Migrant Earnings in Britain's Cities in 1851: Testing competing views of urban labour market absorption

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1. Third world debate on urban labour markets

Debate on Third World urbanization reveals the same gloomy pessimism that characterized Britain in the early XIXth century- -underemployment, primitive housing, poor urban services, poverty, and inequality. Indeed, much like XIXth century Britain, many view the Third World as "overurbanized" (Hoselitz, 1955, 1957). According to this view, the cities are too large and too many, and they got that way somehow through perverse migration behaviour. Pushed off the land by technological events in agriculture, by famine, and by Malthusian pressures, rural emigrants flood the cities in far greater numbers than new modern-sector jobs can be created for them. Attracted by an irrational optimism that they will be selected for those scarce high-wage city jobs, the rural emigrants keep coming. Lacking high-wage jobs in the growing modern sectors, the glut of rural immigrants spills over into low-wage service sectors, unemployment and pauperism, while their families crowd into inadequate housing blighting an otherwise dynamic city economy. The cities find it difficult to cope with the immigrant influx, and authorities look for ways to close the cities to new immigrants.

In the late 1960s, Michael Todaro (1969) developed a framework which could account for the apparent irrationality of rural immigrants rushing to the city even in the face of unemployment. The model includes an urban unemployment (or underemployment) variable, and thus focuses on *expected* earnings differentials. The Todaro framework and its extensions (Harris and Todaro, 1970;

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Stiglitz, 1974; Corden and Findlay, 1975; Cole and Sanders, 1985) has enjoyed considerable popularity over the past decade or so.

The hypothesis is simple and elegant. While similar statements can be found sprinkled through the literature, the most effective illustration can be found in Corden and Findlay, reproduced in Figure 1. There are only two sectors analyzed in Figure 1, but they are sufficient to illustrate the point. Under the extreme assumption of wage equalization through migration, and in the absence of wage rigidities, equilibrium is achieved at E (the point of intersection of the two labour demand curves, AA' and MM'). Here wages are equalized at $w^*_A = w^*_M$, the urbanization level is $O_M L^*_M/L$ (the share of the total force, L, employed in urban jobs, $O_M L^*_M$), where M denotes urban manufacturing and A denotes agriculture. Wages are never equalized in the real world, of course, and so the Todaro model incorporates the widely-held belief that the wage rate in Third World manufacturing is pegged at artificially high levels by unions, by minimum wage legislation, and by emulation of inflated public sector rates, say at w_M If, for the moment, we assume unemployment away, then all those who fail to secure the favoured jobs in manufacturing would accept low-wage jobs in agriculture at w^{**}_A. Although the model has yet to accomodate Todaro's emphasis on urban unemployment, this incomplete version at least allows for a wage gap between the two sectors, a gap of which so much has been made in both British economic history (Williamson, 1987) and the Third World (Squire, 1981, p. 102).

Under the assumption made thus far, Figure 1 makes it clear that the level of employment in the urban sector would be choked off by the high wage in manufacturing, but would city immigration also be forestalled? As Todaro initially pointed out, rates of city growth have been dramatic in the Third World and furthermore there has been an expansion in what might be called "traditional" urban services where, it is alleged, low-wage underemployment prevails. Todaro explains this apparent conflict (e.g., immigration in the face of urban unemployment or underemployment at very low wages) by developing an expectations hypothesis which, in its simplest form, states that the favoured jobs are allocated by lottery, that the potential migrant calculates the expected value of that lottery ticket, and compares it with the certain employment in the rural sector. Migration then takes place until the urban expected wage is equated to the rural wage. Given $\bar{w}_M$, and a wage in traditional urban services so low that it can be taken as zero, at what rural wage would the migrant be indifferent between city and countryside? If the probability of getting the favoured job is simply the ratio of L_M to the total urban labor pool, L_U, then the expression

$$w_A = (L_M/L_U)\, w_M$$

indicates the agricultural wage at which the potential migrant is indifferent

about employment locations. This is in fact the qq' curve in Figure 1. The equilibrium agricultural wage is given by w_A, and those underemployed or unemployed in the city (e.g., the size of the traditional service sector plus without any work at all) is thus given by L_{US}. [1]

The new equilibrium at Z in Figure 1 seems to offer an attractive explanation for the stylized facts of Third World labour markets. It yields a wage gap, $\bar{w}_M - w_A$, and urban low-wage employment or unemployment, L_{US}. Moreover, when the dynamic implications of the model are explored, it turns out that an increase in the rate of manufacturing job creation need not cause any diminution in the size of the low-wage traditional service sector. Indeed,

> as long as the urban-rural [wage gap] continues to rise sufficiently fast to offset any sustained increase in the rate of job creation, then... the lure of relatively high permanent incomes will continue to attract a steady stream of rural migrants into the ever more congested urban slums (Todaro, 1969, p. 147).

Furthermore, the model makes some firm assertion about how urban labour markets operate and how immigrants are absorbed into the labour market. First, it asserts that immigrants earn lower incomes than non-immigrants, the latter having first claim to the favoured jobs. Second, it asserts that immigrants earn less in the cities, when they first arrive, than they earned in the rural areas they left. Third, it implies that those immigrants who stay in the city (and don't return discouraged to rural areas) exhibit far steeper age-earning curves than the non-migrants. After all, they enter in the low-wage urban service sector before getting absorbed in the high-wage modern sectors.

II. Absorbing city immigrants in XIXth century Britain

It may seem odd to have begun a paper on British urban labour markets during the First Industrial Revolution by looking first at a popular Third World model, but there are three strong motivations. First, the parallels seem striking. Second, the Third World debate may serve to give a sharper focus to any study of the operation of urban labour markets in an epoch where the evidence is weaker and the issues are less well defined. Third, I have found few efforts to make economy-wide assessments of how British cities absorbed the immigrants during the First Industrial Revolution, and the Todaro model might be a useful way to organize that assessment.

To begin with, it appears that the development literature surveyed in the

[1] The qq' curve is a rectangular hyperbola with unitary elasticity. The elasticity of the labour demand curve MM' is assumed to be less than unity in Figure 1, an assumption motivated by empirical evidence which has accumulated for the Third World.

previous section has had an impact on British historians, Sidney Pollard in particular (Pollard, 1981, pp. 902-903):

> ... numerous studies have shown that people move, not so much for better-paid jobs, but for jobs... Indeed, many migrants did not even come for jobs, but for the expected opportunity of finding jobs... the millions of migrants keep flocking in although... the chance of a job is small. Once the workers settled, the costs of moving again and the ignorance of conditions elsewhere inhibited... further... adjustment...

