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David Fielding  
Department of Economics  
University of Otago

Shel Rogers  
Department of English and Linguistics  
University of Otago

*Address for correspondence:*

Name David Fielding  
Department of Economics  
University of Otago  
PO Box 56  
Dunedin  
NEW ZEALAND  
Email: david.fielding@otago.ac.nz  
Telephone: 64 3 479 8653

# Monopoly Power in the Eighteenth Century

## British Book Trade

David Fielding

Department of Economics

University of Otago

Shef Rogers

Department of English and Linguistics

University of Otago

### *Abstract*

In conventional wisdom, the reform of British copyright law during the eighteenth century brought an end to the monopoly on the sale of books held by the Stationers' Company, and the resulting competition was one of the driving forces behind the expansion of British book production during the Enlightenment. In this paper, we analyze a new dataset on eighteenth century book prices and author payments, showing that the legal reform brought about only a temporary increase in competition. The data suggest that by the end of the century, informal collusion between publishers had replaced the legal monopoly powers in place at the beginning of the century. The monopoly power of retailers is not so easily undermined.

JEL classification: D42, L12, N83, Z11

Key words: book trade; publishing; copyright; retail monopoly

“It is, perhaps, not considered through how many hands a book often passes, before it comes into those of the reader; or what part of the profit each hand must retain, as a motive for transmitting it to the next.”

From Boswell’s *Life of Johnson*

## 1 Introduction

Until the mid-eighteenth century, authorial copyright in Britain and its colonies was perpetual. Almost all copyrights for the work of major English writers such as Shakespeare were held by the Stationers’ Company, a merchant guild based in London which had oversight over all aspects of the manufacture and sale of books. Copyright law gave the Stationers’ Company a permanent legal monopoly over the publication of these writers. Moreover, the publication of new, unknown writers entailed high risks, and the financial health of individual publishers depended on maintaining a diversified portfolio that included a substantial proportion of “safe” works that were part of the established canon. This constraint gave the Stationers’ Company a de facto monopoly over a large part of the English book trade. The monopoly was threatened by a reform of copyright law which culminated in a 1774 House of Lords ruling that copyright was now limited in term, so the Stationers’ Company no longer had sole right to publish works from the canon. The conventional view of this reform in the historical literature is exemplified by Rose (2009):

“The trade was opened up to new entrepreneurs; reprinting flourished; books became cheaper; and the audience for books grew.”

Thus, the reform of copyright law is seen as one of the driving forces behind the rise in book production during the Enlightenment.

However, the historical literature does not include any statistical analysis of the factors driving variation in book prices and payments to authors over the eighteenth century, so there is no direct quantitative evidence on the impact of copyright reform on the monopoly power of the Stationers' Company. In this paper we present such an analysis, using a newly constructed dataset on prices and payments over the period 1701-1800. Our analysis casts doubt on the conventional view. We find evidence that although copyright reform had a temporary effect on the level of competition in the book trade, by the end of the century the Stationers' Company had managed to re-establish its monopoly position, possibly through collusive arrangements with the "outsider" publishers who were threatening its profits. The introduction of a laissez-faire system did not lead to the establishment of a competitive market. Our results suggest that neither imperfect competition in retail markets (e.g. Cotterill, 1986; Dobson and Waterson, 1999; Smith, 2004; Deltas, 2008), nor the limited effect of some legislative innovations on retailer market power (Orea, 2011), are uniquely modern phenomena.

The next section discusses the eighteenth century publishing industry in more detail. This provides the context for the data analysis in sections 3-4.

## **2 The Eighteenth Century Book Trade<sup>1</sup>**

Up until the beginning of the eighteenth century, the production and retail of books in England was governed by the Licensing of the Press Act of 1662. Under this act, the right to publish a particular title was established when a member of the Stationers' Company entered the title as his "copy" in the guild register. Any disputes about rights to a copy were dealt with internally by the Company. Although the Company incorporated all trades associated with the production and sale of books, copyrights were mostly held by booksellers. In principle, holding a copyright gave the individual

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<sup>1</sup> See Rose (1993) for a detailed history of copyright law in this period.

bookseller a monopoly over the sale of the relevant title, but in practice most booksellers spread their risks by participating in a large number of joint ventures in which several individuals made use of the copyright held by one of them, sharing the production costs paid to the printers and bookbinders. Moreover, the Company collectively held the copyright on many popular works, and profits from the production and sale of these works were distributed as dividends on shares held by Company members. Belanger (1982) estimates that at the turn of the eighteenth century the English book trade was controlled by fewer than 100 booksellers.

The original Licensing Act was renewed in 1685, but this version of the act expired in the 1690s, and in 1695 parliament refused to renew it, the refusal being at least partly due to recognition that the act had created a monopoly (Astbury, 1978). The law was clarified by the Copyright Act of 1710, which assigned statutory copyright to new works for a fixed period of 14 years (renewable for another 14 years if the author was still alive), and extended the copyright on old works for a fixed period of 21 years: in other words, statutory protection of the Stationers' Company monopoly on the canon expired in 1731. However, during the 1730s members of the Company were successful in persuading English courts to grant injunctions that prevented independent publication of works from the canon (Feather, 1987),<sup>2</sup> lawyers for the Company arguing that perpetual copyright was part of English common law, regardless of any statutory legislation.<sup>3</sup> The injunctions did not establish a legal precedent, but they did allow the Company to preserve its monopoly after 1731.

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<sup>2</sup> Outside London, the threat of legal action seems always to have been enough to deter publication (Feather, 1985: chapter 1).

<sup>3</sup> The 1710 legislation included the provision that "nothing in this Act shall extend, or be construed to extend, either to prejudice or confirm any right that... any person or persons have... to the printing or reprinting of any book." The act was silent on whether any such right existed in common law (Amory, 1984).

