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**Promotion Tournaments and White Collar Careers: Evidence from Williams  
Deacon's Bank, 1890 – 1941**

**Andrew J. Seltzer  
Royal Holloway, University of London**

**and**

**Jeff Frank  
Royal Holloway, University of London**

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**Abstract:** This paper uses a unique historical dataset on payroll records from Williams Deacon's Bank to examine career structures in a white collar firm. There was a strong internal labour market with virtually all promotions coming from within. There is evidence the Bank used promotion tournaments with returns to promotion that were inversely related to the probability of promotion. In expectation these returns were relatively constant over an individual's career. There is also evidence that the Bank compensated individuals with pay rises for frequent lateral moves and even demotions. Such moves were designed to discourage dishonest behaviour.

**Address for Correspondence: Andrew Seltzer, Department of Economics, Royal  
Holloway, University of London, Egham, Surrey, TW20 0EX.  
a.seltzer@rhul.ac.uk**

## **Promotion Tournaments and White Collar Careers: Evidence from Williams Deacon's Bank, 1890 - 1941**

### 1. Introduction

Employment in banking and insurance grew more rapidly than in any other sector of the British economy during the late 19<sup>th</sup> and early 20<sup>th</sup> centuries (Lee, 1994). This growth in employment was associated with major organisational changes in the banking industry. Large joint-stock banks consolidated the industry by acquiring small private banks. They expanded branch networks by opening large numbers of smaller branches. These organisational changes had important implications for banking careers. The business of banking increasingly was conducted by salaried staff, who were at a distance from the general manager or directors and did not have the traditional status of private bankers (Bankman, 1919). Issues of motivating staff became much more important than when a bank consisted of only a single branch managed by the proprietor. A natural way of motivating staff was by the prospect of promotion to branch manager. This was facilitated by the growth in the number of small branches from the late 19<sup>th</sup> century and particularly after the First World War.

Bankers were well aware that the reorganisation of the industry resulted in changes to their careers. They worried that the growth in the number of employees working at new branches had depersonalised the workplace, leading to a situation where many bankers had never seen their general manager. They felt that compensation did not reflect the “trust, worry, anxiety, or responsibility” associated with their positions (Bankman, 1919). Despite the changes to the industry there has been little research on the nature of employment and changes in banking careers over the period. Much of the existing evidence is descriptive in nature and outlines the general ranges of range of practices across the industry, rather than the specific practices of any one bank or changes in those practices over time.<sup>1</sup>

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<sup>1</sup>See Gilbart (1865), Kynaston (1995), and Rae (1930). One exception to this is Boot (1991), who studies the staff at the Head Office of the Bank of Scotland between 1730 and 1880. He finds that there were several important changes in practices during this period, most notably the rise of tenure-based wage increments from the late 18<sup>th</sup> century and an increase in the wage premium for better employees.

This paper uses personnel data from Williams Deacon's Bank (WDB) to examine employment practices in banking between 1890 and 1941. Williams Deacon's was a medium-sized branch bank based in Manchester and with offices in London and the North. Its records, housed at the Royal Bank of Scotland Archives in London, cover virtually all staff at the Bank's London offices through 1936 and northern offices through 1941. The records provide the annual nominal wage and branch location of each worker. In addition, they contain information about dates of birth, entry to, and exit from both branch and Bank. Although the records do not contain direct information about position, we are able to infer which employee was the manager of each branch. We also have information on branch size. The data therefore allow us to examine career progression (and associated wage rewards) of staff at the bank, typically from being a clerk to being manager of a small branch or – for particularly successful employees – managing a large branch.

The main purpose of this paper is to examine career and wage progression at the Bank in the context of models of promotion tournaments. In these models, wages are attached to positions and workers compete against each other for promotion (Lazear and Rosen, 1981; Rosen, 1986; and Prendergast, 1999). Contemporary writers noted that banks were extremely concerned about promoting the right people to the level of manager, as poor managerial decisions (such as an inability to attract customers or bad judgement on loans) could be extremely costly (Gilbart, 1895; Kynaston, 1995; and Rae, 1930). Typically, the Bank observed junior clerks' performance on the job for at least 10 years, and often 20, before their first managerial appointment.

The distinctive feature of tournament models is that firms use the internal labour market to set wage rewards to promotion to induce desired behaviour rather than to match marginal productivity.<sup>2</sup> Tournaments create incentives by offering higher wages to the winners (those promoted) than to the losers (those passed over for promotion). The expected value to the employee of supplying higher effort (and thus the size of their incentive) is the effect of effort on the probability of winning the tournament multiplied by the expected wage gains from winning (the difference in

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<sup>2</sup>The internal labour market arose as virtually all staff – including the managers of the largest branches – started at Williams Deacons as junior clerks. Over 93 percent of sample employees and 91 percent of those who rose to the level of branch manager began at Williams Deacon's before their 21<sup>st</sup> birthday.

wages between the two levels plus any option value from higher probabilities of success in achieving future promotions). To maintain constant incentives over an individual's career, salaries should be increasing at an increasing rate as individuals move up the hierarchy.<sup>3</sup> Because of the well-defined hierarchical structure of the Bank, we are able to calculate the incentives to effort at each stage of the hierarchy under a simple set of assumptions. While this has been done in the literature in the context of sports tournaments, we are unaware of a comparable exercise for white-collar personnel data. We find that the sharply increasing salaries with promotions are consistent with a roughly equal incentive to effort throughout the career.

The expansion of the branch network after the First World War provides a test for another prediction of tournament theory. An individual of given ability was more likely to be promoted to manager in the post-War period given the greatly increased number of branch manager positions. Thus the Bank could have maintained incentives while offering a lower salary reward to promotion. We find support for this both in the raw data and in our regression analysis of levels and changes in real wages. The salary gain to promotion was lower in the post-War period.

While banks were concerned about inducing effort, they were also concerned to ensure the honesty of their staff. Rae (1885) observed: "A bank ought not to appraise the value of an officer's services merely by what they would fetch in the clerk market. He may not be a man of capacity; he may be little more than an honest and willing drudge; but when it is considered how much the Directors have to trust the honesty, integrity, and honour of its staff, they will not lightly part with those who have proved themselves by long service, the possessors of those essential qualifications, even if they have little else." Promotion tournaments were unlikely to have a strongly positive effect on honesty. A direct way of lessening the opportunity for dishonest behaviour was to move staff frequently across branches, compensating them for the disutility of moving by significant pay increases. There is evidence in our data for this effect.

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<sup>3</sup>There are three reasons for increasing pay raises further up the hierarchy. First, the probability of further promotion declines further up the hierarchy because of smaller numbers of openings. Thus a greater prize must be offered in order to maintain the same expected value of winning. Second, the option value of being on the promotion track decreases up the hierarchy because there are fewer potential future promotions. Third, if individuals have diminishing marginal utility of income, a higher increment upon promotion will be needed to provide the same incentives.