The testable hypotheses embedded in Pollard's statement are numerous, and many of them reappear in the development literature cited above. First, people moved in response to job vacancies, not simply to better-paid jobs. Thus, city unemployment rates were a critical determinant of migration behaviour. Second, migrants were motivated by the expectation of finding jobs. Since expectation mattered at least as much as actual job availibilities, a significant share of the immigrants must have suffered though periods of low earning before those expectations were fulfilled. Third, migrants kept flocking into the cities although the chances of finding a job were often slim, suggesting that they left behind jobs with greater short-run earning potential. Fourth, once settled, rural-urban migrants found it difficult to move on to other cities where employment opportunities may have appeared much better. Thus, urban-to-urban migrants must have been a small share of total migrants in Britain's cities.

Furthermore, Pollard (1981, p. 902) goes on to stress an aspect of British labour markets which has long a tradition in the literature on regional labour market segmentation:

> Labor markets in the 1840s... were regional; between regions wage levels in given occupations varied randomly, according to industrial demand, the power of trade unions, tradition, and many other factors... Workers from the southern half of Britain, if they wanted to move, did not move to the industrial towns at all, ...but went to London or the colonies. In the north, they tended to go to the nearest town, as Redford showed long ago for England as a whole... They therefore did not choose the best bargain but the town that was accessible...

Thus we can add another hypothesis to our list, that urban labour markets were regional and only weakly linked at best. Rather, wages were set independently by local demand forces. Migration was simply insufficient to force any city to respond to the discipline of national labour markets. The costs of migration and ignorance of employment opportunities tended to create regionally segmented labour markets.

While I have leaned heavily on Pollard's views, he is hardly alone in adopting a language which seems to sound much like the Todaro model. For example, in their massive volume *British Economic Growth 1856-1973,* Matthews, Feinstein and Odling-Smee offer views about the operation of urban labour markets

in XIXth century Britain which stress what Todaro adherents call "the informal urban service sector". That is, urban unemployment and low-wage casual labour play an important part in their view, much like they do in Todaro's Third World model:

> There is fairly abundant qualitative evidence that... there was a chronic surplus of labour... the chronic labour surplus was not of the Keynesian type. It more resembled that found in underdeveloped countries... The classic example of unemployment and underemployment associated with casual working were in the docks and in the building trades... The surplus employment... and the urban surplus continued to be replenished by the immigration of rural surplus labour. (Matthews, et al., 1982, pp. 82-83).

Certainly Mayhew (1861) made much of London's "traditional urban service sector" and low-wage casual labour has played an important part in XIXth century labour histories since. But while Todaro stresses the role of the urban service sector as a holding area for the reserve army of immigrants who have come to the city in the anticipation of getting those high-wage modern sector jobs, Mayhew's London street people seem instead to have been "pushed" into those low-wage jobs (the residuum):

> According to Mayhew [1861, vol. 1, pp. 320-323; vol. 2, p. 5], three groups of people became street traders: those who were bred to the streets; those who took to them for love of the wandering life; and those who were driven there... It was this latter group which provided the recruits for an 'extraordinary increase' in the late 1840s of street traders in London". (Green, 1982, p. 133).

Whether one supports Todaro's "pull" view or Mayhew's "pull" view of city immigration, both predict an additional hypothesis, perhaps the most important: city immigrants must have had lower earnings than non-immigrants. Furthermore, since unsuccessful immigrants were more likely to return to their place of origin with the passage of time while successful immigrants eventually moved up into the higher-paying jobs, city immigrants must have had steeper age-earning profiles than non-immigrants. Thus, these views seem to predict that urban labour markets were selective, favouring non-immigrants, but that as time wore on, and the new immigrants gained more experience, city immigrants who stayed "caught up" with the non-immigrants.

Finally, the literature has made much of the fact that *rural* labour markets were regionally segmented. To quote Pollard again (1978, pp. 103-104):

> It is well known that there was nothing like a single national labour market at the beginning [of the British industrial revolution].
>
> Labour mobility... far from wiping out... economic differentials-as it ought to have done in a proper labour market-tended still further to confirm them.

This view has important implications for the earnings experience of city immigrants by source. The Irish may have gone into low-wage jobs partly because their reservation wage was so low. The English rural immigrants into Britain's cities may have had, in contrast, a higher reservation wage since they could fall

back on poor relief in their rural parish (Boyer, 1986), an option unavailable to the Irish (Mokyr, 1983). The English urban-to-urban migrant, on the other hand, might have had an even higher reservation wage given his greater familiarity with labour conditions elsewhere.

This paper attemps to test these hypotheses using data drawn from the 1851 Census. Section III will discuss how occupation, employment, earning and migrant status can be exploited from that source. Section IV contains some hypothesis-testing. Section V illustrates how this empirical analysis augments our understanding about how urban labour markets worked during the First Industrial Revolution.

III. The 1851 census urban sub-sample

The 1851 *Census of Great Britain* asked a number of question which are very useful for employment and wage experience of migrants which had been pouring into Britain's cities since the end of the French Wars. Besides recording current residence, the census enumerators also asked where the respondent was born, so that individuals can be identified by migrant status. We have classified people according to the following five migrant categories: non-migrants (born in the city of residence), migrants from rural areas in Britain, migrants from other urban areas in Britain, migrants from Ireland, and migrants from other foreign countries. (Unfortunately, the enumerators did *not* ask how long the immigrants had been resident at the current location, so we cannot relate earnings experience to length of time in the city's labour market.) The urban/rural allocation of places follows the appendices to the *Census* where towns and boroughs are listed, lists which have been used by historians interested in urbanization since the census was taken.

In addition to age, sex and family relationship, the enumerators also asked employment questions. The answers make it possible to infer both employment status amd main occupation when working (although those working may not have been employed in their main occupation at the time of the enumeration). As Table 1 indicates, the responses can be classified into one of five categories: not working (retired, sick, unemployed, pauper, resident of workhouse, student, etc.), working, landed proprietor, family member assisting (relative assisting the household head on the farm and elsewhere), and those missing data. For those working, an enormous amount of occupational detail is supplied. This detail can be aggregated into the 29 occupational categories listed in Table 1. The aggregation is essential if this occupational data is to be matched up with what we know about annual earnings.

The critical step in the exercise is converting the occupational detail into crude estimates of current earnings. Occupation is only one variable which influences an individual's earnings. In addition, earnings potential is influenced

by age, sex, experience, intelligence, health, discrimination, occupation of father, schooling, the family resources devoted to the individual during rearing, and luck. The 1851 *Census* does not supply such information, nor does it supply the earnings estimates themseves. Instead, we have reconstructed estimates of earnings based solely on occupation and employment status. Obviously, such data must be treated with care. It will inform us only about very general patterns. It will also limit any inferences we can make about the operation of city labour markets across regions. While the data will inform us about inter-city variance in occupation mix, it will not reveal the extent to which earnings varied across cities *within* occupations.

