

The changing function of patents: a reversion to privileges?

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Since its inception, patent law has had many faces, manifesting different aims and functions. The latest recalibrations of the aims and functions of patent law are striking because – at its core – patent law itself has not changed significantly in this time. This paper examines the chameleon-like nature of the function of patents, tracking historical transformations from the privilege as an instrument of trade policy, to patents as an incentive/reward to invent and disclose the invention, and the most recent shift towards viewing patents as necessary for innovation. In particular, the paper addresses whether the latest shift represents a reversion to privilege-like functions, due to the analogous focus on commercialisation, and argues that this is not the case because of the fundamental move to focusing on patentees rather than society as a whole and to seeing patents as property.

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1. INTRODUCTION

At the core of Modern Era (1850–) patent law is the theory that patents act as an incentive to invent and for one to make public how to make or ‘work’ an invention.¹ The ‘social contract’ of patent law involves a *quid pro quo*, whereby patentees are endowed 20 years of exclusivity in exchange for an enabling disclosure of an invention that satisfies certain criteria (in particular, novelty, non-obviousness and utility). While we continue to theorise patent law on these bases, the role of patents has arguably shifted. Today, economists argue that we not only need patents in order to incentivise invention, but also to ensure innovation, where invention is the process of creation and innovation that of bringing a product to market (in other words, getting an invention into marketable form and commercialising it).² Closely connected to this shift, in recent years, we have observed the rising importance of patents as assets either to facilitate the

1. The ‘Modern Era’ of intellectual property, including patents, is considered to have started mid-nineteenth century; B Sherman and L Bently *The Making of Modern Intellectual Property Law: The British Experience, 1760–1911* (Cambridge: Cambridge University Press, 1999).

2. See eg OECD and Eurostat, *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data* (Paris: OECD, 3rd edn, 2005) ch 3; S Sterckx ‘The ethics of patenting – uneasy justifications’ in P Drahos (ed), *Death of Patents* (London: Lawtext Publishing and Queen Mary Intellectual Property Research Institute, 2005) p 195. Of course the distinction between invention and innovation is by no means well delineated. The two usually take place simultaneously. For example, further invention may be required to bring something to market. This further invention may even be patentable.

coordination and transfer of technology, or to secure debt-financing, venture-capitalist investment or financing via securitisation. Though literature exists examining the appropriateness of using patents in this way, as far as the author is aware, nothing has been written about how the shift of the patent function towards assisting commercialisation might raise analogies with early privileges, which were geared towards 'local working' rather than invention or dissemination.

This paper looks at the way that the function of patents has changed over time, starting from the Elizabethan Era (1558–1603) to today, and how this has mirrored the transformation of intellectual property theory. It starts by analysing the development of patents from privileges; more precisely, the way in which grants have gone from being centralised on the introduction of trades in England and the local working thereof, to the use of patents to reward/incentivise creativity, to patents being a means to ensure the dissemination of new information or knowledge. The paper simultaneously highlights how these transformations reflect, respectively, innovation policy, Lockean labour theory and utilitarian theory. The following sections address how the patent incentive has changed recently from being about incentivising invention to incentivising innovation. Section 3 then looks at post-grant justifications for patents, particularly the performative function of the patent as a document and as 'property'. This is followed by a discussion on the possible implications for patent law theory of the current tendency to justify patents based on commercialisation and the post-grant use of patents. More specifically, Section 4 examines whether the tendency indicates a conceptual reversion to the grant of privileges.

2. INCENTIVISING INVENTION AND DISCLOSURE

Modern patent law is justified via the 'incentive theory',³ which holds that without the incentive of the patent (and the associated legal monopoly),⁴ there would be less invention.⁵ This is because people would be less willing to invest in invention if their competitors would be able to copy the product or service as soon as it is marketed, and offer it at a lower price because they would not have to make-up the costs of invention.⁶ Furthermore, even if invention took place, in the absence of patents,

3. W Cornish, D Llewelyn and T Aplin *Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights* (London: Sweet & Maxwell, 7th edn, 2010) paras 3-36–3-48.

4. Patents are often mistakenly stated as granting monopolies, eg in GS Alexander and EM Peñalver *An Introduction to Property Theory* (Cambridge: Cambridge University Press, 2012) p 185. However, as noted by RA Epstein 'Intellectual property: old boundaries and new frontiers' (2001) 76(4) *Ind LJ* 803, 817, the grant of a 'legal monopoly' does not necessarily result in a 'market monopoly', because patents do not preclude the introduction of close substitutes or competing products/services. See also EW Kitch 'Elementary and persistent errors in the economic analysis of intellectual property' (2000) 53 *Vand L Rev* 1727, 1729–1730; KW Dam 'The economic underpinnings of patent law' (1994) 23 *J Legal Stud* 247, 249–251, who submits that a better description for patents would be the grant of 'economic rents' (a cost advantage that one economic actor enjoys over competitors). The fact that patents seldom confer market monopolies (and the fact that patent owners can price discriminate) means that the deadweight loss usually associated with monopolies may not be so extreme; FS Kieff 'Property rights and property rules for commercializing inventions' (2001) 85 *Minn L Rev* 697, 727–732.

5. PS Menell 'Intellectual property: general theories' in B Bouckaert and G de Geest (eds) *Encyclopedia of Law and Economics, Volume I. The History and Methodology of Law and Economics* (Cheltenham: Edward Elgar 2000) pp 146–147.

6. Dam, above n 4, p 247.

inventors would be motivated to keep their inventions secret rather than publishing them, which would be negative for further invention and the overall production of knowledge. The aim of the patent system is, thus, to incentivise the creation of that which is new and useful to society, and to encourage its disclosure.⁷ Like general property law, patents are argued to be a necessary incentive to avoid under investment in invention, because people do not invest in goods or resources that are common, as they would not be guaranteed the fruits of their labour.⁸ In other words, exclusive rights are granted to ensure that people invest because they will capture the return of their investment,⁹ and to support the security of expectations about the use and enjoyment of particular resources.¹⁰ There is ample evidence that secure, non-corrupt and non-overly bureaucratic property systems (together with effective courts) result in more investment in real property.¹¹

Prior to the passing of the Statute of Monopolies 1623 and continuing throughout the seventeenth century, the focus of patents was very much on the societal benefits of inventions themselves (in other words, the physical embodiment), such as what they did or produced, how they improved an industry or contributed to the local economy.¹² The grant of patents was used to encourage better food supplies, improved communications, and longer and healthier lives,¹³ through the promotion of industrialisation.¹⁴ Patents were an incentive or reward for those who introduced 'new things' (that is to say, new trades, manufactures or industries, and not

7. DS Chisum et al *Principles of Patent Law* (Foundation Press, 2nd edn, 2001) 6; Cornish et al, above n 3, paras 3-05–3-06, 3-49–3-51.

8. Alternatively, property exists to avoid a 'tragedy of the commons', whereby people overuse resources, eg over-hunt. In essence, the tragedy of the commons refers to the inefficient and short-term over long-term use of resources; see H Demsetz 'Toward a theory of property rights' (1967) 57(2) *Am Econ Rev* 347. That intellectual products can suffer from a tragedy of the commons has been challenged; see MA Lemley 'Property, intellectual property, and free riding' (2005) 83 *Tex L Rev* 1031, 1050–58; Epstein, above n 4, 823; JF Duffy 'Rethinking the prospect theory of patents' (2004) 71 *U Chi L Rev* 439; and discussion pt 2.

9. Demsetz, above n 8, p 359: 'If a new idea is freely appropriable by all, if there exist communal rights to new ideas, incentives for developing such ideas will be lacking. The benefits derivable from these ideas will not be concentrated on their originators. If we extend some degree of private rights to the originators, these ideas will come forth at a more rapid pace'. See also J Bessen and MJ Meurer *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk* (Princeton, NJ: Princeton University Press, 2008) pp 6, 34–35.

10. TW Merrill and HE Smith, 'What happened to property in law and economics?' (2001) 111 *Yale LJ* 357, 360–366.

11. Bessen and Meurer, above n 8, pp 38–40. See also E Burke 'Reflections on the revolution in France' (1790) foreword and notes by Francis Canavan (Carmel, IN: Liberty Fund, Inc, 1990) on the stabilising effects of property on society.

12. On the birth of privileges and patents, see A Mossoff 'Rethinking the development of patents: an intellectual history, 1550–1800' (2001) 52 *Hastings LJ* 1255, 1259–1276.

13. C MacLeod, *Inventing the Industrial Revolution. The English Patent System, 1660–1800* (Cambridge: Cambridge University Press, 1988) p 205. See also C Dent "'Generally inconvenient": the 1624 *Statute of Monopolies* as political compromise' (2009) 33 *Melb Univ L Rev* 415, 418–420; S Ricketson, M Richardson and M Davison *Intellectual Property: Cases, Materials and Commentary* (Chatswood: LexisNexis Butterworths Australia, 2013) pp 685–686.

14. S Ricketson 'Business method patents— a matter of convenience?' (2003) 2 *IPQ* 97, 113.

improvements)¹⁵ that were ‘of use’ to the benefit of the public.¹⁶ For example, they were instrumentalised to encourage foreigners to introduce a new technology or trade in the English Realm.¹⁷ Privileges were not a means to protect domestic industries or to promote competitive advantage over international competitors.¹⁸ The most germane dimension of the patent privilege was, thus, the exchange of a legal monopoly endowed by patent (as a reward) for the invention itself or – more precisely – the introduction and local working of a trade, and the system was about local working, not invention in the sense of creation. The positive obligation to work the invention meant that privileges were like a contract between the Crown and the Patentee.¹⁹ That privileges were not about invention as we understand it today is consistent with the observation that, in seventeenth-century England, there was no deeper thought about the economics of patents and inventions,²⁰ and there is no evidence to suggest that the patent acted – or was intended to act – as an incentive to invent at all. As Christine MacLeod elaborates, the English were happy to take Continental inventions and adapt or improve them.²¹ Or as noted by Justine Pila, ‘the focus of patent policy [was] on the establishment of new industries and not “invention” in the sense of conceptualisation’.²²

Because the initial focus of patents was on the societal benefits of inventions being worked,²³ in Elizabethan times, no specification or disclosure was required for the grant of a patent;²⁴ the role of the Law Officer was to check that certain formalities were observed. As the patent system was centred on local working, the Crown had little

15. This is because s 6 of the Statute of Monopolies states that patents can only be granted for manners of new manufactures that are not ‘inconvenient’ and do not hurt trade, meaning that patents could not be issued for something that would infringe on the livelihoods of established workers, ie something that would compete with an existing product or service, such as improvements. See Mossoff above n 12, pp 1262–1264, 1273. Because privileges were only granted for entirely new technologies, trades or manufactures, and not improvements, and they could not be granted if they would somehow lose their trade or livelihood, privileges were far likely to result in market monopolies than modern patents (see n 4).

16. J Pila ‘The common law invention in its original form’ (2001) 3 IPQ 209, 214.

17. On the instrumentality of early privileges, see P Drahos *A Philosophy of Intellectual Property* (Aldershot: Dartmouth Publishing, 1996) pp 29–32.

18. P Drahos ‘Death of a patent system – introduction’ in Drahos, above n 2, p 2.

19. Mossoff, above n 12, p 1270.

20. MacLeod, above n 13, p 206.

21. *Ibid.*, pp 207–209.

22. Pila, above n 16, pp 214–215, see also 211–12. See also Drahos, above n 17, p 31, who states that ‘entrepreneurship’ was being rewarded by early privileges.

23. This is also clear from the historical context of patents and the fact that most patent systems formerly granted patents to the first to import, rather than actually invent. There is a long line of English case law supporting this supposition, see *Clothworkers of Ipswich* (1615) 78 ER 147; *Plimpton v Malcomeon* (1876) 3 ChD 531; *Marsden v Saville St Foundry and Engineering Co* (1878) 3 ExD 203, 206; *Curwen’s Application* (1912) 30 RPC 128; *Du Pont de Nemours & Company’s Application* [1965] RPC 582, 584 (Lloyd-Jacob J).

