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**Careers for the unskilled in the Great Eastern Railway
Company, 1870-1913**

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Careers for the unskilled in the Great Eastern Railway Company, 1870-1913

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One of the most significant changes in the labour market in the twentieth century was the rise of the internal labour market. Its origins can be found in the nineteenth century, particularly in the large service companies such as banks and the railway companies. By studying the internal labour dynamics of the Great Eastern Railway Company (hereafter GER) in the period before the First World War it is hoped that insight can be gained into the workings of an early internal labour market and the implications that had for individual workers within the company. For example, is there evidence of a structured labour market within the company? Were there promotion ‘fast tracks’? How was ‘bad behaviour’ punished? What was the relationship between job levels and wage compensation?

The most influential study on the labour dynamics of the nineteenth century railway companies is that of Kingsford, who considers the period 1830-70.¹ In the chapter most relevant for this study, he examined the evidence on promotions (and demotions) in a range of British railway companies in the period 1830-70 and concluded that there were clearly defined career paths, particularly for traffic staff.² Savage, in his study of the careers of workers on the Great Western Railway (GWR) in the period 1833-1914, takes issue with this conclusion.³ He convincingly argues that before the 1860s careers paths were not systematic but that they became so in the period between the 1860s and 1890s.⁴ In a previous study of the GER, Howlett

¹ Kingsford, *Victorian railwaymen*.

² Kingsford, *Victorian railwaymen*, pp.129-47.

³ Savage, ‘Discipline’.

⁴ There is a similar lack of consensus regarding North American railways. Gratton (‘Age criteria’, pp.634-5), for example, has argued that seniority based wage payment systems and clearly demarcated occupational ladders were already prevalent in American railway companies by the mid-nineteenth century whereas MacKinnon (‘The Great War’, p.208) claims they only began to adopt seniority-based promotion systems in the late nineteenth century.

also argued that a distinctive internal labour market emerged in the period between the 1870s and 1890s.⁵ Using a Foucauldian perspective, Savage further claimed that one of the major challenges facing railway management was in disciplining and supervising its workforce. Initially, a punitive system of fines and a costly, but ineffective, system of visual surveillance had been adopted by the GWR. However, in the late 1870s a new approach was adopted based on ‘attempts to motivate and discipline workers by using career ladders to encourage workers to monitor and regulate their own actions.’⁶ In a related area, the work of Boot is also of interest. Although not taking, perhaps justifiably, an explicit internal labour market approach, he has examined the experience of clerks in the eighteenth and nineteenth century and has shown that age-related payments systems for these ‘skilled’ workers emerged in the late eighteenth century.⁷ From our perspective, it is worth noting that he also argues that in the Bank of Scotland age-related payments systems for its ‘unskilled’ servants emerged after 1870.⁸

This study examines the internal labour dynamics of the GER by analysing the careers of a sample of 848 of its traffic staff in the period 1870-1913. Section I provides a brief survey of the issue of the internal labour market. It shows how some prominent applied labour economists have turned away, at least partially, from the numerous theoretical developments (in areas such as contract theory and asymmetric information) and embraced an older tradition, most notably that associated with Doeringer and Piore. Section II introduces the GER and the sample

⁵ Howlett, ‘Evidence.’

⁶ Savage, ‘Discipline’, p.88. This was not the approach taken in the railway workshops, which faced a different set of labour and managerial constraints. Thus, for example, Drummond has argued that in this period piecework remained an important factor and managerial tool to control the labour process. Drummond, ‘Specifically designed?’

⁷ Boot, ‘Salaries and career earnings’, considers clerks at the bank of Scotland, 1730-1880, whilst Boot, ‘Real incomes’, considers clerks at the London offices and warehouses of the east India Company, 1760-1850. In both articles the methodology employed in examining the internal labour dynamics of the two companies is primarily descriptive, being based on the presentation of wage profiles.

⁸ Boot, ‘Salaries and career earnings’, p.635. Although he offers an explanation for the introduction of age-related salaries for tellers/clerks he says nothing about their introduction for the unskilled servants.

of traffic staff whilst section III sets out a hierarchy of job levels. This hierarchy is then used in section IV to analyse the pattern of careers within the GER; crucially, this material (like the compilation of the hierarchy itself) makes no reference to wages but relies entirely on information from job moves. Wages make their appearance in section V, which examines the relationship between wages and job levels.

I

In economic theory, for the internal labour market to simply reflect the external labour market (in effect, for there to be no internal labour market) firms would have to pay workers according to their marginal product, which in turn would reflect their training, abilities and experience. This is known as a spot wage payment system. The basis of the internal labour market, on the other hand, is the fact that there may be long term benefits to the relationship between employer and employee that exceed possible short-term economic factors at play in the external labour market. In such situations workers may be paid a wage that diverges from their current level of productivity.

In the economic literature the standard neo-classical model of the spot wage payment system came under attack because of widespread empirical evidence that wages did not always reflect worker productivity.⁹ This led to two related developments: economic theories of the internal labour market and dynamic models of the wage-marginal productivity bargain between employee and employer that attempted to reclaim the neo-classical mantle. The key factor in many of these models is that the employer and the employee agree, in effect, to abide by an implicit contract in which the wage at any point in time will not be related to current productivity but will be related to productivity distributed over the length of the contract (for example, in risk aversion models employers effectively insure workers against shocks to their marginal productivity with workers accepting relatively low

⁹ Lazear, 'Agency'; Medoff and Abraham, 'Are those paid more'.

wages in good times and relatively high wages in bad times).¹⁰ There are several reasons for the introduction of a wage payment system based on implicit contracts, for example: the difficulty some employers face in trying to distinguish between the output of individual workers; the cost to the employer of supervising and monitoring the work of employees; the intangible nature of much white collar work; the desire of the firm to reward employee honesty (or loyalty) by paying their workers less than their output warranted in the early years of employment and more than it warranted in later years of employment.

More recently, some applied labour economists, whilst welcoming the theoretical advances associated with work on contract theory that has embraced uncertainty and asymmetric information, have questioned its practical usefulness to empirical work.¹¹ This attitude is best summed up by the title of a short paper by Baker and Holmstrom: 'Internal labour markets: too many theories, too few facts'.¹² They and others, most notably Lazear, have turned back to the older internal labour market literature, especially the work of Doeringer and Piore.¹³ In particular, this new empirical work has focused on job promotions within the firm. For example, Lazear considered movements from jobs with a lower average pay to jobs with a higher average pay, whereas Baker and Holmstrom defined job levels derived from the empirically observed job moves within the firm and then used moves between job levels as the unit of analysis.¹⁴ The latter methodology, focusing on job levels, is employed below to investigate the existence and nature of the internal labour market in GER in the period 1870-1913.

II

¹⁰ Siebert and Addison, 'Internal labour markets', p.80.

¹¹ 'The objective of these theories is to show that internal-labour-market outcomes can be construed as second-best solutions to contracting problems under incomplete information...At this point, there is hardly any feature of internal labour markets that cannot be given some logical explanation using the right combination of uncertainty, asymmetric information and opportunism'. Baker and Holmstrom, 'Internal labour markets', p.255.

¹² Baker and Holmstrom, 'Internal labour markets'.

¹³ Doeringer and Piore, *Internal labour markets*; Lazear, 'Jobs-based analysis'.