The first challenge to the Stationers' Company monopoly came from Scotland in the 1740s. Until 1707, England and Scotland had been separate nation states under a single sovereign; tariffs had restricted the cross-border trade in books, and Scottish booksellers had dealt mainly in the Scottish titles over which they held a monopoly and, in some cases, pirated versions of English titles sourced from Ireland and the Netherlands (Bevan and McDougall, 2009). Very few English titles had been published in Scotland in collaboration with members of the Stationers' Company. The creation of the United Kingdom in 1707 brought free trade between England and Scotland, but the Scottish legal system was still largely separate from the English one. When in the 1740s Scottish booksellers began to market their own versions of English titles with expired copyrights, litigation by members of the Stationers' Company proved to be much less successful in the Scottish courts than it had been in English ones. The first case brought against the Scottish booksellers was inconclusive and the litigation was abandoned (McDougall, 1988). Through the 1750s and 1760s, Scottish booksellers were free to reprint titles with expired copyrights, and for over two decades the English and Scottish booksellers operated in completely different regulatory environments. Scottish reprints were exported to England (Walters, 1974), but the arbitrage appears to have been incomplete, with London prices of English versions nearly twice as high as the Scottish ones (Bevan and McDougall, 2009).<sup>4</sup> The regulatory inconsistency was eventually resolved in the case of *Donaldson v. Beckett* (1774), when, in response to ongoing disputes in the lower courts, the House of Lords considered the case for perpetual copyright as a common law principle. The Lords ruled against perpetual copyright, and Scottish freedoms were finally extended to England.

As noted above, the traditional interpretation of *Donaldson v. Beckett* is that it brought an end to the Stationers' Company monopoly, and the history of the eighteenth

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<sup>4</sup> The Scottish booksellers had to create their own distribution networks in England, and likely faced capacity constraints.

century book trade is divided into three periods: before the mid-1740s (monopoly over the canon in both England and Scotland), from the mid-1740s to 1774 (monopoly in England only; incomplete cross-border arbitrage), and 1774 onwards (competition in both England and Scotland). Some statistical data on the book trade can be interpreted in a way that is consistent with this account. For example, the grey line in Figure 1 shows annual estimates of the ratio of titles printed in Scotland to titles printed in England between 1700 and 1800. The data are taken from the British Library’s *English Short Title Catalogue* (ESTC) at <http://estc.bl.uk>. Until the mid-1740s, the ratio shows relatively little variation, with a mean of about 0.12. From the mid-1740s to the late 1760s, there is more variability in the annual figures and the mean is much higher, at around 0.22. Thereafter, there is a gradual decline in the ratio, and in the last two decades of the century the mean is again close to 0.12. The black line in Figure 1 illustrates these trends; this line is generated by fitting the following equation for the ratio in year  $t$  ( $r_t$ ):

$$r_t = \alpha + \frac{\beta_0}{1 + \exp(-\beta_1 \cdot (t - \beta_2))} + \frac{\gamma_0}{1 + \exp(-\gamma_1 \cdot (t - \gamma_2))} + u_t \quad (1)$$

Here,  $u_t$  is a least-squares regression residual. The estimates of the transition midpoints are  $\beta_2 = 1747$  and  $\gamma_2 = 1774$ ; both of the transition terms are significant at the 1% level. One interpretation of these trends is that until the mid-1740s there was an effective monopoly across both England and Scotland, with both English and Scottish booksellers restricting production of the works over which they had copyright in order to raise prices and/or depress authorial wages. In the middle of the century Scottish booksellers began to compete for the sale of English titles, but the Stationers’ Company was still trying to restrict the production of books in England, so Scottish production was relatively high. By the end of the century the English market became competitive too,

so English production expanded and the original ratio was re-established. This interpretation is also consistent with the rapid expansion in the number of titles published in England after 1774 (Suarez, 2009).

However, the expansion in book production in the later part of the century might alternatively be explained by an exogenous rise in the demand for books: the British population growth rate was as unusually high at this time (Madsen *et al.*, 2010), while per capita book consumption was stable (Buringh and van Zanden, 2009). Moreover, the traditional account downplays the rise of what Sher (2006: chapter 4) terms “the London-Edinburgh publishing axis”. In the first half of the eighteenth century, collaboration between English and Scottish booksellers was minimal: each year saw only a handful of titles published as joint ventures. In the middle of the century this began to change, the fashion for joint publication being spearheaded by the Edinburgh firm of Alexander Kincaid and John Bell and the London firm of Scottish expatriate Andrew Millar. The grey lines in Figures 2-3 illustrate this trend, showing ESTC data on the annual number of joint English-Scottish publications as a fraction of the total number of publications. Figure 2 shows the data for titles printed in Scotland while Figure 3 shows the data for English and Scottish imprints combined. The black trend lines in the figures are calculated by fitting the following equation for joint publications in year  $t$  ( $p_t$ ):

$$p_t = \delta + \frac{\zeta_0}{1 + \exp(-\zeta_1 \cdot (t - \zeta_2))} + v_t \quad (2)$$

Here,  $v_t$  is a least squares regression residual. The estimated transition midpoint is  $\zeta_2 = 1772$  (for Figure 2) and  $\zeta_2 = 1770$  (for Figure 3); the transition terms are both significant at the 1% level. Over the later part of the century, the fraction of joint publications multiplied by a factor of four in Scotland, and by a factor of six across the



whole of Britain. Many of the jointly published titles had originally been protected by perpetual copyright, and one interpretation of the trends in Figures 2-3 is that English booksellers responded to the onset of Scottish competition by including the Scots in their collusive arrangements: the formal monopoly of the Stationers' Company was transformed into an informal monopoly that brought Scottish booksellers into the fold. In this case, the decline in the ratio of Scottish publications to English publications in the later part of the century represents not the beginning of competitive levels of production by English booksellers but the end of competitive levels of production by Scottish ones.

In order to test this hypothesis directly, we need to analyse data on book prices and payments to authors across the eighteenth century. Such data have not previously been available, but in the next section we present a newly compiled dataset on prices and payments that can be used for this purpose.

