Phone Call Money: communication methods and the pattern of English banking mergers, 1825-1924

Candidate 17223

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Word Count (ex titles, contents, abstract, tables, footnotes, and bibliography) = 10,067
Abstract

The English banking sector consolidated dramatically between 1890 and 1924 as a result of a wave of mergers. The literature is divided as to the cause of this wave. In a novel approach, this study, using a newly constructed dataset of the distances between the headquarters of each pair of banks involved in the 530 amalgamations that occurred between 1825 and 1924, tests the theory that advances in communication technology facilitated the process of concentration. It concludes that the growing telephone system was the crucial enabler of the centralised control of banks, of bigger mergers and, thus, of industry consolidation.

1. Introduction

Between 1825 and 1924 over 500 mergers took place in the English and Welsh banking sector. Between 1890 and 1924, the merger wave was so intense that the share of deposits held by the biggest five banks grew from 26.5% to 80% - thus establishing the fundamental competitive structure of British banking that has persisted until the present day. The huge rise in banking concentration in these years occurred against a regulatory background that was almost completely laissez faire in legal terms until 1918 and, thereafter, in practice allowed mergers to go ahead with the minimum of objection. Commercial pressures and considerations, therefore, were the sole determinants of the pattern of mergers in the late 19th and early 20th centuries. What is still debated in the literature, however, is what precisely these commercial considerations were. Most possible explanations (for example that mergers were a means of lowering costs via economies of scale or were aimed at increasing market power) have significant weaknesses. The aim of this paper is to comment on this debate.

\[1\] Capie and Rodrik-Bali, 'Concentration in British Banking 1870–1920', Business History, 24:3, 280-292, 1982, Table 3
and then to elucidate it by considering the geographical aspect of banking mergers – specifically the evolution over time of the distance between the headquarters of merging firms (used as a proxy for the cost of centralised control and referred to as ‘merger reach’ throughout this paper) – in order to test a novel theory that it was the availability of more sophisticated and more widespread communications technologies that was the primary enabler of the rise in concentration of banking. In particular, the paper emphasises the vital part played by the rise of the telephone.

The document is in five further sections. Section 2 provides a brief background to the history of the banking sector in England and Wales from 1825 until 1924 and charts the history of the merger movement. Section 3 sets out some of the theoretical approaches to the issue of the economics of bank mergers, bank size and industry concentration, and presents a short summary of the academic literature on the subject of the developments in 19th and early 20th century banking. The importance of merger reach in assessing the pattern of mergers is also set out. Section 4 then explains the way this paper’s merger reach dataset was created and details the analyses performed using this data. Section 5 contains a discussion of the plausibility of the statistical findings coming from the data analysis by reference to a variety of pieces of supporting, historical evidence about banks’ business practices and the development of communications technology. Last, Section 6 comprises some conclusions, some caveats around the limitations of this study, and some suggestions for further research.
2. **English and Welsh banking: a historical background**

At the start of the 19th century, banking in England and Wales (from here on in shortened to just ‘England’ for convenience) was a separate market from that of Scotland and Ireland and was, to a large extent, a cottage industry. The Bank of England Act of 1708 restricted the activities of other banks such that, "no company or partnership exceeding six persons in England" could "borrow, owe or take up any sum or sums of money on their bills or notes payable on demand or at any less time than six months from the borrowing thereof." ² Bank of England aside, by 1800 banking was therefore carried out by hundreds of small, private banks. Many of these engaged in the standard banking activities of deposit taking, bank note issuance and short term lending but some of them, in contrast, had the characteristics of modern day venture capital firms (making long-dated equity investments which were very closely monitored by the banking partners). ³ By the 1820s, however, under the twin pressures of the public debt burden (incurred because of the recently-ended Napoleonic wars) and of a rapidly growing economy, this functioning but fragmented banking model came under stress; the need was increasingly recognized for a relaxation in legal restrictions. A crisis in 1825 when “93 banks in England and Wales failed (approximately 15 per cent of the total) [resulting] in widespread commercial distress” ⁴ spurred the creation of the 1826 Banking Co-Partnership Act which, for the first time, allowed joint stock banks to be set up and to issue bank notes - providing that they were not within 65 miles of London where the Bank of England maintained its jealously guarded bank note issuance monopoly.

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⁴ Collins, Money and Banking in the UK: A History’, *Routledge*, 1988, p9
The Act led to the creation of a large number of new (at this stage unlimited liability) joint stock banks outside London and, as the years progressed, many of these grew by taking over existing private banks. Joint stock banks were further encouraged when The Bank Charter Act of 1833 allowed joint stock banks within London although it did not allow them to issue notes. Of all banking mergers or acquisitions in the period 1825-1843, over three quarters were carried out by joint stock banks taking over private concerns. From 1844 until 1861, however, the pace of merger activity was markedly reduced - from 6.4 per year in the period 1825-43 to 2.4 per year in 1844-61. This slowdown coincided with a change in regulations. The Bank Charter Act and the Joint Stock Banks Act of 1844 (brought in after more financial turbulence in the 1830s and 1840s) put much tighter limits on the ability of ‘country banks’ (i.e. those outside London) to issue bank notes. One illustration of the strictness of the new restrictions is that, under the new rules, if two country banks (both of them note issuers) merged – only the acquiring bank’s note issue would now be valid. The effect of all this was to shore up the position of the Bank of England as the nation’s dominant (and, eventually, only) note issuer, to prompt the rise of the cheque as a means of payment, and to dissuade the pursuit of further amalgamation.

In time, however, further regulatory changes led to another phase of mergers in the English banking industry. The Limited Liability Act 1855 and Joint Stock Companies Act 1856 allowed the creation of limited liability companies, which, hitherto, had been prohibited by legislation put in place in the early 18th century. It was only in 1862, however, when the Companies Act clarified certain previously existing legal anomalies that had

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5 Sykes, ‘Amalgamation Movement in English Banking 1825-1924’, P.S. King and Son, 1926, Table, p4
6 Ibid, calculated from Appendix 1, p193 – see also Table 1 in this paper
affected only banks, that the general regulatory loosening applied with full force to the banking sector. With this ‘enabling’ legal environment in place, the period 1862-1889 saw an average of almost five mergers per year. ⁷ For many years after 1862, limited liability and unlimited liability joint stock banks co-existed, but the shock prompted by the collapse of the City of Glasgow Bank in 1878 – a large bank which retained unlimited shareholder liability despite having the available legal means to limit it – prompted another change in legislation (the 1879 Companies Act), a move “which tipped the balance of costs and benefits in favour of limited liability” and thus led to dominance of this corporate form. ⁸

But it was from 1890 that the pace of banking amalgamation accelerated most rapidly. Whatever caused this (a question we will consider at length in the next section) the effect was dramatic – over the next 13 years, 153 mergers took place at a rate of just under 12 per year. ⁹ As well as an increased pace of merger activity, the size of mergers was increasing with larger banks (for example, the originally Birmingham-based Lloyds) making strings of acquisitions. In time, in the early 20th century, despite a decline in the pace of merger activity, concerns began to rise over the increased concentration of banking. As one contemporary account observed: “the public, looking on from outside … begin to feel some alarm lest a handful of City financiers should finally succeed in establishing a complete banking monopoly”. ¹⁰ This led to the creation of the Bank Amalgamations Committee in 1918, the recommendation of which was that new legislation should mandate the prior approval of the Government before any further amalgamations took place. Mergers still occurred despite

⁷ Ibid, calculated from Appendix 1, p193
⁹ Sykes, op. cit., Table, p47
¹⁰ Anon, ‘Bank Amalgamations’, The Spectator, 23 February 1918
this obstacle but the process of concentration was essentially already complete. The ‘Big Five’ banks (that is, Barclays Bank, National Provincial Bank, Midland Bank, Westminster Bank, and Lloyds Bank) dominated English Banking for much of the 20th century.