Before examining the internal labour dynamics of the GER, the company in general and the sample in particular need to be introduced. The GER grew fairly rapidly in the decades before the First World War. For example, between 1870 and 1912 its total amount of authorised capital increased from £28 million to £58 million and the total length of track it operated rose from 749 miles to 1222 miles. The returns in output, in terms of two of the most common measures of railway output, was even more impressive: total passenger miles increased by more than threefold (from 4.2 million to 14.1 million) whilst total goods miles more than fourfold (from 3.6 million to 15.4 million).¹⁵

One problem facing railway historians is the lack of any reliable and systematic labour statistics for this period.¹⁶ The available piecemeal evidence for the GER suggests that its labour force increased from about 20,000 in the mid-1880s (and that probably followed rapid expansion in the previous decade following the opening of the £2 million Liverpool Street terminus) to about 25,000 at the end of the century and was probably relatively stable thereafter.¹⁷ In the mid-1880s the traffic staff had accounted for about 40 per cent of the total staff.¹⁸ There is more systematic evidence on the wage bill of the company and this is presented in figure 1, which shows both the total wage bill and that for the traffic department. The total real wage bill and that for the traffic staff grew at a steady and similar rate throughout the period: between 1870 and 1912 the total real wage bill grew by a factor of 3.98 whereas that for the traffic staff grew by a factor of 3.81.¹⁹ In the

¹⁴ Baker and Holmstrom, 'Internal labour markets', p.256.

¹⁵ Public Records Office, Kew (hereafter PRO) RAIL 1110/158 and 162, Yearly reports of the directors.

¹⁶ For a discussion of railway statistics for this period that is wrapped in an air of resigned despair see Vamplew, 'Nihilistic impressions'.

¹⁷ Howlett, 'Evidence', p.24.

¹⁸ RAIL 1053/212. 1884. Miscellaneous returns. Employment in railway companies by department and job on 31 March 1884.

¹⁹ If the vertical axis in figure 1 was in log form it would be seen that the two lines moved in parallel throughout nearly the whole period. Irving has suggested, in considering all UK railways between 1870 and 1899, that cost per train mile of the traffic department rose by 20 per cent, which was the largest rise for any of the four main railway departments. Irving, 'Profitability and performance', pp.48-9.

early period the rising wage bill was not a major concern for the company but in the 1890s revenues suffered a setback and during this decade the half-yearly reports by the directors regularly noted the pressure rising wage costs were putting on the company.²⁰ In this respect the GER was not unusual. All British railway companies faced increased pressure on profitability in the period up to the First World War from two main sources: rising factor input costs, particularly labour and coal costs, and the restraints of government legislation that curbed their ability to increase revenue by raising prices.²¹

The data for this study is taken from the wage books of the weekly paid traffic staff of the GER²². The overwhelming majority of these workers entered the company as either lads or porters, indicating that they were unskilled at point of entry. Most of them would acquire firm and job specific skills (for example, as signalmen or line managers) in the course of their career with the company. Evidence was gathered on the life histories of all those traffic staff who entered the company before 1880 and whose records were preserved in the wage books. After making some minor exclusions, this yielded a sample of 848 individuals present in 1880. Their company histories have been traced from 1870 to 1913. Information on wages and job title, together with the year of entry and age at entry, was collated at the same point in the year for each individual to provide annual series. Table 1 gives a summary of the number of individuals present in every year, the number of new entries and the number of exits.

The records surviving in the GER wage books relate only to those workers who had long service with the company. Thus this data set is unusual in that there are no quits until 1906 (and both workers retiring from the company in that year had 40 years of service). We know from other evidence that most railway companies in

²⁰ PRO RAIL 1110/160-61, Yearly reports of the directors.

²¹ Irving, 'Profitability and performance', gives a succinct summary of these pressures. He argues 'that the deteriorating financial position of the industry up to 1900 was the result of inappropriate operating policies' but that the situation had improved by 1914 (p.65). See also Alderman, 'Railway companies', pp.130-3.

²² PRO RAIL 227/459-79, Wages staff histories registers, traffic staff.

this period experienced high rates of labour turnover but also had a core workforce who had lengthy careers with a single company.²³ Therefore it is likely that there were at least two labour markets in operation within the traffic department.²⁴

The first labour market, which is not recorded in the wage books and hence is not captured by our sample, was a spot market for new entrants and in this labour market there was a very high degree of turnover. These workers superficially resembled, in the language of dual labour markets, a secondary labour market. They entered the company at a low level and with a low wage, appeared to have little job security and stayed with the company for a relatively short period of time (from a few weeks to a couple of years). However, it would be incorrect to describe these workers as casual staff (although it is probable that the GER did also hire casual workers to cope with short periods of high demand). Rather they were participating in a sort procedure that would decide whether or not they gained access to the internal labour market. This was a two-way process: the employer was gathering information on the worker to see if they met its criteria (which would encompass things such as dependability, responsiveness to the discipline necessary for traffic staff, and, given the stance of the GER, a lack of responsiveness to organised labour); whilst the worker would be gauging whether the constraints of working for the GER were outweighed by the benefits. For the worker, who as a new recruit would be young, a key factor would have been the relatively low wage paid at the beginning of a career with the GER. Workers who were not risk-averse, who had short time horizons, or who preferred autonomy to discipline were likely to leave.

²³ 'In the 1870s the actuary to the National Debt Commissioners stated that of the men in the traffic grades appointed annually on the Great Western about 25 per cent left within one year. There was undoubtedly a large number of young unskilled workers who stayed with the company for only a short time. Turnover was higher among unskilled men than among the more skilled. Leaving the railway companies was more voluntary than compulsory.' Kingsford, *Victorian railwaymen*, p.53. Mackinnon ('The Great War', p.210) notes that the Canadian Pacific Railway experienced a similar situation: 'By the beginning of the century, the company had built up a core of men who were already or would become long-service employees, but the majority of recruits worked for less than a year.'

Those who wanted to stay and who the GER were willing to stay, passed into the internal labour market.²⁵ They represented the core permanent staff, or the primary labour market. These workers were characterised by job security, lengthy (often lifetime) employment, and had access to promotion ladders.²⁶ Typically the primary labour market in this period has been associated with skilled workers but in the case of the GER traffic staff it relates to unskilled workers. However, they do share another common characteristic with such skilled workers in that recruitment was often via family networks.²⁷ How these workers fared once they were operating in the internal labour market is the subject of the rest of this article.

III

Within a firm it might initially appear that job titles provide the best unit of analysing the career moves of individual. However, job titles are problematic.²⁸ Often the sheer number of job titles makes it difficult to use them meaningfully as a unit of analysis. For example, the careers of the 848 workers in this sample encompassed 261 different job titles. The existence of formal organisational charts can help by identifying promotion nodes and paths. However, even they might not truly reflect the practical experience of individual workers as their immediate managers may create new job titles or expand the formal criteria of existing titles. Again the records of the GER provide evidence of this: the formal list of wage scales for jobs from 1906 is covered with hand-written amendments which take

²⁴ The plurality of labour markets has been noted elsewhere, including Anderson ('Some aspects') and Littler ('Comparative analysis').

²⁵ It should be noted that there was more than one internal labour market within the traffic department. The most obvious separate market (which is not discussed here) being that for clerks.

²⁶ Bagwell, 'Transport', p.232; Fitzgerald, 'British labour management', p.31.

²⁷ For example, Bagwell cites the general manager of the GER in the early 1890s as stating that he 'knew of many instances of his company employing members of three generations of the same family' (Bagwell, 'Transport', p.232). Also, in 1889 a special committee of the GER recommended raising the wage scale for van guards partly on the grounds that 'so many of these were sons of the Company's servants' and the GER wished to retain their services (PRO RAIL227/165, Special Committee meeting, 24 September 1889, pp.281-2).

