Competition and Efficiency in UK Banking: The Impact of Corporate Ownership Structure

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Abstract

This study analyses the changing efficiency, technological change and competitive market structure of the major retail stock (plc) banks and mutual building societies in the UK. Furthermore, by utilizing the interesting case studies of mutual building societies which have converted into plc banks during the sample period, we are able to gain valuable insights into the impact of corporate ownership structure on these issues. Hence, an important innovation to the literature is that we consider the changes in efficiency, technology and competition from a corporate governance perspective. We find that the relative performance of the three sets of institutions (banks, building societies and converters) varies considerably over the sample period, and that the plc conversion process appears to confer only a temporary benefit (in terms of relative performance) on converting mutual building societies. In addition, we find that the major retail financial institutions in the UK can be characterized as operating within a monopolistically competitive market structure. In contrast to most of the anecdotal evidence, however, this market appears to have become less, rather than more competitive, in recent years and this may be associated, at least in part, with the de-mutualisation of a large part of the building society sector.

JEL classification: C23; C52; G21

Keywords: Data Envelopment Analysis, H Statistic, Malmquist, Retail Banks, Building Societies, Efficiency and Competition.

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1. Introduction

Banking markets around the world have been subject to an enormous degree of structural change since the early 1980s. This structural change has been associated with: increasing competition, both within and across sectors, and from the capital market; the impact of new technology, which is facilitating competition from new entrants; deregulation; increased diversification and merger activity and, more recently in the UK, the de-mutualisation of segments of both the life assurance and mutual building society sectors.

The trend towards de-mutualisation, that is mutual financial institutions converting to plc or stock status, has been evident in many of the "Anglo Saxon" economies such as the US, Australia, New Zealand and South Africa, particularly in the housing finance and savings bank sectors. The UK had seemed largely immune from this general trend prior to 1995, with only the Abbey National taking advantage (in 1989) of the conversion option introduced under the 1986 Building Society Act. The mid 1990s, however, witnessed a wave of plc conversions by UK building societies. The Cheltenham and Gloucester building society was acquired by Lloyds Bank in 1995, and a number of other building societies, such as the Halifax (which merged with the Leeds Permanent in 1995), Woolwich, Alliance and Leicester and Northern Rock, all converted to plc status during 97. These conversions amounted to a very significant de-mutualisation with over 65% of the sector's assets being transferred to the plc sector.

More recently, the boards of other UK building societies, such as the Nationwide and Bradford and Bingley, have been forced to hold votes on plc conversion motions following pressure from members. In the case of the Bradford and Bingley, this pressure eventually forced the board to change from a pro-mutual to a pro-plc stance and, in July 2000, the members voted overwhelmingly for conversion. In terms of saving members, 94.5% voted for conversion, while 89.5% of borrowers supported the conversion option. This vote leaves the Nationwide as the sole remaining large mutual building society.

The mutual corporate form is very prevalent in financial services but much less common in other non-financial business areas. Mutual institutions have generally dominated housing finance and life assurance markets, both in the UK and in many other developed economies such as the US. This has been particularly true in the UK

housing market where mutual building societies have traditionally dominated the mortgage market, even after the intensification of competition which followed deregulation and the entry of banks and wholesale funded lending institutions in the early 1980s. Not only have mutual institutions tended to dominate certain segments of the financial services market, but they have also tended to enjoy a superior public image to their plc counterparts and to compare very favourably in terms of performance measures such as relative profitability and cost/income ratios. This is especially true in respect of the contrast between UK building societies and banks.

There is also evidence that a similar de- mutualisation trend is emerging in the Life Assurance sector with the Norwich Union and Scottish Widows being the latest and most significant mutuals to announce a plc conversion. In the case of Scottish Widows, this conversion is via an acquisition by Lloyds – TSB. Furthermore, the board of Standard Life, the UKs largest mutual life assurance company, only narrowly fought off a recent conversion challenge mounted by a member.

This apparent trend towards de-mutualisation in the UK has, not surprisingly, brought the "mutual versus plc" debate sharply into focus. A key element in this debate typically centres around the differences in ownership structure and the often alleged greater scope for managers of financial mutuals to engage in rent seeking or expense preference behaviour (see Williamson, 1963). In other words, it is typically asserted that agency costs are more serious in mutuals than in plc's because the owners (investors and borrowers) of the former have less influence on managers that do their equity shareholding counterparts (see Fama and Jensen, 1983a,b), and Drake and Llewellyn, 1998). To set against this, however, there are three potential sources of competitive advantage for a financial mutual such as a building society: the absence of external capital that needs to be serviced; the existence of free reserves which generate a rate of return, and frequently lower costs, although it is recognised that comparisons of cost ratios between PLCs and mutuals are complicated by their different business structures.

The fundamental economics of the mutual firm (the ‘margin advantage’ due partly to the absence of external capital that needs to be remunerated) are undoubtedly favourable to building societies (and life assurance offices). Nevertheless, the so-called margin advantage is complex as it depends upon the rate of growth of the building society. In order to maintain a constant capital ratio, and in the absence of external injections of capital, it can be shown that the required surplus (as measured by the rate of return on assets) rises as the growth rate of the society rises. This is

because, leaving aside debt capital, the only source of capital to a mutual is its profits. On the other hand, a plc can, in principle, finance high growth rates through external injections of capital.

