

A preliminary estimate of the female occupational structure of England and Wales 1700–1911

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Preliminary and unfinished paper, not to be cited without the written permission of the authors.

In 2014, Leigh Shaw-Taylor and Tony Wrigley published new estimates of male occupational structure in England and Wales c.1710 and c. 1817 and data derived from the censuses for both men and women for 1851 and 1871 in the fourth edition of the *Cambridge Economic History of Modern Britain (CEHMB)*.¹ The census of 1841 was the first one to provide reliable and complete tabulations of male employment, but it is severely deficient in respect of female occupations. With some caveats, discussed below, the censuses from 1851 onwards provide a good overall picture of women's occupations.² Prior to 1851, there are no reliable national *data* on female occupational structure.³

The CEHMB chapter made a very preliminary attempt to estimate female occupational structure in c.1710 and c.1817, when only male data were available. Pages 12–17 of that chapter explain the basic methodological approach and contain references and justifications not provided here. The sources of the male data for c.1710 and c.1817 are explained there and are not discussed further here. This paper offers a substantially improved, but still preliminary set of estimates of female occupational structure over the whole period c.1710–1911, including an entirely new estimate for c.1761 deriving from the estimate of male occupational structure for that year in Sebastian Keibek's Cambridge Ph.D. thesis.⁴ The aim of the paper is primarily to document the methodology used for the estimates and to outline some key implications of the results.

What we are trying to do here is to estimate the (gendered) occupational structure of the *economy* as conventionally conceptualised by economists. This excludes unpaid *domestic* work of all kinds: housework, childcare and so on, which was overwhelmingly performed by women. Such work fundamentally underpins what is conventionally defined as *economic activity*, and any full understanding of how economies operate would require this to be fully appraised. However, this is not our goal here, which is much more modest: to create estimates of women's contributions to the *economy* as conventionally conceived to sit alongside our estimates of male occupational structure, so that (i) we have a full account of the labour force (as conventionally conceptualised) to contribute to an improved understanding of economic development in the period, and (ii) have a quantitative picture of how *economic* activity was gendered and how that changed over time.

¹ Shaw-Taylor, L., and Wrigley, E. A., 'Occupational Structure and Population Change', in R. Floud, J. Humphries, and P. Johnson, eds., *The Cambridge Economic History of Modern Britain, Volume 1: Industrialisation, 1700-1870* (Cambridge, 2014), pp. 53-88

² On the broad reliability of the 1851 census, see: Shaw-Taylor, L., 'Diverse Experiences: The Geography of Adult Female Employment in England and the 1851 Census', in N. Goose, ed., *Women's Work in Industrial England: Regional and Local Perspectives* (Hatfield, 2007), pp. 29-50.

³ Data for London and a few villages and small towns does exist. See: Saito, O., 'Who Worked When: Life-time Profiles of Labour-force Participation in Cardington and Corfe Castle in the late Eighteenth and Mid-nineteenth Centuries', *Local Population Studies*, 22 (1979), p. 14-29; Earle, P., 'The female Labour Market in London on the Late Seventeenth and Early Eighteenth Centuries', *Economic History Review*, XLII (1989), pp. 328-54; Erickson, A., 'Married Women's Occupations in Eighteenth Century London', *Continuity and Change* 23 (2008), pp.267-307; Terki-Mignot, A., 'Changing Patterns of Female Employment in Westmorland, 1787-1851', BA dissertation, University of Cambridge, 2017, available at: <https://www.campop.geog.cam.ac.uk/research/occupations/outputs/preliminary/>

⁴ Keibek, S., 'The Male Occupational Structure of England and Wales, 1600-1850', PhD thesis, University of Cambridge, 2017.

Section I of this paper identifies some of the problems with the reported census data. Section II documents the corrections to the census data for the period 1851–1911. Section III describes the construction of estimates of female occupational structure 1710–1817. Section IV examines the sensitivity of the estimates to key assumptions. Section V compares the new estimates with more localised estimates for England and Wales and with the findings of studies of Ireland, Belgium and France. Section VI sets out some key implications of the new estimates.

Section I. The Reported Census Data 1851–1911

Tables 1–3 below report the occupational structure, for those 15 and over, reported in the censuses of 1851–1911, with table 1 showing women, table 2 showing men and table 3 showing both sexes combined. All data have been coded to the PSTI classification system, developed by Osamu Saito and Leigh Shaw-Taylor, for international comparative work.⁵ PSTI is a lightly modified version of Tony Wrigley’s original PST system.⁶ All occupations have been further grouped into a number of broad categories convenient for present purposes.⁷ Tables 4, 5 and 6 show the percentage shares of the female, male and both-sexes-combined labour force in the same categories. Table 7 shows the share of the both-sexes labour force in each category made up by women.

Table 1.
Census reported occupational structure, Females, 15 and over,
England and Wales 1851–1911

	1851	1861	1871	1881	1891	1901	1911
Agriculture	429,316	360,618	362,840	62,310	49,927	56,350	92,625
Rest of primary	16	1,120	334	1,022	1,119	164	503
Primary total	429,332	361,738	363,174	63,332	51,046	56,514	93,128
Mining	5,769	3,769	8,069	5,443	4,297	2,904	3,052
Clothing	405,200	475,496	477,612	567,789	620,707	650,381	684,257
Footwear	107,932	116,446	114,854	33,389	41,564	40,955	40,947
Textiles	380,498	430,616	449,467	480,603	484,854	495,081	555,139
Metals	23,621	26,586	24,251	27,993	30,597	41,808	55,545
Machines and tools	914	3,393	23,409	11,606	27,382	7,151	10,525
Building and construction	727	847	1,100	1,403	1,836	702	574
Rest of secondary	98,134	136,812	199,823	162,550	228,189	260,901	367,176
Secondary total	1,022,795	1,193,965	1,298,585	1,290,776	1,439,426	1,499,883	1,717,215
Dealers and sellers	77,052	86,766	125,452	132,265	177,842	273,419	405,893
Services and professions	1,083,066	1,333,253	1,634,635	1,698,651	2,003,221	2,124,194	2,377,367
Transport and communications	6,772	5,386	3,872	6,146	9,906	16,261	48,708
Tertiary non-specific	1,696	823	1,823	835	-	76	4,942
Tertiary total	1,168,586	1,426,228	1,765,782	1,837,897	2,190,969	2,413,950	2,836,910
Female Labour Force	2,620,713	2,981,931	3,427,540	3,192,004	3,681,441	3,970,346	4,647,253

⁵ On PSTI, see: <https://www.campop.geog.cam.ac.uk/research/projects/internationaloccupations/inchos/> and Shaw-Taylor, L., ‘The PSTI System of Classifying Occupations’, in Saito, O. and Shaw-Taylor, L., eds., *Occupational Structure, Industrialization and Economic Growth in a Comparative Perspective*, in progress.

⁶ Wrigley, E. A., ‘The PST System of Classifying Occupations’, 2010, available at: <https://www.campop.geog.cam.ac.uk/research/occupations/datasets/coding/>

⁷ The categories are those used for tabulating the occupational structure of England and Wales in Shaw-Taylor, L., ‘The Occupational Structure of England and Wales, 1710-1911’, in Saito, O. and Shaw-Taylor, L., eds., *Occupational Structure, Industrialization and Economic Growth in a Comparative Perspective*, in progress.

Table 2.
Census reported occupational structure, Males, 15 and over,
England and Wales 1851–1911

	1851	1861	1871	1881	1891	1901	1911
Agriculture	1,427,792	1,408,870	1,274,448	1,199,569	1,128,429	1,093,053	1,205,628
Rest of primary	31,403	36,538	39,897	50,842	49,148	51,849	56,091
Primary total	1,459,195	1,445,408	1,314,345	1,250,411	1,177,577	1,144,902	1,261,719
Mining	256,659	327,216	376,830	457,736	579,325	723,287	948,226
Clothing	176,735	157,620	160,812	161,580	177,120	170,822	183,434
Footwear	204,456	206,672	192,015	183,069	193,308	177,457	164,142
Textiles	382,489	358,646	335,380	326,688	349,293	364,852	447,414
Metals	258,961	329,203	384,982	449,529	497,778	592,256	656,202
Machines and tools	89,516	129,378	195,900	244,259	316,379	417,346	476,272
Building and construction	432,945	511,312	589,612	714,448	712,951	993,009	922,008
Rest of secondary	896,939	998,644	1,277,974	1,445,491	1,652,414	1,718,029	1,831,825
Secondary total	2,698,700	3,018,691	3,513,505	3,982,801	4,478,568	5,157,057	5,629,523
Dealers and sellers	247,757	333,704	401,719	429,882	512,907	693,799	856,677
Services and professions	533,008	627,965	804,243	1,012,896	1,126,711	1,493,795	1,865,735
Transport and communications	372,208	522,074	616,420	755,488	1,085,632	1,290,979	1,488,290
Tertiary non-specific							
Tertiary total	1,152,973	1,483,743	1,822,382	2,198,267	2,725,250	3,478,573	4,210,702
Male Labour Force	5,310,868	5,947,842	6,650,232	7,431,478	8,381,396	9,780,532	11,101,944