24. S Thambisetty ‘Sufficiency of disclosure in the common law: complexity, divergence and confusion’ in CW Ng, L Bently and G D’Agostino (eds), *The Common Law of Intellectual Property* (Oxford: Hart Publishing, 2010) pp 199–200. See also A Monotti ‘Divergent approaches in defining the appropriate level of inventiveness in patent law’ in Ng, Bently and D’Agostino (eds), *ibid.*, p 179.

interest in how exactly an invention worked, so long as it was put to practice.²⁵ Because privileges were not categorised as property, as patents are today (as discussed further below), one could also speculate that the exact bounds of a grant did not have to be delineated in a specification and enabling disclosure. The role of the sufficient disclosure as a ‘teaching’ was performed by the requirement that the patentee train apprentices or employ English workers to work the patent,²⁶ and any detailed descriptions or models were neither appended to the patent (which contained only a brief explanation of the invention) nor made publicly available.²⁷ As stated by Alain Pottage and Brad Sherman, ‘[i]deas were embodied in people more than in texts or drawings’.²⁸ Similarly, in pre-Modern Venice, any descriptions, drawings or models submitted were used for the purpose of assessing technical feasibility and to avoid overlap with other patents; they were not available to the public as teachings.²⁹ However, Venice had strict rules about how and when an invention had to be reduced to practice, requiring that the invention could and did work.³⁰

During the Age of Enlightenment (1650–1780), one started to see inventors as creative beings, and patents as a means to reward and incentivise invention in a more modern sense of the word. As a result, in the midst of the Industrial Revolution (1760–1840) patents were justified on the basis of being a necessary reward or incentive for creativity or mental labour.³¹ Lockean labour theory (a natural-rights theory)³² was used in England to justify property rights in the intangible, particularly in literary

25. M Biagioli ‘Patent republic: representing inventions, constructing rights and authors’ (2006) 73 Soc Res 1129, 1138, 1146. See also A Mossoff ‘Exclusion and exclusive use in patent law’ (2009) 22 Harv JL & Tech 321, 366–367, who notes that this places privileges in stark contrast with today’s patents, as the former ‘imposed on their recipients an affirmative duty to practice the trade’ making the privilege a positive grant with ‘use rights’, whereas the latter grants a negative right to exclude.

26. This is why the patent term was 14 years, as the standard apprenticeship was for seven years. See Dent, above n 13, p 419; Biagioli, above n 25, pp 1133–1134; A Pottage and B Sherman *Figures of Invention: A History of Modern Patent Law* (Oxford: Oxford University Press, 2010) pp 24–25.

27. Biagioli, above n 25, p 1137. On examples of early voluntary specifications, see Mossoff, above n 12, pp 1290–1291.

28. Pottage and Sherman, above n 26, p 23.

29. Biagioli, above n 25, pp 1133–1134.

30. *Ibid.*

31. Sherman and Bently, above n 1, pp 142–149. See also J Hughes ‘The philosophy of intellectual property’ (1988) 77 Geo LJ 287, 296 and 303, who notes that we can view Lockean labour theory normatively from the perspective that we should reward labour (desert theory), or instrumentally because we need to reward labour in order for it to take place (incentive theory). Hughes also states that, in practice, the two propositions co-exist and fusions of the two seem to be based on ‘value-added’ reasoning; that labour create social value and we want to incentivise and reward this (pp 305–306).

32. In Continental Europe copyright protection was and continues – to some degree – to be grounded in Kantian and Hegelian natural-rights theories related to personality and individuality. See I Kant ‘On the injustice of counterfeiting books’ (1785), reprinted in JAL Sterling, *World Copyright Law* (Oxford: Sweet & Maxwell, 2nd edn, 2003); GWF Hegel, *Philosophy of Right* (Thomas M Knox Eng tr, Oxford: Oxford University Press, 1967). For a critical analysis of the application of Kant and Hegel to intellectual property, see TG Palmer ‘Are patents and copyrights morally justified? The philosophy of property rights and ideal objects’ (1990) 13 Harv JL & Pub Pol’y 817, 837–849. For a discussion on Kant and intellectual property, see RP Merges, *Justifying Intellectual Property* (Cambridge, MA: Harvard University Press, 2011) pp 68–101; A Barron

works.³³ Locke stated that ‘every man has a property in his own person. This no body has any right to but himself. The labour of his body, and the work of his hands, we may say are property his’.³⁴ In other words, one has property in that with which he/she mixes his/her labour and adds value to, such as to make it his/her own.³⁵ Mental labour was argued to be equivalent to (if not of greater value than) labour of the body or the hands.³⁶ As a natural-rights theory, Lockean labour theory holds that it is a moral imperative that labour be met with property.³⁷ Though utilitarianism is usually attributed to philosophers such as Jeremy Bentham and John Stuart Mill, Locke’s works in many ways reflect utilitarianism.³⁸ This is evidenced by his means of arguing why it is okay that one can remove something from the commons through the application of labour. Namely, his arguments regarding the value added to land through labour (via cultivation or using it to farm animals) highlight his concern with maximising utility. Lockean theory was developed around the time of the colonisation of the Americas and was in many ways about justifying the taking of land via the maximisation of wealth in the New World.³⁹ It was notably less persuasive with respect to inventions

‘Kant, copyright and communicative freedom’ (2012) 31(1) *Law Philos* 1. On a Hegelian justification of intellectual property, see MJ Radin ‘Property and personhood’ (1982) 34 *Stan L Rev* 957; Drahos, above n 17, ch 4; Hughes, above n 31, pp 330–365. Note: Locke’s statements that ‘he hath mixed his labour with, and joined to it something that is his own, and thereby makes it his property’ (John Locke, *Two Treatises of Government* (Peter Laslett ed, Cambridge: Cambridge University Press, 2nd edn, 1960) s 27) likens Lockean theory to personality theory, raising analogies with Hegel; see A Rapaczynski ‘Locke’s conception of property and the principle of sufficient reason’ (1981) 42(2) *J Hist Ideas* 305, 307; Drahos, above n 17, p 75.

33. Sherman and Bently, above n 1, pp 23–24.

34. Locke, above n 32, s 27. That labour should result in property has been criticised because we simply do not reward all labour and when we do reward labour we do not always do so with property; Palmer, above n 32, p 834. Are we then supposed to determine property based on the ‘value added’ by the labour and, if so, how would we do this? How do we take into account cumulative creation? See Sterckx, above n 2, pp 181–182, see also pp 187–188 where Sterckx notes other aspects of patent law that do not fit a natural-rights basis for property.

35. Locke, above n 32, s 28.

36. Indeed, Hughes has argued that Locke’s proviso that the commons should not be over-exploited (Locke, above n 32, s 27, stating ‘at least where there is enough, and as good, left in common for others’) is better met by intellectual property than physical property. This is because: (1) ideas and their use are inexhaustible. More still, there are many laws and norms that ensure that ideas are never exclusively protected by intellectual property, eg as a result of privacy and freedom of expression laws, and rules about improvements patents and derivative works. And (2) certain ideas (such as everyday and extraordinary ideas) cannot be protected by intellectual property, so are in a ‘permanent commons’. Loss of protection due to genericness also ensures the protection of the commons. Hughes, above n 31, pp 313–323. See also Drahos, above n 17, pp 49–51.

37. Sterckx, above n 2, p 186.

38. As argued by AP Brogan ‘John Locke and utilitarianism’ (1959) *LXIX*(2) *Ethics* 79. See also Drahos, above n 17, p 44; Hughes, above n 31, p 299, who states that Locke’s interest in the ‘common stock of mankind’ is ‘a utilitarian argument grounded in increasing mankind’s collective wealth’. Hughes further notes (p 303) that the instrumental view of Lockean labour theory is ‘has a utilitarian foundation: we want to promote labor because labor promotes the public good’.

39. This is clear from the way that Locke discusses how cultivating lands from the commons (specifically in the Americas) gives it far greater value; Locke, above n 32, ss 37, 40–43. See also C Humphrey and K Verdery ‘Introduction: raising questions about property’ in C Humphrey and K Verdery (eds) *Property in Question: Value Transformation in the Global Economy* (Oxford: Berg, 2004) pp 3–4.

than with literary works,⁴⁰ though Adam Mossoff has argued that – while Lockean labour theory might not have been directly used to develop patent doctrine – the fact that it was the philosophy of the day and ever-present in the political-legal culture at the time, means that it influenced patent law development, which we can observe from the language used in key decisions.⁴¹ Mossoff notes that, between the passing of the Statute of Monopolies and end of the eighteenth century, as a result of Lockean labour theory, patents started to be seen as a reward for past labour instead of for the future working of an invention or trade,⁴² and natural rights (reward-for-labour) theory explains why patents started to be granted for improvements and not just entire trades or industries.⁴³

In any case, by the mid-nineteenth century, Lockean theory had given way to pure utilitarianism and consequentialist thinking, bringing patent law into the Modern Era.⁴⁴ Though natural rights theory is still used today to justify the protection of intellectual property rights, we tend to focus less on the mental labour or creativity of works/inventions in order to justify property rights and instead look at the value of the immaterial thing itself with respect to economic or quasi-economic perspectives.⁴⁵ Modern arguments for patents as an incentive to invent and to ensure disclosure reflect utilitarianism. This states that patents incentivise invention because of the legal monopolies they represent and their ability to prevent free riding. We can look at utilitarian justifications for intellectual property from two perspectives: either as a means of maximising wealth through the allocation of rights over scarce resources, or as ‘justice-as-order’ whereby we need to legally demarcate property in order to prevent violent conflict over scarce resources.⁴⁶

40. HI Dutton *The Patent System and Inventive Activity During the Industrial Revolution, 1950–1852* (Manchester: Manchester University Press, 1984) pp 17–18; MacLeod, above n 13, p 197; Drahos, above n 17, p 32.

41. Mossoff, above n 12, pp 1288–1215. Mossoff notes (p 1318), ‘[o]nce patents were taken up by the common-law courts *in toto* [the Privy Council having refused to relinquish its jurisdiction over patents until 1753, despite s 2 of the Statute of Monopolies], the eighteenth-century judges were free to apply their assumptions about society and rights to this new and untested common-law doctrine. The result was the specification and novelty requirements-seeds planted in the seventeenth century that eventually sprouted in a soil enriched with Lockean theories about natural property rights and civil society’.

42. *Ibid*, p 1303.

43. *Ibid*, pp 1306–1308. On the extent to which Lockean theory can be used to justify intellectual property (as opposed to how it has actually been used to develop it), see Hughes, above n 31, pp 296–330.

44. Note: certain interpretations of Lockean labour theory hold it as an instrumentalist or consequentialist theory; Hughes, *ibid*, pp 305–306.

45. Sherman and Bently, above n 1, pp 173–176. However, inventors and patentees themselves may still think of patents as a just reward for their labour, or even as an extension of their person in a Kantian or Hegelian sense; Kant, above n 32; Hegel, above n 32. See the data collected by J Silbey ‘Patent variation: discerning diversity among patent functions’ (2013) 45 *Loy U Chi LJ* 441, 472–475.

46. Palmer, above n 32, pp 850–851. While Palmer acknowledges that people are more productive when stable property acts as an incentive, he argues against grounding intellectual property in utilitarian arguments because intellectual property ‘does not have the “static” scarcity that tangible property has, and therefore does not qualify as a *locus* of property rights within justice-as-order argument’. (p 851) As Palmer notes, rather than arising from scarcity, intellectual property causes scarcity (pp 860–861, 863–865).

Law officers took the first step towards recognising inventions as encapsulating valuable information when they started to request written specifications at the beginning of the eighteenth century and in 1778 the common law made this a concrete requirement in England.⁴⁷ Mid-nineteenth century, the rationale behind patent protection morphed from being the reward/incentive for creativity/mental labour into ensuring the dissemination of the information behind the invention.⁴⁸ It is at this point that the patent came to be seen as a social contract between the inventor and the state.⁴⁹ With the appearance of the ‘sufficient’ or ‘enabling’ patent specification, requirements for working the patent disappeared. Mario Biagioli has noted that this makes sense because the patent system shifted from one that maximised local utility to one that focused on the enabling disclosure of knowledge.⁵⁰ Utility became something that could be tested by the market.⁵¹ The introduction of the specification also changed the notion of novelty; whereas it previously did not matter if an invention was described or published somewhere in England, so long as it was not being presently practiced,⁵² the introduction of the sufficient or enabling disclosure flipped this so that it was no longer relevant whether the invention had previously been worked in the realm, but whether it had been disclosed.⁵³ The sufficiency of the disclosure is important, as an insufficient disclosure could not be said to be comparable to being ‘reduced to practice’.