²⁸ Baker and Holmstrom, 'Internal labour markets', p.256.

account of jobs that do not appear in the formal list or to note differences between the official wages and the wages actually paid at certain stations.²⁹

The solution adopted below has been to follow the lead of Baker, Gibbs and Holmstrom and focus on the job hierarchy:

Hierarchies are usually said to consist of job titles aggregated into 'levels' related to the job's authority and place in the path of decision making (hence the term level). Careers are often described as a series of promotions to higher-level jobs with rewards and responsibilities.³⁰

An important feature of this approach is that, given the important role often assigned to wages in internal labour markets, wages are ignored in deciding on job levels. The only information considered is that on moves between job titles.

The first stage was to decide on those jobs at the bottom of the hierarchy, the Level 1 jobs. Level 1 jobs are those where new entrants to the firm dominate entry to the job. The sample definition meant that there were no new entries after 1879 and therefore in deciding on Level 1 jobs only information on job moves in the period 1870-79 was used. Any job that a worker took on entry to the GER in that period was considered as a potential Level 1 job.³¹ Next the total number of moves into each potential Level 1 job was considered. If new entrants accounted for 50% or more of the total moves into the job then it was designated as a Level 1 job.³² Having derived the Level 1 jobs, the next step was to decide on the Level 2 jobs. For this, and the subsequent job levels, information on job moves for the whole period 1870-1913 was utilised. Moves from Level 1 jobs (other than exits or stays, where stay included a move to a different Level 1 job) provided the pool of

²⁹ PRO, RAIL 227/360, Scales of pay and hours of duty, etc., of staff in the Superintendent's Department, 1905-11, pp. 4-20, 72.

³⁰ Baker, Gibbs and Holmstrom, 'Internal economics', pp.888-9.

³¹ Half of all the new entrants were porters (including goods porters and parcel porters). The next largest group were lads (123 in total), followed by signalmen (45), greasers (43), and ticket collectors and related (41).

³² Also, all jobs designated as lad, clerk or van guard (which were all entry jobs for boys) were classified as Level 1 jobs.

potential Level 2 jobs. Again the total number of moves into potential Level 2 jobs was considered and if more than half of these were moves from Level 1 jobs, then the job was designated as a Level 2 job. This process was then repeated to derive the other job levels.³³ Those jobs that could not be unambiguously classified were denoted as ‘Other jobs’.³⁴ This process yielded a total of six job levels, although Level 6 contained only one individual.

The information about annual job moves is summarised in table 2. Promotions are defined as moves into a higher job level, moves within the same level are lateral transfers, and moves to lower levels are demotions. The non-shaded cells in the main diagonal of table 2 show both stays (where the job designation did not change from one year to the next) and lateral transfers (where a worker changed between two jobs both in the same hierarchical level). Moves below and to the left of these cells (except from ‘Other’ and to ‘Exit’) are demotions. The shaded cells show promotions of one level. Moves above and to the right of the shaded cells (except from ‘Entry’ and to ‘Other’) are promotions of more than one level. Thus, reading along the rows in table 2 gives the percentage of annual moves from one job level (including new entrants and other jobs) to another job level (including exits and other jobs) summed over the whole period. For example, reading along the row for Level 3 shows that 0.3% of the 12,531 workers who started a year in a Level 3 job in the following year exited the firm, 0.8% were demoted (0.5% to a Level 1 job and 0.3% to a Level 2 job), 95.4% stayed or experienced a lateral transfer, whilst 3.5% were promoted (2.9% to a Level 4 job and 0.6% to a Level 5 job).³⁵

³³ The one major deviation from this was the designation of signalman as a Level 3 job. Following the methodology outlined above it should strictly be a Level 2 job. However, there is a clear job ladder that shows a career path from porter (Level 1) to porter signalman (Level 2) to signalman. The problem for the method employed to designate jobs to levels is that the expansion of the GER in the 1870s created a demand for signalmen that distorted the internal labour market (see below).

³⁴ After all jobs had been allocated to a particular job level (or designated as ‘Other’) another consistency check was applied and it was found that, in general, the allocation corresponded to the hierarchy implied by the job titles themselves and by existing organisational information (for example, yardman was designated a Level 3 job whereas head yardman was a Level 4 job).

³⁵ The raw data numbers were as follows: there were 40 exits, 68 were demoted to Level 1, 32 were demoted to Level 2, 11,956 stayed in Level 3, 364 were promoted to Level 4, 70 were promoted to Level 5, and 1 individual moved to a job designated as ‘Other’.

Exit rates for Levels 1 to 5 were fairly similar and it is therefore difficult to infer anything meaningful from them. Entrants, however, overwhelmingly joined the company in a Level 1 job. This, in turn, meant that internal promotion rather than external recruitment filled vacancies in higher level jobs. Thus, the dominance of the lowest job level as an entry port provides strong support for the contention that the GER operated an internal labour market. This is further strengthened when account is taken of entry at other levels. Entry at Level 2 and Level 3 jobs was dominated by the demand for new signalmen.³⁶ This is consistent with other evidence that suggests that the expansion of the GER in the 1870s (particularly with the opening of the new terminus at Liverpool Street in London in November 1875) caused demand for signalmen to exceed the internal supply of potential signalmen.³⁷ Such hiring was rare after the 1870s. Thus, in its traffic division, the GER hired unskilled workers and initially employed them in jobs in the lowest hierarchical level. This presumably then allowed the company to gauge and sort workers by both their firm loyalty and ability. Workers who the firm decided were too risky to invest in (or workers who felt the firm could not offer them what they wanted) left the company within the first couple of years of employment. The workers who then remained with the company became locked into a long-term (even life time) career with the GER and the company, in turn, provided firm-specific training that allowed the worker to potentially improve their situation significantly over that career.

Not surprisingly, stays and lateral movements within job levels dominate the 33,023 man-year observations. The lowest percentage on the main diagonal for the job levels is 87.5%. Promotions of more than one level in a single year, except for Level 1, were far less common than promotions of a single level. Also, promotion became more difficult at each successive level. The promotion rates were: 12.2% for Level 1, 9.7% for Level 2, 3.5% for Level 3 and 2.3% for Level 4. A more interesting result is that for demotions. At the lower levels promotion is far more

³⁶ Of the 35 individuals who joined the company in a Level 2 job, 19 joined as porter signalmen; and of the 56 individuals whose first job was at Level 3, 45 were signalmen.

³⁷ Howlett, 'Evidence', p.26.

common than demotion (for Levels 2 and 3 the demotion rates were, respectively, 2.3% and 0.8%) but this gap closes dramatically for Level 4 (2.1%).³⁸ It should also be noted that demotion to Level 1 was a possibility at all other levels (although at Level 5 this only represented 2 individuals experiencing an annual demotion to Level 1 over the whole period).

Although the derivation of job levels was a relatively simple process the multiplicity of job titles (including many variations on a seeming core job title) makes it difficult to show such a simple progression in terms of individual jobs.³⁹ However, considering the 18 job titles that each accounted for at least 1% of the observations (and 71% of all observations) does suggest consistency at the level of individual job titles.⁴⁰ For example, the links between these jobs confirmed the porter (including goods porter) to porter signalman to signalman to district relieving signalman ladder. Another ladder they suggested was second guard (and to a lesser extent, acting guard) to head passenger guard (including head passenger guard suburban and head passenger guard branch line), to head passenger guard main line. Other strong links were shunter to head shunter, and acting guard to head goods guard. Two strong lateral movements identified were that one fifth of shunters became acting guards, and a quarter of head passenger guards became head passenger guards branch line.

