Appendix 1. Grain price and tariff data

Grain prices

The British, French, German and US price data are based on the Board of Trade's (1909) Statistical Tables and Charts Relating to British and Foreign Trade and Industry. The publication gives grain prices from 1854 to 1908, all converted to shillings per Imperial Quarter (rye prices are expressed in shillings per cwt.).[1] The British prices are the standard Gazette prices for England and Wales. The other European prices are market averages, whereas US prices are for particular grades of grain in Chicago (for example, wheat prices are for winter wheat). An earlier (1903) report had commented on this problem, and had calculated average Liverpool prices for winter wheat between 1892 and 1901. On average, winter wheat cost 1s.3d. more than than the Gazette average price, and Chicago wheat prices are therefore adjusted downwards by this amount in the paper. However, no attempt is made to adjust other Chicago grain prices. This implies that for grains other than wheat these data may not accurately measure price gap *levels*. Nevertheless, the data should still be useful in inferring *trends* in price gaps.

The 1903 report concluded that "Subject to the above observation respecting the New York price, the prices quoted for the various countries are believed to be as nearly comparable as any which could be obtained, though it is possible, that the French prices may be somewhat raised as compared with the English, by differences of average quality and of situation of the market" [Board of Trade (1903), p. 120].

National grain price indices are then spliced onto these series for the remaining years through 1913. The gold standard meant that exchange rate fluctuations were of no concern for these four countries during this period (1908-13). Sources used are as follows:

Britain

The Gazette prices for England in Wales, as reported in Mitchell (1988, pp. 756-57).

France

Annuaire Statistique de la France: Résumé Rétrospectif 1966, Table II, p. 407, Table V, p. 410.

Germany

Hoffmann (1965), Table 135, pp. 552-54.

United States

Wheat prices: Harley (1980), Appendix Table, pp. 246-47 (Chicago No. 2 spring). Other grain prices are taken from Historical Statistics of the United States (1975). Oats prices: series K-513, p. 511, part 1. Barley prices: series K516, p. 511, Part 1. Rye prices: series K-528, p. 513, Part 1.

Danish and Swedish prices are taken from national sources and converted to shillings per Imperial Quarter. The conversion from crowns into sterling was made at the gold standard parity of 18.16 crowns to the pound. Danish and Swedish rye prices had to be converted from volume to weight terms. The conversion factor for rye was derived by comparing the Danish output figures in thousands of tons given in Johansen (1985, Table 2.9, p. 147) with those given in thousands of hectolitres in Mitchell (1981, Table D2, pp. 254, 266). The data for 1875-1910 imply an average conversion factor of 13.6 hectolitres per metric ton.

[1] The report only gives Bavarian prices through 1906; for grains other than wheat, the report only gives French prices through 1907.

Sweden

Swedish grain prices were obtained from Jörberg (1972, pp. 635-36, 640-41).

Denmark

Danish prices (kapiteltakster) before 1900 were obtained from Christensen (1985, pp. 102-03); after 1900, they were taken from the Danish Statistisk Aarbog (various years).

Odessa prices

Odessa prices are taken from Harley (1980), Appendix Table, pp. 246-47, where they are expressed in gold dollars per bushel. Dollars are converted to pounds at $4.8665 = £1.

Tariff data

French and German tariff data are taken from the Board of Trade (1909), where they are expressed in shillings per cwt. There were no changes in French or German grain tariffs between 1908 and 1913. Swedish tariffs were taken from Kuuse (1971, p. 44, fn. 25), and were also expressed by weight. Barley, oats and wheat weights were converted to volumes by comparing the British output figures for 1885 given in Mitchell (1988, p. 196) in thousands of tons, and those for the same year in Mitchell and Deane (1962, p. 86), given in thousands of bushels. These data implied that there were 36.17 bushels of wheat to the ton, 41.71 bushels of barley, and 56.29 bushels of oats.

Appendix Tables 1.1 to 1.4 give the basic price and tariff data for all four grains. Column headings are as follows:

PB: British price
PF: French price
PP: Prussian price
PBAV: Bavarian price
PUS: US price
PSW: Swedish price
PDK: Danish price
POD: Odessa price
TARF: French tariff
TARG: German tariff
TARS: Swedish tariff

Appendix Table 1.1. Wheat prices and tariffs, 1870-1913

(shillings per Imperial Quarter)

YEAR	PB	PF	PP	PBAV	PUS	PSW	PDK	POD	TARF	TARG	TARS
1870	46.92	46.60	43.67	44.92	28.67	38.64	41.90	33.25	1.04	0.00	0.00
1871	56.67	59.67	50.17	51.92	38.08	44.38	49.56	40.04	1.04	0.00	0.00
1872	57.00	53.92	51.75	56.58	39.90	48.64	48.80	40.72	1.04	0.00	0.00
1873	58.67	59.58	56.50	63.33	38.40	52.52	52.40	47.50	1.04	0.00	0.00
1874	55.75	58.42	51.42	56.83	34.42	43.32	39.18	42.08	1.08	0.00	0.00
1875	45.17	45.00	41.92	46.42	30.54	41.05	41.07	39.70	1.08	0.00	0.00
1876	46.17	47.92	45.00	50.33	31.67	43.26	45.00	40.38	1.08	0.00	0.00
1877	56.75	54.58	49.25	54.67	40.17	46.36	41.43	31.22	1.08	0.00	0.00
1878	46.42	49.42	43.25	49.17	33.92	38.42	36.00	33.25	1.08	0.00	0.00
1879	43.83	51.50	41.92	48.33	32.75	40.66	42.45	42.08	1.08	2.17	0.00
1880	44.33	51.67	46.83	52.58	36.08	42.46	41.04	43.09	1.08	2.17	0.00
1881	45.33	51.67	47.08	53.25	37.50	45.12	42.10	43.09	1.04	2.17	0.00
1882	45.08	44.92	44.58	50.17	40.83	40.31	36.62	38.34	1.04	2.17	0.00
1883	41.58	44.25	39.58	45.25	34.33	39.32	35.10	36.31	1.04	2.17	0.00
1884	35.67	41.33	37.00	42.33	30.67	33.36	29.90	29.52	1.04	2.17	0.00
1885	32.83	38.25	34.67	39.92	28.17	30.18	27.27	25.11	5.17	6.54	0.00
1886	31.00	38.50	33.58	40.83	26.42	29.25	29.71	30.54	5.17	6.54	0.00
1887	32.50	41.17	35.17	40.08	25.17	26.92	28.40	27.48	8.67	6.54	0.00
1888	31.83	43.75	37.25	42.25	28.75	33.96	29.64	27.48	8.67	10.88	6.19
1889	29.75	42.08	39.17	43.50	30.17	34.03	28.88	26.47	8.67	10.88	6.19
1890	31.92	44.08	41.17	46.50	28.08	34.48	28.86	28.84	8.67	10.88	6.19
1891	37.00	47.83	47.50	50.33	31.92	38.87	36.00	30.88	5.17	10.88	6.19
1892	30.25	41.50	40.50	43.75	25.83	32.65	27.04	30.54	8.67	7.63	3.09
1893	26.33	37.75	32.50	35.75	22.00	29.93	25.27	26.13	8.67	7.63	3.09
1894	22.83	34.50	28.92	30.42	18.00	25.02	20.43	19.68	12.17	7.63	3.09
1895	23.08	32.75	30.00	32.33	19.42	27.08	22.64	18.66	12.17	7.63	9.16
1896	26.17	33.33	32.75	35.75	20.83	31.14	27.25	20.70	12.17	7.63	9.16
1897	30.17	43.75	35.42	40.42	26.08	36.62	30.19	24.77	12.17	7.63	9.16
1898	34.00	45.67	39.83	42.50	29.17	36.27	27.82	31.56	12.17	7.63	9.16
1899	25.67	34.92	33.17	36.42	23.17	35.18	24.94	26.81	12.17	7.63	9.16
1900	26.92	33.67	32.08	35.58	22.92	34.54	24.14	26.13	12.17	7.63	9.16
1901	26.75	35.25	34.67	37.67	23.50	34.22	27.45	25.45	12.17	7.63	9.16
1902	28.08	37.75	35.17	37.08	24.25	32.55	24.62	25.11	12.17	7.63	9.16
1903	26.75	39.67	33.17	35.83	25.92	33.29	25.45	25.11	12.17	7.63	9.16
1904	28.33	37.92	36.17	38.67	34.50	34.48	29.92	26.47	12.17	7.63	9.16
1905	29.67	40.83	36.58	39.50	33.50	34.99	29.27	28.50	12.17	7.63	9.16
1906	28.25	41.00	37.25	40.58	26.00	34.96	26.35	28.50	12.17	11.83	9.16
1907	30.58	40.58	43.08	46.45	29.92	38.32	34.71		12.17	11.83	9.16
1908	32.00	38.42	43.67	47.35	32.75	38.07	31.32		12.17	11.83	9.16
1909	36.92	40.12	48.03	52.08	37.40	38.96	31.85		12.17	11.83	9.16
1910	31.67	43.11	42.42	45.99	37.76	37.20	29.80		12.17	11.83	9.16
1911	31.67	43.97	42.42	45.99	32.39	38.87	32.61		12.17	11.83	9.16
1912	34.75	47.81	45.12	48.93	33.82	38.16	30.84		12.17	11.83	9.16
1913	31.67	46.53	41.17	44.64	31.32	35.92	28.97		12.17	11.83	9.16

Appendix Table 1.2. Barley prices and tariffs, 1870-1913

(shillings per Imperial Quarter)