Table 3.
Census reported occupational structure, Both sexes, 15 and over,
England and Wales 1851–1911

	1851	1861	1871	1881	1891	1901	1911
Agriculture	1,857,108	1,769,488	1,637,288	1,261,879	1,178,356	1,149,403	1,298,253
Rest of primary	31,419	37,658	40,231	51,864	50,267	52,013	56,594
Primary total	1,888,527	1,807,146	1,677,519	1,313,743	1,228,623	1,201,416	1,354,847
Mining	262,428	330,985	384,899	463,179	583,622	726,191	951,278
Clothing	581,935	633,116	638,424	729,369	797,827	821,203	867,691
Footwear	312,388	323,118	306,869	216,458	234,872	218,412	205,089
Textiles	762,987	789,262	784,847	807,291	834,147	859,933	1,002,553
Metals	282,582	355,789	409,233	477,522	528,375	634,064	711,747
Machines and tools	90,430	132,771	219,309	255,865	343,761	424,497	486,797
Building and construction	433,672	512,159	590,712	715,851	714,787	993,711	922,582
Rest of secondary	995,073	1,135,456	1,477,797	1,608,041	1,880,603	1,978,929	2,199,001
Secondary total	3,721,495	4,212,656	4,812,089	5,273,576	5,917,994	6,656,940	7,346,739
Dealers and sellers	324,809	420,470	527,171	562,147	690,749	967,218	1,262,570
Services and professions	1,616,074	1,961,218	2,438,878	2,711,547	3,129,932	3,617,989	4,243,102
Transport and communications	378,980	527,460	620,292	761,634	1,095,538	1,307,240	1,536,998
Tertiary non-specific	1,696	823	1,823	835	0	76	4,942
Tertiary total	2,321,559	2,909,971	3,588,164	4,036,163	4,916,219	5,892,522	7,047,612
Both sexes Labour Force	7,931,581	8,929,773	10,077,772	10,623,482	12,062,837	13,750,878	15,749,197

Table 4.
Census reported occupational structure,
Female labour force shares, 15 and over, England and Wales 1851–1911 (%)

	1851	1861	1871	1881	1891	1901	1911
Agriculture	16.4	12.1	10.6	2.0	1.4	1.4	2.0
Rest of primary	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Primary total	16.4	12.1	10.6	2.0	1.4	1.4	2.0
Mining	0.2	0.1	0.2	0.2	0.1	0.1	0.1
Clothing	15.5	15.9	13.9	17.8	16.9	16.4	14.7
Footwear	4.1	3.9	3.4	1.0	1.1	1.0	0.9
Textiles	14.5	14.4	13.1	15.1	13.2	12.5	11.9
Metals	0.9	0.9	0.7	0.9	0.8	1.1	1.2
Machines and tools	0.0	0.1	0.7	0.4	0.7	0.2	0.2
Building and construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest of secondary	3.7	4.6	5.8	5.1	6.2	6.6	7.9
Secondary total	39.0	40.0	37.9	40.4	39.1	37.8	37.0
Dealers and sellers	2.9	2.9	3.7	4.1	4.8	6.9	8.7
Services and professions	41.3	44.7	47.7	53.2	54.4	53.5	51.2
Transport and communications	0.3	0.2	0.1	0.2	0.3	0.4	1.0
Tertiary non-specific	0.1	0.0	0.1	0.0	0.0	0.0	0.1
Tertiary total	44.6	47.8	51.5	57.6	59.5	60.8	61.0
Female Labour Force	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 5.
Census reported occupational structure,
Male labour force shares, 15 and over, England and Wales 1851–1911 (%)

	1851	1861	1871	1881	1891	1901	1911
Agriculture	26.9	23.7	19.2	16.1	13.5	11.2	10.9
Rest of primary	0.6	0.6	0.6	0.7	0.6	0.5	0.5
Primary total	27.5	24.3	19.8	16.8	14.0	11.7	11.4
Mining	4.8	5.5	5.7	6.2	6.9	7.4	8.5
Clothing	3.3	2.7	2.4	2.2	2.1	1.7	1.7
Footwear	3.8	3.5	2.9	2.5	2.3	1.8	1.5
Textiles	7.2	6.0	5.0	4.4	4.2	3.7	4.0
Metals	4.9	5.5	5.8	6.0	5.9	6.1	5.9
Machines and tools	1.7	2.2	2.9	3.3	3.8	4.3	4.3
Building and construction	8.2	8.6	8.9	9.6	8.5	10.2	8.3
Rest of secondary	16.9	16.8	19.2	19.5	19.7	17.6	16.5
Secondary total	50.8	50.8	52.8	53.6	53.4	52.7	50.7
Dealers and sellers	4.7	5.6	6.0	5.8	6.1	7.1	7.7
Services and professions	10.0	10.6	12.1	13.6	13.4	15.3	16.8
Transport and communications	7.0	8.8	9.3	10.2	13.0	13.2	13.4
Tertiary non-specific	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tertiary total	21.7	24.9	27.4	29.6	32.5	35.6	37.9

Table 6.
Census reported occupational structure,
Both sexes labour force shares, 15 and over, England and Wales 1851–1911 (%)

	1851	1861	1871	1881	1891	1901	1911
Agriculture	23.4	19.8	16.2	11.9	9.8	8.4	8.2
Rest of primary	0.4	0.4	0.4	0.5	0.4	0.4	0.4
Primary total	23.8	20.2	16.6	12.4	10.2	8.7	8.6
Mining	3.3	3.7	3.8	4.4	4.8	5.3	6.0
Clothing	7.3	7.1	6.3	6.9	6.6	6.0	5.5
Footwear	3.9	3.6	3.0	2.0	1.9	1.6	1.3
Textiles	9.6	8.8	7.8	7.6	6.9	6.3	6.4
Metals	3.6	4.0	4.1	4.5	4.4	4.6	4.5
Machines and tools	1.1	1.5	2.2	2.4	2.8	3.1	3.1
Building and construction	5.5	5.7	5.9	6.7	5.9	7.2	5.9
Rest of secondary	12.5	12.7	14.7	15.1	15.6	14.4	14.0
Secondary total	46.9	47.2	47.7	49.6	49.1	48.4	46.6
Dealers and sellers	4.1	4.7	5.2	5.3	5.7	7.0	8.0
Services and professions	20.4	22.0	24.2	25.5	25.9	26.3	26.9
Transport and communications	4.8	5.9	6.2	7.2	9.1	9.5	9.8
Tertiary non-specific	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tertiary total	29.3	32.6	35.6	38.0	40.8	42.9	44.7
Female Labour Force	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 7.
Census reported female share of the both-sexes-combined labour force
within each sector, 15 and over, England and Wales 1851–1911 (%)

	1851	1861	1871	1881	1891	1901	1911
Agriculture	0.23	0.20	0.22	0.05	0.04	0.05	0.07
Rest of primary	0.00	0.03	0.01	0.02	0.02	0.00	0.01
Primary total	0.23	0.20	0.22	0.05	0.04	0.05	0.07
Mining	0.02	0.01	0.02	0.01	0.01	0.00	0.00
Clothing	0.70	0.75	0.75	0.78	0.78	0.79	0.79
Footwear	0.35	0.36	0.37	0.15	0.18	0.19	0.20
Textiles	0.50	0.55	0.57	0.60	0.58	0.58	0.55
Metals	0.08	0.07	0.06	0.06	0.06	0.07	0.08
Machines and tools	0.01	0.03	0.11	0.05	0.08	0.02	0.02
Building and construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rest of secondary	0.10	0.12	0.14	0.10	0.12	0.13	0.17
Secondary total	0.27	0.28	0.27	0.24	0.24	0.23	0.23
Dealers and sellers	0.24	0.21	0.24	0.24	0.26	0.28	0.32
Services and professions	0.67	0.68	0.67	0.63	0.64	0.59	0.56
Transport and communication	0.02	0.01	0.01	0.01	0.01	0.01	0.03
Tertiary non-specific	1.00	1.00	1.00	1.00		1.00	1.00
Tertiary total	0.50	0.49	0.49	0.46	0.45	0.41	0.40
Labour Force	0.33	0.33	0.34	0.30	0.31	0.29	0.30

Tables 4 and 7 reveal abrupt declines in the reported importance of female employment in agriculture between 1871 and 1881. They are exceptionally sharp and are uncharacteristic of all other sectors and periods shown, and so distinct from male patterns that they are inherently implausible. In fact, these improbable intercensal declines are artefacts of changes in the assumptions imposed on the data by the Census Office in tabulating them for publication. This draws attention to the need to make at least some

corrections to the published census data 1851–1911. Hence this paper provides both revised estimates of census-data derived female occupational structure for the period 1851–1911 and new estimates for the period c.1710 to c.1817, when there are, at present, no data available reporting female occupational structure at the national level.⁸

Section II. Corrections to the Census Data

In this section we discuss three sets of corrections to the published census tabulations. One relates to the changing ways in which wives, daughters and other female co-resident relatives were reported in the published census tables. The second deals with the well-known problem of the under-enumeration of female day labourers in agriculture. The third deals with an unmistakeable under-enumeration of female farmers in 1901.