### **3 Data on Book Prices, Authorial Payments, and their Covariates**

A monopoly retailer facing a downward-sloping consumer demand curve and an upward-sloping producer supply curve has an incentive to restrict output so as to raise the retail price and depress the producer price. In the case of the eighteenth century English book trade, the producer was an author creating intellectual property, the physical production and retail of books being handled by a vertically integrated monopolistic cartel in the form of the Stationers' Company. Therefore, the relevant retail price is the price of the book as sold in the store, and the relevant producer price is the payment to the author for the copyright. (Printers and booksellers faced other costs, for example labourers' wages and paper prices, but it is unlikely that they held any monopoly power in the markets for these inputs.) Bibliographic databases such as ESTC and *Eighteenth*

*Century Collections Online* (ECCO)<sup>5</sup> do not include details about book prices or authorial payments. However, it is possible to trace price and payment data for a small number of books in published historical sources. The dataset used in the analysis here, described in Fielding and Rogers (2015), matches price and payment data with ESTC entries for 439 individual titles, all recently copyrighted at the time of publication.<sup>6</sup>

Using this dataset, Figure 4 shows the sample distribution of the log of the ratio of the author's payment to the retail price of the book, while Figure 5 shows the sample distribution of the log of the retail price of the book divided by the number of sheets it comprised. (Sheets are a measure of book size: each printed sheet measures  $432 \times 343$  mm, and the number of pages per sheet depends on the format of the book: two pages per sheet for a folio publication, four for a quarto, eight for an octavo, and 12 for a duodecimo.) The distributions are approximately symmetrical, and sample moments are reported in the first two lines of Table 1. Table 1 also includes information about the frequencies of book format and genre, and the sex of the author. As discussed in Fielding and Rogers (2015), these frequencies do not exactly match those of the population of over 300,000 eighteenth century UK publications currently listed in ESTC and ECCO: folio publications are slightly under-represented in the sample and works of fiction are over-represented. It will therefore be important to control for format and genre when estimating the determinants of the inter-temporal variation in payments and prices.

Of the 439 titles in the sample, 409 are purely English publications and 30 are Scottish-English joint ventures later in the century. One interpretation of the joint ventures is that they were a way for the English publishers to share some of their monopoly profits with the Scots, in order to mitigate cross-border competition. In this

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<sup>5</sup> See <http://gale.cengage.co.uk/gale-artemis/gale-artemis-primary-sources.aspx>.

<sup>6</sup> Being recently copyrighted new works (or new translations of old works), these books were all imperfect substitutes for existing works.

case, there might not be any variation in retail prices or authorial payments according to whether there was Scottish involvement in the project. However, Scottish involvement in the publication of a title might indicate that it was a closer substitute for purely Scottish publications sold in a more competitive market north of the border. Individual imprints appear to have been sold at the same price throughout the United Kingdom, so the need to market a book in Scotland as well as England might have exerted some downward pressure on its price, and the need to find an author appealing to Scottish tastes might have exerted some upward pressure on authorial payments. In this case, we should expect Scots involvement to be associated with somewhat higher authorial payments and somewhat lower retail prices, closer to (although still different from) their competitive levels. In the analysis which follows, the joint ventures will be included in the sample, and we will allow for them to be associated with different average retail prices and authorial payments. However, the overall results are very similar if the joint ventures are simply excluded: further details are available on request.

When modelling the effect of the changing regulatory environment on payments and prices, it will be important to control for time-varying cost factors that might affect a bookseller's profit-maximising choices. The statistical analysis in the next section uses two measures of bookseller costs: the log of the annual price of paper and the log of the annual craft wage. Sample moments for these series, taken from Clark (2005, 2007), are reported in Table 1. *Ceteris paribus*, higher costs are likely to reduce the profit-maximising volume of publications, raising the retail price of books and lowering authorial payments. However, higher wages in the economy may shift the authorial supply curve upwards: this will tend to magnify any rise in the retail price of books but also raise authorial payments. The Clark datasets contain other input prices, but these are highly correlated with paper prices and wages, and their addition to the model in the next section does not yield any statistically significant effects.

A second time-varying factor that might affect booksellers' price and authorial payment choices is the anticipated future demand for books. In the presence of capacity adjustment costs, a firm's decisions about current capacity (and therefore current payments and prices) should depend on expected future demand. One measure of anticipated future demand in the industry is the number of apprentices. A larger number of apprentices indicates higher anticipated future demand, which should be correlated with greater current capacity and, potentially, lower book prices and higher authorial payments. The Stationers' Company operated an extensive apprentice system, apprentices serving a standard period of seven years, and the enrolment of apprentices is recorded in the *London Book Trades Project* database (LBTP) at [www.sharpweb.org/london-book-trades-project](http://www.sharpweb.org/london-book-trades-project).<sup>7</sup> From these data, it is possible to construct an annual time series for the log of the total number of apprentices in employment, illustrated in Figure 6. A higher level of apprentice employment should be associated with lower book prices and higher authorial payments. Apprentice employment is unlikely to have been independent of bookseller pricing decisions, so our statistical analysis will rely on instruments for employment that should be correlated with exogenous determinants of the demand for books: these are the log of real UK gross domestic product and the log of the total UK population. Both series are taken from Clark (2005, 2007).

## 4 Modelling Book Prices and Authorial Payments

### 4.1 Model structure

In the conventional account, the eighteenth century market for books is divided into three periods: before the mid-1740s (monopoly throughout Britain), the mid-1740s to 1774 (monopoly in England challenged by Scottish competition), and after 1774 (competition throughout Britain). If this account is correct, then (conditional on format,

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<sup>7</sup> Most of the LBTP apprentice data are taken from McKenzie (1978).

genre, the sex of the author, wages, paper prices, and apprentice numbers) the final period should be characterized by higher authorial payments and/or lower retail prices for books than the initial period. Also, the middle period may exhibit features intermediate between the initial and final periods, if the Scottish competition had some effect on English pricing policy. Taking 1743 (the year that the initial case against the Scottish booksellers collapsed) as the end of the initial period,<sup>8</sup> one way to test these predictions is to fit the following model:

$$y_{it} = \mu + X'_{it}\theta + Z'_t\lambda + \varphi_1 \cdot I[t > 1743] + \varphi_2 \cdot I[t > 1774] + \eta_t + \varepsilon_{it} \quad (3)$$

Here,  $y_{it}$  stands for either the log of the payment-price ratio for book  $i$  published in year  $t$  or the log of the price per sheet. (There is a single observation for each book.)  $X_{it}$  is a vector comprising indicator variables for the book's format (default category = *duodecimo*) and genre (default category = *afterpieces*), plus the sex of its author (default category = *male*) and whether it is a joint Scottish-English publication (default category = *not joint*).  $Z_t$  is a vector comprising the logs of craft wages, paper prices and apprentice numbers in year  $t$ .  $I[t > 1743]$  is an indicator variable for years after 1743 and  $I[t > 1774]$  is an indicator variable for years after 1774. Finally,  $\eta_t$  is a year-specific random effect and  $\varepsilon_{it}$  is a residual. The parameters to be estimated are  $\mu$ ,  $\varphi_1$ ,  $\varphi_2$ , the elements of the vectors  $\theta$  and  $\lambda$ , and the variance of  $\eta_t$ . The log of apprentice numbers is treated as an endogenous regressor, using the logs of UK real GDP and total population as instruments. We will report the results of fitting such a model to the sample of 439 books in the Fielding-Rogers dataset. If the traditional view is correct, then we should find that for the payment-price ratio  $\varphi_2 > 0$  and possibly  $\varphi_1 > 0$ , but for the price per sheet  $\varphi_2 < 0$  and possibly  $\varphi_1 < 0$ .