³⁸ Unsurprisingly, at Level 5 there is only 1 promotion (because there was only one job for one individual above Level 5) but the percentage of demotions is higher than experienced at Level 3. This overall result is in contrast to that of Baker *et al.* ('Internal economics', p.890) who found that demotion was a rare occurrence. A probable explanation for this difference is that their study was of white-collar workers in a US service industry in the period 1969-1988 whereas this study is concerned with blue-collar workers. It is not unreasonable to assume that the degree of fluidity within a blue-collar internal labour market would be higher than in a white-collar internal labour market or that this might be heightened by the fact that this study focuses on a much earlier period when the internal labour market was in its infancy.

³⁹ For a more detailed discussion of the problems raised by this see Howlett, 'Evidence', pp.28-30.

⁴⁰ The jobs considered were, in order, signalman (23% of all observations), head goods guard (8%), porter (6%), foreman porter (5%), ticket collector (5%), head passenger guard suburban (3%), head passenger guard main line, head passenger guard, head passenger guard branch line, acting guard, district relieving signalman, inspector, head shunter, shunter (all 2%), goods porter, second guard, parcel carman, and porter signalman (all 1%).

Given that in this study we trace entrants in the period 1870-79 over their company career until 1913 and that, as has been noted above, almost 9 out of 10 new entrants started in a Level 1 job, we would expect that over time the relative size of the higher levels would expand at the expense of the lower levels. For example, in 1870 50% of all workers in Levels 1 to 6 were in a Level 1 job but from 1889 onwards this figure had stabilised in the range of 12-14%. Table 3 provides a percentage breakdown of workers by job level in selected years. Significant changes had taken place even by 1880 (in particular, the relative decline of Level 1 and expansion of Level 3) and by 1890 the pattern had been set for Level 1 (which thereafter accounted for about one-eighth of the workers) and Level 4 (a quarter). By 1900 the proportion of workers accounted for by Levels 3 and 5 had also more or less stabilised, accounting for, respectively, about one-third and one-fifth of workers.⁴¹ This is an early indication that promotion from Level 1 to Level 3 was fairly rapid, taking place in the first ten years or so after entry to the firm, and that it probably took another ten years or so for the successful workers to gain promotion from Level 3 to a higher level. On the other hand table 3 also implies that about a fifth of workers would find promotion a more difficult task as they remained in Levels 1 and 2.

Figure 2 considers this dynamic from another perspective, showing the number of promotions and demotions over time. It is clear that promotions were more common than demotions over the period as a whole: for every demotion there were four promotions.⁴² Furthermore, demotions are relatively stable in that the highest number in any year was 18 (in 1892), with an average of 8 per year.⁴³ Promotions, on the other hand, ranged from an annual maximum of 133 (in 1882) to a minimum of 2, with an average of 38. However, the relationship between promotions and demotions also changes over time: the gap between the two is most

⁴¹ Level 3 peaked in 1883 with 49.4% of workers in Levels 1 to 6 and thereafter experienced a steady decline until the early twentieth century when it stabilised at 33-34%.

⁴² Of total moves (that is, total demotions plus total promotions), demotions accounted for 17% and promotions 83%.

⁴³ The mode also is 8 and the median 6. In only four years did the demotion rate exceed 2%.

stark in the 1870s and 1880s but then reduces markedly and, indeed, towards the end of the period there are several years in which demotions exceeded promotions. This dynamic probably again reflects the nature of the sample and reinforces the previous point that promotion was most rapid (and most likely) in the first twenty years of employment. What is perhaps more surprising is that demotion is a relatively stable phenomenon over the entire 44 years of the study.

IV

The notion of a career is central to the concept of an internal labour market and this section attempts to address the career patterns of workers in the GER traffic division. It focuses only on information about job and level moves and takes no account of wages. Table 4 presents information about careers within the company in terms of jobs held, promotions and demotions, relating these to job levels. The top half of the table only relates to the 756 workers in the sample who joined the GER in the period 1870-79. The second row shows that there was a significant difference in the average age of new entrants depending upon the level they joined the company at: the average age of entrants to Level 1 was 19.4 years whilst Level 3 entrants had an average age of 24. If age is taken as a proxy for work experience (and assuming that these unskilled workers had roughly the same experience of formal education) this positive relationship between age and entry level would appear to be consistent with general human capital predictions. It also provides another indication that the construction of the hierarchical levels is broadly correct as the more experienced workers were recruited to higher levels than the less experienced workers were.

Although the average number of job titles held was inversely related to the level the entrant joined the GER the difference was quite small, and (with one exception) this was also reflected in similar median and mode values across the levels. Over 60% of workers held four or less job titles in the period studied no matter what their job entry level was. A surprising result is that almost a quarter of

the workers who joined the GER at Level 3 remained in the same job title throughout the period. This would appear to indicate that for internal promotion firm specific human capital was a more important consideration than more general forms of human capital. Overall, entry job inertia was experienced by 42 of the 756 new entrants (5.6%), and a further 27 workers only experienced lateral movements (that is, they remained at the same level).

The bottom panel of table 4 considers the promotion and demotion experience of all workers present in the sample over the period 1870-1913 (where promotion and demotion are defined as a move from one job level to another job level). Two thirds of all promotions were accounted for by promotions into Levels 3 and 4. Although there is not much difference in the age and tenure of those promoted to Levels 2 and 3, thereafter there is a strong positive correlation between the level promoted to and both age and tenure. Similarly, over two-thirds of demotions were from Levels 3 and 4. Also, there is again a positive relationship between the level a worker was demoted from and both age and tenure.

These moves can, of course, hide a variety of different individual experiences. Thus, table 5 provides further analysis of individual career promotions and demotions. By a large margin the two most common career experiences in this period were for one promotion and no demotions (accounting for a quarter of workers) and two promotions and no demotions (21.6%). Overall, two-thirds of workers did not experience any demotions during their career in this period, 30% experienced one demotion (and of these six individuals experienced no promotions), 5% experienced two demotions, and only two individuals were demoted three times. The one-third of workers who did experience demotion did not appear to suffer a long-term penalty as a consequence: for example, 28% of the 215 workers who were promoted to a Level 5 job had previously experienced a demotion. Although some individual workers did experience rapid promotions, there is no clear evidence of systematic 'fast track' careers. Indeed, the individual who made it to the top of this hierarchy (to the Level 6 job of Chief District Inspector) was a

Level 3 entrant but thereafter his career path was not obviously distinguishable from numerous other workers. He entered the GER in 1875 as a signaller and thereafter progressed as follows: relief signaller (1879), assistant signaller (1882), head signaller (1891), inspector (1895), district inspector (1902), and chief district inspector (1911).

V

One of the most important distinguishing characteristics of the internal labour market is that spot markets do not determine wages. Instead wages are attached to jobs and reflect the job content (or evaluation) or to job levels. This section analyses the relationship between wages and the job hierarchy.⁴⁴

The relationship between average real weekly wage and level is established in figure 3.⁴⁵ The first point this makes is that average real wage was positively correlated to job level. Figure 3 also suggests that there were, in average real wage terms at least, two tiers of job levels (Levels 1 –3 and Levels 4-5) in that there is a significant gap between the profiles for Levels 3 and 4. What is also striking is that the relative hierarchical pay structure that was present in the early 1870s remained effectively stable throughout the forty-four year period. This has two strong, and perhaps surprising, implications. First, that the business cycle appears to have had no impact on the *relative* wage structure, that economic conditions in this period did not affect employees differentially across levels.⁴⁶ Secondly, that although these job levels were constructed without any reference to wage levels, the wage differential structure of the GER traffic division had been effectively decided upon at a relatively early stage of the company's life. It is not clear why, from the perspective

⁴⁴ As noted above, the official list of wage scales from 1906 (which is the earliest formal wage schedule for the GER I have discovered) are of only limited use in identifying the relationship between jobs and wages. Also, many discrepancies were discovered in trying to match them up with the wages actually paid to workers in this sample. The lack of coincidence between authorised pay scales and the rates actually paid was also noted by Kingsford, *Victorian railwaymen*, p.88.