Hence, it is not clear, *a-priori*, whether UK banks or building societies have the largest comparative and competitive advantage in the deregulated financial environment evident since the 1980s and 1990s. The wave of plc conversions which occurred during the mid 1990s, however, offers a unique empirical opportunity to investigate the comparative efficiency of UK banks and building societies, and to examine the impact of plc conversion on the comparative performance of UK building societies. In order to facilitate this analysis we calculate Malmquist indices of productivity change using Data Envelopment Analysis (DEA) for a sample of UK banks, building societies and converters (those institutions which converted from mutual building society to plc bank status). Furthermore, in order to provide a valid basis of comparison, and to adequately capture the dynamic impacts of plc conversion, we employ a panel data set from 1995 to 2001. Such a data set contains observation both pre and post-conversions. The inclusion of the Abbey National also acts as an interesting base of comparison as the Abbey was the first building society to convert to plc bank status in 1989.

As emphasised at the outset, anecdotal evidence suggests that the UK banking/retail financial services market has become increasingly competitive in recent years. This is generally attributed to the combined impact of deregulation, new technology and new entrants. With respect to the latter, for example, insurance companies such as Standard Life and the Prudential have obtained banking licences in recent years, as have a number of large supermarkets and retailers, and are typically utilising new technology in the form of internet banking.[1] Furthermore, relatively new "non-financial" entrants into the financial services market-place, such as Virgin and Marks and Spencer, are now offering a range of financial services such as credit cards, unit trusts, pensions, etc. Hence, a further aim in this paper is to undertake a more formal analysis of the competitive conditions pertaining in UK banking, using the Panzar and Rosse (1987) H statistic, and to assess the potential impact of the wave of building society plc conversions on these competitive conditions.

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[1] For example, Furst et al (2002) find that banks with assets over $100 million had significantly higher profitability relative to those banks that did not offer internet transactional accounts and that those who have entered the financial services sector recently were more likely to offer internet transactional accounts than the traditional incumbent banks.

The paper is structured as follows. In Section 2, we present a 3-stage methodology in order to estimate: non-parametric efficiency (DEA); total factor productivity change and its decompositions (Malmquist indices); a parametric competitive market structure test, of the major stock (plc) banks and mutual building societies in the UK. Section 3 presents the non-parametric DEA efficiency results and analyses the 3 sectors (retail banks, building societies and building society converters) in respect of the Malmquist indices of productivity change. We follow this with an analysis of the parametric Panzar and Rosse (1987) analysis to test market structure and competition in Section 4. Section 5 concludes.

2. Methodology and Data

As mentioned previously, the empirical analysis in this paper is undertaken in three stages. Firstly, a relative efficiency analysis is undertaken utilising the non-parametric technique Data Envelopment Analysis (DEA). Secondly, we analyse the comparative trends in total factor productivity across our three sub-groups of financial institutions using Malmquist productivity indices. Finally, an analysis of the competitive structure in UK banking is undertaken using the Panzar and Rosse (1987) H statistic. As will be discussed in more detail subsequently, the latter is typically derived from a reduced form Total Revenue regression. Hence, in this paper, we attempt to ensure a coherent and consistent methodology by adopting a profit oriented DEA specification (with revenue components as outputs and cost components as inputs) rather than the usual 'intermediation' or 'production' approach (attributed to Sealey and Lindley (1977) and Benston and Smith (1976) respectively). Specifically, rather than specifying the usual inputs (labour, capital, deposits, etc), which are often proxied by costs rather than specified as physical units, we specify the various cost elements from the profit and loss account as the relevant inputs. Hence, the 3 inputs specified are employee expenses, other non-interest expenses and loan loss provisions. Similarly, rather than specifying the various categories of income earning assets as outputs, we specify as outputs the various revenue generating elements from the profit and loss account. The 3 outputs specified are, therefore, net interest income, net commission income and total other income.

Hence, from the perspective of an output oriented DEA relative efficiency analysis, the more efficient units will be better at maximising the various revenue streams, given the various costs incurred, and consequently better at maximising profits. Although this is a departure from the usual DEA approach, it is in the spirit of

recent research by Berger and Mester (2001). In their investigation of the causes of the recent changes in the performance of US banks, Berger and Mester found that "banks tried to maximise profits by raising revenues as well as reducing costs. Over time, banks have offered wider varieties of financial services and provided additional convenience. These additional services or higher service quality, which are difficult to control for in cost and profit functions, may have raised costs but also raised revenues by more than these cost increases" (page 29-30). Furthermore, they conclude that, "methods that exclude revenues may be misleading" (page 1). Clearly, a DEA specification which includes physical units or cost proxies as inputs and balance sheet asset items as outputs would therefore be potentially misleading by virtue of the exclusion of revenue effects.

While Berger and Mester (2001) adopted this more comprehensive approach to performance analysis in the context of the parametric stochastic frontier approach, this paper represents one of the first attempts (to the authors' knowledge), to apply this approach using a non-parametric methodology. Furthermore, in the context of a study which incorporates both mutual and plc institutions, our use of the non-parametric profit-oriented DEA methodology does not assume that all institutions have the objective of profit maximisation. Indeed, in the context of the UK mutual building societies, they arguably have more scope to follow objectives other than profit maximisation. They may also be more prone to agency costs than plcs, which might tend to inflate costs relative to revenues. Conversely, however, building societies have the benefit of the "margin advantage" discussed previously which, other things equal, would tend to give them an advantage in respect of profitability. Hence, impact of differential corporate ownership and governance structures on financial performance will depend on the interaction of all these factors and can only be determined empirically. Furthermore, we feel that, following Berger and Mester (2001), a comprehensive empirical analysis of these factors on financial performance can only be conducted in the context of a profit-oriented framework which focuses on revenues as well as costs.

