

# **The occupational structure of England c.1710 to c.1871**

## **Work in progress**

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For further details of the wider project see:  
<http://www.geog.cam.ac.uk/research/projects/occupations/>

### **Abstract**

This paper presents new evidence on the male occupational structure of England c.1710 deriving from c.1000 baptism registers and provides a preliminary analysis of the implications of the data. The key finding is that the secondary sector was perhaps twice as large, in terms of male employment, at the beginning of the eighteenth century as historians have been suggested in recent years. One implication of this is that most of the growth in the relative importance of secondary sector employment, normally associated with the post 1750 period, in fact preceded the eighteenth century. A further implication is that the increase in the productivity of the secondary sector was much larger than has been argued in the national accounts literature. The paper also explores regional differences and documents the scale of de-industrialisation in southern England over the eighteenth century. It also provides a more speculative discussion of likely trends in female employment.

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<sup>1</sup> ESRC: *The changing occupational structure of nineteenth century Britain* (RES-000-23-1579) and ESRC: *Male occupational change and economic growth in England 1750-1851*, RES 000-23-0131; The Leverhulme Trust, *The occupational structure of England and Wales c.1379-c.1729*.

This paper is very much work in progress. At the time of writing the estimates for the period around 1710 have been available for about three weeks. This is therefore not a very considered in-depth interpretation of the data but is very much a first look at new data and its implications. The paper is multi-authored. However, it needs to be emphasised that the paper is the result of work by an even larger group of people as can be seen from figure 1.

**Figure 1 People who contributed to the paper**

<b>Project management:</b> Leigh Shaw-Taylor
<b>Production of the estimates of occupational structure c.1710 and c.1817 from the raw data.</b> P.M Kitson.
<b>Drafting the paper:</b> Leigh Shaw-Taylor
<b>Occupational coding:</b> E.A. Wrigley and R.S. Davies
<b>Population data:</b> E.A. Wrigley. Research assistance: S. Bottomley
<b>Database construction:</b> P.M. Kitson and G. Newton
<b>Management of early register data collection:</b> J. Field
<b>Data collection for early registers:</b> O. Dunn, J. Field and P.M. Kitson
<b>Management of 1813-20 data collection:</b> P.M. Kitson.
<b>Collection of 1813-20 data:</b> J. Barker, R. Churchley, O. Dunn, S. Hennesey, P.M. Kitson, A. Jones, V. Masten, N. Modha, L. Monaghan-Pisano, S. Sovic, G. Stanning, T. Swain, A. Warren, L. Ward, M. Ward, M. Westlake.
<b>Input of published census material:</b> R. Tyler with assistance from S., Basten, L. J. Gibbs, Monaghan-Pisano, G. Stanning, and M. Westlake.
<b>Spatial matching of datasets:</b> P.M. Kitson, G. Newton, M. Satchell, E.A. Wrigley. Research assistance from: S. Basten, S. Bottomley, Z. Crisp, J. Gibbs, G. Wade, S. Thompson, D. Walsh and R.M. Whyte.
<b>GIS resource creation:</b> M. Satchell.
<b>GIS mapping:</b> M. Satchell and J. Field.

The paper is part of a long-run project covering the period 1379-1911 which has been funded by the ESRC and the Leverhulme Trust with some additional funding from the British Academy. All of the occupational data have been coded to the PST system of occupational classification devised by Tony Wrigley.<sup>2</sup> At the simplest level of the PST scheme, illustrated in figure 2, all occupations are coded to one of three sectors: primary, secondary or tertiary.

**Figure 2 PST Definitions**

- Primary Sector: Agriculture, forestry, estate work, fishing and mining.
- Secondary sector: manufacture, construction, handicraft. Anyone making something.
- Tertiary sector: all services - transport, retail, wholesale, professional, clerical, hospitality, government, military.

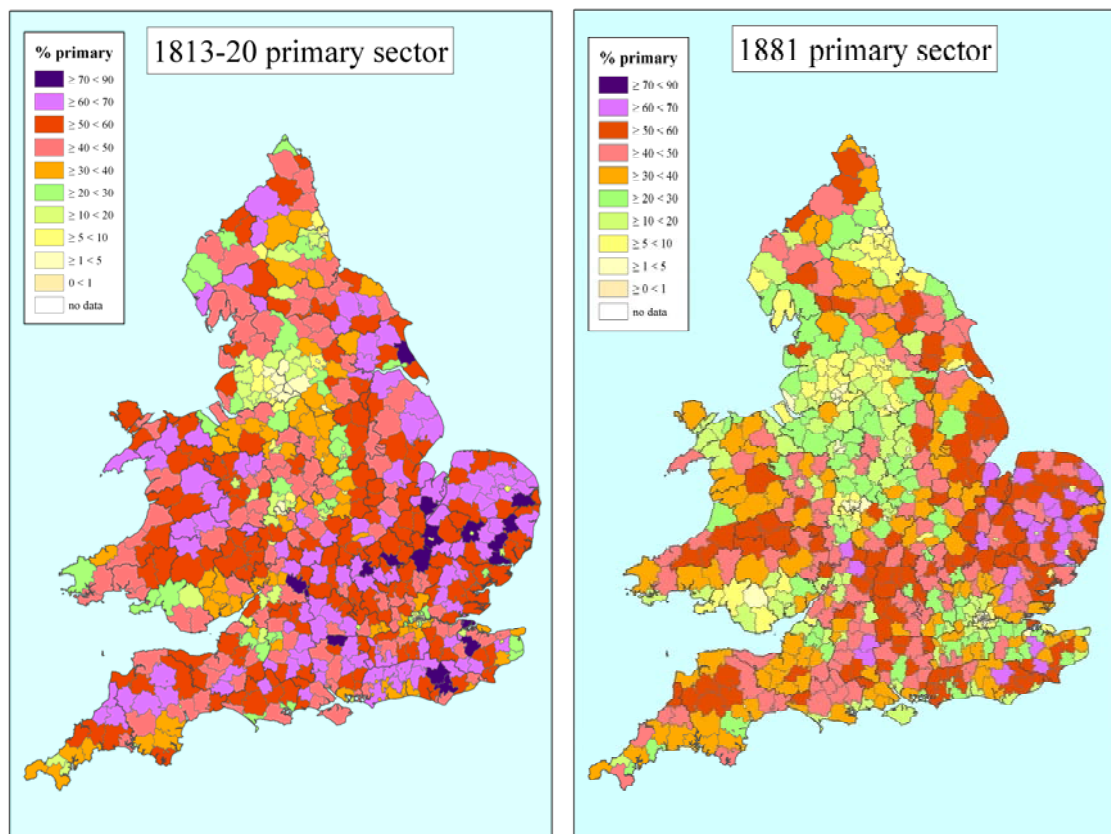
At its most complex level though the system recognises 1,600 distinct occupational groupings and all the data have been coded to one or other of these groupings. We have presented data on the period 1750-1871 previously.<sup>3</sup> What we can present now, that is new, are data for the beginning of the eighteenth century.

<sup>2</sup> For a more detailed account of the system see: Wrigley, E.A., 'The PST System.'

<sup>3</sup> Shaw-Taylor, L. et al, 'The occupational structure of England c.1750 to 1871: A preliminary report.'

We will begin by reviewing what we already know about the nineteenth century before presenting new data on the eighteenth century.<sup>4</sup> Figure 3 (below) shows the percentage of adult males employed in the primary sector (with mining excluded so this was predominantly agriculture) in each mid nineteenth century registration district in 1813-20 on the left and in 1881 on the right.<sup>5</sup> The data for 1813-20 (sometimes abbreviated to c.1817 – the midpoint of the dataset) derive from c.11,400 Anglican baptism registers and were collected as part of two ESRC funded projects. From 1<sup>st</sup> January 1813 it was a legal requirement to record the occupations of fathers in Anglican baptism registers for all legitimate births. For technical reasons we have used the term ‘Anglican registration unit’ to describe the area represented by a baptism register rather than refer to them as parishes and chapelries.<sup>6</sup> The data for the 1881 map derive ultimately from the Census Enumerators’ books but were originally made machine-readable by the Mormon church and were then enhanced by Kevin Schürer and Matthew Woollard at the University of Essex.<sup>7</sup>

**Figure 3 The percentage of adult males employed in the primary sector (excluding mining) in 1813-20 and 1881.**



<sup>4</sup> For a more detailed account of the nineteenth century see: Shaw-Taylor et al, ‘The occupational structure of England and Wales c.1817 to 1881.’