⁴⁵ Throughout the paper nominal wages have been deflated to produce real wages in 1900 shillings, using the cost of living index provided by Crafts and Mills, 'Trends in real wages', pp.181-2.

of the wage structure, the internal labour market for a group of workers who upon entry were predominantly unskilled should have been established so early and remain so resistant to change.

The next obvious question is whether or not job levels were the sole determinant of wages. Figure 4 addresses this question in a simple manner. It takes the real weekly wage structure in a typical year, 1890, and shows, for each level, both the average real wage (the main curve) and the distribution of wages around the mean wage (the other points). The wage incentive to be promoted is again clear in that average real wage increased with job level.⁴⁷ This is reinforced in considering average annual real wage increases over the whole period on the basis of whether a worker was promoted, demoted or stayed at the same level in any given year. Promotion brought with it an average annual real wage increase of 15.4% compared to a 1.1% increase for stayers and an average decrease of 4.9% for those demoted. However, the conclusion implied by these average figures must be modified in the light of what figure 4 says about the distribution of real wages. It shows that there was substantial wage overlap across the levels. For example, those in top quartile in Levels 1 and 2 earned as much as a worker in the third quartile of the next higher level and the 95th percentile in Level 3 overlaps with the bottom quartile of Level 5. This suggests that job level is not the sole determinant of wage.

Table 6 attempts to quantify just how important levels were in determining wages by estimating fixed effects panel regressions. The tenure only regression offers a measure of the impact of human capital on real wages.⁴⁸ Comparing it to the levels only regression (where the explanatory variables are simple dummy variables for each hierarchical level) it can be seen that levels explain significantly

⁴⁶ The lack of influence of the business cycle on relative pay structures was also found by Baker *et al.*, 'Internal economics', pp.904-5.

⁴⁷ Also, once again the significant increase in average real wages between Levels 3 and 4 is noticeable. The percentage increase in real wages between Levels 3 and 4 was 18.5%, compared to a 6.1% differential between Levels 1 and 2, 6.8% between Levels 2 and 3, and 11% between Levels 4 and 5.

more of the variation in the log of real wages than does tenure. Furthermore, the combined equation suggests that adding tenure to levels adds only marginally to explanatory power. Finally, the R^2 for the regressions run without year dummy variables is also reported and this implies that the business cycle had little impact on the results. Thus, table 6 implies that the variation in wages were largely immune from external factors and that job levels alone accounted for an impressive two-thirds of the variation. If wages were, in general, attached to job level (as these results imply) then they were not equal to marginal product and this suggests that promotion was probably the major incentive mechanism.

Table 7 addresses the question of whether or not promotion (or demotion) brought with it a significant wage premium. If wages were determined by levels this should be so. In the table, variations in wage changes and promotion and demotion rates over the business cycle are controlled for by measuring the wage change as the difference in the percentage real wage change for those who stay at a level, or are demoted or promoted into that level, relative to the mean change of all employees in the sample who did not change level in that year. The answer to the question posed is unambiguous: promotion had a positive wage premium (and one that increased by level) and demotion had a negative wage premium (and one that, more or less, decreased by level). On average, being promoted brought with it a 10.1% increase in real weekly wage relative to not changing job level whilst demotion saw a 7.7% reduction. The final column in the table shows the percentage difference in the average real wage between levels. It shows, for example, that the average real weekly wage in Level 4 was 18.3% higher than in Level 3 (and in doing so, again emphasises the importance of that particular divide). Comparing this column to the promotion column shows how important promotion was in explaining the difference in average real wages between levels. For Levels 2 to 4 the promotion premium is between two-thirds and three-quarters of the difference in

⁴⁸ In this instance tenure is effectively a proxy for firm specific human capital as we lack any information on the education of the workers. However, given that these are unskilled workers it is unlikely that there was significant variation in their level of educational attainment.

average wage between levels, whilst for Level 5 the premium exceeds the difference between average real wages in Levels 4 and 5.

It is possible that the causal link that has been posited in the discussion so far, that level was an important (possibly the most important) determinant of pay, is entirely wrong. It is possible that job level merely verified wage level and that the GER promoted workers when they reached a certain level of pay. Thus pay would have determined level and not vice versa. If this were the case then an analysis of wage structures should reveal that those workers who were promoted came from the top wage decile of their previous level.

Table 8 shows the distribution by wage decile of promoted workers, both before they were promoted and after they were promoted. For example, of the 295 workers who were promoted from Level 1 to Level 2, 14.9% had been in the bottom wage decile of all workers at Level 1 before they were promoted, whereas 26.4% of them were in the bottom decile of all workers at Level 2 after they were promoted. If promoted workers came equally from all pay levels, and moved equally into all pay levels, then the percentages in table 8 should equal roughly 10 percent for each decile. If job level merely verified wage level then table 8 should show that promoted workers come predominantly from the upper wage deciles of their previous level. Table 8 clearly demonstrates that this was not true. Indeed, in all cases except for promotions from Level 3 to Level 4 promoted workers came predominantly from the four *lowest* wage deciles.⁴⁹ However, table 8 does confirm that on promotion workers were most likely to be placed on a wage at the lower end of the distribution. Indeed, in the cases of workers promoted from Level 4 to Level 5 and those promoted from Level 1 to Level 3, it accounted for almost half those promoted. These results suggest that wages were not the main criteria for promotion.

VI

This study provides the first systematic evidence of the internal labour dynamics of a major British railway company in the period 1870-1914. Although there has been much discussion in the literature about the existence of internal labour markets in the railway industry this study is the first to provide detailed and systematic evidence of this. An important finding is that there was a clearly structured internal labour market for workers who were unskilled at the point of entry and that this had significant implications for their subsequent careers and wage compensation

It was relatively easy to identify hierarchy of job levels based on evidence from career patterns. There were with six distinct job levels. This distribution of staff across these levels took about twenty years to stabilise (with Levels 1 and 2 accounting for a quarter of the staff in the sample, Level 3 a third, Level 4 a quarter, and Level 5 a fifth). The internal labour market was characterised by classic signs such as clear ports of entry to the lowest level jobs and vacancies in higher level jobs being filled from within the existing staff base. Although general human capital was important at the point of entry, firm specific capital was more important for career advancement.

Promotion proved to be successively more difficult as a worker moved up the job hierarchy. The evidence suggests that there were two main phases of career advancement: in the first ten years of tenure a worker aimed to progress from a Level 1 job to a Level 3 job; in the second decade of tenure their aim was to progress to a Level 4 or Level 5 job. There was no obvious evidence of fast track promotion paths. Demotion remained a probability at all levels (and to all levels) and the rate of demotion remained fairly constant over the whole period. Demotion did not carry with it an obvious long-term penalty in terms of future promotions. However, promotion was more common than demotion (there being four promotions per demotion and two-thirds of the workers did not experience any demotion) but it declined over period, being most common in the first 20 years.

⁴⁹ Even in the case of workers promoted from Level 3 to Level 4, the second most common wage

Although there is no obvious historical benchmark for comparison, it could be argued that the experience of these workers, over a period of thirty to forty years, suggests that the career of a typical worker progressed at a relatively sedate pace and that stasis, rather than dynamic, was their common mode. Thus, for example, a quarter of workers experienced only one promotion (and no demotions) over the period studied and a further fifth experienced only two promotions and no demotion. Furthermore, in terms of job titles (as opposed to job levels), 60% of the sample held four or less job titles over the period.

