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Convergence in the pre-1914 Atlantic economy: what really happened to wages in Ireland between 1881 and 1911?

by

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Abstract

After the Famine Irish wages caught up on those of Great Britain. Catch up is ascribed to globalised labour markets and the effects of emigration. However current estimates of the level of Irish wages and their rate of growth are based on a small sample of the male workforce. This paper presents estimates of the average wage for all wage earners and the Irish wage bill. This enables an estimate of an (implied) British average wage and wage bill. The new estimates show that while there was significant wage catch up in a few occupations, in general catch up was less rapid than recent studies have suggested. The origins of this catch up are also examined. Consistent with earlier studies which emphasise modernisation of the post-Famine economy the evidence of this paper is consistent with the effects of traditional convergence forces such as TFP growth, capital accumulation and structural change operating at least alongside the effects of emigration.

Average wages, wage bill, catch up, emigration, labour demand

Discussion of convergence in the pre-1914 Atlantic economy has focused on capital accumulation and technological change and, more recently, institutional change underpinned by standard neoclassical growth models that predict convergence either unconditional among economies with similar technology, savings rates, population growth and other fundamental characteristics, or conditional allowing for differences in these factors. In a challenge to this view, O'Rourke and Williamson have argued that concentration on capital accumulation and technology transfer (the spread of the industrial revolution) ignores the effects of global factor and commodity market integration: open-economy neoclassical trade theory, in short, has a lot more to tell us about convergence than closed-economy neoclassical growth theory.¹

Relying on a database of wages of urban unskilled labourers for seventeen countries, they argue that the arbitrage effects of factor flows generated factor price convergence in the Atlantic economies. In the labour market, mass migration increased labour supply in the New World and decreased it in the Old with a resulting positive impact on wage catch up. Measured wage catch up was most marked in the labour-abundant European periphery where migration had the greatest negative impact on population: these regions caught up on both the European core and the regions of recent settlement. It is Ireland, Italy and the Scandinavian countries that drive much of this measured catch up.

O'Rourke and Williamsons' wage indices for both Irish and British wages are based on a small sample of the male labour force. Nominal wage indices are constructed as a weighted average of labourers' weekly wages in the Dublin and Cork building trades for Ireland and for Britain bricklayers' labourers' wages in ten cities. These nominal indices are then deflated by Feinstein's UK retail price index to give national real wage indices. A PPP exchange rate is constructed for 1905 and a benchmark comparison with Britain consisting of wages for skilled and unskilled construction and skilled and unskilled engineering workers suggests that that real PPP-adjusted Irish wages were about 92 per cent of British in that year,

increasing from 57 per cent in 1881 based on the movement of the respective national real wage indices.² It is important to note that deflating the British and Irish nominal wage indices by the same price index leaves relative growth unaltered, while the purchasing power parity adjustment merely alters the level of Irish wages relative to British wages: any catch-up is therefore measured by the change in nominal wages.

Identifying no, unimpressive, or slow industrialisation and consistent with their reliance on open-economy forces as the main driver of convergence, they attribute at least the catch-up element of Irish real wage growth to emigration rather than more traditional forces such as TFP growth, capital accumulation and structural change.³ Similarly Boyer, Hatton and O'Rourke, using a Computable General Equilibrium model in which the real wage indices are agricultural labourers' wages and unskilled building wages, the latter representing the non-agricultural real wage, find that emigration could have accounted for a significant amount of Ireland's real wage gain relative to Britain and all of the gain relative to the US.⁴

These studies rely on male wage data from three sectors: building, engineering and agriculture. Wage indices are constructed from unskilled building wages and agricultural labourers' wages and a benchmark level from construction and engineering. Construction workers in this period never accounted for more than 6% of the waged labour force in the UK and 5% in Ireland, so building labourers would represent no more than 3% of the waged labour force in either GB or Ireland. The addition of shipbuilding and engineering workers takes coverage to 16% of the waged labour force at its highest for the UK and 12% for Ireland. Agricultural labourers formed 41% of the Irish wage earners in 1881 and 38% in 1911; the GB equivalences were 11% and 7%. In summary Williamson's wage index is based on wages of about 3 per cent of the labour force and his Irish benchmark wage on about 21 per cent of the labour force, all male.⁵

Given their limited coverage how representative are these series of the relative levels of the average wage in the two regions and of its growth? Comparisons of individual wage indices cannot make allowances for changes in the average wage brought about by changes in the structure of relative wages. It is arithmetically possible that given changes in individual series, structural changes may produce 'level' effects totally offsetting or enhancing any growth pattern.⁶

Williamson and O'Rourke and Williamson argue that using series for similar occupations ensures job and skill comparability across countries and that aggregate measures based on national income accounting totals will be influenced by the compositional or structural effects of including all workers.⁷ However limiting observation to one or two occupational groups within the workforce limits what can be said about wage catch up in general unless the sample is regarded as typical of all workers.⁸ An average wage will, of course, have compositional effects just as average output measures do. In fact this makes comparison of the measures of convergence (average wages and GDP per worker or per head) more reliable in that like is being compared with like. For example, Williamson argues that real wage convergence was far stronger than convergence of GNP per capita or per worker⁹ but he is comparing convergence based on a single series for urban building labourers with series which are a weighted sum of the output of all workers. If the former is among fastest growing of all wage series, as we shall argue was the case in Ireland, then the faster growth of wage catch up that he identifies arises because the single series he examines, if taken as typical of all wage earners, overstates the catch up of wages in general. It is important for conclusions about wage catch up in the aggregate that we compare average wages for all workers and for conclusions about the relative strengths of average wage, average productivity and average welfare catch up that we make comparisons based on similar aggregate statistical measures: average wages, GDP per worker and GDP per capita.

For these reasons we think it appropriate to build on the pioneering work of Williamson *et al* by constructing a series for Irish wages that takes account of all workers and the compositional effects of structural change.

This paper has two objectives. First, to construct an average wage and aggregate wage bill for Ireland and the resulting implied average wage and wage bill for Great Britain which enables us to examining the degree of wage catch up on Great Britain when the wages of all workers are taken into consideration (and, of course estimation of the wage bill is also a positive contribution to the estimation of a series for Irish GDP made from the income side). Second, to consider the competing explanations for Ireland's catch-up performance: was it due to post-Famine emigration in a stagnating economy or did capital accumulation, structural change and TFP growth have a role to play?

In section I we set out the method employed in the construction of the index. In section II we deal with the problems of constructing a series for wage earners in Ireland; section III sets out our estimates of average earnings in the base year and the wage indices; sections IV and V present the resultant series for average earnings and the wage bill. We conclude with a brief consideration of the competing explanations for Ireland's post-Famine performance relative to Great Britain

I

In constructing the index, we are very much influenced by the works of Bowley and of Feinstein on average earnings.¹⁰ By definition the wage bill in any year is:

$$\sum_{i=1}^n W_i N_i \quad (1)$$

where W_i is the average money wage in each industry or group of occupations and N_i is the number of wage earners employed in that industry or group of occupations. From this we can then define average wages for the economy as:

$$\frac{\sum W_i N_i}{\sum N_i} \quad (2)$$

Equation (2) if calculated for each year and with reference to a base year will give us an index of average money wages:

$$\frac{\left(\frac{\sum W_t N_t}{\sum N_t} \right)}{\left(\frac{\sum W_b N_b}{\sum N_b} \right)} \quad (3)$$

Equation (3) requires data on the wage in each sector or group of occupations in each year. Wages are reported very frequently as the change on the previous year rather than as the level for that year: for this reason it is preferable to work with a base or reference year and a set of wage indices indicating the change in wages relative to the base year. The wage indices can then be scaled by estimates of actual money wages in the base year. The estimate of the average wage for any year becomes:

$$\frac{\sum \left(\frac{W_t}{W_b} W_b \right) N_t}{\sum N_t} \quad (4)$$

The index of average wages is thus:

$$\frac{\left(\frac{\sum \left(\frac{W_{i_t}}{W_{i_b}} \right) N_{i_t}}{\sum N_{i_t}} \right)}{\left(\frac{\sum W_{i_b} N_{i_b}}{\sum N_{i_b}} \right)} \quad (5)$$

Where b is a base year, t is a current year and N is number of wage earners. Thus the index is a weighted average of wage indices for each group of wage earners. The weights will be the relative occupation cohort numbers in each year, i.e., a continual current weighted index.

The index and the subsequent calculation of the wage bill requires three sets of data: an annual series for the number of wage earners occupied in each sector in each year between 1881 and 1911 (N_{i_t}); an estimate of average money wages in each sector in the base year (W_{i_b}); an annual series of wage relatives for each sector (W_{i_t}/W_{i_b})

II

Numbers of wage earners are obtained from the Irish census of population for the years 1881, 1891, 1901 and 1911.¹¹ The procedure is to extract the non-waged (employers, self-employed and salaried occupations) from those occupied, the remainder being deemed to be waged occupations. We have followed Bowley's classification between waged and non-waged occupations which was also relied upon by Feinstein.¹² It is basically a broad distinction 'between manual and non-manual work or, what is nearly the same thing in manufacture, between administrative and operative employees'.¹³ Essentially the non-waged class contains all employers, own account workers, office work and all professions.