47. In *Liardet v Johnson* (1778) 1 WPC 53. See also *Turner v Winter* (1787) 99 ER 1274 (KB). For commentary, see MacLeod, above n 13, p 49 I; K Boehm *The British Patent System, Vol. I: Administration* (Cambridge: Cambridge University Press, 1967) pp 20–21; J Pila ‘Inherent patentability in Anglo-Australian law: A History’ (2003) 14 AIPJ 111, 113.

48. Sherman and Bently, above n 1, pp 142–157. Sherman and Bently argue that from the mid-nineteenth century we stopped focusing on mental labour and creativity as the core organising principle of intellectual property, and started to justify intellectual property via consequentialist means. In other words, it was no longer the value of the labour or creativity that mattered, but the contribution of the work, invention, design, etc. itself, as according to economic theory and particularly utilitarianism. This change occurred concurrently with the judicial retreat from judging quality and thus reluctance to assess things like labour or creativity, in contrast to the consideration of something measurable such as the economic contribution of a work or invention. Moreover, with respect to registered forms of intellectual property, mental labour and creativity were no longer as important as the property as registered (pp 173–182). The authors, however, note that mental labour and creativity have not disappeared completely, but can be seen in different guises, such as the requirements of originality and non-obviousness (pp 199–204). See also Chisum et al, above n 7, p 15.

49. See *Boulton & Watt v Bull* (1795) 126 ER 651, 654 (CP), where Justice Buller stated that ‘[t]he specification is the price which the patentee is to pay for the monopoly’. Notably, Mossoff has argued that the social contract between the inventor and state is also a reflection of Lockean labour theory. Mossoff, above n 12, pp 1289–1302. Mossoff stated (p 1298), ‘[t]he claim that an inventor’s natural right terminates in the legal arrangement of disclosing his invention in exchange for a legal right, ie a patent, conforms perfectly with the Lockean conception of the original social contract’.

50. Biagioli, above n 25, p 1138.

51. Pottage and Sherman, above n 26, pp 53–54. Later on in their treatise they discuss how this might not be the case with patents for plants in the US, for which reduction to practice has been important for finding ‘invention’, as ‘unlike mechanical inventions, plant inventions were not the products of’ a prior design, so the moment of conception was “not so readily determined”, meaning that there was no steps between conception and reduction to practice. With plant inventions (and also some chemical inventions), conception and reduction to practice happened simultaneously (pp 176–177).

52. Mossoff, above n 12, pp 1263–1264, 1288, 1303, 1308.

53. Pila, above n 47, pp 113–114.

Therefore, today, the patent system not only incentivises the process of invention itself, but more importantly encourages inventors to publish the information behind their inventions within the patent specification, which they might otherwise keep as a trade secret.⁵⁴ The dissemination of information/knowledge is vital for future invention, as this does not occur in a vacuum, but always off the back of existing information/knowledge.⁵⁵ Patentees are, therefore, given a right to exclude others from their inventions as a return for revealing their invention specifications to the public.⁵⁶ This is considered to be the most vital aspect of the patent *quid pro quo* (bargain or social contract) of modern patent systems.

As an extension of utilitarian theory, since the mid-twentieth century a law-and-economics approach has dominated, which has tried to mathematically model invention, innovation and the effect of patents, under the utilitarian presumption that patents are needed to incentivise creation and ensure the efficient exploitation of resources.⁵⁷ The general law-and-economics approach holds that we need property to ensure the efficient use of resources, whereby property should exist where the gains from the internalisation of externalities is higher than the costs.⁵⁸ More specifically, patents are necessary as an incentive for invention because intellectual products are 'public goods', as they cannot be exhausted (one person's use does not diminish the good) and are non-exclusive (many people can use the good at the same time).⁵⁹ Furthermore, whereas the intellectual good may be costly to invent, the marginal costs of producing additional units is usually relatively low.⁶⁰ All of these factors make intellectual products prone to free riding, such that there will be underproduction if left to the market, in other words, free from government intervention. Put another way, if no property rights existed, there would be less invention, because no one would invest in something if the products of their labour could be appropriated by another. Patents – or property rights – are thus required and are justifiable, so long as the social benefits that

54. WM Landes and RA Posner, *The Economic Structure of Intellectual Property Law* (Cambridge MA: Harvard University Press, 2003) pp 294, 326–332; BH Hall and D Harhoff 'Recent research on the economics of patents' (2012) 4 *Annu Rev Econom* 541, 542.

55. MA Lemley 'The myth of the sole inventor' (2012) 110 *Mich L Rev* 709, 712–733, who discusses the social (rather than individual) phenomenon of invention and the consequential prevalence of simultaneous invention; and Alexander and Peñalver, above n 4, pp 194–195.

56. *Pope Appliance Corporation v Spanish River Pulp & Paper Mill Ltd* (1929) 46 *RPC* 23, 55 (Viscount Dunedin); P Drahos *The Global Governance of Knowledge: Patent Offices and Their Clients* (Cambridge: Cambridge University Press, 2010) pp 27–32; HL MacQueen, C Waelde and GT Laurie *Contemporary Intellectual Property: Law and Policy* (Oxford: Oxford University Press, 2008) paras 10.15–10.16.

57. See eg Landes and Posner, above n 54; Dam, above n 4. cf A Rahmatian 'A fundamental critique of the law-and-economics analysis of intellectual property rights' (2013) 17(2) *Marq Intell Prop L Rev* 191, who argues against the use of economics in law, in general, because law is a normative social science and is at its core about justice, not economic efficiency and wealth maximisation. With respect to patents, Rahmatian is particularly concerned with the absence of inventor as an actor within law-and-economics analyses, due to a focus on patent owners (pp 210–211).

58. Demsetz, above n 8, p 350.

59. Dan Burk has challenged the idea that products of intellectual property are public goods. See DL Burk 'Copyright and the New Materialism' in JC Lai and A Maget Dominicé (eds), *Intellectual Property and Access to Im/material Goods* (Cheltenham: Edward Elgar, 2016) p 44.

60. RA Posner 'Intellectual property: the law and economics approach' (2005) 19(2) *J Econ Perspect*. 57, 58.

accrue outweigh the costs. These are pre-grant justifications for the grant of exclusive rights or property.

3. THE PATENT INCENTIVE: FROM INVENTION TO INNOVATION

The incentive theory itself is often challenged.⁶¹ Though it makes sense from a theoretical perspective that intellectual property rights may act as an incentive to invent, it is difficult to empirically assess whether this is the case and to what extent.⁶² Many have asserted that invention takes place even in the absence of patents because of government funding, subsidies or tax incentives, awards and non-economic motivations.⁶³ Because of the costs involved with obtaining and enforcing patents, these other instruments might be more efficient and have lower social costs.⁶⁴ Non-economic incentives to invent (particularly among university and public-sector researchers) include the prestige associated with invention (possibly the opportunity for co-authorship),⁶⁵ altruistic desires (to 'save the world') and the chance to participate in the advancement of science.⁶⁶ Software development is an example of an industry where there are significant non-patent incentives or motivations to create. There are also arguments that, in most cases, invention and disclosure would take place in the absence of patents because academic researchers make most discoveries or breakthroughs and it is in the nature of academia to publish results.⁶⁷ Finally, rather than seeing patents as an

61. See eg Silbey, above n 45, who discusses qualitatively the different functions that patents have; Lemley, above n 8, who argues that it is incorrect to think about intellectual property as real property, ie the incentive theory and the avoidance of a tragedy of the commons.

62. Lemley, above n 8, p 1065, states that 'it also seems at least highly probably that intellectual property increases innovation and creation relative to a world without intellectual property rights, though it is hard to say by how much. For a summary on theoretical and empirical research on whether patents do indeed function as incentives for invention and innovation, see Hall and Harhoff, above n 54.

63. See eg AD Moore 'Intellectual property, innovation, and social progress: the case against incentive based arguments' (2003) 26(3) *Hamline L Rev* 602; TG Palmer 'Intellectual property: a non-Posnerian law and economics approach' (1989) 12(2) *Hamline L Rev* 261; EC Hettinger 'Justifying intellectual property' (1989) 18(1) *Philos Public Aff* 31, 47–51. For a critique on non-patent means to incentivise invention, see Kieff, above n 4, pp 705–717, whose core argument is that, while these may incentivise invention, non-patent incentives do not incentivise commercialisation.

64. Bessen and Meurer, above n 9, pp 217–218.

65. Y Benkler 'Commons-based strategies and the problems of patents' (2004) 305 *Science* 1110, 1111.

66. R Feldman 'The open source biotechnology movement: is it patent misuse?' (2004) 6(1) *Minn J L Sci & Tech* 117, 161.

67. On scientific norms and patents, see RS Eisenberg 'Patents and the progress of science: exclusive rights and experimental use' (1989) 56 *U Chi L Rev* 1017. On patents as a means of disclosure compared to academic articles, see N van Zeebroeck et al 'Patents and academic research: a state of the art' (2008) 9(2) *JIC* 246. cf Bessen and Meurer, above n 9, pp 168–173, who highlight that many inventions, including breakthrough inventions, are nevertheless created in large companies. At the same time, they find that patents may be an overall disincentive for publicly listed companies (ch 6). Moreover, it is incorrect to presume that just because a lot of research is undertaken by universities and publicly funded institutes, the patent incentive is not necessary. More and more, universities and public research organisations also seek and hold patents (a phenomenon that started in the mid-twentieth century and gained speed in the 1980s

incentive, the costs involved in obtaining, policing and enforcing a patent mean that many inventors prefer to use trade secrecy and copyright.⁶⁸ In such cases, invention clearly occurs in the absence of patent incentives.

The Industrial Revolution is often touted as the prime example of how patents can promote invention and development. However, Klaus Boehm has raised doubts as to whether patents actually acted as an incentive for invention or put thrust into the Industrial Revolution, as patents were expensive to obtain and enforce at the time, meaning that many inventions were usually worked secretly.⁶⁹ He, furthermore, argued that the rise in patent applications that we observed during this time was due to there being more inventions to patent and also an increasing propensity to patent.⁷⁰ Christine MacLeod has also highlighted that the reason that patenting increased during the Industrial Revolution in England was not due to patents acting as an incentive, but the fact that patents – though still expensive – became relatively cheaper to obtain (due to inflation), it became easier to travel to London to apply for a patent, and the existence of the patent system became more well-known.⁷¹ Furthermore, there was a snowball effect, as the more the patent system was used, the more it behaved others to use it.⁷² Overall, MacLeod argued that eighteenth-century patents ‘had little to do with inventiveness’, ‘a lot to do with emergent capitalism’ and ‘the restructuring of the English economy’, meaning that ‘the decision to patent frequently was quite independent of the decision to invent’.⁷³ At the same time, James Bessen and Michael Meurer have tentatively suggested that the US patent system played a more positive role on invention and economic growth in the nineteenth century, but – more importantly – the differences between the British and US experiences ‘underline the contingent nature of the benefits of a patent system. They depend very much on the details of the system and the nature of the institutions that support it’.⁷⁴

with the advent of the biotech era); van Zeebroeck et al, *ibid*, pp 249–251. Indeed many small firms and university ‘technology transfer offices’ have spun off or resulted from such patents; MA Heller and RS Eisenberg ‘Can patents deter innovation? The anticommons in biomedical research’ (1998) 280 *Science* 698, 698; van Zeebroeck et al, *ibid*, p 249. This is partially because what constitutes as patent-eligible subject matter is broadening to include basic research and basic research is often commercialised, such as in the biotechnology and software industries; Eisenberg ‘Patents and the Progress of Science’, *ibid*, pp 1017–1018; RS Eisenberg ‘Proprietary rights and the norms of science in biotechnology research’ (1987) 97 *Yale LJ* 177, 195–196. This indicates that the notion that non-industry researchers are not part of the incentive equation is false. Put another way, these researchers (and perhaps more so the institutes that they work for) are also influenced by the patent incentive.