<sup>5</sup> The registration districts are those of 1851. We have patched the 1813-20 and 1881 datasets into those registration districts. This was done to make them comparable with the occupational data published by registration district in the published census reports of 1851 and 1861.

<sup>6</sup> This is because while many of these units were indeed parishes or chapelries some of them were in fact those parts of parishes not covered by chapelries which were therefore neither parishes or chapelries.

<sup>7</sup> Schürer, K., and Woollard, M., *1881 Census for England and Wales (enhanced version)*.

As one might expect agriculture was declining in importance in almost all parts of England and Wales but its share of employment varied considerably between different regions.

Figure 4 below shows the percentage of adult males employed in the secondary sector in each mid-nineteenth century registration district in 1813-20 on the left and in 1881 on the right. The data derivation is the same as for figure 3.

**Figure 4 The percentage of adult males employed in the secondary sector in 1813-20 and 1881.**

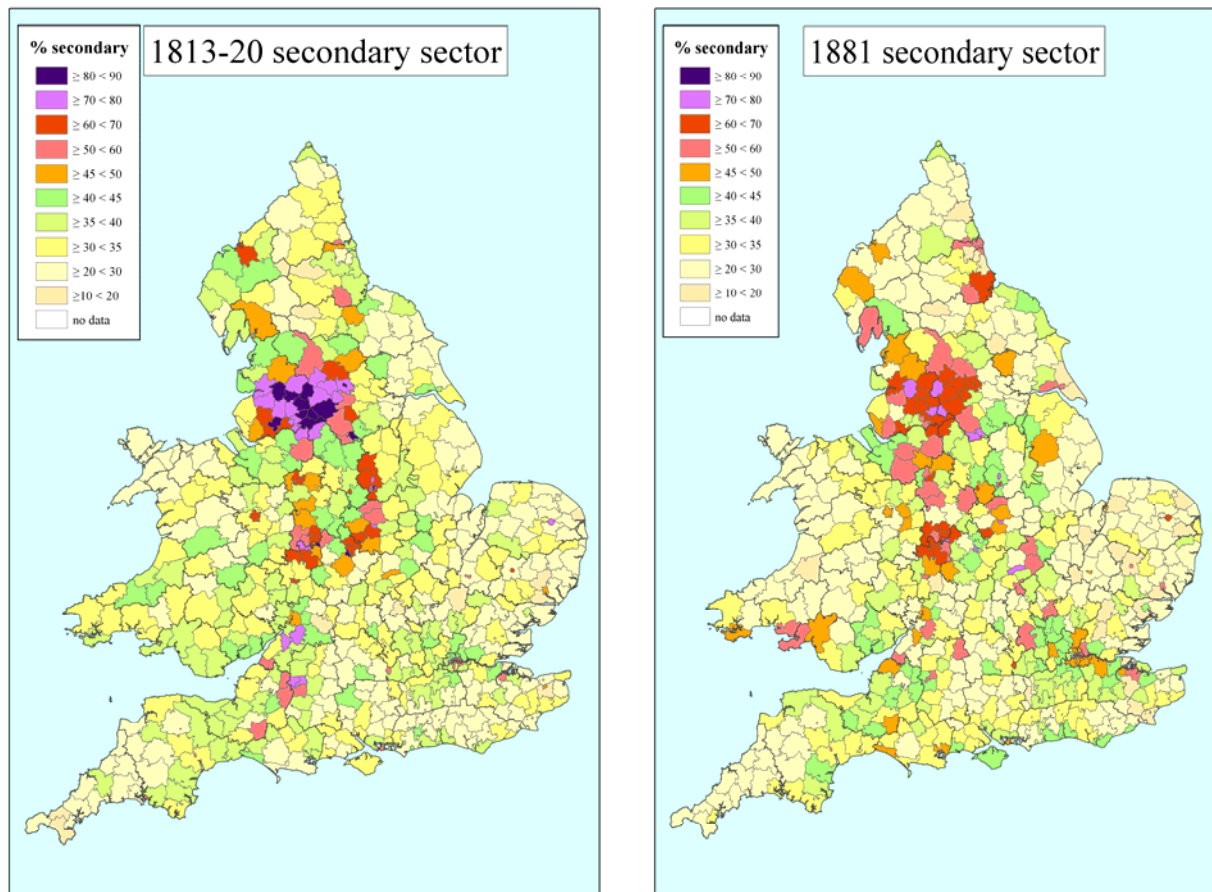
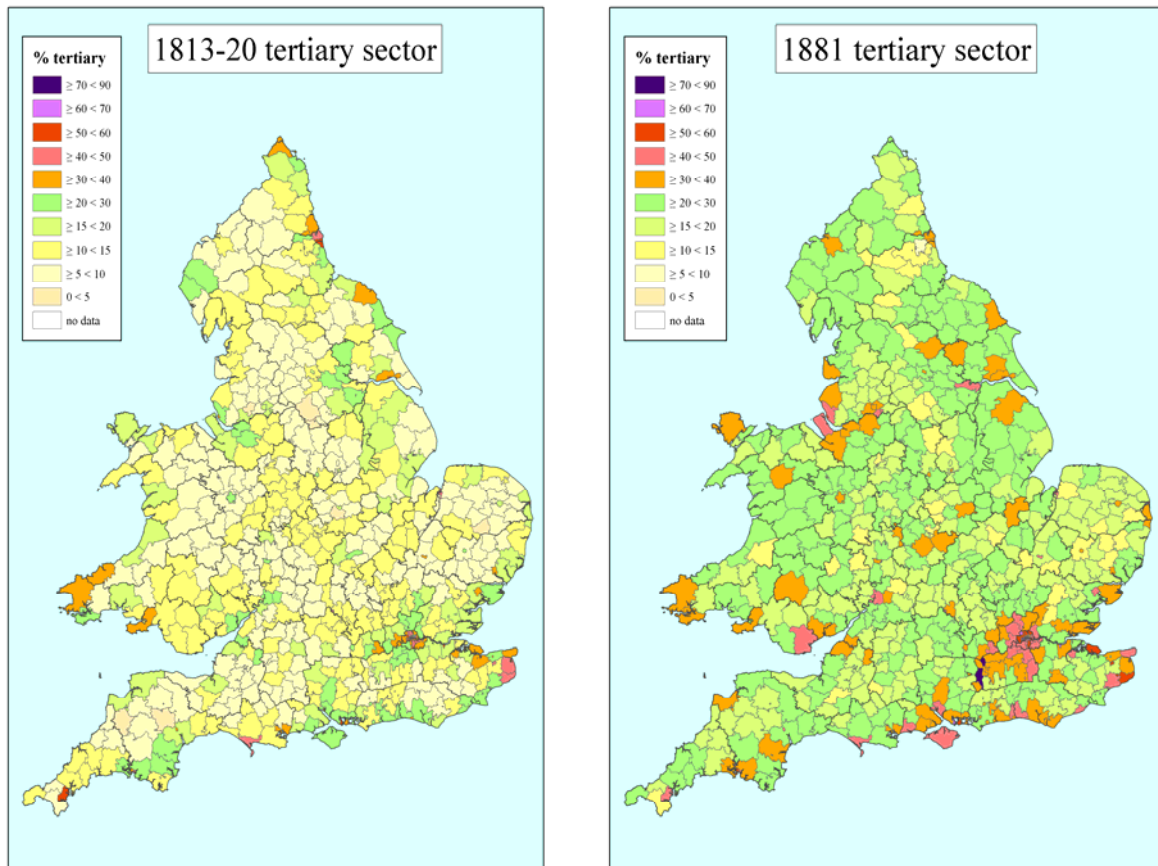


Figure 4 shows that there was very little change in the broad regional geography of secondary sector employment over the course of the nineteenth century.<sup>8</sup> Nationally the increase in the share of secondary sector employment was very modest rising from 42.2 per cent in 1813-20 to 46.8 per cent in 1871. Given that this encompasses the second half of the period conventionally described as the Industrial Revolution this is a very modest change indeed.