The plan of the paper is as follows. Section 2 outlines the nature of the English banking industry and the position of Williams Deacon's within the industry. We also summarize the Williams Deacon's data set. Section 3 shows the career structure at the Bank, and in particular the probabilities of promotion to different ranks and the typical wage gains from promotion. The raw data support the tournament model, but also show evidence of significant gains to wage when moving branch without a promotion. These results continue to hold in section 4 when we control for a number of different factors in regressions on the level and change in wages. We are also able to control for unobservable heterogeneity and to examine the time pattern of the returns to promotion. Section 5 presents our conclusions.

## 2. The UK Banking Industry and the Williams Deacon's Bank Data

The UK banking industry underwent large-scale changes in a period of consolidation that began about 1870 and intensified after 1890. By 1913, virtually all of the private banks were gone, typically merged into joint-stock banks. The total number of banks in the United Kingdom declined from 303 in 1890 to 75 in 1920 (Cappie and Wood, 1994). Another important change to the industry during this time was the growth in branch networks. Between 1890 and 1920, the total number of banking offices in the United Kingdom increased from 3,478 to 9,668, implying a thirteen-fold increase in the average number of branches per bank and nearly a doubling of bank offices per capita (Cappie and Webber, 1985).

Williams Deacon's was a medium sized branch bank that, in common with much of the industry, arose as the product of a series of mergers, most importantly the acquisition of the London-based Williams, Deacon's & Co. by the Manchester and Salford Bank in 1890.<sup>4</sup> Williams Deacon's itself was absorbed by the Royal Bank of

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<sup>4</sup>Although it was by far the smaller partner, the name Williams Deacons was retained because of its seat on the London Clearing House. The official name after the merger was Williams Deacon and Manchester and Salford Bank. This was shortened to Williams Deacon's Bank in 1901. For the sake of simplicity, we use the name Williams Deacon's Bank throughout the study. In addition to Williams Deacon's and Manchester and Salford, sample employees began their careers at Heywood Brothers & Co. and Hardcastle Cross & Co. (two northern banks that were absorbed by Manchester and Salford Bank in the 1870s) and at Sheffield and Rotherham Bank (which was absorbed in 1906). Among the employees in the sample 6.6 percent started their careers at one of the banks that was absorbed by Manchester and Salford or Williams Deacon's. (William Deacon's Bank, 1971).

Scotland in 1930, but continued to trade separately under its own name until 1969. Like most surviving banks, Williams Deacon's was expanding during the period of this study. In 1896, the first year for which we have full records, it operated 68 branches and sub-branches with 411 staff. In 1936, the last year for which we have full records, it operated 202 branches and sub-branches with 968 staff. The branches opened after 1890 were universally small. In 1896 56.1 percent of branches had fewer than 6 staff and 90.2 percent had fewer than 20. By 1930 69.18 and 91.94 percent of branches had fewer than 6 and 20 staff, respectively. The growth in the number of small branches had important implications for the staff. New branches typically were staffed by existing employees, and thus the expansion of the network resulted in increased mobility across branches. In addition, the smaller size of the new branches meant that there was a rise in the proportion of employees at the level of manager. In 1900 10.7 percent of sample staff held managerial positions, in 1930 this figure was 14.9 percent. With the increased distance (both geographically and hierarchically) of staff from the Head Office, issues of motivating and monitoring staff became more important. This was well understood by contemporaries. Gilbart (1865) noted, "Numerous branches require a peculiar mode of government and a rigid system of discipline."

The primary source of data for this paper is the unusually comprehensive Williams Deacon's Bank (WDB) wage records, collected from the Royal Bank of Scotland's Archive in London. The records, which are written in 8 sets of ledgers, are organized by branches and time period.<sup>5</sup> The records contain the date of birth, date of entry to the bank, date of entry to the branch, annual wage, date of exit from the branch, and reason for exit (transferred to another branch, left the bank, died, dismissed, or retired on a pension) for staff at each branch during the period covered by the ledger. They cover virtually all employees at the Bank's London branches between 1890 and 1936 and at the northern branches between 1890 and 1941.<sup>6</sup> We have recorded this

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<sup>5</sup>Williams Deacon's Bank Limited, Staff Registers. GB 1502/WD/480/1 (covers all branches 1890-1901), GB 1502/WD/480/2 (covers all branches 1901-1910), GB 1502/WD/481 (covers most northern branches, 1907-1918), GB 1502/WD/46/1 (covers London Branches and Mosley St. 1911-1921), WD/482/2 (covers most northern branches 1919-27), GB 1502/WD/482/3 and GB 1502/WD/482/4 (covers most northern branches 1924-1934), GB 1502/WD/482/5 and GB 1502/WD/482/6 (covers most northern branches 1931-1941), GB 1502/WD/46/2 (covers London Branches and Mosley St. 1921-36).

<sup>6</sup>There are a few exceptions to this. Any employee who left the bank before 1896 is absent from the records. The records for the Bank's head office at Mosley St. in Manchester are complete only through

information for all male employees, entering wage and branch information annually, using values as of October 1 in each calendar year.<sup>7</sup> All totalled, the sample contains 2,116 male employees and 34,977 man-years of data.<sup>8</sup> The wages in the records are denominated in nominal pounds, and we have deflated them using Feinstein's price series indexed to 1890 values (Feinstein, 1972).

In considering career structures at the Bank, we examine promotions to branch manager. While the records do not contain direct information about position, it is possible to infer the name of the manager of each branch. We assume that the first person listed for each branch was the manager at the start of the period covered by the record. If he left the branch and another senior person arrived at approximately the same time, we assume that he was the new manager. If the manager left and there wasn't another senior person arriving at the time, we then assume that there was an internal promotion to manager. In this case we consider the structure of wages of the other branch staff (e.g. high wages and large increases at the time of the original manager's departure) to infer the new manager.<sup>9</sup> A Bank document lists all branch managers prior to 1900 and there is a 100 percent correspondence between this list and the list inferred through the method above.<sup>10</sup>

Another important piece of information that can be determined from the records is the size of the branch, measured by the number of staff.<sup>11</sup> Banking scholars have noted

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1936. We do not believe that these omissions have much effect on the results presented in sections 3 and 4 as the number of missing observations is likely very small and the results of this paper are very robust. As a further check on the data we have used the overlap between the ledgers to check for missing or inconsistent information, and found no evidence of inaccuracy.

<sup>7</sup>In the cases of first-year employees who joined after October 1 and last-year employees who left before October 1, we have recorded the information as of the latest date available.

<sup>8</sup>From 1915 the records include female as well as male staff. Women had very different career prospects than men; for example, during this period they could not be promoted to branch manager and they typically had much shorter careers. Because of these differences in career structures, the sole focus of this paper is on male staff.