68. Bessen and Meurer, above n 9, pp 176–177.

69. Boehm, above n 47, pp 32–37.

70. *Ibid*, pp 22–24.

71. MacLeod, above n 13, ch 8, esp p 146.

72. *Ibid*, p 147. This continues today and many entities stockpile patents because everyone else does, resulting in a ‘nuclear deadlock’, where everyone might be better off if no one patented; Silbey, above n 45, pp 471–472.

73. MacLeod, above n 13, pp 156–157.

74. Bessen and Meurer, above n 9, 80. See also Drahos, above n 17, p 15, who notes that ‘[h]istory may teach us that the connection between intellectual property, science and economic development is contingent and local rather than necessary and universal’.

There is no evidence that patents incentivise invention (except in the pharmaceutical industry)⁷⁵ or economic growth overall.⁷⁶ The reason why the incentive theory works so well with pharmaceuticals is because of the high cost of their development, animal testing, human testing and governmental approval, compared to the relatively low cost of imitation.⁷⁷ Many of these costs would not have to be undertaken by an imitator, resulting in a significant difference in entry costs between the initial inventor and the imitator, which may not be so great in other industries.⁷⁸ Furthermore, information pertaining to pharmaceuticals – particularly their chemical composition, rather than how they are produced – is ‘leaky’ and cannot be contained by its inventor, and thus requires patent protection in order for exclusivity to be maintained. The incentive theory does not function so well with knowledge that is ‘sticky’, or closely tied to its inventor, difficult for others to reproduce and time intensive to transfer.⁷⁹ This may include a difficult manufacturing process or know-how, which the inventor would likely prefer to keep as a trade secret. This has led to a further criticism of the incentive theory. Namely, that patents only incentivise the disclosure of information that others could discover anyway by analysing the invention. This argument highlights the danger of the modern *quid pro quo* being phrased as a contract that exchanges a legal monopoly for the disclosure of an invention. The incentive theory also pertains to the process of invention itself. Thus, while it may be true that a patent is not necessary to effect the disclosure of certain inventions, this is not to say that the invention would have been invented in the first place in the absence of the possibility to patent.

Arguments that patents in fact retard invention by preventing follow-on research are also common.⁸⁰ Bessen and Meurer have suggested that the existence of patents may even act as an overall disincentive to invent, as the more one invests in research and development, the higher the chances are that one is infringing on another patent.⁸¹ After noting that the fact that invention occurs in places with strong patent protection is a correlation and not a linear relationship, Bessen and Meurer conclude that – apart from within the chemical and pharmaceutical industries – patents are an overall ‘drag’ on research and development, not an incentive, in particular due to the costs of patent litigation relative to profits derived from patents.⁸²

As mentioned above, the modern *quid pro quo* of the patent system relates to the information underlying or pertaining to the invention. The ‘textbook’ *quid pro quo* does not deal with access to the actual invention, but its disclosure. Put another way, the *quid pro quo* is not about innovation, but publication of the invention. Yet, the distinction between invention and innovation is important because there may be cases where one could validly argue that no patent incentive is required for the invention stage

75. Silbey, above n 45, p 476; Bessen and Meurer, *ibid.*, pp 14–16. Indeed, Bessen and Meurer conclude that – outside of the chemical and pharmaceutical industries – the aggregate costs of patents exceeded the aggregate private benefits of patents in the 1990s in the US (p 141). See also FM Scherer ‘A half century of research on patent economics’ (2010) 2(1) *The WIPO Journal* 20.

76. As discussed in Bessen and Meurer, above n 9, pp 81–84; Sterckx, above n 2, pp 200–202.

77. Scherer, above n 75, p 22.

78. Bessen and Meurer, above n 9, pp 88–89.

79. J Pénin and J-P Wack ‘Research tool patents and free-libre biotechnology: a suggested unified framework’ (2008) 37 *Res Policy* 1909, 1915.

80. See above, n 63.

81. Bessen and Meurer, above n 9, ch 6. This is only for public listed (and presumably larger) firms. Bessen and Meurer conclude that patents are an incentive for small inventors (ch 8).

82. *Ibid.*, ch 6.

and disclosure would take place in the absence of patents (and, thus, no patent is required to gain the informational aspects of the invention), but a patent may be required in order that innovation risks and costs be undertaken and the public be provided with access to the invention. More and more, one bases the existence of patents not on the argument that they are necessary for the process of invention and disclosure, but that patents are required to incentivise one to bring an invention to market, in other words, to commercialise inventions.⁸³ Companies will only invest in setting up manufacturing processes, hiring necessary staff and developing know-how to formulate marketable forms of the invention, for example, if they have the security of a patent.⁸⁴ As noted by F. Scott Kieff, '[w]ithout the property right acting to concentrate benefits and costs on owners, too few individuals will invest in making use of inventions to bring them to commercial fruition'.⁸⁵ The importance of patents for commercialisation is particularly strong for all entities that do not have the infrastructure to bring a product to market, such as universities and publicly funded institutes, or small inventors,⁸⁶ which either need to raise capital to do so or need a property right to licence out their invention. This reflects a shift from an incentive to invent to an incentive to patent. In the least it highlights a move from *ex ante* justifications for patents to *ex post* reasoning.⁸⁷

Thus, though it may be the case that much invention might take place in a patent-free environment, it is questionable if anyone would undertake the step of innovation and bring a product to market without patents.⁸⁸ Why would a third party invest in innovation if they do not have some kind of legal monopoly? Even with pharmaceuticals, many of the costs that we take into account to justify patent protection arguably belong to the innovation phase (namely, those associated with the stages of animal or human testing and seeking governmental approval). Thus, even with the 'classic' patent industry, financing related to innovation is important.

At the same time, as with the concept of patents as an incentive to invent, there is evidence that patents also do not play a great role in incentivising innovation, even within companies that do seek patents and regardless of the industry.⁸⁹ Other factors may play a more important role to incentivise innovation. For example, there are often strong 'first-mover advantages':

83. As discussed by Kieff, above n 4, pp 747–748, who supports broad patentability (including living organisms, gene fragments, computer software and financial services) on the basis that without patentability there is under-production and commercialisation in these fields. See also Menell, above n 5, pp 146–147; Silbey, above n 45, p 475; Ricketson et al, above n 13, pp 705–707; Report of the President's Commission on the Patent System 'To promote the progress of ... useful arts: In an age of exploding technology' (1966) p 2: 'a patent system stimulates the investment of additional capital needed for the further development and marketing of the invention'.

84. D Harhoff 'The role of patents and licenses in securing external finance for innovation' (2009) 14(2) EIB Papers, 74–95.

85. Kieff, above n 4, p 726.

86. On small inventors, see Bessen and Meurer, above n 9, pp 177–179.

87. C Godt, *Eigentum an Information* (Tubingen: Mohr Siebeck, 2007) p 449.

88. As noted by Sterckx, above n 2, p 195.

89. See eg SJH Graham et al 'High technology entrepreneurs and the patent system: Results of the 2008 Berkeley Patent Survey' (2009) 24(4) Berkeley Tech LJ 1255, 1283–1287. There were differences between industries as to the level of incentive (eg 'moderate' for the biotechnology industry and 'slight' for the software industry), however no industry reported that patents were a strong incentive to innovate.

These include the head-start that innovators usually have over imitators and the opportunity to earn supra-normal profits during this period; the extension of that head-start through resort at first to product and then production process secrecy; the opportunity to advance down learning curves and hence reduce costs during the head-start period; the reputation advantage that accrues to those who are perceived by consumers to have pioneered a product innovation, permitting the retention of sizeable market shares and premium prices despite imitation; and the fact that imitators often have to spend nearly as much on research and development as innovators but typically capture much smaller market shares over which to amortise their R & D costs.⁹⁰

As Richard Posner notes, if costs of production decline as experience is gained in production, first-movers may have a permanent advantage over imitators.⁹¹ According to the 2008 Berkeley Patent Survey, first-mover advantages are generally important in capturing competitive advantage, whether in the biotech, medical-devices or software industries.⁹² For software and medical devices, it seems that first-mover advantages are more important than patents for capturing competitive advantage.⁹³ As to biotechnology, while first-mover advantages are also very important for capturing competitive advantage, patents appear to be more so.⁹⁴

Additionally, non-pharmaceutical industries can rely on trade secrecy and can be supported by the sale of complementary products and services. The existence of established networks of investors, manufacturers, retailers and so on, are also of great import for commercialisation. This is also the case with having recognised trade marks and, related to this, an established reputation and would-be-customers. These factors can result in successful commercialisation without patent protection. They also contribute to the attainment of first-mover advantages.

The need for intellectual property for commercialisation to occur versus the degree to which first-mover advantages might suffice, is by no means uncontested. Michael Abramowicz and John Duffy have argued that first-mover market entry (or 'market experimentation') can give competitors information about consumer demand and market feasibility that they can free-ride on, which may result in first-mover *disadvantages* in certain circumstances.⁹⁵ Imitators do not have to bear the cost of invention, do not undertake any of the risks in discovering whether there is a viable market for a particular product or service, can learn from the first-mover's mistakes and successes, and can also free-ride on marketing and lobbying done by the first-mover.⁹⁶ These are all investments made by the first-mover, the results of which cannot be kept secret or exclusive. It is also easier for subsequent movers to raise capital, as investors will be familiar with the market and will see the first-mover's success as indicating lower risks.⁹⁷ In the same vein, Kieff has noted that first-mover disadvantages are particularly prevalent in the pharmaceutical industry, where the

90. Scherer, above n 75, p 22.

91. Posner, above n 60, p 66.

92. Graham et al. above n 89, pp 1290–1293.

93. Ibid, pp 1290–1293.

94. Ibid.

95. M Abramowicz and JF Duffy 'Intellectual property for market experimentation' (2008) 83 NYU L Rev 337.

96. Ibid, pp 372–374. See also Kieff, above n 4, pp 708–709.

97. Kieff, *ibid*, p 709.

initial costs and risks associated with commercialisation are especially high in relation to marginal costs, which is why patents work so well for pharmaceuticals.⁹⁸ Arguing that market experimentation can represent just as much risk as technological experimentation, and creates information that competitors can free-ride on, Abramowicz and Duffy maintain that it is likely under-produced the same way that works and inventions are in the absence of intellectual property protection.⁹⁹ Abramowicz and Duffy note the social benefit of market experimentation (including the introduction of new products or services, the creation of a new variety of an existing good or service, reforming an organisation or supply chain, and selling an existing good or service in a new location), and highlight ways in which intellectual property – albeit incidentally – already supports market experimentation and how it could better do so.¹⁰⁰ As an illustration, they suggest introducing a ‘commercialisation patent’ for the ‘commercially non-obvious’ marketing of a product or service; for example, of a product that is not novel but was never effectively commercialised.¹⁰¹

In contrast, Mark Lemley has severely criticised ‘*ex post* justifications’ for intellectual property.¹⁰² While he does not argue against the function of intellectual property as an incentive for creation, he attempts to categorically dismantle arguments that it is required to ensure that there is production and dissemination of the products of intellectual property.¹⁰³ Lemley disagrees with the notion that no one will bring products to market in the absence of supracompetitive prices guaranteed by intellectual property, as companies will always produce as long as they can sell at a price higher than their costs.¹⁰⁴ While he notes that ‘[w]e need to give creators of patented and copyrighted works power over price because the act of creation imposes a cost that imitators do not share’, he continues that ‘[t]here is no similar cost imbalance when it

98. Kieff, *ibid*, pp 724–725. Note: Kieff discusses the pharmaceutical industry under the biotech industry, when strictly speaking they are not the same industry, though they may be related and the boundary between the two may be amorphous.