Figure 5 shows the percentage of adult males employed in the tertiary sector in each mid nineteenth century registration district in 1813-20 on the left and in 1881 on the right. The data derivation is the same as for figure 3.

<sup>8</sup> There are some very interesting second order features of the map which cannot be explored in this paper. In particular the declining relative importance of the secondary sector within industrial districts over the period 1813-20 to 1881 and the emergence of some new areas of industrial concentration by 1881, most notably in the north-east and in south Wales.

**Figure 5 The percentage of adult males employed in the tertiary sector in 1813-20 and 1881.**



It is clear from figure 5 that rapid tertiary growth took place in nearly all parts of England and Wales between 1813-20 and 1881. At a national level structural change consisted largely of a shift from agricultural to tertiary employment.

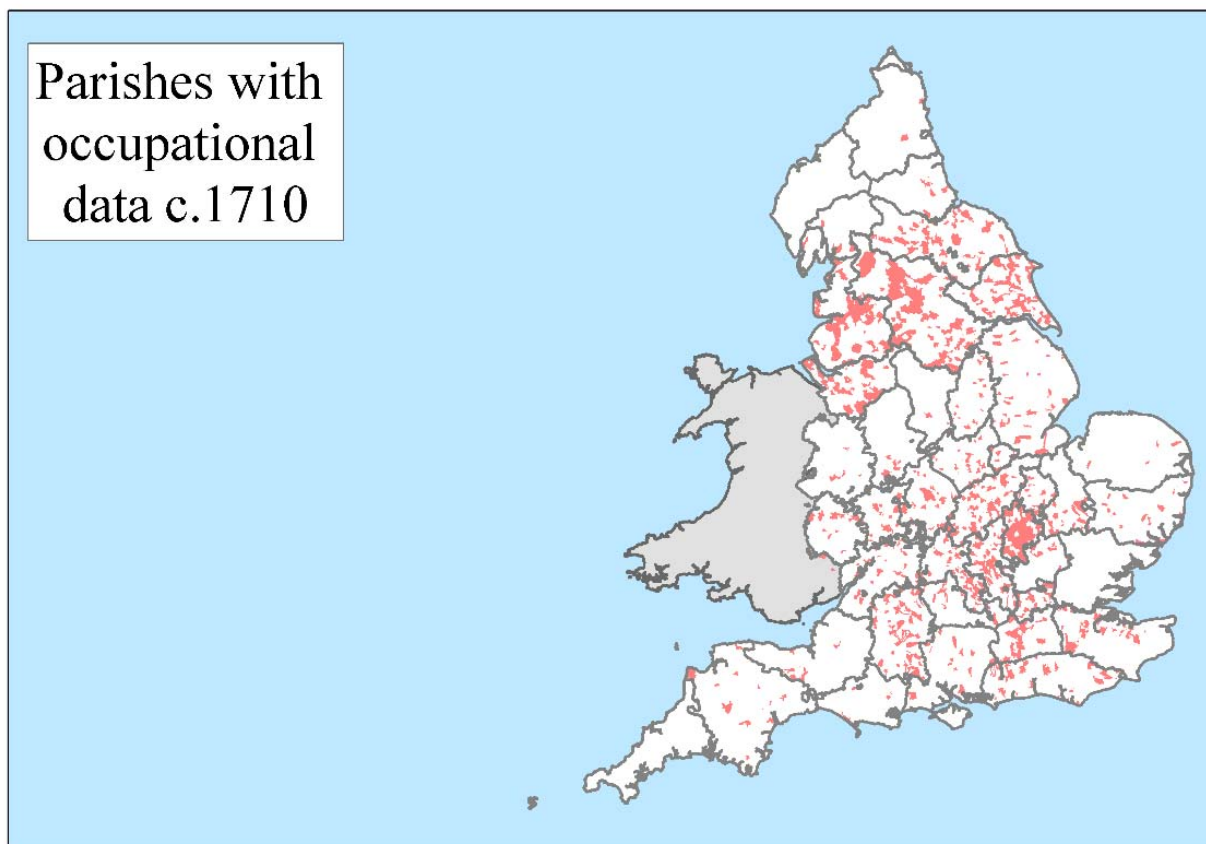
It is never going to be possible to acquire such spatially comprehensive male occupational data for any date before 1813. Nevertheless, some Anglican parish registers did record occupations before 1813. Whilst collecting the 1813-20 data on the two ESRC funded projects it also proved possible to search all 11,400 baptism registers in England and Wales for occupational recording between 1690 and 1799.<sup>9</sup> With funding from the Leverhulme Trust we are in the process of collecting the data from those registers which record occupations for the period between 1695 and 1729.<sup>10</sup> There are data for around 1,200 parishes and chapelries in England and Wales (around ten per cent of all parishes and chapelries). The location of around 1,000 parishes and chapelries in England for which we currently have data are shown in figure 6 while figure 7 indicates the percentage of parishes and chapelries this represents in each ancient county.

<sup>9</sup> ESRC: RES-000-23-1579 and ESRC: RES 000-23-0131

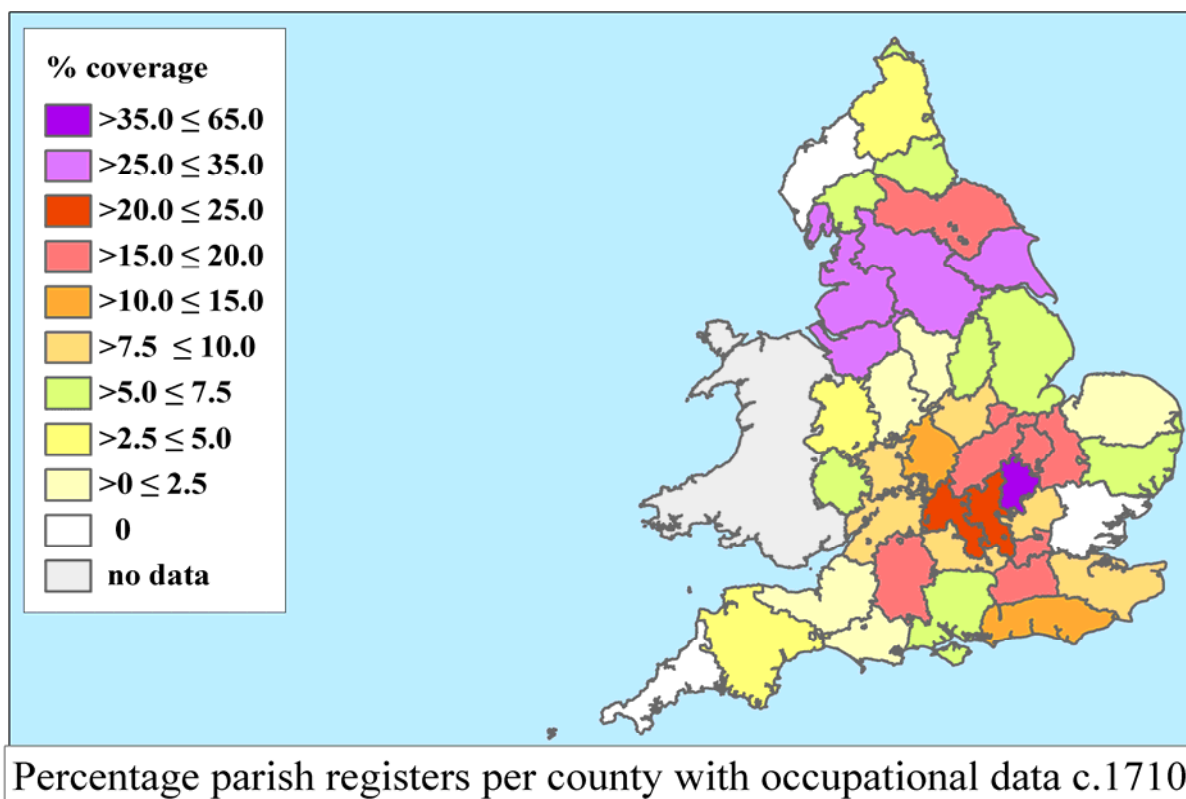
<sup>10</sup> For a detailed discussion of the recording of occupations in Anglican baptism registers between 1695 and 1813 see: P.M. Kitson, 'The recording of occupations in the Anglican baptism registers of England and Wales, 1690-1799.'