In dealing with the Irish census there are four main problems. The first is common to both the British and Irish censuses and was identified by Bowley: the census does not distinguish between those farmers whose work was mainly directive and those farmers who

did manual labour on small holdings with their families. His solution was to take only those described in the census as farmers as non-waged and we have we have simply followed him.¹⁴

Second, there is a problem with shop assistants. Each of the censuses from 1881 to 1911 includes in the table in the General Report headed 'Occupations of Males and Females' (Table 18 in 1881 and 1891, Table 19 in 1901 and 1911) the statement, 'All assistants have been included under the Trade (when stated) to which they belong, e.g.:—A person returned as "Grocer's Assistant" has been tabulated under the head of "Grocer".' Similarly assistants do not appear to be distinguished from general shopkeepers and dealers returned in the sub-order 'makers and dealers (general or undefined)'. If this is the case, in the sub-orders relating to general and food distribution shop assistants are classed as non-waged. The numbers involved, though, are not large: even if half the returned general and food dealers could be more accurately regarded as shop assistants this would represent an underestimate of the number of wage earners of around two percent. This was also a problem with the British census which Bowley resolved by including shop assistants among the salary earners.¹⁵ In general, he argued, inclusions were offset by exclusions, 'while some of these classes include manual workers, other classes not named include dealers.'¹⁶

Third, there is the problem of the number of females in Ireland returned as domestic servants in 1881 and 1891. The number of female domestic servants returned fell from 372 thousand to 199 thousand; the reason given by the 1891 commissioners was that, 'in 1881 there were tabulated under the heading of "others engaged in service", 139,092 females almost all of whom - being cases of wives and other near relatives of the heads of families returned as "housekeepers" - have on this occasion been placed in Order 24, the Indefinite and Non-productive class.'¹⁷ Clearly inclusion of these females would inflate the size of the

female wage-earning work force in 1881 so the solution adopted here is to exclude the 139 thousand females returned in that year as 'others engaged in service'.

Fourth, there is a problem with the return of agricultural labourers. In each census between 1881 and 1911 the commissioners attached to the return for the occupation 'Agricultural Labourer' a note to the effect that the reader should, 'see "General Labourer"...the majority of whom may be assumed to be Agricultural Labourers, although not having returned themselves as such.'¹⁸ The allocation between occupations is important for the estimate of the average wage and of the wage bill. The 1881 Commissioners made the commonsense observation that, 'the majority of persons in rural districts who returned themselves as "labourers" and who are tabulated under the head "General Labourer"....may be assumed to be agricultural labourers'.¹⁹ We assume, then, that those returned as general labourers living in towns were general labourers and that those returned as general labourers living outside towns should be regarded as agricultural labourers (though this will probably exaggerate the number of agricultural labourers).²⁰

Table 1 sets out the numbers of non-wage earners by occupation. Despite the fall in population and work force, the numbers in the professional and commercial classes increased, that of the industrial class declined slightly but by much less than the fall in the occupied population and this fall is confined to those working in food and lodging and general dealers. The largest decline arises from the fall in the number of farmers. Overall the share of the non-waged class in the occupied population increased. A final point to note is the greater share of non-waged occupations in Ireland compared to Great Britain. This is attributable to the relatively greater share of farmers in Ireland's occupied population averaging 20 per cent over the four decades compared to 2 per cent in Great Britain.

Table 1. Non-waged workforce by occupation, 1881-1911 (000s)

	1881	1891	1901	1911
PROFESSIONAL CLASS (with immediate subordinates)	65.0	69.8	72.9	82.4
Central and local government	8.5	11.5	13.8	14.4
Defence	8.7	7.5	5.4	5.3
Professions	47.8	50.8	53.7	62.7
<i>Clerical Profession</i>	13.1	15.0	16.9	17.8
<i>Legal Profession</i>	4.7	4.3	4.5	4.6
<i>Medical Profession</i>	3.2	3.9	4.7	9.7
<i>Teachers</i>	21.3	21.2	20.6	22.2
<i>Engineers & surveyors</i>	1.4	1.3	1.4	1.7
<i>Others</i>	4.1	5.1	5.6	6.7
COMMERCIAL CLASS	24.6	31.0	41.0	50.1
Merchants and agents	20.6	25.9	35.1	42.4
Dealer in money	2.4	2.4	2.7	3.1
Persons occupied in insurance	0.5	0.9	1.6	2.7
Others	1.2	1.8	1.7	1.9
AGRICULTURAL CLASS	446.8	422.3	404.4	387.9
Farmers	441.9	417.0	399.4	383.2
Others	4.9	5.3	5.0	4.7
INDUSTRIAL CLASS (employers, dealers, shopkeepers)	98.3	102.5	106.4	95.8
Food and lodging	51.4	53.5	52.1	47.1
Textiles	10.4	11.9	14.2	14.5
General or undefined dealers	29.1	29.0	31.5	25.4
Others	7.3	8.1	8.6	8.8
TOTAL	634.7	625.6	624.7	616.1
OCCUPIED POPULATION	2164.1	2048.9	1952.1	1806.8
% of occupied population non-wage earners Ireland	29%	31%	32%	34%
% of occupied population non-wage earners GB	17%	18%	19%	21%
% of occupied population non-wage earners UK	19%	20%	20%	22%

Source: Classification adapted from Bowley, *Wages and Income*. Data from Census of Population, Ireland 1881, 1891, 1901 and 1911. UK proportion of population non-wage earners Feinstein, *New estimates*, Table 1, p. 602. GB proportion calculated from Table 1 and Feinstein Feinstein, *New estimates*, Table 1, p. 602.

The number of wage earners in each census year is set out in Table 2: it is the total of those occupied less the non-wage earning occupations. The classification is that of the census with some sub-headings aggregated. It can probably be regarded as for the most part an industrial classification. The aggregations of sub-headings were selected to correspond with the data we have been able to obtain on average earnings and wage series.

The number of wage earners fell by 22% compared to the fall in the occupied population of 16%. The gross loss was 374 thousand jobs though with 35 thousand jobs

gained, the net loss was 339 thousand. Of the total loss more than three-quarters is accounted for by domestic service and agriculture with the bulk of the remainder being in textiles and in clothing. There were gains in transport, building, machines, carriage and shipbuilding among others. Tables 1 and 2 might suggest that the quantities (and prices) observed in Irish labour markets were not simply the result of declining supply of labour as workers emigrated, but were also due to increase in labour demand in some industries and the resulting structural change as workers moved between occupations.

Table 2. Wage earners 1881-1911 (000s)

	1881	1891	1901	1911
Government (central & local) and defence				
Civil Service (Messengers etc.)	2.4	3.6	7.6	8.7
Prison Officer etc.	0.8	0.6	0.6	0.5
Police	16.8	14.0	12.3	11.6
Army (At Home)	27.4	27.5	23.9	26.3
Navy (Ashore or in Port)	2.9	1.6	2.2	1.2
Total Government (central & local) and defence	50.1	47.3	46.6	48.3
Domestic and other service				
<i>Domestic service</i>	265.6	232.9	195.0	152.8
<i>Other service</i>	22.5	23.4	25.8	19.2
Total Domestic and other service	288.1	256.3	220.8	172.0
<i>of which females</i>	253.0	220.7	193.3	144.9
Transport				
Railways	8.3	9.6	11.7	13.0
Roads	14.8	15.2	20.2	23.2
Canals, rivers and seas	17.3	17.0	15.3	14.5
Storage	1.1	0.4	0.5	1.1
Messenger, porter etc. (not railway or govt.)	8.0	11.8	11.7	12.2
Total Transport	49.5	53.9	59.4	64.0
Agriculture (excluding some general labourers)				
Total Agriculture	630.8	571.2	519.4	458.2
Building	53.7	51.4	58.4	57.5
Manufacturing & Mining				
Books etc	6.2	6.8	7.1	7.2
Machines & implements	6.5	8.3	10.8	15.0
Carriage & harness	5.5	5.8	6.7	7.3
Shipbuilding	2.8	4.3	6.2	7.9
Chemicals	0.2	0.2	0.2	0.2
Tobacco & pipes	1.5	1.5	1.9	2.3
Food & drink	16.8	17.0	16.4	14.7
Textiles				
<i>Cotton & flax</i>	85.9	92.9	76.8	74.0
<i>Other</i>	33.4	25.1	18.6	16.2
Total Textiles	119.4	118.0	95.4	90.2

<i>of which females</i>	79.4	79.9	67.5	63.1
Clothing and dress				
<i>Tailors</i>	17.4	18.0	17.0	16.7
<i>Dressmakers</i>	42.9	46.8	44.5	30.7
<i>Shirtmaker, seamstress</i>	71.0	64.2	56.9	31.4
<i>Shoes</i>	26.7	21.4	16.3	13.6
<i>Other</i>	2.2	2.6	2.8	3.4
Total Clothing and dress	160.2	153.0	137.5	95.8
<i>of which females</i>	117.6	115.5	105.7	65.8
Animal substances	2.9	2.5	1.7	1.5
Vegetable substances	9.9	9.7	8.4	7.9
<i>Wood</i>	7.5	6.8	5.5	4.7
<i>Other</i>	2.4	2.9	2.9	3.2
Mineral substances	38.2	37.8	38.3	36.9
<i>Stone, clay & roadmaking</i>	9.6	10.1	11.7	10.5
<i>Iron & steel</i>	19.6	19.0	17.8	17.3
<i>Other</i>	9.0	8.7	8.9	9.0
Total Manufacturing & Mining	370.1	364.8	330.8	286.8
Dealers (general or undefined)	3.4	3.3	3.7	3.5
Unclassified				
<i>Mechanics & labourers (general or undef.)</i>	81.4	72.9	86.9	98.7
<i>Others</i>	2.3	2.2	1.3	1.7
Total Unclassified	83.7	75.1	88.3	100.4
Total wage earners	1,529.4	1,423.3	1,327.3	1,190.6

Source: Classification adapted from Bowley, *Wages and Income*. Data from Census of Population, Ireland 1881, 1891, 1901 and 1911.