The long trek from the enumerators' manuscript to our reconstructed machine-readable urban subsample has involved many scholars, but two have been instrumental to this project. Michael Anderson was awarded a Social Science Research Council grant in 1972 to construct a magnetic tape based on a sample drawn from the enumerators' books of the 1851 *Census of Great Britain.* The national sample entailed a stratified two percent systematic cluster sample from the enumerators' books. The sampling procedure is described in detail in Anderson's final report to the SSRC (Anderson, Collins and Scott, 1980). Professor Carolyn Crane then secured a sub-sample of the main tape, requesting those 18 counties which were among the most urban in mid-XIXth century Britain. [2] In addition, Professor Crane coded occupations by the 29 categories listed in Table 1 (actually 30, when "landed proprietors" are included), and then assigned each with an average earnings estimate. [3] While Professor Crane has constructed this data for another purpose, it is ideal for the project reported in this paper, and she was kind enough to supply her tape to me.

The final step was to restrict Crane's sub-sample to urban populations, since our interest here is in employment and wage experience of city immigrants. The urban sub-sample includes 20,893 individuals, and they are broken down by age, sex and migrant status in Table 2. One striking feature of Table 2 ought to be

[2] The counties included in the 1851 sub-sample are: South of England - Middlesex, Hampshire, Hertfordshire, Northamptonshire, Essex, Suffolk, Norfolk, Wiltshire, Dorsetshire, Devonshire; North of England - Lancashire, Northumberland, West Riding, East Riding; and Scotland - Lanarkshire, Perthshire, Forfarshire, Renfrewshire. Among big cities, only Birmingham, Bristol and Edinburgh are excluded from the subsample.

[3] Professor Crane's matching of occupation with earnings is summarized in Table 1, but the sources are the following: Lindert and Williamson (1980, Tables 3 and 4); *British Parliamentary Papers,* 1842, Vol. 6; *British Parliamentary Papers,* 1887, Vol. 89; *British Parliamentary Papers,* 1898, Vol. 83, Part II; and Bowley (1900). A detailed documentation can be found in Crane (1985, Chp. 4), but she relies on fairly standard sources used extensively by historians interested in XIXth century wages and earnings.

Table 1

EMPLOYMENT AND OCCUPATION DATA INCLUDED IN THE 1851 CENSUS ENUMERATION

A. *Employment Status*			
Not Working	Retired, sick, unemployed, pauper, etc.		Included in analysis
Working	Principal occupation *or* other work		
Landed proprietor			Excluded from analysis
Family Member Assisting			
Missing data			
B. *Occupation*			
1.	Farm Labourers	Agricultural labourers, shepherds, woodmen, gardeners, nurserymen, grooms, horsekeepers, fishermen	29.04 £
2.	General Non-agricultural Labourers	Coal heavers, chimney sweeps, brickmakers, road labourers, railway labourers, labourers	44.83
3.	Messengers and Porters	Warehousing, storage, conveyance on roads, but excludes government employed	88.88
4.	Government Low-wage	Watchmen, guards, porters, messengers, Post Office letter carriers, janitors and other low-wage government employed	66.45
5.	Police and Guards	Includes both public and private sector	53.62
6.	Miners	Miners, quarriers and marble masons	55.44
7.	Government High-wage	Clerks, Post Office sorters, warehousemen, tax collectors, tax surveyors, solicitors, architects and other high-wage government employed	234.87
8.	Skilled in Ship-building	Shipwrights, ship builders, boat and barge builders	64.12
9.	Skilled in Engineering	Engineers, fitters, turners, iron moulders, those involved in watch making, machine making	84.05
10.	Skilled in Building Trades	Bricklayers, masons, carpenters, plasterers	66.35
11.	Skilled in Textiles	Weavers, spinners, those engaged in wool, silk, flax, cotton, hemp, paper, straw, feathers, quills	58.64

A. *Employment Status*		
Not Working	Retired, sick, unemployed, pauper, etc.	Included in analysis
Working	Principal occupation or other work	
Landed proprietor		
Family Member Assisting		Excluded from analysis
Missing data		
B. *Occupation*		
12. Skilled in Printing Trades	Compositors, engravers	74.72
13. Clergy	Clergymen and ministers	267.09
14. Solicitors	Solicters, barristers, lawyers, judges, law court officers	1837.50
15. Clerks	Clerks, accountants, auctioneers	235.81
16. Doctors	Surgeons, doctors, chemists, veterinarians	200.92
17. Teachers	School masters in elementary school, authors, professors, teachers, persons of science	81.11
18. Engineers	Engineers, surveyors, architects, pattern designers, draughtsmen	479.00
19. Military	Professional military officers	150.66
20. Domestic Servants	Servants, nurses, housekeepers	21.99
21. Unskilled Textiles	Piecers, warpers, reelers, factory workers	29.32
22. Skilled Craftsmen	Blacksmiths, basket makers, coach makers, journeymen	69.58
23. Apprentices	Apprentices	34.79
24. Helpers	Helpers, assistants, boys, errand boys	14.66
25. Merchants	Salesmen, brokers, dealers, merchants	57.21
26. Propietors	Bakers, grocers, butchers, shopkeepers, tailors, brewers, innkeepers, victuallers, barbers	36.94
27. Factory Managers	Overlookers, managers, superintendents	234.87
28. Miscellaneous	Artists, poets	21.99
29. Missing data	Excluded from analysis	

Source: See text.

Table 2

NUMBER OF URBAN WORKERS IN THE 1851 SUBSAMPLE ANALYSIS

	Non-Migrants			Migrants			Total		
Age	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-9	1,155	1,126	2,281	1,331	1,270	2,601	2,486	2,396	4,882
10-14	360	395	755	641	654	1,295	1,001	1,049	2,050
15-19	300	347	647	576	724	1,300	876	1,071	1,947
20-29	448	561	1,009	1,381	1,683	3,064	1,829	2,244	4,073
30-39	267	288	555	1,181	1,297	2,478	1,448	1,585	3,033
40-49	189	223	412	835	918	1,753	1,024	1,141	2,165
50-59	131	156	287	523	606	1,129	654	762	1,416
60 +	112	158	270	444	607	1,051	556	765	1,321
Missing	0	1	1	4	1	5	4	2	6
Total	2,962	3,255	6,217	6,916	7,760	14,676	9,878	11,015	20,893

Notes: These totals exclude all those with the following employment status reported by the census enumerators: "landed proprietors", "family members assisting" and "missing data". These individuals accounted for only 250 of the total urban subsample, 21,143, or 1.2 percent. The figure would have been far higher, of course, if the sub-sample included those employed in rural areas where "landed proprietors" and "family members assisting" were much more common. All ambiguities on place of birth were resolved, so no individuals were excluded on this score.

stressed immediately: migrants reflect a young-adult selectivity bias (see also Williamson, 1985a, 1988). That is, the share of the migrants aged 15-49 was 58.2 percent while only 42.2 percent for non-migrants. Obviously, any attempt to assess differences in earnings experience between migrants and non-migrants must control for age given the size of the young-adult selectivity bias.

