any nexus. However, France defended itself in the Council discussions stating that its IP Box did not have a sufficiently low tax rate to attract foreign investments, but it only helped local undertakings. For a deep analysis on the situation before the changes, see Evers, Miller and Spengel (n 30).

[66] On the 24th of March 2014, the Commission formally requested information on the Luxembourg IP Box to verify its compatibility with State aid legislation. Specifically, it demanded details on the largest 100 undertakings benefiting from it. However, Luxembourg refused to disclose such information. For procedural reasons, the legal proceeding was won by Luxembourg, as explained in the Case T-259/14 *Luxembourg v Commission* [2014]. By the end of the same year, Luxembourg decided to disclose the information anyway, despite the decision of the Court, but no further formal analyses were undertaken by the Commission.

Subsidies Regulation[67] ("FSR"), which entered into force on 12 January 2023. The Regulation covers any form of contributions, direct or indirect, offered by non-EU governments to companies that operate in the EU market, including tax exemptions and reductions, state-funded R&D and other forms of intellectual property subsidization. This means that innovation-oriented incentives granted by third countries might fall within the scope of this EU Regulation and be scrutinized by the European Commission, which oversees infringements in such cases. This measure constitutes a paramount change in the EU approach to competition, which will be shaped according to how the Commission is going to use it, on a case-by-case basis, as there is probably going to be a delicate equilibrium with trade legislation and possible countervailing measures.

5. Conclusion

This paper analyzed the tax incentives related to innovation and their interaction with the intellectual property rights system. It provided a comparative analysis between the approaches taken by the US and the EU in this direction.

The first part of the paper presented the most common features of IP rights, questioning their relationship with innovation. Indeed, patents and copyrights do not necessarily imply innovation or positive externalities, whereas some forms of innovation might not be necessarily patentable. At the same time, trademarks need further analysis of their effects on innovation-oriented investments and R&D.

When the tax system intervenes in innovation with tax incentives, some policy recommendations are necessary, especially when it comes to targeting the right underlying factors. In this context, unpacking the elements that are generally associated with innovation can be a good approach. The analysis of tax incentives, based on an expenses- vs revenue-centered categorization of the most common innovation-

[67] Regulation (EU) 2022/2560 of the European Parliament and of the Council of 14 December 2022 on foreign subsidies distorting the internal market.

related policies, seems to suggest that expenses-centered tax incentives, such as R&D tax credits, might be a better complement to IP rights. However, further analyses of the economic consequences of both R&D tax incentives and IP Boxes could help formulate a more precise policy examination, which might lead to more precise considerations on what to do in terms of policy design.

In the context of the US and the EU approaches to innovation-oriented tax incentives, the paper presented some of the structural differences between the two blocs. The adoption of GILTI and FDII by the US has acted as a sort of defensive measure to the IP Boxes adopted at the EU level, which were, by the way, softened by the coordinated transposition of Action 5, possibly triggered by the EU state aid investigations. However, several competition-oriented trade and tax measures are still in place between the two blocs, while new agreements get signed, such as the global minimum tax. In this context, a strong transatlantic tension between tax cooperation and competition can be highlighted in the measures adopted by both the EU and the US.

References

Alstadsæter A and others, 'Patent Boxes Design, Patents Location, and Local R&D' (2018) 33 Economic Policy 131

Altshuler R and Goodspeed TJ, 'Follow the Leader? Evidence on European and US Tax Competition' (2015) 43 Public Finance Review 485

Anderman SD and Kallaugher J, *Technology Transfer and the New EU Competition Rules: Intellectual Property Licensing after Modernisation* (Oxford University Press 2006)

Arginelli P, 'Innovation through R&D Tax Incentives: Some Ideas for a Fair and Transparent Tax Policy' (2015) 2 World Tax Journal 3

Arrow KJ, 'Economic Welfare and the Allocation of Resources for Invention', *The Rate and Direction of Inventive Activity: Economic and Social Factors* (Universities-National Bureau Committee for Economic Research, Committee on Economic Growth of the Social Science Research Council, Princeton University Press 1962)

Bloom N, Griffith R and Van Reenen J, 'Do R&D Tax Credits Work? Evidence from a Panel of Countries 1979–1997' (2002) 85 Journal of Public Economics 1

Boldrin M and Levine D, 'The Case Against Intellectual Property' (2002) 92 American Economic Review 209

Boldrin M and Levine DK, *Against Intellectual Monopoly* (Cambridge University Press 2008)

Bornemann T, Laplante SK and Osswald B, 'The Effect of Intellectual Property Boxes on Innovative Activity & Effective Tax Rates' [2018] SSRN Electronic Journal <https://www.ssrn.com/abstract=3115977> accessed 5 April 2023

Buchanan JM and Musgrave RA, *Public Finance and Public Choice: Two Contrasting Visions of the State* (The MIT Press 1999) <https://direct.mit.edu/books/book/2423/public-finance-and-public-choicetwo-contrasting> accessed 5 April 2023

Chari VV, Golosov M and Tsyvinski A, 'Prizes and Patents: Using Market Signals to Provide Incentives for Innovations' (2012) 147 Journal of Economic Theory 781