Input and output data were obtained from the Bankscope resource package produced by Bureau Van Dijk (BVD), over the period 1995-2001.[2] Due to the Malmquist procedure necessitating a balanced panel data set, however, some banks, building societies, and converters had to be excluded due to missing data. For

[2] This study therefore represents a considerable extension of the work of Valnek (1999) who investigated the relation between risk and non-risk adjusted returns on assets for a sample of UK banks and building societies over the period 1985-1993.

this reason, the sample of converters consists of three out of the four institutions which converted during 1997. Furthermore, although there are over 60 mutual building societies operating in the UK, many of these are very small institutions in comparison to many of the UK banks and relative to the converting building societies. McAllister and McManus (1993), for example, argue that due to potential differences in income streams, very significant asset size differentials, the inclusion of smaller societies can bias the empirical results (see also Shaffer (1998)). Hence, our panel data sample consists of 8 building societies, although this sample does contain the largest 5 societies which held, on average, 70% of the industries assets,

With respect to banks, our sample consists of 9 UK banks. Furthermore, this is a representative sample of UK retail banks in the sense that it contains the large well-known high street banks such as HSBC, Nat West, Lloyds-TSB and Barclays, as well as smaller banks such as the Yorkshire Bank, the Clydesdale Bank and the Bank of Scotland. Finally, we also include two banks which are particularly interesting from a corporate ownership/governance perspective. Firstly, the Abbey National, which was the first UK building society to convert to plc bank status, well ahead of the main conversion wave of the mid to late 1990s. Secondly, the Co-op bank which represents the only non-plc bank in the sample. Hence, this bank should provide a useful contrast with respect to both the plc banks and the mutual building societies.

2.1. Stage 1 - DEA

The non-parametric efficiency approach was originally developed by Farrell (1957) and later elaborated by Banker, Charnes and Cooper (1984) and Fare, Grosskopf and Lovell (1985). The constructed relative efficiency frontiers are non-statistical or nonparametric in the sense that they are constructed through the envelopment of the decision making units (DMUs) with the "best practice" DMUs forming the non-parametric frontier. This non-parametric technique was referred to as Data Envelopment Analysis (DEA) by Charnes et at (1978).

A particular advantage of non-parametric techniques such as DEA, relative to statistical or parametric techniques such as stochastic frontier analysis (see Drake and Weyman-Jones (1996) and Ferrier and Lovell (1990)), is that the latter must assume a particular functional form which characterises the relevant economic production function, cost function, or distance function. Hence, any resultant efficiency scores will be partially dependent on how accurately the chosen functional form represents the true production relationship (i.e., the relationship between inputs/resources and outputs). As DEA is non-parametric and envelops the input/output data of the DMUs

under consideration, the derived efficiency results do not suffer from this problem of functional form dependency. Examples of DEA applied to the analysis of banking include: a Hellenic example by Noulas (1997); a study into US large bank efficiency by Thompson et al (1997); a study of Japanese banking efficiency by Drake and Hall (2003), and an analysis of UK mutual credit unions by McKillop et al (2002).[3]

For each DMU in turn, using x_{ij} to denote input i, (i=1,...,m), used by each financial institution j in the sample (j=1,...n), y_{ij} to denote output r, (r=1,...,s), from financial institution j, a_j are the weights attached to financial institution j's inputs and outputs, and θ is the output based efficiency index, then the output based DEA model can be written as follows:

$$
\begin{aligned}
&\min \theta, \text{ such that} \\
&\sum y_{rj} a_j - y_r / \theta \geq 0, && r=1,...s \\
&\sum x_{ij} a_j \leq x_i, && i=1,...,m \\
&\sum a_j = 1 \\
&a_j \geq 0 && j=1,...,n \\
&\theta \text{ undetermined in sign}
\end{aligned}
\qquad (1)
$$

The technical efficiency programme detailed in (1) assumes a variable returns to scale technology and hence produces a measure of pure technical efficiency. To obtain a measure of overall technical efficiency, we permit constant returns to scale and solve the technical efficiency problem (1) without the constraint $\sum a_j = 1$. This permits scaled up or down output combinations to be part of the DMUs production possibility set. In the case of programme (1), the efficiency ratios with and without the constraint may be labelled θp and θo, and scale efficiency θs, is then θ_o / θ_p. In the subsequent

[3] Credit unions in the UK differ from building societies in that former's members "are primarily from low-income communities and are viewed by certain retail financial institutions as offering limited prospects for the provision of profitable financial services" McKillop et al (2002), page 1574. Indeed, credit unions are small in asset size compared to retail banks and building societies; for example, the total assets of the credit unions in the UK was £263 million in 2001, whereas total assets were equal to £171,375 million for building societies.

results, we refer to overall technical efficiency as OE, pure technical efficiency as PTE and scale efficiency as SE. As explained above, it follows that:

$$OE = PTE \times SE \qquad \text{and} \qquad SE = OE / PTE.$$

2.2. Stage 2 Malmquist

The output based Malmquist is defined as the geometric mean of two Malmquist indices, as follows (see Caves et al (1982)):

$$M\left(y_{t+1}, x_{t+1}, y_y, x_t\right) = \left[\frac{D_t\left(y_{t+1}, x_{t+1}\right)}{D_t\left(y_t, x_t\right)} \frac{D_{t+1}\left(y_{t+1}, x_{t+1}\right)}{D_{t+1}\left(y_t, x_t\right)}\right]^{\frac{1}{2}} \tag{2}$$

which can also be written as follows:

$$M\left(y_{t+1}, x_{t+1}, y_y, x_t\right) = \frac{D_{t+1}\left(y_{t+1}, x_{t+1}\right)}{D_t\left(x_t, y_t\right)}\left[\frac{D_t\left(y_{t+1}, x_{t+1}\right)}{D_{t+1}\left(y_{t+1}, x_{t+1}\right)} \frac{D_t\left(y_t, x_t\right)}{D_{t+1}\left(y_t, x_t\right)}\right]^{\frac{1}{2}} \tag{3}$$

where the first term in equation (3) shows the changes in relative efficiency between periods t and t+1 and the second term relates to changes in technology (or frontier shift) between the time periods. Hence, we can estimate Total Factor Productivity (TFP) change by accounting for technical and efficiency advances which incorporate data and information from two adjacent time periods. That is, if the index of efficiency change (effch) is greater (smaller) than one, then efficiency of the bank or building society has increased (decreased) in period t+1 relative to period t. Similarly, if the index of technological change (techch) is greater (smaller) than one, then technological progress (regress) has occurred. In addition, we can further decompose the former Malmquist index of efficiency change into its two sub-components, scale efficiency change (sech) and pure technical efficiency change (ptech).