III

The year 1906 was selected as the base year to fit with the eight reports of the 1906/7 Board of Trade reports on the earnings, hours of work and holidays of workpeople in the UK.²¹

These reports were the main sources of estimates for all groups other than government wage earners and domestic servants: for the former we used official sources²² and for the latter Miss Collet's report on wages of domestic servants supplemented by further Irish data.²³

Details of the calculations are given in appendix 1.

Table 3. Average wage earnings in Ireland, 1906

Occupations / Industries	Sub groups of wage earners (000s)	average earnings (£ p. a.)	Main groups of wage earners (000s)	average earnings (£ p. a.)
Government (central & local) and defence			47.3	45.06
Civil Service (Messengers etc.)	8.1	39.82		
Prison Officer etc.	0.5	75.33		
Police	12.0	70.97		
Army (At Home) & Navy	26.7	34.44		
Domestic service			194.7	18.5
Males	27.3	25.09		
Females	167.4	17.43		
Transport			61.6	49.57
Railways	12.4	50.48		
Roads	21.7	59		
Canals, rivers and seas	14.9	59		
Storage	0.7	23.5		
Messenger, porter etc. (not railway or govt.)	11.9	23.5		
Agriculture (excludes some general labourers)			487.8	29.06
Building			57.9	60.42
Printing, paper and books			7.2	43.67
Engineering, Shipbuilding, Steel and chemicals			44.8	61.71
Food, Drink and Tobacco			17.6	44.07
Textiles			91.3	30.96
Linen & flax and cotton				
Male	14.2	42.54		
Female	61.2	26.09		
Other	15.9	38.67		
Clothing & Animal Substances			115.6	33.68
Tailors				
Male	13.5	69.79		
Female	3.3	24.49		
Dressmakers	37.0	24.46		
Shirtmaker, seamstress	42.3	27.11		
Shoes	14.9	44.6		
Other	3.1	26.98		
Animal substances	1.6	44.6		
Vegetable substances			8.3	43.55
Wood	5.1	44.16		
Other	3.2	42.66		
Other Mineral substances			20.0	53.03
Stone, clay & roadmaking	11.1	48.26		
Other	9.0	62.72		
Unclassified Mechanics, labourers, dealers			97.7	48.47
Total wage earners			1251.7	
Aggregate average earnings				34.52
Total Irish Wage Bill (£ million)		43.29		

Source: See text and appendix 2

For each of the main groups in Table 3 we estimated average money wage indices from 1881 to 1911. Each series consists of both male and female workers including skilled and unskilled.²⁴ These are given in table 4 below. Details of the sources and construction may be found in Appendix 2. It seems clear from the final row that the growth rates of nominal wages for agricultural labourers, construction and shipbuilding are not typical of the movement in the other main occupational groups. A weighted average of all series should then give more accurate measure of the movement of the average wage in the economy.

Table 4. Indices of Average Money Wages in Ireland, 1881-1911 (1906 = 100)

	Govt. & Defence	Domestic Service	Transport	Agriculture	Building	Printing & books	Shipbuilding & engineering.	Food, drink & tobacco	Textiles	Clothing	Vegetable substances	Mineral substances	Mechanics & labourers
1881	101.0	73.6	82.6	80.9	79.5	95.4	94.3	92.8	89.3	89.2	95.3	88.4	87.6
1882	102.6	74.3	83.4	82.5	79.0	95.4	90.5	92.8	89.2	89.6	95.3	86.9	86.5
1883	99.7	75.1	84.2	83.3	79.2	95.4	90.5	92.8	89.1	90.0	95.3	87.3	86.9
1884	102.9	75.8	85.0	84.2	79.2	95.4	85.7	92.8	89.0	90.3	95.3	85.3	84.9
1885	104.2	76.5	85.8	84.3	79.9	95.4	82.9	92.8	89.0	90.7	95.3	84.3	83.6
1886	104.3	77.3	86.6	85.2	81.7	95.4	81.0	92.8	89.0	91.1	95.3	83.8	83.1
1887	104.7	78.0	87.1	86.1	83.0	95.4	82.9	92.8	89.1	91.4	95.3	85.0	84.5
1888	105.3	78.8	87.9	86.6	84.0	95.4	89.5	92.8	89.2	91.8	95.3	88.7	88.1
1889	105.2	79.5	88.7	86.7	84.0	95.4	96.2	92.8	89.3	92.2	95.3	92.5	91.4
1890	104.6	80.2	89.5	87.7	86.3	95.4	96.2	92.8	90.6	92.5	97.2	92.9	92.0
1891	104.0	81.0	90.3	88.1	87.4	94.9	96.2	92.8	90.8	91.9	97.2	93.3	92.2
1892	104.9	81.7	92.3	88.7	89.6	96.4	94.3	92.8	91.1	92.9	97.2	93.3	91.5
1893	103.8	82.4	92.9	88.4	89.7	97.9	91.4	92.8	91.3	93.3	98.6	92.2	89.9
1894	103.9	83.1	93.5	89.8	91.1	97.9	91.4	92.8	91.7	93.7	98.7	92.5	90.6
1895	103.8	84.6	94.1	90.4	91.1	97.9	91.4	92.8	93.1	94.1	98.7	92.8	90.9
1896	103.5	86.1	94.7	91.5	94.2	97.9	97.1	92.8	93.5	94.6	100.0	95.9	94.3
1897	102.3	87.5	98.1	91.8	95.5	99.1	100.0	92.8	93.9	95.0	100.0	99.1	95.9
1898	100.9	89.0	98.1	92.2	97.4	99.1	103.8	92.8	94.3	95.4	100.0	101.0	98.0
1899	102.0	90.5	98.1	93.8	98.1	99.1	105.7	92.8	94.8	95.8	100.0	101.9	99.7
1900	101.9	91.9	98.5	94.3	98.1	99.5	105.7	92.8	96.8	96.3	100.0	102.1	100.0
1901	100.6	93.4	98.1	95.3	98.9	100.0	105.7	94.3	97.3	96.3	100.0	101.9	100.5
1902	100.5	94.9	97.3	96.4	98.5	100.0	105.7	94.3	97.9	96.8	100.0	101.5	101.1
1903	100.7	96.3	98.1	97.5	99.9	100.0	103.8	94.3	98.5	97.2	100.0	101.0	100.7
1904	98.9	97.8	96.8	97.9	99.9	100.0	103.8	94.3	99.3	97.7	100.0	100.3	100.9
1905	98.3	98.9	97.3	99.4	100.0	100.0	100.0	94.3	100.0	98.2	100.0	98.6	99.7
1906	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1907	99.7	101.1	99.5	100.7	101.0	100.0	100.0	100.0	102.5	100.5	100.4	99.7	100.3
1908	99.5	102.2	99.4	101.5	101.0	100.3	101.9	100.0	102.5	100.9	100.4	100.6	101.7
1909	99.9	103.3	100.6	102.5	101.0	103.3	101.9	101.5	100.8	101.4	100.4	101.3	102.2
1910	99.9	104.4	104.0	103.8	101.0	103.3	101.9	101.7	100.8	101.9	100.4	103.0	102.8
1911	99.9	105.5	105.3	105.1	102.0	104.0	110.5	101.7	100.8	102.6	100.4	107.9	107.8
Increase	0.99	1.43	1.27	1.30	1.28	1.09	1.17	1.10	1.13	1.15	1.05	1.22	1.23

Source: See appendix 2

IV

The wage indices in table 4 were weighted for each year by the proportion of total wage earners corresponding to each series. These proportions were derived from the four census years and logarithmic interpolation for the intervening years. The outcome is an index of average full time money wages set out in column (1) of table 5. Column (4) sets out the implied index of average wages in Great Britain using Feinstein's series for average wages in the UK.²⁵

Table 5. Indices of average money wages in Ireland and GB, 1881-1911 (1906 = 100)

