

Patents, public agency, and prices: the Case of Covid-19 Vaccines

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Abstract

Regarding problems such as the development of Covid-19 vaccines, strengthening of (quasi-)public agencies such as CEPI is crucially important for making pertinent “public-private-partnerships” (the funding of R&D consortia including private firms) more effective. Foundational considerations regarding the role of price- and patent systems motivate the conclusion that (semi-)public institutions must not operate on the presumption that they always have to go for the cheapest, leanest, and most flexible strategies: costly capability build-up may be required, and it may be better to keep more downstream rights of publicly funded developments and increase the funds granted for those developments (if needed for making them viable). Even if short run effects on affordability of current arrangements à la CEPI were satisfactory, issues of strategic behavior and market power should be subject to debate, as a more comprehensive approach to the role of public institutions may be justified.

Keywords: Patents, public goods, essential medicines, Covid-19, bottlenecks.

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1. Introduction

It belongs to the folk wisdoms of our time (well explained in economics textbooks and taken for granted in newspaper articles and blogs) that the free market price mechanism is justified as a superior mechanism for the allocation of goods and services, in particular in the modern world with its diverse, multifarious and changing needs and wants. This folk wisdom (under some fairly plausible conditions) is vindicated by economic argumentation applying to a large array of goods and services. According to John Stuart Mill (1848. V.xi) this argumentation is a sufficient justification to allocate the onus of argument in a specific way: “*Laissez-faire* ... should be the general practice: every departure from it, unless required by some great good, is a certain evil”. However, Mill motivates a substantial number of “exceptions” to “the practical maxim, that the business of society can be best performed by private and voluntary agency”.

In this paper I argue that free market price solutions for essential medical goods such as a Covid 19-vaccine are ambiguous. In both of their main institutional variants they can be defended only under premises sufficiently extravagant to question Mill’s asymmetric allocation of the onus of argument. Hence such cases are not merely empirically contingent exceptions to Mill’s general rule where some role for the government may be justified, but cases where the expediency of development and provision mechanisms should in principle be discussed in absence of any asymmetric onus of argument. This has implications for the coordinates of the general public discourse, but also for the design principles relevant for the public-private partnerships which factually have an important function in such processes. Concomitant mental models also may affect the bargaining position between various stakeholders in those partnerships.

Reasonable, non-extravagant normative defenses of the patent-based price mechanism in the case of such medical goods will depend on various assumption about the distributional and informational setting, which in practice can hardly be met in absence of the implementation of fairly far-reaching (and probably quite complex) complementary public policies.

Here are the basic theoretical rationales of the argument: the quasi-axiomatic robust justification of the price mechanism (implicitly assumed by Mill) may fail due to a combination of various aspects, including the plausibility of perceptions according to which the demand for the good in question is driven (a) either by some “objective” needs (the satisfaction of which is subject to some egalitarian or sufficitarian normative reasoning) rather than purely subjective preferences (cf. Weitzman 2007) or (b) by some credible

scientific (e.g. epidemiological) criteria of prioritization (cf. Sturn 2008) or (c) is confronted with (temporarily) inelastic supply giving rise to phenomena of shortage/bottlenecks regarding vitally important goods (cf. Sturn 2016).

To be sure, pertinent problems of purely price-mediated arrangements *are* reflected in various kinds of public policies (regulations, subsidies, coordination schemes) worldwide supplementing or interfering with the operation of the market. The scope of relevant complementary policies (whether justifiable in a normative sense or explainable as opportune in the sense of narrower goals) includes elements of *public finance as well as forms of governance and regulation beyond* creating and enforcing private property rights. However, design of such policies would benefit for approaching the problem at a more foundational level. For instance, questions like the following could be addressed: is there a link between strong patent protection and a specifically activist profile of nation states? To which extent may prices and state-sponsored schemes be considered as complementary bases of rationing?

All in all, what follows is motivated by the search for guiding principles for institutional reform. The arguments presented here are well compatible with acknowledging the potential role of the patent system in providing incentives for creating and disclosing knowledge in a private-property entrepreneurial economy. Moreover, they are compatible with (but do not presuppose) the hypothesis that some of the advantages of the patent system are particularly strong in the *pharmaceutical and biotech industries* and some of its potential shortcomings carry particularly little weight in the pharmaceutical industry (cf. e.g. FTC 2003).

The remainder of this essay is organized as follows. In section 2, I sketch the contours of the problems and introduce three scenarios summarizing key features of alternative arrangements which provide institutional support for innovation processes and the exchange and use of knowledge-based goods (KBG). Section 3 discusses the foundations and the factual relevance of the scenarios from the viewpoint of economics. Section 4 concludes by deriving some lessons for the framing of public-private-partnership-programs aiming at the development and affordability of vaccines and other essential medicals goods.

2. Development of Medical products as Knowledge-based Goods: Three Scenarios

Before introducing the scenarios which will organize our subsequent discussion, here is a sketch of three general properties of the problem.