<sup>9</sup>One issue that arises in the identification of managers is the treatment of employees at the sub-branches. Our approach to classification of managers at the sub-branch is as follows. If the branch and sub-branch are listed on the same page in the wage books, we treat the most senior employee at the sub-branch as a non-manager. If the sub-branch is listed separately from the branch, we treat the most senior employee at the sub-branch as a manager.

<sup>10</sup>Williams Deacon's Bank Limited, Particulars of Branches. Although this volume continues through 1940, only the ledgers prior to 1900 list branch managers.

<sup>11</sup>We are fairly confident that this provides a reasonable measure of branch size. The volume Particulars of Branches provides information on credit transactions, debit transactions, and number of accounts at each branch. The correlation between these variables and the number of staff at the branch ranges from .74 to .89.

that the responsibilities of the branch manager were roughly proportionate to the size of his branch. Blackburn (1967) stated, “[T]here are many promotions possible within the status of branch manager, for branch sizes vary considerably.” We follow this approach by considering managers of different branch sizes as different levels within the hierarchy. In the regressions on wages in Section 4 we use a continuous variable to characterise branch size. However, in the analysis of transitions in Section 3 it is necessary to divide branches into discrete categories. In subsequent analysis where the individual employee is the unit of observation, we classify branches as small (5 or fewer male staff), medium (6-19 male staff), large (20 or more male staff).<sup>12</sup> In analyses where the man-year is the unit of observation and thus the sample size is considerably larger, we separate out the two very large branches at Mosely St., Manchester and Birchin Lane, London. While the majority of branches were small, employees were distributed fairly evenly in the different sized branches. In the sample 27.7 percent of employees were at small branches, 31.4 percent were at medium branches, 15.0 percent were at the large branches (excluding Mosely St. and Birchin Lane), and the remaining 26.0 percent were at the 2 very large branches.

There is one way in which the absence of position information is problematic. While all branches had a number of clerks, larger branches also had at least one specialised teller and a branch accountant. The Mosely St. and Birchin Lane offices also housed a few very senior staff such as the Bank’s secretary and treasurer. Because of the limitations of the data, we do not attempt to identify different types of non-managers.<sup>13</sup> In approximately 0.5 percent of observations, non-managerial employees had annual wages over £1100, approximately 4 standard deviations above the mean. In all of these observations, the employees were based at either Mosely St. or Birchin Lane, and were thus almost certainly holding fairly senior positions at the Bank. We

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<sup>12</sup>The size division is necessarily somewhat arbitrary. We chose 5 staff as a cut-off because this was normally the largest sized-branch that probably would not have had an appointed accountant, though there was likely some variation from branch to branch. The upper cut-off of 20 is also somewhat arbitrary, and was chosen to ensure a reasonably large sample size of large branch managers (.83 percent of the sample).

<sup>13</sup>The method used to identify branch managers would not help to identify different types of non-managerial employees because the number of tellers, accountants, and other senior staff differed across branches and within branches over time. It also would be unhelpful to identify position based on assumptions about wage because one of our main objectives in this paper is to identify the relationship between position and wage.

have conducted our analysis in Sections 3 and 4 excluding these observations from the sample.

This historical payroll data has considerable advantages for examining career structures and promotion tournaments, compared to existing studies based on recent data. Most existing studies of tournaments have focussed upon chief executives or professional athletes, and therefore have limited applicability to the wider workforce (Prendergast, 1999). Where contemporary payroll records of more representative white-collar employees are used, these are necessarily of a duration that cannot cover the majority of an individual's career, particularly given current mobility across firms (and therefore into and out of the dataset). For example, Baker, Gibbs and Holmstrom (1994) have payroll records of 20 years duration. In contrast, we observe at least 20 years information for 35 percent of the sample and the whole career at the Bank for 36 percent.

There are other reasons why this is an extremely useful dataset for examining career dynamics at a white-collar firm. The workers were extremely homogeneous in terms of background and education, being almost uniformly middle class and possessing some secondary education.<sup>14</sup> They were on a simple hierarchical structure; all staff started as junior clerks, typically at age 15-18 and almost always before age 21, and could progress to manager of branches of different sizes. The length of the dataset also means that we can examine how the changes to the banking industry affected personnel practices over time. In our analysis we split the data into the periods 1890-1913 and 1919-1940 in order to capture the effects of these changes. The First World War is a natural focal point for several changes to the industry and to the Bank's workforce. Much of the growth of Williams Deacon's branch network took place immediately after the War, with 52 branches and sub-branches being opened between 1919 and 1922. In addition, the bank began hiring women to do routine clerical duties in 1915 and the bank clerks formed a national union, the Bank Officers' Guild, in 1917.

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<sup>14</sup>The WDB records do not contain information about personal background, however the practise of hiring those from a middle class background with secondary education was universal in the industry. See Klingender (1935), Blackburn (1967), and Hill (1982). The homogeneity of educational attainment was further ensured by the requirement that new recruits had to pass a banking entry exam covering geography, arithmetic, and English as a condition of employment.

From an historical perspective, the data adds to the existing literature on the British banking industry. The only other quantitative study of personnel practices in the industry that we are aware of is Boot (1991), whose study of the Bank of Scotland is restricted to staff at the Head Office. In contrast, the WDB records cover all of the bank's branches over the period of this study. The coverage of the branches in our data set is important for several reasons. By the late 19<sup>th</sup> century, the majority of staff across the industry were based in the branches. In 1900 62.8 percent of WDB staff worked outside the Head Office at Mosely St. or the main London office at Birchin Lane, and over the entire sample approximately 85 percent of staff who remained for at least 5 years spent at least part of their careers at smaller branches. In addition to being able to observe all of the Bank's employees in any given year, the availability of records from the branches means that we continue to observe staff when they move between branches, enabling us to form a more complete picture of the importance of internal movement to the wages and careers of WDB staff.

Table 1 presents summary statistics on the WDB data used in this paper for the whole sample period, and then for the two period sub-samples. There are several important changes in the later period. With the opening of new branches, the average branch size declined, staff were moved more regularly, a higher percent were employed at the level of manager, and a lower percent were employed at the Head Office. In addition, in the later period staff were less likely to resign early in their careers, resulting in higher average tenure and a higher proportion remaining through to retirement.

### 3. Promotion Tournaments at Williams Deacon's

In this section, we use the raw data to examine the career histories of individuals at Williams Deacon's Bank. A striking feature of the data is that staff were regularly re-assigned to different branches during their careers. These moves were often lateral, moving from a non-managerial post at one branch to a non-managerial post at another, although promotions also normally involved a change in branch (to one with a vacant manager post). The sample contains 2,636 job changes including branch moves or changes in rank. Of these, 2,044 were lateral moves below manager level, 115 were lateral moves at manager level, 273 were promotions to manager involving a move, 86 were promotions to manager without a move, 23 were demotions without a move, and 95 were demotions involving a move. In this section, we show that the sample displays the characteristics of an internal labour market that was conducive to the use of promotion tournaments as an incentive device. We find evidence in the wage rewards to promotion that supports the tournament model. However, lateral moves were also important to the smooth running of the Bank. Lateral transfers served two purposes: they helped to monitor staff and they provided an opportunity for younger staff to learn about the different tasks involved with banking (Gilbart, 1865 and Blackburn, 1967). We therefore also examine the wage implications of lateral moves.