IV. Testing competing views of urban labour market absorption

Pollard (1981, p. 903) has suggested that

> Once the workers settled the cost of moving again and the ignorance of condition elsewhere inhibited... further adjustment...

Since the 1851 *Census* only reported place of birth, we have no way of learning the extent to which migrants were multiple-movers, so Pollard's thesis cannot be tested. Yet, the implications of Pollard's thesis are that lack of further mobility having once moved into a given city tended to weaken links between city labour markets. It suggests that city immigration was limited to pairwise migration from specific rural to specific urban locations with little inter-urban migration. The evidence presented in Table 3 suggests a rejection of that inference since almost a quarter of the migrants in Britain's cities were in fact immigrants from other cities. While the Irish were an additional tenth of all city immigrants in 1851, the vast majority were, nonetheless, immigrants from rural Britain (62.2 percent). Indeed, according to our 1851 urban subsample almost half of Britain's city population was born in rural Britain (48 pecent). The figure varies significantly across regions, of course, as the Irish seem to have crowded out potential rural emigrants in Scotland and the North of England, while not in the South of England.

Table 3

ADULTS (15+) IN THE URBAN SUB-SAMPLE BY REGION AND MIGRANT STATUS

Migrant Status	Current Location			
	South	North	Scotland	Total
Urban Migrant	1,518	732	193	2,443
Rural Migrant	5,038	1,257	405	6,700
Irish	144	582	371	1,097
Other Foreign	318	157	60	535
All Migrant	7,018	2,728	1,029	10,775
Non-migrants	1,761	834	585	3,180
Total	8,779	3,562	1,614	13,955

The Todaro model and Pollard both predict that the earnings of young, new immigrants were likely to have been less than they could have received at home. While the 1851 *Census* enumerators did not identify when an immigrant arrived in the current location, the data they collected certainly do not seem to support the view that young, rural emigrants earned less in the city than they might have made in the parishes from whence they came. Fully employed farm labourers in England earned about £ 29 in 1851 (Lindert and Williamson, 1983, Table 2, p. 4, assuming an implausibily high employment rate of 52 weeks per year), while rural migrants in their twenties earned almost £ 70 in the cities even after adjusting for the incidence of unemployment (Table 4: aged 20-29, rural male migrants). While young Irish males earned somewhat less (Table 4: aged 20-29, Irish males) than migrants from rural Britain, they certainly earned far more than they could have in Ireland (about £ 13 in 1836: Mokyr, 1983, Table 2.6, p. 26). While these comparisons fail to adjust for higher living costs and the greater disamenities of the cities, it seems to me unlikely that such urban-rural nominal earning differentials could be fully explained by such factors.

Table 4

1851 EARNINGS ESTIMATES: ADULTS FROM THE URBAN SUB-SAMPLE (£s)

Age	Non-Migrants	Migrants, from				
		Rural	Urban	Irish	Other Foreign	Total
Males						
15-19	53.49	55.46	47.19	43.04	23.04	50.15
20-29	68.22	69.89	74.52	53.90	62.09	68.58
30-39	73.06	70.46	69.43	58.76	72.47	69.07
40-49	80.74	68.43	75.79	51.76	100.51	70.88
50-59	62.91	77.91	69.24	73.59	69.84	75.26
60 +	81.15	50.04	94.95	29.23	203.15	63.81
Average	68.22	67.09	70.19	53.17	82.23	67.22
Females						
15-19	29.46	25.62	28.00	34.59	20.67	27.02
20-29	29.62	24.20	27.90	27.63	22.85	25.39
30-39	25.91	16.69	18.88	15.38	19.11	17.19
40-49	19.77	13.83	19.55	12.22	16.60	15.06
50-59	18.51	15.90	14.97	14.20	14.85	15.56
60 +	20.41	16.35	30.58	13.43	7.67	18.44
Average	25.86	19.24	23.64	21.10	19.06	20.40

Table 5

1851 ESTIMATES OF PERCENT NOT WORKING: ADULTS FROM THE URBAN SUB-SAMPLE (IN PERCENT)

Age	Non-Migrants	Migrants, from				
		Rural	Urban	Irish	Other Foreign	Total
Males						
15-19	11.0	15.1	22.0	6.5	60.9	17.7
20-29	2.5	2.7	1.6	1.2	7.1	2.5
30-39	1.5	1.6	1.5	6.9	5.7	2.5
40-49	3.2	3.8	3.0	2.7	5.5	3.6
50-59	2.3	4.8	5.6	1.9	10.7	5.0
60 +	16.1	19.4	21.9	51.2	22.2	23.0
Average	5.2	5.9	6.3	7.6	12.1	6.6
Females						
15-19	32.0	33.9	40.8	20.3	54.5	34.7
20-29	38.3	46.9	46.1	34.5	55.1	45.8
30-39	44.1	67.2	64.6	68.3	68.6	66.8
40-49	55.6	69.2	63.9	74.7	64.5	68.4
50-59	54.5	62.1	66.9	62.5	69.2	63.2
60 +	55.7	61.9	64.2	75.0	77.8	63.8
Average	43.3	56.7	55.7	52.2	62.9	56.3

These comparisons already include the impact of unemployment in the cities, but since the Todaro model stresses unemployment experience we ought to isolate that variable by itself. Table 5 reports the percent of adults not working, and there is no evidence to support the view that young presumably "new", male immigrants to the cities had higher unemployment rates [4] than non-mi-

[4] We use the terms "unemployment" and "not working" interchangeably, although the latter is cleary more accurate. To repeat, those not working include unemployed, sick, retired, paupers, wives at home, students and so on. It is not clear just how long one had to be without work to get the unemployed label, but it appears to refer to employment status at the time of enumeration only. In any case, those unemployed would be without *any* kind of work, not simply without work in their principal occupation.

The average male unemployment rate reported in Table 5 is 6.6 percent, not too far above the rate recorded for membership in engineering, metal and shipbuilding unions, 3.9 percent (Mitchell and Deane, 1962, p. 64). It is apparent, however, that 1851 was a better year than the 1840s as a whole (4.4 percent: Lindert and Williamson, 1983, p.15) or the 1850s as a whole (5.1 percent: Mitchell and Deane, 1962, p. 64). The fact that

grants of the same age. Indeed, Irish males in their twenties had *lower* unemployment rates than non-migrants, although migrants as a whole had the same as non-migrants. In contrast, female migrants *did* have higher unemployment rates than non-migrants, a result attributable, I assume, to their higher fertility rates.