2.3. Stage 3 H Statistic

The Panzar and Rosse (1987) H statistic has been widely used to provide an empirical assessment of the competitive conditions in banking markets (see Molyneux et al (1994) and De Bandt and Davis (2000), for examples relating to European banking, Hondroyiannis et al (1999), for an example pertaining to Greek banking, and

Bikker and Haaf (2002), for a study of 23 industrialised countries). The Panzar and Rosse (1987) H statistic is derived from reduced form revenue equations, and is calculated as the sum of the elasticities of total revenue with respect to input prices. If the market is characterised by firms behaving as monopolists, for example, the statistic will be negative because an increase in factor prices will shift the marginal cost curve, thereby reducing output and revenue. This scenario could also apply to the cases of a perfectly colluding oligopoly, or a conjectural variations short run oligopoly.

In contrast, in a perfectly competitive industry the statistic will be unity because, providing certain conditions hold, an increase in factor prices will shift both the marginal and average cost curves but will not change the optimal output of the firm. That is, long run demand adjusts through the exit of some firms in the industry so that the increase in factor price is transferred to the selling price. It should also be noted that the H statistic will also be equal to unity in cases of a sales maximising firm subject to breakeven constraints and for a natural monopoly operating in a perfectly contestable market. Finally, when the statistic is greater than zero but less than unity the industry can be characterized as monopolistically competitive.

There are two steps in respect of the derivation of the H statistic. The first is to establish the existence of long run market equilibrium. Only if this condition is satisfied can the second stage 'market test' be implemented to establish the nature of the competitive conditions. The logic of the former test emanates from the fact that, in competitive capital markets, risk adjusted rates of return should be equalised across banks. Hence, rates of return should not be statistically related to input prices and this can be tested for by substituting either Return on Assets or Equity for Total Revenue as the dependent variable in the reduced form revenue equation. Therefore, in the context of this modified specification, if $H = 0$ the market is in long run equilibrium and if $H < 0$, it is in disequilibrium.

In general terms, the model employed in this study is specified in equation (4):

$$\ln TR_{it} = const + \left(\alpha_i \sum_i \ln P_{it}\right) + \beta_j \sum_j Dj + \delta_k \sum_k \ln Z_{kt} + \upsilon_{it} \qquad (4)$$

where, ln denotes the natural logarithm; TR is Total Revenue; P_{it} is a vector of i input prices; D_j is a vector of dummy variables; and Z_{it} is a vector of control variables. The calculation of the H statistic is the sum of the input price elasticities, that is,

$$H = \left(\alpha_i \sum_i \ln P_{it}\right) \tag{5}$$

In the case of the equilibrium test and the market test models we use Return on Assets (ROA) and Total Revenue (TR) respectively as the dependent variables, where the latter variable includes interest income, commission income and other income. Hence, in this study we follow Nathan and Neave (1989) and Hondroyiannis et al (1999) in using total revenue rather than alternative studies which utilise only 'interest revenue', see for example, Molynuex et al (1994) and Bikker and Haaf (2002). The reason total revenue instead of interest revenue was utilised in the estimation procedure is that, in the case of UK financial intermediaries, the use of the latter variable, would fail to recognise the considerable changes in the business mix of both building societies and retail banks as they have progressively diversified away from traditional interest margin based intermediation business and towards fee and off-balance sheet income.

The input prices follow Bikker and Haaf (2002) in that we use a labour input price ($\ln P_{1,}$ measured as total employment costs divided by total assets), a capital input price ($\ln P_{2,}$ non-labour and non-interest costs divided by fixed assets) and finally an interest price variable ($\ln P_{3,}$ interest paid divided by total interest bearing funds). In addition, we include two dummy variables D_1 and D_2 to account for differences across retail banks and building societies respectively. Total assets are included to take account of any possible scale effects ($\ln Z_1$). Finally, following Bikker and Haaf (2002), we also include bank-specific risk factors as measured by loans loss provisions divided by total assets ($\ln Z_2$) and the ratio of equity to total assets ($\ln Z_3$).

Hence, the equation to be estimated, in respect of the market model is specified in equation (6) below:

$$\begin{aligned} \ln TR_{it} &= const + \left(\alpha_1 \ln P_1 + \alpha_2 \ln P_2 + \alpha_3 \ln P_3\right) \\ &+ \beta_1 D_1 + \beta_2 D_2 + \delta_1 \ln Z_1 + \delta_2 \ln Z_2 + \delta_3 \ln Z_3 + \upsilon_{it} \end{aligned} \tag{6}$$

The empirical results are presented and discussed in the next section.