	Index of average wages, Ireland (1)	Index of changes in wages within sectors (2)	Index of changes in wages between sectors (3)	Index of average wages, G. B. (4)
1881	79.3	82.6	95.9	81.0
1882	79.8	82.6	96.7	81.8
1883	80.3	83.1	96.6	82.2
1884	80.6	83.5	96.5	81.8
1885	80.9	83.8	96.5	80.9
1886	81.3	84.3	96.5	80.2
1887	82.2	85.0	96.6	80.6
1888	83.3	85.9	97.0	81.7
1889	84.2	86.5	97.3	83.4
1890	85.0	87.3	97.4	86.4
1891	85.5	87.7	97.5	87.6
1892	86.2	88.3	97.7	87.9
1893	86.2	88.3	97.7	87.6
1894	87.3	89.1	97.9	88.1
1895	88.0	89.9	98.0	88.1
1896	89.6	91.1	98.3	89.2
1897	90.9	92.0	98.8	90.6
1898	92.3	93.0	99.3	92.3
1899	93.7	94.2	99.5	93.9
1900	94.6	95.0	99.6	96.9
1901	95.6	95.9	99.7	97.9
1902	96.5	96.8	99.8	97.9
1903	97.6	97.7	99.9	98.2
1904	98.1	98.3	99.9	98.2
1905	98.8	99.1	99.8	98.8
1906	100.0	100.0	100.0	100.0
1907	100.9	100.7	100.1	102.2
1908	102.1	101.5	100.6	102.9
1909	103.1	102.2	100.9	102.9
1910	104.5	103.2	101.2	103.8
1911	106.9	104.6	102.2	105.3

Source: See text

Average full time money wages in Ireland rose by 35% between 1881 and 1911. In column (2) the Irish index is recalculated using 1881 weights thereby tracing wage changes within sectors. These accounted for 76% of the increase (a 27 percentage point increase), leaving 24% to be explained as resulting from shifts in employment between sectors. For the same years Feinstein estimated that that UK full time money earnings increased by 33% of which about 66% resulted from within sector changes.²⁶ The derived GB index of average wages increased by 30%.

Fig. 1. Indices of average earnings in Great Britain, Ireland and the UK, 1881-1911 (1911 = 100)



The Feinstein index for the UK is more volatile than the Irish index implying a greater volatility in British earnings. The average value of the absolute percentage annual changes in earnings is 0.9 per cent for Ireland and 1.1 per cent for both the UK and Great Britain. This greater volatility in the Feinstein index may be explained by a number of factors. First, there is the volatility of certain of Feinstein's series and their weight in the indices. For example

mining is not included as a separate series in the Irish index (there were 1200 miners returned in Ireland in 1911): this sector has a weight of 7 per cent in the UK index and it is one of the most volatile of Feinstein's earnings series at 3.7 per cent on the measure above. On the other hand, agriculture which has a weight of almost 40 per cent in the Irish index and only 10 per cent in the UK index shows UK average annual fluctuations of 0.7 per cent (1.1 per cent in the Irish series). Second, to the extent that a few of the wage indices in the Irish index (see appendix 2) may be wage rate as opposed to earnings biased then the relatively faster growth of Irish wages will be understated and at the same time the series will underestimate increases in earnings in an economic upswing and decreases in a downturn. Third, the tendency of the Irish workforce to emigrate in hard times, especially in the 1881 to 1891 period, will have exerted a degree of damping on the fluctuations in Irish wages.

Feinstein estimated UK average full time wages as £44 in 1881 rising to £58.6 in 1911.²⁷ The Irish equivalents were £27.4 and £36.9 which implies a British average wage of £46.4 in 1881 rising to £60.4 in 1911. Irish wages were about 59 per cent of British wages in 1881 rising to 61 per cent in 1911. With Williamson's PPP uplift these ratios are 63 per cent and 65 per cent respectively. This is substantially below his ratio of Irish to GB PPP-adjusted real wages of 96 per cent in 1911. Similarly the increase in the wage index of 35 per cent is substantially below the 58 per cent of Williamson's index.²⁸ The reason for the relatively higher level of Irish wages reported by Williamson is that the wage data he employed to calculate his 1905 benchmark Ireland/GB wage ratio is from the building and the engineering industries. Table 3 indicates that these were the two highest paid industries in Ireland in 1906. Table 6 below indicates that in 1911, after his PPP conversion, the Ireland/GB wage ratios for these industries are similar to those he reports but they are not representative of all Irish wages.²⁹ In Table 6 we compare for the 1881-1911 period the Irish and GB wage growth and average wage ratios for selected industries. The GB figures are estimated by subtraction of

our figures from Feinstein's UK figures.³⁰ In the final column we convert the 1911 ratios using Williamson's purchasing power factor. The ratios for building and shipbuilding, after purchasing power parity conversion, are similar to those found by Williamson in his benchmark index based on construction and engineering as are those reported by Boyer *et al* for the occupations agricultural labourers, carpenters and fitters.³¹ However, it can also be seen that shipbuilding and construction are at the top end of the scale in terms of the Ireland/GB wage ratios and that wages in no industry increase by as much as 58 per cent suggesting that an index based on unskilled building wages will exaggerate Irish wage growth. Catch up is further exaggerated because Williamson's GB index appears to underestimate the growth of GB wages. Feinstein's UK index of average earnings grows by about 33 per cent between 1881 and 1911 and the implied GB index grows by 30 per cent (see table 6) compared to growth in Williamson's GB index of 22 per cent.³²

Table 6 Relative increase in Irish and GB wages between 1881 and 1911

	Percentage Increase in Average Money Wages		Ratio of Irish/GB Average Money wages		PPP conversion
	Ireland	GB	1881	1911	1911
Agriculture	30	26	0.67	0.69	0.73
Building & Construction	28	14	0.76	0.85	0.90
Shipbuilding	17	21	0.91	0.88	0.94
Government & Defence	-1	33	0.84	0.62	0.66
Textiles	13	18	0.69	0.66	0.70
Clothing	15	8	0.68	0.72	0.77
Printing & Books	9	17	0.74	0.70	0.74
Railways	27	27	0.66	0.74	0.79
Domestic Servants	43	19	0.33	0.40	0.43
All Other Industries	21	17	0.76	0.78	0.83
Weighted Average	35	30	0.59	0.61	0.65

Source: See text

A possible worrying feature of our estimate is the ratio of domestic service wages between the two countries. For Ireland we use Collett's and Hearn's data to estimate the level and Hearn's for the index (see appendices). Miss Collett was not happy about her Irish data

but she published a table showing a ratio of Irish to GB wages around 85%. Our GB figure is derived from Feinstein's UK figure (we don't think he used any Irish data in compiling this – he mentions none). He increases the UK average by 10/- per week (1911 prices) to allow for board and lodging. Miss Collett hints that the Irish figures already include food allowances. If we were to double the Irish average for female domestic servants (increase wages by about 10/- per week) – and note we have no basis whatsoever to do this or to disbelieve Miss Collett - this would restore the Collett ratio of Irish/GB servants wages and increase the overall average of Irish wages to GB wages from 59% in 1881 to 65% and from 61% to 66% in 1911 (around 70% with Williamson's PPP adjustment). But this would be a speculative and unfounded upward adjustment (and would if anything slow the measured rate of wage catch up).

The fall in the Government and Defence series reflects an increase in the number of lower-paid workers, largely postal workers, from the 1890s on. This is a UK-wide phenomenon. Feinstein's series declines from the 1890s to 1904 but recovers thereafter while the Irish series does not. This group accounts for less than 4% of wage earners. In terms of calculating the average wage and the wage bill they have to be included but we are inclined to the view that changes are not driven by economic forces for which reason it is as well to ignore this small group for all purposes other than the aggregate calculation.

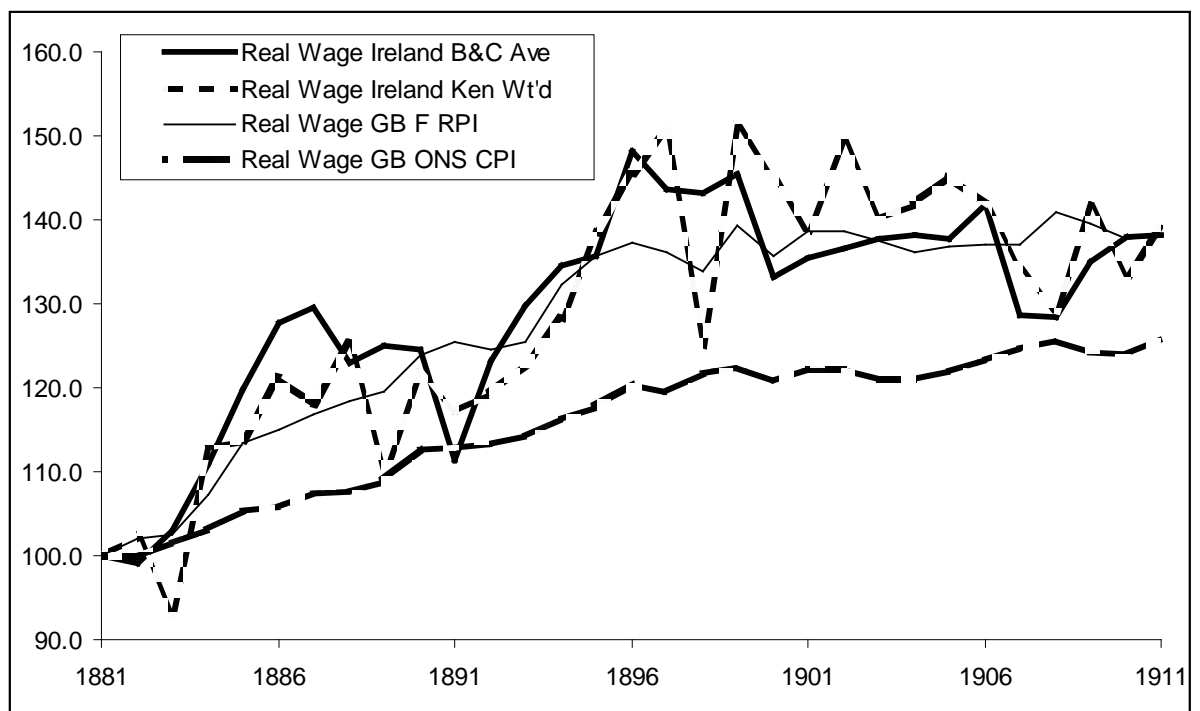
How reliable are these estimates of the average wage? We consider the benchmark estimates for 1906 based for the most part on the Board of Trade wage censuses to be very reliable but less so the money wage indices. These series are a collation of wage rate/earnings figures from a wide range of largely official and published sources. Feinstein graded his indices into three groups, the best offering a 90% chance of the true value lying between a stated error of +/- 5 to 15% and the worst greater than +/- 25%. In order to replicate his reliability estimates as far as possible, each series was scored (out of 20 marks) according to