YEAR	PB	PF	PP	PBAV	PUS	PSW	PDK	TARF	TARG	TARS
1870	34.58	29.08	25.33	26.25	22.33	23.23	23.52	0.00	0.00	0.00
1871	36.17	31.83	27.08	28.25	22.58	24.42	25.86	0.00	0.00	0.00
1872	37.33	25.25	27.08	30.42	18.00	26.85	27.25	0.40	0.00	0.00
1873	40.42	32.08	32.42	39.17	24.67	30.73	30.86	0.00	0.00	0.00
1874	44.92	34.25	35.75	35.08	39.25	32.68	30.40	0.00	0.00	0.00
1875	38.42	27.75	30.00	32.17	34.50	28.23	29.04	0.00	0.00	0.00
1876	35.17	28.67	30.00	32.92	21.33	29.03	30.72	0.00	0.00	0.00
1877	39.67	30.42	30.17	34.17	19.92	29.06	27.73	0.00	0.00	0.00
1878	40.17	30.83	28.00	30.17	22.25	25.89	24.11	0.00	0.00	0.00
1879	34.00	29.83	26.42	30.42	26.50	24.67	26.37	0.00	0.96	0.00
1880	33.08	30.08	30.00	29.83	26.83	27.43	27.87	0.00	0.96	0.00
1881	31.92	28.25	29.67	32.08	36.83	27.36	26.23	0.00	0.96	0.00
1882	31.17	28.25	27.42	27.17	32.00	24.19	23.84	0.00	0.96	0.00
1883	31.83	26.75	26.08	27.67	22.50	23.62	25.22	0.00	0.96	0.00
1884	30.67	26.50	26.67	28.92	21.33	22.91	24.53	0.00	0.96	0.00
1885	30.08	25.58	25.50	27.58	23.00	21.50	21.74	2.32	2.88	0.00
1886	26.58	23.83	24.08	27.00	23.58	20.73	21.19	2.32	2.88	0.00
1887	25.33	22.92	22.83	28.50	20.92	17.62	20.52	2.32	2.88	0.00
1888	27.83	25.00	24.08	27.33	27.25	20.96	21.65	2.32	4.32	5.37
1889	25.83	25.00	27.00	29.17	22.92	21.88	24.30	2.32	4.32	5.37
1890	28.67	26.17	29.42	31.25	18.58	22.11	22.43	2.32	4.32	5.37
1891	28.17	26.50	30.50	30.42	21.00	25.67	25.98	2.32	4.32	5.37
1892	26.17	23.17	27.83	28.92	17.50	22.91	21.35	4.72	3.84	2.68
1893	25.58	24.67	25.50	29.00	16.08	22.24	21.42	4.72	3.84	2.68
1894	24.50	23.83	23.50	23.75	17.67	19.48	19.25	4.72	3.84	2.68
1895	21.92	21.17	22.25	27.75	14.75	20.60	19.14	4.72	3.84	7.94
1896	22.92	22.00	23.17	27.92	10.25	22.08	20.61	4.72	3.84	7.94
1897	23.50	24.08	24.08	31.42	11.08	24.77	21.12	4.72	3.84	7.94
1898	27.17	25.92	26.67	30.75	14.92	24.22	21.97	4.72	3.84	7.94
1899	25.58	24.67	25.75	29.75	15.25	25.15	23.31	4.72	3.84	7.94
1900	24.92	24.67	25.50	28.33	16.58	24.86	21.37	4.72	3.84	7.94
1901	25.17	24.67	25.92	28.33	20.25	25.15	21.95	4.72	3.84	7.94
1902	25.67	24.83	25.33	26.42	21.75	24.64	21.65	4.72	3.84	7.94
1903	22.67	24.67	24.67	25.92	18.92	24.45	21.65	4.72	3.84	7.94
1904	22.33	23.75	24.83	28.67	18.25	24.61	23.29	4.72	3.84	7.94
1905	24.33	25.75	26.58	30.75	16.67	24.90	24.28	4.72	3.84	7.94
1906	24.17	26.25	27.50	31.92	17.58	25.51	23.72	4.72	7.67	7.94
1907	25.08	27.00	30.33	34.27	26.33	27.36	26.69	4.72	7.67	7.94
1908	25.83	28.10	30.00	35.05	25.25	27.59	26.16	4.72	7.67	7.94
1909	26.83	28.55	28.66	33.48	24.81	26.27	23.72	4.72	7.67	7.94
1910	23.08	24.77	26.31	30.74	27.02	25.63	23.63	4.72	7.67	7.94
1911	27.25	27.30	32.01	37.40	36.77	27.52	30.08	4.72	7.67	7.94
1912	30.67	29.11	34.19	39.94	22.59	27.94	28.97	4.72	7.67	7.94
1913	27.25	26.83	27.15	31.72	23.48	26.56	25.73	4.72	7.67	7.94

Appendix Table 1.3. Oats prices and tariffs, 1870-1913

(shillings per Imperial Quarter)

YEAR	PB	PF	PG	PBAV	PUS	PSW	PDK	TARF	TARG	TARS
1870	22.83	24.58	19.75	20.42	11.75	15.09	15.98	0.00	0.00	0.00
1871	25.17	27.17	20.33	20.50	12.83	14.68	16.65	0.00	0.00	0.00
1872	23.17	20.17	19.17	17.17	8.83	15.92	16.56	0.30	0.00	0.00
1873	25.42	23.08	22.25	20.83	8.25	17.91	19.67	0.00	0.00	0.00
1874	28.83	27.58	26.75	25.67	13.42	20.25	21.19	0.00	0.00	0.00
1875	28.67	25.75	25.08	22.75	15.00	17.85	20.82	0.00	0.00	0.00
1876	26.25	26.58	24.67	24.08	9.67	19.00	22.16	0.00	0.00	0.00
1877	25.92	24.92	22.25	22.17	9.92	19.13	18.73	0.00	0.00	0.00
1878	24.33	24.00	19.33	18.42	7.75	14.58	15.52	0.00	0.00	0.00
1879	21.75	22.75	18.67	17.92	8.58	14.29	16.05	0.00	1.42	0.00
1880	23.08	23.42	21.17	18.75	9.92	15.92	17.94	0.00	1.42	0.00
1881	21.75	22.50	22.08	20.42	12.50	16.41	18.43	0.00	1.42	0.00
1882	21.83	22.75	20.33	19.33	14.92	14.39	16.19	0.00	1.42	0.00
1883	21.42	21.33	19.08	16.75	11.92	14.23	17.78	0.00	1.42	0.00
1884	20.25	20.92	20.08	18.67	10.00	14.39	18.13	0.00	1.42	0.00
1885	20.58	21.50	19.92	19.17	9.83	13.87	16.12	1.72	2.13	0.00
1886	19.00	20.42	18.50	17.33	9.42	13.20	15.62	1.72	2.13	0.00
1887	16.25	19.25	15.75	16.67	8.83	10.86	14.30	3.49	2.13	0.00
1888	16.75	21.17	18.08	19.92	9.92	11.86	15.32	3.49	5.68	1.59
1889	17.75	21.33	21.08	19.50	8.00	12.62	18.01	3.49	5.68	1.59
1890	18.58	22.08	22.25	23.08	9.42	12.75	16.01	3.49	5.68	1.59
1891	20.00	21.83	22.50	21.17	13.33	15.51	20.08	3.49	5.68	1.59
1892	19.83	20.00	20.75	18.92	10.50	13.62	16.19	3.49	3.97	1.59
1893	18.75	23.25	22.00	22.42	9.75	15.00	17.46	3.49	3.97	0.00
1894	17.08	22.75	19.33	18.83	10.67	11.79	14.19	3.49	3.97	0.00
1895	14.50	19.25	16.92	17.83	8.17	11.50	13.96	3.49	3.97	0.00
1896	14.75	18.83	17.50	20.75	6.17	12.50	15.48	3.49	3.97	0.00
1897	16.92	20.67	18.67	21.25	6.25	13.78	16.35	3.49	3.97	0.00
1898	18.42	21.83	20.58	21.50	8.50	14.00	16.01	3.49	3.97	0.00
1899	17.00	20.67	19.08	20.42	8.42	15.09	16.15	3.49	3.97	0.00
1900	17.58	20.67	19.08	19.50	7.83	14.58	15.75	3.49	3.97	0.00
1901	18.42	22.25	19.92	21.08	10.92	15.41	16.54	3.49	3.97	0.00
1902	20.17	22.58	21.50	22.17	13.58	15.57	16.70	3.49	3.97	0.00
1903	17.17	19.92	18.75	18.92	12.17	14.80	15.78	3.49	3.97	0.00
1904	16.33	18.67	18.67	18.83	12.58	17.08	17.07	3.49	3.97	0.00
1905	17.33	21.75	20.33	22.17	10.25	15.96	17.90	3.49	3.97	0.00
1906	18.33	23.92	22.42	23.83	11.25	16.34	16.79	3.49	7.11	0.00
1907	18.83	22.83	24.92	31.96	15.50	17.40	18.29	3.49	7.11	0.00
1908	17.83	21.27	22.42	29.02	17.50	16.15	16.95	3.49	7.11	0.00
1909	18.92	23.77	23.41	30.30	15.36	15.89	16.84	3.49	7.11	0.00
1910	17.33	22.61	20.71	26.81	12.86	15.54	16.56	3.49	7.11	0.00
1911	18.83	24.33	23.55	30.49	16.07	17.82	20.34	3.49	7.11	0.00
1912	21.50	25.89	26.11	33.79	12.14	17.82	19.09	3.49	7.11	0.00
1913	19.08	24.74	21.57	27.92	13.93	16.89	17.30	3.49	7.11	0.00

Appendix Table 1.4. Rye prices and tariffs, 1870-1913

(shillings per cwt.)