Table 1 provides a summary of the merger activity described above.

Table 1 - Summary of English Banking Merger Activity 1825-1924

<table>
<thead>
<tr>
<th>Period</th>
<th>Amalgamation Type</th>
<th>Statistics</th>
<th>Major Events in Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Private buys</td>
<td>Joint Stock</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>Joint Stock</td>
<td>Private</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>buys Joint</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stock</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Private</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>buys Joint</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Stock</td>
<td></td>
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<td></td>
<td></td>
<td>Private</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>buys Joint</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stock</td>
<td></td>
</tr>
<tr>
<td>1825-1843</td>
<td>23</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>1844-1861</td>
<td>11</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>1862-1889</td>
<td>31</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>1890-1902</td>
<td>37</td>
<td>51</td>
<td>1</td>
</tr>
<tr>
<td>1903-1924</td>
<td>1</td>
<td>58</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>165</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Sykes, ‘Amalgamation Movement in English Banking 1825-1924, P.S. King and Son, 1926, Table, p97

A 1982 paper by Capie and Rodrik-Bali calculates the effect this merger activity had on banking concentration. 11 Graph 1 below shows one measure of this – the proportion of deposits held by the biggest 5 and 10 firms in England and Wales. 12 A very sharp rise in the degree of concentration can be observed between 1890 and 1920.

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12 ibid, graph plotted with data from Table 3
Another measure the authors calculate is the ‘Numbers Equivalent’ of the Herfindahl-Hirschman (or HH) concentration index. This shows the hypothetical number of firms with equal market share that would have the same HH index as the real, unequal firms – a hypothetical number which can be calculated simply as the reciprocal of the sum of the squares of the shares of the real firms. For English banking, this number collapsed from 46 in 1890 to 8 in 1920 – a dramatic increase in concentration.\(^\text{13}\) The authors examine to what extent amalgamation was the cause of this increase in concentration (as opposed to it resulting from the unequal organic growth of existing firms) and conclude that, “all the reduction [in HH Numbers Equivalent] came from mergers”.\(^\text{14}\) Understanding the cause of these mergers, therefore, is vital to understanding the changes that occurred in English banking.

\(^\text{13}\) ibid, Table 4
\(^\text{14}\) ibid, p289
3. **A theoretical perspective on banking mergers**

A powerful framework for understanding firms’ choice of organisational form and their size is that of Transaction Cost Economics (TCE). Coase, in his seminal 1937 paper, suggests that firms exist in order to minimise the transactions costs of doing business and that, “a point must be reached where the costs of organizing an extra transaction within the firm are equal to the costs involved in carrying out the transaction in the open market” – an inflexion point that determines the extent of the firm.  

He argues that firms should become larger as, *ceteris paribus*, the costs of organizing the firm internally fall; as the firm’s managers become less prone to sub-optimal resource allocation with increasing firm size; and as the economies in factors of production arise with increasing scale (i.e. economies of scale and scope). In short, firm size is a balance between the advantages of extra scale and the associated disadvantages of managing that scale. Williamson (1967) expands on these first two of Coase’s costs (costs of internal organisation and managerial decision making) by modelling the managerial ‘loss of control’ as firm size increases. In his model, the limitation on individual manager’s span of control leads to an increased numbers of hierarchical layers as firm size rises and thus to serial distortions in information transmission; these “cumulative effects of control loss are fundamentally responsible for limitations to firm size”, he asserts.

More recent literature building on these foundations has specific relevance for the discussion of English banking. A 2006 paper by Lamoreaux and Rosenthal models a firm’s decision of whether to adopt a partnership or corporate form within a TCE framework. The choice

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between partnership and corporation, they state, can be thought of as a balance between minimizing the sum of three different transactions costs for the owners: the cost of monitoring corporate managers; the potential costs of untimely dissolution (triggered in a partnership if a partner leaves); and the cost of ‘minority shareholder oppression’ in the corporate setting. A simple game-theoretical model of this cost-driven choice leads the authors to conclude that: “the choice of organizational form depends on the relative magnitude of the different transaction costs and on equity stakes”.  

A corporate structure will be chosen when the agency problem inherent in managing a corporation is outweighed by the disadvantages of the less flexible, constrained partnership form.

The gradual rise to dominance of the joint stock bank in 19th century English banking (once the legislation of 1826 made joint stock banks legally possible at all) can be perfectly understood in this light. Indeed, contemporary evidence shows that the trade offs were pointed out (to corporations’ advantage) when new banks tried to attract potential shareholders. See, for example, this extract from the 1833 prospectus of the London and Westminster Bank describing the benefits of unlimited liability joint stock banks: “Their capital cannot be diminished by either deaths or retirements; their numerous proprietors ensure to them confidence and credit, as well as ample business on deposit, loans and discounts … [and] they are under the management and control of men who are elected by the respective proprietors, who have no individual interest which can induce them to depart from an approved prudential course, and who are a safe and constant check upon every officer in the several establishments…”.

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18 Ibid, p18  
19 Anon, London and Westminster Prospectus 1833, Royal Bank of Scotland archives. Also Sykes op. cit. note 8, p7
as an advantage (in a neat and slightly audacious reversal of the idea of the problem of agency) points to another perceived weakness of private banking partnerships: their lack of transparency and tendency to fail. Often failure happened because of difficulties with concentrated, ‘venture capital’ style investments, a problem that the London and Westminster prospectus makes reference to when it lists, as an advantage of joint stock banks, that “their rigid exclusion of every kind of mercantile and special transaction affords a satisfactory guarantee … that their means are only employed in legitimate banking operations”. Thus, over the century we are considering, did the corporate form become dominant – a tendency that was accelerated when legislation made limited liability more cost effective in the period following the collapse of the City of Glasgow Bank in 1878.

A TCE approach, therefore, provides a plausible account of the evolution of the organisational form of banks in the period of interest - but what of their growth in size by merger and the resultant growth in market concentration? A 1992 paper by Krasa and Villamil sets out a theoretical approach to the issue of optimal bank size that provides a useful start to answering this question. They conclude that the optimal size (that is to say portfolio size, but also, by implication, size in terms of personnel) of a bank from the point of view of its creditors is determined by the balance of two opposing forces: first, the benefit provided by increasing scale by virtue of a reduction in the probability of bank default as the impact of diversifiable, ‘idiosyncratic’ risk is ameliorated by the portfolio effect; second, the rising cost of monitoring as size grows. Despite the paper’s mathematical language this is, in effect, a restatement of Coase’s argument – that a firm’s size depends on the balance between the cost of control and the benefits to scale (which, in the banking context that this paper analyses, is abstracted

to that of default risk). Grossman uses Krasa and Villamil’s work as starting point for an expanded theory of why banks merged: “the decision to undertake acquisitions can be thought of in terms of a threshold model: when the optimal size of banks [in Krasa and Villamil’s terms] exceeds the actual bank size … the urge to merge is high, the larger the gap, the greater the incentive to merge”. Grossman suggests a wider set of drivers of optimal bank size than pure bank default risk as used in Krasa and Villamil’s deliberately abstract model, however. A larger optimal bank size, he states, may come from extra efficiency resulting from economies of scale (from reduced costs per unit of output, say) or from increased market power (as concentration reduces price competition or as the growth in the size of banks keeps pace with that of a rapidly concentrating set of industrial customers). Indeed, contemporaries cited some or all of these as reasons for amalgamation. Despite this, the evidence for the impact of these drivers is not completely clear. We will consider each in turn in more detail.