The reporting of female relatives as occupational categories is summarised in table 8 below. Between 1851 and 1871, the Census Office, in compiling tabulations of occupational data for the census report, thought it was reasonable to assume that the wives and co-resident daughters (and other female relatives) of male farmers were employed on the farm. As noted above, we are not concerned here with the *indirect* (but necessary) contribution that female *domestic* labour made to the operation of farms, but with the *direct* contribution in the form of agricultural work. Co-resident farmers' wives, daughters and other relatives were tabulated in the occupational tables as an *occupational* category. They thus appear in the labour force in any tabulations of occupational data deriving from the published census tables, as in tables 1–7 above. In 1851, the same decision was made for butchers' wives, shoemakers' wives, shopkeepers' wives, innkeepers' wives, licenced victuallers' wives and beerkeepers' wives.⁹ However, outside agriculture, daughters were not so included. In 1861, the list was extended to include the wives of lodging house-keepers, and in 1871 a new joint category appeared for 'innkeepers, publicans and beersellers.' No mention was made of licensed victuallers, but judging by the numbers tabulated in table 8, it is very likely they were reported in the new aggregate category.

Table 8. The enumeration of wives and daughters as occupational categories in the census

	1851	1861	1871	1881	1891	1901	1911
Farmers, graziers wife	164,618	172,740	187,029	0	0		
Farmers, graziers dau, granddau, sister, niece	105,147	84,217	90,738	0	0	17,465	57,103
Butchers wife	24,345	25,883	32,529	0	0	0	0
Shoemakers wife	81,037	81,885	91,133	0	0	0	0
Shopkeepers wife	5,860	2,137	12,256	0	0	0	0
Innkeepers wife	16,041	16,591		0	0	0	0
Licensed victuallers, beershop keepers wife	25,017	30,489		0	0	0	0
Wife of innkeeper, publican, beerseller			61,553				
Lodging, hoarding, -house keeper's wife	0	2,136	3,327	0	0	0	0
Total	422,065	416,078	478,565	0	0	17,465	57,103

In each of the three years, 1851, 1861 and 1871, over 400,000 women were reported in these categories. In 1881, the Census Office decided that henceforth these women should not be tabulated in these occupational categories. As a result, all such women disappeared from the labour force, as reported in tables 1–7. In 1901, there was a partial re-instatement of farmers' daughters, and a more thoroughgoing re-instatement in 1911. Clearly, any use of these data in adjusted form will be misleading, and the sharp

⁸ For estimates for more restricted areas, see: Saito, O., 'Who Worked When: Life-time Profiles of Labour Force Participation in Cardington and Corfe Castle in the Late Eighteenth and Mid-nineteenth Centuries', *Local Population Studies*, 22 (1979), pp. 14-29; Erickson, A. L., 'Married Women's Occupations in Eighteenth-Century London', *Continuity and Change*, 23 (2008), pp. 267-307; Terki-Mignot, A., 'Changing Patterns of Female Employment in Westmorland, 1787-1851', BA dissertation, University of Cambridge, 2017.

⁹ It should be noted that, rather curiously, this decision was only ever applied to those described merely as shopkeepers or general shopkeepers. It was never applied to the much larger numbers of grocers or to other specialised shops. In the current estimates we have not added wives and daughters to other categories of shop-keeping.

change in census practice between 1871 and 1881 is responsible for the improbably sharp decline in the numbers and proportions of women in agriculture between these dates seen in tables 1, 4 and 7.

Female domestic labour supported the business *indirectly*, as did the domestic work of, say, agricultural labourers' wives and daughters, but this problem is beyond the scope of the current exercise. Given the heavy domestic responsibilities that married women and daughters bore, even if we allow for the possibility that women worked longer hours than men *in toto*, it is unlikely, on average, that they put as much time *directly* into the business as their husbands or fathers did. To that extent the recording of these women between 1851 and 1871 must exaggerate their direct relative labour contributions to these economic activities vis-à-vis their husbands and fathers. On the other hand, it is inconceivable that the decision to exclude them altogether from 1881 onwards (with the partial exception of farmers' daughters in 1901 and 1911) does not under-estimate women's relative labour inputs in these areas. Unfortunately, at present, we lack any direct evidence of the relative labour inputs to farms, pubs, shops and so forth of different family members in this period, or of how or whether these changed over time. For present purposes, we have decided to assume that wives in the categories of employment enumerated in table 8 put in half the time their husbands did and that daughters put in 75%, and that these figures were invariant 1700–1911. These numbers can easily be changed to model the effects of different assumptions and can be replaced as when and if good empirical evidence emerges.

If we treat labour force distributions as an indicator of the relative distribution of labour inputs by economic activity, then every individual enumerated carries the same weight, regardless of how many hours s/he worked in the year. This is a basic limitation of census data until very recent times. In 1851–1871, the Census Office effectively gave married women and daughters a weight relative to their husbands and fathers of one. From 1881, the relative weight was zero (aside from farmers daughters in 1901 and 1911). Our approach in essence is to apply weights of 0.5 and 0.75 all the way through. Whilst this is unlikely to be correct, it does have the merit of being consistent and may not be that wide of the mark. For married women our estimate is the average of the two improbably implicit weights used by the Census Office. We chose 0.75 for farmers' daughters on the arbitrary assumption that as single women they would have worked more on the farm than did their mothers. The adjustments made entail reducing the size of the female labour force in agriculture for 1851–1871 and inflating it for 1881–1911.

The second area where the census requires some correction is the under-enumeration of female day labourers in agriculture. Whilst men's occupations were expected to be reported whether they were working or not, women's occupations were only supposed to be reported if they worked 'regularly', but 'regularly' was never defined.¹⁰ Studies of farm accounts make it clear that female day labour in agriculture was predominantly employed during seasonal peaks such as at hay-making time or harvest time. Whilst casual workers (male and female) might account for 80% of all those employed over a year, they typically accounted for only 20% of the days worked.¹¹ Women working irregularly were unlikely to be recorded as agricultural labourers. Fortunately, we are able to draw on Joyce Burnette's study of farm wage books which reveals both the relative size of male and female day labourers labour contribution in agriculture over the 1750-1851 period and the declining role of women in day labour over this period.¹² If we take Burnette's estimates of the relative female to male labour inputs in day labour (0.12) and apply them to the census total of male day labourers in 1851, we get the equivalent of 130,673 women, as against 41,355 women 15 and over actually reported as agricultural labourers in the 1851 census report. We have used the ratio between these two numbers, 3.16, to inflate the number

¹⁰ See: Shaw-Taylor, L., 'Diverse Experiences'.

¹¹ Yamamoto, C., 'Two Labour Markets in Nineteenth-century English Agriculture: The Trentham Home Farm, Staffordshire', *Continuity and Change*, 15 (2004), pp. 89-116; Burnette, J., 'The Wages and Employment of Female Day-labourers in English Agriculture, 1740-1850', *Economic History Review*, LVII (2004), pp. 664-690.

¹² Burnette, J., 'The Wages and Employment of Female Day-labourers in English Agriculture, 1740-1850', *Economic History Review*, LVII (2004), pp. 664-690.

of female agricultural labourers across the whole period 1851–1911. From 1881 to 1911, the census reports do not distinguish between female day labourers and female servants, so it was necessary to estimate the reported number of female labourers for this period before replacing them with the new higher estimates.¹³

The third problem relates to the under-enumeration of female farmers in 1901, shown in table 9 below. Across the period, the share of those enumerated as farmers who were female fluctuated between 9 and 10 per cent, except for 1901, when it was 2 per cent. It is not clear what happened in 1901, but the number of female farmers reported, 4,043, is clearly wrong, and we have replaced the 1901 figure with 22,577, using the mean of the percentage for 1901 and 1911.

Table 9.
The number of female farmers reported in the censuses of 1851–1911

1851	1861	1871	1881	1891	1901	1911
22,916	26,250	24,338	20,612	21,691	4,043	24,157

Table 10 below shows the net additions made to each major occupational category across the 1851–1911 period. In general, this involves reductions for 1851–1871 and increases for 1881–1911. However, in agriculture, the additions in relation to agriculture labour 1851–1871 broadly cancel out the deductions for farmers’ wives and daughters. From 1881, both sets of adjustments represent net additions.