each of four characteristics: source (official or other); coverage of wage earners in category; number of missing years and finally whether based on earnings, wage rates or an adjustment of the latter. The highest scoring series (80 marks) were accredited a level 5; these were government and agriculture. The next group obtained level 3 (between 60 and 70); these were transport, construction, shipbuilding, textiles, mechanics and labourers, vegetable and mineral substance workers. The remaining groups were accorded a level 1 mark (see fn. 35 for more detail). A wage-earner-weighted score for the whole collection produced a reliability index of just over 3, i.e., good reliability throughout the data period. This scoring system applied to a series that contains only agriculture, construction and shipbuilding generates scores of just over 2 indicating that the current index is an improvement on one with more limited coverage.³³ This does not, of course, exclude the current series being improved upon with more or better: we would regard it as iteration in the process begun by Williamson *et al.*

Since the wage studies of Williamson *et al* appeared, separate Irish cost of living indices have been estimated.³⁴ There are no separate indices for Great Britain. For the UK there are Feinstein's Retail Price Index and a series for Consumer Price Inflation produced by the ONS and House of Commons Library.³⁵ An average of the four series produced by Brunt and Cannon declines from 100 to 98 compared to the fall in Feinstein's UK index to 94 and a rise in the ONS index to 103. The Irish index is also more volatile: the average value of the annual fluctuations is 1.8% for Feinstein's series, 1% for the ONS series and 3.6% for the Irish series. Kennedy estimated rural and urban indices. A weighted average (0.3 for the urban, 0.7 for the rural) produces a decline to 97 and the index displays average annual fluctuations of 6.3%. Thus deflating Irish money wages with an Irish cost-of-living index slightly increases real wages relative to nominal wages but also makes them more volatile arising from fluctuations in Irish prices. If Irish prices are more volatile then it may be that market forces operate more strongly via prices in Ireland and via wages in GB consistent with

the smoother time path for nominal wages in Ireland. As regards catch up in real terms: if British money wages are deflated using Feinstein's UK RPI then the ratio of Irish real wages to British real wages is about the same in 1911 as it was in 1881; if the ONS UK CPI is used to deflate British wages then Irish catch up is maintained or slightly increased. Clearly both the choice of comparator years and index is important.

Fig. 2 Indices of Irish and British Real Wages, 1881 - 1911



V

Combining the estimated series for wage earners with the estimated annual average wage enables us to calculate the annual wage bill for Ireland between 1881 and 1911 and derive the wage bill for Great Britain from Feinstein's UK data.

Table 7. The Wage Bill in the UK, Ireland and G.B., 1881-1911 (£s m.)

	UK	Ireland	GB
1881	540.0	41.8	498.1
1882	549.5	41.8	507.7
1883	556.9	41.8	515.2
1884	558.5	41.6	516.9
1885	557.2	41.5	515.7
1886	557.3	41.4	515.9
1887	564.1	41.5	522.6
1888	576.3	41.8	534.5
1889	592.4	42.0	550.5
1890	617.2	42.1	575.1
1891	629.9	42.0	587.8
1892	640.8	42.0	598.7
1893	647.1	41.7	605.4
1894	659.9	41.9	618.0
1895	668.9	41.9	627.0
1896	686.2	42.4	643.8
1897	706.3	42.7	663.6
1898	729.3	43.0	686.3
1899	751.1	43.4	707.6
1900	784.5	43.5	740.9
1901	802.9	43.8	759.1
1902	809.1	43.7	765.4
1903	818.0	43.7	774.3
1904	824.4	43.4	780.9
1905	835.2	43.2	792.0
1906	851.6	43.3	808.3
1907	876.3	43.3	833.0
1908	888.5	43.3	845.2
1909	895.3	43.3	852.1
1910	909.6	43.4	866.2
1911	930.6	44.0	886.5

Source: See text

The first most noticeable feature is the relative constancy of the size of the Irish wage bill: while the wage bill in Great Britain and the UK increased by 78 per cent, that of Ireland increased by 5 per cent reflecting decline in the number of Irish wage earners. The share of the wage bill in UK GDP at factor cost measured in current prices remained fairly constant at around 44 percent between 1881/5 and 1907/11.³⁶ While there are no direct time series estimates of Irish GDP, there are estimates by Geary and Stark of Ireland's share of UK GDP which suggest that in real terms Irish GDP increased by around 4 per cent between 1881 and 1911.³⁷ There is no separate Irish GDP deflator. The Irish (consumer) price indices

mentioned point above to a fall in Irish prices of 2% to 3% suggesting a 'real' increase of around 6% to 7% in the wage bill and as such indicating an increasing share of GDP accruing to waged labour. On the other hand at the UK level while Feinstein's RPI shows a fall of 6%, his implicit GDP deflator rises by 4%³⁸ (in line with the ONS CPI); if this GDP deflator can be applied to Ireland then this would imply an 8% increase in nominal GDP and consequently a fall in the share of the wage bill in GDP. The former case would hint at decreasing inequality in Ireland whereas the latter hints at the reverse.

We can separate out some of the influences on the wage bill (WB); consider:

$$\Delta WB = \Delta W.N + \Delta N.W + \Delta W. \Delta N \quad (6)$$

where W is the wage level, N the level of employment and Δ the change between period t and an earlier period 0: $\Delta W.N$ is the total wage effect and is defined across occupations as

$$\Sigma (W_{it} - W_{io}).N_{io} \quad (7)$$

The total wage effect is made up of a national average wage level effect:

$$\Sigma [(W^*_t / W^*_o). W_{it} - W_{io}].N_{io} \quad (8)$$

and a relative or differential wage change effect measured as (7) – (8).

$\Delta N.W$ is the total effect of changes in the number of earners and is

$$\Sigma (N_{it} - N_{io}).W_{io} \quad (9)$$

from which we have a aggregate employment level effect

$$\Sigma [(N^*_t / N^*_o).N_{io} - N_{io}].W_{io} \quad (10)$$

where N^* is aggregate employment and (10) is the effect had all sectors changed in equal proportion such that (9) – (10) is the change resulting from changes in structure of

employment between occupations. The final term, ($\Delta W. \Delta N$) is the inevitable shift-share residual. Table 7 sets out the results

Table 8. Changes in the Irish full-time, full-employment wage bill, 1881 – 1911

	Change in wage bill	Total wage effect (7)	Wage level effect (8)	Relative wage effect (7) - (8)	Total employment effect (9)	Employment level effect (10)	Employment structure effect (9) – (10)	Residual
1881- 1891	0.44	6.49	8.41	-1.92	-5.61	-12.54	6.93	-0.44
1891- 1901	4.27	8.30	3.52	4.78	-3.61	-10.35	6.74	-0.42
1901- 1911	0.51	7.88	4.02	3.86	-6.67	-16.97	10.3	-0.72

Source: See Text

The total wage effect is positive in each decade and strongest between 1891 and 1901. The wage level effect is also positive in each decade as is the relative wage effect after 1891 suggesting relative gains for lower paid workers in the decade 1881 to 1891. The employment level effect in each period is strongly negative as would be expected given Ireland's declining labour force. This is partially offset by changes in the structure of employment suggesting growth in relatively higher paid occupations in each decade sufficient to offset the impact on the wage bill of the fall in employment in agriculture, domestic service and textiles – relatively lower paid occupations

V

In the second half of the nineteenth century Irish money wages were catching up those of GB. The measurement of this wage catch up is a matter of debate. This paper has sought to show that while there was significant wage catch up in a few occupations, on average the degree of catch up was smaller and the rate of catch up less rapid than recent studies have suggested. The benchmark Irish/GB wage ratio in 1905, based on wages in engineering and

construction, employed in these studies is overestimated not because wages in engineering and construction are overestimated but because lower wages in other occupations are not taken into account. Similarly the slower growth of Irish wages identified here is not due to overestimation of growth in the series employed in earlier studies – builders’ labourers and agricultural labourers – but to slower growth of wages in other occupations. When an index of average wages is constructed giving due weight to a wider range of occupations, the level of Irish wages is reduced and their rate of growth slowed compared to the limited sample on which earlier studies were based.