3. Nonparametric Efficiency and Malmquist Results.

3.1. DEA Results

A summary of the panel data DEA results for PTE, SE and OE are provided in Tables 1, 2 and 3 respectively. When attempting to interpret trends in efficiency levels in these tables, it should be borne in mind that the DEA results are based on a panel data sample. Hence, the efficiency scores for any particular bank or building society in any year are calculated relative to all the banks and building societies (and converters) in all years of the sample. The mean scores for each year are therefore simply the means across the DEA scores that emerge for the institutions in a particular year. Although it could be argued that the Malmquist productivity indices (analysed subsequently) may provide a better perspective of the trends in efficiency, as they provide a year on year decomposition of the factors impacting on productivity change, it is nevertheless potentially informative to examine the panel data DEA results.

INSERT TABLES 1, 2, and 3

In order to initially abstract from scale efficiency effects, and to focus on the aspect of profit efficiency (in the context of the revenue/cost DEA specification) most directly under the control of the individual institution, we first consider the PTE results in Table 1. Although it is somewhat problematic to utilise mean DEA scores in the context of only 3 converted building societies, a comparison of the individual efficiency levels and the mean DEA scores in the base year of 1995 clearly indicates that the building societies and converters were generally outperforming the retail banks in the UK. The mean PTE scores for the building societies and converters were 96.63 and 96.47 respectively, for example, in contrast to the mean PTE score for the UK banks of only 88.49. This compares favourably to McKillop et al (2002), who found a PTE score equal to 83.36 for UK credit unions in their 'base model'.

This is an interesting result given that building societies, as mutual institutions do not have to be as overtly oriented towards profit-maximising as banks. This result also sheds some light on the ongoing debate concerning the relative performance of mutuals versus plcs in the financial sector. As outlined previously, it has often been argued that financial mutuals may face greater agency problems than plcs. Furthermore, it is also the case that UK banks have typically had greater scope to generate fee incomes and other off-balance sheet incomes than UK building societies (although this imbalance has been reducing through time, partly due to deregulation). To set against this, however, building societies benefit from the so-called 'margin advantage' associated with the lack of external equity and dividend payments, etc. It is also the case that their simpler business structure (in large part associated with the

historic legacy of restrictive regulation) has typically allowed UK building societies in the past to operate on lower cost-income ratios than their bank counterparts.

It is clear from Table 1, however, that in respect of these various pros and cons of mutual versus plc status, building societies (and the subsequent converters) were clearly outperforming their UK bank competitors in the base year of this study (1995). This finding accords with the earlier results of Valnek (1999) who argued that, during the sample period 1983 to 1993, "the benefits of mutual organisations have outweighed the benefits of stock organisations" (page 936). It is also interesting to note that the impact of ownership structure on relative performance is not always so clear-cut. The Coop bank, for example, is the only non-plc bank in the sample, and it displayed one of the worst performances across the whole sample (banks, building societies and converters) in 1995, with a PTE score of only 77.30. This may reflect the expected impact of ownership structure on relative performance, however, in the sense that a non-plc bank such as the Coop bank does not have to be as explicitly profit-oriented as its plc bank counterparts. This issue is discussed in more detail subsequently in the context of the relative performance of UK building societies.

If we consider the years immediately before and after the main wave of building society conversions to plc status (in 1997), it is clear that the relative performance across our 3 sectors diverges quite markedly over the years 1995 to 1998. It is clear from Table 1, for example, that the relative performance of the building society sector deteriorates very significantly over this period. The mean PTE score, for example, declines from 96.63 in 1995 to only 87.55 in 1998. Furthermore, whereas 5 out of 8 building societies had PTE scores of 100 in 1995, only 1 society (the Scarborough) remained efficient by 1998. In contrast, the performance of the UK banks remained reasonably stable over the same period with the mean PTE score increasing slightly from 88.49 to 89.03. Hence, from a position in which building societies had been clearly outperforming banks in 1995, the position had been reversed (albeit marginally) by 1998.

Finally, if we contrast the performance of the building societies and banks over this period with that of the converters, it is clear that the latter improved their relative performance considerably. The mean PTE score for the converters, for example, increased from 96.47 to 100 between 1995 and 1998. It is clear, however, that this increase in the mean performance is mainly driven by the dramatic improvement in the PTE score of the Woolwich. Whereas the PTE scores of the Halifax and the Alliance and Leicester remained at 100, the PTE score of the Woolwich increased from 89.40 to 100 between 1995 and 1998. To underline the

extent of this relative improvement in performance, it is interesting to note that the Nationwide, the largest remaining mutual building society, exhibited a decline in PTE from 93.30 to 79.90 over the same period.

In seeking to establish possible reasons for the declining relative performance of the mutual building societies between 1995 and 1998, it seems unlikely to be associated with the state of the housing market. Firstly, the UK housing market had recovered from the severe recession of the early 1990s by 1994, in terms of the resumption of positive house price growth and declining levels of negative equity, etc. Secondly, any impact of the housing market cycle on UK building societies would be expected to be mirrored by the performance of the converters, given that, in the immediate pre and post-conversion period, the latter would have a very similar asset and liability structure to that of the mutual building societies, with assets being dominated by mortgage loans.

The most likely explanation for the diverging fortunes of the building societies and converters in this initial period, therefore, relates to the differential impact of the plc conversion wave. With respect to the converters, the plc conversion process would be expected to have a positive impact on performance, both in the pre-flotation phase and the immediate aftermath of conversion. Firstly, the converters would have to become more overtly oriented towards profit-maximisation and shareholder value. This would commence prior to conversion in order to ensure a successful stock market flotation, and would be likely to impact on lending margins, costs and executive remuneration (in the form of performance related pay, etc). Secondly, the move to plc status would be expected to reduce any residual agency problems and costs associated with mutuality. It should be noted, however, that both these impacts are inherently one-off benefits which would consequently produce improvements in performance only in the short term. Hence, the converted building societies might be expected to have difficulties in sustaining this relative improvement in performance given the loss of the margin advantage and the burden of servicing external capital.