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<sup>8</sup> It makes little difference to the results if some other year in the 1740s is used instead.

Our alternative interpretation of the eighteenth century book trade is that any competition was limited to the middle of the century, when Scottish book production was relatively high. In this case, we should find that for the payment-price ratio  $\varphi_1 \approx -\varphi_2 > 0$  and for the price per sheet  $\varphi_1 \approx -\varphi_2 < 0$ . In this case, a better model of  $y_{it}$  might be to replace  $I[t > 1743]$  and  $I[t > 1774]$  with the trend term in Figure 1, which captures the intensity of Scottish competition during the middle of the century. We will also report the results of fitting such a model.

One complicating factor in the interpretation of the estimated parameters in equation (3) is that craft wages, paper prices, apprentice numbers, the annual average payment-price ratio, or the annual average price per sheet might contain a stochastic trend, in which case the standard distributions of test statistics such as the t-ratio will not be relevant. For this reason, Table 2 includes Augmented Dickey-Fuller (ADF) test statistics for these time series. These statistics suggest that there is no stochastic trend in the payment-price ratio or in the price per sheet: the null that the annual averages of these variables contain such a trend can be rejected at the 1% level. Nevertheless, the annual averages are based on a small number of individual observations,<sup>9</sup> so there could be some stationary measurement error that makes the ADF test statistics on annual data over-powered. Therefore, Table 2 also includes ADF test statistics for five-year averages. Even though the five-year average sample comprises only 19 observations, the null that the series contain a stochastic trend can still be rejected at the 5% level.

However, the null of a stochastic trend in wages, paper prices and apprentice numbers cannot be rejected at conventional confidence levels,<sup>10</sup> so it is necessary to simulate the distributions of the t-ratios on the parameters in equation (3) under the

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<sup>9</sup> For three years there are no recorded payments or prices at all, which is why the test sample size  $N \ll 100$ , even though the data span 1701-1800.

<sup>10</sup> The null of a stochastic trend in the first differences of the series can be rejected, so none of them is integrated to order I(2).

null that these three variables are difference-stationary time series. The simulation involves 10,000 replications of the following model:

$$\tilde{y}_{it} = \mu + X'_{it}\theta + \tilde{Z}'_t\lambda + \varphi_1 \cdot I[t > 1743] + \varphi_2 \cdot I[t > 1774] + \eta_t + \varepsilon_{it} \quad (4)$$

In each replication, the simulated dependent variable is  $\tilde{y}_{it} = \tilde{\eta}_t + \tilde{\varepsilon}_{it}$ , where  $\tilde{\eta}_t$  and  $\tilde{\varepsilon}_{it}$  are independent normal variables drawn from the distributions  $N(0, \sigma_{\eta}^2)$  and  $N(0, \sigma_{\varepsilon}^2)$ , the variance parameters  $\sigma_{\eta}^2$  and  $\sigma_{\varepsilon}^2$  having first been estimated by fitting an equation  $y_{it} = \eta_t + \varepsilon_{it}$  to the sample data. The vector  $\tilde{Z}_t$  comprises three independent random walk processes.<sup>11</sup> It turns out that the simulated 5% critical values of the t-ratios on the  $\lambda$  and  $\varphi$  parameters are no larger than the conventional value of 1.96. However, the simulated 5% critical values of the t-ratios on the  $\theta$  parameters are slightly larger, in the range 2.1-2.2. This difference should be noted in the interpretation of the results which follow.

## 4.2 Results

Table 3 shows the results of fitting equation (3) to the data.<sup>12</sup> Four sets of regression parameters are shown, varying according to (i) whether the dependent variable is the log payment-price ratio or the log price per sheet and (ii) whether the indicator variables  $I[t > 1743]$  and  $I[t > 1774]$  or the Figure 1 trend is used to capture structural breaks in competitiveness. The table also reports three test statistics designed show whether equation (3) adequately captures the time-series variation in the data: (i) a t-

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<sup>11</sup> The absolute values of the parameters of correlation between the growth rate of apprentices, the growth rate of the craft wage and the growth rate of the paper price are all less than 0.1 and insignificantly different from zero.

<sup>12</sup> The results are produced using the *xtivreg* routine in Stata 12.

test of the significance of the correlation between  $\varepsilon_{it}$  and  $\eta_{t-1}$ ; (ii) a t-test of the significance of a linear time trend added to the regression equation; (iii) a Wald  $\chi^2$ -test of the joint significance of year fixed effects. In no case does any of the test statistics indicate significance at the 5% level, so equation (3) does appear to be a reasonable representation of the time-series variation in the data. (However, the year fixed effects are significant at the 10% level in the price per sheet models, and the effect of including them will be noted in due course.)

The parameters in Table 3 indicate that there is considerable systematic variation in both the payment-price ratio and the price per sheet according to the format and genre of the book in question: both the format and the genre variables are jointly significant at the 5% level in all versions of the model. As one might expect, larger format books are associated with a much higher price per sheet. For example, the parameter of 1.6 on the *folio* variable indicates that on average, holding all other factors constant, folio editions (with relatively large and ornate bindings) retailed at five times the price per sheet of duodecimo editions.<sup>13</sup> Moreover, the format parameters in the payment-price model are roughly half as large as those in the price per sheet model, indicating that a substantial proportion of the extra revenue from large-format publications went to the author. This suggests that on average, larger formats were associated with more prestigious authors who had greater bargaining power. Holding format constant, medical works attracted a relatively low price per sheet while afterpieces and dramatic works were associated with a relatively high payment-price ratio. This last effect suggests that dramatists may have had more bargaining power than other writers, possibly because theatrical productions gave dramatists more name recognition. Holding format and genre constant, female writers are associated with both

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<sup>13</sup> Note that  $\exp(1.6) \approx 5$ .



a lower average price per sheet and a lower average payment-price ratio; however, neither effect is significant at the 5% level.<sup>14</sup>