Table 10.
Net additions to the female labour force 1851–1911

	1851	1861	1871	1881	1891	1901	1911
Agriculture	-17,354	2,358	-40,693	251,608	214,461	208,523	144,874
Rest of Primary	0	0	0	0	0	0	0
Primary Total	-17,354	2,358	-40,693	251,608	214,461	208,523	144,874
Mining	0	0	0	0	0	0	0
Clothing	0	0	0	0	0	0	0
Footwear	-39,027	-38,002	-48,929	41,549	43,872	39,658	36,575
Textiles	0	0	0	0	0	0	0
Metals	0	0	0	0	0	0	0
Machines and tools, making	0	0	0	0	0	0	0
Building and construction	0	0	0	0	0	0	0
Rest of secondary sector	-11,901	-11,787	-16,128	18,540	22,161	24,901	29,400
Secondary Total	-50,928	-49,790	-65,057	60,088	66,033	64,559	65,975
Dealers and Sellers	-1,867	-795	-6,227	8,121	8,156	5,899	9,786
Services and Professions	-20,654	-26,358	-42,613	24,698	24,125	30,388	30,031
Transport and Communication	0	0	0	0	0	0	0
Tertiary non specific	0	0	0	0	0	0	0
Tertiary Total	-22,521	-27,153	-48,840	32,819	32,281	36,287	39,817
Labour Force Total	-90,802	-74,585	-154,590	344,515	312,775	309,370	250,667

¹³ In future work we plan to extract the number of female day labourers direct from the digitised Census Enumerators books for 1881-1911 using the ICeM data.

Section III. Estimating Female Occupational Structure 1710–1817

Our basic methodology for estimating female occupational structure is very simple. We take our estimates of male occupational structure c.1710, c.1761 and c.1817, and apply estimated ratios of female to male employment to these to generate estimates of female employment. In most cases we derive these ratios from the corrected version of the 1851 census. Consider the first three columns of table 7. If we look at the female share of each of the three *sectors* (primary, secondary and tertiary), these are very stable over the period 1851–1871. For the smaller groupings shown, the share of women in the labour force is generally, though not always, fairly stable over the same period. Our approach is to apply the corrected ratios for 1851 to the three earlier dates for the groups shown in table 7, *except* where the secondary literature or other evidence suggests that nineteenth century ratios would be a poor guide to earlier periods. This is the case with agriculture, textiles and clothing, and we use other evidence to derive ratios for the earlier periods. Clearly, using ratios deriving from a *corrected* version of 1851 census for c.1710, c.1761 and c.1817 is less than ideal. However, it does provide us with a way to estimate female occupational structure from male data until such time as better data are available. Also, as is discussed below, the exercise is useful in identifying areas of female employment where more research would yield the highest returns in improving our estimates. Moreover, we hope that by putting these preliminary estimates into the public domain, we will encourage or irritate others into providing more robust ratios or other and better estimates.

We can be reasonably certain that our estimates of the combined numbers of men and women employed in building and in transport will be broadly correct. Throughout the 1851–1911 period in England and Wales, female participation in these industries was close to zero. Whilst illuminated manuscripts and other evidence suggests a significant female presence on medieval building sites, there is no evidence that women constituted a significant part of the labour force in these two sectors at any point in the eighteenth and nineteenth centuries, so the combined labour force for both sexes must have been very close to the male figures.¹⁴ Evidence from the INCHOS (International Comparative History of Occupations) project suggests the position was similar elsewhere in Europe, though in India there were substantial numbers of women in the construction industry in the late nineteenth century.

There are two groupings where 1851 ratios may be unsatisfactory for earlier periods, but where we have not attempted, at this stage, to modify the ratios from the 1851 values: mining and ‘machines and tools’, because we currently know of no basis on which to do so. Female employment in mining must have been significantly higher before the 1842 Mines and Collieries Act made it illegal for women to work underground. However, even before that, large scale employment of women was largely restricted to a subset of the coal-fields rather than general.¹⁵ Women may have figured more prominently in proto-industrial tool making than they did by 1851, but this is purely speculative. In any case, both mining and ‘machines and tools’ accounted for very modest proportions of male employment in 1851 (table 6), and it is unlikely they ever accounted for a substantial share of female employment nationally 1700–1911.

We will now discuss, in turn, the three occupational groupings where we have not used the 1851 sex ratios to estimate female occupation structure: agriculture, textiles and the clothing trades. In agriculture, there are five distinct groups of women who we need to consider: female farmers, farmers’ wives, farmers’ daughters (and other female relatives), female farm servants and female agricultural labourers. For female farmers, farmers’ wives and farmers’ daughters, we do use in fact use 1851 ratios derived from the 1851 census. Hence, we assume that at the three earlier dates: (i) for every male farmer there were 0.1 female farmers; (ii) that 72 per cent of farmers were married; and (iii) that the average farmer had 0.63 co-resident daughters. In general, marriage ages declined over the eighteenth and early nineteenth century, so this might be considered an overestimate for the earlier periods. However, it is quite possible that under such circumstances men became farmers at slightly later average ages, so we

¹⁴ Roff, S. E., “‘Appropriate to Her Sex?’ Women’s Participation on the Construction Site in Medieval and Early Modern Europe’, in T. M. Earenfight, ed., *Women and Wealth in Late Medieval Europe* (New York, 2010), pp. 109–34.

¹⁵ Church, R., *History of the British Coal Industry. Volume 3: 1830–1911: Victorian Pre-Eminence* (Oxford, 1986).

have made no further adjustments. For day labourers, we again have the benefit of Burnette’s work and can apply ratios derived from her study of farm accounts 1750–1850 to our c.1761 and c.1817 data. Based on a linear interpolation of Burnette’s data, we fix the ratio of female to male day labour at 0.15 in c.1761 and 0.14 in c.1817. It is quite possible that the masculinisation of agricultural day labour which Burnette identified in the period 1750–1850 was already preceding between c.1710 and 1750, but we have no evidence to that effect, so we have applied the c.1761 ratio of 0.15 to 1710 as well. We are on less well evidence ground with the estimation of female farm servants. We have made three assumptions. First, that in c.1710 and c.1761 the share of males aged 15–24 who worked as farm servants was the same as the share of older men (who appear as fathers in baptism records) who were farm labourers. Second, that there was near parity with 0.9 female servants in husbandry for every male in c.1710 and c.1817. We know that farm service went into an abrupt decline from the late eighteenth century, and our third assumption is of a linear trend between our c.1761 estimate and the figure in the 1851 census, which gives us our c.1761 estimate.¹⁶

Textiles is the area of economic activity, above all others, where using ratios deriving from 1851 would be entirely inappropriate for earlier periods. Fortunately, the textile sector is relatively well covered by what could be termed quantitative anecdotes. All over Europe these consistently indicate high ratios of women to men in the textile industry pre-mechanisation. For example, in 1715, the wool merchant, J. Haines in *Great Britain’s Glory* provided the following account of the number of people required to make a quantity of worsted cloth:

			£	s.
7	Combers	(3%)	3	10
	Dyeing		5	0
250	Spinners	(83%)	18	0
20	Throwers and Doublers	(7%)	5	0
25	Weavers and Attendance	(7%)	12	0
302			43	10

Since it is likely that combers, dyers, throwers, doublers, (hand-loom) weavers (at this date) and their attendants were virtually all male, and that the spinners were overwhelmingly female, the preponderance of female labour is clear. C. Rey in *The Weavers’ Case* provided us with the following:

Of Weavers	100	Bobbin Winders	12
Wool Sorters	4	Back throw Winders	12
Wool Pickers	10	Quill Boys	50
Wool Combers	20	Warpers	5
Spinners	900	Dyers	6
Throwers	4	Pressers	6
Turners of the Throwing Mill	4		
Thread Makers	4	Total	1187
Doublers	50		

These accounts are not as specific as we might like on key details. Neither unambiguously specifies the sex of the individuals concerned, or how many were children and how many were adults, or whether some individuals, as we might guess of married women for instance, were working shorter hours than the rest. A further complication is that the male and female contributions varied with the type of cloth and with its quality. However, it has proved possible using such material to make estimates of the ratio of adult female to adult male textile workers in c.1710, c.1761 and c.1817 as being around 3, 3.5 and 2. Because of the complexity of deriving these ratios, this work is the subject of another paper and here we simply apply the ratios derived there to the male data without further explanation.¹⁷ Note that in

¹⁶ We plan to generate more empirically derived estimates of the number of female farm servants further via the Cambridge Group’s collection of parish listings. This will require dealing with the thorny issue of apportioning activity between domestic service and farm service. No doubt many or most female servants in farm households undertook both farm work and domestic work as required.