The origins of this catch up are also a matter of debate. Recent scholarship has stressed the globalisation of labour markets and the role of emigration. Kennedy *et al* liken Irish improvement in living standards after the Famine to what happened in Europe after the Black Death.³⁹ This appears to rely implicitly on a quasi-Malthusian model in which, with the aggregate production function fixed, a leftward shifting labour supply curve moves up a static labour demand curve increasing both wages and average product without industrialisation, accumulation or TFP growth. An older view, revisionist in its day, typified by Louis Cullen’s classic textbook emphasises the modernisation of the Irish economy by the end of the nineteenth century over than emigration, ‘Ireland was in many respects a highly developed country by end of the centuryAlong with its large foreign trade, its export-oriented industries, its highly developed infrastructure of banking, commerce and railways, and its foreign investment yielding a sizable income made Ireland comparable in some respects to a handful of highly developed nations.’⁴⁰

Approaching the catch-up debate from another angle, output per worker, Geary and Stark endorse the Cullen story. In considering the origins of Ireland’s labour productivity growth they suggested that at most (assuming an output elasticity of labour of 0.5) emigration may explain that part of post-Famine labour productivity growth that may be regarded as

catch-up: the bulk (over 70%) of Ireland's labour productivity gain is explained by an upward shifting total product curve – traditional growth forces in short such as capital accumulation, TFP growth and structural change, dominate and clearly a higher output elasticity of labour reduces further the contribution of emigration to labour productivity growth.⁴¹

The wage evidence presented here tends to support this story. Wages increase, *ceteris paribus*, if either labour supply declines (emigration) or there is an increase labour demand (upward shift in the production function) or a combination of both. Employment declined at different rates across sectors and in some it grew and similarly wages grew at different rates across sectors (even declining in one). Clearly there are identification problems which can not be solved by simply attributing Irish wage growth to mass emigration. An emigration case can be built around the movement of two series: agricultural labours and domestic servants where as shown in tables 2 and 4 employment decrease and wage growth were far in excess of the average. On the other hand table 2 shows employment increasing in a number of occupations – building, transport, carriage, shipbuilding, printing, tobacco, dealers and unclassified mechanics and labourers. A combination of rising wages and increased employment implies that labour demand was increasing faster than labour supply was falling in these sectors. This in turn suggests an upward shifting total product curve which suggests traditional growth forces were operating at least along with emigration to promote wage growth. In short, Ireland's late-nineteenth century performance is not just a classical tale of a negative labour supply shock but also a neo-classical one of capital accumulation and technological change. In the wider world of the Atlantic economy the Irish case suggests that, at least for the peripheral economies, while the role of emigration provides additional insight into the convergence process, capital accumulation and technology transfer cannot be ignored: catch up was driven by more than a static reallocation of labour resources between countries.

Appendix 1. Estimates of average earnings in 1906 by occupation/industry

In table 3 there are 37 categories of occupied persons. For 21 of these the average earnings are estimated directly from category specific Irish data covering 72.5% of the occupied population. For a further 12 the averages are either derived from Irish data for other years and indexed to 1906 (as for domestic servants), or are derived from Irish data for some trades within the group but not covering all such trades. For the remaining 4 the averages are a proportion of UK figures, there being no direct Irish data.

1. Civil servants. Class I, Class II and Class IV messengers, labourers, cleaners, porters and post office stampers, letter receivers, sorting clerks, bagmen, postmen, gatekeepers and labourers. The annual wages of these groups were published annually in the Civil Service Estimates.⁴²

2. Prison Officers. Annual earnings are recorded by the General Prison Board Ireland.⁴³

3. Police. Police wages and salaries are recorded in the annual Treasury Civil Service estimates and in the Board of Trade annual abstract of labour statistics. An additional resource is Thom's Official Directory. A summary of much of this data is provided in the 1920 Report of the Committee of Inquiry into the Royal Irish Constabulary.⁴⁴

4. Armed Forces. Based solely on army data and covering the earnings of all NCOs and other rank and file in artillery, cavalry, infantry and engineers regiments as given in the official army estimates.⁴⁵

5. Domestic Servants. Miss Collet's Report provided data on female servants' wages in Ireland for 1896.⁴⁶ Hearne estimated a ratio of 1.44 for male to female wages for three

country houses between 1890-1895.⁴⁷ Hearne's data enabled us by straight line interpolation to estimate levels of earnings from 1881 through 1896 up to 1906 and beyond.

6. Transport. Railway workers average annual earnings are from report VII of the 1906/7 Enquiry. Average annual earnings for road workers are a weighted average of the Enquiry returns for Ireland for roads and sanitary and for trams and buses both from report IV. Water transport is based on the UK average for harbour and docks construction workers (report III) deflated by 0.84 which was the ratio of Irish/UK earnings in the building trades. Transport messengers (not railways) is an average of 1900 and 1911 of the weekly wages of carters in counties Cork and Down⁴⁸ Other than for railways all annual averages were derived from weekly earnings.

7. Agriculture. Average earnings estimated from the 1906/7 Enquiry Report V, and scaled back to 1906 using the Irish agricultural cash wages index in the 15th Abstract of labour Statistics.

8. Building Trades. From 1906/7 Enquiry Report III.

9. Printing and Books. There were no Irish data for this category. We used data published in Enquiry Report VIII for the Rest of the United Kingdom – Ireland, Wales and the North East of England.

10. Engineering, Shipbuilding, Steel and Chemicals. We used engineering and shipbuilding data for this group. Report VI of the 1906/7 Enquiry gives a UK only average for these

groups, therefore we applied the Ireland/UK shipbuilding and engineering wage ratio as estimated in Pollard and Robertson.⁴⁹

11. Food, Drink and Tobacco. 1906/7 Enquiry Report VIII provided Irish data for 37% of Irish workers in this category, covering grain milling, brewing and malting and bakery and confectionary. We estimated an average for these groups and a corresponding Ireland/UK ratio and applied this to the UK average for the whole category.

12. Textiles. The average for linen is from Report 1 of the 1906/7 Enquiry. For other textiles there were only Irish data for bleaching. We took the UK averages for bleaching, wool, hosiery etc. and estimated a weighted average based on Irish employment in each (given in Report 1) and this average was then scaled down by the Ireland/UK average for bleaching.

13. Clothing. Report II of the 1906/7 Enquiry gave Irish data for most categories.

Employment was largely female except for tailoring where male and female employment were on a par, though their average earnings were vastly different – hence the sub-division. The Report had no Irish data on workshop laundry wages and in this case we used the Irish average for power laundries. There were also no Irish data for Boot and Shoe trades and other workers working with animal substances (assumed to be mainly leather). In this case we adopted the average earnings given for ‘The Rest of the UK’ for Boot and Shoe, which comprised Wales, the North East and Ireland.

14. Vegetable Substances. For wood we used a weighted average of the Irish average earnings for saw milling and cabinet makers from the 1906/7 Enquiry Report III. Other

vegetable substances we assumed to be largely paper manufacture and from Report VII we used the average for the Rest of the UK.

15. Other mineral substances. Stone, clay and road making average earnings are the weighted averages for Ireland in Report IV for roads and sanitary services. We also made an allowance for brick, clay and tile manufacture using data from Report VIII deflated by the Irish /UK ratio for the wages of all male workers in the construction trades and with a 0.2 weighting. For other in this category we took a weighted average of the Irish averages for gas, electricity and water industries.

16. Miscellaneous. Mechanics and labours accounted for 80% of this group. From seven of the Enquiry reports (not agriculture) we gathered weekly wages and numbers in Ireland of mechanics and labourers from which we calculated an annual average and adopted this for the whole category.

Appendix 2. Money Earnings Indices

1. *Government employees.* These cover groups 1 to 4 of Appendix 1 and indices are derived from the same sources. They are based on annual average earnings and refer largely to financial years (April to March). The steady decline in Civil Service wages after 1890 is a result of the proportionately greater increase in the numbers of lower paid jobs largely in the postal services.

2. *Domestic servants.* Hearn⁵⁰ provides average wages for four classes of servants for 1884, 1894, 1904 and 1914. We obtained an index by straight line interpolation and assumed the index also tracked the wages of male servants.

3. *Transport.* The Parliamentary Papers provided us with weekly wages for railway servants for 1886, 1891 and 1896 annually through to 1913.⁵¹ We interpolated for the gap between 1887 and 1890 and extrapolated back to 1881.

4. *Agriculture.* An index of the cash earnings of agriculture labourers for the years 1879 to 1910 is published in the 15th Abstract of Statistics.⁵²

5. *Building.* The Labour Department of the Board of Trade regularly between 1881 and 1906 produced wages data for skilled trades and labourers in building for the towns of Armagh, Belfast, Cork and Dublin.⁵³ We assembled 16 series and each constructed an index and took a weighted average. The weights were first the proportion in each trade according to Report III of the 1906 Enquiry and secondly relative population size of each town in the previous census.

6. *Printing and Bookbinding.* Estimated from various Board of Trade returns for printing occupations.⁵⁴ These were converted to annual rates and the final index was a weighted (by

population and occupations) average of the indices and covered approximately 60% of workers.