Turning now to the mutual building societies, the impact of the conversion wave on performance emanates from the pressures which all building societies faced at the time to unlock the embedded value in their reserves via conversion. Indeed, the period 1996 to 1998 was characterised by the presence of so-called “carpet-baggers” who made deposits with building societies simply in anticipation of receiving windfall gains on conversion. As mentioned previously, many building societies came under significant pressure from members to hold a vote on plc conversion, and the Bradford and Bingley eventually succumbed to these pressures in 2000. A number of analysts

have criticised the building societies themselves, however, for having been overly concerned with profitability prior to the conversion wave. The implication of this was an accumulation of excess reserves (relative to growth and capital adequacy requirements). As the value of these reserves could only be unlocked by plc conversion and so-called windfall payments, this produced consequent pressure from many mutual members for their building societies to convert.

As this pressure for conversion was contrary to the wishes of the boards of many building societies, however, the latter recognised (albeit belatedly) the need to demonstrate the benefits of mutuality to their membership much more clearly than had hitherto been the case. In some instances, this took the form of so-called 'mutual dividends', but more typically it was manifested in the demonstration of the 'margin advantage' of mutuals via higher deposit and lower lending rates than offered by bank competitors. In other words it was a deliberate attempt on the part of UK building societies to reduce their excessive levels of internal capital by being less profit-orientated than plc banks. In the context of the profit efficiency DEA specification utilised in this study, therefore, this strategic shift would be expected to produce a significant deterioration in relative performance. To put it another way, during the period of intense pressure for plc conversions, the mutual building societies began to behave more like the Coop bank and more in line with the expected objectives of a mutual financial institution. It is interesting to note in this context, therefore, that the Coop bank continued to exhibit relatively poor performance over this period with PTE declining from 77.30 in 1995 to 67.20 by 1998.

If we now turn to the more recent period, 1998 to 2001, it is clear from Table 1 that there has been something of a reversal of fortunes for our 3 sectors. In particular, the mean PTE scores for the building societies and banks increased from 87.55 to 95.49 and from 89.03 to 96.99 respectively, while the mean PTE score for the converters declined from 100 to 89.17. With respect to the latter, as mentioned previously, this may well be associated with the difficulty of sustaining the inherently short run positive impact of plc conversion on performance. For the mutual building societies, the relative improvement in the more recent period may reflect, at least in part, the significant easing in the pressures for conversion which characterised the earlier period. The improvement may also reflect the extremely buoyant conditions in the mortgage and credit markets, combined with the margin benefits conferred by the period of sustained low and declining interest rates in recent years. This may be associated, at least in part, with the Bank of England's success in targeting low inflation since gaining monetary policy independence in 1997. With respect to the

associated margin benefit, many lenders have been criticised for lowering deposit rates by more than lending rates during this recent phase of low and declining interest rates.

Finally, the UK banks would also be expected to benefit from the extremely favourable economic conditions over the period 1998 to 2001, which have contributed to the buoyant growth in the demand for credit. They will also have benefited from the margin effect outlined above. Paradoxically, the recent improvement in the relative performance of the banks may also reflect the significant potential intensification in competition in the retail banking and financial services sector. This is associated in part with the building society conversion trend, but is also associated with the entry of insurance companies, retailers, and foreign financial institutions, together with the use for new technology such as internet and telephone banking. This has resulted in attempts by UK banks to eliminate excess capacity and to reap economies of scale via restructuring and the effective utilisation of new technology. As these aims are often best achieved via mergers, we have consequently witnessed a significant recent merger movement in UK banking (Royal Bank of Scotland / Nat West, Halifax / Bank of Scotland, for example) as well as amalgamations across the banking and insurance sectors. Furthermore, the extent of merger activity would arguably have been much more significant but for the restrictions imposed by the competition authorities which prevented, for example, the proposed merger between Lloyds-TSB and Abbey National.

3.2 Scale Efficiency Results

The panel data scale efficiency results are presented in Table 2. Not surprisingly given their relatively small scale of operations, in comparison to the large UK clearing banks, for example, the mutual building society sector tends to exhibit mainly increasing or constant returns to scale. The main exceptions being the Yorkshire and Nationwide Building Societies which exhibit evidence of decreasing returns to scale in some years. As was emphasised previously, the latter represents the largest remaining mutual building society in the UK. It is clear from the mean SE scores, however, that in spite of their relatively small scale and the prevalence of increasing returns to scale, the extent of scale inefficiency in the mutual building society sector is not particularly high, with the mean SE level generally varying between 96 and 99 over the sample period.

Turning now to the bank sector, it is again not surprising to see the prevalence of decreasing returns to scale given the relative size of many of these institutions. Indeed, the established high street clearing banks, such as the Nat West and Barclays, tend to exhibit consistent evidence of decreasing returns to scale. In the case of the smaller banks such as the Abbey National and Clydesdale, however, there is greater evidence of either constant or increasing returns to scale in most years. Although mean scale efficiency levels are once again reasonably high, the fact that the mean SE levels tend to vary between 92 and 97 suggests that scale inefficiency is a somewhat greater problem for UK banks than building societies and is largely associated with diseconomies of scale.