1. *Deadweight loss of monopoly prices.* Boldrin & Levine (2004, ch. 4) aptly summarize a long-standing key aspect of the problem which applies in the case of COVID-19 as well, even though specific epidemiological aspects may gain in importance which are less relevant in the case of AIDS drugs: “Although the current tendency is to argue that the traditional welfare cost of monopoly overpricing and underproducing is not great, in the case of innovation this is clearly not true. The example of AIDS drugs both illustrates the theory and the potential for welfare loss. AIDS drugs are relatively inexpensive to produce. They are sufficiently inexpensive to produce, that the benefits to Africa in lives saved exceed the cost of producing drugs by orders of magnitude. But the large pharmaceutical companies charge such an enormous premium over the cost of producing drugs – to reap large profits from sales in Western countries – that African nations and individuals cannot afford them.” Recall that as willingness-to-pay not only depends on subjective preferences but also on the wealth distribution, price-based prioritization is in general problematic on utilitarian or welfaristic grounds. The problem may have an additional dimension if the underlying preferences are plausibly categorized as needs rather than as wants. Invoking ethical views beyond welfarism, many would argue that price-based rationing is may be problematic if pricing affects the availability of means which are not just satisfying some preferences in the sense of wants, but are required for vital functionings, needs, or rights (cf. Sturn 2008). It is in those cases where an insight modeled by Weitzman (2007) applies: “Other things being equal, the price system has greater comparative effectiveness in sorting out the deficit commodity and in getting it to those who need it most when wants are more widely dispersed or when the society is relatively egalitarian in its income distribution. Conversely, rationing is more effective as needs for the deficit commodity are more uniform or as there is greater income inequality.”
2. *Bottlenecks, vulnerabilities, priorities, and rationing.* In cases such as COVID-19, a second aspect becomes center stage: prioritization according to willingness-to-pay is particularly problematic, mainly due to a combination of various facts: (i) for a significant time, bottlenecks in the availability of the vaccine are anticipated; (ii) the epidemiological properties of the pandemic calls for specific prioritization according to differences between agents regarding the active role in further spreading the virus; (iii) the needs of more

vulnerable agents (and perhaps of currently more vulnerable collectives) should be given due attention. Over and above that, in the case of a COVID-19 vaccine additional considerations are relevant. As stressed by David Hume (see section 3), the advantages of a private-property-price mechanism as rationing device are strongest in case of “moderate scarcity”, whereas they are vanishing in cases of abundance. And they are at least questionable in cases of absolute shortage and bottlenecks. In the case under consideration a combination of shortage and the force of prioritization principles based on epidemiological aspects (Which types of agents are most likely to spread the virus?) renders rationing/prioritization by the prize mechanism a *prima facie* implausible scheme.

3. *Distortion in R&D.* There is now a fairly broad consensus that the development of essential medicines poses a serious ethical and economic problem on a global scale especially in cases of neglected diseases¹. COVID-19 certainly does not fall in that category. In cases of *neglected diseases* (neglect being caused by a heavily skewed incidence of these diseases) the low purchasing power of the poor implies low R&D efforts: neither the premise nor the consequence does apply to COVID-19. However, serious distortions regarding R&D efforts may occur due to poorly coordinated, speculation driven and hence wasteful efforts under the premise of whatever-it-takes.

For sake of organizing the discussion, I now introduce the three scenarios representing alternative institutional regimes for dealing with KBG in general. They put forward institutional alternatives in a stylized way in order to make transparent their factual and normative premises. *Scenario 1 (S1)* envisages a competitive market-libertarian solution as institutional framework for innovation and KBG. A significant strand of market libertarians reject the patent system for entailing *monopolistic* IPR. The claim: “Stronger patents always bring innovative activity closer to an optimum” is considered as false, and incentives to innovate generated by first mover advantages and temporary capacity constraint-induced rents as sufficient. *Non-monopolistic* IPR entailing the right to sell ideas are well compatible with S1. But all kinds of licensing or other forms of downstream control of knowledge are ruled out. Under S1, the functional role of the public sector (if there is any, as some protagonists of S1 are market anarchists) does not go beyond the classical libertarian case of an agency enforcing contracts and stability of possession. Along these lines, important liberal or market-libertarian economists *are sceptical about IPR*². Examples in case are Sir Arnold

¹ For a perceptive discussion of the economics underlying S1 see Boldrin and Levine (2002; 2004); cf. also Lessig (2004). For disagreements amongst libertarians concerning the desirability of IPR see Nozick (1974, 141).

² See Lerner (2002). It is frequently pointed out that this history is also a history of pendulum movements (with the most recent period being characterized a pendulum swing in the proprietary direction (cf. FTC 2003).

Plant (1934), Murray Rothbard (1962, 652-60), who made a sharp difference between copyright which he *endorses* and patents which he *rejects*, and Fritz Machlup (1958; 1962; Machlup/Penrose 1950) who suggests that a pragmatic case in favour of maintaining the patent system has to be based on the high costs of institutional change. **Scenario 2 (S2)** is the market-proprietary alternative to S1. S2 is based on the Schumpeterian idea that monopoly (whether supported by patents or by business secrets) must accompany innovation. Scholars endorsing S2 are optimistic concerning the question of whether a system based on monopolistic IPR can mediate the complex, far-reaching interdependencies underlying modern innovation systems. This optimistic stance is combined with the tendencies to *globalize* “strong” IPR-standards prevailing in some Western countries, and to stress the benefits of broad rather than narrow patent protection (Posner 2005, 69) and other lines of *strengthening IPR*, as endorsed by scholars such as Landes and Posner³. **Scenario 3 (S3)** entails a vision of the knowledge economy as essentially public. It holds that the increasing importance of KBG provides the economic basis for a widening the scope of the public economy. DeLong and Fromkin (1999) even suggest a “deconstruction of Adam Smith’s case for the market system”, invoking nonexcludability, non-rivalry and non-transparency as basic features of innovation dynamics and KBG. Under these premises, a market-proprietary system leads to artificial, inefficient and monopolistic exclusion which implies a winner-takes-all economy.

I take the three scenarios as an expository device for organizing the discussion. Sections 3 and 4 will show that a casuistic approach including some public-private-partnerships is plausible. However, a critical, problem-responsive discussion of the rules and provisions framing those partnerships (and their improvement) will benefit from abandoning Mill’s claim of an asymmetric onus of argument favoring market solution. Given the problems and ambiguities of market solutions becoming obvious when seeing together S1 and S2, it will become clear that there certainly is no more support for either S1 or S2 as institutional reference points of the discussion than for S3. This is fully consistent with acknowledging that the force of the various pros and cons is not the same all over the place, but depends on specific circumstances rendering the three possible drawbacks sketched at the beginning of