¹⁷ Sugden, K., Shaw-Taylor, L., and You, X., ‘Estimating Female Employment in Textiles in England and Wales c.1710-1851’, in progress.

1851, the ratio of males to females recorded with textile occupations in the census was almost exactly 1:1 whether we are looking at adults or children. Thus, the mechanisation of spinning was associated with a considerable decrease in female to male labour inputs. A partial reversal of this, consequent on the later diffusion of power-loom weaving (mostly by women), is apparent in table 7 above.

Tables 11 and 12 below show the estimated numbers of adult males and male labour force shares 1710–1911 in the same groupings as earlier tables. First three columns are the data to which we apply the various estimated ratios of female to male labour inputs discussed above. According to table 12, the percentage of the male labour force making clothes (i.e. men who were tailors) actually fell between 1761 and 1817. A fall in the share of men who were tailors across the eighteenth century can be seen in the parish register data in county after county. At a time when the price of cloth was falling, it is scarcely likely that the consumption of cloth was declining. Prior to the invention of the sewing machine in the 1850s, it is unlikely there were any productivity increases in the making of clothes. There is, however, evidence in the secondary literature that the industry was feminising as the making of women's clothes was increasingly taken over by women from the late seventeenth century. By 1851, 70 per cent of all adults making clothes were female (table 7). It seems likely that the share of adults making clothes rose over the eighteenth century, but that women's share of this work also rose over time. This much is fairly straightforward; the question, which cannot be answered with the data currently available, is how much did the share of the labour force making clothes rise over time?

Table 12 indicates some rise in the share of men making shoes over the eighteenth century, though focussed on the period before 1761. There is no reason to think that the price of leather or shoes was falling in the eighteenth century, and this is probably evidence of rising incomes – continuing a rather stronger pre 1700 trend. In earlier estimates, we chose to keep the both sexes share of clothing constant over the period 1710–1851 at the 1851 level. Here, we have allowed for some modest growth by assuming that total employment for *both sexes* in making clothes tracked total *male* employment in making shoes over the period 1710–1851. This is rather conservative, since it seems likely that employment in making clothes would have risen faster than employment in making shoes over this period.

Note that our new estimates 1710–1817 are *not* estimates of the number of women working in each of these sectors, but of the labour inputs of women relative to males: the number of *male equivalents*. Thus *one woman* might correspond to one woman working similar hours to men, or it might correspond to two women working half that time. This approach mirrors that taken by Joyce Burnette, and conveniently avoids the problem that we do not know the relative working time of men and women, which no doubt varied with women's age and marital status, as well as geographically and by sector. To calculate the number of actual women involved would require additional data, or at least estimates of the distribution of working hours (in the conventionally conceptualised economy) by women.

Table 11.
Estimated male occupational structure, 15 and over, 1710–1911

	1710	1761	1817	1851	1861	1871	1881	1891	1901	1911
Agriculture	795,790	875,488	1,219,152	1,427,792	1,408,870	1,274,448	1,199,569	1,128,429	1,093,053	1,205,628
Rest of Primary	7,189	12,169	17,820	31,403	36,538	39,897	50,842	49,148	51,849	56,091
Primary Total	802,980	887,657	1,236,971	1,459,195	1,445,408	1,314,345	1,250,411	1,177,577	1,144,902	1,261,719
Mining	11,564	42,953	102,384	256,659	327,216	376,830	457,736	579,325	723,287	948,226
Clothing	85,548	106,633	113,660	176,735	157,620	160,812	161,580	177,120	170,822	183,434
Footwear	61,151	84,716	125,180	204,456	206,672	192,015	183,069	193,308	177,457	164,142
Textiles	149,847	198,445	260,810	382,489	358,646	335,380	326,688	349,293	364,852	447,414
Metals	70,697	75,452	122,251	207,572	274,677	320,438	362,692	397,940	426,298	494,447
Machines and tools	19,641	24,534	37,521	89,516	129,378	195,900	244,259	316,379	417,346	476,272
Building and construction	114,388	188,334	250,300	432,945	511,312	589,612	714,448	712,951	993,009	922,008
Rest of secondary sector	271,278	299,369	510,049	948,328	1,053,170	1,342,518	1,532,328	1,752,252	1,883,987	1,993,580
Secondary Total	784,114	1,020,438	1,522,155	2,698,700	3,018,691	3,513,505	3,982,801	4,478,568	5,157,057	5,629,523
Dealers and Sellers	52,686	64,488	111,942	247,757	333,704	401,719	429,882	512,907	693,799	856,677
Services and Professions	99,686	162,919	289,572	533,008	627,965	804,243	1,012,896	1,126,711	1,493,795	1,865,735
Transport and Communicati	82,891	94,884	177,391	372,208	522,074	616,420	755,488	1,085,632	1,290,979	1,488,290
Tertiary non specific	1,055		825							
Tertiary Total	236,318	322,290	579,730	1,152,973	1,483,743	1,822,382	2,198,267	2,725,250	3,478,573	4,210,702
Labour Force Total	1,823,411	2,230,385	3,338,856	5,310,868	5,947,842	6,650,232	7,431,478	8,381,396	9,780,532	11,101,944

Table 12.
New estimates of male occupational structure, 15 and over
Labour force shares 1710–1911 (%)

	1710	1761	1817	1851	1861	1871	1881	1891	1901	1911
Agriculture	43.6	39.3	36.5	26.9	23.7	19.2	16.1	13.5	11.2	10.9
Rest of Primary	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.6	0.5	0.5
Primary Total	44.0	39.8	37.0	27.5	24.3	19.8	16.8	14.0	11.7	11.4
Mining	0.6	1.9	3.1	4.8	5.5	5.7	6.2	6.9	7.4	8.5
Clothing	4.7	4.8	3.4	3.3	2.7	2.4	2.2	2.1	1.7	1.7
Footwear	3.4	3.8	3.7	3.8	3.5	2.9	2.5	2.3	1.8	1.5
Textiles	8.2	8.9	7.8	7.2	6.0	5.0	4.4	4.2	3.7	4.0
Metals	3.9	3.4	3.7	3.9	4.6	4.8	4.9	4.7	4.4	4.5
Machines and tools, making	1.1	1.1	1.1	1.7	2.2	2.9	3.3	3.8	4.3	4.3
Building and construction	6.3	8.4	7.5	8.2	8.6	8.9	9.6	8.5	10.2	8.3
Rest of secondary sector	14.9	13.4	15.3	17.9	17.7	20.2	20.6	20.9	19.3	18.0
Secondary Total	43.0	45.8	45.6	50.8	50.8	52.8	53.6	53.4	52.7	50.7
Dealers and Sellers	2.9	2.9	3.4	4.7	5.6	6.0	5.8	6.1	7.1	7.7
Services and Professions	5.5	7.3	8.7	10.0	10.6	12.1	13.6	13.4	15.3	16.8
Transport and Communicati	4.5	4.3	5.3	7.0	8.8	9.3	10.2	13.0	13.2	13.4
Tertiary non specific	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tertiary Total	13.0	14.4	17.4	21.7	24.9	27.4	29.6	32.5	35.6	37.9
Labour Force Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 13 below shows the new estimates for women 1710–1817 generated by applying these estimating procedures to the male estimates 1710–1817, and the revised census derived numbers for 1851–1911. Table 14 below shows the new and revised female occupational structure as labour force shares. Table 15 shows the percentage labour force shares for both sexes combined. Table 16 shows what proportion of the labour force was female in each sector and sub-sector. The abrupt decline in agricultural employment that was so marked in the unadjusted census data between 1871 and 1881 is now replaced

by a more credible long continuous decline from 1710 to 1911 in all three series. The erratic growth and decline of the clothing industry visible in the male data between 1710 and 1851 appears as steady growth in both female and overall employment down to 1851, only falling after the introduction of the first sewing machines in the 1850s. On this account, textile employment peaked as a share of the labour force, in all three series, on the eve of the mechanisation of spinning, and then declined continuously in the face of increasing levels of mechanisation across the whole period 1761 to 1911, but the decline 1761–1851 was much sharper for women and both sexes combined than it was for men. The estimates for women and for both sexes combined show no implausible or puzzling patterns of development and, textiles aside, no sudden jumps or declines.