YEAR	PF	PP	PBAV	PUS	PSW	PDK	TARF	TARG	TARS
1870	7.92	7.75	7.33	4.83	6.65	6.75	0.00	0.00	0.00
1871	9.08	8.58	8.33	5.83	7.06	7.48	0.00	0.00	0.00
1872	7.67	8.33	9.17	4.50	7.50	7.18	0.10	0.00	0.00
1873	9.00	9.58	10.83	4.50	8.51	9.18	0.00	0.00	0.00
1874	9.75	9.92	11.17	6.08	8.42	7.85	0.00	0.00	0.00
1875	7.58	9.25	8.42	6.42	7.65	7.44	0.00	0.00	0.00
1876	7.83	8.67	8.75	4.67	7.68	8.06	0.00	0.00	0.00
1877	8.58	8.83	9.33	4.75	7.58	6.71	0.00	0.00	0.00
1878	8.33	7.17	8.00	4.08	6.66	5.91	0.00	0.00	0.00
1879	8.67	7.25	7.92	4.00	6.57	6.65	0.00	0.50	0.00
1880	9.08	9.67	10.00	6.17	8.10	8.79	0.00	0.50	0.00
1881	8.42	10.08	10.25	7.83	8.51	8.08	0.00	0.50	0.00
1882	7.92	8.00	8.92	6.25	6.84	6.34	0.00	0.50	0.00
1883	7.33	7.33	7.58	4.58	6.75	6.55	0.00	0.50	0.00
1884	7.08	7.33	8.00	4.67	6.20	6.28	0.00	0.50	0.00
1885	6.75	7.17	7.75	4.67	5.45	5.17	0.60	1.50	0.00
1886	6.42	6.75	7.25	4.58	5.15	5.19	0.60	1.50	0.00
1887	6.75	6.25	7.08	4.17	4.40	4.67	0.60	1.50	0.00
1888	6.75	6.75	7.67	4.58	5.67	5.39	0.60	2.50	1.40
1889	6.67	7.75	7.92	3.58	6.07	5.94	0.60	2.50	1.40
1890	7.58	8.50	8.67	3.92	6.17	5.85	0.60	2.50	1.40
1891	7.67	10.42	10.17	6.25	8.26	7.77	0.60	2.50	1.40
1892	7.00	8.92	8.58	5.42	6.38	5.61	1.23	1.75	0.70
1893	6.50	6.75	7.00	3.92	5.69	5.29	1.23	1.75	0.70
1894	6.00	5.92	6.08	3.75	4.88	4.44	1.23	1.75	0.70
1895	5.25	6.08	6.50	3.08	5.33	4.52	1.23	1.75	2.07
1896	5.33	6.08	7.33	2.83	5.66	4.78	1.23	1.75	2.07
1897	6.83	6.33	7.50	3.17	6.16	5.40	1.23	1.75	2.07
1898	7.33	7.25	8.33	4.00	6.40	5.68	1.23	1.75	2.07
1899	6.25	7.17	7.75	4.42	7.08	5.87	1.23	1.75	2.07
1900	6.00	7.17	7.67	4.17	6.79	5.40	1.23	1.75	2.07
1901	6.25	7.08	7.42	4.25	6.61	5.51	1.23	1.75	2.07
1902	6.58	7.17	7.33	4.33	6.41	5.40	1.23	1.75	2.07
1903	6.58	6.58	7.33	4.17	6.39	5.29	1.23	1.75	2.07
1904	6.33	6.67	6.67	5.67	6.69	5.67	1.23	1.75	2.07
1905	6.67	7.33	7.33	5.67	6.86	6.24	1.23	1.75	2.07
1906	6.75	7.83	8.67	4.92	6.89	5.75	1.23	2.50	2.07
1907	7.17	9.33	10.19	6.17	7.52	7.27	1.23	2.50	2.07
1908	6.66	9.00	9.76	6.25	7.36	6.32	1.23	2.50	2.07
1909	6.53	8.60	9.32	6.27	7.26	5.93	1.23	2.50	2.07
1910	6.56	7.49	8.12	6.26	6.74	5.51	1.23	2.50	2.07
1911	7.42	8.40	9.10	6.93	7.46	6.88	1.23	2.50	2.07
1912	8.43	9.30	10.08	5.59	7.58	6.56	1.23	2.50	2.07
1913	7.48	8.15	8.83	5.24	7.33	6.01	1.23	2.50	2.07

Appendix 2. Protection and grain prices in Europe

This appendix links Continental grain prices explicitly to Continental tariffs. The strategy is to compare grain prices in protected markets with 'world' prices, taken to be grain prices in Britain or Denmark as appropriate; and to then compare those intra-European price gaps with tariff levels in protectionist economies. If tariffs were effective in raising prices (and grain markets were well-integrated internationally) then domestic prices should have equalled world prices plus the tariff.

There are good reasons to expect that my estimate of the Franco-British price gap for a particular grain, say, should not have precisely equalled the appropriate French tariff. There may have been problems of comparability between grain in different countries (see Appendix 1). Moreover, transport costs were not negligible even within Europe, and more importantly, were declining over time, implying that movements in Franco-British price gaps, say, cannot solely be explained by tariffs. Given these qualifications, the evidence presented below is fairly striking. Throughout, French and Bavarian prices are compared with British prices; while Prussian and Swedish prices are compared with Danish prices.

The link between tariffs and domestic prices appears most clearly in the case of wheat (Appendix Figure 2.1). Throughout this period, Swedish and Prussian wheat prices exceeded Danish prices by the amount of the two countries' tariffs, while Franco-British and Bavarian-British price gaps mirrored exactly the evolution of French and German tariffs.[1] It seems clear that wheat tariffs were binding; that is, domestic wheat prices in

[1] Tariffs were specific during this period. In the figures, they are converted into *ad valorem* rates by dividing them by the price in the *free trade* market (i.e. Denmark or Britain, as the case may be).

protected markets were raised above ‘world’ prices by the amount of the tariff.

The picture is not quite so straightforward in the case of other grains, but broadly speaking the same message emerges (Appendix Figures 2.2-2.4). Bavarian oat and barley prices were lower than British prices until the late 1880s or early 1890s; thereafter, Bavarian prices exceeded British prices by the amount of the German tariff. French oat prices exceeded British prices by the amount of the French tariff; however, the evidence linking French barley and rye prices with French tariffs is weaker. Swedish prices were consistently lower than Swedish tariffs suggest should have been the case, which raises the question of how comparable Jörberg’s Swedish price series are with the official Danish prices used here.

Although this method simplifies, the moral is clear: generally speaking, grain tariffs seem to have been effective in increasing grain prices. Differing grain price evolutions in various European countries can thus to a large extent be explained by their tariff policies. It is reasonable, therefore, to conclude that the lack of market integration between Germany and the US, say, can be attributed to German protection. Protection *did* offset declining trans-Atlantic transport costs in the German case, and *did* mute their impact in Sweden and France.

Appendix 3. Calibrating the CGE models

3.1. Calibrating the British model, 1871

O'Rourke and Williamson (1992) modelled agriculture as a single sector producing a single output, using only land (R), labour (L) and capital (K). In addition, the model included a manufacturing (M) and a non-traded (S for services) sector. They gave value added in British agriculture as £130.4 m, basing their estimate on Deane and Cole (1962). The labour input in the sector amounted to £69 m., the capital input to £25.6 m., and the land input to £35.8 m.[1] This paper assumes that there are three agricultural sectors, grain (G), non-grain crops (NG) and pasture (P). In order to accomplish this disaggregation, the structure of production in general had to be enriched. Moreover, whereas the previous model allowed for 'exotic' imports of intermediate inputs (e.g. silk), the present model includes in the category 'exotic imports' (denoted by 'E') imports of consumer goods, such as tea and coffee. Furthermore, this model allows for two-way trade in all goods, keeping it as similar as possible to the Swedish and French models. Thus foreign goods are in all cases distinguished from British goods, and are denoted by a suffix 'F'.

This necessitated returning to the official British trade figures for 1871.[2] Individual commodities were classified as belonging to one of the following categories: grain, non-grain vegetable, animal products, manufactures, and exotic products.[3] Exports and net imports (imports minus re-exports) of the goods are as follows (in millions of pounds):

Good	Exports	Imports
Animal products	3.4	38.5
Grains	2.2	38.5
Non-grains	0.0	17.2
Exotic goods	0.0	109.7
Manufactures	217.5	66.6
Total	223.1	270.5

---

[1] O'Rourke and Williamson (1992), Appendix Table 3.2.

[2] These are given in the Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Possessions, for the Year 1871, B.P.P., Accounts and Papers, vol. LVI, 1872 [c. 664].

[3] Imported goods were classified as follows. Animal products: live animals, bacon and hams, beef, bones, bristles, butter, cheese, eggs, feathers for beds, fish, animal hair, raw hides, cattle horns and hoofs, other meat, pork, poultry, sheep and goat skins, sheeps' wool. Grains: corn and grain. Non-grains: chicory, flax, hops, seeds (clover and grass, flax and linseed, rape), hewn timber. Exotic goods: bark for tanners and dyers, Peruvian bark, rubber, cocoa, coffee, unmanufactured cork, raw cotton, dyeing and tanning stuffs, dyewoods, ornamental feathers, fruit (almonds, currants, figs, citrus, raisins and other), guano, gum, gutta percha, hemp, isinglass, jute, liquorice, nuts (oil and other), oils (whale, animal, coconut, olive, palm, and seed), opium, painters' colours and pigments, plumbago, rice, safflower, sago and other farinaceous substances, seeds (cotton, tares and lentils, other), raw silk, silk knubs or husks, sealskins and other skins, furs, spices, raw sugar, molasses, tea, ivory, raw tobacco, whalefins, wine, mahogany, other hard wood, wool (alpaca, vienna and llama). Other imports were classified as manufactures.