The Bank's workplace displayed all of the characteristics of an internal labour market defined by Doeringer and Priore (1971). Very few individuals were hired from outside beyond the initial entry age. Among the sample entrants to William Deacon's, 74.2 percent and 93.1 began prior to their 18<sup>th</sup> and 21<sup>st</sup> birthdays, respectively.<sup>15</sup> Further, if individuals departed from employment at the Bank, they generally did so in the first few years. Approximately 47 percent of employees in the sample left within 7 years of starting, but of those reaching the 7<sup>th</sup> year approximately 69 percent stayed until retirement or death. If individuals remained at the Bank past this initial period, they were reassigned between branches several times, and had the possibility of eventual promotion to manager of a small branch, and, for particularly talented

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<sup>15</sup>Many of those entering after their 21<sup>st</sup> birthday were non-standard employees who came to Williams Deacon's as a result of a merger, were hired during or immediately after the First World War, or were on temporary contracts.

employees, to manager of a medium sized or large branch. Promotion tended to be a slow process: the mean time to the first promotion was 18.63 years. Individuals who failed to be promoted were often eventually moved to a more senior clerking position at a large branch or the Head Office. Among employees remaining at the Bank for at least 20 years, 81.4 percent of those who never rose to manager finished their career at a large branch, compared to 28.8 percent of those who at some point in their career held a managerial post. Virtually all promotions were internal, with the exception of those who started their careers at a bank acquired by Williams Deacon's. These policies were commonplace throughout the industry prior to the Second World War (Blackburn, 1967; Gilbert, 1865; and Rae, 1930).

Since individuals tended to remain for their entire careers at the Bank, it was important to have appropriate incentives to ensure high productivity. Labour economics suggests a number of mechanisms that a firm can use to induce effort, including merit pay, promotion by standards, or promotion tournaments. In the context of the Williams Deacon's Bank, promotion tournaments were the natural incentive mechanism. Over the period of the sample, the Bank opened 161 new branches and sub-branches, creating 107 additional managerial positions (since sub-branches did not typically have their own managers) and thereby plentiful opportunities for promotion. Since the number of promotions was determined by branch openings and retirements, and could not easily vary to match the number of individuals meeting a fixed standard of performance in a given year, the allocation of promotions needed to be competitive. While the Bank could have attached relatively small wage rewards to promotion – given that relatively few individuals would leave to an outside opportunity if not promoted or if the wage increase was viewed as insufficient – it would seem surprising if it ignored the incentive potential of rewarding employees who were sufficiently able or hard working to attain promotion. This is particularly the case given that the homogeneity of entrants to the bank in terms of background probably tempered one of the well known drawbacks of tournaments, namely that individuals would have had little incentive to supply effort once they realised they were unlikely to win promotion. Employees of given length of service at the Bank would have been relatively evenly-placed in a promotions tournament, with their career achievements largely determined by their choice of effort. Furthermore, the frequency of managerial openings would have meant that

individuals passed over for a particular promotion would have been soon considered again. As such, a promotions tournament would have well-directed effects on inducing effort. Rae (1885) noted exactly this sort of practice, stating, “A bank cannot give high wages to all its officers; but if its highest offices are open to every one in its employment, who shall prove his fitness for the same, there will be no apathy for its staff. It will be the object of every one to devote his best abilities to the practice and study of his profession; and thus an able, zealous and loyal staff will be developed.”

Table 2 shows a year-on-year transition matrix between ranks at the Bank, and the associated wage gains. In the raw data, over 98% of staff remained in the same rank each year, with a small number promoted or demoted. In an average year, about 1.3% of clerks were promoted to branch manager, typically to managing a small branch, although a few to managing a medium or large branch.<sup>16</sup> Managers of small branches had comparable probabilities of being demoted to clerk or to be promoted to medium branch manager, although the great majority (93%) remained as manager of a small branch. Interestingly, more medium and large branch managers were demoted each year than promoted.

Table 2 also shows the real wage gains to remaining in rank, being promoted, and being demoted. As would be expected, promotions (cells below the diagonal) were typically accompanied by an above-normal wage increment, compared to remaining in the given post. The wage gains were generally larger with moves further up the hierarchy and for those who skipped one or more levels. Although demotions from large branch manager had a wage penalty, demotions from small and medium branch managers to clerk came with an above-normal pay increase. As discussed previously, movements between branches were an important part of the Bank’s employment strategy, and this evidence suggests that many demotions were simply routine moves between branches. This is further supported by the fact that about a third of demoted employees were later promoted back up to manager.

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<sup>16</sup>A few of these cases are misleading since the data do not distinguish between non-managerial posts, the vast majority of which are clerks. In three cases, a non-manager was promoted directly to managing either the Mosely St. or Birchin Lane branches. These individuals had very high wages prior to promotion and almost certainly occupied senior positions such as accountant or secretary.

Tournament theory emphasises the lifetime gains from a promotion, a significant part of which arise from the increased probability of subsequent promotions – a small branch manager was more likely to be promoted to managing a medium or large branch than a clerk was to gain a direct promotion to managing a medium or large branch. In Table 3, we show the career probabilities that a clerk (or a holder of any of the given ranks) will have ended up being promoted to each more senior rank as a terminal position. We also show in the Table the average wage over his career for an individual whose highest position was that shown in the left hand column. For this table, we only use entrants from 1890 to 1905 and restrict attention to employees remaining at the Bank for at least 20 years. These restrictions allow us to consider comparably-placed individuals to make career comparisons, and to eliminate the very low average wages of those individuals who left early in their careers and therefore were invariably not promoted beyond the position of clerk. In effect, these individuals never entered the promotions tournament at the Bank.