99. Abramowicz and Duffy, above n 95, pp 345–353.

100. *Ibid*, pp 378–408. One interesting example they use is the historical grant of patents for importation (see n 23), which they argue reflect that patent law is concerned with experimentation in a new market (pp 341, 378–380). Abramowicz and Duffy further note that our concern with patent trolls (non-practising entities) highlights our concern for commercialisation, as these particular patentees otherwise satisfy the *quid pro quo* of the grant of the patent in exchange for the disclosure of the invention (pp 343–344). Importantly, Abramowicz and Duffy are very careful to note that incentivising market experimentation would not always be justified when we look at social gain overall, due to created costs, and also that it would not always result in increased intellectual property protection (pp 341, 363, 394–395).

101. *Ibid*, pp 405–408. Abramowicz and Duffy recognise that determining what is ‘commercially non-obvious’ would not be easy (pp 407–408, 410). See also T Sichelman, ‘Commercializing patents’ (2010) 62 *Stanford L Rev* 341.

102. MA Lemley ‘*Ex ante* versus *ex post* justifications for intellectual property’ (2004) 71 *U Chi L Rev* 129. See also Lemley, above n 55, pp 738–745.

103. See, however, Lemley, above n 55, where Lemley does question whether patents act as an incentive.

104. This argument is similarly made in Lemley, above n 8. Lemley argues against the prevention of free riding or the full internalisation of the social benefits of intellectual property should not be a means to determine its infringement, because this is not necessary for the creation of intellectual property, which will take place so long as protection is broad enough to ensure that one can ‘charge a sufficiently high price to ensure a profit sufficient to recoup their fixed and marginal expenses’. (p 1057)

comes to the distribution of a work that has already been created'.¹⁰⁵ Furthermore, Lemley argues that – while intellectual property has the characteristics of public goods – there can be no tragedy of the commons (or overuse of) intellectual property products. This is because information is not a finite resource that can be depleted. Lemley points out that, indeed, using information can multiply the resource through copies being created or ideas being spread. He states, '[i]ntellectual property, then, is not a response to allocative distortions resulting from scarcity, as real property law is. Rather, it is a conscious decision to create scarcity in a type of good in which it is ordinarily absent in order to artificially boost the economic returns to innovation'.¹⁰⁶ Similarly Richard Epstein has argued that the reason why patents and copyright are limited in duration, in contrast to property in land, is that on the expiration of protection there is no cost caused by a 'free-for-all' over the property, as there is with land, because there is no cost or competition associated with third-party use of the inventions and works. Furthermore, whereas land cannot be operated profitably while part of the commons, inventions and works do not lose their value upon falling into the public domain. Overall, removal of the legal monopoly increases social welfare because more people can use the inventions and works.¹⁰⁷

However, Lemley recognises that, in some cases, we can take post-creation costs into account, as '[p]rospect theory is needed when control over subsequent development is a necessary part of the incentive to produce the pioneering invention in the first place, as is arguably true with pharmaceuticals'.¹⁰⁸ In other words, *ex post* justifications are valid when they also contribute to the creation of intellectual property goods. For example, when something would not be created at all if there were not the post-grant ability to control distribution as well as an incentive to invent. Presumably, this would always be the case when the field is one where the costs of innovation are always high, such as the pharmaceutical industry but not the software industry. However, according to Lemley, post-grant justifications by themselves are invalid.

Without empirical data, it is very difficult to know who is correct, Abromovicz and Duffy or Lemley. Arguably, they all are depending on the exact facts at hand. Lemley must be right that companies will produce as long as they can sell at a price higher than their costs. However, his statement that we should not base theory on post-grant innovation because there are no cost imbalances for distribution after creation, is questionable in light of the costs that Abromovicz and Duffy highlight are associated with first-movers; namely, the costs related to being the first to experiment on a market. In cases where first-movers are at an overall advantage, Lemley is right that patents are

105. Lemley 'Ex ante versus ex post justifications for intellectual property', above n 102, p 138.

106. Lemley, above n 8, pp 1050–1058. See also Duffy, above n 8, who discusses why basing prospect theory on an analogy between patents and real property does not solve the common pool problem. He instead proposes making an analogy between patents and natural monopolies (which exists where the average cost of production declines with each additional unit produced, as a result of high fixed costs but low marginal costs), due to the non-rival nature of intellectual property. See also Palmer, above n 32, pp 860–861 and 863–865, who similarly argues that we cannot justify intellectual property rights based on the requirement of property to ensure negotiation over scarce resources without resorting to conflict, because without the existence of intellectual property there is no scarcity of resource – intellectual goods are after all non-exhaustive and non-exclusive. It is intellectual property that creates the scarcity

107. Epstein, above n 4, p 823

108. Lemley 'Ex ante versus ex post justifications for intellectual property', above n 102, p 141.

not required for commercialisation to occur. However, if first-movers are at an overall disadvantage, patents may be required for a good or service to be brought to market. Whether a first-mover is at an overall advantage or disadvantage depends very much on the precise situation. In this sense, whether patents are required for commercialisation cannot be determined purely on an industry basis, as alluded to by Lemley. As an illustration, in the pharmaceutical industry, one could say that a first-mover could be at an overall disadvantage because of the costs incurred in animal or human testing and administrative clearance, the data from which third parties can free-ride. At the same time, many countries protect this data through regulatory-data exclusivity. In these jurisdictions, it is possible that the first-mover is not at an overall disadvantage, even though he/she incurred certain post-invention costs.

In any case, whether we see arguments that patents are necessary for innovation to take place as compelling or not, it is an empirical reality that more and more economists and legal academics presume this to be the case.¹⁰⁹ Given that we have stepped away from the ideological perspective that intellectual property is about creativity and mental labour towards valuing immaterial goods themselves, it is not clear that we have to tie intellectual property justifications to the process of invention/creation. If we just consider the incentive theory and its *quid pro quo*, we naturally conclude that creation and publication thereof are key. However, there may be some cases when an invention may have been created and disclosed in a patent-free environment, but the step between this and developing a marketable product is so great, that one cannot sell at a price higher than costs or have an overall first-mover advantage if they are not in supracompetitive conditions. In which case, no investment would be made in innovation and the public would not have access to the invention. Thus, from a purely utilitarian or quasi-economic perspective, it may well be reasonable – in certain cases – to base patent justifications on innovation, depending on the value that we place on having inventions brought to market, as well as created and disclosed. It is important to note, however, patents are not the only means by which supracompetitive conditions can be achieved for inventions, as mentioned above. Moreover, while certain mechanisms or rights might be required to incentivise and facilitate the commercialisation of inventions, valid concerns exist regarding the appropriateness of using patents for this end, as discussed further in the following.

4. THE PATENT DOCUMENT: FROM DISCLOSURE TO SECURING FINANCE

Whether patents are indeed an effective means of achieving disclosure is controversial. As alluded to above, this is because much research would be disclosed with or without the patent incentive. This is supported by the fact that patentees only patent inventions that would be easily reverse-engineered or extremely difficult to keep as trade secrets; in other words, inventions that do not require a patent disclosure in order for the knowledge to be publicly disseminated.¹¹⁰ Additionally, a lot of research is performed by universities and public research institutes, which historically had a culture of the

109. See above n 83–87.

110. Hall and Harhoff, above n 54, Appendix 2, 5. The authors note, however, that this does not include pharmaceuticals. Though they are usually easily reverse-engineered, the extensive clinical testing means that patent documents can be very informative.

production of public knowledge and publication thereof. At the same time, there is a rising sentiment that patents have changed the non-industry research arena, removing its collegial spirit, particularly in the medical profession, and changing the publication culture.¹¹¹ That this reflects a naïve and overly simplified perception of reality has been discussed elsewhere.¹¹² What this perspective further suggests is that there is a preference for academic publication over patent disclosure. While arguments can be made that patents are in a way a better means of disclosure than academic publications,¹¹³ empirical data emphatically shows that, in practice, researchers seldom use patents as a source of information.¹¹⁴ The 2008 Berkeley Patent Survey indicated that patent searches are not performed in order to gain information.¹¹⁵ Furthermore, it found that many start-ups do not perform patent searches, particularly in the software field, and one-third of the companies that do undertake patent searches do so only after commercial launch.¹¹⁶ Even when patents are read as a source of information, the usefulness of patents for this purpose is limited due to careful drafting of the patent, the use of ‘patentese’ (technical patent language), the omission of know-how, and the fact that patented subject matter does not necessarily have to already have been reduced

111. JD Sarnoff ‘The current state of patent eligibility of medical and biotechnological inventions in the United States’ in M Rimmer and A McLennan (eds), *Intellectual Property and Emerging Technologies: The New Biology* (Cheltenham: Edward Elgar, 2012) pp 99–100; van Zeebroeck et al, above n 67, p 252. cf Eisenberg ‘Patents and the progress of science’, above n 67, pp 1048–1055; Y Joly ‘Open source approaches in biotechnology: utopia revisited’ (2007) 59(2) *Me L Rev* 385, 392.

112. JC Lai ‘The changing culture of patenting and its effects on research culture: university research and biotechnology’ in S Howe and JC Lai (eds), *Recht und Kultur* (Zurich: Schulthess, 2015) pp 104–108.

113. See Eisenberg ‘Proprietary rights and the norms of science in biotechnology research’, above n 67, who notes that, in many ways, the patent regime shares similarities with scientific norms because of the requirement of sufficient disclosure, much more so than the regimes of trade secrecy or breach of confidence, which do not allow for the dissemination of knowledge (p 194). Eisenberg concluded that, in some cases with biotechnology, the patent law disclosure is more effective than publication in academic journals. This is because replication of biotech research often requires access to biological materials (such as certain strains), which are clearly not made publicly available through journal publication. If a biological material is rare or difficult to access, simply refusing access to it may accord more exclusivity than a patent. Material transfer – even between universities – remains complex, encountering transaction and negotiation costs between lawyers and technology transfer offices, or researchers unwilling to share their materials out of fear of competition (p 198). Eisenberg stated that this highlights that academic researchers are prone to stray from the scientific norm of open disclosure and facilitating the progress of science, regardless of any intellectual property incentives (p 204). See also L Mandrusiak ‘Balancing open source paradigms and traditional intellectual property models to optimise innovation’ (2010) 63 (1) *Me L Rev* 303, 316–317. This essentially allows researchers to gain recognition for their work without making an effective disclosure and, thus, retain an advantage over their competitors (whether commercially or for future research).

114. WM Cohen et al ‘R&D spillovers, patents and the incentives to innovate in Japan and the United States’ (2002) 31 *Res Policy* 1349, 1362–1264; van Zeebroeck et al, above n 67, p 257; Hall and Harhoff, above n 54, p 550 and Appendix 2, 6. Though, evidently, the more valuable a patent, the more it is cited in other patents; D Harhoff et al ‘Citation frequency and the value of patented inventions’ (1999) 81(3) *Rev Econ Stat* 511.

115. Graham et al., above n 89, pp 1320–1323.

116. *Ibid.*

to practice prior to patenting, meaning that the claimed invention might actually be unworkable.¹¹⁷ Moreover, by the time a patent is published it may no longer represent the state of the art.¹¹⁸ Overall, patents are neither the ideal medium for disseminating knowledge nor are they seen as such by researchers, suggesting that the theory that the public should be willing to put up with the pseudo monopoly created by patents because of the benefits from the patent disclosure is not overly convincing.¹¹⁹ We might have to look elsewhere to justify the granting of patents.

As discussed in the preceding section, the idea that patents are not only necessary to incentivise invention, but also innovation is a component of today's patent systems. Often the step between invention and a marketable product or service can be quite large, often too large for smaller or non-practising entities (such as universities or publicly funded research institutes) and start-ups, which have no manufacturing capability, existing customer-base, distribution network, or business acumen. An important aspect of the innovation phase is, thus, securing finance or external investment and the patent then not only plays a role for the patentees themselves, but also for potential investors (whether they be banks, venture capitalists, securities investors, and even 'friends and family').¹²⁰ This is particularly true for small or start-up companies that are looking for

117. SB Seymour 'The teaching function of patents' (2010) 85(2) *Notre Dame L Rev* 621, 625–626, 628–641; Hall and Harhoff, above n 54, p 542 and Appendix 2, 6.