These data refer to UK trade, whereas the model is a British model. In practice, the difference will only matter a lot for trade in agricultural products, and in particular animal products. Anglo-Irish trade statistics are unavailable for the period, but Peter Solar (1987, pp. 228, 231, 234) estimated Irish grain trade figures for 1867, and I use these. Net Irish wheat imports from Britain amounted to 257 cwt., worth £0.2 m.; net Irish oats exports to Britain amounted to 1801 cwt., worth £0.8 m.; and net trade in barley was negligible. Net Irish grain exports to Britain thus amounted to £0.6 m. (From now on all figures will be taken as representing millions of pounds.)

In addition, Solar (1987, p. 251) gives data for Irish exports of 'pasture' output (butter, beef and mutton) and 'pork'. In 1860-63, pasture exports amounted to 8.7, and pork exports to 3.2 (pp. 249, 251). All pasture exports are taken to be net exports; Solar gives separate constant price figures for pork net exports (pp. 252-54). In 1840-45 prices, net exports accounted for 80.4% of total pork exports; applying this ratio to the above figures yields net pork exports of 2.5, and total Irish net exports of animal products of 11.2. Solar provides constant price export figures through 1867. 1867 exports of both pasture and pork products were a little over 15% higher than in 1860-63 (p. 254); scaling the export figures up accordingly implies a total figure for Irish animal products exports of 13.0. I simply assume these exports went to Britain.

Finally, in 1863-67, 24815 thousand cwt. of maize was imported into Ireland, and 48982 cwt. into the UK as a whole [Solar (1987, p. 234), Mitchell (1988, p. 225)]. Maize imports in the period averaged £7.9 million [Ojala (1952, p. 213)]; £3.9 million were assumed to be imported into Ireland. Irish trade was assumed to be balanced, with net agricultural export revenues (£9.7 million) being spent on British manufactures.

This implies the following data for British trade:

Good	Exports	Imports
Animal products	3.4	51.5
Grains	2.2	35.2
Non-grains	0.0	17.2
Exotic goods	0.0	109.7
Manufactures	227.2	66.6
Total	232.8	280.2

Finally, these imports have to be divided into intermediate inputs and goods destined for consumption.[4] This exercise yields the following intermediate flows:

Animal products: used in pasture.....£5.5

[4] The following imports were taken to be intermediate goods (inputs into agriculture denoted with an asterisk): alkali, live animals (*, an input into pasture), bark, bones, brimstone, bristles, rubber, unmanufactured cork, raw cotton, yarn of all kinds, dyeing and tanning stuffs, dyewoods, feathers for beds, flax, guano (*, an input into grain and non-grain production), gum, gutta percha, hair, hemp, raw and tanned hides, hops, horns and hoofs, jute, ores of all kinds, metals of all kinds, oil nuts, animal and whale oil, chemical oils, opium, petroleum, pitch and tar, pyrites, quicksilver, rags for paper-making, rosin, saltpetre, seeds (clover and grass, flax and linseed, rape) (*, an input into non-grain production), other seeds (except tares and lentils), seedcake (*, an input into manufacturing), silk (raw, knubs and husks, and thrown), animal skins, raw sugar, tallow, raw tobacco, ivory, turpentine, wax, whalefins, wood and timber, wool, dried yeast.

	used in manufacturing	£16.4
Non-grains:	used in non-grain sector	£5.5
	used in manufacturing	£11.1
Manufactures:	used in pasture	£1.5
	used in manufacturing	£26.8
Exotic products:	used in tillage	£1.9
	used in manufacturing	£82.4

The basis for the output disaggregation is Ojala's (1952) figures for 1870-76, derived for the United Kingdom as a whole. Ojala gives vegetable output for the period as £94.99 m, and animal output as £152.19 m (Table XVI, p. 208). Total output is thus £247.18 m. This figure represents gross output, i.e. it includes the value of inputs from outside agriculture, but excludes outputs consumed within agriculture.

These numbers need to be amended so as to conform with my model structure. First, consider the grain sector. Wheat output is estimated to be 27.56, or 90% of production, the remainder of which is taken to be seed (pp. 192-93). Wheat production is thus taken to be 30.6, of which seed requirements are 3.0.

Barley production is 18.8, and barley imports amounted to 5.2 (p. 194). Barley worth 22.7 was sold to manufacturing; the excess supply (1.3) was taken to represent seed requirements.

Oats production was 2593 tons, of which 10% (259) was taken to represent seed (pp. 193-95). Only 997 tons were sold off the farm; the remainder (1596) was divided between seeds and fodder (1337 tons). Off-farm horses consumed a total of 1300 tons. Oats production was thus 23.6; seed was 2.4; fodder was 12.2; and sales to off-farm horses were 11.8 (such sales are taken to be inputs to the non-traded sector).

Finally, rye production was taken to be 0.1 (p. 208). Total grain production was thus 73.1. Seed requirements were 6.7, fodder was 12.2, sales to the non-traded sector were 11.8, and sales to manufacturing were 22.7.

Ireland now has to be subtracted from these figures. Wheat production amounted to 1.5, oats production to 9.4, and barley production to 1.9 [Mitchell (1988, p. 198) and prices given in Ojala]. Seed requirements for each grain were taken to be the same proportion of production as in the UK as a whole, implying seed requirements of 1.2. Residual barley production (1.8) was taken to be an input to manufacturing; off-farm Irish horses were taken to eat as many oats as in the UK as a whole, implying sales to the non-traded sector of 0.5 (Ojala, pp. 195-96). Ireland was taken to account for 50% of UK human oats consumption; Mitchell's import data (1988, p. 225) and Ojala's prices indicate that oat imports into the UK amounted to 5.2, implying a consumption level (i.e. residual supply) of 2.4. Irish oats consumption thus amounted to 1.2, implying that oats fed to on-farm animals accounted for 6.0 (i.e. residual oats production).

Irish grain production thus amounted to 12.8, of which seeds were 1.2, sales to manufacturing were 1.8, sales to the non-traded sector were 0.5, and fodder was 6.0. British grain production was thus 60.3; seed requirements were 5.5; sales to manufacturing were 20.9; sales to the non-traded sector were 11.3; and fodder amounted to 6.2.[5]

---

[5] Ojala (p. 213) states that 0.5 worth of imported wheat was fed to on-farm animals, as well as 7.9 worth of imported maize. In 1863-67, 24815 cwt. of maize was imported into Ireland, and 48982 cwt. into the UK as a whole. I therefore assumed that half (4.0) of the maize fed to on-farm animals was used in Britain; this implies that animals were fed imported grains worth 4.5.

The most important non-grain crop was potatoes. Ojala (pp. 196-97) gives production as 19.7, and output as 13.8. Assuming as he does that seed requirements per acre were the same in 1870-76 as in 1867-69, that fodder represented 4% of the crop in the earlier period, and that all production net of output was either seed or fodder, the seed requirement can be calculated as 5.1, and fodder as 0.8.

The entire hop output (3.4) was taken to be an input to industry (pp. 196-97). 50% of bean production, and 45% of peas production, was fed to livestock (p. 198), implying production of 4.6, of which 2.2 was fodder, and 2.4 was consumed (p. 208). The entire flax output (1.8) was treated as an input into manufacturing (pp. 198-99). The entire fruit (4.8) and vegetable (4.8) crop was consumed (p. 208).

Adding up, total non-grain vegetable production was 39.1. Of this total, 5.1 represented seed requirements, 3.0 was fodder, and 5.2 was an input into manufacturing.

Ireland now has to be subtracted from these UK totals. Irish potato production amounted to 3246 tons [Mitchell (1988, p. 198)], worth 9.9 at Ojala's prices. Assuming the same seed to production ratio as in the UK, Irish seed requirements were 2.6. Ó Gráda (1993, p. 175) uses an output to production ratio of 1:3 for 1876, implying that fodder amounted to 4.0 (= 6.6 - 2.6).

These numbers imply a necessary revision to the UK numbers, since those estimated total UK fodder as only 0.8. Ireland accounted for roughly 50% of the total UK crop. Assuming that Ojala's fodder ratio was correct for Britain, this implies that British fodder potatoes amounted to 0.4; total UK fodder potatoes thus amounted to 4.4, 3.6 more than previously estimated. 3.6 is thus added to the UK fodder estimate (yielding 6.6).

Irish hops production was negligible. Allocating beans and peas production between Ireland and Britain in the ratio 21:1002 [the acreages of 'other corn' in the two countries: Mitchell (1988, pp. 186, 190)] implies an Irish production of 0.1. The entire flax crop (1.8) was taken to be Irish (p. 198).[6] Finally, other non-grain output is taken to be 0.5 (= 0.6 minus beans and peas output; Ó Gráda p. 154). Adding the numbers yields an Irish production figure of 12.3, of which 2.6 was seed, fodder was 4.0, and manufacturing inputs were 1.8.

Subtracting from the UK totals, British non-grain vegetable production was 26.8, seed was 2.5, fodder was 2.6, and manufacturing inputs were 3.4.

Finally, an adjustment has to be made for turnip production, not included in Ojala's output estimates. Feinstein (1978, p. 70) estimates that British non-grain crop production was 60% as large as British grain production, or 36.2 (= 0.6x60.3) in 1870-76. Fodder crop production (turnips, etc.) was thus taken to be 9.4 (= 36.2 - 26.8). Total British production was thus 36.2, of which seed was 2.5, fodder was 12.0, and manufacturing inputs were 3.4.