The parameters on the Scottish-English joint venture variable are all significant at the 1% level. In the payment-price ratio equations, the estimate is close to 1.0, indicating that the ratio is about 2.7 times higher for joint ventures. In the payment per sheet equations, the estimate is close to  $-0.2$ , indicating that the price is about 20% lower for joint ventures. Both effects suggest that joint ventures are associated with authorial payments and retail prices closer to a competitive level. However, the 20% difference in prices is much lower than the discounts on the cheap Scottish exports to England discussed in the introduction, which were aimed at undercutting existing English titles. In other words, it is still reasonable to interpret the joint ventures in terms of Scots sharing in some of the English monopoly profits and publishing books marketed through English distribution networks, with a lower profit margin that is perhaps explained by a closer substitutability between the joint ventures and purely Scottish works marketed in Scotland.<sup>15</sup>

The t-ratios for parameters on individual time-varying factors (the log paper price, log craft wage and log apprentice numbers) are statistically insignificant in most versions of the model. However, the levels of the craft wage and apprentice numbers are quite highly correlated ( $\rho \approx 0.8$ ), so the t-ratios may be biased downwards. In all but one version of the model, Wald  $\chi^2$ -tests indicate the joint significance of the log craft

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<sup>14</sup> Nevertheless, female writers were heavily over-represented prose fiction, which was the second lowest-earning genre, holding format constant. Moreover, books in this genre were more frequently produced in duodecimo format (especially if the writer was a woman), so the average female writer was earning much less than the average male writer.

<sup>15</sup> Conceivably, the difference in the margin could have varied over the century as the level of competitiveness in the English market changed. However, with only 30 joint ventures, the sample is too small for a test of such an effect to have much power. When the appropriate interaction terms are added to the models, the parameters on them are insignificantly different from zero.

wage and log apprentice numbers at the 1% level.<sup>16</sup> (In the remaining version, the parameters are jointly significant at the 5% level: see the final column of Table 3.) In the price per sheet models, the wage parameter is greater than zero and the apprentice parameter less than zero, while in the payment-price ratio models both parameters are positive: all of these signs are consistent with theory. However, as noted above, the year fixed effects are significant at the 10% level in the price per sheet models, and the addition of these fixed effects leads to jointly and individually insignificant parameters on all of the time-varying factors.

Conditional on all of these factors, the models of the price per sheet do not produce statistically significant parameters on either the indicator variables  $I[t > 1743]$  and  $I[t > 1774]$  or the Scottish share trend from Figure 1. There is no evidence for any variation in retail pricing policy over the century. One possible explanation for the insignificance of these effects is that the sample is too small; however, there *are* statistically significant effects in the model of the payment-price ratio. The estimates indicate that  $\varphi_1 \approx -\varphi_2 > 0$ , which is consistent with our alternative hypothesis of competition only in the middle of the century, and the parameter on the Scottish share trend is significantly greater than zero. The parameter estimate of 6.6 indicates that transition from the mean value of the share at the beginning and end of the century (0.12) to the mean value in the middle of the century (0.22) raises the payment-price ratio by around 90%.<sup>17</sup> In other words, the middle of the century saw writers earning much more relative to the prices for which their books sold. This effect is robust to the exclusion of other regressors: when the Scottish share trend is the only variable in the model, the estimated parameter is equal to 5.2 and significant at the 1% level.

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<sup>16</sup> The simulations discussed above suggest that it is appropriate to use the conventional  $\chi^2$  distribution for these tests.

<sup>17</sup> Note that  $\exp((0.22 - 0.12) \times 6.6) \approx 1.9$ .

Although the insignificance of the Scottish share trend in the price per sheet model may simply reflect a small sample size, it could also be the case that Scottish competition really did affect producer prices much more than retail prices. The demand for books may well have been very price elastic while the authorial supply curve was rather inelastic: there were many alternative luxuries to books and relatively few alternative careers for the average writer. In this case, any expansion of supply under more competitive conditions would generate a relatively large rise in authorial wages and a relatively small fall in book prices.

## 5 Conclusion

Data presented in Baten and van Zanden (2008) show a strong positive correlation between *per capita* book production and literacy rates in England between 1450 and 1650, but between 1650 and 1800 literacy rates rose while *per capita* book production was stagnant. The eighteenth century *was* a period of increasing Enlightenment, but this was not a consequence of a greater availability of books. The middle of the century saw the advent of some of the most important publishing houses in the English-speaking world, such as Longman and Murray, but evidence presented in this paper suggests that publishers at the end of the century exercised just as much monopoly power as those at the beginning, and monopolists have an incentive to restrict supply. At the end of the century, retail book prices were just as high as at the beginning (relative to costs) and payments to authors were just as low. Changes to copyright law saw a period of competition in the middle of the century when authors fared relatively well, but this period was short-lived.

The results also suggest a high level of strategic sophistication on the part of the English publishers wielding monopoly power. During the middle part of the century they did litigate against the legal reforms which threatened their monopoly power by giving market access to Scottish publishers. But while this (ultimately unsuccessful)

litigation was still ongoing, the English publishers were already starting to increase their level of collaboration with the Scots. In the end, the transformation of an English cartel into a British cartel seems to have had minimal impact on English profits. As in many other markets, legislation to raise the level of competition had very little effect.

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TABLE 1  
DESCRIPTIVE STATISTICS

(i) Sample Distributions ( $N = 439$ )

	<i>mean</i>	<i>std. dev.</i>	<i>minimum</i>	<i>maximum</i>
log payment-price ratio	5.46	1.22	1.95	8.52
log price per sheet	-3.90	0.55	-5.38	-1.76
log paper price	2.50	0.13	2.21	2.89
log wage	3.06	0.10	2.92	3.41
log apprentices	6.15	0.20	5.86	6.66

(ii) Shares of Different Formats and Genres,  
of Male and Female Authors, and of Joint Ventures ( $N = 439$ )

<i>format:</i>	duodecimo	0.21	quarto	0.17
	octavo	0.56	folio	0.06
<i>genre:</i>	afterpieces	0.02	history	0.12
	drama (comedy)	0.12	law	0.03
	drama (musical)	0.03	medical	0.02
	drama (tragedy)	0.06	phil. / religion	0.08
	other drama	0.06	politics	0.04
	epic verse	0.03	science	0.02
	other verse	0.11	travel	0.02
	prose fiction	0.19	reference	0.02
	satire	0.01	periodicals	0.01
	criticism	0.03		
<i>sex of author:</i>	female	0.12	male	0.88
<i>publishers:</i>	English only	0.93	Scottish-English joint venture	0.07