³ Landes and Posner (2002) recently made a case for indefinitely renewable copyright. Epstein (2004) makes explicit the factual and axiological premises driving such views. The axiological premises include “the ostensible parity between liberty and property” as “political values” at a constitutional level. Epstein acknowledges tensions which are couched in terms of tension between property and liberty, but his main point is that the *infringement of liberty* entailed by private property by way of limiting free access to valuable assets occurs in much the same way in the sphere of tangible private property and IPR. Epstein believes that one can deal with them by analogous fine-tuning.

the section more or less important. While an institutional one-size-fits-all approach is off the mark and the *policy has to play a dynamic and responsive* role as the profile of challenges may be changing over time, it is crucial to bring to the fore the public core of the underlying problem. More specifically, private market solutions anyway become untenable as a benchmark. The idea of strong private property rights including strong patent protection (as envisaged by S2) in combination with a minimal state appears incoherent, as strong patent protection requires a state with specifically strong capabilities, including the services of the patent office as well as policies dealing with the side effects of patent regimes. Alternatively, market anarchism (S1) may be coherently defended in theory. However, its normative implications and the empirical premises required for getting it off the ground as a plausible setting are questionable.

3. Bottlenecks, Public Good Properties, Sunk Costs: Market Allocation and the Price System beyond Moderate Scarcity

I start with an outline of some *basic conceptions of a pre-institutional economic features of a KBG whose introduction/dissemination is subject to a period of significant bottleneck phenomena*. I will sketch the structure and specificities of the problem, as a basis for answering the question: in which sense and under which conditions can free markets *can be thought of as part of the solution*. My argument has two main parts: the first refers to the bottleneck situation in the early phase of dissemination, while the second applies to the general circumstances of innovation, production and provision.

For both arguments, we need to be clear about the status of scarcity. Scarcity is the core concept employed by economics to capture the pre-institutional conditions characterizing economic interdependencies. Scarcity of a good is defined by the existence of alternative “rival” use-options of good which are valuable in terms of positive willingness-to-pay. Scarcity is equivalent to positive opportunity costs representing the value of the most highly valued foregone rival use-option. Economics is about incentives and co-ordination devices mediating the rival use of scarce resources.

However, that kind scarcity is not the only way the external world may set the conditions for human choices and interactions. Indeed, Hume (1777) deals at length with scarcity as a

circumstantial condition for justice as stability of possession and its foundational relevance for private property, contract, and market exchange. Hume's scarcity is characterized as an *intermediate degree* of availability of resources and goods at a social scale, which two centuries later is aptly summarized by the term "moderate scarcity" by John Rawls (1971, 127), who refers to Hume's reasoning in an analogous fashion. The content and significance of moderate scarcity is brought to the fore by comparing it both with states of shortage as well as with situations where choices are not linked to positive opportunity costs, which may be due either to general abundance or else to more specific non-rivalries. Regarding the problems under consideration, both of those circumstantial conditions beyond "moderate scarcity" may play a role.

Hume assumes that "moderate scarcity" is paradigmatically important and empirically relevant. Its importance is justified on *empirical*, not on *logical* grounds. Hume (1777, III.i. §§145 – 147) describes the alternative state of non-rival use and its implications (there are no choices implying trade-offs) as follows:

"Why give rise to property, where there cannot possibly be any injury? Why call this object mine, when upon the seizing of it by another, I need but stretch out my hand to possess myself to what is equally valuable? Justice, in that case, being totally useless, would be an idle ceremonial, and could never possibly have place in the catalogue of virtues. We see, even in the present necessitous condition of mankind, that, wherever any benefit is bestowed by nature in an unlimited abundance, we leave it always in common among the whole human race, and make no subdivisions of right and property. Water and air, though the most necessary of all objects, are not challenged as the property of individuals; nor can any man commit injustice by the most lavish use and enjoyment of these blessings. In fertile extensive countries, with few inhabitants, land is regarded on the same footing. And no topic is so much insisted on by those, who defend the liberty of the seas, as the unexhausted use of them in navigation. Were the advantages, procured by navigation, as inexhaustible, these reasoners had never had any adversaries to refute; nor had any claims ever been advanced of a separate, exclusive dominion over the ocean. It may happen, in some countries, at some periods, that there be established a property in water, none in land; if the latter be in greater abundance than can be used by the inhabitants, and the former be found, with difficulty, and in very small quantities" (1777, III.i. §§145 – 147).

Hume also describes the opposite case, where there are choices to be made, but those choices are “hard choices,” not choices implying marginal tradeoffs; hence prices may not be really useful in reaching a satisfactory decision: “To make this truth more evident, let us reverse the foregoing suppositions; and carrying everything to the opposite extreme, consider what would be the effect of these new situations. Suppose a society to fall into such want of all common necessaries, that the utmost frugality and industry cannot preserve the greater number from perishing, and the whole from extreme misery; ...?” Hume discusses all that in the context of socially advantageous institutional foundations of markets and price systems: the institutions of private property, voluntary transactions, contract and notion of “justice” as “stability of possession.” He mentions phenomena of shortage and abundance / non-rivalry as circumstances under which private property, voluntary exchange and prices will either make no sense or will cease to function in an acceptable way, as may be duly expected under conditions of moderate scarcity. Moderate scarcity can thus be regarded as a shorthand formula for the circumstantial conditions giving rise to the private-property market exchange game. However, when we are confronted with bottlenecks, shortages and related phenomena on the one hand, and with non-rivalry and non-appropriability on the other, we are confronted with different games, in which issues of coordination, equilibrium, (social)choice and power will pose different problems. The questionable status of price-based rationing in case of the provision of a presumptively developed COVID-19 vaccine is reflected by various currently observed arrangements, whereby nation states subsidize private pharmaceutical firms developing COVID-19 vaccines in exchange for privileged access in case of a predictable production/distribution bottleneck situation after successful development of a vaccine. While this preferential treatment hardly will be considered as a rationing mechanism which is defensible from some universalizable normative viewpoint (which will include needs-based considerations subject to epidemiological regularities), it illustrates the implausibility (already diagnosed by Hume) of purely price-based rationing in cases of bottlenecks regarding goods satisfying vitally important needs.