Ojala (p. 208) gives pasture output as 152.2. In the model, hay making is taken to be a pasture activity, rather than a tillage activity, although it tends to be classified the latter way in official statistics. Sales of hay and straw off the farm amounted to 9.8 m.; this figure is added to pasture, yielding a pasture total of 162.0.[7] Of this total, 36.5 was accounted for by Irish production [Ó Gráda (1993) p. 154], implying a

---

[6] This tallies well with Ó Gráda's (1993, p. 154) estimate of flax output in 1876 (1.7).

[7] Ojala does not, unfortunately, break down this figure between hay and straw (the latter, clearly, being a tillage output). Off-farm sales of straw were however probably dominated by hay sales.

British figure of 125.5.

The output of various goods was then allocated to different uses, using Ojala's (p. 208) and Ó Gráda's (p. 154) figures for the UK and Ireland. Wool (8.3-0.9 = 7.4) was taken to be an input to manufacturing. Hay and straw (9.8 - 0.8 = 9) was taken to be an input into the non-traded sector.

The value of inputs to agriculture now has to be subtracted from these output totals to give value added in agriculture. Ojala's table XIX (p. 213) gives their value, broken down by category. Where possible, I replace his data for imported inputs with the 1871 trade data presented above. I assume that feeds and imported animals were inputs into pasture, while fertilisers, imported seeds, machinery repairs and fuel were inputs into tillage. Offals and oilcakes, and fertilisers, machinery repairs and fuel were taken to be inputs from manufacturing, while molasses were inputs of exotic goods, and feed and fertiliser margins, as well as miscellaneous expenses were inputs from the non-traded sector. Miscellaneous expenses were allocated between grains, non-grains and pasture proportionally to output in the three sectors (i.e. in the proportion 60.3:36.2:125.5); inputs to tillage were similarly allocated between grains and non-grains (i.e. in the proportion 60.3:36.2).

The values for inputs into the various sectors were as follows:

Input	Sector	Grains	Non-grains	Pasture
PF	(live animals)	0.0	0.0	5.5
G	(seed & fodder)	5.5	0.0	6.2
GF	(maize and wheat)	0.0	0.0	4.5
NG	(seed and fodder)	0.0	2.5	12.0
NGF	(seed, imported pulses)	0.0	5.5	0.6
M	(offal & oilcakes)	0.0	0.0	19.7
M	(fertilisers)	2.8	1.7	0.0
M	(mach. repairs, fuel)	1.1	0.6	0.0
MF	(seedcakes)	0.0	0.0	1.5
E	(molasses)	0.0	0.0	0.1
E	(guano)	1.2	0.7	0.0
NT	(margin on feed)	0.0	0.0	2.9
NT	(margin on fertilisers)	0.6	0.4	0.0
NT	(misc.expenses)	3.9	2.3	8.0
Total		15.1	13.7	61.0
Output		60.3	36.2	125.5
Value added		45.2	22.5	64.5

The above table shows that these inputs imply a total agricultural value added of 132.2, 1.8 above the estimate in Mitchell and Deane. However, Ojala's figures for inputs of imported animals and seed included margins for local transport and distribution; the above figures (5.5 for both imported seeds and animals) are import values only. I therefore add an input of 0.9 from the non-traded sector to both the non-grain and pasture sectors, and reduce value added in the two sectors correspondingly.

Land, labour and capital inputs now have to be allocated between grains, non-grain crops, and pasture. Mitchell (1988, p. 186) gives the grain acreage in 1871 as 8,674,000 acres, the non-grain crop acreage as 5,025,000, and the pasture acreage as 16,806,000 acres.[8] Dividing total land rents (35.8) between the three sectors proportionally implies a land input to grains of 10.2, a land input to non-grains of 5.9, and a land input to pasture of 19.7.

[8] These figures exclude the bare fallow.

Boreham (1953, Table 1, p. 263) estimates UK agricultural capital in 1867-73. This consisted of livestock worth £178.155 m., crops worth £261.652 m., and other capital worth £32.929 m. The British capital embodied in livestock and crops is estimated by assuming that the capital to output ratio was the same in Britain as in the UK as a whole. This yields a total for British capital in pasture of 138.0 (=(125.5/162.0)x178.155). British and UK grain output (in 1870-76) were 60.3 and 73.1 respectively. British non-grain output was 36.2. UK non-grain output was 39.1, plus British and Irish fodder crop production. British fodder crop production was 9.4. The British acreage of turnips, swedes, mangolds, cabbage, kohlrabi, rape and other green crops in 1870-76 was 3084,600, while the Irish acreage of turnips, mangolds, and other green crops was 467,900. Assume the same output to acreage ratio in Ireland as in Britain, this implies an Irish fodder crop output of 1.4, and a UK non-grain output of 49.9. British tillage capital was thus 205.3 (=((60.3+36.2)/(73.1+49.9))x261.652). This is then allocated between grains (128.3) and non-grains (77.0) in proportion to output. Dividing total payments to capital in agriculture (£25.6 m.) between the three sectors in the proportion 128.3:77.0:138.0 yields profits in grain, non-grains and pasture of 9.6, 5.7 and 10.3 respectively. Labour inputs into the three sectors are then derived as residuals.

Appendix Table 3.1 gives all production, income and consumption flows needed to solve the British model. The figures for the manufacturing and non-traded sectors follow in a straightforward manner from the above information and the data in O'Rourke and Williamson (1992). Consumption of all goods is derived as a residual.

Appendix Table 3.1. British National Accounts, 1871

	G	NG	P	M	S	Sub.	Imp.	Exp.	Cons.	Prod.
G	5.5	0	6.2	20.9	11.3	43.9	0	2.2	14.2	60.3
NG	0	2.5	12	3.4	0	17.9	0	0	18.3	36.2
P	0	0	0	7.4	9	16.4	0	3.4	105.7	125.5
M	3.9	2.3	19.7	0	1.4	27.3	0	227.2	262.8	517.3
S	4.5	3.6	11.8	0	0	19.9	0	0	399.6	419.5
GF	0	0	4.5	0	0	4.5	35.2	0	30.7	0
NGF	0	5.5	0.6	11.1	0	17.2	17.2	0	0	0
PF	0	0	5.5	16.4	0	21.9	51.5	0	29.6	0
MF	0	0	1.5	26.8	0	28.3	66.6	0	38.3	0
E	1.2	0.7	0.1	82.4	0	84.4	109.7	0	25.3	0
Sub-total	15.1	14.6	61.9	168.4	21.7	281.7	280.2	232.8	924.5	1159
L	25.4	10	33.6	237.3	196.2	502.5				
K	9.6	5.7	10.3	111.6	201.6	338.8				
R	10.2	5.9	19.7	0	0	35.8				
Value Added	45.2	21.6	63.6	348.9	397.8	877.1				
Total	60.3	36.2	125.5	517.3	419.5	1158.8				

G: grains
NG: non-grains
P: pasture
M: Manufacturing
S: services (non-traded) sector
E: exotic imports
L: labour input
K: capital input
R: land input
GF, NGF, etc.: imports of grains, non-grains, etc.

Source: see text.

3.2. Calibrating the French model, 1867-76

1. Outputs

The output data is primarily taken from Toutain (1987). All figures in this appendix refer to millions of francs. Over the period 1867-76, agricultural output averaged 8843.5; industrial output averaged 9427.4; and services output averaged 6385.3. All figures refer to value added; GDP thus equalled 24656.2.

Agricultural output is broken down between tillage and pasture activities using the data given in Toutain (1961) for 1865-74. He gives the vegetable output (minus seeds) as 10641 (Table 76), and an animal output of 3395 (Table 77). The vegetable output consists of cereals (3526), wine (1720), 'fourrages' (fodder crops) (2286), and other vegetable crops (3109) (Table 76).[9] Of the fodder crops, 20% consisted of root crops, and 80% consisted of the output of natural and artificial 'prés' (Table 134): i.e. hay.[10] Hay production is included in the pasture sector: the total output of that sector is therefore equal to 3395 + 0.8(2286) = 5224. Non-grain vegetable output is equal to 3109 + 0.2(2286) = 3566.

A further adjustment needs to be made to the output of the pasture sector. Toutain (pp. 65-68) discusses at great length the fact that in many years, animals' consumption of fodder exceeds the output of animal products. One of the reasons why this does not imply that animal husbandry was loss-making is that animals provided manure and work: in 1882, while animal production was equal to 3308, the value of manure and work provided by animals was valued at 838. An equivalent amount (i.e. 3395 x (838/3308) = 860) is thus added to the pasture sector, yielding a total output there of 6084. The manure and work is taken to be an input to vegetable production: it is split between grains (458) and non-grains (402) in proportion to production in the two sectors (net of the wood component in non-grain, equal to 466) (3526 and 3100).

Table 91 gives details of animals' consumption of vegetable products. Animals' cereals consumption was 671. As mentioned, 20% of 'fourrages' output, or 457, was an input from non-grains to pasture; to this amount has to be added animals' consumption of non-grains (176), implying a total input from non-grains to pasture of 633. Animals consumed 1829 (=0.8x2286) of hay, and milk worth 294 (Table 92), implying a total input from pasture to itself of 2123.

Value added in cereals is now 3068 (=3526-458), and value added in non-grains is 3164 (=3566 - 402). Value added in wine production is 1720. Value added in animal production is 2657 (=6084-671-633-2123). Total agricultural value added is thus 10609, greater than the 8843.5 given by Toutain (1987) for the later period 1867-76. All numbers are thus scaled down by the proportion 8843.5/10609. Cereals production is now 2939.2;

---

[9] Animals were fed straw valued at 1184 (Table 91), and this is included by Toutain in total vegetable production. This straw consumption is valued at market prices, which may not be appropriate. Straw and grain were joint products; in such cases, of course, one of the products may sometimes be regarded as a free good. The revenue maximising quantity of the good is sold at the appropriate price; the rest is left unsold. In such cases, the appropriate price at which to value the straw fed to animals on the farm is not the market price, but zero; and that is what is done here. Comparing the value of animal output with the value of fodder, it is clear that this is probably a reasonable procedure, as Toutain himself suggests (pp. 66-67).