7. *Shipbuilding and Engineering, Iron and Steel etc.* There were no data for iron and steel workers in Ireland so we adopted shipbuilding and engineering as representative. An index, based on Belfast was derived from Pollard and Robertson.⁵⁵ It covers 44% of the workforce in this category

8. *Food, Drink and Tobacco.* Official data were restricted to wage rates for bakers in Dublin and Belfast for 1892 to 1906 and 1909 and 1910. Since the wage rates were virtually static the gaps from 1881 were filled by simple extension and a weighted bakers' index computed. This index was then averaged with one based on the wages of labourers in Locke's Distillery in Dublin.⁵⁶ The indices cover approximately 60% of the workforce.

9. *Textiles.* There are intermittent data on textile wages in Ireland for the 1850's through to the early 1880's and up to 1889.⁵⁷ These sources plus interpolation and extrapolation - made easier by virtue of the long run constancy of rates - produced a series for nine occupations in linen and flax up to 1906, accounting for between 70% and 80% of employment. If hemp and those in mixed and unspecified materials (which includes weavers, bleachers and factory hands undefined and embroiderers) are included this becomes 90% to 92%. Most of the remainder was in wool based trades (cotton accounts for between 2% and 3%).⁵⁸ The weighted average provided both a wage rate index and overall linen/flax wage rate levels for years including 1906 and 1886. The wage rate data suggest a gap of 23% between wage rates and earnings in 1906 and of 11% in 1886. Linear interpolation and extrapolation allocated earnings gaps for other years and combined with wage rate index produced an earnings index. The index was extended past 1906 using an earnings index for all UK textiles from the 15th Abstract of Statistics.

10. Clothing. We combined two indices weighted by relative occupational size from the previous census year. The first was a weighted index of the annual wages, estimated from a mixture of hourly, daily and weekly wages, of male tailors from Cork, Belfast and Dublin. The second index was boot and shoe manufacturing.⁵⁹ The occupational coverage of these indices was approximately 30%.

11. Vegetable substances. The index was an average of indices of wage rates from Dublin for upholsterers and cabinet makers from Belfast.⁶⁰ Occasional data from the same sources for relevant trades (coopers, turners, carvers, French polishers and so on) in these cities indicated similar changes in wages. The index covers 60% of the workers in this category.

11. Mineral substances. With no time series data at all for any of the trades in this category we have assumed the change in wages may be approximated by an average of the indices for shipbuilding, engineering etc. and transport. The 1886 Wage census gave approximate average earnings for all workers for town road workers, gas and water workers. Though the change in earnings between 1886 and 1906 varied in each industry, the overall average produced a change quite similar to that of the combined index.⁶¹

11. Miscellaneous. As over 95% of this category were general mechanics and labourers we considered an average of the agriculture index and that for shipbuilding and engineering etc most appropriate.

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Footnotes

¹ Williamson, 'Evolution of Global Labour Markets'; O'Rourke and Williamson, 'Around the European Periphery'; O'Rourke and Williamson, *Globalization and History*.

² Williamson, 'Evolution of Global Labour Markets', Appendices 1 and 2; Williamson, 'Erratum'.

³ Williamson, 'Economic Convergence', p. 24 puts this most forcefully, 'post-famine Irish historyoffers no evidence of industrial catching up, spectacular accumulation or remarkable total factor productivity growth.' but see also Williamson, 'Evolution of Global Labour Markets', p. 155; O'Rourke and Williamson, 'Around the European Periphery', pp. 153 and 172.

⁴ Boyer Hatton, and O'Rourke, 'The impact of emigration on real wages in Ireland', p.238.

⁵ These ratios are calculated from Feinstein, 'New Estimates of Average Earnings', Tables 2 and 3, pp. 603 and 604 and from Table 2 below.

⁶ If all series in two countries grew equally and the shifts in employment from lower to higher wage employments were positive in both but different then we could have a situation where the growth of each aggregate wage not only exceeded that of any individual series but differed between the two countries: now consider the possible array of outcomes if the initial assumption were broken.

⁷ Williamson, 'Evolution of global labour markets', pp. 142-3; O'Rourke and Williamson, 'Around the European Periphery', p. 155. The difference here is not entirely clear. First, within the construction industry plasterers' labourers, bricklayers' labourers, plumbers' mates, general labourers and so on will have different endowments of human and physical capital and between countries these differences may well be greater yet so the homogeneity conferred by the term "builder's labourer" is more apparent than real. Second, to the extent that the series 'urban builders' labourers wages' is an average (or an implied average) of the wage paid to a range of different labouring jobs in the construction industry, it will contain structural or compositional effects just as a more general average wage for all workers does.

⁸ Williamson *et al* despite their reservations about an average wage continually refer to Irish wages and wages per employed worker as if they are discussing Irish wages on average rather than the wages of urban male unskilled builders' labourers. For example Williamson, 'Economic Convergence' p. 27 states, 'I use wages rather than national income or domestic product because I think it is living standards of the working class that matters in the convergence debate.' Since his wage evidence is unskilled building wages in Dublin and Cork then he must be assuming here that this limited sample of Irish wages represents some average wage for the working class. O'Rourke and Williamson argue that, 'Real unskilled wages are a better measure of ordinary workers living standards than traditional macroeconomic aggregates.' (*Globalization and History*, p. 269)

⁹ 'Evolution of global labour markets', pp. 152-3 and p. 161; 'Economic convergence', p. 12, '...the Anglo-Irish real wage per employed worker gap eroded much faster than the output per capita gap'.

¹⁰ Bowley, *Wages and Incomes*; Feinstein, 'New Estimates of Average Earnings'

¹¹ *Census of Ireland*, 1881, General Report, Tab. 18; *Census of Ireland*, 1891, General Report, Tab. 18; *Census of Ireland*, 1901, General Report, Tab. 19; *Census of Ireland*, 1911, General Report, Tab 19.

¹² Bowley, *Wages and Incomes*, pp. 127-36; Feinstein, *National Income*. pp. 31-6; 'New Estimates of Average Earnings'.

¹³ Bowley, *Wages and Incomes*, p.127

¹⁴ *ibid.* p. 127

¹⁵ *ibid.* p.127, '...there is the rapidly increasing class of shop assistants, not always distinguished from others engaged in distribution...The most convenient course is to include shop assistants (with certain exceptions) as middle class. Since little is known till quite recent times about wages or salaries in shops, this procedure allows the best estimate of wage changes.'

¹⁶ *Ibid.* p. 132

¹⁷ *Census of Ireland*, 1891, General Report, p. 23

¹⁸ Each of the censuses from 1881 to 1911 includes in the General Report (Table 19 in 1881 and 1891, Table 20 in 1901 and 1911) along with the return of agricultural labourers the following footnote, 'See "General Labourer" (Class V) the majority of whom may be assumed to be Agricultural Labourers, although not having returned themselves as such'.

¹⁹ 1881 census, general report, p. 22.

²⁰ We have a simple check on the reliability of the estimated figure for general labourers. The one year in which we have a return which differentiates between agricultural and non-agricultural labourers is 1851. The return of 'labourers (not agricultural)' for 1851 was 59 thousand; the estimate for 1851 is 62 thousand. The error arising from wrongly assuming that all labourers were agricultural (which we would do in subsequent years if all general labourers were regarded as agricultural labourers) would be to overestimate those in agriculture by 59 thousand; the error arising from using the estimate of 62 thousand is to underestimate the agricultural labour force by 3 thousand. A third possibility would be to treat only those general labourers returned in towns and cities as 'general labourers'; in 1851 there were 31 thousand general labourers returned in the towns and cities covered by the census so this procedure would lead to an overestimate of the agricultural labour force in that year of about 28 thousand.

²¹ *Report of an Enquiry into the earnings and hours of workpeople in the United Kingdom in 1906.*

²² See Appendix 1

²³ Miss Collet's Report, p. 39 - 47; Hearn, *Below Stairs*, pp. 87-8 and 93-4

²⁴ Around 31% of the GB labour force was female in 1881 and in Ireland 34%. These ratios had fallen to 29% and 24% respectively by 1911. Dealing with wage earners only, female participation in Ireland was around 34% in 1881 falling to about 25% in 1911. Female waged employment in 1881 was for the most part domestic service (45%), textiles (15%) and clothing (23%). In 1911 these numbers were 43%, 21% and 22%. Neither Feinstein nor Bowley furnish separate numbers for female wage earners except in the case of domestic servants where Feinstein furnishes numbers for 1881 and 1911: he doesn't give a total for female wage earners only the number of female domestic servants so we cannot comment on GB participation rates among female wage earners. Our data sources did not permit any further subdivision into skilled and unskilled among either males or females.