**Figure 6** Parishes with occupational data in the baptism registers c.1710

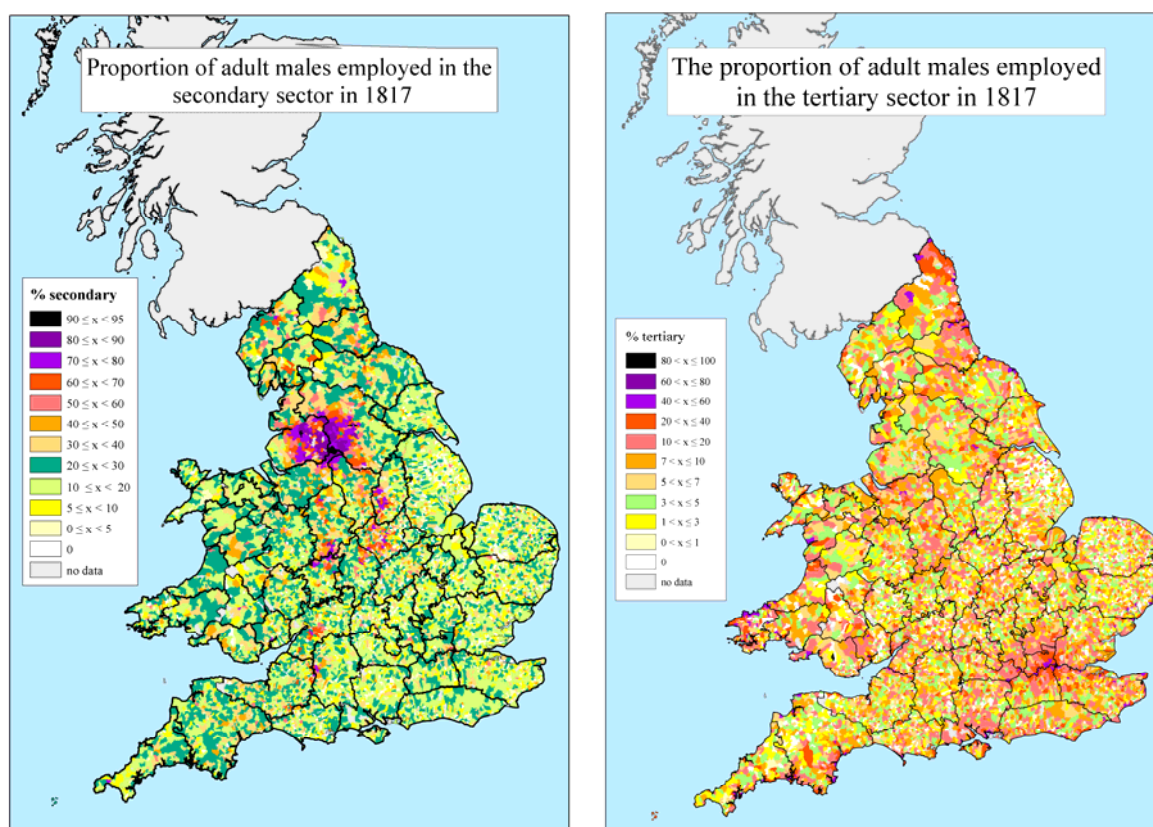


**Figure 7** Percentage of parishes within each county with occupational data in the baptism registers c.1710



Even though we have a very large sample with around 1,000 out of 10,000 units in England it is evident that this is a very long way from a random sample. It is clear from figures 3 to 5 that, even at registration district level, occupational structure is highly geographically variegated. Figure 8 below demonstrates that this even more starkly at parish level.

**Figure 8 The proportion of males in the secondary and tertiary sectors in 1813-20 by parish**



Given the highly variegated nature of occupational structure, a non-random sample of even as many as 1,000 units is unlikely to be fully representative of the country as a whole. However, because we have data for all 11,400 parishes and chapelries in 1813-20 then, for whatever area we can get data for periods before 1813, it is possible to get data for exactly the same area in 1813-20. The degree of bias caused by making such a selection in 1813-20 is straightforward to establish. Applying the same correction factor that would be necessary in 1813-20 to data from earlier periods this makes it viable to re-weight non-random samples with some degree of plausibility.<sup>11</sup>

Table 1 shows our raw results. In the first phase of coding all occupations were coded to the primary, secondary or tertiary sectors with the exception of labourers. The description 'labourer' will, in a majority of cases, refer to a labourer in agriculture. However, not all labourers worked in agriculture and the accurate

<sup>11</sup> This is not the only approach to re-weighting the data but it is the only one used in this preliminary exploration of the data. In time we plan to use a variety of approaches to re-weighting the data and to triangulate the different approaches which should serve to limit the possible scale of errors to modest levels.

sectoral allocation of labourers poses a major methodological problem to which we will return shortly. The first column of data in table 1 shows the results from our non-random sample c.1710. The second column shows the results for the parallel sample of the same set of units in 1813-20 whilst the last column shows the results for England as a whole in 1813-20. It is clear from comparing columns 2 and 3 that the sample is biased towards parishes with a rather higher than average share of the workforce in the secondary sector, though the bias is not overwhelming.

**Table 1 Sectoral occupational breakdowns for England in the c.1710 sample and in c.1817**

	<b>SAMPLE c.1710</b>	<b>SAMPLE c.1817</b>	<b>TOTAL c.1817</b>
<b>Sector</b>	<i>%</i>	<i>%</i>	<i>%</i>
<b>Primary</b>	<b>20.2</b>	<b>12.2</b>	<b>14.9</b>
<b>Secondary</b>	<b>42.5</b>	<b>47.2</b>	<b>39.2</b>
<b>Tertiary</b>	<b>15.4</b>	<b>14.9</b>	<b>17.2</b>
<b>Labourers</b>	<b>22.0</b>	<b>25.7</b>	<b>28.7</b>
<i>TOTAL</i>	<i>100</i>	<i>100</i>	<i>100</i>
<b>N</b>	153,866	349,322	2,605,361

Table 2 documents the re-weighting methodology used here. The first column shows the uncorrected c.1710 data. The second column shows the correction factor used – which is the ratio of the third to second columns in table 1. The third column shows the estimates this generates for national male occupational structure in c.1710.

**Table 2 Estimating England's male occupational structure c.1710**

	<b>SAMPLE c.1710</b>	<b>Correction factor</b>	<b>TOTAL c.1710</b>
<b>Sector</b>	<i>%</i>		<i>%</i>
<b>Primary</b>	<b>20.2</b>	<b>1.2</b>	<b>24.1</b>
<b>Secondary</b>	<b>42.5</b>	<b>0.8</b>	<b>34.5</b>
<b>Tertiary</b>	<b>15.4</b>	<b>1.2</b>	<b>17.4</b>
<b>Labourers</b>	<b>22.0</b>	<b>1.1</b>	<b>24</b>
<i>TOTAL</i>	<i>100</i>		<i>100</i>

Table 3 repeats the estimate for c.1710 in the first column. In the second column is our data from 1813-20 and in the third column data for 1851 deriving from the



published census. We must now return to the issue of how to allocate labourers between the primary, secondary and tertiary sectors.<sup>12</sup> In 1851, and for later census derived datasets, this is relatively simple since the census itself divided labourer into agricultural labourers and other labourers. At that date around 75 per cent of all labourers were agricultural.