3.1 Pursuit of economies of scale. Banks can grow in two ways: by internal growth (primarily via the process of opening new offices, that is, ‘branching’) or by amalgamation – a process considered by contemporaries to be faster and cheaper than internal growth. But did such growth result in scale economies that led to a lower ratio of costs to revenues? Unfortunately, it is difficult to give a definitive answer to this question since “no statistics had ever been prepared by bankers who had engaged in amalgamation to show whether or not definite economies were secured”. The evidence that does exist, however, indicates that, on the contrary, the expense ratio of banks that published detailed figures (not all of them by

\[22\] Sykes, op. cit. p126
any means) actually increased in the period of the greatest increase in market concentration. To illustrate this, Table 2 shows London-based banks’ net profits and expenses as a percentage of assets for some sample years from 1861 to 1914, along with the ratio of expenses to net profits. This ratio shows a clear upwards trend. A similar analysis of provincial firms shows an increase of the ratio of expense to net profits growing from 0.52 in 1881 to around 1.00 in 1912-1915 – a very similar trend to that of the London banks.  

Table 2 - Net Profit and Expense Percentages of London-based Banks 1861-1914

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Banks</th>
<th>Net Profits %</th>
<th>Expenses %</th>
<th>Expenses / Net Profits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1861</td>
<td>6</td>
<td>1.12%</td>
<td>0.74%</td>
<td>0.66</td>
</tr>
<tr>
<td>1866</td>
<td>11</td>
<td>1.74%</td>
<td>0.86%</td>
<td>0.49</td>
</tr>
<tr>
<td>1871</td>
<td>13</td>
<td>1.33%</td>
<td>0.72%</td>
<td>0.54</td>
</tr>
<tr>
<td>1876</td>
<td>15</td>
<td>1.04%</td>
<td>0.70%</td>
<td>0.67</td>
</tr>
<tr>
<td>1881</td>
<td>14</td>
<td>1.62%</td>
<td>0.79%</td>
<td>0.49</td>
</tr>
<tr>
<td>1886</td>
<td>14</td>
<td>1.37%</td>
<td>0.88%</td>
<td>0.64</td>
</tr>
<tr>
<td>1891</td>
<td>15</td>
<td>0.92%</td>
<td>0.68%</td>
<td>0.74</td>
</tr>
<tr>
<td>1896</td>
<td>12</td>
<td>1.12%</td>
<td>0.94%</td>
<td>0.84</td>
</tr>
<tr>
<td>1901</td>
<td>10</td>
<td>1.30%</td>
<td>1.04%</td>
<td>0.80</td>
</tr>
<tr>
<td>1905</td>
<td>10</td>
<td>1.16%</td>
<td>1.08%</td>
<td>0.93</td>
</tr>
<tr>
<td>1911</td>
<td>9</td>
<td>1.02%</td>
<td>1.18%</td>
<td>1.16</td>
</tr>
<tr>
<td>1913</td>
<td>4</td>
<td>1.06%</td>
<td>1.31%</td>
<td>1.24</td>
</tr>
<tr>
<td>1914</td>
<td>4</td>
<td>0.90%</td>
<td>0.96%</td>
<td>1.07</td>
</tr>
</tbody>
</table>

Source: Sykes op. cit. Tables, p127 & 128.

In many ways this is not surprising. To a very crude first approximation, banking industry revenues are driven by the broad money supply since they arise primarily from the spread between the interest paid on deposits and that earned by lending. Consistent with this idea, Capie and Webber, in the absence of other data, estimate bank revenues by multiplying the size of various components of banks’ balance sheets by some assumed returns on assets. In the period 1870 until 1913, the money supply in England and Wales (M3 measure) increased from £616 million to £1,367 million – that is, up 122%. On the other hand, the total

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23 ibid, Table 4, p130
number of bank branches (a very crude proxy for aggregate industry costs) increased in the same period from 1,779 (1872) to 6,839 in 1913 – up 284%. If we assume costs are linear with number of branches this would be entirely consistent with the observed increase in expense percentage from 1870 to 1913. In the light of this evidence, the idea that banks’ growth by merger resulted in reduced cost per unit output by utilising economies of scale seems difficult to sustain.

3.2 Pursuit of market power. Another possible motivation for mergers and for industry concentration is that, as a result, banks could have gained greater market power and thus could have increased their ability to set prices to their advantage, possibly by collusion. Indeed, the concern that banks were attempting to do this lay behind the decision to convene the 1918 Bank Amalgamations Committee to investigate the merger movement since, “there [may be] a real danger lest one bank, by the gradual extension of its connections, may obtain such a position that it can attract an altogether preponderant amount of banking business … [and that] the financial safety of the country … would be placed in the hands of a few individuals”. There may have been some basis for this concern – a private memo written in 1900 by Edward Holden of Midland Bank following a discussion with an officer of Yorkshire Banking Company notes that, “it [is] the policy of the day to form large institutions; our bank combined with his would command the best business and destroy active competition”. In a 1999 paper, Grossman investigates whether the concentration in English banking between 1870 and 1914 did in fact lead to better financial

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26 Sykes op. cit. Table, p113.
27 In 1870, the ratio of branches to money supply (a proxy for expense percentage) = 1,779/616; by 1913 the ratio = 6,839/1,367 – this represents an increase in the ratio of 73%, similar to the proportional uplift in expense percentage in Sykes’ table from 0.72% to 1.31%
29 Grossman, 2010, op. cit. p 125
performance (as would be expected if market power was important) and concludes that, “increased concentration appears to have bolstered bank returns … [and] may have rendered English banks less efficient as allocators of capital”.  

Braggion, Dwarkasing and Moore, by measuring the wealth effects from the equity returns during bank takeovers in the period 1885-1925, “find positive wealth effects for bidders (0.7%-1%) and targets (6.6%-8%) over the announcement month. Wealth creation appears to be related both to efficiency gains and to increased oligopoly power”.  

At first sight, then, the theory of market power seems plausible.

But there are weaknesses in the argument. First, if market power was pursued to enhance profitability, it seems difficult to reconcile this with the profit statistics shown in Table 2. The trend in net profitability here (although volatile) is clearly downwards. In fact, this trend is consistent with the raw findings of Grossman’s 1999 paper. In the absence of reliable profitability data from a large enough sample of banks, he imputes financial performance from stock market holding returns according to a simple variant of the Capital Asset Pricing Model - these returns “declined steadily over the period”.  

The paper’s diametrically opposite conclusion that increased concentration bolstered returns is a consequence of the influence (within the paper’s OLS modelling) of an adjustment for the “negative demand shock resulting from banks' declining importance relative to other financial intermediaries”.  

One variable used a proxy for ‘declining importance’ in these regressions is the ratio of banks’ market capitalization to that of the stock market as a whole (having corrected for the value of government securities and the like which do not represent alternative

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31 Braggion, Dwarkasing and Moore, ‘From Competition to Cartel: Bank Mergers in the U.K. 1885 to 1925’, Social Science Research Network, March 2011, p1
32 Grossmann 1999, op. cit. p1
33 ibid, p1
finance for firms provided in competition with that from banks). This measure fell steadily during the period. Another is the ratio of bank market capitalization to that of non-bank financial intermediaries. But these variables are potentially flawed and, as a result, the conclusions drawn from their use are questionable. Banking sector market capitalization represents the market’s best estimates of the discounted cash flows resulting from profits coming from existing assets and from providing finance in the future. Put another way, if the banking sector became extremely competitive with a resulting precipitate decline in profitability, the market capitalization of banks would also decline and show a ‘demand shock’ in Grossman’s model – this despite the fact that banks could still be providing a very large, or even a growing share of financing for firms. In short, both variables that Grossman uses as a proxy for demand shock to assess the effect of concentration on bank profitability are, in themselves, heavily linked to bank profitability. This throws some doubt on the ‘demand shock’ adjustment and leaves us with the raw data showing declining returns in a period of steadily increasing concentration.