Table 3 can be used to illustrate the expected gains from promotion and therefore the incentives to provide high effort. In the tournament model, a clerk who does not supply effort beyond the level required to avoid dismissal will never be promoted and has a lifetime average annual real wage of  $W_C$ , which from table 3 is £177.92. By providing effort, he could have hoped to be promoted to higher ranks. Assume that each individual in this restricted sample chose to put in the requisite effort to be considered for promotion and has an equal chance of promotion. The average lifetime expected wage  $V_C$  for a clerk putting in effort is the probability that he finally ended up in each of the higher ranks ( $\pi_{CS}$  for example is the probability that a clerk finishes his career as a small branch manager, which from table 3 is 24.07 percent), multiplied by the average lifetime wage of someone attaining that terminal rank. Similar calculations hold for individuals starting from the other ranks (S for small branch manager, M for medium branch manager, and L for large branch manager):

$$V_C = (1 - \pi_{CS} - \pi_{CN} - \pi_{CL})W_C + \pi_{CS}W_S + \pi_{CM}W_M + \pi_{CL}W_L$$

$$V_S = (1 - \pi_{SM} - \pi_{SL})W_S + \pi_{SM}W_M + \pi_{SL}W_L$$

$$V_M = (1 - \pi_{ML})W_M + \pi_{ML}W_L$$

$$V_L = W_L$$

Using the data from Table 3, the values of  $V_C$ ,  $V_S$ ,  $V_M$ , and  $V_L$  are 201.92, 221.77, 250.12, and 501.00. At each career point, the worker has to decide whether to remain in the promotions tournament by supplying high effort, or to settle for the lifetime average wage were his current post to be the highest he ever achieved. An approximation of the gains to supplying effort at each rank is given by the difference  $V_i - W_i$ , multiplied by expected tenure at the Bank (approximately 38 years for this sub-sample).<sup>17</sup> The respective non-discounted lifetime gains are £918, £1,292 and £683 for clerks, small managers, and medium managers. These are significant gains compared to the average annual wage of £177.92 for a clerk who does not progress. Further, the gains are fairly comparable across the starting points – a clerk has roughly the same gain to putting in sufficient effort for being considered for promotion as does a medium branch manager. An important result in tournament theory is that relatively equal incentives for effort over the entire career were sustained by sharply increasing returns to promotion at higher ranks. This is seen clearly in Table 4, showing the average real wage by position. The gain to promotion at each level was sharply increasing in absolute (although not necessarily percentage) terms, at £115.39 (84%) from clerk to small branch manager, £156.37 (62%) to medium branch manager, £381.61 (93%) to large branch manager, and £1,715.11 (217%) to managing the largest branches. Tournament theory predicts this pattern of wage gains, as promotions at later stages do not open the way to as many potential future promotions in the way that promotion to small branch manager opens the way to future promotions to managing larger branches (Rosen 1986).

Table 4 also breaks down the average real wages for each rank into the pre- and post-World War I periods. In each sample period, there were sharp and increasing wage gains to promotion with size of branch. Interestingly, the size of the gains (except for small branch managers) declined after the First World War. This provides additional support for the hypothesis that the Bank was using promotion tournaments to induce effort. In a promotion tournament the extent to which promotion acts as an incentive depends on the expected reward, the probability of promotion multiplied by the promotion premium. After the First World War, there was a sharp increase in the

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<sup>17</sup>This actually understates the total gains over the employee's lifetime because the Bank's pension was based on the final wage.

number of new branches and consequently in the need for managers. The probability of promotion went up sharply, so a given incentive for effort would have been maintained if – as in the data – the wage return was not as great as before the War. An alternative hypothesis to promotion tournaments is that the Bank set wage levels as compensating differentials for the extra responsibilities of being a manager. Rae (1885) noted that promotion to manager carried – “a serious heritage of unaccustomed duties and anxieties”. But if this – rather than promotion tournaments – was the basis for the wage differentials, these should have increased after the War. The greater the number of managers out of a given pool of employees, the greater the marginal disutility that needed to be compensated. The Bank would have needed to promote not just those individuals who welcomed the additional responsibilities and social status, but additional staff who suffered greater ‘anxieties’ and who therefore needed greater compensation.

Promotions were not the only form of job transition in the payroll data. About 82 percent of all transitions in the sample were lateral moves between non-managerial positions. Table 5 shows the percentage changes in real wages to the different forms of transition. Interestingly, lateral moves were associated with large wage increases – for current clerks, promotion led to a £14.76 wage increase, but moving branches with no change in position led to a nearly comparable £14.25 increase. One explanation is that lateral moves were used to expose promising young employees to new tasks or to be reviewed by a different manager (Blackburn, p. 74). Among staff entering as a clerk in the sample period and remaining in the data set for at least 20 years, the average number of observed moves for those eventually promoted to manager was 4.42 compared to 2.52 for those never promoted. Under this explanation, the pay increase could be associated with the Bank’s recognition of the high ability of the clerk.<sup>18</sup> However, comparable pay increases occurred for managers moving between branches without a promotion. An alternative explanation is that lateral moves were primarily to help the bank monitor its employees. Staff who were left in the same branch indefinitely had greater opportunities to collude with each other or with

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<sup>18</sup>It is also possible that the pay increases given to clerks for lateral moves were in part due to annual increments on the Bank’s pay scales. The salary scale tended to give the largest increments to younger employees. The average tenure for clerks moving between branches was 9.1 years, compared to 13.5 years for clerks not moving. Thus it is possible that these clerks would have received above average increments, whether or not they moved branches.

customers in order to defraud the bank. Moving staff between branches helped to prevent such coalitions and to uncover them, as when an employee moved, the first task of his replacement was to check the books for errors or fraud. In this case, the Bank may have offered staff moved to a new location a wage increase to compensate them for the disutility of moving.

Another possible transition involves demotion, which occurred 110 times in the sample. Demotions were sometimes used as a penalty for infringements on the Bank's rules or as a response when the bank realised that an employee was unsuitable for managerial positions. However, it can be seen in tables 3 and 6 that most demotions were associated with above-normal pay increases. This may have been because many demotions were in fact routine moves, necessitated by the need for continuous monitoring (as discussed previously) and occurring at a time when there were no managerial openings. Approximately 33.8 percent of demotions were subsequently followed by promotion back to manager. In other cases, apparent demotions may have been reassignments to senior positions at much larger branches. Approximately 55 percent of demotions came with a move to a large branch, and these demotions also had a very large average pay increment (£30.36).

#### 4. The Determinants of Real Wage Levels and Changes

The previous section examines whether the raw data is consistent with the tournament model of promotions. Wages were rising with rank at an increasing rate, as predicted by the tournament model, leading to relatively constant incentives to provide effort throughout the career. By breaking the sample into two periods, pre- and post-War, we also find that wages follow the pattern predicted by tournament theory. In the second period, when there was a much higher probability of promotion, the returns to promotion were lower. In this section, we present regressions on the level and changes of real wages. This allows us to confirm whether the Section 3 results continue to hold after controlling for individual variables such as age upon entry and tenure at the Bank, as well as the general economic environment (including the effects of the War and inflation). We are also able to look at additional issues such as unobservable heterogeneity – 'ability' – and the time pattern of the returns to promotion.

The first column of Table 6 shows a standard OLS earnings regression on the log of real wages for the full sample period. We model the relationship between wages and tenure at the Bank as a polynomial of fourth order.<sup>19</sup> This allows for the possibility that – even after controlling for promotion – the bank used high expected end-of-career wage rises as a way of inducing effort and cutting turnover. The positive coefficient on the cubic term is evidence that there was deferred compensation of this sort. The regression also shows that wages rose rapidly at the beginning of workers’ careers. Entry age (a proxy for experience or education when joining the Bank) had the expected positive (but diminishing) effect. Being at the Head Office or in London had a positive effect. Real wages were lower during the War. Even after controlling for the very high War-time inflation rates, World War I had a strong negative effect since many younger staff were conscripted and received no increments while on active duty.<sup>20</sup> In general, inflation had a negative effect on real wages, and indeed the coefficient is higher than unity. The Bank did not typically respond to inflation by raising nominal wages, although there were catch-up rises after the War in 1919, 1920, and 1925.