Table 13.
New estimates of female occupational structure, 15 and over, 1710–1911

	1710	1761	1817	1851	1861	1871	1881	1891	1901	1911
Agriculture	445,041	450,317	409,203	411,962	362,976	322,147	313,918	264,388	264,873	237,499
Rest of Primary	4	6	9	16	1,120	334	1,022	1,119	164	503
Primary Total	445,044	450,323	409,212	411,978	364,096	322,481	314,940	265,507	265,037	238,002
Mining	260	955	2,299	5,769	3,769	8,069	5,443	4,297	2,904	3,052
Clothing	88,502	134,491	222,776	475,496	475,496	477,612	567,789	620,707	650,381	684,257
Footwear	20,609	28,551	42,188	68,905	78,444	65,925	74,938	85,436	80,613	77,522
Textiles	449,540	694,559	521,620	380,498	430,616	449,467	480,603	484,854	495,081	555,139
Metals	6,449	6,882	11,151	23,621	26,586	24,251	27,993	30,597	41,808	55,545
Machines and tools, making	201	251	383	914	3,393	23,409	11,606	27,382	7,151	10,525
Building and construction	192	316	420	727	847	1,100	1,403	1,836	702	574
Rest of secondary sector	24,668	27,222	46,380	86,234	125,025	183,695	181,089	250,350	285,802	396,576
Secondary Total	590,421	893,226	847,217	1,042,164	1,144,175	1,233,528	1,350,864	1,505,459	1,564,442	1,783,191
Dealers and Sellers	15,988	19,570	33,970	75,186	85,971	119,225	140,386	185,998	279,318	415,679
Services and Professions	198,698	324,736	577,185	1,062,412	1,306,895	1,592,022	1,723,349	2,027,346	2,154,582	2,407,398
Transport and Communicat	1,508	1,726	3,227	6,772	5,386	3,872	6,146	9,906	16,261	48,708
Tertiary non specific	320	513	911	1,696	823	1,823	835	0	76	4,942
Tertiary Total	216,515	346,545	615,294	1,146,066	1,399,075	1,716,941	1,870,715	2,223,250	2,450,236	2,876,727
Labour Force Total	1,251,980	1,690,094	1,871,723	2,600,207	2,907,346	3,272,950	3,536,519	3,994,216	4,279,716	4,897,920

Table 14.
New estimates of female occupational structure. 15 and over
Labour force shares 1710–1911 (%)

	1710	1761	1817	1851	1861	1871	1881	1891	1901	1911
Agriculture	35.5	26.6	21.9	15.8	12.5	9.8	8.9	6.6	6.2	4.8
Rest of Primary	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Primary Total	35.5	26.6	21.9	15.8	12.5	9.9	8.9	6.6	6.2	4.9
Mining	0.0	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.1	0.1
Clothing	7.1	8.0	11.9	18.3	16.4	14.6	16.1	15.5	15.2	14.0
Footwear	1.6	1.7	2.3	2.6	2.7	2.0	2.1	2.1	1.9	1.6
Textiles	35.9	41.1	27.9	14.6	14.8	13.7	13.6	12.1	11.6	11.3
Metals	0.5	0.4	0.6	0.9	0.9	0.7	0.8	0.8	1.0	1.1
Machines and tools, making	0.0	0.0	0.0	0.0	0.1	0.7	0.3	0.7	0.2	0.2
Building and construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rest of secondary sector	2.0	1.6	2.5	3.3	4.3	5.6	5.1	6.3	6.7	8.1
Secondary Total	47.2	52.9	45.3	40.1	39.4	37.7	38.2	37.7	36.6	36.4
Dealers and Sellers	1.3	1.2	1.8	2.9	3.0	3.6	4.0	4.7	6.5	8.5
Services and Professions	15.9	19.2	30.8	40.9	45.0	48.6	48.7	50.8	50.3	49.2
Transport and Communicat	0.1	0.1	0.2	0.3	0.2	0.1	0.2	0.2	0.4	1.0
Tertiary non specific	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1
Tertiary Total	17.3	20.5	32.9	44.1	48.1	52.5	52.9	55.7	57.3	58.7
Labour Force Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 15.
New estimates of both sexes occupational structure, 15 and over, 1710–1911

	1710	1761	1817	1851	1861	1871	1881	1891	1901	1911
Agriculture	40.3	33.8	31.3	23.3	20.0	16.1	13.8	11.3	9.7	9.0
Rest of Primary	0.2	0.3	0.3	0.4	0.4	0.4	0.5	0.4	0.4	0.4
Primary Total	40.6	34.1	31.6	23.7	20.4	16.5	14.3	11.7	10.0	9.4
Mining	0.4	1.1	2.0	3.3	3.7	3.9	4.2	4.7	5.2	5.9
Clothing	5.7	6.2	6.5	8.2	7.1	6.4	6.6	6.4	5.8	5.4
Footwear	2.7	2.9	3.2	3.5	3.2	2.6	2.4	2.3	1.8	1.5
Textiles	19.5	22.8	15.0	9.6	8.9	7.9	7.4	6.7	6.1	6.3
Iron and steel manufacture	2.5	2.1	2.6	2.9	3.4	3.5	3.6	3.5	3.3	3.4
Machines and tools, making	0.6	0.6	0.7	1.1	1.5	2.2	2.3	2.8	3.0	3.0
Building and construction	3.7	4.8	4.8	5.5	5.8	6.0	6.5	5.8	7.1	5.8
Rest of secondary sector	9.6	8.3	10.7	13.1	13.3	15.4	15.6	16.2	15.4	14.9
Secondary Total	44.7	48.8	45.5	47.3	47.0	47.8	48.6	48.4	47.8	46.3
Dealers and Sellers	2.2	2.1	2.8	4.1	4.7	5.2	5.2	5.6	6.9	8.0
Services and Professions	9.7	12.4	16.6	20.2	21.9	24.1	24.9	25.5	25.9	26.7
Transport and Communication	2.7	2.5	3.5	4.8	6.0	6.3	6.9	8.9	9.3	9.6
Tertiary non specific	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tertiary Total	14.7	17.1	22.9	29.1	32.6	35.7	37.1	40.0	42.2	44.3
Labour Force Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

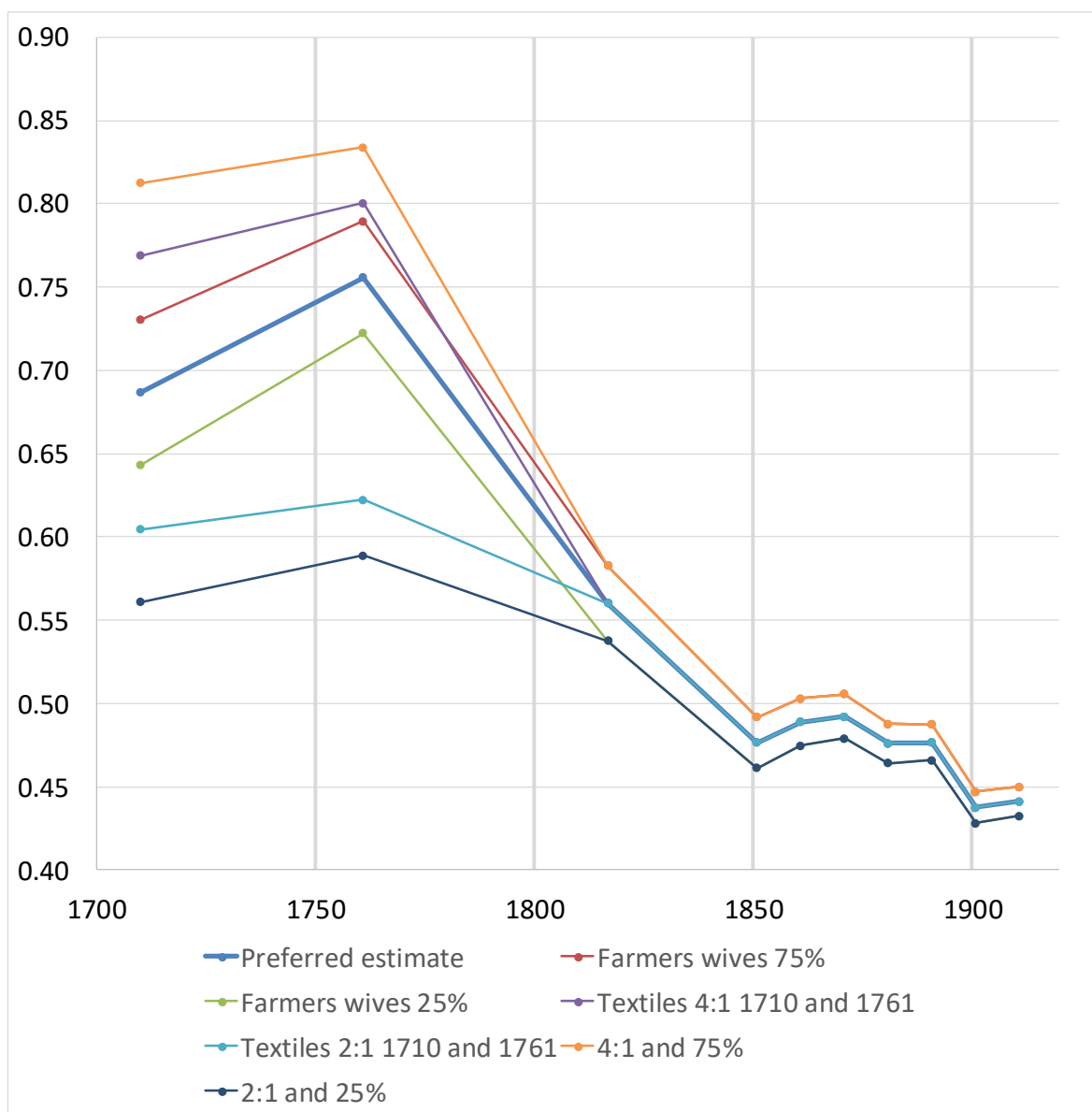
Table 16.
New estimates of the female share of the both-sexes combined labour force within each sector, 15 and over, 1710–1911