In short, the evidence in Table 4 and 5 does not support the hypothesis that young male migrants had lower learning and higher unemployment rates than young male non-migrants. Nor does it support view that "new" city immigrants earned incomes less then they could have received in their source of emigration. The evidence at first glance does not seem to be consistent with the Todaro model or with Pollard's view of the operation of urban labour markets. It seems more consistent with the view that migrant absorption rates were very fast and that migrants responded to *actual* wages and *current* job opportunities, rather than to expectations of future employment in high-wage jobs.

We can, of course, sqeeeze far more information out of these data if we exploit regression analysis. But before we can, some concessions must be made to data limitations. Our earnings estimates are unlikely to tell us very much about the true earnings received by any of the 13, 955 adults in our urban sub-sample. They are simply too crude to be used for that purpose. As a result, we will aggregate the individual data to groups whose average earning are more likely to approximate their true earnings. We shall use 90 group observation in what follows (e.g., 3 regions x 5 migrant classes x 6 age groups), and the regression will weight each observation by the number in each group. The analysis is restricted to males only. [5]

The first set of regressions are reported in Table 6. Three questions are explored in those tables. First, did earning vary across regions? The regional dummy variables NORTH (dominated by Manchester and Liverpool) and SCOTLAND (dominated by Glasgow) make it possible to see if either of them differed significantly from the South of England (dominated by London). Second, did migrants as a group earn less than non-migrants? The dummy variable MIGR makes it possible to see if migrants really did earn less than non-migrants after controlling for other influences. Third, did migrants as a group trace out different age-earning paths than non-migrants? To get an answer here, we introduce interaction terms between the migrant status dummies (MIGR and NONMIG) and age (where the age class 15-19 is taken as the norm). The purpose of

urban unemployment rates were relatively low in 1851 may help explain why the variance in unemployment accounts for such a small share (only 28 percent) of total earnings variance among males in our sample. Nevertheless, it was variance in male occupations which drove variance in total male earnings in 1851, not variance in unemployment experience.

[5] While the analysis reported here is restricted to males, results for females can be found in a working paper (WILLIAMSON, 1985c) available upon request.

Table 6

DETERMINANTS OF EARNINGS (Y) IN 1851, BRITISH CITIES: ADULT MALE IMMIGRANTS VS. NON-IMMIGRANTS

Variable i	ß	t-statistic
Constant	51.972	6.001 **
MIGR	− 2.574	0.247
NORTH	− 0.875	0.204
SCOTLAND	9.013	1.524
NONMIGAGE20	14.855	1.360
NONMIGXAGE30	20.088	1.630
NONMIGXAGE40	27.217	2.001 *
NONMIGXAGE50	9.702	0.632
NONMIGXAGE60	28.531	1.757 *
MIGRXAGE20	18.452	2.540 **
MIGRXAGE30	19.036	2.557 **
MIGRXAGE40	20.889	2.632 **
MIGRXAGE50	25.334	2.862 **
MIGRXAGE60	13.658	1.475
$\bar{Y}$ (£s)	67.443	
STANDARD ERROR	17.383	
$\bar{R}^2$	0.062	
F(13,76)	1.454	
N.	90	

Notes: See "notes" to Table 7.

this exercise is to shed further light on migrant absorption experience. If the Todaro model is correct, "new" immigrants should have lower earnings than non-immigrants, but the immigrants should "catch up" with the non-migrants the longer they stay in the city. If the Todaro hypothesis holds true, the age-earning paths for migrants should be steeper than for non-migrants. [6]

The results suggest (i) that migrants did *not* earn less than non-migrants, (ii) that earnings did *not* vary significantly across regions, and (iii) that age-earnings paths look pretty much alike for migrants and non-migrants. The statement that age-earning paths "look pretty much alike" is likely to be a bit too vague for most readers - we shall be more precise below, but the predicted paths are plotted in

[6] This inference should be strengthened by the presence of a selectivity bias. Discouraged migrants may have returned home as years wore on, leaving successful migrants behind.

Figure 2 where the similarity between migrants and non-migrants is clearer, especially from their teenage years through their thirties.

A second set of regressions are reported in Table 7 where we now distinguish between all four city migrant types- -urban migrants (URBMIG), rural migrants (RURMIG), the Irish (IRISH) and other foreigners (OTHERFOR). Most of the findings in Table 6 are repeated in Table 7. While the coefficients on IRISH and OTHERFOR are large and negative, and while the coefficient on RURMIG is positive, the t-statistics are small enough to warrant the tentative conclusion that none of the migrant groups had different earnings than non-migrants in 1851, after controlling for age and location. However, regions now begin to matter since the coefficient on the SCOTLAND dummy is significantly positive. After controlling for other factors, earnings were higher in Scotland than in the South of England, but they were no different in the North of England. I should repeat, however, that while the evidence rejects the view that earnings differed between the North and South of England, it is based on earnings constructed from occupation. North-South wage gaps may still have appeared *within* occupations.

The problem with the regression reported in Table 7, however, is that it does not allow for a really robust test of many of the hypotheses listed in Section II. To test those hypotheses properly, we should allow migrant status to influence earnings *by region* as well as allow age-earnings paths by migrant status to vary *by region*. Unfortunately, the addition of the necessary interaction terms would quickly exhaust our degrees of freedom (recall N = 90). Instead, an Appendix table offers extensive hypothesis testing where we exploit various maintained hypotheses. The Table reports the constraint tested (the null hypothesis) in terms of variables already defined, the maintained hypothesis (the form of the regression and restrictions on variable coefficients), the relevant *t* and F tests, and our conclusion.

Ten hypotheses are tested in the Appendix Table. An overall summary is offered in Table 8, where the hypotheses are posed as questions. It appears that migrants as a group did *not* have different earnings than non-migrants, nor did they have different age-earnings paths. Furthermore, native-born migrants (the dominant migrant group) did *not* have different earnings than non-migrants, nor did they have different earnings paths. This seems to be the critical finding: city immigrants from rural and urban Britain exhibited the same earnings experience as non-immigrants in 1851. Whatever were the labour market adjustments which the native-born migrant had to make, they were not reflected in unemployment or occupation experience. While they were predominantly unskilled, the native-born migrants did not suffer any disadvantage relative to the non-migrants born in the city. City absorption of the native-born migrant must have been very fast indeed.