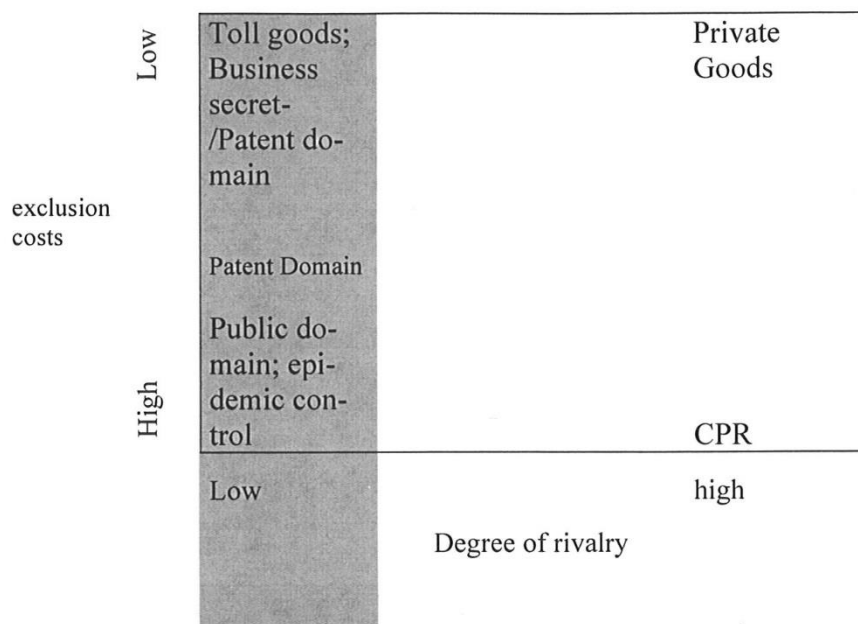
Regarding the development of new medical goods, circumstantial conditions modifying the role of scarcity are an issue at further levels: their development employs scarce resources in the usual sense, the costs of which are for the greater part sunk; the scientific-technological knowledge involved connotes some non-rivalry properties; the scarce resources needed for ongoing production and concomitant marginal costs are often relatively small; and in the phase of dissemination-distribution bottleneck phenomena may play a role.

To be sure, scarcity is one of the factors shaping the environmental conditions of innovative R&D: like all other activities, R&D typically requires scarce resources such as the disposable time of the inventors and innovators. However, the most salient characteristics of pertinent innovative processes seems to be located elsewhere. They are cumulative and path-dependent, depending on the products of earlier innovation processes as well as various types of knowledge acquired there (principles of composition, research tools, multipurpose-technologies, codes, languages, styles, and so forth). Consequently, the dichotomy brought to the fore by classical Political Economy between “*human ingenuity*” and *scarcity* (“*the limited generosity of nature*”) seems to play a role. Human ingenuity was seen as responsible for increasing returns in modern production using science-based technologies. The history of economics brought about two ways of dealing with this insight.

- (1) The *first* makes use of standard textbook-economics: ingenuity-driven increasing returns are contrasted against scarcity-driven decreasing returns. Technically, increasing returns are linked to indivisibilities and high fixed costs. There are two reference conditions responsible for creating “high” fixed costs: marginal production costs and the size of the market. Whether fixed costs are “high” in the relevant economic sense depends on the constellation ensuing when considering marginal costs and the resulting average cost curve: *high R&D-expenses (characteristic for KBG) combined with negligible marginal costs may generate conditions of a natural monopoly, with decreasing average costs over the whole range*. If marginal costs are non-negligible and increasing, a U-shaped average cost curve occurs. In those cases, the extent of the market becomes more relevant for assessing the economic effects, as the intersection of average costs and demand may either be located in the increasing or decreasing branch of the average cost curve, or else the market may be sufficiently big for more than one supplier. The ideal profile of public regulation will be different in those diverse cases. Without going into details, we may conclude that the larger the role of fixed costs, and the larger the extent to which these fixed costs are sunk (as it is likely to be the case with R&D), *the less likely it is that laissez-faire competition leads to satisfactory results and the greater becomes the potential for welfare gains by public regulation*. Laissez faire will lead to monopolistic distortions and to inefficient prices/quantities under these conditions.
- (2) The *second* paradigmatic way of making sense of *increasing returns* does not confine itself to applying the textbook case of high fixed costs to KBG, but stresses the role of KBG as products of and prerequisites for the ongoing dynamics of the modern division

of labour. The effects of human ingenuity cannot be fully captured by the static analysis of the implications of high fixed costs. They moreover are the source of *dynamically increasing returns, driven by cumulative and irreversible changes in technology*. This has fundamental implications regarding the institutional framework. Models which take on board the insight that the socioeconomic logic of R&D processes is not reducible to the logic imposed by the conditions of scarcity, will differ in a far-reaching manner from models with a basically scarcity-theoretic outlook. The logic of scarcity is the *foundational core of the economic arguments in favour of private property, contract, price system and perfect market competition*. These institutions can be understood to a large extent in terms of their capacity to mediate socio-economic interdependencies conditioned by scarcity and informational decentralisation. Insofar as innovative processes encompass interdependencies which are *beyond the scarcity-theoretic framework*, they are beyond the scope of institution-related arguments concerning private property. Put another way, private property is not in the same way a natural institutional premise for the analysis of market interaction in the knowledge economy as it is in economies based on excludable scarce assets.

In addition to dynamic considerations and fixed costs, public goods-properties are further non-scarcity aspects characterizing the circumstances of the provision of KBG. Pure public goods are defined by (i) non-rivalry and (ii) non-excludability. The different types of coordination problems can be represented in a diagram:



The shaded region of non-rivalry implies that Pareto efficient price $p^* = 0$. Some form of collective coordination is prima facie plausible.