Another weakness in the idea that the search for market power was the cause of the merger movement is the question of timing. The urge to merge to reduce competition would have been present at all times – what was so special about the late 19th century? At no stage in the entire period under consideration was there any outright legal block on the attainment of scale for joint stock banks and, even if we allow that regulation was a factor, the last very significant change in regulation tangentially related to size came in 1862 (with the Companies Act that allowed limited liability). But, as can be seen from Graph 1, the acceleration in the concentration of English banking only occurred post 1880-1890. This brings us to the third possible
explanation of banking mergers: that it was as a response to increased market concentration in industry – a change that occurred around this time.

3.3 **Response to industry concentration.** As the industrial customers of banks grew larger by internal growth or acquisition, optimal bank size could have risen in order to provide a negotiating counterweight to the demands of larger customers or to provide more sophisticated financial products. Certainly, in evidence to the 1918 Bank Amalgamation Committee, bankers “argued that banks must grow now to keep pace with the growth of size of business houses generally”. 34 The problem with this view of causality is, once again, one of timing. Hannah’s 1974 paper examining mergers in the British manufacturing industry indicates that the take off in merger activity happened around 1895-1900 35 and was confined in large part to two sectors only – textiles and brewing – “whilst many industrial sectors remained relatively untouched”. 36 The rise in banking concentration, as we have seen, started somewhat before this. As Capie and Rodrik-Bali conclude: “banking merger activity preceded that in industry by a clear margin, and this is of interest since most bankers claimed they were simply following the example of industry in pursuing economies of scale”. What’s more, they found “no relationship between the number of mergers and the pace of economic activity … it was considerations peculiar to the banking sector that dominated in the amalgamation movement.” 37

To sum up: looking at the evidence of economies of scale, market power and industrial concentration, none seem wholly adequate to explain the growth in banking concentration that we observe in the historical record.

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34 Colwyn et al, op. cit.
36 Ibid, p10
37 Capie and Rodrik-Bali, op. cit., p291
If the explanation of banking mergers cannot be found convincingly from considerations of the benefits of scale, what of the other side of Coase’s transaction cost-benefit ledger (and, indeed, the ‘ledger’ in Williamson’s and Krasa and Villamil’s models) – that of the costs of managerial control? The technical means to enable managerial monitoring and control of banks changed dramatically during the 19th century, which saw the rapid advance of the railway network, telegraphs and, latterly, telephones. This should be significant. As Coase puts it: “Changes like the telephone and the telegraph which tend to reduce the cost of organizing spatially will tend to increase the size of the firm. All changes which improve managerial technique will tend to increase the size of the firm”.\(^{38}\) Sutton’s work on technology and industry structure would also suggest that the effect of combining independent regional banking submarkets into one larger, national one (as communication improved) should have resulted in the potential for higher concentration.\(^{39}\)

The difficulty lies in testing such theories - looking at the frequency of mergers through time is a crude measure and is subject to significant ‘noise’ from regulatory change, as well as not being specifically linked to the costs of control. But the geographical distance between merging firms (dubbed, ‘merger reach’ throughout this paper) may provide a better dataset since it is overwhelmingly likely that merger reach is directly related to the difficulty of managerial control. Certainly, the importance of distance on the transactions costs of monitoring is strongly hinted at by contemporary evidence: the divestment of the Doncaster business of Leatham Tew and Co. (of Wakefield) in 1847, for example, was predicated on the “difficulty of

\(^{38}\) Coase, op. cit. p397

maintaining communication between the two towns". 40 How did merger reach change over time, and to what extent can the temporal evolution of this variable be explained by reference to the rise of communications technology?

4. **Creation and analysis of the merger reach dataset**

The most comprehensive single list of bank amalgamations during the 19th and early 20th centuries is included in Sykes 1926 book, ‘Amalgamation Movement in English Banking 1825-1924’. The list of mergers in this book is thus the foundation of this study’s dataset. Sykes lists mergers in six groups, with mergers in each group arranged chronologically. The first five groups correspond to mergers of banks that eventually formed the ‘Big Five’ banks in the UK at time of the book’s publication. The sixth group represents miscellaneous mergers that did not end up forming a part of the Big Five. To create the dataset, for each merger the organisational form (private or joint stock) and headquarters location of both the acquired and acquiring bank as well as the year of the merger were determined from the historical record.

An extensive series of sources was used to provide this information since it is not included any comprehensive listing. Appendix 1 of this paper lists the sources used. Most data was found in contemporary directories, copies of trade magazines, or in the published historical archives of the successor banks to the Big Five. On the few occasions that any data in Sykes was contradicted by evidence from contemporary historical sources (most often for dates, but sometimes the details of bank headquarters in the minority of times that Sykes provides them), the contemporary source was preferred and the conflict noted in the dataset.

40 Sykes, op. cit. p25
For each merger, the geographical distance between the headquarters of the two banks involved was then calculated. Since ‘merger reach’ is used in this study as a proxy for the difficulty of managerial control (the “cost of organizing spatially” in Coase’s terms) the distance used was distance by road (which corresponds to, for example, the distance a visiting manager would have needed to travel) rather than by any measure ‘as the crow flies’. Although the calculation of distances was done using the current, rather than the contemporary, road network for convenience (the Automobile Association’s online route planner was used \(^41\)) this should not introduce any significant errors since the modern network very closely mirrors that in place in the 19\(^{th}\) century and, besides, England and Wales are small countries.\(^42\) Similarly, distance by road should also be a decent proxy for distance by rail. A bigger potential problem arises because of branching.

The takeover of a bank with a large number of geographically dispersed branches distributed in a wide radius around a central headquarters would impose more managerial burden than that of a bank with only one office; thus a headquarters-to-headquarters merger reach measure may be an underestimate of the cost of spatial organisation. Studies of 19\(^{th}\) century branching, however, show that - with the exception of the National Provincial Bank (which we return to in more detail in the next section) - even the biggest multi-branch joint stock banks were relatively compact spatially. See, for example, figures 2 and 3 in Barnes and Newton’s 2014 discussion paper on branching.\(^43\) Smaller banks (which tended to be the targets of takeovers until very late in the period under


\(^{42}\) Indeed, the distance from London to Birmingham via Watling Street in Roman times was very close to the modern distance – successive improvements to the road network over the centuries very often followed the paths of existing routes.

review) were even more compact. Thus, a headquarters-to-headquarters measure should provide a good proxy for the costs of managerial control.

A related issue in the dataset is the distance between banks with headquarters in the same town or city – this has been set to zero to avoid the burden of having to find, and then calculate the distance between, street addresses. With the exception of London-to-London transactions this should not create any meaningful distortion and, even within London, most banks involved in takeovers were very closely bunched in the EC1 and EC2 postcodes. Last, some of the ‘amalgamations’ specified in Sykes were, in fact, merely changes of form (from private to joint stock) without a real takeover being effected. These have been omitted from the data analysis. So too have the few mergers that were the combination of a large bank with a foreign affiliate, since the degree of managerial control in these cases was of a different nature to that of full takeovers. Appendix 1 contains a summary comparison of the dataset used in this paper’s analysis with that in Sykes' book. In all significant aspects they are extremely similar.
Graph 2 shows a scatter chart of all the merger reach data points through time from 1825 to 1924.

The pattern of mergers ‘bunching’ around certain dates can be observed, as well as general upwards drift in merger reach in miles, but a clearer view of the evolution of merger reach can be gained by plotting the five-year moving average of this number (the sum of all merger reach figures – including zeroes - within a five year rolling window divided by the number of observations). This is plotted in Graph 3.

Three distinct phases can be observed: a ‘hump’ in merger reach in the mid-1830s to mid-1840s; a long period of stability from 1850 to around 1890; then a rapid climb in the average distance between merging banks’ headquarters until the early 20th century – a climb only interrupted by some fluctuations around the time of the First World War. Table 3 presents another view of the data split by five-year slices. A similar picture to Graph
2 is evident (that is, a steady rise in average merger reach from 1880-1890 onwards) with the added detail that the coefficient of variation of merger reach increased steadily as well. As the average distance between headquarters in mergers rose, so did the variation of that distance. Later mergers were sometimes between banks based hundreds of miles from each other but were also sometimes between (almost literal) next-door neighbours.