TABLE 2  
AUGMENTED DICKEY-FULLER TEST STATISTICS

(i) ADF Test Statistics for the Average Log Payment-Price Ratio and Log Price Per Sheet

<i>data</i>	<i>deterministic components</i>	<i>annual averages</i>			<i>5-year averages</i>		
		<i>N</i>	<i>lags</i>	<i>t<sub>ADF</sub></i>	<i>N</i>	<i>lags</i>	<i>t<sub>ADF</sub></i>
log payment-price ratio	intercept	86	2	-3.14	19	0	-3.40
	intercept + trend	94	0	-9.23	19	0	-3.97
log price per sheet	intercept	94	0	-6.54	19	0	-3.52
	intercept + trend	94	0	-9.34	19	0	-3.73

(ii) ADF Test Statistics for Other Variables

<i>variable</i>	<i>deterministic components</i>	<i>N</i>	<i>lags</i>	<i>t<sub>ADF</sub></i>
log craft wage	intercept	95	4	3.42
	intercept + trend	95	4	1.84
log paper price	intercept	97	2	-2.01
	intercept + trend	97	2	-1.60
log apprentices	intercept	93	7	-0.75
	intercept + trend	93	7	-2.05



TABLE 3  
RANDOM EFFECTS IV ESTIMATES ( $N = 439$ )

		<i>log payment – price ratio</i>				<i>log price per sheet</i>			
		<i>coef.</i>	<i>t ratio</i>	<i>coef.</i>	<i>t ratio</i>	<i>coef.</i>	<i>t ratio</i>	<i>coef.</i>	<i>t ratio</i>
<i>format</i>	octavo	0.573	3.67	0.562	3.62	0.318	5.99	0.327	6.13
	quarto	0.512	2.56	0.482	2.46	0.981	14.36	0.964	14.28
	folio	0.820	3.20	0.768	3.01	1.637	18.86	1.651	18.97
<i>genre (relative to afterpiece)</i>	drama (comedy)	-0.010	-0.02	-0.036	-0.09	-0.039	-0.29	-0.069	-0.51
	drama (musical)	-0.782	-1.72	-0.765	-1.67	0.228	1.47	0.216	1.38
	drama (tragedy)	0.336	0.81	0.318	0.77	-0.002	-0.01	-0.032	-0.23
	other drama	-0.180	-0.44	-0.203	-0.49	-0.021	-0.15	-0.039	-0.28
	epic verse	-0.837	-1.77	-0.816	-1.73	0.061	0.38	0.040	0.25
	other verse	-0.669	-1.69	-0.662	-1.67	-0.099	-0.73	-0.119	-0.88
	prose fiction	-1.299	-3.22	-1.322	-3.32	-0.199	-1.45	-0.221	-1.62
	satire	-0.872	-1.58	-0.913	-1.69	0.137	0.73	0.085	0.46
	criticism	-1.827	-3.90	-1.901	-4.07	-0.060	-0.37	-0.085	-0.53
	history	-1.425	-3.63	-1.436	-3.66	-0.098	-0.73	-0.115	-0.86
	law	-2.101	-4.66	-2.099	-4.64	-0.108	-0.70	-0.121	-0.78
	medical	-0.619	-1.18	-0.606	-1.15	-0.441	-2.45	-0.449	-2.49
	philosophy / religion	-1.480	-3.49	-1.502	-3.66	-0.123	-0.85	-0.169	-1.20
	politics	-1.400	-3.10	-1.419	-3.23	-0.003	-0.02	-0.046	-0.31
	science	-1.178	-2.48	-1.168	-2.45	0.088	0.54	0.076	0.47
	travel	-0.641	-1.32	-0.669	-1.38	-0.170	-1.03	-0.182	-1.09
	reference	-0.770	-1.60	-0.769	-1.61	-0.102	-0.62	-0.130	-0.79
periodicals	-0.976	-1.40	-1.006	-1.50	-0.040	-0.17	-0.120	-0.52	
	female author	-0.265	-1.53	-0.274	-1.60	-0.042	-0.72	-0.049	-0.84
	Scottish joint venture	1.046	4.64	1.066	4.76	-0.217	-2.78	-0.220	-2.83
<i>time-varying factors</i>	log paper price	-0.146	-0.32	-0.315	-0.67	-0.252	-1.35	-0.257	-1.34
	log craft wage	2.508	1.23	2.586	1.66	1.743	2.14	1.101	1.79
	log apprentices	0.366	0.28	0.592	0.88	-0.540	-1.01	-0.068	-0.25
	$t > 1743$			0.537	3.30			0.005	0.07
	$t > 1774$			-0.634	-2.90			-0.030	-0.35
	Scottish share trend	6.585	4.48			0.294	0.49		
<i>significance tests</i>	$\text{corr}(\varepsilon_{it}, \eta_{t-1})$	p = 0.18		p = 0.31		p = 0.20		p = 0.06	
	linear time trend	p = 0.73		p = 0.96		p = 0.38		p = 0.07	
	year fixed effects	p = 0.75		p = 0.74		p = 0.07		p = 0.08	
	joint significance of log craft wage & log apprentices	p < 0.01		p < 0.01		p < 0.01		p = 0.05	