118. Lemley 'The Myth of the sole inventor', above n 55, 746. Lemley has also suggested that the minor contribution of most patents (because invention is cumulative) does not justify the 20 year exclusivity offered by patents (p 747).

119. See A Devlin 'The misunderstood function of disclosure in patent law' (2010) 23(2) *Harv JL & Tech* 401, who argues that we should focus on the relationship between patents and the incentive to invent and commercialise, and only look at disclosure as an ancillary benefit. This is because patent documents are seldom drafted in a way that makes them a useful source of information and are also rarely used as a source of information. Furthermore, most inventions can be reverse-engineered, decreasing the importance of the patent disclosure, such that we should centre policy decisions on incentivising invention because this will result in disclosure. Devlin argues that we should be careful about basing policy decisions on disclosure because requiring disclosure can decrease the patent incentive. While Devlin is correct that many products and services can be reverse-engineered once they are brought to market, his argument that we should thus just see patents as an incentive to invent has several flaws. First, the patent disclosure of an invention is (at least in principle) broader than a product or service brought to market, as commercialisation is usually of on only one (or perhaps a few) possible embodiments of the invention. Secondly, it is highly questionable if we should expect third parties to invest in the experimentation required to reverse engineer a patented product or service. Third, Devlin argues that we should not allow for an experimental use exception because this weakens the incentive to invent (pp 432–437). Taken together, not focusing on the disclosure and not allowing for experimental use, would result in a prolonged effective patent term, as third parties would not be allowed to attempt to reverse-engineer the product/service until after the patent expires. This is presuming that the product/service can be reverse-engineered. Fourth, most patents are not commercialised, meaning that there is a bulk of inaccessible knowledge that cannot be reverse-engineered because there is no marketed product or service. Moreover, combined with the fact that much research (particularly by non-academics) is only published in patents, there are many cases where the patent is the only medium of disclosure; see Seymour, above n 117, pp 665–666. As a consequence, Seymour proposed that we need to transform patents into readable teaching documents. Finally, Devlin presumes that disclosure requirement decreases the incentive to invent to a significant degree, without any evidence that this is indeed the case.

120. Graham et al., above n 89, pp 1303–1309.

investment from – or to be bought out by – larger companies.¹²¹ The 2008 Berkeley Patent Survey found that venture-backed firms are much more likely to hold patents than non-venture backed firms, independent of the field of technology, because venture capitalists are more willing to invest in companies that hold patents.¹²²

The supracompetitive prices and income streams that patents can represent are an obvious aspect of how patents act as an incentive to invest in innovation. Patents also function to ‘signal’ or evidence the potential of an invention, the competence of the patentees,¹²³ and ‘industriousness and a well-functioning organization’ or ‘managerial sophistication’ of a company.¹²⁴ The importance of this is particularly great with small start-up companies, which do not have other observable measures of success and for which the reputational gain is, thus, tied to securing financing and improving liquidity.¹²⁵ That patents are physical documents gives investors a point of entry into inventions that would otherwise seem nebulous and inaccessible.¹²⁶ From a more fundamental perspective, the fact that patents are a form of property is also important. Property can act as collateral and something well defined to contract around.¹²⁷ It allows for the division and transfer of rights, thereby facilitating transactions.¹²⁸ This is particularly important with patents that pertain to complementary information and that are associated with ‘sticky’ knowledge, as the presence of patents may promote

121. This is particularly important in the biotech industry compared to the software and internet industries; Hall and Harhoff, above n 54, pp 552–553.

122. Graham et al, above n 89, pp 1279–1283.

123. Harhoff, above n 84, pp 80–82; Hall and Harhoff, above n 54, p 542; Silbey, above n 45, pp 454–446. See also G Dutfield and U Suthersanen *Global Intellectual Property Law* (Cheltenham: Edward Elgar, 2008) p 51, who discuss the stakeholder analysis of intellectual property and note that the three main stakeholders are the author/inventor, the producer/investor and the consumer.

124. Silbey, above n 45, p 460.

125. Graham et al., above n 89, pp 1298–1302 and 1303–1309.

126. Silbey, above n 45, p 459.

127. Kieff, above n 4, pp 732–736, who states (p 735) ‘[r]ights of exclusion facilitate efforts for the social ordering and bargaining around inventions that are necessary to generate output’. See similarly Posner, above n 60, p 68, who suggests that, in contrast to patents, the fact that trade secrets are so difficult to contract around, increases their social costs, either because of the expensive negotiations involved or because the original inventor might choose to manufacture themselves instead of outsourcing to a more efficient manufacturer.

128. Bessen and Meurer, above n 9, pp 31, 35–36; Kitch, above n 4, p 1740, who stated ‘[i]t is clear that the ability of the owners of intellectual property rights to transfer these rights in whole or in part to others is an important feature of the systems. The rights can easily arise in the hands of persons or firms who are not in the best position to exploit them. In order to involve others in the full exploitation of the economic potential of the right, the owners must be able to enter into a wide range of arrangements with other firms’. The ability of property to structure transactions forms the basis of the ‘prospect theory’, which states that we should allow for early, broad patents in order to ensure coordinated development of a technology and minimise duplication of research; see EW Kitch ‘The nature and function of the patent system’ (1977) 20(2) *J Law Econ* 265. The prospect theory has been challenged; RP Merges and RR Nelson ‘On the complex economics of patent scope’ (1990) 90 *Colum L Rev* 839; DG McFetridge and DA Smith ‘Patents, prospects, and economic surplus’ (1980) 23 *J Law Econ* 197. See also Duffy, above n 8. For a critique on centring economic analysis on property’s function of facilitating contractual transfer, see Merrill and Smith, above n 10. See also Lemley, above n 55, 748, who suggests that licences for patents do not facilitate the ongoing exchange of technological knowledge or know-how, but are predominantly cross-licences.

coordination between different patentees to ensure that innovation can take place.¹²⁹ Patents might do so through signalling to others that the information or knowledge exists and by structuring interactions between different entities.¹³⁰ Patent can, thus, enable technology transfer and Christine Godt has gone as far as to say that patents are no longer about an incentive or reward for innovation nor the dissemination of information, but the private organisation of information (technology transfer via commodification) and the protection of the production process rather than the product itself.¹³¹

These post-grant functions of patents are very different from an incentive function, whether for invention or innovation. They are of course related to innovation, but are not so much about incentivising it as structuring and managing it. The patent is not playing a role as an abstract notion or promise as it does when it acts as an incentive, but a performative role as a physical document with certain connotations. The use of patents in this way to structure and manage commercialisation relates to a core property function, as property is about regulating human interactions and transactions with respect to ‘things’ or the objects or property.¹³² Property allows for the ‘orderly and coherent development’ and ‘efficient management’ of resources, as owners ‘can decide whether to improve, alienate, or consume the resource, and ... develop its potential in a

129. Pénin and Wack, above n 79, pp 1917–1918.

130. Silbey, above n 45, pp 466–467. There is, of course, a fine line between patents acting as a means of signalling and coordination, on the one hand, and patents hindering cooperation and the downstream application of the different pieces of information, on the other hand. With reference to a comment by an interviewee regarding the use of patents as weapons, the patent landscape and patent landmines, Silbey stated: ‘The linguistic shift from “architecture” to “landscapes” charts a rhetorical move from patents as ornamental and functional frameworks that are constructed within necessary constraints to patents as essential features of the field of play in which one must strategically manoeuvre. These two spatial forms are related and share similarities. Nonetheless, we construct “architecture” and we react to “landscape.” The addition of “landmine” to the mix suggests a normative valence – danger and disaster! – implying that both patent architecture and patent landscapes can retard progress (by being blown up) rather than promote progress’. (p 470)

131. Godt, above n 87, pp 262, 402–405, 449.

132. W Newcomb Hohfeld ‘Some fundamental legal conceptions as applied in judicial reasoning’ (1913) 23(1) Yale LJ 16, 28–33 (on ‘jural relations’); FS Cohen ‘Dialogue on private property’ (1954) 4(2) Rutgers L Rev 357, 361–363 (‘on social relations’). On the development of the patent as a species of property and the historical and theoretical underpinnings that connect patents to general property in the US, see Mossoff, above n 25. Mossoff discusses why one sees patents as only providing ‘negative’ rights to exclude and how this shares analogies with general property and how this developed as a consequence of the evolution of generally property theory in the early twentieth century, in the US. On the analogies between physical property and intellectual property, see also Epstein, above n 4. A significant difference between physical property and intellectual property is that there can be legally allowed unauthorised use of the latter, eg via the experimental-use exception. See Posner, above n 60, pp 62–64, who argues that this makes economic sense because the non-exclusive nature of intellectual products, which means that it does not make sense to negotiate for certain uses because they do not prevent the owner from simultaneously using the product, unlike with physical property. Further to this, the fact that many exceptions to infringement are subject to reasonable compensation (especially within copyright law in Europe), intellectual property is often more akin to liability rules than property rules in accordance with the distinction established by G Calabresi and AD Melamed ‘Property rules, liability rules, and inalienability: one view of the cathedral’ (1972) 85(6) Harv L Rev 1089. As a response to Calabresi and Melamed’s article, Epstein has argued that property

coherent fashion'.¹³³ Though categorised today as intellectual 'property', whether patents indeed constitute property has been vigorously debated over the centuries.¹³⁴ To be clear, there can be no doubt that, in 2016, patents are a form of personal property.¹³⁵ This is clear from different patent statutes that deem them to be so.¹³⁶ It is also clear from statutes dealing with the securitisation of personal property, which also stipulate that patent are personal property.¹³⁷ Different theories used to justify property have also been applied to patents to varying degrees of success.¹³⁸ Whether the exclusive rights granted by patents can effect the theorised pre-grant functions of patents is discussed above. The following discusses whether patents can truly function like property post-grant.

Bessen and Meurer have severely challenged the notion that patents are 'property-like' enough ensure innovation, support technology transfer and structure coordination.¹³⁹ The general thrust of their argument is that patents cannot perform property's notice function that tells third parties what the boundaries of the property are. This is for several reasons: (1) It is difficult to perform patent searches because there are so many patents, fragmented across many different owners.¹⁴⁰ (2) Clearance is inefficient because it involves the interpretation of abstract or vague terms. Unlike with physical property, the boundaries of what is embodied by a patent are not clear. This means that legal opinions about the scope of patents cannot be relied upon and the only way to truly know the boundaries of a patent is through litigation.¹⁴¹ (3) The boundaries of the property cannot be shown through possession, as it is non-rivalrous. Though an enabling disclosure is the patent law equivalent of possession, boundaries are subject to

rights should dominate because most things do not have a cash-value equivalent and liability rules create instability or a destabilising of possession, expectations and transactions; RA Epstein 'A clear view of the cathedral: The dominance of property rules' (1997) 106 *Yale LJ* 2091. However, as argued by Posner (*ibid*) is not necessarily the case with intellectual products, because of their non-exclusive and non-exhaustive nature, which mean that third-party use does not deny the owner from possession and enjoyment.

133. Epstein, above n 4, pp 808–809, 816. On whether we can truly justify intellectual property rights based on the requirement of property to ensure negotiation over scarce resources without resorting to conflict, see the discussion of Palmer, above n 106.

134. Eg see discussion in Mossoff, above n 25; Posner, above n 60, p 58, who calls patents and copyright 'limited property-rights systems' because they enable owners 'to exclude other from access to it' without authorisation, 'but not to exclude as completely as in the case of physical property'; Drahos, above n 17, pp 19–21, who discusses the historical debate about whether intellectual properties were indeed choses in action or incorporeal hereditaments.

135. As also noted by Mossoff 'Exclusion and exclusive use in patent law', above n 25, pp 322 and 326. See also HE Smith, 'Intellectual property as property: delineating entitlements in information' (2007) 116 *Yale LJ* 1742.

136. Eg 35 USC 261; Patents Act 1977 (UK), s 30; Patents Act 2013 (NZ), s 17(1).

137. Eg Personal Property Securities Act 1999 (NZ), s 16.

138. See above part 2 and n 32. See also Alexander and Peñalver, above n 4, pp 183–203.

139. Bessen and Meurer, above n 9.

140. *Ibid*, pp 8–11 and 41–42.