<table>
<thead>
<tr>
<th>Date</th>
<th>Number</th>
<th>Sum (miles)</th>
<th>Average (miles)</th>
<th>Standard Deviation (miles)</th>
<th>Coefficient of Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1825 - 1830</td>
<td>9</td>
<td>128.1</td>
<td>14.2</td>
<td>3.2</td>
<td>22%</td>
</tr>
<tr>
<td>1831 - 1835</td>
<td>18</td>
<td>729.2</td>
<td>40.5</td>
<td>12.7</td>
<td>31%</td>
</tr>
<tr>
<td>1836 - 1840</td>
<td>52</td>
<td>2629.2</td>
<td>50.6</td>
<td>28.6</td>
<td>56%</td>
</tr>
<tr>
<td>1841 - 1845</td>
<td>25</td>
<td>1393.8</td>
<td>55.8</td>
<td>20.3</td>
<td>36%</td>
</tr>
<tr>
<td>1846 - 1850</td>
<td>8</td>
<td>452.1</td>
<td>56.5</td>
<td>13.2</td>
<td>23%</td>
</tr>
<tr>
<td>1851 - 1855</td>
<td>11</td>
<td>420.3</td>
<td>38.2</td>
<td>9.6</td>
<td>25%</td>
</tr>
<tr>
<td>1856 - 1860</td>
<td>13</td>
<td>435.5</td>
<td>33.5</td>
<td>11.4</td>
<td>34%</td>
</tr>
<tr>
<td>1861 - 1865</td>
<td>31</td>
<td>1485.3</td>
<td>47.9</td>
<td>23.0</td>
<td>48%</td>
</tr>
<tr>
<td>1866 - 1870</td>
<td>21</td>
<td>773.5</td>
<td>36.8</td>
<td>13.7</td>
<td>37%</td>
</tr>
<tr>
<td>1871 - 1875</td>
<td>24</td>
<td>920.6</td>
<td>38.4</td>
<td>17.1</td>
<td>45%</td>
</tr>
<tr>
<td>1876 - 1880</td>
<td>21</td>
<td>738.4</td>
<td>35.2</td>
<td>14.2</td>
<td>40%</td>
</tr>
<tr>
<td>1881 - 1885</td>
<td>19</td>
<td>815.2</td>
<td>42.9</td>
<td>15.0</td>
<td>35%</td>
</tr>
<tr>
<td>1886 - 1890</td>
<td>42</td>
<td>2166.6</td>
<td>51.6</td>
<td>27.6</td>
<td>53%</td>
</tr>
<tr>
<td>1891 - 1895</td>
<td>57</td>
<td>3654.3</td>
<td>64.1</td>
<td>38.7</td>
<td>60%</td>
</tr>
<tr>
<td>1896 - 1900</td>
<td>59</td>
<td>6010.2</td>
<td>101.9</td>
<td>67.2</td>
<td>66%</td>
</tr>
<tr>
<td>1901 - 1905</td>
<td>40</td>
<td>4255.6</td>
<td>106.4</td>
<td>72.7</td>
<td>68%</td>
</tr>
<tr>
<td>1906 - 1910</td>
<td>24</td>
<td>3554.4</td>
<td>148.1</td>
<td>86.9</td>
<td>59%</td>
</tr>
<tr>
<td>1911 - 1915</td>
<td>16</td>
<td>1617.8</td>
<td>101.1</td>
<td>55.4</td>
<td>55%</td>
</tr>
<tr>
<td>1916 - 1920</td>
<td>29</td>
<td>4481.4</td>
<td>154.5</td>
<td>149.6</td>
<td>97%</td>
</tr>
<tr>
<td>1921 - 1925</td>
<td>11</td>
<td>2001.9</td>
<td>182.0</td>
<td>180.1</td>
<td>99%</td>
</tr>
</tbody>
</table>

4.1 Modelling merger reach and communications. In a simple world where the only means of communication was by direct contact between people or by physically transported postal messages, the cost in time (and by extension, money) for the management team of a bank wishing to impose its control on a newly acquired target would be the distance to the target (merger reach) divided by the speed by which they or their letters could get to it. Thus, for constant cost, we would expect the evolution of merger reach to be related in a linear way to evolution in the speed of travel. In a more complex world with numerous means of communication
we would expect a relationship to a number of different measures of communication speed, convenience or cost. We would also expect the most convenient to be dominant in much the same way that, say, speed of travel in horse drawn vehicles would dominate that of walking in the simple, ‘personal contact’ world.

The analysis performed for this study is thus an OLS regression of merger reach against broad proxy measures of the three most important communications technologies of the 19th and early 20th centuries: railway, telegraph and telephone. Specifically, the following model is used:

\[
MR_i = CONST + a \cdot RAIL_i + b \cdot TELEGRAPH_i + c \cdot TELEPHONE_i + \text{error}_i
\]

- \(MR_i\) is Merger Reach in miles for merger \(i\) (\(i = 1\) to \(530\))
- \(RAIL_i\) is the value, for the year of merger \(i\), of an annual index of cumulative railway mileage installed in Britain (set to 100 at the point of maximum extent in the 1825 – 1924 period).
- \(TELEGRAPH_i\) is the value, for the year of merger \(i\), of an annual index of the number of telegrams sent, set to 100 at the point of maximum usage
- \(TELEPHONE_i\) is the value, for the year of merger \(i\), of an annual index of the cumulative number of installed telephone lines, set to 100 at the point of the maximum installed base.

The data for these three variables was taken from the 2015 edition of the Databanks International Cross-National Time-Series Data Archive. In the case of each variable, alternative measures were available. For

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example: passenger miles travelled could have been used instead of miles of track for RAIL; telegraph mileage, not telegram numbers, for TELEGRAPH. In fact, regressions were performed using alternative representations of the communications variables with virtually identical results – this is unsurprising given the very close correlations between them. The variables were indexed to 100 in order to illustrate the relative significance of the various measures. Missing data (during the years of World War One) was interpolated linearly. A small correction was made to the post-World-War-One railway mileage numbers to make them consistent with pre-1914, since the original data no longer includes track miles for Ireland. The evolution of these indexes is shown in Graph 4.

The results of the OLS analysis are shown in Table 4. The first column shows the three-factor model described above. The $R^2$ of the model is only around 20% - symptomatic of the high degree of scatter in the merger reach figures, especially in later years. The influence of the telephone is, however, extremely statistically significant: for every extra
percent of extent of telephone coverage (relative to 1925), merger reach extended by 1.37 miles. TELEGRAPH is also significant but the influence is smaller (0.45 miles for every percent). Contrary to intuition, the sign of the influence of RAIL is negative. It is clear why this is so: the disappearance, in the 1850s, of the large ‘hump’ in the merger reach data which peaks around 1835-1845 (see Graph 3) corresponds to a rapid rise in the extent of the rail network (see Graph 4). National Provincial Bank’s mergers caused the hump and there is plausible historical evidence that this was an anomaly; this point is covered in detail in section 5.2 below. The second column in Table 4 shows a two-factor model including only TELEGRAPH and TELEPHONE – the significance and influence of TELEPHONE is still very high and similar to that in the three-factor model; that of TELEGRAPH drops and is only significant at the 90% level. The CONST of 41.73 miles may be considered as a ‘baseline’ of merger reach in the absence of any of the communications technologies that gained acceptance in the 19th century – that is, with communications restricted to the speed of horse-drawn transport of people or postage. The magnitude of this constant makes intuitive sense since it corresponds to a distance in miles which could be travelled – there and back – within a single day assuming a speed in a horse-drawn coach of 7.5 miles per hour. 45