²⁵ Feinstein, 'New Estimates of Average Earnings'. Feinstein was able to obtain wage data for 19 industries in calculating his average UK wage. Data and other considerations restricted us to 13. We do not include mining for obvious reasons. He has three series for textiles - cotton, wool & worsted and other textiles - since Irish textiles were overwhelmingly flax and linen we have only one. He was able to differentiate clothing and boot & shoe operatives and shipbuilding operatives from engineering, we were not. In essence we followed similar procedures for identifying the number of wage earners but the series that make up the average wage index are more numerous in Feinstein's UK index. Since Feinstein's UK estimates were obtained using slightly different Irish data on employment and wages to the data employed for the separate Irish estimate presented here there will be some error in the UK and GB series. However the error does no substantial damage to the estimate of the GB wage bill. Over the 30 years under consideration, our estimate of the Irish wage bill averages 6% of Feinstein's estimate of the UK wage bill. This is pleasingly close to the various Ireland/UK GDP estimates. Feinstein puts Irish GDP at around 6% to 6.5% of the UK total in 1911, Cullen at 6.4%, Ó Gráda between 6% and 6.4% and Geary and Stark at 6.3%. (Geary and Stark, 'Examining Ireland's Post-Famine Economic Growth' p. 926) Ireland is such a small proportion of the UK and hence GB wage bill that an error of say 20% in the Irish estimate while it would alter the Irish estimate significantly would alter the UK estimate by only around 1 percentage point. Hence while Feinstein's UK estimate is probably out by the size of the error in his inclusion of Irish data (which is most unlikely to be as high as 20%), this does little damage to his UK estimate. Hence if we strip out our estimate of the Irish wage bill from Feinstein's UK wage bill the GB estimate should be at worst 1% plus or minus off what it would have been had Feinstein been able to use our data. We think this an acceptable margin of error. The alternative would be to re-do Feinstein's UK estimate employing our Irish data which would be a lot of work for little return if we could actually do it.

²⁶ Feinstein, 'New Estimates of Average Earnings', p. 612

²⁷ *Ibid.* Tables 2 and 6.

²⁸ The 1911 ratio employs the revised index for GB real wages published in 'Erratum' p. 553. The Irish index is as published in Williamson, 'Evolution of Global Labour Markets', Table A2.1, pp. 179-8.

²⁹ The average ratio obtained from the 1906 earnings and hours of work enquiries covering a wider range of industries than Williamson's 1905 benchmark estimate but a narrower range of occupations than those contained in the average presented in this paper, is 0.65.

³⁰ From Feinstein 'New Estimates of average Earnings' tables 2 and 3 (pp. 603-4) we extracted for 1881 and 1911 the number of UK wage earners for the groups of earners in table 6 above. Feinstein also in these tables gave for 1911 the respective average wage for each group enabling us to derive the respective 1911 group wage

bills. The index of money wages for each group in Feinstein's table 4 (pp. 608-9) enabled the exercise to be repeated for 1881. If we subtract our equivalent Irish estimates from the UK group wage bills we then have the GB group wage bills and consequently GB average wage for each group. Due to marginal differences in classification with Feinstein it is not possible to compare all our groups. Note that these are money wage ratios: deflating each series by the same UK RPI would make no difference to the ratios.

³¹ Boyer *et al.*, 'Emigration and real wages', p. 226, give ratios for 1913 around 90 per cent for carpenters and for fitters and 75 per cent for agricultural labourers.

³² Feinstein, 'New Estimates of Average Earnings', Table 6; Williamson, 'Evolution of Global Labour Markets', Appendices 1 and 2; Williamson, 'Erratum'

³³ The scoring system for reliability was as follows for each index: a) official source = 20 marks, semi-official = 15, other = 10; b) coverage of wage earners 100% = 20marks, 75%+ = 15marks, 50%+ = 10 marks; 30%+ = 5 marks, less than 30% = 1 mark; c) missing years fewer than 5 = 20 marks, 6 to 10 = 15 marks, 11-20 years = 10 marks, more than 20 years = 5 marks, plus 1 mark if each decade is covered; d) Earnings data = 20 marks, wage rate data adjusted to earnings = 15 marks, wage rate data = 10 marks. In the scoring system 80 = grade 5 (excellent), 70-79 = grade 4 (very good), 60-69 = grade 3 (good); 50-59 = grade 2 (satisfactory), less than 50 = grade 1 (poor). Two groups got grade 5, 6 got grade 3 and 5 grade 1, the lowest mark being 40 for domestic servants. Using 1881 weights the overall average was 3.1 and with 1911 weights 3.2. If we only considered agriculture, construction and shipbuilding the respective scores are 2.2 and 2.1 We think grades 5 & 4 correspond to Feinsteins 5 to 15% error range, 3 & 2 to the 15 to 25% range and 1 to his above 25% range.

³⁴ Kennedy, 'The cost of living in Ireland'; Brunt and Cannon, 'Irish grain trade'.

³⁵ Feinstein, *National income and expenditure*, Tab. 65, T140; O'Donoghue *et al.*, 'Consumer Price Inflation since 1750', Tab. 1, p. 43.

³⁶ Table 6 and Feinstein, *National income and expenditure*, Tab. 3, T10.

³⁷ Geary and Stark, 'Regional GDP in the UK', Tab. 3, p. 8.

³⁸ Feinstein, *National income and expenditure*, Tab. 60. T132-3.

³⁹ Kennedy *et al.*, *Economic Development of Ireland*, p. 21.

⁴⁰ Cullen, *Economic History of Ireland*, Ch. 6, pp. 167 & 170.

⁴¹ Geary and Stark, 'Regional GDP in the UK' pp. 14-16.

⁴² Treasury, *Civil Service estimates*, annual

⁴³ Board of Trade (henceforth BT) Miscellaneous Statistics (PP annual); Report of the General Prison Board, Ireland (P.P. annual)

⁴⁴ Treasury, Civil Service Estimates annual; Thom's Official Directory annual; BT, *Abstract of labour statistics of the UK*, annual; Royal Irish Constabulary, *Report of the Committee of Inquiry*, (1920, XCVII)

⁴⁵ Treasury, *Army estimates of the effective and non-effective forces*, annual

⁴⁶ Miss Collet's Report, pp. 39-47

⁴⁷ Hearn, *Below Stairs*, pp. 87-8 and 93-4. Hearn also collected wage data from the Irish Times and Freeman's Journal

⁴⁸ BT, *Eighth Annual Report on changes in Rates of Wages and Hours of Labour 1899-1900*, P.P. 1901 LXXII, pp 116-7; BT, *Report on Standard Time Rates of Wages*, P.P. 1912-13 XCII, p 116

⁴⁹ Pollard and Robertson, *British Shipbuilding Industry*. The ratio was 0.9 and was estimated via tables 3.2, p. 53, B.5a, p245 and B5b, p. 246-7.

⁵⁰ Hearn, *Below Stairs*, pp. 87-8 and 93-4.

⁵¹ BT, *Report on changes in rates of wages and hours of labour*. annual

⁵² BT, *15th abstract of labour statistics in the United Kingdom*, p.76. The series covers the years 1880 to 1910; we extrapolate for 1911. An index of cash earnings for agricultural labourers for 1850-1903 can be found in BT, *Second report by Mr. Wilson Fox on the wages, earnings, and conditions of employment of agricultural labourers*, pp. 120-144. The difference between the two is almost imperceptible so we have used the former.

⁵³ BT, *Annual report on changes in rates of wages and hours of labour*

⁵⁴ BT, *Report on changes in rates of wages and hours of labour*, annual. Much of the data in these reports up to 1906 is contained in BT *Rates of wages and hours of labour for a series of years* (Unpublished), pp. 202-215 and thereafter in the Annual Abstract of Labour Statistics as well as the regular BT *Reports on changes in wages and hours of labour*

⁵⁵ Pollard and Robertson, *British shipbuilding industry*, Tab. 5B, p.246-7

⁵⁶ Bielenberg, *Locke's Distillery*, Tab. 9, p. 58

⁵⁷ BT, *Returns of Wages Published between 1830 -1886*, 1887 P.P. LXXXIX, pp 59 - 114; BT, *Return of the Rates of wages in the principle textile industries*, 1889 P.P LXX, pp. 134 -140; BT, *Changes in wages and hours of Labour*, 1898 LXXXVIII p 114

⁵⁸ *Census of Ireland*, 1881, General Report, Tab.18; *Census of Ireland*, 1891, General Report, Tab.18; *Census of Ireland*, 1901, General Report, Tab.19; *Census of Ireland*, 1911, General Report, Tab.19.

⁵⁹ *BT Returns of Wages Published between 1830 -1886*, P. P. 1887 LXXXIX p 252-261; *BT Report on Changes in Rates of Wages and Hours of Labour*, P.P. 1894 LXXXI p. 126 & 130; *BT Report on Changes in Rates of Wages and Hours of Labour*, P.P. 1896 LXXX, pp. 140 & 144; *BT Report on Changes in Rates of Wages and Hours of Labour*, P. P. 1897 LXXXIII, pp. 88, 94 & 162.

⁶⁰ *BT Returns on Wages Published between 1830 -1886*, 1887 P. P. LXXXIX p 252-261; *BT Report on Changes in Rates of Wages and Hours of Labour*, P. P. 1897 LXXXIII pp. 96 & 176; *BT, Report on Standard Time Rates of Wages*, P.P. 1909 LXXX p. 99; *Report on Changes in Rates of Wages and hours of Labour*, P.P. 1912-13 XCII p. 119

⁶¹ *BT, Returns of Wages Published between 1830 -1886*; *BT, Return of Rates of Wages paid by Local Authorities and Private Companies to Police and Workpeople employed on Roads, Gas and Water Works*, P.P. 1892 LXVIII, pp.65, 92, 93, & 109; *BT, Report of an Enquiry into the earnings and hours of workpeople in the United Kingdom in 1906*.