Controlling for the effects of job tenure lowers the estimated returns to promotion compared to the raw data. This is likely because managers had greater average seniority than non-managers and all employees could have expected to receive wage increases with seniority, whether or not they were promoted. Other things being equal, the regression implies that the manager of the smallest branch earned about 22 percent more than a clerk at a similar branch. Likewise the manager of a branch with 50 staff earned approximately double that of manager of a branch with 2 staff. These are smaller figures than shown in the raw data Table 5, but it remains the case that branch managers earned substantially more than clerks, and that this differential increased with the size of the branch. Note that the increase in remuneration with respect to branch size for managers is reflective of a hierarchy of ranks, not a pure branch size effect where all workers at larger branches were paid more. Although the

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<sup>19</sup>The quartic specification originally comes from Murphy and Welch (1990). Seltzer and Merrett (2000) find that the quartic specification describes wages in the Australian banking industry better than the standard quadratic specification.

<sup>20</sup>The Bank continued to pay staff who were on military leave (usually at the rate of the difference between their bank wage and military wage), and thus these observations are included in the sample.

pure branch size coefficient in the regression is significant, it is small compared to the interactive effect for being manager at different size branches. All else equal a clerk in a branch with 50 staff earned only about 1.5 percent more than a clerk in a branch with 2 staff, compared to the 100 percent differential for a manager at these branch sizes. The regression also shows the pay effects of the other forms of transition discussed in Section 3. Lateral moves across branches ('moves to date') had significant effects on wages, although these effects were small compared to promotion. Prior demotions had a large positive effect on current wage. An important feature of this regression is that it shows the longer-term effects of lateral moves and demotions. In Table 5 (and in the changes in income regression presented below), we see the immediate effects of a lateral move or demotion, rather than the ultimate effects on the individual's career and wage progression. We return to the issue later in this section.

We now look at what the regressions in Table 6 tell us about the use of promotions tournaments at the Bank. The regression coefficients from column 1 can, under specific assumptions, be used to calculate the value of promotions relevant to the individual's effort choice, comparable to the calculations from the raw data in Section 3. To illustrate, we calculate predicted values of lifetime average wages for an individual who directly entered Williams Deacon's at age 16 in 1890; whose career as a clerk was spent at branches with 5 staff; who moved branch in years 2, 5, and 10; who did not work in London or at the main office; and who retired at age 60. We also consider a specific promotion path: there were potential promotions after 20, 25, and 30 years to managing a small (4 staff), medium (10 staff), and large (70 staff) branch. We take the probabilities of promotion from table 4. Under these assumptions, the coefficients from Table 6 give the predicted values of lifetime average wages  $W_C$ ,  $W_S$ ,  $W_M$ , and  $W_L$  for someone ending their career in each level as 164.31, 200.41, 225.13, and 536.02. The predicted lifetime average wages  $V_C$ ,  $V_S$ , and  $V_M$  for individuals at each rank who puts in effort to have the average probability of promotion to higher ranks are 197.69, 228.35, and 245.87. The calculated lifetime nondiscounted gains to effort at each rank are 1268, 1061, and 788. These values are very similar to the figures (918, 1292, and 683) computed from the raw data in table 3. The large returns to promotion support the tournament hypothesis, as does the fact that the sharply

increasing wages with rank leads to a relatively constant return to effort throughout the individual's career.

In the 3<sup>rd</sup> and 4<sup>th</sup> columns of table 6, we compare the pre-War and post-War periods. Tournament theory predicts that the gain in 'winning the tournament' would be less if the probability of winning was greater. The sharply increased percentage of staff at the level of manager in the post-War period shown in Table 1 would suggest a smaller return to promotion. As with the raw data, we find significantly lowered returns to being a manager in the post-War period compared to the pre-War period. The magnitude of the decrease in the promotion premium between the two periods approximately offsets the increase in the odds of promotion. Thus the expected value of promotion changed little between the two periods, as would be expected if promotions were being used to optimally provide incentives. Interestingly, the magnitude of the decline differed across branch size. The regression results show that the premium for managing a branch with 2 staff declined by 42.9 percent (from 29.1 percent to 16.6 percent), whereas the premium for managing a branch of 50 declined by a more modest 24.3 percent (from 138.6 percent to 105.0 percent). Since the bulk of the increase in branches in the latter period was in small branches, this is consistent with the tournament model.

Using regression analysis, we can examine issues beyond those explored using the raw data. While a firm may set high rewards in a tournament to induce effort, both ability and effort can help in winning a promotion. Lazear and Rosen (1981) argue that, provided ability is at least partially observable, the firm might optimally handicap able individuals. Otherwise, lower ability individuals would not provide high effort since they did not have a chance of winning the promotions tournament, and high ability individuals would lessen their effort given their confidence in winning. In these circumstances, the firm would have paid higher wages to able employees even before promotion to encourage the recruitment of more able entrants, but would have paid lesser returns to promotion. This can be examined using a fixed effects estimator to control for unobserved heterogeneity ('ability'). As expected, both the estimated return to being a branch manager, and to managing a larger branch, decline when we control for fixed effects in column 2 of Table 6. A similar effect

holds for employment at Head Office, suggesting that this was an assignment given to the Bank's more capable employees.

While the fixed effects estimator is one way of controlling for unobserved heterogeneity, it is also possible that the results are driven by selective exits. It is likely that lower ability or unsuitable workers leave early in their career, and this may bias the regression coefficients because tenure and position will be correlated with ability. We control for this in the fifth column of Table 6 by considering only employees in their 30<sup>th</sup> year of tenure, thereby eliminating individuals who exited early.<sup>21</sup> It can be seen that the coefficients on manager and the manager-branch size interaction are only slightly smaller than in the OLS specification, thereby suggesting only a limited role for selective exits.

In the tournament model where promotions reward effort, wage levels differ from marginal product and are attached to ranks. The bulk of the gain associated with a promotion should occur in the year of promotion, with possible subsequent pay rises if the new rank is on a higher incremental pay scale. In contrast, promotions may just be reflecting the firm's recognition of an individual's high productivity which is already incorporated in the individual's within-rank wage. In this case, the pay rise may anticipate the promotion. To look at this issue, we estimate the effects of job transitions on the change rather than the level of real wages in Table 7.<sup>22</sup> We find in column 1 that a promotion has a significant effect on pay increases in the year of promotion with weak evidence of a substantially smaller further effect in the subsequent year. There is no evidence that wage increases were higher in the year prior to promotion. This supports the tournament approach, that wages are attached to ranks rather than directly to productivity. The second column of the Table adds terms for promotion to manager of a large branch, with similar but stronger results – in this case, pay rises continued after the initial year of promotion. Another interesting result

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<sup>21</sup>The lack of an effective instrument in the data for the exit decision precludes the approach of jointly modelling exits and wages.