Table 4 - Regression Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>3-factor model</th>
<th>2-factor model</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONST</td>
<td>48.49 ***</td>
<td>41.73 ***</td>
</tr>
<tr>
<td></td>
<td>(6.17)</td>
<td>(7.75)</td>
</tr>
<tr>
<td>RAIL</td>
<td>-0.24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-1.18)</td>
<td></td>
</tr>
<tr>
<td>TELEGRAPH</td>
<td>0.45 *</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>(1.81)</td>
<td>(1.43)</td>
</tr>
<tr>
<td>TELEPHONE</td>
<td>1.37 ***</td>
<td>1.42 ***</td>
</tr>
<tr>
<td></td>
<td>(5.51)</td>
<td>(5.82)</td>
</tr>
<tr>
<td>R2</td>
<td>19.1%</td>
<td>18.9%</td>
</tr>
<tr>
<td>N</td>
<td>530</td>
<td>530</td>
</tr>
</tbody>
</table>

$t$ statistics in parenthesis; * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Graph 5 shows the modeled evolution of merger reach through time based on the two-factor regression output compared to the five-year moving average of the merger reach data itself. The rapid rise in merger reach just at the time of the rise of the telephone is made clear.

4.2 An alternative explanation: spreading 'circles of fire'. There is another possible explanation of the rise in merger reach post 1880-1890. It
is possible that the link with the rise of the telephone is a mere coincidence and that some unknown trigger started the merger wave. If that was the case, it is also possible that banks started to acquire target firms in their immediate locality (since these targets would cover a customer base that was most familiar to the acquiring bank’s management) but then, as time passed, they would need to expand further and further afield because all the potential targets locally had already been purchased. This can be imagined as akin to a fire, started at a point within a field of dry grass, gradually expanding outwards as the grass is consumed. Increasing merger reach in this view is simply a natural consequence of business expansion. There are two reasons that this alternative view of what happened is implausible.

First, if this was the case, and acquisitions were made at the edge of a ‘ring’ of existing coverage (and not within it), it seems reasonable to suppose that the coefficient of variation of merger reach would decline with time as the denominator (average merger reach) increased. As Table 3 shows, the exact opposite was the case.

Second, a detailed examination of the acquisitions of two banks that expanded rapidly in the crucial years 1880-1900, shows a pattern of mergers that is inconsistent with the ‘circle of fire’ model. During these years, the two most active acquirers were Lloyds Bank (initially based in Birmingham but subsequently based in London) with 28 purchases and Capital & Counties Bank (based in Southampton) with 18. The acquisitions that they made, however, very often crossed over into their rival’s ‘circle’. In the period, of the 18 purchases made by Capital & Counties Bank, nine were closer to the headquarters of Lloyds than they

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46 Eventually, Lloyds took over Capital & Counties Bank in 1918.
were to that of Capital & Counties. The equivalent for Lloyds was eight from 28. Overall, 37% (17 of 46) of the purchases made by the biggest acquirers in the busiest period of mergers were closer to their rivals than to them. The eventual structure of English banking (with the Big Five being rivals all over the country) is consistent with a pattern of widespread, overlapping merger rather than the establishment of local dominance within a ‘circle’.

5. Discussion of the results

5.1 Banks, managerial centralisation and the telephone. We have seen that there is a well-established theoretical framework to link the rise of the telephone with increasing bank size (and thus banking sector concentration) and, as set out in the previous section, very strong statistical evidence that merger reach rose in lockstep with it. To what extent does the historical record of banks’ behaviour accord with this view of the importance of the telephone? This section discusses three aspects of this question. First, the degree to which banks centralised managerial control. This is important because without centralisation the appeal to Transaction Cost Economics in our theoretical understanding of the evolution of merger reach is meaningless. If newly acquired banks were not controlled centrally but were merely held as a loosely affiliated set of firms in a holding company the cost of control would not have been a constraint on distance when acquisitions were made. Second, whether there is evidence that banks specifically used the telephone as a tool in this centralisation. Last,

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47 For example, the bank Wells, Hogge & Lindsell of Biggleswade in Bedfordshire was taken over by Capital & Counties Bank in 1894. This was a bank situated 116 miles from Southampton but only 48 miles from London – the headquarters of Lloyds at the time.
why it was that the influence of the telephone was manifested in a gradual rise in merger reach and not a sudden step change.

A constant theme in contemporary commentary on the late 19th and early 20th century banking scene is the rise of ‘scientific’ methods: “the practice of banking has been put on to a scientific basis and has regularly become more and more logicalised”, states Sykes while explaining why the concentrated banking market of the 1920s is safer from failure than that of the mid 19th century. 48 ‘Scientific’, ‘logicalised’ banking had a number of components. One was the standardisation of bookkeeping and accounting methods across banks’ growing number of branches (both those grown ‘organically’ and those acquired). Trade magazines like Bankers’ Magazine and Journal of the Money Market or the Journal of the Institute of Bankers are, from the 1880s onwards, filled with articles and letters commenting on the details of such matters. Indeed, the very creation of the Institute of Bankers in 1879 is in itself evidence of a move towards greater degree of formalization and coordination in the industry. Another aspect of the ‘science’ of banking was the growing professionalisation of the job of being a banker: “The day-to-day operation of the business … was a full-time occupation. Senior executives became full-time salaried staff, as did branch managers and the expanding cadre of bookkeepers (‘accountants’), cashiers and clerks employed throughout the banks”. 49 Central to the creation of a banking profession was the rise in the use of staff training and development as well as the creation of a more rigidly formalised career progression (most often within one firm); the higher reaches of these careers were increasingly restricted to those who passed professional examinations. The effect of all of this was a growing standardisation and

48 Sykes, op. cit. p122
centralisation of the business of banking. Take for example, the Midland Bank where, “from the late 1890s ... branch managers worked to standardised regulations and procedures, continually updated by new instructions and circulars. Each branch’s book-keeping and administration were brought into line with the Midland model”. 50 Overall, there can be no doubt that the late 19th and early 20th centuries saw sharp rise in the degree of banking centralisation.

There is also very strong evidence that banks were enthusiastic early adopters of the telephone. Bell’s patent for the telephone was granted in 1876 and, less than four years later, in January 1880, the technology was sufficiently commercially advanced that the first telephone directory was published in the United Kingdom. This document, created by The Telephone Company, lists 249 subscribers in London. Of these, 228 (92%) are listed as having addresses in the EC postcode - that is, London’s financial district. Among the banks, brokers and law firms listed are the National Provincial Bank and Royal Bank of Scotland. 51 But telephone exchanges were not restricted to London - the 1880 directory lists the following provincial exchanges: Manchester, Liverpool, Glasgow, Birmingham, Sheffield, Bristol, Dundee, Leeds, Edinburgh, and Leith. In the provinces, too, banks were quick to adopt the telephone. Lloyds Banking Group’s history relates that, “In 1881, Bank of Scotland became the first Scottish bank to utilise this new-fangled technology [when it] instructed the National Telephone Company to install a 'wire' in its head office in Edinburgh. The cost was £15 a year – about £700 today. Within months,

51 Anon, 'The Telephone Company; January 1880 Telephone Directory for the Metropolis', January 1880, located in the BT archives, Holborn, London
the branch manager at Glasgow requested a telephone too.”

The ubiquity of the telephone in banks is also suggested by the fact that, in 1926, Sykes listed ‘Telephone Charges’ as one item in a list of 19 categories of expense that had been consistently important during the previous 50 years.