141. *Ibid*, p 10 and ch 3. Bessen and Meurer discuss arguments that the problem of vague claims would be too expensive and not worth it to fix because most patents have little value and are not asserted; citing D Lichtman 'Rethinking presecution history estoppel' (2004) 71(1) *U Chi L Rev* 151. They conclude that this under estimates the cost of problems relating to the patents consequent inability to effectively execute a notice function, in particular, the costs related to litigation (pp 221–222).

interpretation and change over time, and courts can interpret patents to include subject matter that was never in the possession of the inventor, for example, via the doctrine of equivalents.¹⁴² (4) Applicants can draw out the grant process, effectively shielding patent documents from the public.¹⁴³

The authors note that patents work well for chemicals and pharmaceuticals because they have high value and are easy to define and, thus, create borders around; they are defined by exact chemical formulae and make-up. This means that their enforcement is effective as it is clearer when there might be infringement, which lowers bargaining costs and decreases the chances of bargain breakdown.¹⁴⁴ In contrast, software is frequently litigated as it is difficult to place boundaries around such an inherently abstract technology.¹⁴⁵

Bessen and Meurer's conclusions are largely consistent with the practice and academic discussion regarding the use of patents as securities. More specifically, patent-backed securities have proven to be very difficult to get off the ground and have had a relatively low success rate.¹⁴⁶ The reasons for this are diverse, but are generally: (1) It is very difficult to value a patent and there is no agreement about how to do so.¹⁴⁷ Unlike physical property, one cannot easily place a value on an invention based on experience, such as similar or past products or services.¹⁴⁸ Moreover, the market for patents is not highly developed or transparent.¹⁴⁹ (2) Related to Bessen and Meurer's findings, patents are not a stable form of property because they can be challenged

142. Bessen and Meurer, *ibid*, pp 9–10 and 65–67. Bessen and Meurer argue (pp 223–226) that the core problem does not stem from invalid patents and cannot be solved by more stringent application examination or opposition proceedings, because the determination of validity depends on the way the claims are written and defined or interpreted. Thus, while they see invalid patents as an issue, their thesis is that the main reason the patent system performs poorly is because of the inability of claims to effectively give clear notice as to the boundaries of the property (ie vague claims). They makes proposals as to how one could improve the notice function on patents at ch 11.

143. *Ibid*, p 62.

144. *Ibid*, pp 18, 21, 107.

145. *Ibid*, pp 22 and ch 9.

146. See eg J Leung 'Patent securitizations, patently bad idea? Risk/benefit approach reveals possible reasons for lack of patent securitizations' (2006) 25 IPL Newsletter 4; MC Odasso and E Ughetto 'Patent-backed securities in pharmaceuticals: what determines success or failure' (2011) 41(3) R&D Management 219; M Ritsch 'Patent portfolios as securities' (2013) 63 Duke LJ 89; A Nikolic 'Securitization of patents and its continued viability in light of the current economic conditions' (2009) 19(2) Alb LJ Sci & Tech 393.

147. Ritsch, above n 146, pp 92–94; Nikolic, above n 146, pp 412–418. On patent valuation, see WJ Murphy, JL Orcutt and PC Remu *Patent Valuation: Improving Decision Making through Analysis* (Hoboken, NJ: John Wiley & Sons, 2012).

148. This is less so with copyright works and the securitisation of copyright has been successful. For example, if one were to securitise JK Rowling's next book, one could have a good idea of its market value from the sales of her previous books, because her earlier works are an indicator of quality and their sale represents a degree of loyalty. In contrast, one cannot value a new pain medication based on sales of aspirin, as one can neither know nor predict what share of the pain-medication market will be captured by the new product.

149. See Bessen and Meurer, above n 9, p 177, who note that the connection between the poor manner in which patents give notice and the difficulties involved in valuing patents. Bessen and Meurer further discuss the history of patent markets in the US and point out that from the mid-nineteenth to the beginning of the twentieth century, there was a market for patents, which disappeared (pp 179–181).

and partially or fully invalidated.¹⁵⁰ (3) Whether a patent or invention finds market success depends a great deal on the patentee's experience and market savvy. (4) One cannot presume that patents will reap 20 years of income. All inventions are prone to technological obsolescence and this often occurs before the lapse of any patents protecting them.¹⁵¹ As a consequence, patent-backed securities usually only succeed if packaged in portfolios with a diversity of inventions, so that there is stability in overall value, even if a few patents are incorrectly valued, invalidated, made obsolete, or fail on the market.¹⁵²

Whether or not patents are always capable of acting as a stable form of property that one could invest in or securitise, they (along with other forms of intellectual property) are ever-increasingly being treated as assets or objects of investment. Rochelle Dreyfuss and Susy Frankel have convincingly outlined how international intellectual property instruments – from the WIPO Paris and Berne Conventions, to the WTO TRIPS Agreement, to free trade agreements (FTAs) and bilateral investment treaties (BITs) – have reconceptualised intellectual property from being a means to incentivise invention/innovation, to a tradeable commodity, to an investment asset.¹⁵³ While the Paris and Berne Conventions require that members protect the works, inventions and trade marks of the nationals of other members, the main concern underlying the Conventions was not international protection for international exploitation, but to prevent the flow of products from a nation where there was no protection into one where there was. In other words, the aim of the Conventions was to protect local activity. States were left with a lot of flexibility as to the exact form of protection, requirements for protection and the balance of various interests, in line with the incentive-based rhetoric, which has an in-built concept of balance. With the increase in globalisation this changed and creators of intellectual property became interested in international protection because their products could be traded internationally and the value chain became globalised. This led to the WTO TRIPS Agreement, which – while harmonising intellectual property to a significant degree to reflect its commodification – left a lot of flexibility to states to continue the incentive-based rhetoric and attempt to balance different interests. This has shifted considerably with the removal of flexibility in various FTAs and intellectual property entering the 'investment rhetoric' via BITs. Dreyfuss and Frankel argue that the final conceptual shift has torn intellectual property away from incentive-based rationale towards 'assetisation', where one talks of investment and expropriation, and not intellectual property's incentive function or overall balance. Notably, Godt has made very similar observations,¹⁵⁴ for example stating that today's

150. Leung, above n 146, p 7.

151. *Ibid.*

152. Nikolic, above n 146, pp 407, 411; Leung, above n 146, p 8. See also Ritsch, above n 146, who argues that we should regulate patent portfolios like securities even when they are not securitised in the traditional sense (ie simply licensed out), as this will make patent-related transactions more transparent.

153. R Dreyfuss and S Frankel 'From incentive to commodity to asset: how international law is reconceptualizing intellectual property' (2015) 36 *Mich J Int'l L* 557.

154. Godt, above n 87, pp 134, 378, 446, 448–452, notes the conceptual shift from the patent as an instrument to promote innovation, to one that ensures the transferability of information via commodification, to one that protects of investment. She names the defensive use of patents as an example of the instrumentalisation of patents to protect investment (p 451). Godt further asserts that the commodification of information resulting from international patent law and the resultant focus on technology transfer has led to patent law now being about protecting the production process rather than the product itself, and patent law has become the 'sister to public-international-law investment protection' (pp 404–405).

patent law 'is not only related to the end-product market. The industrial property right has, with its focus on the protection of investment, the same goal of protection as international investment protection agreements'.¹⁵⁵

On the whole, patents can function to support external investment in post-grant activities. However, with their hazy boundaries, related uncertainty and consequent inability to place third parties on notice, the post-grant use of patents for this purpose is limited. Nevertheless we continue to try and treat them like regular assets or physical property, more and more, whether via their securitisation or international investment agreements. By doing so, we have changed the rhetoric from one that was incentive-based towards one centred around investment assets.

5. IMPLICATIONS FOR PATENT LAW THEORY

As the above would indicate, the theory surrounding why we grant patents (or privileges) has had many – albeit overlapping – lives (see Table 1). We started with privileges granted to inventions (trades or manufactures) that could be worked locally to benefit local society, where invention, information and knowledge were not of primary importance. The reasons for granting patents then transformed into offering an incentive and reward for creativity, based on Locke's natural rights theory. Thereafter, we started to see the value in inventions themselves and their informational contribution and we based patent law on utilitarian or quasi-economic arguments. Today, there are doubts surrounding the notion that patents are required for invention to take place and the patent is not seen to be a valuable source of information in practice. Instead, there are purely economic grounds to suggest that patents are required to support post-grant investment and commercialisation, whether by patentees or third parties. Given this shift in the function of patents, it behoves us to re-assess patent law theory.

Though today's literature tends to focus on the *quid pro quo* and utilitarian arguments for patents, natural-rights theory is still important. This is particularly the case in civil law countries, but is also true in common law jurisdictions. When we think about patents as offering incentives for the process of invention and disclosure, we see the relevance of natural rights and utilitarian theories. However, when we focus on the post-grant role that patents can play, this is a significant step away from natural rights theory, because it has neither anything to do with creation nor the tie between a creator and the fruits of his/her labour. It is even a step away from utilitarianism, as it is not about the ultimate social good, but singularly economic from the perspective of rights holders and narrowly focused on investment, commercialisation and assetisation.

Looking at the role that patents play to promote post-grant investment to bring a product to market clearly focuses on an end product or service and, thus, the societal benefits of the invention itself (not directly the information behind it). The significance of physical access to the invention itself is often overlooked in modern patent systems, which focus on invention and the disclosure aspect of the *quid pro quo*. Yet, there is much literature questioning whether patents really do incentivise invention and the value of the patent as a useful medium of disclosure, as discussed above. At the same time, the patent grant or privilege was historically very much about the local working

155. Godt, *ibid*, p 415 (own translation of 'Dieser Schutz bezieht sich nicht allein auf die Endproduktmärkte. Der gewerbliche Rechtsschutz hat mit seinem Focus auf Investitionsschutz dasselbe Schutzziel wie die internationalen Investitionsschutzabkommen'.)

Table 1: Change in the societal value and theory of patents

	Societal value	Theory
Elizabethan Era	New trades or manufactures	Local working to benefit local society
Age of Enlightenment/ Industrial Revolution	Creativity	Locke's natural rights theory
Modern Era	Information behind inventions and the dissemination thereof	Utilitarian or quasi-economic arguments
Today	Post-grant investment	?

of inventions by the patentee and the perceived societal benefits associated with this. The historical functions of patents did not pertain to the creation of new information or knowledge, or its disclosure in the patent document. As stated by Klaus Boehm, '[t]he policy [behind seventeenth-century privileges] would more accurately be described as a policy to induce innovation in general rather than invention *per se*'.¹⁵⁶ One could, hence, argue that the new focus on securing post-grant finance and supporting commercialisation is a modern form of the focus on local working, and the failure of the patent to incentivise invention or effectively disclose the invention is irrelevant because we should only be interested in an invention being brought to market.¹⁵⁷ Put another way, one could maintain that the focus on commercialisation, as well as the failure of the patent as an incentive to invent and as a disclosure of information or knowledge, could together reflect that the function of patents has reverted to the function of privileges to encourage the local working of inventions.

However, there are several reasons why this is not the case (see Table 2). Privileges were granted to encourage local working by the patentee and not, for example, about securitising the income stream from licensing a patent in order to have an instant cash flow. Local working was desired because of the benefits that accrued to society via the working of the invention, whether from the invention itself or its practice and the training of apprentices. It was not about maximising patent exploitation for the benefit of the patentee, enabling technology transfer between parties or protecting investment, blind from the needs and good of society. All of these new post-grant facets of patents reflect that they have taken or have been given more and more characteristics usually associated with non-intellectual property. In other words, they suggest the assetisation of patents. They also mean that we cannot theorise patents today around local working to benefit local society.¹⁵⁸ This conclusion is supported by the observations made by Peter Drahos in his seminal work *A Philosophy of Intellectual Property*,¹⁵⁹ that intellectual property should be based on an instrumental approach that is not centred on the 'rights' of grantees, but rather the use of privileges for specific aims,¹⁶⁰ whereby

156. Boehm, above n 47, p 14.

157. See above n 119.

158. Indeed, many post-grant functions of patents are incongruent with a theory that patents are about local working to benefit local society, such as the defensive use of patents to not be sued, or the creation of patent portfolios to wall off a commercial space; see Silbey, above n 45, p 462.