**Table 3    Estimate of England's male occupational structure c.1710 compared with 1817 and 1851**

	<b>c.1710</b>	<b>1817</b>	<b>1851</b>
<b>Sector</b>	<i>%</i>	<i>%</i>	<i>%</i>
<b>Primary</b>	<b>24.1</b>	<b>14.9</b>	<b>14.6</b>
<b>Secondary</b>	<b>34.5</b>	<b>39.2</b>	<b>40.1</b>
<b>Tertiary</b>	<b>17.4</b>	<b>17.2</b>	<b>23.1</b>
<b>Labourers</b>	<b>24.0</b>	<b>28.7</b>	<b>21.2</b>
<i>TOTAL</i>	<i>100</i>	<i>100</i>	<i>100</i>

Table 4 below shows our current estimates for the relative size of the primary, secondary and tertiary sectors between c.1710 and 1871 based on the estimated occupational structure in 1710 discussed above and some preliminary procedures for allocating labourers to each sector. For the moment we are making two stylised assumptions to allow us to allocate these non-agricultural labourers. Firstly, that they all belong in mining within the primary sector, or within the secondary sector, or in transport within the tertiary sector. Secondly, that they should be allocated to mining, the secondary sector and transport in proportion to the size of those sectors as measured before any allocation of labourers. In the future we expect to be able to improve on this method of allocating non-agricultural labourers, but any changes are unlikely to produce major revisions to the results. The third and fourth columns of table 4 show the results of this procedure in 1851 and 1871. For the pre-census estimates for c.1710 and 1813-20 we also need to adopt a procedure for allocating labourers between agriculture and the rest. The basis for doing this is discussed elsewhere.<sup>13</sup> But the basic methodology is to use the share of labourers in the non-agricultural sectors in 1851 in the same area as the basis for the allocation of labourers to mining, the secondary sector and transport at earlier dates and to allocate the residual to agriculture. This procedure results in around 80 per cent of all labourers being allocated to agriculture in both c.1710 and 1813-20 and the results are shown in the first and second columns of table 4.

One further adjustment has been made to the raw data for 1813-20 to produce the results shown in table 4. The 1813-20 data have been re-weighted by census derived population data to correct for differing levels of under-registration of baptisms between Anglican registration units. This procedure has been fully described

<sup>12</sup> For a much fuller discussion of this issue and the procedures adopted see Shaw-Taylor L., and Kitson, P.M., 'The sectoral allocation of labourers.'

<sup>13</sup> Ibid.

elsewhere.<sup>14</sup> As it happens it makes only a modest difference to the national figures. No such re-weighting has been effected for c.1710 because we do not currently have the local population data required for re-weighting. That will change in the future and may lead to some minor refinement of these estimates.

**Table 4 Current best guesses for England's male occupational sectoral distribution c.1710 to 1871**

	<b>c.1710</b>	<b>1817</b>	<b>1851</b>	<b>1871</b>
<b>Sector</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
<b>Primary</b>	<b>43.4</b>	<b>38.9</b>	<b>30.7</b>	<b>25.2</b>
<b>Secondary</b>	<b>38.7</b>	<b>42.2</b>	<b>45.3</b>	<b>46.8</b>
<b>Tertiary</b>	<b>18.0</b>	<b>18.9</b>	<b>24.0</b>	<b>28</b>
<b>TOTAL</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

*Note: The figures for 1817 to 1871 are fairly stable though some further adjustments may be made to the sectoral allocation of labourers. The figures for 1710 are provisional and likely to be subject to more change.*

Between 1710 and 1817 structural change for England as a whole was modest with a small fall of around 10 percent in the primary sector's share of the workforce. This was mirrored by a modest rise, of around 10 per cent, in the secondary share of male employment from 38.7 per cent to 47.2 and a 4 per cent rise in the tertiary sector's share from 18.0 to 18.9 per cent. Structural change consisted largely of a shift from primary to secondary sector employment as might be expected. The nineteenth century pattern was quite different. Between 1813-20 and 1871 the dominant structural shift was from primary employment to tertiary employment. The primary sector's share of male employment fell by 54 per cent whilst the tertiary sector rose by 48 per cent. The secondary sector's share of employment grew by only 11 per cent in the same period. Perhaps what is most striking about the new data is that the primary sector of the English economy accounted for less than half of male employment as early as 1710.

The virtual absence of tertiary growth in the eighteenth century is surprising in the light of our finding that this was most dynamic sector in the nineteenth century.<sup>15</sup> However, it must be borne in mind that these are highly provisional estimates at this stage so it is possible that future estimates will increase the growth of the tertiary sector somewhat. However, any such effect is unlikely to be large and it is equally possible that further work will remove or reverse what little tertiary growth we can measure. The remarkably large size of the secondary sector is very unlikely to be an artefact of either the crudeness of the re-weighting of the data used here or of the method of allocating labourers. In fact if we allocated all labourers to agriculture in c.1710, an entirely improbable allocation, we would only reduce the secondary sector's share of male employment to 34.5 per cent. What this suggests is that most

<sup>14</sup> Kitson, P.M. et al. 'The creation.'

<sup>15</sup> Shaw-Taylor, L et al, 'The occupational structure of England and Wales c.1817-1881.'

of the long-term rise in the share of secondary sector employment conventionally associated with the Industrial Revolution antedated c.1710.

The historiographical implications of these data can best be seen by comparing the data in table 4 with the estimates currently in use by historians. Table 5 shows the figures used by Nick Crafts which derive from Peter Lindert and Geoffrey Williamson's reworking of Gregory King's estimates.<sup>16</sup> It should be noted that the figures are not strictly comparable for three reasons. Firstly, Crafts' estimates nominally relate to Britain not England. That said, Lindert and Williamson's data for 1688 relate only to England and England was, demographically speaking, around 85 per cent of Britain. Secondly, Crafts' data include women as well as men. However, their inclusion in 1688 is again fairly nominal.<sup>17</sup> Thirdly, Crafts' data include mining within the secondary sector. However this was a very small sector in 1688 and reallocating mining to the secondary sector in our data would only increase the discrepancy between the two datasets. Our estimate for the share of the secondary sector is slightly more than twice the figure used by Crafts. It is inconceivable that the caveats just mentioned account for a large proportion of the difference between our estimates and those of Crafts.

**Table 5 Crafts' figures for Britain's labour force shares 1688-1841**

	1688 %	1759 %	1802-3 %	1841 %
Primary	55.6	48.0	41.7	22.2
Secondary	18.5	23.8	24.7	40.5
Tertiary	25.9	28.2	33.6	37.3
Total	100.0	100.0	100.0	100.0

*Note: Table 5 is not strictly comparable with table 4 because Crafts' data (1) nominally pertain to Britain (2) nominally include women (3) include mining in the secondary sector.*

It is, of course possible, that too many labourers have been allocated to the secondary sector in c.1710. However, even if we allocated all labourers to agriculture in c.1710 to produce a lower bound figure for the secondary sector we would still end up with an estimate of 35.5 per cent of the adult male workforce in the secondary sector which is still nearly twice the figure used by Crafts. The same procedure would produce an upper bound exercise of the proportion of the adult male workforce in agriculture of 48.1 per cent which is still substantially below Crafts' figure of 55.6 per cent in 1688.

It is important to stress that Lindert and Williamson were very open about the need for more data from parish registers to improve on the work they had begun.<sup>18</sup> Their own samples consisted only of between 27 and 51 parishes in each time period.<sup>19</sup> It should be very clear from figure 8, that a non-random sample of even 50 parishes out

<sup>16</sup> Crafts, N.F.R., *British economic growth*; Lindert, P.H., and Williamson, J.G., 'Revising England's social tables'; Lindert, P.H., 'English occupations, 1670-1811.'

<sup>17</sup> Lindert in essence was only able to document women in domestic service and appears therefore not to have counted women in the primary and secondary sectors. This may go some way towards explaining why the Lindert and Williamson estimates produce a much larger tertiary sector than the estimates presented here: Lindert, 'English occupations.'

<sup>18</sup> Lindert, 'English occupations', p.711-12.

<sup>19</sup> Lindert, 'English occupations', p.688.

of 10,000 carries a heavy risk of being very unrepresentative. As table 1 shows the problem is not eliminated even when the sample is increased twenty or forty-fold to cover 1,000 registration units. There may be a further source of difference between Lindert and Williamson's work and our own. We have imposed a very strict data quality threshold on parish registers for inclusion in our sample. We have only made use of parish registers where for a period of one or more years, 95 per cent of all legitimate baptism include the fathers' occupations.<sup>20</sup> Lindert used burial registers but it is not clear what level of occupational recording was required for a parish to be included in the sample.<sup>21</sup> It is possible that he set the threshold as low as 70 per cent. The ways in which that might bias the outcome can only be guessed at.