Finally, although it is difficult to draw firm conclusions from a sample of three institutions, the evidence for the converters does seem to suggest that, over the period 1995 to 1997, these institutions were tending to approach the optimal scale, in the context of the profit-oriented specification adopted in this paper, as the mean SE level increased from 97.67 to 99.77. Over the latter part of the sample period, however, continued growth, possibly stimulated by the injections of equity capital associated with plc conversion, appear to have pushed the converters beyond this optimal scale, with the mean SE level decreasing from 99.77 in 1997 to 94.77 in 2001. Furthermore, it is interesting to note that in 2001, in contrast to all the previous years, all the converters unambiguously exhibit evidence of decreasing returns to scale. Hence, we are presented with the interesting result that, around the time when most of the large building societies were converting to plc status, they were close to the optimal scale of operation from a profit maximising perspective. Following plc conversion, however, these converted building societies have expanded some way beyond this optimal scale.

In terms of the previous empirical evidence on scale economies in banking, it should be borne in mind that most of this evidence was drawn from cost based parametric analyses or 'traditional' DEA specifications. Nevertheless, these results do support the conclusions of Berger et al (1993) that pure technical inefficiencies (and X-inefficiencies) are a more significant problem than scale inefficiencies. In respect of US banking, for example, Berger et al (1993) find that the mean level of scale inefficiency is typically around 5% in contrast to mean X-inefficiency (technical plus allocative inefficiency) levels of around 20%. Finally, they also support Drake (2001) who found "the minimum efficient scale in UK banking is probably in the region of £18-23 billion of assets in 1984 prices and that the larger UK clearing banks

are typically operating well above this asset level and experiencing decreasing returns." (page 566).

Although scale efficiency will inevitably impact to some degree on the overall efficiency results, it has been stressed previously that the levels of scale inefficiencies exhibited are generally relatively modest. Hence, it is clear from Table 3 that the relative trends in OE across the sectors and through time generally mirror those of the PTE scores in Table 1. In the interests of brevity, therefore, we will not discuss these OE results in detail. It is interesting to note, however, that the influence of scale effects implies that the relative improvement in the performance of the converters over the period 1995 to 1998, and their subsequent relative decline over the latter part of the sample period, is somewhat more pronounced than the trends in PTE would suggest. The mean OE score for the converters increased from 94.20 in 1995 to 99.40 in 1998, for example, before declining to only 84.57 by 2001 (see Table 3).

3.3. Malmquist Productivity Indices

Turning now to the Malmquist indices of productivity change, Table 4 shows that, in terms of the mean levels of Total Factor Productivity (TFP) change, the results appear to echo those exhibited by the pooled PTE and OE results. Specifically, over the period 1996 to 1998 the converters exhibited clearly superior performance in the sense of exhibiting positive levels of productivity growth in each of the 3 years, ranging from 0.57% in 1996 to 3.33% in 1997 (TFP indices of 1.0057 and 1.0330, respectively). In contrast, the mutual building societies exhibited regress in terms of TFP change over the same period with Malmquist TFP indices of 0.8709, 0.9953 and 0.8778 in 1996, 1997 and 1998 respectively. While it does appear that the relative TFP performance of the mutual building societies improved considerably in 1997, this was largely associated with a marked improvement on the part of one building society, the Scarborough, during this year. If we remove this society from the calculation, then the mean TFP index for 1997 declines to 0.8760, which is very similar to the mean levels exhibited in 1996 and 1998.

INSERT TABLES 4 and 5

In line with the pooled PTE and OE results, the TFP indices for the banks are initially relatively poor, although not as low as those of the building societies. Specifically, the TFP indices are 0.9726 and 0.9960 in 1996 and 1997, thereby showing modest TFP regress. By 1998, however, the banking sector is seen to be

exhibiting positive TFP growth, and this improvement in performance is sustained through to 2001. Furthermore, the levels of TFP growth exhibited in some years are particularly impressive. In 1998, for example, TFP growth amounted to 10.59%, while in 1999 this increased to 19.6% before declining to more modest levels of 1.76% and 3.71% in 2000 and 2001 respectively.

The reversal of fortune discussed previously, in terms of the relative performance of the converters, is also very evident in Table 4. Between 1998 and 2001, for example, the mean TFP index for the converters declines from 1.0287 to only 0.9003. Furthermore, while we have already highlighted the marked improvement in TFP recorded by the banking sector in the later years of the sample, the TFP improvement recorded by the mutual building society sector is somewhat more dramatic. The TFP index for this sector increases from 0.8778 in 1998 to 1.0335 in 2001, and peaks at 1.0404 in 2000.

As outlined previously, it is possible to decompose the overall Malmquist indices of TFP change into its constituent components of efficiency change (effch) and technological change (techch) or frontier shift. The former can also be further decomposed into the constituent components of PTE change (ptech) and scale efficiency change (sech). In the context of a panel data set spanning three sets of institutions, however, such decompositions tend to produce a voluminous output. Given that the converters are at the centre of the analysis in this paper, therefore, and given the apparent 'reversal of fortune' of this sector evident from the initial DEA analysis, it is potentially informative to focus on the Malmquist productivity decompositions for this sector in order to cast further light on this change in relative performance. Hence, in Table 5 we present the mean Malmquist productivity decompositions for the converters for the years 1997 and 1998, and 2000 and 2001. These pairs of years are drawn from the periods when the initial DEA results suggest that the relative performance of the converters was improving and deteriorating respectively.

The Malmquist decompositions shown in Table 5 strongly confirm the evidence presented in the earlier panel data DEA results. Specifically, the improvements in TFP recorded during 1997 and 1998 were attributable to a combination of improvements in both PTE productivity (ptech) and SE productivity (sech). Similarly, the deterioration in performance (as measured by TFP regress) during 2000 and 2001 is associated with a regress in respect of PTE and SE productivity. As discussed previously, while we can decompose the productivity change associated with efficiency change (effch) into its constituent components of

ptech and setech, overall TFP productivity change (tfpch) is actually a combination of effch and technological change (techch), where the latter measures frontier shifts associated with the impact of new technology, etc. It is interesting to note, therefore, that in 1997 the converters exhibited marked productivity growth in respect of effch (1.1220) but this was offset to a large extent by technical regress (techch = 0.9217). Hence, the overall improvement in TFP productivity was more modest with tfpch recorded at 1.0330.