<sup>22</sup>The independent variables in table 7 differ somewhat from those in table 6. Many of the variables in table 7 (moved branches, change in branch staff, promoted) are first differences of the variables in table 6. Several of the remaining variables from table 6 (entry age, entry age squared, entered through merger) have first differences of zero and thus were not included in the regressions in table 7. We use a quadratic tenure specification rather than a quartic specification for simplicity, and further regressions show that the main results of table 7 are not sensitive to this specification. We also include dummy variables for 1919, 1920, and 1925 – years when the bank had across-the-board wage adjustments.

is that spending a long time in the same position (i.e. failure to be reassigned or promoted), carried a small wage penalty. These phenomena are consistent with the observation that, in each position, there was a minimum wage with a number of annual increments up to a maximum level. Once an individual had reached the top point for their position they could only receive a higher wage through reassignment.<sup>23</sup>

Table 7 also allows us to distinguish between the impact effects of a job transition and the longer-term career effects (from Table 6). This is not very important for promotions, since both the short and long-run effects on wage are positive. Similarly, lateral moves across branches have positive short and long-run effects. The significant difference occurs for demotions. The short-run impact of a demotion is negative, presumably since the individual is put on the pay scale for the lower-ranked post. However, it should be noted that most demotions involved a move across branches, so the additive effect of ‘demoted’ and ‘moved’ is roughly zero. The long-run effect from Table 6, however, is positive. This is consistent with the argument that demotions were largely part of the Bank’s policy of moving individuals between branches on a regular basis, rather than a strong negative re-evaluation of the worker.

## 5. Conclusions

In this paper, we have used a unique data-set of historical payroll records to examine career structure at a white collar firm. By using historical data, we have a long series of wage figures and can trace many workers through their entire careers. As such, we can examine not only impact effects of job transitions – lateral moves, promotions and demotions – but the longer-term career effects. There was a strong internal labour market at the Bank with virtually all promotions coming from within. Those workers who made it through an initial 7 year period typically remained with the Bank until retirement. Given the internal labour market, the Bank did not need to follow marginal productivity and outside opportunities in determining wages. It could instead establish promotion tournaments with wage rewards set to induce the optimal level of effort.

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<sup>23</sup>Gilbart (1865) argues that this practice was used by some banks. He stated, “Another bank may have a fixed *minimum* salary [for each post]. Each clerk holding a post for a certain period has an annual advance for that period. Then he stops, and receives no further advance until he is promoted to the next post, where again he becomes entitled to annual advances.”

We find evidence that the Bank used promotion tournaments in this way. There were above normal wage increases in the year of promotion and, to a lesser extent, in the subsequent year, showing the tie between wage rates and rank. If the promotion went to the most productive worker, and the Bank was setting wages to match productivity, wages would have been higher prior to the actual promotion, but there is no evidence that this was the case. Tournament theory suggests that the wage gains on promotion should increase at an increasing rate higher up the hierarchy. This maintains a relatively constant inducement to effort throughout the individual's career, since later promotions do not contain the same option value as earlier promotions. For example, the promotion to general manager is the final possible promotion and the gain is just the immediate wage gain, while an earlier promotion increases the likelihood of an eventual promotion to general manager. We find, in both the raw data and in estimated wage levels, evidence that wages increased at an increasing rate up the hierarchy, and that the calculated return to effort remained fairly constant. Another prediction of tournament theory is that the return to a promotion should be less if the probability of achieving the promotion is higher. By breaking the sample into two periods, pre-War (when relatively few individuals were promoted to manager) and post-War (when branch expansion meant that many more individuals were promoted), we test this hypothesis and find support for it.

In addition to promotions, there were frequent lateral moves across branches, and less frequent demotions. Honesty from staff was particularly important in this industry, and moving staff across branches lessened the opportunities for dishonest behaviour and increased the monitoring since the new holder of the post would report on any irregularities discovered. As such, the Bank treated moves and even some demotions as a normal part of career progression. There is strong evidence that wages increased with lateral moves and that, after an initial negative impact on wage, demotions too had a long-run positive impact on wages. This suggests that staff were being compensated with wage increases for the disutility of moving between branches.

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Table 1. Summary statistics of variables

		1890-1941	1890-1913	1919-1941
Variables by man-year	Real Wage	168.03 (187.03)	170.65 (245.22)	179.40 (153.90)
	Manager	0.1370 (.344)	0.1078 (.310)	.1591 (.366)
	Of small branch	.0935 (.291)	.0647 (.246)	.1146 (.319)
	Of medium branch	.0351 (.184)	.0333 (.179)	.0364 (.187)
	Of large branch	.0084 (.091)	.0098 (.098)	.0075 (.086)
	London	0.1735 (.379)	0.2248 (.417)	.1331 (.340)
	Head Office	0.1271 (.333)	0.1731 (.378)	.0950 (.293)
	Inflation rate	2.13 (7.72)	0.606 (2.25)	.920 (8.91)
	Branch size	34.03 (39.57)	40.19 (32.24)	28.37 (37.89)
	Tenure	15.09 (11.88)	13.75 (11.41)	15.71 (11.96)
	Moved branches	.073 (.259)	.052 (.222)	.088 (.283)
	Number of branches	91.73	51.42	137.39
	Number of observations	34,803	11,447	19,933
	Variables by staff member	Age at entry	17.41 (3.25)	17.94 (3.28)
Age at exit		35.95 (17.92)	32.48 (16.86)	41.93 (18.35)
Percent of exits due to resignation		55.64	65.26	45.63
Due to termination		2.68	4.96	1.28
Due to death		13.38	7.94	12.37
Due to retirement		28.30	21.84	40.94
Number of observations		2,093	1,006	1,523

Notes: Number of branches and the inflation rate are per year (not per man-year).  
Standard deviations in parentheses.

Table 2. Year-on-year transition matrix between ranks: numbers, percentages and real wage gains

		Clerk	Manager (staff $\leq$ 5)	Manager (6 $\leq$ staff $\leq$ 19)	Manager (20 $\leq$ staff $\leq$ 49)	Manager (50+ staff)
Position in current period	Clerk	27,829 (98.7%) [£6.81]	103 (3.3%) [£10.15]	10 (0.9%) [£13.03]	2 (1.2%) [-£15.00]	0
	Manager (staff $\leq$ 5)	294 (1.0%) [£19.18]	2,872 (93.0%) [£5.41]	55 (4.8%) [£5.05]	0	0
	Manager (6 $\leq$ staff $\leq$ 19)	39 (0.1%) [£28.57]	113 (3.7%) [£16.25]	1,061 (93.4%) [£6.54]	3 (1.8%) [-£27.04]	0
	Manager (20 $\leq$ staff $\leq$ 49)	14 (0%) [£69.63]	0	9 (0.8%) [£22.58]	166 (97.1%) [£23.99]	0
	Manager (50+ staff)	7 (0%) [£109.39]	0	1 (0.1%) [£422.57]	0	95 (100%) [£23.56]

Notes: Percent of observations in parentheses.  
Average real wage gain in brackets.