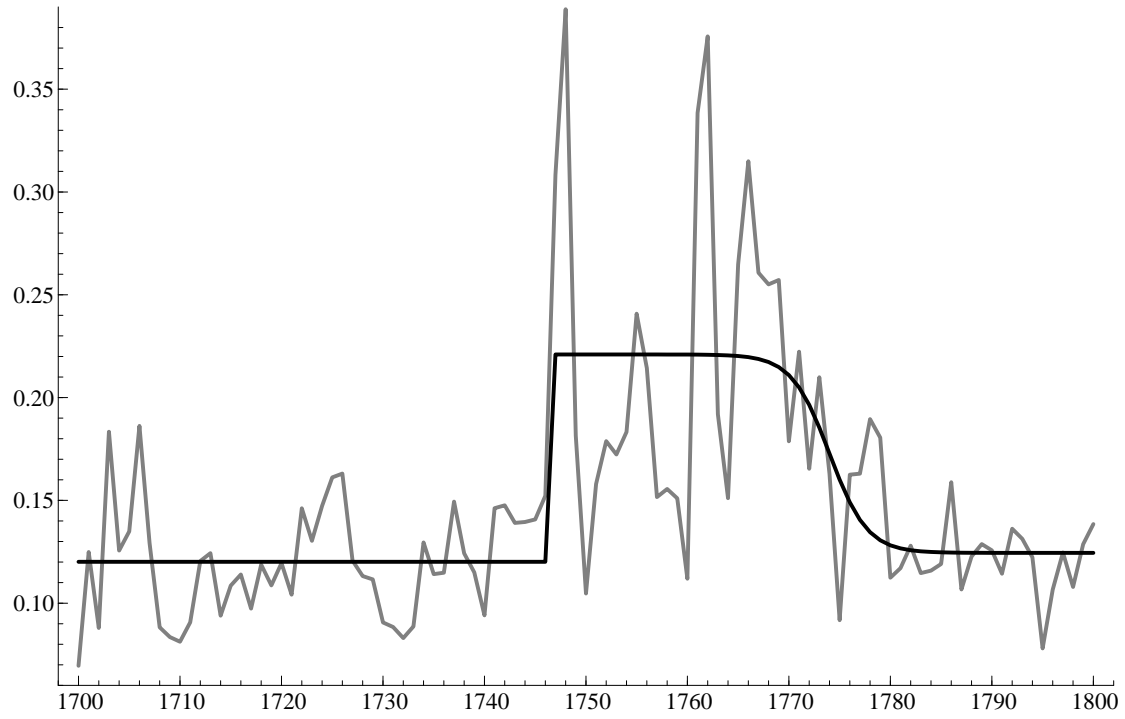


FIGURE 1

PUBLICATIONS IN SCOTLAND ÷ PUBLICATIONS IN ENGLAND

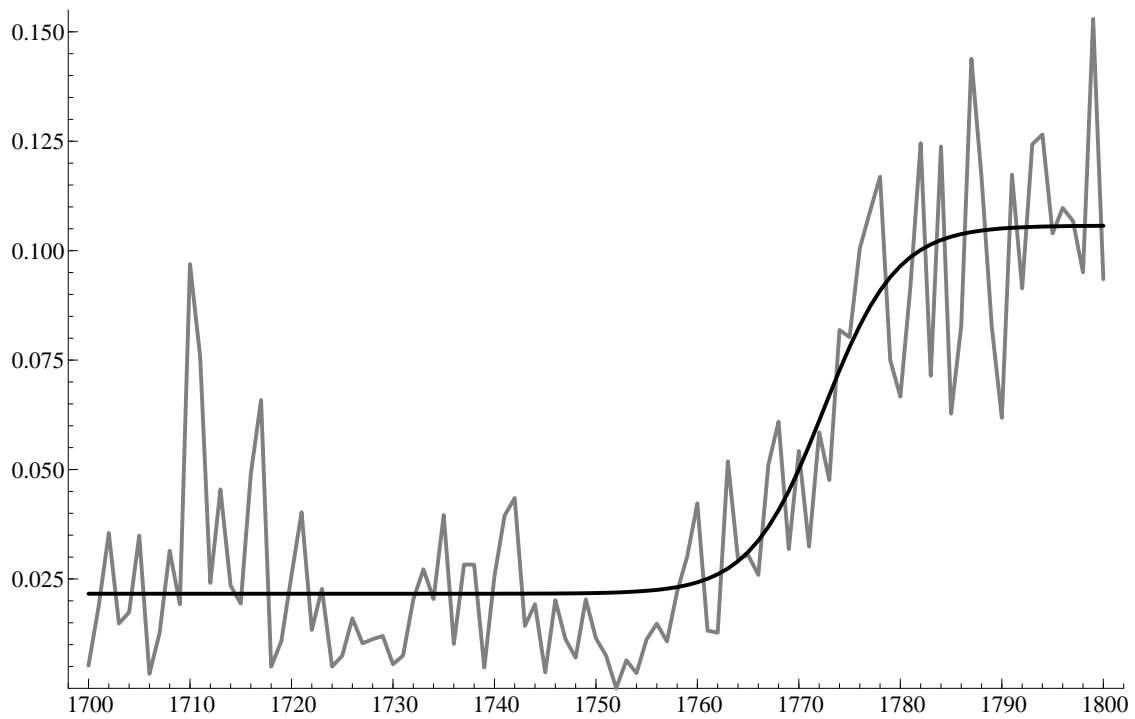


FIGURE 2

IN SCOTLAND: JOINT SCOTTISH-ENGLISH PUBLICATIONS ÷ TOTAL PUBLICATIONS

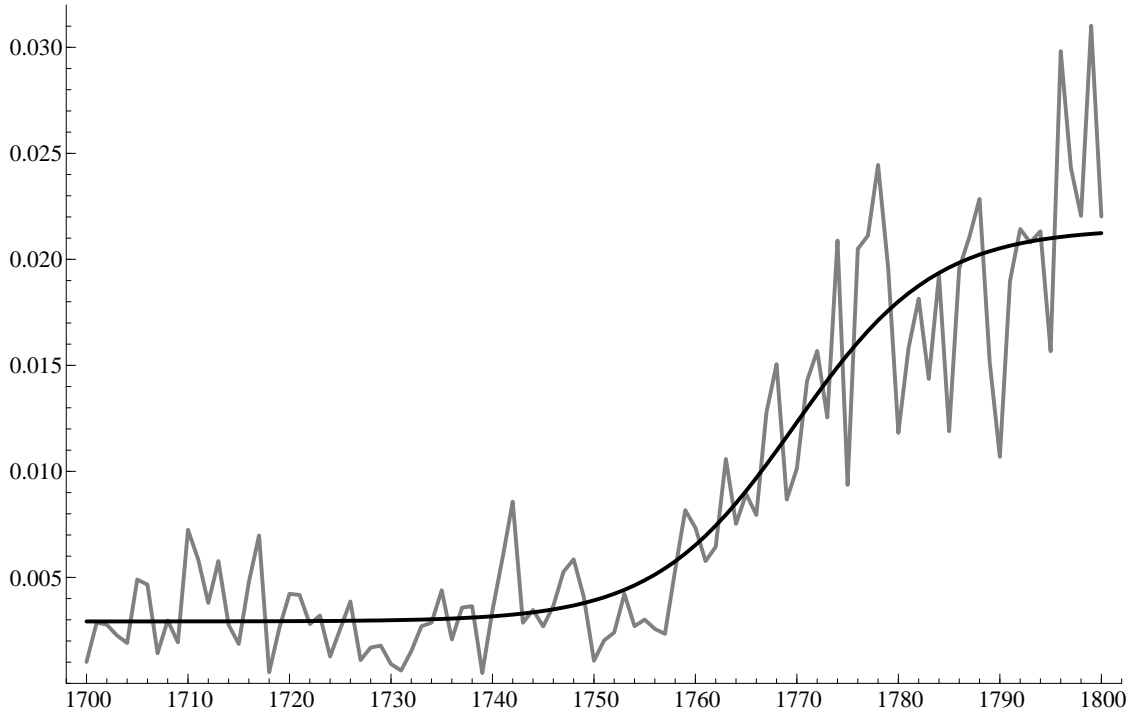


FIGURE 3