Fig. 1: Taxonomy of goods

On this basis, a four-prong taxonomy of goods becomes available: pure private goods are both excludable and rival. *Pure public goods* are both non-rival in use and non-excludable (or characterized by prohibitively high exclusion costs). This applies to knowledge which *immediately is usable for everybody as soon as it is used by somebody*, but also to two other “services” relevant in the context of this paper: epidemic control programs and norm-enforcement are contributions to a public good⁴. *Common pool resources* (CPR) are nonexcludable but rival in use, giving rise to overgrazing problems. *Toll goods* are excludable but non-rival. This applies to knowledge which can be easily kept as business secret or is simply not useful to outsiders because it can be used only within a complex of tacit knowledge. In this case patentability is an *option* by which the patentee is granted a temporary monopoly in exchange for making the knowledge public, thereby enhancing exchange opportunities. In cases however where it is difficult to maintain secrecy (caused by reverse engineering or employee mobility), a second function of the patent system becomes relatively more important. As it is the institutional premise of temporary monopoly rents it provides incentives to innovate, not merely incentives to disclose secrets. This case is the basis for the so-called *Nordhaus (1969) trade-off: Weak IPR lead to under-provision of KBG caused by the free-rider problem entailed by knowledge as a public good. Strong IPR create monopoly distortions* caused by the fact that Pareto efficiency requires free access to non-rival knowledge. A further important case is the kind of generic knowledge which is produced by basic research: It will typically be (i) super-nonrival (it becomes more useful for future research as well as for technological application if it is more broadly communicated) and (ii) characterized by negative exclusion costs, as it is not immediately accessible but requires costly teaching.

⁴ This applies to the maintenance of an IPR-system. Hence patent-granting procedures should not be primarily thought of as a service for the would-be patentee. Jaffee and Lerner (2004) criticise the transformation of the US Patent Office from a public sector bureaucracy to a service agency.

Non-Rivalry and non-excludability are concerned with the *logic of use of existing knowledge*. In this context, the non-scarcity properties stand in the forefront, despite some qualifications which can be made, given that acquiring and using of knowledge typically requires complementary scarce resources. Concerning the processes generating *new* ideas, scarcity is relevant. Agents consciously devote *scarce resources* to R&D. But R&D processes are linked to public-good aspects at various levels as well as to (dynamically) increasing returns discussed above. Seeing the various aspects (non-rivalry, increasing returns, scarcity, excludability) together suggests that IPR-based price mechanisms are a possible, but not an ideal solution.

Various types of problems become visible:

1. To which extent can the price mechanism be relied upon as efficient incentive mechanism for development/disclosure of knowledge?
2. To which extent can the price mechanism be relied upon as efficient mechanism rationing access to KBG? How does it interact with non-price rationing and with schemes and policies actively supporting beneficial use of KBG (e.g., within the health system)?
3. To which extent can the price mechanism be relied upon as proper mode of raising revenues to finance R&D?
4. To which extent can and should the basis of the price mechanism (patent rights) be construed as deterministic, precise, stable and uncontested?

A few brief hints concerning plausible answers to these questions are in order. The identification of different levels and different types of problems suggests that there is a corresponding plurality of policy goals, even disregarding issues of distribution and health policy: The price mechanism-serves multiple functions according to 1-3. When there is a plurality of goals, tradeoffs between those goals must be expected as well. For instance, incentives for creating and/or disclosing and/or costly activities enhancing the availability of new knowledge need to be balanced with the possible costs of implied limited access. Now a well-known rule for enhancing means-ends rationality in such complex policy environments says that in cases of a plurality of goals one ought to have one instrument for each goal. Hence there is a *prima facie* reason for a plurality of institutions dealing with the complex of problems at hand. This idea of functional goal-specific specialisation of institutions is entailed in Arrow's (1962) suggestion of *separating provision of incentives for the production of new knowledge from the regulation of access to knowledge*. Similar suggestions have been

recently advanced by Romer (2004) or by Shavell et al. (2001). Assuming multiple goals, well-designed artificial incentive mechanisms may be superior in terms of aggregating the private information of decentral agents and of tailoring of the rewards than IPR-based markets (cf. Scotchmer 2004). The specific problem with respect to 4 is the following: the *quasi-mathematical precision* which David Hume demands for the normative anchor of the market (*stability of possession*) is precarious in the context of IPR. Various strands of discussion show that IPR are *essentially contested* at various levels⁵. Think of the discussions concerning patent races, the issue of broad vs. narrow patents, prior user rights, or the tragedy of the anti-commons occasioned by multiple IPR in the same area. Or think of discussions suggesting that patents might work as starting point for litigation and monopoly (in cases of strategic submarine patenting and cross-licensing), not for efficiency-enhancing market exchange⁶. The fair use exception in copyright law and the experimental exception in patent law further illustrate these complexities. The theoretical concept of *probabilistic patents* suggested by Lemley and Shapiro (2005) provides a useful general framework for discussing such issues. The concept of *well-defined property rights* does not seem to be a useful pivot for discussing institutional alternatives. Patents factually *are* probabilistic for epistemological reasons and provide the basis for a domain of *contested exchange*. Hence the idea that IPR (like private property of land) can be well-defined *once and for all* (as Coasean minimal-government starting point of exchange) is implausible in contexts where IPR really matter. This is reflected in the above-mentioned scepticism of libertarian economists toward patents. Not without reason, patents are felt to require thick public institutions in order to deal with all these complexities.

Further considerations could be added which are relevant for the assessment of IPR and their alternatives, but I stop at this point. What has been argued is sufficient to illustrate the points which matter here:

- the **irreducibly public aspects** of the process of development, production and use of KBG such as essential KBG-drugs
- the role of **decreasing average costs** in this process
- the **contested and probabilistic** character of IPRs
- the **ambiguities and complexities** of patent regimes where the force of pro and cons can be only settled **empirically**

⁵ Another area of contested exchange requiring thick institutional embedding is the labour market.

⁶ Hunt (2006) shows that under certain conditions patenting is a substitute for R&D.

- the questionable status of **price-based rationing** for the problem at hand.