An article published in the Bankers’ Magazine in 1888 – just eight years after the UK’s very first telephone directory was printed - gives a fascinating insight into the connection between centralisation and communication technology. Written by a Mr. Robert Murray, the article is a prize-winning essay on the theme of ‘Branch Management’. “Even in these days of rapid communication of telegraphs and telephones”, it begins, “a branch manager has often to act promptly and decisively on matters of considerable importance, without being able to consult with anyone” (present author’s emphasis). He goes on to say that while it is of the “utmost importance that a close and active connection be maintained between branch and headquarters”, nevertheless, “the manager is not meant to be a mechanical phonograph automatically applying … a general ‘no’ imprinted by head office”. The unmistakable implication of the article is that, whereas head office was always in close control of branches by means of ‘rapid communication’ - despite this, control should not preclude branch managers from ‘often’ using their initiative. Although anecdotal, it is strong, contemporary evidence of the part played by the telephone in facilitating centralisation and standardisation in banks.

Given the importance of the telephone, why is it that merger reach only increased gradually from 1880-1890 onwards? Since telephone

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53 Sykes, op. cit. p134


55 The prize of £50 was a very significant sum at the time, since it amounted to the best part of year’s income for an unskilled worker
communication is essentially instantaneous and given the early existence of provincial exchanges, why was there not a step change in merger reach after the invention of the telephone? Could banks not have acquired – and integrated - targets hundreds of miles away from 1880 or so onwards? One explanation for why they did not do so might be that, although early adopters owned telephones from 1880, the feasibility of controlling a large dispersed organisation only came with a more widespread use of the telephone since this would have coincided with a gradually larger number of bank employees becoming familiar with the use of the technology. In this explanation, the variable TELEPHONE (cumulative number of phones installed) can be regarded as a good proxy for the practicality of organisational control arising from network effects and learning.

Another explanation is a straightforwardly technical one: although provincial exchanges existed, this did not mean a caller in London could necessarily contact a subscriber attached to one in Southampton, for instance. For this a trunk line connecting the two exchanges was needed and these were only installed gradually after 1880. At first, this process was rigidly controlled by the Post Office “which reserved to itself the right of connecting exchanges via trunk lines”. In 1884, however, this policy was relaxed and there was a surge in trunk line installations by private companies. In 1890 London was connected to Birmingham and, in 1891, London to Paris. These well-documented cases aside, there is confusion over the exact timing of the creation of many of the other lines since they were installed by a large number of independent firms with no central planning. Figure 1 is a simplified, schematic version of the earliest map within the BT archives that shows the initial extent of the trunk line network.

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Dense webs of local trunk lines served the great industrial heartlands of England and all the major centres were connected (or were planned to be). Despite this, for much of the country connections were patchy or non-existent. By 1905 or so, however, the entire country was connected together. It is telling that of the 11 mergers between banks in London and Birmingham in the dataset only two pre-date the construction and installation of the trunk line linking the two cities.

A final potential explanation for the gradual rise of merger reach after the introduction of the telephone is that, at least in the early days of the telephone system, there was a significant overhead incurred as the distance increased.

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57 The National Telephone Company Ltd, ‘Map of Trunk Lines, BT Archive. The map is undated but staff at the archive estimate (from internal evidence) that it dates from the late 1880s (since London-Birmingham, which opened in 1890 is not shown as merely ‘planned’) or possibly as late as 1893.
of phone calls increased. A long-distance call would often need to go through several intermediate exchanges. One from London to Newcastle, say, would need to be manually routed through the exchanges in Birmingham, Manchester, and Leeds by operators in each location. As well as causing delays in placing calls, it also led to a deteriorating signal quality. This drawback eased as the decades progressed.

In summary, whether banks needed to wait for the network effects of a growing stock of phones or whether they were hampered by difficulties arising from the early limitations of the trunk line network, it is not surprising that they only gradually extended the scope of their merger activities with time.

5.2 The special case of National Provincial Bank. A counterintuitive finding of the regression using the three-factor model shown in Section 4 is that the sign of the influence of RAIL is negative. As discussed, this is due to the ‘hump’ in the merger reach data around 1835-1845 caused by the activities of the National Provincial Bank. Graph 6 shows the 31 National Provincial Bank mergers highlighted within the scatter plot of all data; 20 of them were made in the period 1835-1846 and are circled.
The merger reach of these acquisitions was very high. For example, Pyke & Co, which was taken over in 1836 was based in Barnstable in Devon, 212 miles from National Provincial’s headquarters in London. Skinner & Co. of Stockton in County Durham (also 1836) was 258 miles away. At the speed of horse-drawn carriages (the fastest mode of transport at the time) a round trip to either location would have taken several days. This would have imposed a severe constraint on centralised management of the network of banks acquired in these years. But at this time National Provincial was not managed like other banks, nor was it intended to be.

The founder of National Provincial, Thomas Joplin (1790-1847), ran a determined campaign to end the Bank of England’s monopoly in the 1820s. He advocated that England and Wales should adopt the joint stock model of banking already established in Scotland. The 1826 Banking Co-Partnership Act and 1833 Bank Charter Act were – in part – a result of his efforts. His vision for the National Provincial Bank was not, however, one of a centrally managed ‘scientific’ organisation akin to the Big Five in the late 19th and
early 20th century. Instead, his concept was “a joint stock banking chain” in which, “each branch bank [would be] formed with local shareholders, the parent company extending the necessary credit to the branch in return for a share of the profits”. In order to achieve this, “the practice was to take over, wherever possible, an existing well-established local bank with its own note issue” and to rely on the expertise of the “old private banker [who] knew his customers and their circumstances [and could use] his power of quick decision and his close personal touch”. In short, National Provincial, in its early days at least, was in effect a cross between a holding company and a banking franchise operation. The London office, until 1863, was, “solely an administrative centre” (although thereafter the bank began to operate more and more like its conventional rivals). There is therefore a valid reason to consider the early National Provincial mergers to be of a different type to the others in this study.

How is the analysis of merger reach altered if it is adjusted for the special case of National Provincial? Table 5 shows the result of regressions using the three-factor and two-factor models on merger reach data that omits the early National Provincial mergers in the years 1835-1846.

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59 ibid, p13
60 ibid p18
Although omitting these early mergers (and thus flattening the ‘hump’ in the data) results in the sign of the influence of RAIL being positive in a way that makes intuitive sense, the impact of RAIL is small and statistically insignificant (as is TELEGRAPH). In the two-factor model, the significance of TELEGRAPH has risen noticeably (versus the analysis of the full dataset in Table 4) but its effect is still smaller than that of TELEPHONE. Graph 7 shows the modeled evolution of merger reach through time based on the new two-factor regression output compared to the five-year moving average of the modified merger reach dataset. Fundamentally, the picture (compared to Graph 5) is unchanged: the vital importance of the rise of the telephone is still clear and the ‘baseline’ distance (CONST, now 28.15 miles) is still consistent with a day’s round trip at the speed of a horse.

<table>
<thead>
<tr>
<th>Variable</th>
<th>3-factor model</th>
<th>2-factor model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>21.56 **</td>
<td>28.15 ***</td>
</tr>
<tr>
<td></td>
<td>(2.63)</td>
<td>(5.23)</td>
</tr>
<tr>
<td>RAIL</td>
<td>0.21</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>(1.07)</td>
<td>(1.13)</td>
</tr>
<tr>
<td>TELEGRAPH</td>
<td>0.27</td>
<td>0.46 ***</td>
</tr>
<tr>
<td></td>
<td>(1.13)</td>
<td>(3.12)</td>
</tr>
<tr>
<td>TELEPHONE</td>
<td>1.33 ***</td>
<td>1.29 ***</td>
</tr>
<tr>
<td></td>
<td>(5.67)</td>
<td>(5.57)</td>
</tr>
<tr>
<td>(R^2)</td>
<td>25.1%</td>
<td>24.9%</td>
</tr>
<tr>
<td>N</td>
<td>510</td>
<td>510</td>
</tr>
</tbody>
</table>