159. Drahos, above n 17.

160. *Ibid*, p 212, notes that intellectual property historically created 'a common disadvantage' through the grant of 'public privileges'. However, 'intellectual property rights are no longer thought of in this way ... [because] they are continually referred to by the aggregated term of rights. Through that process of reference they have become deeply entrenched in the discourse

Table 2: Comparison of the Elizabethan Era with today

	Elizabethan Era	Today	Differences
Purpose	Local Working	Commercialisation	Different values at stake. While both have limitations, only privileges had positive obligations.
Incentive for invention	Patents were not understood as a tool to incentivise invention	Patents perhaps do not incentivise invention	Patents are considered to be a tool to incentivise invention, even if possibly a failing one.
Value of information	Patents were not seen as a source of information.	Questionable value of patents as a source of information	Patents are considered to be a source of information, even if there are practical difficulties.

the actions of the holders of the privileges are restricted by certain duties connected to those aims.¹⁶¹ Drahos points out that this was historically the case with patent privileges:

One historically important goal of the English patent system, as we have seen, was to help create certain trades or industries thought to be vital to the needs of the country. So one finds early on in the evolution of patent law the view that patentees had a duty to work the patent in the realm so that relevant industrial expertise was made accessible to all. Various English patent statutes contained provisions prohibiting the abuse of patent rights. A reading of these provisions shows that their purpose was to facilitate the transfer or circulation of the patented knowledge in the United

of private property rights. Their relocation in the language of private property has obscured their origins in public privilege'. In recent years, several superior courts have taken an instrumental approach to restrict patentability. For example, regarding merely isolated genetic sequences, the US Supreme Court stated that "Laws of nature, natural phenomena, and abstract ideas are not patentable." *Mayo* 566 US... Without this exception there would be considerable danger that the grant of patents would "tie up" the use of such tools and thereby "inhibit future innovation premised upon them". *Association for Molecular Pathology v Myriad Genetics* (2013) 133 S Ct 2107, 2116, citing its own decision in *Mayo v Prometheus* (2012) 132 SCt 1289, 1293 and 1301. Similarly, the High Court of Australia stated that, in assessing patentable subject matter, courts should address whether patentability 'could give rise to a large new field of monopoly protection with potentially negative effects on innovation', or 'have a chilling effect on activities beyond those formally the subject of the exclusive rights granted to the patentee'. *D'Arcy v Myriad Genetics Inc* [2015] HCA 35, [28] French CJ et al. Note, however, that instrumentalism is being used here pre-grant.

161. Ibid, p 220, states that 'instrumentally based privileges are accompanied by duties that fall on the holder of the privilege. If the purpose in creating the privilege is to fulfil some approved goal then it should also follow that the privilege holder is subject to duties not to exercise the privilege in a way that defeats the purpose for which the privilege was granted in the first place'. Note: In a paper regarding the introduction of commercialisation patents, Sichelman, above n 101, calls obligations to make and sell the patent products affirmative or positive rights. Examples of existing restriction are the exception to infringement for experimental use and regulatory review, and the ability of third parties or the government to obtain compulsory licences in certain circumstances.

Kingdom. The English courts in fact went a long way towards imposing instrumental duties on the patentee in order to ensure that this particular goal of the patent system was met. One case laid down that patentees had to attempt to create a demand.¹⁶²

While certain restrictions are placed on patentees' rights today,¹⁶³ patentees have no positive obligations or duties. Therefore, despite both being focused on commercialisation, the policy goals and practical limitations and duties of historical privilege were quite different from the post-grant justifications of today's patents.

With respect to the role of patents as an incentive, not viewing patents as a tool for incentivising invention during the Elizabethan Era, on the one hand, and questions regarding whether they are apt to be such a tool in the Modern Era, on the other hand, cannot be equated. Although a new aspect of today's patent function pertains to commercialisation, we cannot discard the role of patents as an incentive to invent simply because we question exactly how and to what degree of success patents perform this role.

As regards the disclosure function of patents, although there was historically no enabling disclosure in patent documents, it is not strictly speaking true to say that Elizabethan privileges were not interested in information and knowledge. This was passed on through local use and through the training of apprentices. One could compare this with commercialisation and the ability of third parties to reverse-engineer the invention,¹⁶⁴ as this also results in third parties gaining information through market use. However, the obvious difference is that where the former is about the active passing-on of information and knowledge (as the modern *quid pro quo* is also meant to be), the latter is passive and places the burden on third-parties to invest and possibly even infringe a patent to gain information about a marketed product or service. We, hence, cannot disregard that the patent represents a social contract or *quid pro quo* that is not satisfied by a patentee simply via commercialisation. Because virtually all invention is cumulative,¹⁶⁵ one cannot validly argue that the function of patents as a means of disclosing new information or knowledge is not important, though one may question if they are apt to do so in their exact form and with regard to surrounding rules concerning access to patent documents.

Perhaps one could show that it would ultimately be most beneficial to society if patents were purely an incentive to commercialise, because – at the end of the day – society benefits from products and services being on the market, and incentivising commercialisation results in invention, which has to take place on the road to commercialisation, and disclosure will occur because most inventions can be reverse-engineered. However, there is no evidence that this is the case. Finally, if we truly were not interested in the patent as an incentive to invent and as a medium of disclosure, we would not base novelty on prior publications, but purely on prior local working, and we would continue to allow for invention by importation.

Possibly the only way we can theorise the post-grant function of patents is on purely economic rationale, based on patents as assets and the misguided notion that patents are capable of performing the same notice functions as non-intellectual property. This reflects the tendency to see patents more and more as being 'property'. This is despite the fact that – as discussed above – from an economic perspective, intellectual products

162. Ibid, pp 222–223.

163. See above n 161.

164. See Devlin, above n 119.

165. See above n 55.

and resources differ significantly from physical objects because, with the former, the scarcity is created by intellectual property, whereas, with the latter, scarcity is inherent. Furthermore, patents may not have clear enough boundaries to function the same way as physical property

Post-grant justifications for intellectual property grounded in economic theory designed for physical property results in a very narrow economic analysis of patents, based on economic maximisation for owners and not overall balance. Whereas most law and economics approaches promote balance,¹⁶⁶ post-grant rationale is purely about protecting investment. As stated by Godt, the incentive is no longer directed towards inventors but investors,¹⁶⁷ which again highlights how different today's patents are from privileges. Theorising the grant of patents around post-grant functions and the efficient use of resources has the potentially dangerous effect of encouraging prospect theory – in other words, patenting as early as possible in order to ensure the efficient use of information/knowledge – and theories tied to the efficiency of having rights concentrated on one or a few owners (to prevent a tragedy of the anti-commons).¹⁶⁸ While such theories have value, they must be tempered with concerns relating to overall balance, which a pure focus on commercialisation does not allow for. This could result in basic research being tied up in proprietary rights and the aggregation of information and knowledge between a few owners, which could be bad for follow-on research and development and competition.

There are several additional and more practical reasons why taking a narrow focus on the post-grant functions of patents to justify patents is problematic. One problem with looking at the patent's function from a post-grant perspective is that post-grant behaviour is not always about innovation. There are post-grant behaviours that are undesirable, such as 'trolling',¹⁶⁹ the defensive use of patents or 'war-chest' behaviour to threaten 'mutual assured destruction',¹⁷⁰ that may also be implicated by the incentive that a patent can represent. If a patent does not incentivise invention, disclosure or innovation, its social worth is undoubtedly dubious. This leads to the core problem with post-grant incentives, which is that you cannot predict post-grant behaviour. We do not know that patentees will indeed use their patents in a manner conforming with arguments for post-grant incentives, in other words, to invest in or seek investment for innovation. Indeed, most patents are never commercialised in any way. In comparison, because of the timing of the grant, we can decide whether we want to grant a patent for a certain type of pre-grant behaviour (namely, if there is invention reaching certain standards) and also grant-behaviour (the disclosure). Put another way, with theories for patents based on pre-grant and grant behaviour, we can assess whether the actual behaviour displayed by an applicant corresponds to our theory and determine

166. Posner, above n 60.

167. Godt, above n 87, p 449.

168. Where information or knowledge is not further developed because there are too many different owners who can block each other and other potential users; Heller and Eisenberg, above n 67.

169. Patent trolling is the practice of taxing third parties for the use of patents that the patent owner does not him/herself use. Lemley has noted the importance of looking at the exact behaviour in individual cases to determine whether there is troll-like behaviour, rather than making deterministic judgements based purely on the entity type; M Lemley 'Are universities patent trolls?' (2008) 18 *Fordham Intell Prop Media & Ent LJ* 611.

170. J Boyle 'Open source innovation, patent injunctions, and the public interest' (2012) 11 *Duke L & Tech Rev* 30, 33, 38, 55 and 61. See also Scherer, above n 75, p 23.

whether to grant a patent or not. This is not the case for post-grant theory, where it is limited what one can do if the actual post-grant behaviour does not match our post-grant theory for granting patents.¹⁷¹

Other minor problems exist. For example, there may be cases where the gap between invention and innovation is not significant and no incentive or external investment is required to bring a product to market once it has been invented. There may well be inventions that would be invented and disclosed in the absence of patents, for which little investment is required to bring a product to market. Genetic diagnostic testing may be a case in point.¹⁷²

CONCLUSION

In conclusion, when we talk about the incentive theory in patent law, we should remember that there are three relevant aspects: invention, disclosure and innovation. Thinking purely about the *quid pro quo* or the social contract is too narrow. Disclosure implicitly implicates invention (as one can only disclose something he/she has invented), but it leaves out the important consideration of innovation. While the shift of the patent system away from a singularly local-utility-focused system towards valuing the information behind the invention (the disclosure) was important, it arguably over-shot the mark, as it has led patent law theory away from recognising the importance of the physical embodiments of inventions to the public. The information behind an invention is undeniably important for future invention, but we should not forget that the patent system started as one that privileged that which bettered the lives of the public through its local working. Thus, we should not only be using the patent system to incentivise creation and disclosure thereof, but also the working of the invention.

Whether this has been achieved with arguments that patents are also required to ensure that patentees invest in commercialisation, or to assist them to achieve external funding for this, is debatable. While there is certainly an analogy to be made between commercialisation and local working, as both pertain to bringing a product or service to the market, this is not to say that there is coalescence in either the societal values at stake or the theory behind trying to gain these values. Local working was thought to benefit the local society via the introduction of new trades or manufactures, through the presence of the invention itself and also the creation of jobs. In contrast, post-grant functions of patents are related to the use of patents as assets and property's notice function, for the benefit of owners and the protection of investment. Justifying patents purely based on their post-grant functions as 'property' is dubious. First, because the subject matter covered by patents is too ill-defined and uncertain for patents to carry out a notice function. Secondly, because we simply cannot predict post-grant behaviour and there are risks involved in presuming certain behaviour to shape patent law. This, of

171. There are some means by which we can control or check post-grant behaviour of patent owners, such as compulsory licences, Crown or government use exceptions, experimental or private-use exceptions, requirements for local working and competition law.

172. This is in part due to fact that diagnostic tests have historically not required regulatory approval the way that pharmaceuticals do and the fact that the line between basic and applied research, and invention and innovation, is ill-defined when it comes to certain biotechnologies. See Eisenberg 'Proprietary rights and the norms of science in biotechnology research', above n 67, p 195; I Huys, G Matthijs and G Van Overwalle 'The fate and future of patents on human genes and genetic diagnostic methods' (2012) 13 Nat Rev 441, 441.

course, says nothing about the pre-grant functions of patents as property; whether we see patents as property or as exclusive rights that do not constitute property rights, patents can potentially serve to incentivise invention and encourage the disclosure of inventions – though this has been severely challenged. However, given the rather precarious nature of post-grant justifications for patents, instead of supporting innovation via the grant of patents or more patent rights, we should consider (re)introducing or reinforcing existing mechanisms that promote commercialisations, such as a requirement for local working and compulsory licensing, a discussion of which is worthy in an of itself of a separate article.