

Patenting in England, Scotland and Ireland during the Industrial Revolution, 1700–1852



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Abstract

There are two competing accounts for explaining Britain's technological transformation during the Industrial Revolution. One sees it as the inevitable outcome of a largely exogenous increase in the supply of new ideas and ways of thinking. The other sees it as a demand side response to economic incentives—that in Britain, it paid to invent the technology of the Industrial Revolution. However, this second interpretation relies on the assumption that inventors were sufficiently responsive to new commercial opportunities. This paper tests this assumption, using a new dataset of Scottish and Irish patents. It finds that the propensity of inventors to extend patent protection into Scotland and/or Ireland was indeed closely correlated with the relative market opportunity of the patented invention.

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1. Introduction

Technological development is considered immanent to any meaningful account of the Industrial Revolution; without it, the impressive rate of advance seen in Britain over the preceding two centuries would have petered out, as had invariably occurred with previous episodes of growth, most pertinently, the Dutch Golden Age. Broadly speaking, there are two competing explanations for Britain's technological transformation. The first can be seen as a 'demand-side' explanation—that in Britain,

and only in Britain, was it profitable to invent the technology of the Industrial Revolution. An influential exponent of this view is Bob Allen. Allen notes that compared to other countries, Britain had a unique structure of factor prices—labour was expensive, while capital and energy were cheap. Accordingly, technological change was biased towards increasing the capital–labour ratio and this labour-saving technology was ultimately the progenitor of industrialisation.¹ In a similar vein, Daron Acemoglu suggests that the

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¹ 'Britain's high wages and cheap energy increased the demand for technology by giving British businesses an exceptional incentive to invent techniques that substituted capital and energy for labour'. Allen (2009, 15).

large-scale migration of rural labour into English towns and cities induced the development of technologies that allowed manufacturers to replace skilled labour with unskilled labour.² This interpretation, however, is critically dependent on the assumption that inventors were sufficiently attuned to specific economic opportunities. In attributing the development of technology to economic imperatives, Deirdre McCloskey accuses Allen of ‘reductionism’.³ She emphasises instead, how new ‘bourgeois’ ideals and rhetoric increased the supply of innovation and enterprise. Joel Mokyr also argues for the primary importance of the supply of ideas, stressing that although ‘factor prices might have determined the *direction* of technological change, the *power* and *intensity* of improvements were a function of technological capabilities and motives that had deeper causes’.⁴ These motives were not necessarily financial: ‘when the decisions [to invent] were made largely by independent individuals, ambition, curiosity, and altruism may have had a larger role relative to naked greed’.⁵

The primary purpose of this paper is to examine the responsiveness of inventors to market signals using a comparative analysis of the English, Scottish and Irish patent series—although in so doing, the paper also provides the first précis of the Scottish and Irish patent systems during the Industrial Revolution.⁶ The following section describes the patent systems in each of the three countries. It shows that the administration and law of patents were essentially the same in all three, meaning that direct comparisons between their respective patent series is possible. Section 3 outlines the compilation of the Scottish and Irish patent series, which have not been previously available (but which can now be found online as part of the replication data for this paper). For every patent awarded in Scotland and Ireland before reform in 1852, these series provide the patentee(s) name(s), their

residency, the subject of the patent, the date of the patent and, where applicable, the number of the corresponding English patent. Section 4 provides a statistical overview of the three patent series. It shows that the number of patents awarded in Scotland increased precipitously during the late 1820s and 1830s, the same time as when Scottish manufacturing began to industrialise.⁷ This suggests that inventors were responding to developments in Scotland, and were determined to pursue returns there via patenting. The final section analyses this proposition in more detail. One exercise examines the pro-cyclicality of patents and the business cycle. If inventors were responding to market signals, then patent numbers should increase as business conditions improve. This is shown to be the case after 1775. A second exercise examines the quality of patents that were extended to Scotland and Ireland. Because of the additional costs of extending patent protection, inventors would be expected to invest in additional protection for only more valuable inventions. Again, this is shown to be the case after 1775.

2. The administration and law of patents in England, Scotland and Ireland

Modern patent systems are normally administered by a single, specialised office, responsible for the examination, awarding and cataloguing of patents within its jurisdiction. There was, however, no equivalent to such an administration in the United Kingdom before the Patent Law Amendment Act was passed in 1852. Instead, patenting was administered by a slew of law courts, government offices, and departments. These offices were not run by technically qualified professionals but by amateur gentlemen who often sub-contracted the clerical work to deputies. Moreover, England, Scotland and Ireland each maintained separate patent administrations. To secure an English patent, a petition had to pass through ten distinct stages, briefly:

- 1st stage. The inventor submitted his petition to the Home Office, providing a brief description of the invention, the name(s) of the petitioner(s), and the circumstances on which the claim to a patent was founded, i.e. whether the petitioner was the original inventor or an importer.
- 2nd stage. The petition was forwarded to the Attorney or Solicitor-General (the law officers) to investigate and report upon.

² Acemoğlu (2002, 797–798).

³ McCloskey quotes a letter written by the chemist Claude Louis Berthollet to James Watt, advising him that ‘When one loves science... one has little need for fortune which would risk one’s happiness’. McCloskey (2011, 346–347). Watt, however, failed to heed this advice, patenting many of his inventions—most famously the separate condenser for atmospheric steam engines—and enforcing them rigorously against other engineers, thereby making his fortune.

⁴ Mokyr (2009, 272).

⁵ Mokyr (2005, 322). Elsewhere, however, Mokyr admits that ‘Allen’s basic assumption that inventive activity was driven by a desire to make money is not controversial’. Mokyr (2009, 270).

⁶ On the English patent system, see Dutton (1984) and MacLeod (1988, 1991). For a more positive assessment of the pre-reform English patent system, see Bottomley (2014). On patenting in Scotland, there is one essay that includes a discussion of Scottish patent law (MacQueen, 2010). To my knowledge, there has been no work on patents for inventions in Ireland during this period.

⁷ Devine (2004, 399).

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