The new data indicate that the secondary sector was about twice the size (in employment terms) that Crafts' reworking of the Lindert and Williamson figures suggested for the beginning of the eighteenth century. It is unlikely that any subsequent reworking of our data will dramatically reduce the size of that discrepancy. While Crafts' work suggested that the economy was much more developed in 1688 than Deane and Cole had believed, our work suggests that Crafts' revisionism did not go far enough.<sup>22</sup> The fundamental question this finding opens up is during what period before c.1710 did the sustained rise in the relative importance of the secondary sector take place? Further research is currently underway on this vital question as part of the work funded by the Leverhulme Trust.<sup>23</sup>

The much larger size of the secondary sector in c.1710 implies a much slower growth in the size of the secondary sector during the eighteenth and nineteenth century. Whilst this will not affect the estimates made by Crafts and by Crafts and Harley of the rates of economic growth in the period it does have major implications for our understanding of growth rates in sectoral productivity.<sup>24</sup> The new findings must imply that productivity growth in the secondary sector was much greater in the period than is currently suggested in the national accounts literature. This may in turn imply that new technology had a much larger impact than is currently argued in that literature. That said it must be remembered that any increase in productivity could have been generated by Smithian processes (i.e. an increase in the division of labour). It is our intention, once the data are in a more final form, to investigate formally the implications for the Crafts-Harley story in collaboration with Crafts.

One of the attractions of occupational data is that it is possible to examine not just aggregate trends but regional and local trends too. In the next section of the paper I want to examine, in a highly preliminary way, some differences between the north and the south of England. Table 6 shows the male occupational structure for a number of northern counties for which have good data coverage c.1710.<sup>25</sup> Table 7 summarises the data we have available for a number of non-metropolitan southern

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<sup>20</sup> This is something of a simplification and algorithm used will be detailed in full either in the expanded version of this paper or in a separate publication.

<sup>21</sup> Lindert, P.H., 'English occupations', p. 689.

<sup>22</sup> Deane, P., and Cole, W.A., *British economic growth*; Crafts, N.F.R., *British economic growth*.

<sup>23</sup> We hope, within twelve months, to be able to map local population densities c.1676 for most of England and Wales. Since low population densities are characteristic of a predominantly agricultural economy and high population densities are suggestive of high levels of non agricultural activity this should provide a robust means of assessing the importance of non-agricultural employment in 1676. We also hope to be able to replicate this work for the later medieval period using the poll tax returns of 1379-81. All this work will be done as part of the new project funded by the Leverhulme Trust.

<sup>24</sup> Crafts, N.F.R., *British economic growth*; Crafts, N.F.R., and Harley, K., 'A restatement.'

<sup>25</sup> Cheshire, Lancashire, East Riding of Yorkshire, North Riding of Yorkshire and the West Riding of Yorkshire

English counties at that date.<sup>26</sup> In both these tables the re-weighted data have been used for c.1710.

A comparison of tables 6 and 7 reveals some striking contrasts. Firstly, secondary sector employment was substantially higher in the northern counties by c.1710 than it was in the southern counties. Thus the north-south differences which are so familiar in the later period emerged long before the onset of mechanisation in the textile sector in the late eighteenth century. Secondly, whereas secondary sector growth was quite muted at national level over the eighteenth century it was more rapid in the north of England rising from 47 per cent to 62 per cent in these counties between c.1710 and 1813-20. Thirdly, the southern counties experienced a significant level of de-industrialisation over the eighteenth century with secondary sector employment falling from 39 per cent to 28 per cent and the primary sector rising from 51 per cent to 61 per cent.

**Table 6 Male occupational structure for northern counties c.1710 and 1813-20**

	<b>c.1710</b>	<b>1817</b>
<b>Sector</b>	<b>%</b>	<b>%</b>
<b>Primary</b>	<b>39</b>	<b>25</b>
<b>Secondary</b>	<b>47</b>	<b>62</b>
<b>Tertiary</b>	<b>14</b>	<b>13</b>
<b><i>TOTAL</i></b>	<b><i>100</i></b>	<b><i>100</i></b>

*The counties covered by this table are Cheshire, Lancashire, East Riding of Yorkshire, North Riding of Yorkshire and the West Riding of Yorkshire*

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<sup>26</sup> Bedfordshire, Buckinghamshire, Cambridgeshire, Huntingdonshire, Northamptonshire, Oxfordshire, Rutland, Wiltshire.

**Table 7 Male occupational structure for southern counties c.1710 and 1813-20**

	<b>c.1710</b>	<b>1817</b>
<b>Sector</b>	<b>%</b>	<b>%</b>
<b>Primary</b>	<b>51</b>	<b>61</b>
<b>Secondary</b>	<b>39</b>	<b>28</b>
<b>Tertiary</b>	<b>10</b>	<b>11</b>
<b>TOTAL</b>	<b>100</b>	<b>100</b>

*The counties covered by this table are Bedfordshire, Buckinghamshire, Cambridgeshire, Huntingdonshire, Northamptonshire, Oxfordshire, Rutland, Wiltshire. Counties encompassing parts of London have been excluded.*

Table 8 shows male secondary sector employment shares in all the counties represented in tables 6 and 7. Significant de-industrialisation is apparent in every southern county between c.1710 and 1813-20. This is true both of the county level estimates shown in columns 3 and 4 and for the sample parishes. It follows that the effect cannot be an artefact of the re-weighting process. Experience in the north of England was more varied. Lancashire and the West Riding experienced significant industrialisation while levels of secondary sector employment were broadly stable elsewhere.

**Table 8 Male secondary sector share c.1710 and c.1817 (percentages)**

	<i>Sample c. 1710</i>	<i>Parallel sample 1817</i>	<i>Estimate c. 1710</i>	<i>Population 1817</i>
Bedfordshire	26.5	19.5	28.6	21.3
Buckinghamshire	32.1	22.9	29.8	22.1
Cambridgeshire	26.5	17.4	33.4	19.7
Huntingdonshire	27.1	21.9	29.7	22.3
Northamptonshire	38.1	31.4	35.3	28.6
Oxfordshire	32.5	28.6	30.1	26.1
Rutland	28.1	18.5	29.1	23.6
Sussex	26.2	22.4	26.9	23.5
Wiltshire	37.6	26.3	48.7	29.0
Cheshire	35.9	34.8	44.5	42.5
Lancashire	48.0	66.7	46.6	64.2
Warwickshire	41.8	39.8	56.6	52.8
Yorkshire City and Ainsty of York	42.8	46.1	39.9	45.2
Yorkshire East Riding	27.9	28.3	26.2	26.7
Yorkshire North Riding	40.2	35.6	33.3	31.0
Yorkshire West Riding	55.4	68.0	48.6	61.4



Which sectors were driving de-industrialisation in the south of England? Table 9 shows estimates of male employment shares in textiles. The ubiquity of the declining importance of textiles in the non-metropolitan south is striking, as is the scale of the decline in Wiltshire. The disappearance and decline of textile industries in the south of England in the eighteenth century is clearly a major component of de-industrialisation.

The increase in the West Riding is modest but the scale of the increase in Lancashire from 17.8 per cent to 38.3 per cent is more dramatic. It is clear that the rise in industrial employment in both counties was primarily driven by an expansion of textile employment.

Table 10 (below) shows estimates of male employment shares in the manufacture of clothes. This shows a large fall in every area shown with the sole exception of the city of York. On average the decline in the tailoring trades is from around 5 per cent to around 3 per cent. The fact that it affects both the north and the south is particularly striking. Three possible explanations may be advanced. The first, that the production of clothes was declining over the eighteenth century can be dismissed as improbable without further discussion.