Chen S and others, 'The Effect of Innovation Box Regimes on Income Shifting and Real Activity' [2019] SSRN Electronic Journal <https://www.ssrn.com/abstract=3486428> accessed 5 April 2023

Dagan T, *International Tax Policy Between Competition and Cooperation* (Cambridge University Press 2018)

Devereux MP and Loretz S, 'What Do We Know About Corporate Tax Competition?' (2013) 66 National Tax Journal 745

European Commission. Directorate General for Research and Innovation., *R&D Tax Incentives: How to Make Them Most Effective?* (Publications Office 2017) <https://data.europa.eu/doi/10.2777/976217> accessed 5 April 2023

Evers L, Miller H and Spengel C, 'Intellectual Property Box Regimes: Effective Tax Rates and Tax Policy Considerations' (2015) 22 International Tax and Public Finance 502

Faulhaber LV, 'The Luxembourg Effect: Patent Boxes and the Limits of International Cooperation' [2017] Minnesota Law Review

Gangjee D, 'Trade Marks and Innovation?', *Research Handbook on Trademark Law Reform* (Graeme B Dinwoodie, Mark D Janis, Edward Elgar 2021)

Garbarino C, 'Tax Transplants and Circulation of Corporate Tax Models' (2011) 2 British Tax Review 159

Griffith R, Miller H and O'Connell M, 'Ownership of Intellectual Property and Corporate Taxation' (2014) 112 Journal of Public Economics 12

Guceri I and Liu L, 'Effectiveness of Fiscal Incentives for R&D: Quasi-Experimental Evidence' (2019) 11 American Economic Journal: Economic Policy 266

Hall B, 'Tax Policy for Innovation' (National Bureau of Economic Research 2019) w25773 <http://www.nber.org/papers/w25773.pdf> accessed 5 April 2023

Hansson Å and Brokelind C, 'Tax Incentives, Tax Expenditures Theories in R&D: The Case of Sweden'

James S, 'Tax and Non-Tax Incentives and Investments: Evidence and Policy Implications' [2014] World Bank

Jones CI and Williams JC, 'Measuring the Social Return to R & D' (1998) 113 The Quarterly Journal of Economics 1119

Korah V, *Intellectual Property Rights and the EC Competition Rules* (Hart Pub 2006)

Kremer M, 'Patent Buyouts: A Mechanism for Encouraging Innovation' (1998) 113 The Quarterly Journal of Economics 1137

Lokshin B and Mohnen P, 'Do R&D Tax Incentives Lead to Higher Wages for R&D Workers? Evidence from The Netherlands' (2013) 42 Research Policy 823

Luts J, 'Compatibility of IP Box Regimes with EU State Aid Rules and Code of Conduct' (2014) 23 EC Tax Review 258

Mang F, 'The (In)Compatibility of IP Box Regimes with EU Law, the Code of Conduct and the BEPS Initiatives' 55 European Taxation 78

Mazzoleni R and Nelson RR, 'The Benefits and Costs of Strong Patent Protection: A Contribution to the Current Debate' (1998) 27 Research Policy 273

Mazzucato M, *The Entrepreneurial State* (Demos 2011)

Merrill P, 'Innovation Boxes: BEPS and Beyond' (2016) 69 National Tax Journal 847

Mirrlees JA, Adam S and Institute for Fiscal Studies (eds), *Tax by Design: The Mirrlees Review* (Oxford University Press 2011)

Mirrlees JA and Institute for Fiscal Studies (eds), *Dimensions of Tax Design: The Mirrlees Review* (Oxford University Press 2010)

Nussim J and Sorek A, 'Theorizing Tax Incentives for Innovation' (2017) 36 Virginia Tax Review 25

OECD, *Action 5: Agreement on Modified Nexus Approach for IP Regimes* (OECD 2015)

OECD, *Countering Harmful Tax Practices More Effectively, Taking into Account Transparency and Substance, Action 5 - 2015 Final Report* (OECD 2015)

Roin BN, 'Intellectual Property versus Prizes: Reframing the Debate' (2014) 81 University of Chicago Law Review 999

Shi C, 'IP Boxes in Light of the BEPS Project and EU Law – Part II' 56 European Taxation 371

Sinnreich A, *The Essential Guide to Intellectual Property* (Yale University Press 2019)

Slemrod J (ed), *Tax Policy in the Real World* (1st edn, Cambridge University Press 1999) <https://www.cambridge.org/core/product/identifier/9780511625909/type/book> accessed 5 April 2023

Stiglitz JE, 'Economic Foundations of Intellectual Property Rights' (2008) 57 DUKE LAW JOURNAL 1693

United Nations, *Design and Assessment of Tax Incentives in Developing Countries: Selected Issues and a Country Experience* (United Nations 2018)

Wright BD, 'The Economics of Invention Incentives: Patents, Prizes, and Research Contracts' (1983) 73 The American Economic Review 691

Zammit I, 'Centralized Intellectual Property Business Model – Tax Implications of EU Patent Box Regimes' [2015] Bulletin for International Taxation 540

Zolt EM, 'Tax Incentives and Tax Base Protection Issues' [2014] United Nations