	1710	1761	1817	1851	1861	1871	1881	1891	1901	1911
Agriculture	0.36	0.34	0.25	0.22	0.20	0.20	0.21	0.19	0.20	0.16
Rest of Primary	0.00	0.00	0.00	0.00	0.03	0.01	0.02	0.02	0.00	0.01
Primary Total	0.36	0.34	0.25	0.22	0.20	0.20	0.20	0.18	0.19	0.16
Mining	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.00	0.00
Clothing	0.51	0.56	0.66	0.73	0.75	0.75	0.78	0.78	0.79	0.79
Footwear	0.25	0.25	0.25	0.25	0.28	0.26	0.29	0.31	0.31	0.32
Textiles	0.75	0.78	0.67	0.50	0.55	0.57	0.60	0.58	0.58	0.55
Metals	0.08	0.08	0.08	0.10	0.09	0.07	0.07	0.07	0.09	0.10
Machines and tools, making	0.01	0.01	0.01	0.01	0.03	0.11	0.05	0.08	0.02	0.02
Building and construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rest of secondary sector	0.08	0.08	0.08	0.08	0.11	0.12	0.11	0.13	0.13	0.17
Secondary Total	0.43	0.47	0.36	0.28	0.27	0.26	0.25	0.25	0.23	0.24
Dealers and Sellers	0.23	0.23	0.23	0.23	0.20	0.23	0.25	0.27	0.29	0.33
Services and Professions	0.67	0.67	0.67	0.67	0.68	0.66	0.63	0.64	0.59	0.56
Transport and Communication	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.03
Tertiary non specific	0.23	1.00	0.52	1.00	1.00	1.00	1.00	-	1.00	1.00
Tertiary Total	0.48	0.52	0.51	0.50	0.49	0.49	0.46	0.45	0.41	0.41
Labour Force Total	0.41	0.43	0.36	0.33	0.33	0.33	0.32	0.32	0.30	0.31
Female: Male Labour Force	0.69	0.76	0.56	0.49	0.49	0.49	0.48	0.48	0.44	0.44

Section IV. Sensitivity Analysis

These estimates of female labour input into the economy (as conventionally conceived) are, for the period 1710–1817, only as good as the assumptions documented above. The revised estimates for 1851–1911 are much less dependent on the assumptions made since these are largely the product of hard data. Before discussing the implications, we therefore present a brief sensitivity analysis. Figure 1 below graphs our estimates of the relative labour inputs of adult females to adult males, showing the impact of modifying some of our key assumptions. The thicker blue line shows our preferred estimates documented in the foregoing tables. All the estimates show a rise to 1761, then a fall of varying degrees of sharpness through to 1851.

Figure 1. Estimated female: male labour inputs 1700–1911: Variant assumptions



In our view, our estimates are most vulnerable to potentially erroneous assumptions in relation to the relative time inputs of farmers’ wives and daughters, where we have simply made guesses, and in the ratios for textiles, which are based on a fair quantity of evidence, but are still subject to non-trivial margins of error. For illustrative purposes, we have shown in figure 1 the effects of changing the assumptions about farmers’ wives and textiles in particular ways. We have not modelled the effect of changing the assumptions about farmers’ daughters.

Note that these estimates are not identical to female labour force participation rates. Because some unknown fraction of women worked part-time, the actual share of women working in the economy is likely to have been greater than shown here at all dates. Hence, if we could plot female labour force participation rates over time, all the lines would be higher than the lines plotted. However, the lines would almost certainly be raised more in earlier periods than later for two reasons. First, many women worked part-time spinning at home c.1710 and c.1761, and no doubt in c.1817. The importance of part-time working in textile factories thereafter must have been modest compared to the earlier period. Part-

time work was no doubt also prevalent amongst wives and daughters in farming households, but as the share of agriculture in the labour force declined, and agriculture proletarianized, the wives and daughters become a smaller share of the agricultural labour force and of the labour force as a whole. Thus, any upward revisions of each of the lines shown in figure 1, at least as regards textiles and agriculture, would be much greater in earlier periods than in the later period. In other words, unless there were powerful trends in the opposite direction, to more part-time work later, and this seems unlikely, labour force participation rates are likely to have fallen more steeply over time than the corresponding estimates for the ratio of the female to male inputs. It should be noted that it is textiles and agriculture which are the primary drivers for the declines shown on the graph.

Our preferred estimates are shown by the thick blue line in the middle of the distribution. On this account, the ratio of female to male labour inputs fell from around 76 per cent to around 49 per cent over the course of the Industrial Revolution (1761 to 1851). Moving out from the central estimate, the green line below and the red line above show the impact of reducing farmers' wives relative contribution to 25 per cent or increasing it to 75 percent while keeping all other ratios as before. This has the biggest impact at the beginning of the period, when male farmers made up fully 20 percent of all adult males, with the lower estimate being 65 percent and the higher estimate being 73 per cent, as opposed to our preferred figure of 69 per cent. We might consider 25 per cent and 75 per cent as approaching the upper and lower bound estimates of the contributions of farmers' wives relative to their husbands that are credible. Moving out again, the next pair of lines show the impact of changing the ratios for textiles only in 1710 and 1761, with the effect of a 2:1 ratio shown in light blue and a 4:1 ratio shown in purple. The range of relative female: male contributions is a massive 17 per cent in 1710 and 18 percent in 1761. The highest estimates, shown by the orange line, come from assuming a 4:1 ratio in textiles *and* a 75 per cent figure for the farmers' wives, while the lowest estimates (dark blue) derive from a 2:1 ratio in textiles and a 25 per cent figure for farmers' wives.

Our central estimate is clearly sensitive to the assumptions made. A 2:1 estimate for textiles is implausibly low, and it seems unlikely that farmers' wives would have contributed much less than 25 per cent of their time to the farm in 1700 or 1761. A 4:1 ratio in textiles is within the bounds of possibilities, but it is hard to imagine that farmers' wives, on average, could have put more than 75 percent of their time *directly* into the farm. The two extremes shown may indicate roughly the upper and lower limits of plausibility, but all the estimates shown indicate some rise in relative female labour inputs over the 1710–1761 period as well as steep declines between 1761 and 1851, and none show any major changes between 1851 and 1891. It would be extremely difficult to make any plausible set of suggestions for changing our estimates that would produce *different* trends, as opposed to trends of different *magnitudes*. Note that we have only shown the effects of changing the assumptions about textiles *and* farmers' wives, when the two changes change the female: male labour inputs in the same direction. We have not shown the equally plausible possibility that the two sets of estimates should be changed in opposite directions, which would partially cancel each other out in their effects.

Section V. Some Comparisons

There are no other estimates of female occupational structure c.1710–c.1817 for England and Wales, and no other series which corrects the clear deficiencies of the census 1851–1911. It is not therefore possible to compare our estimates of female occupational structure directly with other estimates. However, it is possible (i) to compare our tentative account of the decline in textile employment for women with a number of other studies, (ii) to consider the geography of female labour force participation in 1851 alongside some of these other studies and in relation to their estimates, and (iii) to compare our estimates of female employment in textiles with the estimates made recently by Craig Muldrew using a completely different methodology and with one contemporary estimate from. Each of these comparisons suggests our estimates are in the right ball-park. However, in France and perhaps in Belgium, the prevalence of small farmers amongst the husbands of former spinners meant that scale of

the falls in female labour force participation was muted as large numbers of women returned to agriculture. We do not know how well that labour was absorbed and hence to what degree this led to significant underemployment in agriculture.

Frank Geary found that over a single decade the mechanisation of flax spinning in Ireland reduced female employment in textiles from 48 per cent of the female labour force in 1841 to 32 per cent in 1851.¹⁸ Work by Erik Buyst indicates that the mechanisation of the Belgian flax industry reduced the ratio of adult female to male employment from 3.8 to 1.9 between 1846 and 1910. Textiles fell from 31.4 per cent of all adult female employment in 1846 to 9.8 per cent in 1890.