Table 7

DETERMINANTS OF EARNINGS (Y) IN 1851, BRITISH CITIES: ADULT MALE IMMIGRANTS VS. NON-IMMIGRANTS

Variable j	β_j	t-statistic
Constant	50.390	7.720 **
URBMIG	− 5.119	0.479
RURMIG	3.720	0.417
IRISH	− 12.295	0.870
OTHERFOR	− 29.374	1.234
NORTH	1.736	0.516
SCOTLAND	13.207	2.849 **
NONMIGXAGE20	14.980	1.825 *
NONMIGXAGE30	20.356	2.199 *
NONMIGXAGE40	27.343	2.676 **
NONMIGXAGE50	10.225	0.887
NONMIGXAGE60	29.272	2.399 *
URBMIGXAGE20	27.621	2.608 **
URBMIGXAGE30	22.827	2.099 *
URBMIGXAGE40	29.290	2.535 **
URBMIGXAGE50	22.276	1.634
URBMIGXAGE60	47.626	2.937 **
RURMIGXAGE20	14.416	1.969 *
RURMIGXAGE30	15.175	2.022 *
RURMIGXAGE40	13.067	1.649
RURMIGXAGE50	22.801	2.634 **
RURMIGXAGE60	− 4.858	0.551
IRISHXAGE20	10.735	0.705
IRISHXAGE30	15.545	0.984
IRISHXAGE40	8.549	0.476
IRISHXAGE50	30.933	1.566
IRISHXAGE60	− 16.652	0.794
OTHERFORXAGE20	39.444	1.526
OTHERFORXAGE30	49.056	1.902 *
OTHERFORXAGE40	77.770	2.847 **
OTHERFORXAGE50	47.572	1.537
OTHERFORXAGE60	180.216	5.774 **
$\bar{Y}$ (£s)	67.433	
STANDARD ERROR	13.057	
R^2	0.471	
F(31,58)	3.555	
N	90	

Notes: The regression is based on 90 weighted observations. The observations are based on mean earnings in 90 = 3 regions X 6 age classes X 5 migrant statuses where

Regions	*Ages*		*City Migrant Status*
North of England (NORTH)	15-19	(AGE 15)	Non-migrant (NONMIG)
South of England (SOUTH)	20-29	(AGE 20)	Urban immigrant (URBMIG)
Scotland (SCOTLAND)	30-39	(AGE 30)	Rural immigrant (RURMIG)
	40-49	(AGE 40)	Irish immigrant (IRISH)
	50-59	(AGE 50)	Other foreign immigrant (OTHERFOR)
	60 +	(AGE 60)	

cell "norm" in the regressions is teenagers (aged 15-19), located in the South of England, who were born in the city of location (non-migrants).

The dependent variable is constructed by: those not working get an earnings figure of zero, and those working get an earnings figure based on occupation (see Table 1). There are 13955 individuals underlying the 90 group means (see Table 3). "Landed proprietors", "family members assisting" and those missing occupation data are all excluded. On the t-statistics, a "*" denotes 5 percent and a "**" denotes 1 percent.

However, foreign immigrants (dominated by the Irish) *did* enter urban labour markets at an earnings disadvantage. They *did* have lower earnings than non-migrants and native-born migrants. However, among the Irish lower earnings were *not* due to higher unemployment, since unemployment rates were lower among young Irish males (aged 15-29. Table 5). Rather, they were due to their presence in more unskilled occupations. Foreign immigrants also had different age-earnings paths. Yet, while the Todaro model predicts that the disadvantaged Irish should have "caught up" as they were absorbed into city labour markets over time, it turns onto that in fact the Irish age-earnings paths were flatter, not steeper. This can be seen most clearly from predictions generated by the regression in Table 7. For urban males in the South of England:

Age	Earnings		
	Irish	Non-Migrants	Difference
15-19	38.10 £	50.39 £	− 12.29 £
20-29	48.83	65.37	− 16.54
30-39	53.65	70.75	− 17.10
40-49	46.65	77.73	− 31.08
50 +	45.24	70.14	− 24.90

Finally, while earnings did vary across urban regions in Britain, the absorption experience of the migrants seems to have been the same everywhere.

V. Implications and Qualifications

While unemployment, poverty and inequality blighted Britain's cities in the mid-XIXth century, the same was true of the countryside. As a result, there is nothing inconsistent between the well-known finding of poverty in Britain's cities during the First Industrial Revolution and a relatively efficient city labour market which absorbed the migrants quickly into the labour force.

The evidence presented here seems to support the view that Britain's cities absorbed the flood of migrants with apparent ease. With the exception of the Irish, male immigrants into Britain's cities did not exhibit lower earnings than non-immigrants. Nor did they exhibit higher unemployment rates. They also exhibited the same age-earnings experience. The evidence seems, therefore, to be inconsistent with the view that migrants entered the city in response to expected future high earnings, suffering unemployment or underemployment in the traditional low-wage service sectors while they waited for the better jobs.

Table 8

ABSORBING MALE IMMIGRANTS IN BRITAIN'S CITIES: SUMMARY OF HYPOTHESIS TESTING

Question	Answer
1. Did migrants have different earnings than non-migrants?	No
2. Did migrants have different age-earnings paths than non-migrants?	No
3. Did native-born migrants have different earnings than non-migrants?	No
4. Did native-born migrants have different age-earnings paths than non-migrants?	No
5. Did migrants have different earnings by source of origin?	Yes
6. Did migrants have different age-earnings paths by source of origin?	Yes
7. Did Irish and other foreigners have different earnings than native-born migrants?	Yes
8. Did Irish and other foreigners have different age-earnings paths than native-born migrants?	Yes
9. Did earnings vary by region?	Yes
10. Did age-earnings paths vary by region?	No

Note: Results taken from Appendix Table.

Rather, they appear to have been motivated by *current* job prospects, and those prospects appear to have been confirmed. This is not to say that migrants were never unemployed or that they could not be found in the low-wage service sectors in large numbers. Rather, they simply had the same experience as non-migrants.

These findings are, of course, conditional on the quality of the evidence. The 1851 *Census* certainly has its limitations. The enumerators never asked how long a migrant had been resident in the city, so we cannot properly explore their earnings experience after immigration. The best we can do is to use age as a proxy for length of time in the city. Since the vast majority of immigrants into Britain's cities were young adults, [7] the assumption is likely to be innocuous.

[7] Elsewhere I have estimated that 62.8 percent of all male migrants who entered Britain's cities in the 1850s were aged 15-29, while almost all of the adult male migrants were in that age group. See Williamson, 1988, Table 3.