**Table 9 Male shares of employment in textiles c.1710 and c.1817 (percentages)**

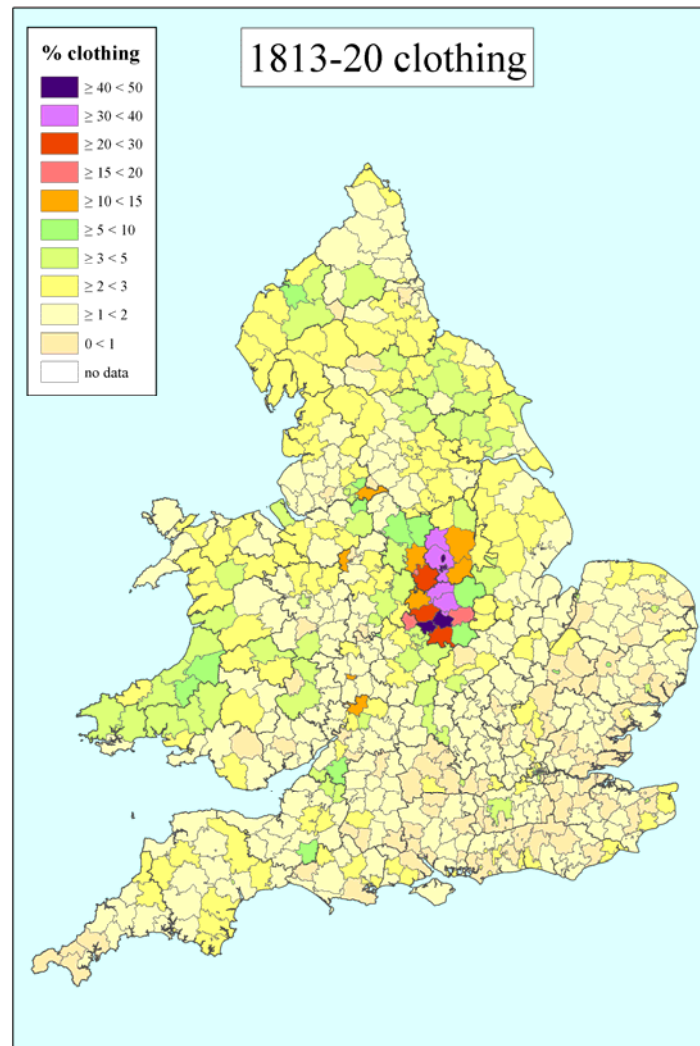
	<i>Sample</i> <i>c.1710</i>	<i>Parallel</i> <i>sample</i> <i>1817</i>	<i>Estimate</i> <i>c.1710</i>	<i>Population</i> <i>1817</i>
Bedfordshire	2.1	0.3	3.5	0.6
Buckinghamshire	2.4	0.5	2.7	0.5
Cambridgeshire	1.7	0.0	6.9	0.1
Huntingdonshire	1.0	0.2	1.5	0.4
Northamptonshire	5.9	1.7	4.8	1.4
Oxfordshire	3.1	1.7	3.0	1.6
Rutland	4.0	0.0	3.7	0.6
Sussex	1.2	0.4	0.6	0.2
Wiltshire	11.7	3.0	28.5	8.4
Cheshire	5.2	6.3	11.1	13.5
Lancashire	22.1	44.5	17.8	38.3
Warwickshire	9.8	11.8	6.4	7.8
Yorkshire City and Ainsty of York	3.5	1.8	5.2	3.1
Yorkshire East Riding	2.9	1.1	3.7	1.5
Yorkshire North Riding	8.9	4.3	8.9	4.6
Yorkshire West Riding	20.8	26.5	20.4	28.4

**Table 10    Male shares of employment in clothing c.1710 and c.1817  
(percentages)**

	<i>Sample</i> <i>c.1710</i>	<i>Parallel</i> <i>sample</i> <i>1817</i>	<i>Estimate</i> <i>c.1710</i>	<i>Population</i> <i>1817</i>
Bedfordshire	4.7	1.7	5.8	2.3
Buckinghamshire	4.9	2.2	3.2	1.4
Cambridgeshire	3.6	1.3	4.5	1.7
Huntingdonshire	6.8	1.7	6.9	1.9
Northamptonshire	4.6	2.8	3.7	2.3
Oxfordshire	5.4	3.0	4.2	2.4
Rutland	3.9	2.9	3.2	2.5
Sussex	3.9	1.3	3.9	1.3
Wiltshire	3.8	1.4	3.2	1.4
Cheshire	5.7	2.4	9.1	3.8
Lancashire	4.6	3.4	4.2	3.3
Warwickshire	5.6	2.1	12.0	4.6
Yorkshire City and Ain	5.2	7.0	3.4	5.2
Yorkshire East Riding	4.9	3.1	4.7	3.1

A second possible explanation is that this period saw the rise of a ready-made clothing industry in areas not covered by table 10. Some support for this possibility can be seen in figure 9 below. It is very clear that such an industry had already emerged in the east Midlands by the early nineteenth century. However, we do not, at present, know whether this industry came into being during the eighteenth century or began at an earlier date. More importantly, it seems unlikely that East Midlands industry was large enough to account for tailoring falling from 5 per cent to 3 per cent of the adult male workforce.

**Figure 9    The percentage of adult males employed in the clothing trades in 1813-20**



There is a third possible explanation which is likely to prove to be the key to the puzzle: the feminization of the workforce for the making of clothes from the late seventeenth century. This trend is well documented in the existing literature but has not been quantified.<sup>27</sup> This new evidence, albeit indirect, would suggest that the growth of female employment in dress-making and related trades was very substantial over the long eighteenth century. Whereas the existing historiography suggests a rise in the importance of women in the needle trades, the scale of the decline in male employment documented here suggests we may be looking at a wholesale take-over by women.<sup>28</sup> To the extent that the decline in the male tailoring trades was driven by feminisation it was not part of any process of de-industrialisation, so the figures given in table 7 and 8 may somewhat overstate the scale of southern de-industrialisation and the figures in table 6 may slightly understate the growth of the secondary sector in the north.

<sup>27</sup> See the discussion in Amy Erickson, 'Clockmakers, Milliners and Mistresses: Women Trading in the City of London Companies 1700-1750.'

<sup>28</sup> I am grateful to Amy Erickson for this point.

Table 11 shows the estimates for the proportion of adult males employed in the tertiary sector c.1710 and 1813-20. Trends over time were geographically mixed with many counties experiencing slight rises or slight declines. Both Lancashire and Rutland show rather peculiar trends which seem improbable. It will be necessary to inspect the data more closely to see whether these trends are real or artifactual, perhaps relating to some problem with the dataset. The very muted changes in tertiary employment shares over the eighteenth century in most of the counties makes it unlikely that any more careful re-weighting of the data for c.1710 will produce a very big shift from our current estimates of a minor increase in the importance of the tertiary sector over the eighteenth century, though it would not take much of a change to transform this from a stable trend of to a slight decrease. The very high figures for Middlesex and Surrey reflect the great importance of the tertiary sector in the Metropolis even at the beginning of the eighteenth century.

**Table 11 The percentage of adult males employed in the tertiary sector (percentages).**

	<i>Sample</i> <i>c.1710</i>	<i>Parallel</i> <i>sample</i> <i>1817</i>	<i>Estimate</i> <i>c.1710</i>	<i>Population</i> <i>1817</i>
Bedfordshire	8.9	8.7	8.6	9.3
Buckinghamshire	11.7	12.2	9.9	10.4
Cambridgeshire	8.7	8.6	10.6	10.8
Huntingdonshire	15.5	13.8	12.9	12.2
Northamptonshire	10.6	13.4	8.9	11.2
Oxfordshire	13.2	14.9	11.9	13.2
Rutland	12.5	4.2	24.7	9.5
Sussex	6.6	11.9	8.4	16.3
Wiltshire	9.7	10.7	7.4	9.5
Cheshire	12.7	14.3	11.9	14.1
Lancashire	14.6	10.3	18.8	13.1
Warwickshire	7.3	9.2	9.7	12.5
Yorkshire City and Ainsty of York	38.0	39.7	21.7	25.1
Yorkshire East Riding	16.2	18.4	14.7	17.9
Yorkshire North Riding	10.2	15.4	8.6	15.1
Yorkshire West Riding	6.6	7.2	7.0	8.6
Middlesex	32.3	33.7	39.6	41.8
Surrey	14.7	17.0	28.2	30.1