Wages did not determine job level. At the same time, job level was an important, but not the sole, determinant, of wages (other factors affecting wages would have included, for example, tenure and individual specific skills). The strong link between job level and wages (with variations in the former explaining about two-thirds of the variation in the latter) suggests that wage did not equal marginal product. It also suggests that promotion was a major incentive mechanism within the firm. Relative to workers who did not change job levels in a particular year, the promotion real wage premium was 10.1% whilst the demotion wage penalty was 7.7%. However, the wage range within each level (in particular, the fact that these wage ranges often overlapped across levels) suggests the firm was also aware of the need to provide wage incentives to workers who remained at a particular level for a long period. Two final points of interest with regards to wages are that there was no evidence of a significant business cycle effect on wages, particularly on the relative wage structure and that the relative wage structure (that is, the differential wage structure between job levels) that was present in 1870 held sway throughout the period.

decile departure point was the bottom decile of Level 3 (17.3%).

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Table 1. Summary of Individuals in sample each year (n), entries (e) and exits (x)

| Year | n | e | Year | n | x |
|-------------|-----|-----|------|-----|----|
| 1870 | 107 | 15 | 1906 | 846 | 2 |
| 1871 | 139 | 32 | 1907 | 846 | 0 |
| 1872 | 223 | 84 | 1908 | 846 | 0 |
| 1873 | 286 | 63 | 1909 | 846 | 0 |
| 1874 | 369 | 83 | 1910 | 842 | 4 |
| 1875 | 459 | 90 | 1911 | 824 | 18 |
| 1876 | 565 | 106 | 1912 | 773 | 51 |
| 1877 | 655 | 90 | 1913 | 734 | 39 |
| 1878 | 745 | 90 | | | |
| 1879 | 848 | 103 | | | |
| 1880 - 1905 | 848 | 0 | | | |

Note: The equivalent figures for the pre-1870 entrants are as follows:

| Year | n | e | Year | n | e |
|------|----|---|------|----|----|
| 1858 | 1 | 1 | 1864 | 22 | 5 |
| 1859 | 2 | 1 | 1865 | 31 | 9 |
| 1860 | 4 | 2 | 1866 | 46 | 15 |
| 1861 | 5 | 1 | 1867 | 63 | 17 |
| 1862 | 10 | 5 | 1868 | 78 | 15 |
| 1863 | 17 | 7 | 1869 | 92 | 14 |

Table 2. Annual transition matrix for job levels, 1870-1913 (per cent)

| Old Level | New Level (next year) | | | | | | | | Total % | Sample size |
|-----------|-----------------------|------|------|------|------|------|-------|-------|---------|-------------|
| | Exit | 1 | 2 | 3 | 4 | 5 | 6 | Other | | |
| Entry | . | 88.0 | 4.6 | 7.4 | . | . | . | . | 100 | 756 |
| 1 | 0.3 | 87.5 | 4.8 | 6.8 | 0.6 | 0.0 | . | . | 100 | 6,011 |
| 2 | 0.4 | 2.3 | 87.5 | 8.2 | 1.5 | 0.0 | . | 0.2 | 100 | 2,618 |
| 3 | 0.3 | 0.5 | 0.3 | 95.4 | 2.9 | 0.6 | . | 0.0 | 100 | 12,531 |
| 4 | 0.3 | 0.3 | 0.1 | 1.7 | 95.4 | 2.3 | . | 0.0 | 100 | 6,823 |
| 5 | 0.5 | 0.0 | 0.0 | 0.1 | 1.0 | 98.3 | 0.0 | 0.0 | 100 | 4,228 |
| 6 | . | . | . | . | . | . | 100.0 | . | 100 | 2 |
| Other | 1.9 | 0.0 | 0.0 | 1.9 | 0.0 | 0.0 | 0.0 | 96.3 | 100 | 54 |
| Total | 0.3 | 18.4 | 8.0 | 38.6 | 21.2 | 13.3 | 0.0 | 0.2 | 100 | 33,023 |

The table shows all transitions between job levels, including entry, exits and stays, as a percentage of movements from a job level (or entry) to a new level (or exit) in the next year. 'Other' refers to jobs that could not be unambiguously categorised in a particular level. The main diagonal shows stays (that is, cases where workers did not change job or the job change represented a lateral, within level, movement). The shaded cells show promotions of one level; cells to the right of these (excluding 'Other') show promotions of more than one level. Cells to the left of the main diagonal (ignoring 'Exit') represent demotions. Values of 0.0 denote non-empty cells that round to zero whilst empty cells are denoted by '.'.

Table 3. Size of levels in selected years (as percentage of annual observations)

| | 1870 | 1880 | 1890 | 1900 | 1910 |
|---------|------|------|------|------|------|
| Level 1 | 50.5 | 32.3 | 12.7 | 11.8 | 13.7 |
| Level 2 | 17.8 | 10.4 | 8.4 | 6.7 | 6.8 |
| Level 3 | 28.0 | 42.5 | 44.1 | 36.2 | 33.9 |
| Level 4 | 3.7 | 11.2 | 23.2 | 26.0 | 24.6 |
| Level 5 | 0.0 | 3.5 | 11.6 | 19.3 | 20.9 |

For each year the figure shows the number of workers in a particular level as a percentage of all workers in the sample in that year.

Table 4. Career and level characteristics

| | Level | | | | | |
|---|-------|------|------|------|------|------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| <i>New entrants</i> | | | | | | |
| - number | 665 | 35 | 56 | | | |
| - average age | 19.4 | 21.3 | 24.0 | | | |
| Percent in period 1870-1913 holding: | | | | | | |
| - 1 job title | 4.1 | 5.7 | 23.2 | | | |
| - 2 job titles | 16.7 | 14.3 | 12.5 | | | |
| - 3 job titles | 21.4 | 17.1 | 16.1 | | | |
| - 4 job titles | 17.9 | 25.7 | 12.5 | | | |
| - 5 job titles | 17.1 | 17.1 | 19.6 | | | |
| - 6 job titles | 11.9 | 14.3 | 8.9 | | | |
| - 7 job titles | 5.7 | 2.9 | 1.8 | | | |
| - 8 job titles | 2.9 | 2.9 | 5.4 | | | |
| - 9+ job titles | 2.4 | 0.0 | 0.0 | | | |
| Number of job titles held: | | | | | | |
| - mean | 4.2 | 4.0 | 3.5 | | | |
| - median | 4.0 | 4.0 | 3.0 | | | |
| - mode | 3.0 | 4.0 | 0.0 | | | |
| Promotions into level: | | | | | | |
| - number | | 295 | 633 | 439 | 230 | 1 |
| - average age | | 25.5 | 24.9 | 30.4 | 36.4 | 58.0 |
| - average tenure | | 6.5 | 5.6 | 11.1 | 17.5 | 36.0 |
| Demotions from level: | | | | | | |
| - number | | 59 | 100 | 137 | 48 | 0 |
| - average age | | 33.3 | 35.4 | 37.6 | 45.5 | |
| - average tenure | | 13.6 | 15.4 | 18.3 | 26.4 | |

The table considers the careers of workers over the period 1870-1913. The top panel refers only to the careers of workers who entered the GER in the period 1870-79. The bottom panel uses all workers in the sample (including those already employed by the GER before 1870).