All this suggests a *strong role of public sector-institutions* complementing the price mechanism in the case of strong IPR. IPR-based price systems cannot be considered as natural outcomes of laissez-faire and cannot be sustained in absence of strong statehood. The empirical contingencies suggest a dynamic and responsive role of public policy which eventually needs to adapt to new circumstances. The libertarian solution along the lines of S1 is still a possible institutional setting if it can be shown that, under prevailing circumstances, problems of public goods, fixed/sunk costs and bottlenecks empirically do not matter so much, and that distributional and health policy problems can be dealt with separately under this scenario. However, in cases such as the development and provision of a COVID-19 vaccine the array of pertinent assumptions seems to be sufficiently heroic such that the asymmetric onus of argument assuming market solution as the benchmark is bound to collapse. By contrast, the combination: *minimal public governance cum strong IPR* fails as a benchmark because it is incoherent. If free rider problems and fixed costs do not matter much, free marketeers may consistently subscribe to the libertarian arguments of S1. If they matter, we are in a world of monopolistic IPR with inevitably strong complementary political governance, either based on formal political procedures or market-feudalistic power of corporations. Put somewhat differently, it is implausible that the R&D-enhancing incentive effects of patents are essential for successful innovation while at the same time public-good-problems and the “monopolistic effects of patents are exaggerated” (Posner 2005, 68). Notice that it may well be true that public good-problems and monopolistic effects are exaggerated. But if it *is* empirically true, it is unlikely that the claim that the patent system is essential can be sustained.

4. Public-private partnerships

But what follows for the design of public-private partnerships who are a crucial feature of the innovation systems of our time all over the world? The main conclusion is that status and the capabilities of (semi-)public agencies, notably including supranational agencies such as CEPI (Coalition of Epidemic Preparedness Innovations) should be strengthened in a specific sense, on which I will expand towards the end of this section. In particular, what has been argued in the above lends strong support to the (now apparently somewhat attenuated) rules of the game which originally were designed to regulate the use of public or private charity funds dedicated

to the development of vaccines in private pharmaceutical companies or consortia where the latter play a major role. Those rules (to be sketched below) should not be too easily dismissed as driven by unrealistic moralism “reflective of the idealism that inspired the creation of CEPI” (Huneycutt et al. 2020: 2144), but can be defended on the grounds of efficiency and pragmatic expediency in terms of public goals which are not based on specifically demanding normative claims, even if those rules failed “to reflect the business realities” of vaccine developers under current conditions – as those conditions themselves may be subject to criticism.

To bring the point home, let us return to the basic functions of prices. Prices in general have the twin function of (i) rationing demand according to willingness-to-pay and (ii) providing incentives for provision. As an incentive and financing mechanism, *patent-based price systems* are said to have the following specific virtues: (ii)’ The price-based reward for the innovator in the form of temporary monopoly rents generates dynamic incentives. (iii) These rents support ongoing innovation as they are used to finance future innovation. The rents are (iv) positively correlated to the social value of innovations as expressed by market demand. Buyers of KBG voluntarily pay the price, so (v) no one has reason to object to the funding of pertinent innovations. (i) – (v) are related to the general defense of price systems as institutional schemes supporting the voluntary co-operation of individuals. This is often conceived of as a *morally unproblematic realm of exchange* contrasted against morally problematic *coercive, statist* forms of coordination.

In the case of essential KBG-medical products, several parts of suchlike arguments break down. (i) is problematic because KBG-prices above marginal costs imply inefficient and morally objectionable exclusion, while bottleneck-situations in the case of vitally important needs render are incompatible with the kind of moderate scarcity which is the basis of a private-property exchange economy. (ii’- v) clearly lose their normative appeal (be it sufficitarian, prioritarian, egalitarian, or utilitarian) not only in the case of neglected diseases, but in all cases where the social valuation of alternative allocations and R&D priorities substantially differ from market valuations. The latter is the case if the outcome itself either is

- a public good (such as epidemics control)
- a merit good benefiting individuals unable to recognize its value,
- or a good mainly benefiting individuals with insufficient purchasing power.

Regarding neglected diseases, specific arrangements have been suggested and/or put in place and more general schemes have been proposed to address the access problem as well as the

development problem within the existing institutional and legal structure. Some time ago, the DEFEND scheme (Developing Economies' Fund for Essential New Drugs) suggested by Ganslandt, Maskus and Wong (2005) envisaged a public international organisation (financed according to an ability-to-pay principle on a global scale) purchasing the license rights for designated areas and distribute the drugs at low (marginal) costs with a required co-payment from local government. Parallel trade would be restricted to support desirable price discrimination. In the theoretical framework sketched here, proposals along the line of DEFEND have three attractive features:

- (i) The limited scope institutional reform renders them realistic.
- (ii) It has a tendency to separate the issue of access conditions from the issue of incentives for innovation, which – given the complex structure of multiple goals and trade-offs – certainly is a step in the right direction.
- (iii) It proposes a hybrid public-private institutional mix somehow reflecting the dual public-private nature of the problems at hand.

It is no coincidence that the schemes employed by CEPI (Coalition of Epidemic Preparedness Innovations) which in addition to affordability is also concerned with the speeding of pertinent research and development on the basis of medical/epidemiological priorities (and neutralizing the excluding effects of allocation according to purchasing power) function according to principles which are somehow similar in their main thrust. An obvious focus are vaccines for combating epidemics such as Ebola and more recently COVID-19. Nonetheless, schemes functioning according to the basic principles of CEPI and DEFEND (which are by and large reasonable and steps in the right direction) suffer from a shortcoming which is related to their limited institutional scope. While some of the initial provisions envisaged by CEPI clearly reflect the awareness of the challenges of the monopolistic effects of patents and were designed to mitigating socially undesirable consequences, the subsequent attenuation of them may have revealed the extent to which a framework for organizing the bargaining between institutions such as CEPI and private pharmaceutical companies is missing. In analogy to DEFEND, the purpose of CEPI is reasonable access to medical goods in situations such as pandemics, including making available vaccines to the poor at affordable prices. Access to patented vaccines had long been a concern for the medical community, gaining a sense of urgency in crises such Ebola or Covid-19.