Table 4 and tables 6 through 11 document the changing male occupational structure over the period c.1710 to 1813-20. But they shed no light on the sub-periods within this century in which the various shifts document were occurred. At the national level it is currently too early to provide an answer. In due

course, when we have completed our parish register data collection for the eighteenth century and have integrated these data with our militia list datasets (mainly for southern England) for the second half of the eighteenth century we will be able to answer this question. At present we can only provide a tentative answer for the counties of northern England because these are the only areas for which we have data in a consistent format at dates intermediate between c.1710 and 1813-20. Table 12 shows the estimates currently available. While the importance of the secondary sector appears more or less stable over the course of these 100 years in Cheshire and most of Yorkshire, the sustained increases in the West Riding of Yorkshire and in Lancashire, driven primarily by an expansion of textile employment, appear to come to an end by 1785. It therefore follows that the increase in the relative importance of male secondary sector employment in the northern counties almost entirely antedates the beginnings of mechanisation in the late eighteenth century. Whilst we are not in a position to examine the de-industrialisation which took place in much of southern England between c.1710 and 1813-20 it seems likely that much of this post-dated 1785 because that de-industrialisation was probably caused by the mechanisation in the north.<sup>29</sup>

**Table 12    Percentage of adult males employed in the secondary sector in Northern counties c.1720 to 1813-20**

Year	1720	1755	1785	1817
Cheshire	44.5	40.5	41.0	43.5
Lancashire	46.6	62.3	67.4	64.1
Yorkshire City and Ainsty of York	39.9	44.5	43.3	43.0
Yorkshire East Riding	26.2	27.6	26.8	26.4
Yorkshire North Riding	33.3	30.9	30.1	29.0
Yorkshire West Riding	48.6	52.5	60.6	60.8

### **Conclusions**

The estimates provided in this paper are highly provisional for the reasons set out above. More work is required on ways of extrapolating from the non-random sample and on the sectoral allocation of labourers to produce national estimates. However, these estimates are almost certainly more robust than the figures used by Crafts based on Lindert and Williamson's reworking of Gregory King's famous social tables and they suggest that the secondary sector was almost twice as large at the beginning of the eighteenth century as current orthodoxy suggests. It is therefore clear that most of the growth in the relative size of the secondary sector normally associated with the classic Industrial Revolution period, say 1750 to 1850, had already taken place by 1710. The growth of the secondary sector's share of male employment across the eighteenth century was modest for England as a whole. In the north of England the growth in the relative importance of the secondary sector had peaked by 1785. It is likely that much of the de-industrialisation in the south took place

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<sup>29</sup> The virtual disappearance of the worsted industry from Northamptonshire can be shown to date from the very end of the eighteenth century and coincides with the onset of mechanisation in the West Riding. See Shaw-Taylor L., and Jones, A., 'The male occupational structure of Northamptonshire.'

between 1785 and 1813-20 and it is therefore quite possible that nationally the secondary sector's share of male employment actually fell somewhat in that period. It is certainly the case that the vast bulk of the increase in the secondary sector's share of total male employment preceded the onset of mechanisation in the late eighteenth century. Outside London the south of England experienced substantial de-industrialisation as formerly successful textile industries collapsed or declined.

We are not yet in a position to present data on long-term trends in female employment. However, it is possible, and arguably probable, that if we were, it would show that total female employment contracted sharply at the national level at the turn of the eighteenth and nineteenth centuries because the mechanisation of wool and worsted spinning in the West Riding swept away the traditional industrial employment of hundreds of thousands of women outside the industrialising north-west. Craig Muldrew has estimated that by 1780 most adult women in England may have been involved in spinning wool and worsted.<sup>30</sup> By 1851 outside parts of Lancashire, the West Riding and north-east Cheshire and a number of very small textile districts elsewhere, female employment in spinning was almost non-existent.<sup>31</sup> The decline in female participation rates documented for Corfe Castle between 1793 and 1851 by Osamu Saito, driven by the extinction of hand spinning, was probably typically of most parts of England and Wales.<sup>32</sup> By 1851 employment in textiles was fairly evenly split between males and females. All of the accounts we have of textile employment prior to mechanisation suggest far more women were required to spin than men to weave. Thus it seems likely that the decline in male employment in the textile sector, so visible in our data, was paralleled, over a wider area by a substantially greater loss of female employment. If this line of reasoning turns out to be correct, and it clearly requires empirical testing, then overall secondary sector employment may well have been significantly lower in 1813-20 than earlier in the 1780s and possibly lower than at the beginning of the eighteenth century.

Whether this is so or not, the male evidence on its own suggests that the rise in the productivity of the secondary sector as a whole over the eighteenth century must have been substantially greater than the national accounts literature currently suggests. If the speculative argument about a sharp decline in female employment is correct the estimates of productivity increases will need be increased that much further. Whilst much of these productivity increases may have been caused by Smithian growth it is possible, and perhaps likely that the bulk of this increase was caused by technological improvements. If that turns out to be so, then the new data on occupational structure will push our narrative of the classic Industrial Revolution period back to a much greater emphasis on the productive impact of new technology than has been the case in recent years.<sup>33</sup>

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<sup>30</sup> Muldrew, J.C. 'Th'ancient distaff' and whirling spindle.'

<sup>31</sup> Shaw-Taylor, L., 'Diverse experiences'

<sup>32</sup> Saito, O., 'Who worked when?'

<sup>33</sup> This chimes neatly with the emphasis on technological change in the recent books by Bob Allen and Joel Mokyr: Allen, R.C., *The British Industrial Revolution*; Mokyr, J., *The enlightened economy*.



One fascinating feature of the new findings is the sharp contrast between the nature of structural change in male employment in the eighteenth century and in the nineteenth century.<sup>34</sup> In the nineteenth century structural change consisted very largely of a relative shift out of agricultural employment and into tertiary employment. In the eighteenth century the relative shift was very largely out of agricultural employment and into secondary sector employment. Why structural change should be so different in these two periods is a question of great importance which will need to be fully investigated. For the moment a preliminary speculation will have to suffice.

It is possible that down to about 1780 technological change had produced a very limited increase in aggregate levels of productivity in the secondary sector. As Crafts and Wrigley have argued, high productivity agriculture released labour to low productivity industry.<sup>35</sup> But, once mechanisation began in earnest, perhaps very large increases in the overall output of the secondary sector were possible without significant increases in labour inputs. The secondary sector's share of the workforce may therefore have grown only modestly in relative importance, if at all. Whilst it may be true that GDP per capita was increasing only very modestly in the late eighteenth century it is often overlooked that GDP itself was growing very rapidly, because population was growing very rapidly. The very rapid growth in the overall size of the economy, the increasing spatial concentration of the population (inadequately described as 'urbanisation') and the increasing specialisation of the north in manufacturing and the south in the production of foodstuffs meant much larger quantities of primary and secondary products needed to be moved around the country. Over half of male employment in the tertiary sector in this period was accounted for by the distributive trades: wholesaling, shop-keeping and transport. It may be that the majority of tertiary growth in the nineteenth century was required simply to move the greatly increased output of primary and secondary goods longer average distances around the country. If this is the case then the rise of the tertiary sector was caused, at least in part, by the marked expansion in the productivity of other sectors and in that sense heralds the onset of modern economic growth.

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<sup>34</sup> Shaw-Taylor, et al, 'The occupational structure of England and Wales c.1817-1881.'

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Erickson, A.L., 'Clockmakers, milliners and mistresses: Women trading in the City of London companies 1700-1750.' (2010), unpub. paper available as paper 16 at <http://www.geog.cam.ac.uk/research/projects/occupations/abstracts/>

Kitson, P.M., Shaw-Taylor, L., Wrigley, E.A., Davies, R.S., Newton, G., and Satchell, A.E.M., 'The creation of a 'census' of adult male employment for England and Wales for 1817' (2010) available as paper 3 at <http://www.geog.cam.ac.uk/research/projects/occupations/britain19c/papers.html>

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### **Digital datasets**

UK Data Archive, SN4177, Schürer, K., and Woollard, M., *1881 Census for England and Wales, the Channel Islands and the Isle of Man* (Enhanced Version).