[10] Unfortunately Table 134 is based on quantity data; I am obliged to use it for want of better information.

non-grain production is 2972.6; wine production is 1433.8; animal production is 5071.5; animal inputs to cereals are 381.8; animal inputs to non-grains are 335.1; animals are fed cereals worth 559.3, non-grains worth 527.7, and animal products worth 1769.7. Value added in cereals is thus 2557.4; value added in non-grains is 2637.5; and value added in animal production is 2214.8.

2. Factor shares

Markovitch (1967, pp. 85-88) puts the wage bill in manufacturing in 1860-65 at 28% of value added, with capital earning the remaining 72%. This implies industrial profits of 6787.7, and industrial wages of 2639.7.

Marchand and Thelot (1991, Table II) estimate employment in agriculture, industry and services as (in thousands) 9245, 5232 and 3835 respectively. Assuming that average wages were the same in the industrial and tertiary sectors, the wage bill in services amounted to (3835/5232)x2639.7 = 1934.9. This in turn implies service sector profits of 4450.4.

The non-industrial wage bill amounted to 4574.6. The agricultural wage bill was 3095.2. Agricultural employment was 9245; non-agricultural employment was 9067. These data imply that agricultural wages were 100x(3095.2/9245)/(4574.6/9067) = 66.36% of non-agricultural wages. Unfortunately, this implies a wage gap of around 50%, much larger than the wage gaps found by Sicsic (1992) (of around 20%). Of course, my data refer to earnings, while their's refer to wage rates; but this will not help in reconciling things unless seasonal unemployment was significantly higher in industry than in agriculture. If one assumed a nominal wage gap of around 20%, about the level which they find, and accepted the agricultural factor shares given above, one would arrive at a wage bill in industry of only 22% of value added. For the moment, I will use the factor shares explicitly calculated by the authors mentioned.

Grantham (1993, Table 5) estimates that the factor shares in agriculture in 1870 for land, capital and labour were 0.33, 0.32 and 0.35 respectively. This implies that in 1867-76, agricultural land rents were 2918.4; agricultural profits were 2829.9; and agricultural wages were 3095.2.

I now have to disaggregate factor payments in agriculture between grains, non-grains and pasture. Toutain (Table 146) gives the distribution of agricultural land in France during 1865-74.[11] 2339 thousand hectares were under vines, 9993 thousand hectares were in meadow and pasture, and 32,173 thousand hectares were in wood and 'other cultures' (assumed here to be grains and non-grains). Mitchell (1981, p. 213) gives the area under cereals (wheat, rye, barley, oats and maize) as 13712 in 1871; this figure is accepted, and the balance (18461) is taken to be under non-grain vegetable crops. Land rents are divided between sectors in proportion to hectarage, yielding land inputs of 899.1 into cereals, 1210.6 into non-grains, 153.4 into wine, and 655.3 into animal production.

Grantham (1993, Table 3) calculates French agricultural capital for 1870. In billions of francs, livestock totalled 6366; and capital embodied in vineyards totalled 3230. He assumes that crop inventories amounted to half of vegetable production; I prefer Feinstein's assumption, in the British context, that stocks of harvested and standing crops amount to 85% of total crop production [Feinstein (1978, p. 70)]. This implies crop inventories of 2498 in cereals, 2527 in non-cereals, and 1296 in pasture

[11] For two components, 'other cultures' and meadows and pastures, there are no data for this decade. Figures for the previous and subsequent decades are thus averaged to give interpolated values. In fact the figures for these two components are reasonably stable over the period.

(hay inventories). Dividing agricultural profits between sectors in proportion to these numbers implies capital inputs of 444.1 into cereals, 449.3 into non-grains, 574.3 into wine, and 1362.2 into animal production.

Wages in the four sectors are derived as residuals. Wages were 1214.2 in cereals, 977.6 in non-grains, 706.1 in wine, and 197.3 in animal production.

3. Trade data

The trade numbers come from the Tableau Decennal du Commerce, 1887-1896. Table 16 (p. CLX) gives import data for 1867-76 (commerce special), while Table 37 (p. CCXL) gives import duties paid by commodity. Table 18 (p. CLXXVII) gives the export data. The numbers are:

Good	Import value	Duty paid	Export value
Cereals	244.6	3.4	119.6
Non-grains	486.3	2.2	149.0
Wine	16.5	1.2	244.1
Pasture	644.4	2	317.2
Manufactures	1050.6	53.7	2228.9
Exotic goods--producer	759.8	0	205.9
Exotic goods--consumer	205.3	105.5	41.8

In domestic value terms, the following table gives the domestic uses of imports:[12]

[12] Manufactured and exotic inputs to tillage activities (nitrate and guano respectively) are divided between cereals and non-grains in proportion to output in the two sectors.

Appendix Table 3.2 Domestic Uses of French Imports, 1867-76

(millions of francs)

Import good	Consumed	Inputs to:				
		G	NG	W	P	M
Cereals	248.0	0	0	0	0	0
Non-grains	162.2	0	20.9	0	0	305.4
Wine	17.7	0	0	0	0	0
Pasture	214.1	0	0	0	17.4	414.9
Manufactures	642.3	7.0	6.1	0	0	448.9
Exotic goods -- producer	0	18.3	16.0	0	0	519.6
Exotic goods -- consumer	310.8	0	0	0	0	0
TOTAL	1595.1	25.3	43.0	0	17.4	1688.8

G: grains; NG: non-grains; W: wine; P: pasture; M: manufacturing.

The inputs from non-grains to itself are seed-grains; the inputs from pasture to itself represent horse imports.

4. Intermediate flows between agriculture and industry

Wool and hides were the main inputs from pasture to industry. In 1865-74, the textile industry's consumption of raw wool amounted to 328 (Markovitch, 1966, Table XVI). The leather industry's consumption of hides came to 348 (ibid., Table XVII). The total input from pasture to manufacturing therefore amounted to 676.

The value of 'cultures industrielles' was 408 in 1865-74 (Toutain, 1961, Table 76). Exports of these products amounted to 27.5; imports at domestic prices came to 144.4. The net supply of these (non-grain) crops to domestic industry was thus 524.9 (=408+144.4-27.5). Toutain (1961, Table 76) estimates wood production as 466. Markovitch (1966, Table XXIII) estimates wood consumption (“bois de chauffage”) as 388. Imports of “bois communs” amounted to 161 in domestic prices, and exports were 36.5. The wood consumption of industry was thus 202.5 (=466-388+161-36.5). Total inputs from the non-grain sector to industry thus totalled 727.4.

Markovitch (1966, Table XXI) estimates the consumption of barley in brewing at 44.

To recap, industry used inputs from the following sources: cereals (44), non-grains (727.4 = 524.9 + 202.5), pasture (676), foreign manufacturing (448.9), and the foreign exotic goods sector (519.6). Total inputs in terms of the model structure were thus 2415.9. This amount has to be added to industrial value added to give a figure for total industrial output of 11843.3.

In addition, there are exotic inputs to tillage (guano) of 34.3, and foreign manufactured inputs to tillage (nitrates used as fertilisers) of 13.1. These are divided between cereals and non-grains in proportion to output (net of wood) in the two sectors. A total of 25.3 is therefore added to cereal output, yielding a total cereal output of 2964.5; and 22.1

is added to the non-grain sector, in addition to the 20.9 representing imported seeds, yielding a total non-grain output of 3015.6. Finally, 17.4, representing imported horses, are added to pasture output, implying a total production value of 5088.9. Summarising, an input-output table for the French economy of 1867-76 can be constructed using the above data (consumption is derived as a residual; while inputs of foreign goods are distinguished from inputs of dometic goods).[13] It is these data, given in Appendix Table 3.3, which are used to calibrate the model. As mentioned in the text, in the base runs the wine and non-grain sectors are amalgamated.

Appendix Table 3.3. French National Accounts, 1867-76
(millions of francs)

To: From:	P	G	NG	W	M	S	Subtot.	Export	Import	Cons.	Prod.
P	1769.7	381.8	335.1	0	261.1	0	2747.7	317.2	0	2024	5088.9
G	559.3	0	0	0	44	0	603.3	119.6	0	2241.6	2964.5
NG	527.7	0	0	0	422	0	949.7	149	0	1916.9	3015.6
W	0	0	0	0	0	0	0	244.1	0	1189.7	1433.8
M	0	0	0	0	0	0	0	2228.9	0	9614.4	11843.3
S	0	0	0	0	0	0	0	0	0	6385.3	6385.3
PF	17.4	0	0	0	414.9	0	432.3	0	646.4	214.1	0
GF	0	0	0	0	0	0	0	0	248	248	0
NGF	0	0	20.9	0	305.4	0	326.3	0	488.5	162.2	0
WF	0	0	0	0	0	0	0	0	17.7	17.7	0
MF	0	7	6.1	0	448.9	0	462	0	1104.3	642.3	0
E	0	18.3	16	0	519.6	0	553.9	0	822.9	269	0
Sub-total	2874.1	407.1	378.1	0	2415.9	0	6075.2	3058.8	3327.8	24925.2	30731.4
L	197.3	1214.2	977.6	706.1	2639.7	1934.9	7669.8				
K	1362.2	444.1	449.3	574.3	6787.7	4450.4	14068				
R	655.3	899.1	1210.6	153.4	0	0	2918.4				
VA	2214.8	2557.4	2637.5	1433.8	9427.4	6385.3	24656.2				
Costs	5088.9	2964.5	3015.6	1433.8	11843.3	6385.3	30731.4				

P: pasture
G: grains
NG: non-grains
W: wine
M: manufacturing
S: services (non-traded) sector
E: exotic imports
L: labour input
K: capital input
R: land input
VA: value added
PF, GF, etc.: imports of animal products, grains, etc.