CEPI's original policy included specific provisions to cope with some of the problems described in the previous sections: all vaccine-manufacturing contracts would need initial approval by a

public review board. Prices would be set at levels affordable to those needing vaccines and sustainable to pharmaceutical companies. Trade secrets would not be funded by the CEPI. Companies had to share all research data based on developments financed with CEPI funds. Moreover, CEPI retained step-in rights to license and use intellectual property developed with CEPI funds for vaccine production if the company that had received the funding and is now in the possession of respective IPRs later withdrew from the agreement with CEPI. However, in general CEPI would not retain and license the intellectual property developed with CEPI funds (ceding IPRs to the consortia or firms awarded funding⁷). The original policy also required pre-registration of any trials in a registry and publication of results within a year of study completion (except with compelling reason and permission of CEPI), complemented by mechanisms for sharing underlying data and testing results, including negative results.

Several prominent pharmaceutical corporations claimed that public-private-partnerships are infeasible for them under those conditions, leading to their attenuation in December 2018, including softening the requirement that CEPI's board review CEPI's contracts. Of course, it is a matter of dispute in how far the reasonable expectations associated with a CEPI-like arrangement are still met under the new setting. Those responsible for the policy changes will stress that CEPI is faithful to its basic mission regarding the affordability of basic medical goods under the factual conditions imposed by business realities, while critics will object to the attenuation of transparency and the watering down of provisions meant to guarantee that public/charity money is used for public purposes while minimizing the probability that this money helps to build up positions of private power, which then are translated either into rents or further strategic advantage. A charitable reading of the attenuated (more business friendly) rules of the game will stress that they reflect learning processes and the flexibility required for successfully pursuing the goals of an innovative organization such as CEPI (see Huneycutt et al. 2020).

Here is not the place for assessing in detail the merits of both sides of this controversial discussion. However, it is worthwhile to put this discussion in perspective by thinking through the overall situation from a more general perspective. It apparently has some traits of a multilateral bargaining problem. Construing it as a principal-agent problem where CEPI is the principal trying to efficiently implement some public goal may also make some sense, provided the entrepreneurial goals of the “agents” (which may go beyond effort minimization

⁷ It is a matter of dispute whether this is really part of an optimal institutional design. It may be argued that in case of vitally important developments the position of institutions such as CEPI (viewed as a principal and guardian of the public interest) should be stronger, perhaps in exchange of larger funds awarded to agents.

of “normal” agents are duly taken into account). Considering the situation as a bargaining setting, an organization like CEPI ideally should be in the position of making take-it-or-leave-it-offers to private sector companies, offering a publicly funded grant for R&D, ideally allowing them to cover all relevant specific development costs including normal remuneration of required factors (plus the sunk costs of the investments necessary for starting the production), while excluding extra profits entailed by monopolistic pricing or subsequent strategic use of patents. Moreover, the scheme must include some compensation for the foregone revenues caused by a pricing scheme based on medical needs (which for some users may imply prices lower than average or even marginal costs), ensuring that companies operate without loss or extra-profit. Those considerations suggest that there may be desirable and undesirable form of learning and flexibility. While it is highly desirable for CEPI to learn as much as possible about those costs in order to develop schemes with appropriate funding (because schemes that would imply commercially unviable developments cannot be in its interest), a reputation for flexibility in a vague and general sense may be detrimental to efficiency and effective goal achievement, as it may invite strategic influence activities, including further costly bargaining and haggling.

In such a setting, asymmetric information and epidemiological urgency might lead to situations in which private companies rather than organizations à la CEPI factually are in a position to make take-it-or-leave-it offers. It is hard to see how CEPI could prevent this merely by designing a better (incentive compatible) mechanism, without an expensive build-up of expertise and capabilities alleviating at least the asymmetric information problem (such that claims according to which some arrangements are commercially unviable could be successfully countered if not true) or at least without the credible possibility of such a buildup. The shared perception that a build-up of such capabilities is possible and legitimate would perhaps suffice for creating a more favorable framing of the bargaining situation in the background of pertinent public-private-partnerships. This more favorable framing in turn hinges on the clear understanding that Mill’s asymmetric onus of argument favoring private market solutions is invalid in the situation under consideration, due to the public character of the problem and core role of public/charitable funds, while private corporations have an historically contingent instrumental role within the overall solution. Strengthening public agencies such CEPI or the WHO is crucially important: whether or not an expensive build-up of capabilities is required or the credible possibility of such a build-up suffices, they must not operate on the presumption that they always have to go for the cheapest, leanest, and most flexible strategies: costly capability build-up *may* be required, and it *may* be better to keep

more downstream rights of publicly funded developments and increase the funds granted for those developments (if needed for making them viable).

Even if short run effects on affordability of current arrangements à la CEPI were satisfactory, effects on strategic behavior and market power should thus be subject to debate in the longer run. The conclusions of this paper amount to suggesting a more comprehensive approach as far as the role of public institutions is concerned: the role envisaged by DEFEND and CEPI (mainly targeted at affordability and development) ought to be complemented by broader efforts concerning the balance between public finance, competition, health and patent policies: public governance should encompass (i) public finance-component targeted at access as well as innovation-related incentive problems, (ii) a competition policy component balanced with problem-oriented developments in patent law and (iii) a sector-related policy component in order to support co-ordination processes in and between the health sector and health sector-related industries.

The conclusions presented so far have a strong foundation in a broad class of institution-related normative principles. Nonetheless they do not hold *irrespective* of normative premises. Someone who is subscribing to “the ostensible parity between liberty and property” as “political values” at a constitutional level (cf. Epstein, 2004) may consistently defend S2 irrespective of demonstrable efficiency problems and the fact that under such a regime people are excluded from access to essential drugs even if they could be provided at modest costs. Analogous reasoning applies to those who believe that – S1 is to be preferred on the basis of libertarian or anarchist values; or

- the status-quo is *per se* morally dignified, or
- basic goods or well-being and their distribution are morally irrelevant in a strong sense such that neither egalitarian nor prioritarian nor sufficitarian norms may motivate institutional change which improve access to essential medicines.