Rest of text for this section to follow. Works to be discussed:

Saito, O., 'Who worked when: life-time profiles of labour-force participation in Cardington and Corfe Castle in the late eighteenth and mid-nineteenth centuries', *Local Population Studies*, 22 (1979), p. 14-29.

Earle, P., 'The female labour market in London on the late seventeenth and early eighteenth centuries', *Economic History Review*, XLII (1989), pp. 328-54.

Erickson, A., 'Married women's occupations in eighteenth century London', *Continuity and Change* 23, 2 (2008) pp.267-307.

Terki-Mignot, A., 'Changing Patterns of Female Employment in Westmorland, 1787-1851', BA dissertation, University of Cambridge, 2017.

Section VI. Some Implications

- (1) The female share of labour inputs in the economy (as conventionally defined) appears on any of these estimates to have been rising over much of the eighteenth century, driven by the expansion of employment in textiles and the growth of the tertiary sector, which more than outweighed the declining weight of farm families in the economy.
- (2) The relative importance of adult female labour vis-à-vis adult males in agriculture was declining for much of the period, but especially between 1761 and 1851 (table 16). The share of the female labour force declined continuously from 1710 to 1911. The declining share of farm families in the labour force within a proletarianising sector between 1710 and 1761, together with agriculture's shrinking share of the labour force, were much bigger factors than the reduced share within agriculture for female day labourers noted by previous studies.¹⁹ There can be no doubt about the reality of this decline, though it could have been offset somewhat if the remaining wives and daughters of farmers came to put more of their time into the farm over time. This seems most unlikely since farms were getting bigger and farmers' households were getting richer, and it is on the smaller poorer farms where we would expect to find the highest inputs to the farm by female household members.
- (3) On any of the assumptions considered here, there was a dramatic relative masculinisation of adult employment in textiles between 1761 and 1851 driven by two inter-related effects of the diffusion of machinery for spinning. The first and largest effect was a major reduction of employment in spinning vis-à-vis weaving and other processes. A second and smaller effect, once powered machinery was introduced, was the dilution of women within spinning by the emergence of male spinners who operated the machines. Women (and children) continued to work in spinning fixing

¹⁸ Geary, F., 'De-industrialization in Ireland to 1851: Some Evidence from the Census', *Economic History Review*, 51 (1998), p. 516.

¹⁹ Snell, K., *Annals of the Labouring Poor* (Cambridge, 1985); Burnette, J., 'The Wages and Employment of Female Day-labourers in English Agriculture, 1740-1850', *Economic History Review*, LVII (2004), pp. 664-90.

broken yarn, but not operating the machines. The effect may be larger or smaller than we suggest in our central estimate, but in our view, it is very unlikely to be much smaller.

- (4) One of the key implications of these estimates is the conclusion that any plausible set of estimates we can make indicates there was a major decline in the relative inputs of adult women compared to adult men over the period c.1761 to 1851. Our central estimate is that this fell from 76 percent to 48 per cent. This in turn suggests even steeper *involuntary* declines in the female labour force participation rate over the same period. Of the alternatives considered above, the lowest estimate of the decline is from 58 per cent to 46 per cent, and the highest is from 83 per cent to 49 per cent. Clearly there is room for doubt on the precise scale of the effect, but it seems hard to escape the conclusion that there was a very substantial decline in the availability of work for women after c.1761 which was not reversed in any significant way in the nineteenth century.
- (5) On our central estimates, it is unlikely that female labour force participation rates recovered their mid-eighteenth-century levels before the 1980s.
- (6) None of our estimates can be squared with the claims of those who have argued for a major increase nationally in female employment during the Industrial Revolution, but they do lend support to the argument set out long ago by Erik Richards that female employment reached a pre-industrial peak just before the onset of mechanisation.²⁰
- (7) Jan de Vries has argued that female labour force participation was increasing over the period 1650 to 1850 as households chose to deploy more female labour in the market, and then declined over the second half of the nineteenth century as women withdrew voluntarily from the labour force. It is inconceivable that female labour force participation was rising over more than the first decade of de Vries' 1650–1850 period, and almost certain that female labour force underwent a precipitate and *involuntary* decline. Nor is there any evidence for a withdrawal from the labour force after 1850, voluntary or involuntary. The fluctuations over the next four decades are small and may simply be artefacts of changing census practice. There clearly was a decline in female labour force participation after 1891, and some of this may well have been voluntary. It may not be a coincidence that the last decade of the nineteenth century saw the emergence of the so called *servant problem*. This was as a problem for employers who could no longer find so many women willing to become domestic servants at the rates they were accustomed and willing to pay. Domestic service peaked as a share of female employment in 1891, and then declined gradually over the next twenty years. Domestic service meant living with one's employer and being at the employer's beck and call seven days a week. The declining incidence of service may reflect the particularly unattractive aspects of this form of employment compared with most other options women had available at a time of generally rising incomes.
- (8) Our estimates have negative implications for the standard of living debate. There has been much work on male wage rates over the last four decades, and recently some work on women's wages. The scale of the decline in the availability of work on our estimates suggest that trends in the availability of work for women have to be factored in as a negative contribution to the standard of living of the working classes across much of the country, but especially in the rural south and east, where gains in male wages are least clear. The loss of employment in spinning combined with low male wages in agriculture may have been a major determinant of the spiralling cost of poor relief from the late eighteenth century that culminated in the 1834 Poor Law Amendment Act.

²⁰ Richards, E., 'Women in the British Economy since about 1700. An Interpretation' *History* 59 (1974), pp. 337-57.

- (9) Our estimates of employment in the secondary sector c.1710 are much higher than those used by either Crafts or by Broadberry et al., and our estimates of the growth of the secondary sector labour force through to 1841 and 1851 are accordingly much lower too.²¹ This is partly because we estimate a higher share of the male labour force in the secondary sector, but also because we estimate much larger numbers of women in secondary sector employment c.1710 and c.1761. If we combine our estimates of employment in the secondary sector with either the old Crafts' estimates or the new Broadberry et al. estimates of output, we get much higher rates of growth in labour productivity than either. This suggests a significantly higher rate of technological change in manufacturing during the Industrial Revolution than has been suggested by four decades of work within the national accounts framework, though it does not get us back up to the levels suggested by Deane and Cole. As Jane Humphries has long argued, we cannot get economic history right if we do not account for women's 'economic' activity.²²

Section VII. Future Research

Views will no doubt vary on the value of this approach. We make no pretence to exact accuracy, but we would contend (i) that our estimates are likely to capture, the relative importance of female labour in different sectors and sub-sectors in broad outline (ii) that the basic trends over time are likely to be correct even if the exact magnitudes are in doubt (iii) that our estimates of the both sexes occupational structure are likely to be considerably closer to reality than simply using male data as a proxy for the whole labour force in the period before 1851. Estimates made by way of ratios applied to male estimates are obviously inferior to more direct data. However, whilst direct data can be generated for specific localities, it seems unlikely we will ever find enough data to produce robust national estimates of female occupational structure before 1851 without some resort to male data. Much more work can and should be done to provide a more secure empirical foundation for the ratios used here for the pre-census period.²³ One unanticipated outcome of this work has been to highlight the areas where further research might yield the greatest dividends in relation to reducing the uncertainties in the distribution of female 'economic' activity before 1851. Three areas stand out as particularly important: first, the textile sector; secondly, the relative labour inputs of wives and daughters in businesses nominally headed by husbands and fathers; third the changing incidence of female service in husbandry and domestic service. Service has not been discussed in the paper, but two issues should be noted. First, for females in farm-households, the distinction between domestic service and farm-work is hard to draw. Second, in the estimates made here, domestic service is hidden within the larger miscellaneous 'services and professions' category. More work is also needed on the period 1851-1911. Most obviously further work is needed both on identifying the sub-sectors within which wives and daughters contributed to family businesses and their relative time contributions in these sub-sectors.

²¹ Crafts, N. F. R., *British Economic Growth During the Industrial Revolution* (Oxford, 1986); Broadberry, S. N., Campbell, B. M. S., Klein, A., Overton, M., and Leeuwen, B. v., *British Economic Growth, 1270-1870* (Cambridge, 2015).

²² Humphries, J., "... The Most Free from Objection...": The Sexual Division of Labour and Women's Work in Nineteenth-Century England', *Journal of Economic History*, 47 (1987), pp. 929-49; Humphries, J., "Lurking in the Wings...": Women in the Historiography of the Industrial Revolution', *Business And Economic History*, 20 (1991), pp. 32-44.

²³ Some of our own plans are indicated in Field, J., and Erickson, A. L., 'Prospects and Preliminary Work on Female Occupational Structure in England from 1500 to the National Census', available as paper 16 at <https://www.campop.geog.cam.ac.uk/research/occupations/outputs/preliminary/>