Figure 1
THE TODARO-CORDEN-FINDLAY MODEL

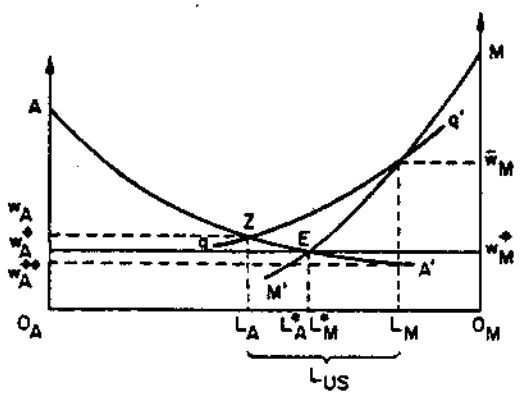
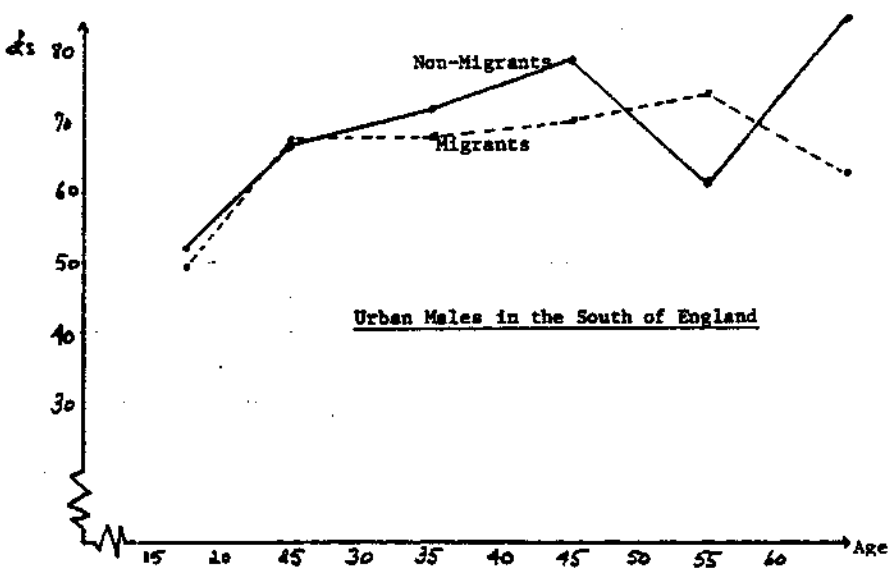


Figure 2
PREDICTED EARNINGS OF URBAN MALES FROM THE 1851 CENSUS: MIGRANTS AND NON-MIGRANTS



(Source: derived from Table 6)

More seriously, while the enumerators recorded occupation and employment status, they did not report income or earnings. As a result, we have found it necessary to reconstruct their earnings based on (i) independent evidence on the average earnings associated with their reported occupations, and (ii) their reported employment status. Earnings did vary by occupation, of course, but did migrants in the same occupation get less than non-migrants? If so, there may be a bias lurking in the results reported here.

My guess is that flaws in the data cannot possibility account for the main findings. I am encouraged towards that view since similar findings have emerged from a decade of research on city labour markets in the Third World (Mazumdar, 1976; Yap, 1977; Merrick, 1978; Mohan, 1980, Kelley and Williamson, 1984). The maintained hypothesis emerging from this paper therefore seems to be: Britain's cities absorbed migrants quickly, current not expected future employment prospects dominated migrant decisions, and "overurbanization" driven by a flood of irrational migrants was never an attribute of mid-XIXth century Britain.

REFERENCES

M. Anderson, B. Collins and J.C. Stott, *Preparation and analysis of a machine-readable national sample from the enumerators books of the 1851 Census of Great Britain* (Edinburgh: Univeristy of Edinburgh, 1980).

A.L. Bowley, *Wages in the U.K. in the Nineteenth Century* (Cambridge: Cambridge University Press, 1900).

G.R. Boyer, "The Old Poor Law, and the Agricultural Labor Market in Southern England: An Empirical Analysis," *Journal of Economic History*, 46, (March 1986), pp. 113-135.

W.E. Cole and R.D. Sanders, "Internal Migration and Urbanization in the Third World", *American Economic Review*, 75, 3 (June 1985), pp. 481-494.

W. Corden and R. Findlay, "Urban Unemployment, Intersectoral Capital Mobility and Development Policy", *Economica*, 42 (February 1975), pp. 59-78.

C. Crane, "The Role of Children in the Industrial Revolution", Ph.D. thesis, Northwestern University (September 1985).

D.R. Green, "Street Trading in London: A Case Study of Casual Labour 1830-60", in J. Johnson and C. Pooley (eds.), *The structure of nineteenth century cities* (London: Croom Helm, 1982).

J.R. Harris and M. Todaro, "Migration, Unemployment, and Development: A Two-Sector Analysis", *American Economic Review*, 60, 1 (March 1970), pp. 126-142.

B.F. Hoselitz, "Generative and Parasitic Cities", *Economic Development and Cultural Change*, 3(April 1955), pp. 278-294.

B.F. Hoselitz, "Urbanization and Economic Growth in Asia", *Economic Development and Cultural Change*, 5 (October 1957), pp. 42-54.

House of Commons, *Parliamentary Papers*, 1846, vol. 6.

House of Commons, "Report on the 1851 Census of Great Britain", *Parliamentary Papers*, 1852-53, vol. 85.

House of Commons, *Parliamentary Papers*, 1887, vol. 89.

House of Commons, *Parliamentary Papers*, 1898, vol. 83.

A.C. Kelley and J.G. Williamson, *What Drives Third World City Growth? A Dynamic General Equilibrium Approach* (Princeton, N.J.: Princeton University Press, 1984).

P.H. Lindert and J.G. Williamson, "English Workers' Living Standards During the Industrial Revolution: A New Look", *Economic History Review*, 2nd series, 36, 1 (February 1983), pp. 1-25.

R.C.O. Matthews, C.H. Feinstein, and J.C. Odling-Smee, *British Economic Growth* 1856-1973 (Stanford, Cal.: Stanford University Press, 1982).

H. Mayhew, *London Labour and the London Poor*, Volumes 1 and 2 (London: Griffin Bohn, 1861).

D. Mazumdar, "The Urban Informal Sector", *World Development* 4,8 (1976), pp. 655-679.

T.W. Merrick, "Employment and Earnings in the Informal Sector in Brazil", *The Journal of Developing Areas*, 10, 3 (1978), pp. 337-354.

B.R. Mitchell and P. Deane, *Abstract of British Historical Statistics* (Cambridge: Cambridge University Press, 1962).

R. Mohan, "The People of Bogata: Who They Are, What They Earn, Where They Live" *Bank Staff Working Paper* No. 390. Washington, D.C.: The World Bank, 1980.

J. Mokyr, *Why Ireland Starved: A Quantitative and Analytical History of the Irish Economy,* 1800-1850 (London: Allen and Unwin, 1983).

S. Pollard, "Sheffield and Sweet Auburn - Amenities and Living Standards in the British Industrial Revolution: A Comment," *Journal of Economic History,* 41, 4 (December 1981), pp. 902-904.