3.3. Calibrating the Swedish model, 1871

[13] Inputs of domestic goods are simply obtained by subtracting imported inputs from the totals derived above.

The underlying data base is described in O'Rourke and Williamson (1995d), Appendix 5, henceforth referred to as HIE. The tillage sector of that model is disaggregated into its grain and non-grain components using two sources: Lindahl et al. (1937, Part 2, henceforth referred to as NIE), and the Swedish Historical Statistics (1959, henceforth referred to as HS).

In the language of NIE, the non-grain sector consisted of root crops and horticulture. There was no trade in root crops (NIE Table 67, p. 51) and NIE allocates total horticultural output to consumption (p. 136); for want of better data the entire sector is taken to be non-traded, and all tillage trade flows are allocated to the grain sector.

Total tillage output is allocated between grains and non-grains according to NIE Table 67, pp; 49-51 (remembering to add 20 to non-grain output to represent horticulture (HIE)).[14] The allocation of grain and non-grain output to seed, forage and industrial use is made according to NIE, Table 67, pp. 49-51.[15] Inputs of capital and non-agricultural output are allocated between the two sectors proportionately to output,[16] while land inputs are allocated proportionately to acreage (HS, Tables E5, E6, pp. 37-39).[17]

Labour inputs,[18] and consumption of the two goods,[19] are calculated as residuals. Finally, it is a straightforward matter to aggregate the home and export industrial sectors into one aggregate manufacturing sector. Similarly, in some runs forestry is aggregated together with the non-grain sector. The following table gives the relevant input-output flows.

---

[14] G output = 233.3; NG output = 58.7.

[15] G seed = 29.5; NG seed = 3.9; G fodder = 59.9; NG fodder = 13.6; G X-input = 4.6; NG X-input = 0.2; G H-input = 77; NG H-input = 3.6.

[16] G capital = 18.1; NG capital = 4.6; G X-input = 0.4; NG X-input = 0.1; G H-input = 4.6; NG H-input = 1.2; G NT-input = 15.6; NG NT-input = 3.9.

[17] Leguminous plants are allocated to the non-grain sector; rents are thus distributed between grains and non-grains in the proportion 1246:229. G land input = 45.8; NG land input = 8.4.

[18] G labour input = 119.3; NG labour input = 36.6.

[19] G consumption = 29.8; NG consumption = 37.4.

Appendix Table 3.4. Swedish National Accounts, 1871

(millions of Swedish crowns)

From\To:	P	G	NG	FF	M	S	Sub-total	C	EX	IM	Total
P	10	0	0	0	10.9	0	20.9	141.5	2.8	0.2	165
G	59.9	29.5	0	0	81.6	0	171	29.8	34.7	2.2	233.3
NG	13.6	0	3.9	0	3.8	0	21.3	37.4	0	0	58.7
FF	0	0	0	0	41.1	0	41.1	83.9	11.6	0.8	135.8
M	3.1	5	1.3	2.6	100	21	133	377	107	131	486
S	33.7	15.6	3.9	20.8	111	37	222	277	28	0	527
E	1.9	0	0	0	27.6	0	32.8	14.4	2.9	46.8	0
Sub-total	122.2	50.1	9.1	23.4	376	58	638.8				
Wages	8.3	119.3	36.6	106.8	76	146					
Profits	14.1	18.1	4.6	5.6	34	323					
Rents	20.4	45.8	8.4	0	0	0					
Total	165	233.3	58.7	135.8	486	527					

P: pasture
G: grains
NG: non-grains
FF: fishing and forestry
M: manufacturing
S: services (non-traded) sector
E: exotic goods
C: consumption
EX: exports
IM: imports

Finally, budget shares had to be constructed so as to deflate factor prices by appropriate CPIs. The shares of alternative foods were based on Williamson (1995), Table A3.2, p. 185. The goods were matched with the model commodities as follows:

P: bacon and sausage, beef and veal, pork, lamb and mutton, cheese, butter and margarine, milk, eggs.
G: flour and meal, bread.
NG: potatoes.
E: tea and coffee, sugar.

The share of food, as well as manufactures and non-tradeables in total consumption, were derived from the following sources (in all cases, housing is taken to be non-traded; residual consumption is allocated to manufacturing):

Britain

Williamson (1985), p. 221.

France

Lévy-Leboyer and Bourguignon (1990), Table 1.6, p. 44. I use the budget weights for French cities in 1907. In the extended version of the French model described in Appendix 4, I am forced to use a zero budget weight for wine, as alcohol was not considered by the Board of Trade when constructing the budget weights used by Williamson (1995).

Sweden

Allen (1955), Table III, p. 91. I use the budget weights for 'unspecified' workers in column 5. In Appendix 4, I let fuel represent consumption of forestry output, and let residual manufacturing represent consumption of home-oriented industry.

The budget shares are as follows:

Good	Britain	Sweden	France
E	0.076	0.068	0.052
G	0.121	0.120	0.143
NG	0.033	0.023	0.030
P	0.370	0.339	0.415
NT	0.160	0.100	0.110
M	0.240	0.350	0.250

Appendix 4. Re-specifying the French and Swedish models

In this appendix I report the effects of changing the specification of the French and Swedish models in ways that make sense given the structures of their economies.

France

In the French case, I separate wine from the rest of the non-grain sector. In experiments where land is sector-specific, I allow for three types of land: land in pasture, land in tillage, and land in vineyards. I impose the same three shocks on this model as in the text of the paper. The results are given in Appendix Table 4.1. As can be seen by comparing this table with Tables 7 and 8 in the text, re-specifying the model in this way makes almost no difference to the results.

Sweden

In the Swedish case, I adopt a more complicated specification, as in O'Rourke and Williamson (1995a). That is, I separate fishing and forestry from the rest of the non-grain sector, and allow labour to be imperfectly mobile between agriculture, industry and services, and fishing and forestry. Second, manufacturing is divided into 2 sectors: export oriented sectors such as wood products and mining, and home-market oriented sectors such as clothing and textiles.

The results of imposing the price shocks on this revised model are given in Appendix Table 4.2. The decline in the price of grain produces larger declines in agricultural employment, as workers who move to forestry are now counted as leaving agriculture, rather than moving within agriculture. This is only an accounting difference, rather than a substantive difference in results. The key income distribution results of the paper are only very slightly affected by the change in model specification.

Appendix Table 4.1. Alternative French results

(percentage changes)

	Sector-specific land			Mobile land		
	GBP	FP	TAR	GBP	FP	TAR
P	3.7	4.7	1.3	11.9	15.7	4.4
G	-44.8	-57.2	-19.3	-48.0	-61.0	-20.4
NG	24.8	32.2	10.3	19.4	24.6	8.3
W	9.0	11.4	3.7	17.1	22.7	6.4
M	3.7	4.5	1.5	3.0	3.4	1.2
S	-1.3	-1.6	0.0	-1.4	-1.7	0.0
WA	-5.0	-6.0	-2.4	-4.5	-5.3	-2.2
WNA	-4.1	-4.9	-2.0	-3.7	-4.3	-1.8
K	5.6	7.3	2.4	6.9	9.0	2.8
R				-4.2	-4.7	-2.3
RT	-10.2	-12.1	-5.0			
RP	9.7	12.7	3.6			
RW	9.7	12.6	3.9			
LA	-5.5	-6.8	-2.6	-5.1	-6.1	-2.4

Note: ‘Sector-specific’ experiments assume land specific to either pasture or tillage; ‘mobile’ experiments assume land mobile between all agricultural sectors. The ‘GBP’ scenario imposes a 28.9% decline in the price of grain; the ‘FP’ scenario imposes a 33.7% decline in the price of grain, while the ‘TAR’ scenario imposes a 33.7% decline in the world price of grain, and a 26.5% tariff on grain imports. P, G, NG, W, M, S: outputs in pasture, grains, non-grains, wine, manufacturing and services. WA, WNA, K, R, RT, RP, RW: real returns to agricultural and non-agricultural labour, capital, land, and land in tillage, pasture and wine. LA: agricultural employment.

Source: see text.

Appendix Table 4.2. Alternative Swedish results

(percentage changes)

	Sector-specific land			Mobile land		
	GBP	SWP	TAR	GBP	SWP	TAR
P	2.6	2.3	1.2	6.0	5.3	2.8
G	-21.0	-19.3	-13.1	-22.3	-20.3	-13.3
NG	5.1	4.6	2.9	4.9	4.4	2.6
FF	8.4	7.8	5.7	8.5	7.9	5.5
EX	25.4	23.7	17.2	26.7	24.7	17.3
H	8.5	7.7	4.6	8.0	7.2	4.0
S	0.9	0.8	0.5	1.0	0.9	0.6
WA	-1.7	-1.6	-1.3	-0.8	-0.8	-0.8
WNA	1.0	0.9	0.3	2.0	1.7	0.8
WFF	1.0	0.9	0.4	2.0	1.7	0.9
K	5.2	4.6	2.5	5.5	4.8	2.4
R				-15.7	-14.4	-10.1
RT	-22.2	-20.5	-14.4			
RP	7.9	6.9	3.3			
LA	-17.3	-15.9	-11.1	-17.5	-16.0	-10.8

Note: ‘Sector-specific’ experiments assume land specific to either pasture or tillage; ‘mobile’ experiments assume land mobile between all agricultural sectors. The ‘GBP’ scenario imposes a 28.9% decline in the price of grain, while the ‘SWP’ scenario imposes a 26.8% decline in the price of grain, and the ‘TAR’ scenario imposes a 26.8% decline in the world price of grain, and a 22.4% tariff on grain imports. P, G, NG, FF, EX, H, S: outputs in pasture, grains, non-grains, fishing and forestry, export-oriented and home-market-oriented manufacturing, and services. WA, WNA, WFF, K, R, RT, RP: real returns to agricultural, non-agricultural and forestry labour, capital, land, and land in tillage and pasture. LA: agricultural employment.