Table 5. Promotions and demotions experienced by individual workers, 1870-1913

| Number of 1870-1913 career: | | Individuals | |
|-----------------------------|-----------|-------------|----------|
| Promotions | Demotions | Number | Per cent |
| 0 | 0 | 72 | 8.5 |
| 1 | 0 | 202 | 23.8 |
| 2 | 0 | 183 | 21.6 |
| 3 | 0 | 78 | 9.2 |
| 4 | 0 | 15 | 1.8 |
| 0 | 1 | 6 | 0.7 |
| 1 | 1 | 55 | 6.5 |
| 2 | 1 | 79 | 9.3 |
| 3 | 1 | 75 | 8.8 |
| 4 | 1 | 29 | 3.4 |
| 5 | 1 | 9 | 1.1 |
| 6 | 1 | 1 | 0.1 |
| 1 | 2 | 2 | 0.2 |
| 2 | 2 | 13 | 1.5 |
| 3 | 2 | 13 | 1.5 |
| 4 | 2 | 11 | 1.3 |
| 5 | 2 | 3 | 0.4 |
| 2 | 3 | 1 | 0.1 |
| 3 | 3 | 1 | 0.1 |

The figures refer to all 848 workers in the sample and consider career promotions and demotions (defined as moves from one level to another level) over the period 1870-1913. Thus, for example, the first row shows that 72 workers (8.5% of the total) experienced neither a promotion nor a demotion in this period.

**Table 6. Effect of tenure and job levels on current real wage:
panel regressions, 1870-1913**

| Independent variables | Tenure only | Levels only | Combined |
|-------------------------------------|--------------------|---------------|--------------------|
| Constant | 2.46 (.02) | 2.49 (.02) | 2.43 (0.01) |
| Tenure | .04 (.001) | | 0.02 (.0005) |
| Tenure ² | -.0006 (.00001) | | -.0003 (.00001) |
| Level 2 | | .11 (.004) | .09 (.004) |
| Level 3 | | .21 (.003) | .19 (.002) |
| Level 4 | | .38 (.003) | .35 (.003) |
| Levels 5-6 | | .46 (.003) | .43 (.003) |
| R ² | .47 | .68 | .70 |
| R ² without year dummies | .44 | .49 | .67 |
| N | 32,739 | 32,739 | 32,739 |

Notes: in all the regressions the dependent variable was the log of real weekly wages (at 1900 prices). The panel results were derived using fixed effects regressions and year dummy variables (whose results are not shown). Standard errors are in parentheses. All the coefficients were significant at the 1%.

Table 7. Real wage premiums by type of job transition and across levels

| Level | % wage premium on: | | | Difference in mean wage relative to level below (%) |
|-------|--------------------|------|-----------|---|
| | Demotion | Stay | Promotion | |
| 1 | -10.4 | 0.8 | | |
| 2 | -6.4 | -0.7 | 7.5 | 9.9 |
| 3 | -7.1 | -0.7 | 8.3 | 10.9 |
| 4 | -5.1 | -1.0 | 12.3 | 18.3 |
| 5 | | -0.6 | 12.6 | 11.1 |
| 1-6 | -7.7 | 0.0 | 10.1 | |

The wage premium is defined as the mean percentage change in real wage (across years) for those with that type of job move relative to the mean change (that year) of all employees who did not change level. Demotion (promotion) refers to demotions (promotions) to the specified level in the current year. Given the small number of observations on Level 6, this is not shown as a separate category.

Table 8. Distribution of pay for workers promoted in wage deciles**a. Before promotion**

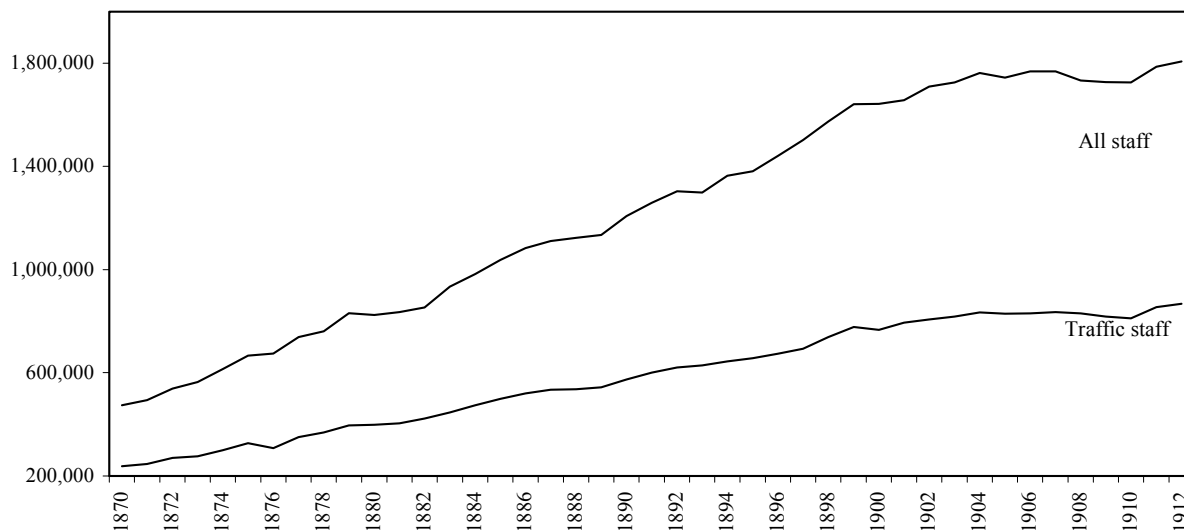
| Promotion | N | Percentage in each wage decile | | | | | | | | | |
|--------------------|-----|--------------------------------|-------------|-------------|-------------|------|------|-----|-------------|------|-----|
| | | bottom | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | top |
| Level 1 to Level 2 | 295 | 14.9 | 11.2 | 24.7 | 16.3 | 6.1 | 9.5 | 3.1 | 6.1 | 3.1 | 5.1 |
| Level 2 to Level 3 | 219 | 19.6 | 20.1 | 15.1 | 3.2 | 7.3 | 7.8 | 9.1 | 11.0 | 3.2 | 3.7 |
| Level 3 to Level 4 | 365 | 17.3 | 5.2 | 5.2 | 7.4 | 9.9 | 9.0 | 7.1 | 21.4 | 12.3 | 5.2 |
| Level 4 to Level 5 | 156 | 11.5 | 17.3 | 12.8 | 17.9 | 16.0 | 1.3 | 4.5 | 6.4 | 5.8 | 6.4 |
| Level 1 to Level 3 | 414 | 8.2 | 9.7 | 17.1 | 16.2 | 10.4 | 12.6 | 5.3 | 9.4 | 7.5 | 3.6 |

b. After promotion

| Promotion | N | Percentage in each wage decile | | | | | | | | | |
|--------------------|-----|--------------------------------|------|------|------|------|------|-----|------|-----|-----|
| | | bottom | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | top |
| Level 1 to Level 2 | 295 | 26.4 | 18.6 | 10.2 | 3.7 | 4.4 | 10.5 | 7.8 | 9.8 | 4.7 | 3.7 |
| Level 2 to Level 3 | 219 | 44.3 | 10.0 | 2.7 | 5.5 | 9.1 | 7.8 | 3.2 | 10.5 | 4.1 | 2.7 |
| Level 3 to Level 4 | 365 | 22.2 | 14.2 | 12.3 | 17.3 | 19.7 | 3.6 | 3.3 | 2.5 | 3.8 | 1.1 |
| Level 4 to Level 5 | 156 | 48.7 | 17.3 | 5.1 | 2.6 | 0.6 | 3.2 | 5.8 | 4.5 | 2.6 | 9.6 |
| Level 1 to Level 3 | 414 | 47.8 | 13.5 | 2.9 | 5.6 | 7.7 | 13.0 | 2.9 | 2.9 | 1.7 | 1.9 |

