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Factor prices and productivity growth during the British industrial revolution ☆

Pol Antràs [a] and Hans-Joachim Voth [a,b,c,*]

[a] *Economics Department, MIT, Cambridge, MA, USA*
[b] *Economics Department, Universitat Pompeu Fabra, Barcelona E-08005, Spain*
[c] *Centre for History and Economics, King's College, Cambridge, UK*

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Abstract

This paper presents new estimates of total factor productivity growth in Britain for the period 1770–1860. We use the dual technique and argue that the estimates we derive from factor prices are of similar quality to quantity-based calculations. Our results provide further evidence, calculated on the basis of an independent set of sources, that productivity growth during the British Industrial Revolution was relatively slow. The Crafts–Harley view of the Industrial Revolution is thus reinforced. Our preferred estimates suggest a modest acceleration after 1800.

JEL classification: N13; O47; O52

Keywords: British industrial revolution; Productivity growth; Dual measurement of productivity

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* Corresponding author.
E-mail addresses: pol@mit.edu (P. Antràs), hjv23@cam.ac.uk (H.-J. Voth).

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1. Introduction

How rapid was productivity growth during the Industrial Revolution? Since the pioneering studies of Ashton (1948) as well as Deane and Cole (1962), this question has been central to the economic history of Britain, 1750–1850. It is also of wider interest for the speed and timing of productivity changes following major inventions. After the introduction of electric motors and the computer, for example, productivity performance remained sluggish for decades. When it did pick up, total factor productivity (TFP) increases were rapid and widespread. Of course, technological change need not be mirrored in TFP growth. As the recent work of the Boskin commission and of Nordhaus demonstrates, traditional measures such as price indices may miss substantial product innovation altogether.[1] Yet it is important to examine how TFP changes during and after major inventions. Recent examples of slow productivity growth and rapid technical progress may not be aberrations, but could form part of a regular pattern if we can also demonstrate convincingly that England did not become much more efficient during the first few decades of the Industrial Revolution.[2]

Crafts and Harley have estimated modest rates of output growth during the Industrial Revolution.[3] Crafts found that Deane and Cole (1962) had chosen an inappropriate price index with which to deflate the nominal income series in the national accounts, thus overstating growth. He also compiled alternative indices for agricultural, industrial and service output. His finding of substantially slower growth was reinforced by Harley, who argued that the earlier estimates of industrial production by Hoffmann (1955) had seriously overestimated growth (by giving too high a weight to the revolutionary cotton sector). Since rates of input growth have not been similarly revised downwards, their results also imply that the Solow residual was only growing relatively slowly during the late eighteenth and early nineteenth century.[4]

Deane and Cole did not provide any estimates of total factor productivity growth during the industrial revolution. Later work by Feinstein (1981), however, showed that Deane and Cole's estimates implied remarkably rapid total factor productivity growth, especially for the period 1801–1831.[5] Using the standard, primal approach to growth accounting, Feinstein estimated annual productivity growth of 0.2% for the period 1760–1800 and of 1.3% for the period 1801–1830. The latest calculations by Crafts and Harley, based on their revised output series, imply increases of only 0.1% p.a. during 1760–1800 and 0.35% p.a. during 1800–1830 (Table 1). The new orthodoxy thus holds that both output and productivity growth were slow during the English Industrial Revolution. Also, advances were heavily concentrated in the 'revolutionizing sectors' such as cotton and iron manufacturing. These sectors were too small to have a sizeable impact on the manufacturing sector as a whole (and the

[1] Boskin et al. (1998) and Nordhaus (1997).

[2] David (1990).

[3] Crafts (1985), Harley (1982), and Crafts and Harley (1992).

[4] Voth (1998) revises labour input figures based on a sharp rise in working hours.

[5] Feinstein's revisions of Deane and Cole's estimates concentrated on the figures on capital formation. See Feinstein and Pollard (1988) for more on this issue.