Source: see text.

Appendix 5. Aggregate price shocks

While section 2 in the text provided detailed evidence about movements in individual grain prices and tariffs, the CGE models used here embody an aggregate cereal sector producing an aggregate commodity, 'grain'. In order to calculate the impact of both the grain invasion and grain tariffs, two pieces of information are required. First, how far would average cereal prices have fallen in the absence of protection? And second, by how much did protection succeed in raising average cereal prices?

Appendix Table 5.1 gives the crop mix within the grain sector (taken to be wheat, oats, barley and rye) for the five European countries in 1871. The weights are derived as follows:

Britain

Derived from the UK and Irish figures in Appendix 1.

France

Production data in Mitchell (1981, p. 255), combined with the price data in Appendix 1.

Germany

Hoffmann (1965), Table 51, p. 292 and Table 135, p. 552.

Sweden

Lindahl *et al*. (1937, p. 28).

Denmark

Christensen (1985), Table IV.3a, p. 56 (figures are for 1875).

Appendix Table 5.2 uses this information, together with the price data of Appendix 1, to calculate aggregate cereal price shocks. The first row gives the actual average cereal price declines observed in five

European countries over the period, while the next three columns give alternative counterfactual free trade price declines (only relevant in the cases of France, Germany and Sweden). The table confirms that average grain prices fell most steeply in Britain, and least steeply in Denmark, reflecting declining transport costs across the North Sea.

What about average cereal price movements in protected economies? The fact that Germany, France and Sweden all registered larger price declines than free-trading Denmark might make one think that the aggregate impact of protection was minimal; but these average cereal prices mask the fact that the cereal mix varied tremendously across economies (Appendix Table 5.1). In particular, wheat, whose price was most affected by the grain invasion, was not particularly important in Denmark. Alternative counterfactual free trade price declines are thus presented in Appendix Table 5.2 for all countries. The first and second experiments assume that individual grain prices declined as in Britain and Denmark respectively; while the third ('no tariff' experiment) assumes that the abolition of tariffs would have lowered grain prices by exactly the amount of the tariff (as would be true if markets were perfectly integrated and tariffs were binding).

It is clear from Appendix Table 5.2 that protection increased average cereal prices in all three protected economies substantially. The strong links between French and British grain markets re-emerge: assuming zero specific tariffs produces the same average price decline as assuming that individual prices evolved as in Britain. Comparing these two counterfactual price declines with the actual price decline produces estimates of average cereal tariffs of 26.5% and 26.7%, compared with the geometric average tariff of 26.6%.

What about German prices? I concentrate on Bavaria rather than

Prussia, as you would expect the former to be better integrated into Western European trade than the latter. While Bavarian average cereal prices actually fell by 11%, they would have fallen by 35% had individual grain prices moved as in Britain, and by 34% if they had been lower by the amount of the specific tariff. Comparing these counterfactual and actual price declines implies average tariffs of 36.3% and 34.7%, compared with a geometric average tariff of 34.8%

If individual Swedish grain prices had moved as in Denmark, average prices would have fallen by 16.7%, while if they had moved as in Britain, they would have fallen by 30.9%. If prices had equalled domestic prices minus the tariff, average prices would have fallen by 26.8%, implying an average cereal tariff of 22.4%.

In the paper I begin by exploring what the implications of cheap grain on its own would have been. I start by imposing the actual British cereal price decline -- 28.9% -- on all three models. I then impose counterfactual free trade price shocks on the Swedish and French models, on the assumption that tariffs were binding; that is, I explore the implications of a 33.7% cereal price decline in France, and a 26.8% price decline in Sweden. This will provide estimates of what would have happened to income distribution in these countries in the absence of protection. Finally, I explore the impact of protection in these countries, by imposing both the counterfactual free trade price shocks, and average tariffs of 26.5% in France, and 22.4% in Sweden. In Table 11, I impose a counterfactual price decline of 34.2% on the German economy, followed by the same price shock, combined with an average tariff of 34.7%.

Appendix Table 5.1. Grain production, 1871

(percentage shares of total grain production)

	Britain	France	Germany	Sweden	Denmark
Wheat	48.3	50.1	34.4	7.5	10.1
Barley	28.0	9.8	12.9	22.2	33.5
Oats	23.5	27.6	5.6	39.6	31.0
Rye	0.2	12.6	47.1	30.7	25.4

Note: Danish figures for 1875

Source: see text.

Appendix Table 5.2. Cereal prices and protection, 1870-1913

(percentage price declines, 1870-74 to 1909-13)

	Britain	France	Germany	Sweden	Denmark
Actual price decline	28.9	16.1	11.4	10.4	9.8
Counterfactual price decline (1)	28.9	33.8	35.0	30.9	26.2
Counterfactual price decline (2)	13.2	22.8	29.0	16.7	9.8
Counterfactual price decline (3)	28.9	33.7	34.2	26.8	9.8

Note: all cereals prices are geometric averages of individual grain prices, deflated by national GDP deflator.
Counterfactual price decline (1): assumes that individual nominal grain prices decline as in Britain.
Counterfactual price decline (2): assumes that individual nominal grain prices decline as in Denmark.
Counterfactual price decline (3): assumes that individual grain prices equal actual domestic price minus specific tariff.

Source: for grain prices, see Appendix 1; for GDP deflators, see Appendix 6.

Appendix 6. Data sources for the regression analysis

Unless otherwise stated, data on the following variables were taken from O'Rourke *et al.* (1993), and are documented there: endowments of labour, capital and land; aggregate productivity; manufactured goods prices.

Australia

CPI: Vamplew (1987), p. 214; series PC30 and PC31 spliced together in 1901.
GDP deflator: Vamplew (1987), p. 219; series PC79.
Wheat price: Vamplew (1987), p. 223; series PC106 (wholesale).
Animal product prices: wool price, Vamplew (1987), p. 223, series PC107 (greasy).

United States

CPI: David and Solar (1977), Table 1, p. 16.
GDP deflator: Romer (1989), Table 2, pp. 22-3.
Wheat price: Chicago No. 2 spring, Harley (1980), Appendix Table, pp. 246-47. Harley's prices are gold prices throughout; for 1870-78, they are converted to greenback prices using the dollar price of gold from Table 2 (p. 36) in J.K.Kindahl (1961), "Economic factors in specie resumption: the United States, 1865-79", Journal of Political Economy, pp. 30-48.
Animal products price: salted beef; 1870-1890, United States Congress, 52nd Congress, 2nd Session, Senate (1892-93), Wholesale Prices, Wages, and Transportation. Report by Mr. Aldrich, from the Committe on Finance (Washington: Government Printing Office), Table XI, p. 89. 1890-1913, U.S. Department of Labor, Bureau of Labor Statistics (1923), Wholesale Prices 1890-1922 (Washington: Government Printing Office), Table 9, pp. 68-9.
Manufactured goods prices: textile products price index, Historical Statistics of the United States (1975), series E56 and E45, linked at 1890, pp. 200-1.

France

CPI: Lévy-Leboyer and Bourguignon (1990), Table A-IV, series 13.
GDP deflator: Toutain (1987), V43, pp. 151-55.
Wheat price: Lévy-Leboyer (1972), Table K-62, series 9, p. 200.
Animal products price: meat prices, Lévy-Leboyer (1972), Table K-62, series 12, p. 200.

Germany

CPI: Mitchell (1981), Table I2, p. 779.
GDP deflator: derived from constant and current price NNP series in Mitchell (1981), Table K1, pp. 817-21.
Wheat price: Hoffmann (1965), Table 135, series 1, pp. 552-54 (producer prices).
Animal product prices: beef (wholesale), Hoffmann (1965) Table 136, series 1, pp. 558-59.
Manufactured goods prices: iron price index, Hoffmann (1965), Table 140,Series 6, pp. 572-73.

Britain

CPI: Feinstein (1991), Table 6.4, pp. 170-71.
GDP deflator: Feinstein (1972), Table 61, series 7, p. T132.
Wheat price: Mitchell (1988), pp. 756-57 (average market prices).

Animal products price: middling beef (average prices), Sauerbeck (1893, pp. 241-42; 1899, p. 188); Paish (1914, p. 565).

Denmark

CPI: Mitchell (1981), Table I2, p. 779.
GDP deflator: Gammelgård (1985), Table 2, series 15, pp. 9-10.
Wheat price: see Appendix 1.
Animal products price: pork (official prices); prices before 1900 from Christensen (1985, Table VII.1, pp. 102-3; prices after 1900 are export prices for fresh pork, from Danish Statistical Department (1958), Landbrugets Priser 1900-1957 (Copenhagen: Statistical Department), Table 15, series 5, p. 78.
Manufactured goods prices: Hansen (1970), Table II, p. 74.

Sweden

CPI: Mitchell (1981), Table I2, p. 780.
GDP deflator: derived from current and constant price estimates of GDP, Mitchell (1981), Table K1, pp. 818, 825.
Wheat price: see Appendix 1.
Animal products price: beef, Jörberg (1972), pp. 660-61.