L. Squire, *Employment Policy in Developing Countries* (Oxford: Oxford University Press, 1981).

J. Stiglitz, "Wage Determination and Unemployment in LDCs", *Quarterly Journal of Economics,* 88, 2 (May 1974), pp. 194-227.

M.P. Todaro, "A Model of Labor Migration and Urban Unemployment in Less Developed Countries", *American Economic Review,* 59, 1 (March 1969), pp. 138-148.

J.G. Williamson, "The Urban Transition During the First Industrial Revolution: England, 1776-1871", *HIER Discussion Paper* No. 1146, Harvard University (April 1985a).

J.G. Williamson, "Migrant Earnings in Britain's Cities in 1851: Testing Competing Views of Urban Labor Market Absorption", *HIER Discussion Paper* No. 1176, Harvard University (August 1985c).

J.G. Williamson, "Did English Factor Markets Fail During the Industrial Revolution?", *Oxford Economic Papers* 39 (1987), pp. 641-678.

J.G. Williamson, "Migrant selectivity, Urbanization, and Industrial Revolution," *Population and Development Review,* a (1988), pp. 287-314.

L. Yap, "The Attraction of Cities: A Review of the Migration Literature", *Journal of Development Studies,* 4 (1977), pp. 239-264.

Appendix Table

HYPOTHESIS TESTING: CITY ADULT MALES IN 1851 BRITAIN

Conclusions	Constraint tested (Null Hypothesis	Maintained Hypothesis	Statistic	Significance level
1. Earnings of migrants as a group are not significantly different than non-migrants	Coefficient on MIGR equals zero	Earnings constrained to be the same for all migrants, and age-earnings paths constrained to be the same for everyone.	t (81) = − 0.526	* Constraint cannot be rejected
2. The age-earnings path for migrants as a group is not significantly different from that of non-migrants	Coefficients on interaction terms of the form MIGXAGE all equal zero	(a) Earnings the same for all migrants	F(5,76) = 0.523	*
		(b) Earnings allowed to differ across migrants by source of origin	F(5,73) = 0.594	* Constraint cannot be rejected
3. Earnings of native-born migrants as a group are not significantly different than non-migrants	Coefficients on URBMIG and RURMIG equal zero	(a) Earnings of Irish and other foreign allowed to differ, but age-earnings paths are the same		
		(i) No regional differences in earnings allowed	F(2,80) = 0.378	*
		(ii) Regional differences in earnings allowed	F(2,78) = 0.362	*

		(b) Age-earnings paths of Irish and other foreign also allowed to differ		
		(i) No regional differences in earnings allowed	$F(2,70) = 0.489$	*
		(ii) Regional differences in earnings allowed, but same age-earnings paths by region	$F(2,68) = 0.325$	*
		(iii) Regional variations in age-earnings paths allowed as well	$F(2,58) = 0.393$	* Constraint cannot be rejected
4. Age-earnings paths of native-born migrants as a group are not significantly differet from that of non-migrants	Coefficients on all interaction terms of the form URBMIGXAGE and RURMIGXAGE equal zero	Age-earning paths allowed to differ for Irish and other foreign. Urban migrants and rural migrants assumed to differ by the shift terms URBMIG and RURMIG		
		(a) No regional difference in earnings allowed	$F(10,60) = 1.526$	*
		(b) Regional differences in earnings allowed, but same age-earnings paths by region	$F(10,58) = 1.679$	*

Appendix Table

HYPOTHESIS TESTING: CITY ADULT MALES IN 1851 BRITAIN

Conclusions	Constraint tested (Null Hypothesis	Maintained Hypothesis	Statistic	Significance level
		(c) Regional variation in age-earnings paths are allowed	F(10,48) = 1.874	10% Constraint cannot be rejected
5. Migrants have different earnings according to source of origin	Coefficients on URBMIG, RURMIG, IRISH, OTHERFOR, and MIGR are equal	Regional differences in earnings allowed. (a) Migrants constrained to have the same age-earnings paths as non-migrants	F(3,68) = 3.781	2.5%
		(b) Migrants allowed to have different age-earnings paths than non-migrants	F(3,73) = 3.708	2.5% Constraint rejected
6. Migrants have different age-earnings paths according to source of origin	Coefficients on URBMIGXAGE, RURMIGXAGE, IRISHXAGE, and OTHERFORXAGE are equal	Regional differences in earnings allowed. The various categories of migrants are allowed to have different earnings. The age-earnings path for non-migrants differs from that of all migrant types.	F(15,58) = 3.926	5% Constraint rejected
7. Irish and other	Coefficients on IRISH	All native-born con-		

foreigners have different earnings than native-born migrants	and OTHERFOR are zero	strained to have the same earnings. Everyone has the same age-earnings path, except for Irish and other foreigners who are allowed to have different age-earnings paths		
		(a) No regional differences in earnings allowed	F(2,82) = 4.287	2.5%
		(b) Regional differenecs in earnings allowed	F(2,80) = 5.661	2.5% Constraint rejected
8. Irish and other foreigners have different age-earnings paths than native-born migrants	Coefficients on interaction terms of the form IRISHWAGE and OTHERFORXAGE equal zero	All native-born constrained to have the same earnings behaviour.		
		(a) No regional differences in earnings allowed	F(10,70%) = 4.356	0.5%
		(b) Regional differences in earnings allowed	F(10.68) = 4.261	0.5% Constraint rejected
9. Earnings vary across regions	Coefficient on NORTH and SCOTLAND equal zero	(a) Only Irish and other foreigners allowed to have different earnings	F(2,80) = 2.775	10%
		(b) All migrants allowed to have different earnings by source of migrant	F(2,78) = 2.539	10%

Appendix Table

HYPOTHESIS TESTING: CITY ADULT MALES IN 1851 BRITAIN

Conclusions	Constraint tested (Null Hypothesis	Maintained Hypothesis	Statistic	Significance level
		(c) In addition, Irish and other foreigners allowed to have different age-earnings paths, but		
		(i) All native-born are alike	F(2,70) = 4.06	2.5%
		(ii) Native-born migrants are allowed to differ from non-migrants	F(2,68) = 3.745	5.0%
		(iii) In addition, native-born urban and rural migrants are allowed to have different age-earnings paths	F(2,58) = 4.097	2.5% Constraint rejected
10. Age-earnings paths do not vary significantly across regions	Coefficients on interaction terms of the form NORTHXAGE and SCOTLANDXAGE equal zero	Same as 9(c) above		
		(i) ibid	F(10,60) = 1.019	*
		(ii) ibid	F(10,58) = 1.012	*
		(iii) ibid	F(10,48) = 1.279	* Constraint cannot be rejected

Note: A "*" denotes that test does not pass a 10% level of significance.