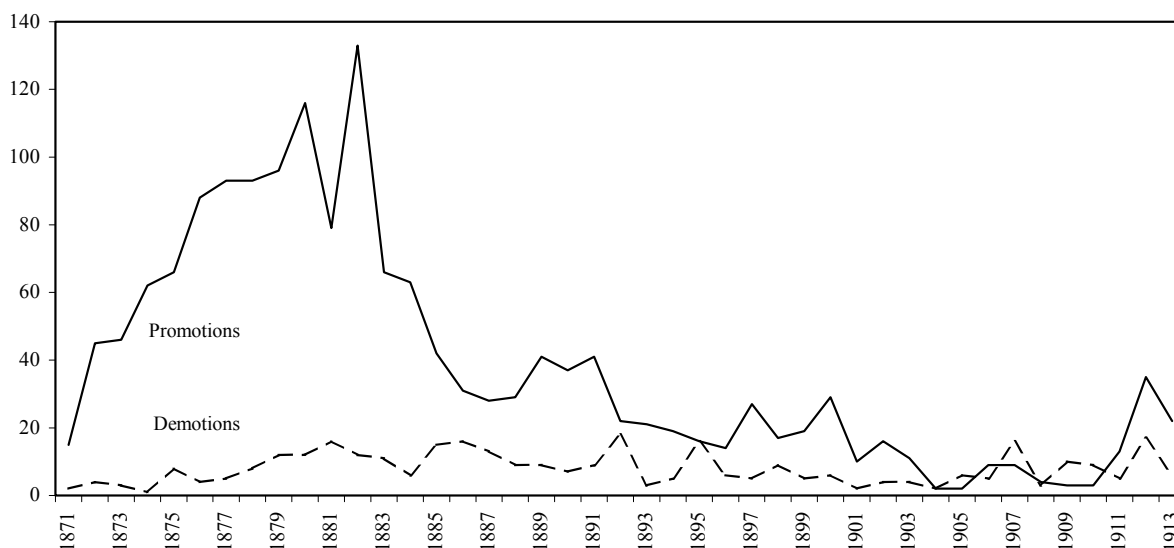
Panel (a) shows the distribution of those workers promoted in terms of the wage decile of the level they were in before they were promoted (for example, of the 295 workers promoted from Level 1 to Level 2 14.9% had been earning a wage in the bottom decile of the wage distribution of Level 1 workers). Panel (b) shows the distribution of those workers promoted in terms of the wage decile of the level they were in after they were promoted (for example, of the 295 workers promoted from Level 1 to Level 2 18.6% were earning a wage after promotion in the bottom decile of the wage distribution of Level 2 workers). The highest percentage in each row is shown in bold. Promotions of more than one level, with one exception, are not shown because of the small numbers involved. They were promotions from Level 1 to Level 4 (35 promotions), Level 1 to Level 5 (3), Level 2 to Level 4 (39), Level 2 to Level 5 (1), and Level 3 to Level 5 (70).

Figure 1. Real wage bill of the GER, 1870-1912 (£1913)



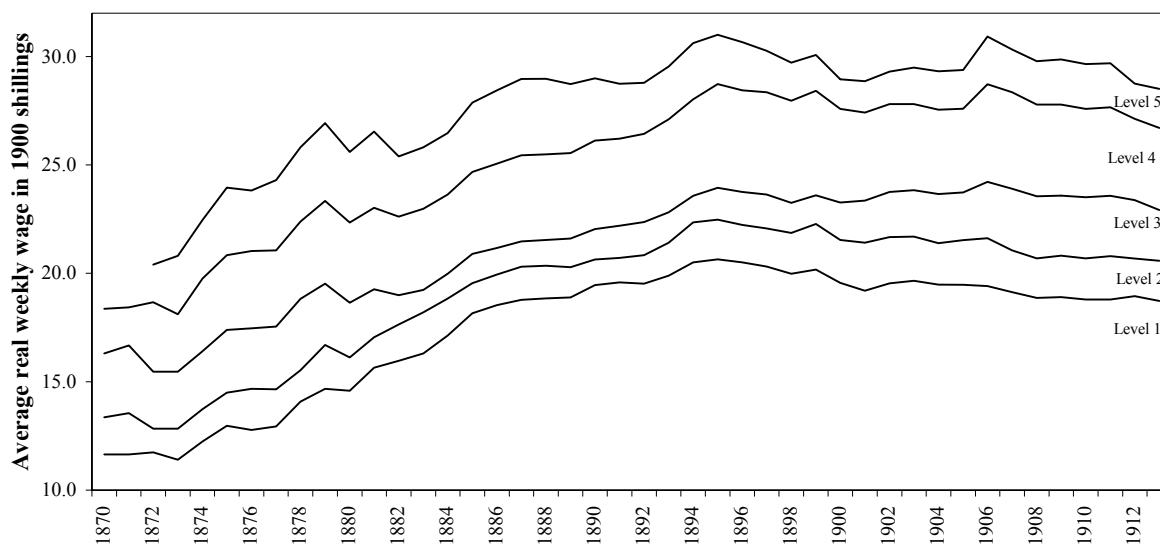
Sources: nominal wage data from PRO RAIL 1110/158-62; deflated by consumer price index from Feinstein, National income, table 61, col.1, T132.

Figure 2. Number of promotions and demotions, 1871-1913



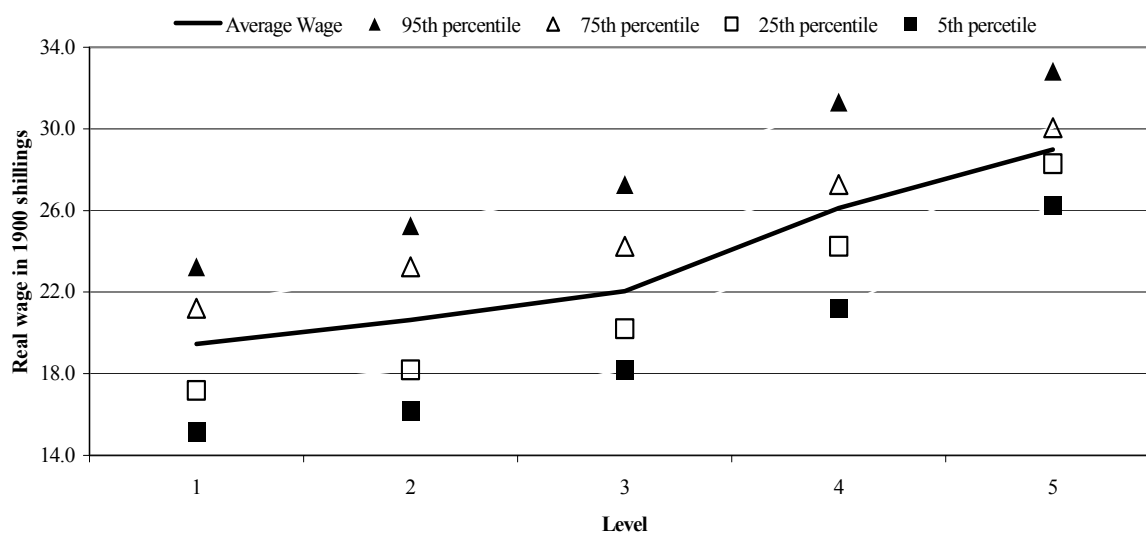
Source: see text.

Figure 3. Average weekly real wage by job level, 1870-1913



Source: see text.

Figure 4. Real wage range by level, 1890



Source: see text.