* t statistics in parenthesis; * p<0.05, ** p<0.01, *** p<0.001
How can we explain the fact that advances in rail travel do not appear to have had a significant impact on the pattern of mergers despite the elimination of the distortion from the early National Provincial deals? Certainly the speed of rail journeys, even allowing for waiting times, was significantly greater than for journeys by coach. Leunig in his 2005 working paper calculates a blended average speed for all rail journey types of 15.1 mph in 1850 and 17.4 mph in 1870 – a multiple of that via horse-drawn transport. Thus, we would expect a rise in the availability of rail travel to have extended the reach of banking mergers. One potential explanation of why it did not is that the period of the greatest growth in railways coincided with the most restrictive regulatory environment for banking. The years 1844-1862 saw the slowest pace of mergers in the entire 100 years covered by this study (2.4 per year, see Table 1). This period however, saw the RAIL index grow from 9 to 49 (that is, from 9% to 49% of its maximum extent in 1925) – its highest annual growth rate. The potential benefits of

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61 Leunig op. cit. Table 8, p27
increasing rail speed in this period could well have been made redundant because banks were discouraged from merging. An attempt to test this theory by adding a dummy variable for ‘regulatory permissiveness’ to the regression model failed to reveal anything of statistical significance however - probably because the effect of regulation is non-linear. 62 In the railway system’s defense, it should be noted that its efficiency enabled a very well organised postal system – something that was a critical building block for a larger banking sector in an era where the daily practicalities of the industry were dominated by the transportation of large quantities of physical documents like cheques.

One last point remains to be discussed: why was the impact of TELEGRAPH so much weaker than that of TELEPHONE? The most likely explanation is simply that a telegram is a form of communication that is inherently inferior to a phone call. An analysis of the length of telegrams sent from New York in 1903 shows that over 95% of them were shorter than 25 words long with a median of below 10. 63 A typical speaking speed, on the other hand, is around 130-160 words per minute. Although useful for very urgent issues, using telegrams to run a complex organisation like a bank would be comparable to attempting to do so today by relying on text messages or Tweets.

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62 Multiplicative, power models of the relationship between merger reach, communications and a subjective assessment of regulatory permissiveness are impractical because the communications indexes are zero for much of the period under discussion as are many of the merger reach data points.

6. Conclusions

The analyses performed in this study (whether making allowances for National Provincial or not) point to a clear conclusion: *the availability of more advanced communications technology in England and Wales in the 19th and early 20th centuries was the critical enabler of wider and larger banking mergers*. The telephone (and to a lesser degree the telegram and railways) reduced the managerial overhead of - and thus allowed the widespread adoption of - centralised control within bigger banks. This effect is clearly seen in the growth of merger reach and is entirely consistent with the predictions of Transaction Cost Economics. Regulation was important in determining the organisational form of banks and seems to have been linked to the frequency of mergers but, once regulatory hurdles had been removed, technology determined the limits to bank size. The importance of the telephone is also clear from its early adoption by banks and from contemporary accounts of its use. The gradual (and not step change) increase in merger reach can be explained by the gradual increase in the scope and usefulness of the telephone system over time.

Of course, the fact that telephones enabled a growth in scale tells us little about the motivations of the managers of banks who took advantage of this change. Although, as we have seen, the evidence of the success of attempts to generate economies of scale or market power is mixed and open to question, it is still possible that 19th century bank managers were perfectly sincere with regard to their *desire* to do so. It is also possible that mergers were undertaken to reduce overall portfolio risk (as suggested by Krasa and Villamil’s work); this would be consistent with the observed stability of 20th Century English banking. Unfortunately, it has proved very challenging to pursue this line of inquiry. ‘Riskiness’ is difficult to measure and one possible approach - the analysis of bankruptcy rates by location
through time - would need an in-depth analysis of the historic records of hundreds of banks. An attempt, as part of this study, to use population growth by county as a crude proxy for different levels of regional risk yielded no useful insights and its results have therefore not been reported.

Away from the attempt to gain economies of scale or market power, or the attempt to reduce risk, it is also possible that managers were driven by less praiseworthy agendas. It is plausible to think that the extra social caché of running a large bank rather than a small one (to say nothing of director remuneration) was a motivator. Certainly, there seems to be evidence that mergers were undertaken in order to ‘keep up’ with rivals. But we should not be too harsh on 19th century bankers. No matter what their motivations were, they created a banking industry that was a model of stability throughout the ravages of the 20th century, and which remained stable until very recently. For that they should get some credit, since, as we have seen in modern times, it is perfectly possible to do the opposite.

This study has a couple of limitations. One is that the indexes used to measure communication are rather broad-brush. A much longer and more detailed study could attempt a merger-by-merger analysis of the contemporary travel time, or the existence of a telephonic trunk line, between the locations of each one of the 530 pairs of bank headquarters so as to provide a more precise sense of the importance of the various technologies. Secondly, this study is confined to England and Wales, but banking concentration was an international phenomenon – to what extent was communications technology important in other countries? Table 6 shows estimates of the year where the number of banks reached a peak in a selection of countries, alongside the year that the telephone was introduced in each one.
In some countries (like England) the two dates are close, in others (like the Netherlands) the start of banking concentration comes decades later than the telephone. Noticeably, no country’s banking concentration started significantly earlier than the telephone’s arrival; a goal of future research could be to find out why the timing varied so much by nation. Understanding the drivers of historical concentration could be of importance in the present day, since banking still plays a vital role in the global economy and technological change is always with us.

<table>
<thead>
<tr>
<th>Country</th>
<th>Year of Peak Bank Numbers</th>
<th>Year of Introduction of Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>1887</td>
<td>1880</td>
</tr>
<tr>
<td>Canada</td>
<td>1876</td>
<td>1880</td>
</tr>
<tr>
<td>Australia</td>
<td>1890</td>
<td>1902</td>
</tr>
<tr>
<td>Japan</td>
<td>1900</td>
<td>1890</td>
</tr>
<tr>
<td>Sweden</td>
<td>1908</td>
<td>1881</td>
</tr>
<tr>
<td>Germany</td>
<td>1909</td>
<td>1882</td>
</tr>
<tr>
<td>Norway</td>
<td>1918</td>
<td>1896</td>
</tr>
<tr>
<td>USA</td>
<td>1922</td>
<td>1880</td>
</tr>
<tr>
<td>Denmark</td>
<td>1924</td>
<td>1888</td>
</tr>
<tr>
<td>Italy</td>
<td>1927</td>
<td>1882</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1929</td>
<td>1884</td>
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Sykes, ‘Amalgamation Movement in English Banking 1825-1924’, P.S. King and Son, 1926


Appendix 1: Merger reach dataset - reference list and comparison with Sykes

Major references:

5. British Banking History Society, online archive, http://www.banking-history.co.uk
11. Twigg, ‘Twigg’s corrected list of the country-bankers of England and Wales’, T. Twigg, 1830

All websites last accessed May 2016.

Minor references:

18. Various online resources (newspapers, coin and banknotes catalogues, privately published histories etc.) – links provided in the Merger Reach Dataset spreadsheet

Comparison with Sykes

The tables show the differences between the merger reach dataset used in this study and the analysis of the nature of mergers set out in Sykes (1926). The main inconsistency is in the number of ‘private buys private’ transactions. Given that Sykes does not give any detail about which banks in his list are private and which are joint stock it is
not possible to identify how he has constructed his tables and thus exactly why the differences arise. However, since the current study deliberately omits those ‘amalgamations’ in Sykes which are mere changes of organisational form (from private to joint stock in the main), it is likely that the differences arise from Sykes classifying this type of ‘amalgamation’ as ‘private buys private’. This aside, however, the two datasets match closely with any remaining differences being explained by small inconsistencies in dates and the nature of the firms involved

### Merger Reach Dataset - Summary

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<td>74</td>
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<td>41</td>
<td>98</td>
</tr>
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### Sykes - Summary

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MergerDatabase.xlsx