ACROSS BRITAIN: JOINT SCOTTISH-ENGLISH PUBLICATIONS ÷ TOTAL PUBLICATIONS

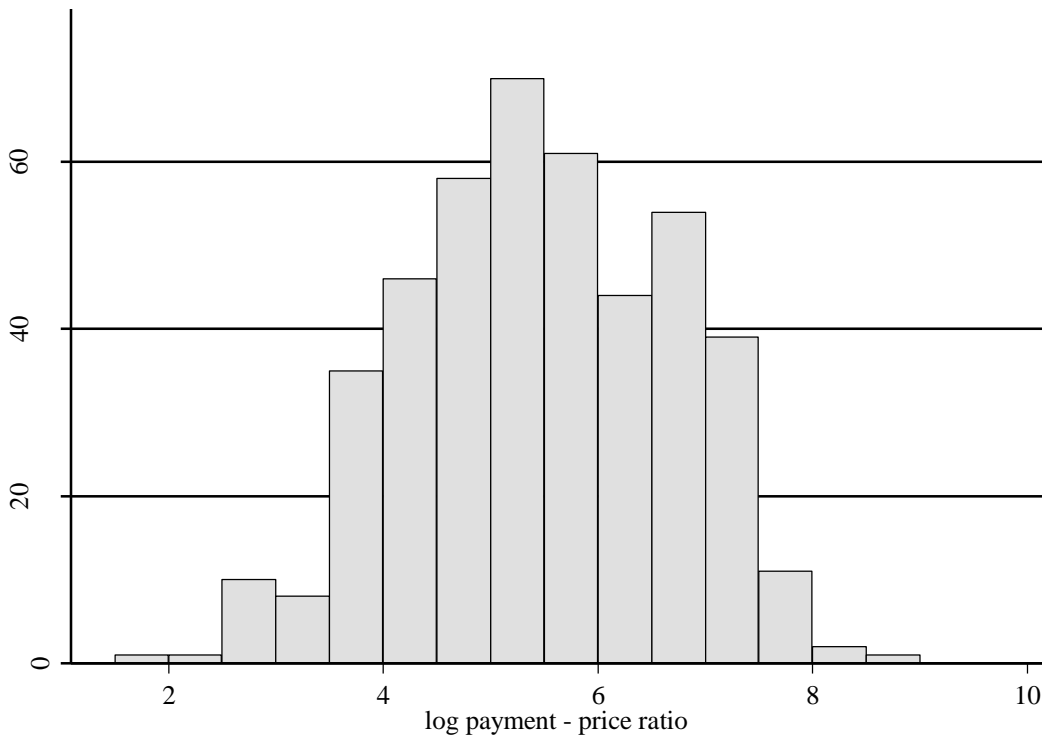


FIGURE 5

SAMPLE DISTRIBUTION OF THE LOG PAYMENT-PRICE RATIO

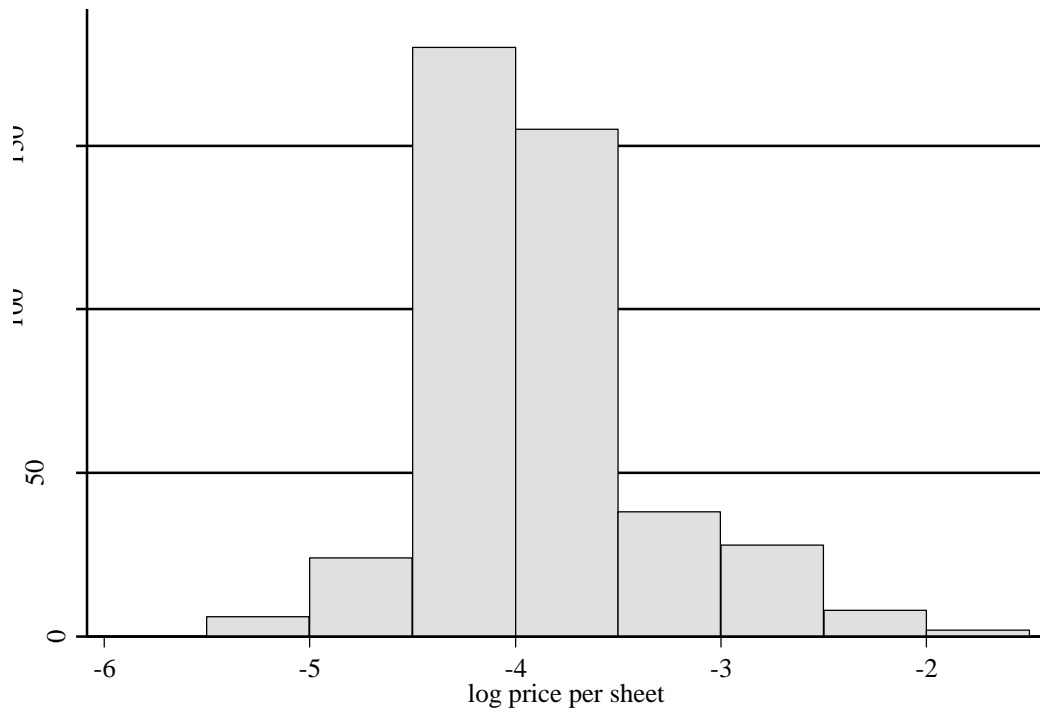


FIGURE 5  
 SAMPLE DISTRIBUTION OF THE LOG PRICE PER SHEET



FIGURE 6  
 THE LOG OF ANNUAL APPRENTICE EMPLOYMENT IN THE COMPANY