Table 3. Career transition matrix and associated real wages, 1890-1905 entrants

Position	Number of employees	Average real wage	Percent attaining maximum level			
			Clerk	Small manager	Medium manager	Large manager
Clerk	112	£177.92	51.85	24.07	20.83	3.24
Small manager	52	£187.26	----	56.04	38.47	5.49
Medium manager	43	£232.19	----	----	93.33	6.67
Large manager	7	£501.00	----	----	----	100

Notes: Only individuals remaining at the Bank for at least 20 years are included.  
The average real wage is calculated over the career for all individuals achieving the maximum position in the left-hand column.

Table 4. Average annual real wages by position

	All Years	1890-1913	1919-1940
Non-managers	£136.89 (30,028)	£139.58 (9,634)	£144.55 (16,768)
Managers	£363.87 (4,776)	£436.46 (1,234)	£349.12 (3,166)
Managers ( $\leq 5$ staff)	£252.28 (3,255)	£221.03 (741)	£272.36 (2,284)
Managers (6-19 staff)	£408.65 (1,224)	£396.70 (381)	£436.38 (726)
Managers (20-49 staff)	£790.26 (191)	£992.02 (58)	£731.65 (114)
Managers (50+ staff)	£2,505.37 (106)	£3,076.54 (54)	£1,976.90 (42)

Note: Sample size in parentheses.

Table 5. Percentage change in real wages by transition type

	Clerks in year t-1	Manager in year t-1
No transition	8.32 (13.57)	2.70 (10.00)
Moved branches, position unchanged	14.25 (15.17)	15.46 (16.60)
Promoted	14.76 (16.36)	
Demoted		5.16 (11.10)
Demoted, moved to a larger branch		7.67 (17.80)
Exits during current year	5.86 (14.12)	1.21 (7.72)

Note: Standard deviation in parentheses.

Table 6. Regressions on the determinants of log real wages

	OLS (1890-1941)	Fixed Effects (1890-1941)	OLS (1890-1913)	OLS (1919-1941)	OLS (Tenure=30)
Tenure	.2138** (159.14)	.1813** (46.95)	.2356** (101.80)	.1960** (132.54)	
Tenure <sup>2</sup>	-.0088** (72.81)	-.0093** (82.48)	-.0103** (50.28)	-.0079** (58.15)	
Tenure <sup>3</sup>	.00017** (43.16)	.00020** (52.91)	.00020** (32.04)	.00016** (34.97)	
Tenure <sup>4</sup>	-.0000012** (28.28)	-.0000016** (39.05)	-.0000014** (21.77)	-.0000012** (24.44)	
Entry age	.0729** (38.53)		.0720** (23.69)	.0484** (20.12)	.0035 (0.66)
Entry age <sup>2</sup>	-.00068** (19.03)		-.00074** (12.95)	-.00025** (5.38)	
Head office	.0993** (13.51)	.0132 (1.38)	.0928** (7.36)	.0539** (6.27)	.0802 (1.02)
London	.1978** (34.06)	.1450** (8.65)	.3102** (27.66)	.1158** (19.49)	.1453* (2.30)
World War I	-.3310** (61.54)	-.2982** (65.90)			-.4299** (8.00)
Entered through merger	.0008 (0.14)		-.1205** (13.41)	.0239** (2.90)	.0038 (0.09)
Time trend	.0031** (25.88)	.0339** (9.40)	-.0099** (20.95)	.0179** (71.37)	.0003 (0.19)
Inflation rate	-.0135** (67.70)	-.0132** (80.34)	-.0075** (6.13)	-.0176** (96.95)	-.0084* (4.25)
Employment at branch	.00029** (4.08)	.00064** (7.46)	.00082** (5.57)	.00056** (7.41)	.0014 (1.60)
Branch manager	.1862** (35.37)	.1391** (23.33)	.2464** (23.38)	.1361** (26.53)	.1830** (4.12)
Manager*employment	.0202** (81.69)	.0117** (40.09)	.0229** (53.24)	.0184** (68.18)	.0168** (10.49)
Moves to date	.0069** (5.79)	.0444** (22.74)	.0023 (0.63)	.0166** (14.65)	.0184 (1.63)
Prior demotion	.0965** (13.14)	.0890** (10.01)	.2479** (12.86)	.0532 (8.11)	.1126* (2.21)
Constant	2.1624** (93.11)	2.7759** (52.38)	2.2703** (61.01)	1.9270** (64.94)	5.3104** (45.99)
Adjusted R <sup>2</sup>	.9107	.9024	.9091	.9391	.5006
Sample Size	34,803	34,803	11,447	19,933	474
F	20,888.27**	21,578.37**	7,152.68**	19,203.92**	40.52**

Notes: \*\* = significance at a 1 percent level.

\* = significance at a 5 percent level.

t-statistics in parentheses.

Dependent variable is Ln(Real Wage).

Within group R<sup>2</sup> is reported for the fixed effects regression.

Table 7. Determinants of changes in log real wages

	All employees	All employees
Moved	.0164** (10.21)	.0167** (10.39)
Promoted	.0355** (8.58)	.0314** (7.53)
Year prior promotion	-.0009 (0.24)	-.0009 (0.22)
Year subsequent to promotion	.0074 (1.93)	.0062 (0.59)
Promoted to manage large branch		.1238** (7.46)
Year prior to promotion (large branch)		.0017 (0.10)
Year subsequent to promotion (large branch)		.0398* (2.45)
Demoted	-.0176* (2.58)	-.0172* (2.52)
Change in employment at branch	-.0001 (0.71)	-.0001 (0.77)
Change in employment at branch*moved	.00004 (0.25)	.00004 (0.26)
Time at branch	-.00022* (2.44)	-.00022* (2.40)
Constant	.1908** (142.84)	.1907** (142.92)
Adjusted R <sup>2</sup>	.7306	.7312
F	4804.15**	4094.27**
Sample Size	32,129	32,129

Notes: \*\* = significance at a 1 percent level.

\* = significance at a 5 percent level.

Dependent variable is  $\ln(\text{Real Wage}_t) - \ln(\text{Real Wage}_{t-1})$ .

Individual fixed effects used in the regressions. Within group R<sup>2</sup> is reported.

Control variables are: Tenure, Tenure<sup>2</sup>, World War I, Inflation, Branches opened, Year=1919, Year=1920, Year=1925.