However, such normative premise will probably appear extravagant, in particular when confronted with their implications in pandemics entailing great risks for humanity.

Bibliography

Arrow, Kenneth (1962): Economic Welfare and the Allocation of Resources for Invention. In National Bureau of Economic Research, *The Rate and Direction of Inventive Activity: Economic and Social Factors*. Princeton: Princeton University Press, 609-625.

Boldrin, Michele and Levine, David K. (2002): The Case Against Intellectual Property. *The American Economic Review*, Papers and Proceedings of the 114th Annual Meeting of the American Economic Association, Atlanta, GA, January 4-6, 209-212.

Boldrin, Michele and Levine, David K. (2004): *Case Against Intellectual Monopoly*. Available at author's website <http://www.dklevine.com/general/intellectual/against.htm>. Last accessed: 28 July 2020.

DeLong, J.B. and Froomkin, A.M. (1999): *Speculative Microeconomics for Tomorrow's Economy*. <http://personal.law.miami.edu/~froomkin/articles/spec.htm>

Epstein, Richard A. (2004): *Liberty versus Property? Cracks in the Foundations of IP Law*. Chicago Working Paper Series (2D Series): John M. Olin Law & Economics Working Paper No. 204.

FTC (2003): *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy*. A Report by the U.S. Federal Trade Commission.

Ganslandt, M., Maskus, K.E. and Wong, E.V. (2001): Developing and Distributing Essential Medicines to Poor Countries: The DEFEND Proposal. In *Intellectual Property and Development: Lessons from Recent Economic Research*, ed. by C. Fink and K.E. Maskus. Washington, DC-New York: World Bank and Oxford University Press, 207-226.

Hettinger, Edwin C. (1989): Justifying Intellectual Property. *Philosophy & Public Affairs* 18 (1), 31-52.

Huneycutt, B., Lurie, N., Rotenberg, S., Wilder, R., & Hatchett, R. (2020). Finding equipoise: CEPI revises its equitable access policy. *Vaccine*, 38(9), 2144–2148. <https://doi.org/10.1016/j.vaccine.2019.12.055>

Hunt, Robert M. (2006): When Do More Patents Reduce R&D? *American Economic Review Papers and Proceedings* 96, 87-91.

Jaffe, Adam B. and Lerner, Josh (2004): *Innovation and Its Discontents. How our broken patent system is endangering innovation and progress, and what to do about it*. Princeton-Oxford: Princeton University Press.

Landes, William M. and Posner, Richard A. (2002): *Indefinitely Renewable Copyright*. Chicago Working Paper Series (2D Series): John M. Olin Law & Economics Working Paper No. 154.

Lemley, Mark and Shapiro, Carl (2005): Probabilistic Patents. *Journal of Economic Perspectives* 19, 75- 98.

Lerner, Josh (2002): 150 Years of Patent Protection. *The American Economic Review*, Papers and Proceedings of the 114th Annual Meeting of the American Economic Association, Atlanta, GA, January 4-6, 221-225.

- Lessig, Lawrence (2004): *Free Culture. How big media uses technology and the law to lock down culture and control creativity*. New York: The Penguin Press.
- Machlup, Fritz (1958): *An Economic Review of the Patent system*. Washington (DC): Govt. Printing Office.
- Machlup, Fritz (1962): *The Production and Distribution of Knowledge in the United States*. Princeton: Princeton University Press.
- Machlup, Fritz and Penrose, Edith (1950): The patent controversy in the 19th century. *Journal of Economic History* 10, 1-29.
- Mill, John Stuart (1848): *Principles of Economics*. London: Parker.
- Nordhaus, William (1969): *Invention, Growth, and Welfare*. Cambridge (MA): The MIT Press.
- Nozick, Robert (1974): *Anarchy, State, and Utopia*. Oxford: Basil Blackwell.
- Plant, Arnold (1974): The Economic Aspect of IPs for Books. In *Selected Economic Essays and Addresses*. London: Routledge and Kegan Paul, 57-186.
- Posner, Richard (2005): Intellectual Property. *Journal of Economic Perspectives* 19, 57-74.
- Romer, Paul (2002): When Should We Use IPRs? *The American Economic Review*, Papers and Proceedings of the 114th Annual Meeting of the American Economic Association, Atlanta, GA, January 4-6, 213-216.
- Rothbard, Murray (1962): *Man, Economy, and the State*. Los Angeles: Nash Publishing.
- Scotchmer, Suzanne (2004): *Innovation and Incentives*. Cambridge (MA)-London: The MIT Press.
- Shavell, Steven and van Ypersele, Tanguy (2001): Rewards versus IPR. *Journal of Law and Economics* 44 (2), 525-47.
- Sturn, Richard (2008): *What, if anything, can justify the patent-based price mechanism in the case of essential medicines?* Paper presented at the Braga Conference of the EU Network HPRN-CT-2002-00231 “Applied Global Justice”. <http://www.uni-graz.at/fwiwww/2010/dt/forsch/wp/wp2008-1.pdf>. Last accessed 26 May 2020.
- Sturn, Richard (2016): Scarce Means, Competing Ends: Lord Robbins and the Foundations of Contextual Economics. *Journal of Contextual Economics – Schmollers Jahrbuch* 136, 59–85.
- Towse, Ruth and Holzhauser, Rudi (2002): Introduction. In Towse, Ruth and Holzhauser, Rudi (eds.), *Economics of Intellectual Property*, Vol. 1, Edward Elgar International Library of Critical Writings in Economics. Cheltenham-Northampton (MA): Edward Elgar Publishing, ix-xxxii.
- Weitzman, M. (1977): Is the Price System or Rationing More Effective in Getting a Commodity to Those Who Need it Most? *The Bell Journal of Economics* 8(2), 517-524.