Interestingly, the relatively poor performance of the converters in this earlier period in respect of techch appears to be a legacy of their mutual building society heritage. In 1997, for example, the majority of the mutual building societies were exhibiting techch indices of between 0.82 and 0.88. In contrast, the UK banks exhibited a mean techch index of 0.963. Furthermore, the large high street banks such as HSBC, Lloyds-TSB and Nat West appear to have been at the forefront of technological change and positive frontier shift, exhibiting techch indices of 1.0420, 1.1110 and 1.1100, respectively. It is also pertinent to note that the Coop bank exhibited the worst technical regress of all the banks in 1997, with a techch index of only 0.8860. As this is similar to the indices typically recorded by the mutual building societies at this time, this results suggests a strong link between corporate ownership structure and technological change and innovation.

With respect to the later period, it is clear that there is a marked decline in effch, associated with declines in both scale and PTE productivity, but that there is a significant improvement in the techch component of TFP change. By 2001, for example, the mean effch index for the converters has declined to 0.8830, but the mean techch index has increased to 1.0243. Indeed, if we compare this to the mean techch indices for the banks and building societies of 0.9946 and 0.9943 respectively, it is clear that, in the process of converting from mutual to plc status, the converters have considerably improved their technical productivity in the context of positive frontier shifts. It is also clear that mutual building societies themselves have also considerably improved the contribution to TFP change associated with techch over time. The mean techch index of 0.9943, for example, reflects positive productivity growth for some building societies (techch >1) and modest regress for most of the others. Interestingly, this trend is also mirrored in the performance of the Coop bank. Between 1997 and 2001, for example, the techch index for this bank increased from 0.886 to 0.990. Hence, these results suggest that, while many of the non-plc institutions are still not at the forefront of technical change and innovation, their

relative position has improved considerably in recent years from what appears to have been a relatively low base.

4. Panzar and Rosse H Statistic Results.

As outlined previously, the use of the Panzar and Rosse (1987) H-statistic in order to establish the nature of the competitive conditions in the UK retail banking market is essentially a two-stage process. Firstly, testing the market for long run equilibrium in a regression with the ROA as the dependent variable, and secondly the market test using total revenue as the dependent variable. These two sets of regression results are presented in Table 6, while Table 7 presents the relevant H statistics. With respect to the latter, we present the results for the whole sample, 1995-2001, and for two sub-sample periods, 1995 to 1997 and 1999 to 2001, in order to assess whether there has been any change in competitive conditions over time. In all three time periods it is clear that the H statistic in respect of the equilibrium test, although positive, is not statistically different from zero. Hence, we can conclude that the market is in long- run equilibrium and therefore proceed with the market test.

As can be seen from Table 6, the market test regression explains around 99% of the variation in total revenue. Interestingly, the coefficients on the dummy variables reveal that, when other factors, such as scale and loan quality, are controlled for banks actually generate lower total revenues than mutual building societies. Not surprisingly, total revenues are positively and significantly related to scale, as measured by total assets. Furthermore, total revenue also appears to be positively and significantly related to the riskiness of lending, as measured by the ratio of loan loss provisions to total assets. This accords with a-priori expectations as banks which are willing to make lower quality loans (as measured by the riskiness of borrowers) would be expected to undertake a greater volume of lending. Other things equal, this would produce greater revenues. As banks would tend to reflect any increases in borrower risk profiles in interest margins via a risk premium, however, this would also tend to compound the volume effect on total revenues.

Finally, total revenue also appears to be significantly related to the equity to assets ratio of banks. This is in line with the previous result in the sense that banks undertaking riskier lending would tend to hold higher levels of capital relative to (unweighted) assets.

Turning now to the H statistic emanating from the market test regression, it is clear from Table 7 that in all three periods the H statistic is significantly different from both zero and unity. This suggests that the UK retail banking market can best be characterised as monopolistically competitive. This result is in line with De Bandt and Davis (2000), who find that France, Germany and Italy can be characterised by some form of monopolistic competition, and Molyneux et al (1994) who find that in Germany, UK, France and Spain "bank revenues appear to be earned as if under monopolistic competition" (page 454)).

If we contrast the two sub-periods with the full sample period, however, it is clear that the H statistic has declined over time, from 0.8038 in the period 1995 to 1997 to 0.6094 in the period 1999 to 2001, with the H statistic for the whole sample period 1995 to 2001 being 0.6669. Given that an H statistic of 1 is suggestive of perfect competition, while a statistic of less than or equal to zero is indicative of monopoly, this result suggests that the UK retail banking market has tended to become less competitive over recent years. On the face of it, this result appears to be at odds with anecdotal evidence relating to the potential impact of new entrants such as insurance companies, supermarkets, retailers, internet banks, etc, and the impact of the deregulation of the building society sector in 1986 and 1997.

This perception that the UK retail banking market has become intrinsically more competitive in recent years, however, neglects the potentially powerful impact of corporate ownership structure. More specifically, the mutual building society sector would be expected to exert a potentially powerful competitive impact on the retail banking market by virtue of their inherent margin advantage referred to previously. Furthermore, this competitive impact would be expected to become more powerful as the mutual building society sector was gradually freed from the legislation that traditionally restricted them to the mortgage lending and retail deposit markets. This process, initiated by the 1986 Building Societies Act, was completed by the 1997 legislation. It is also relevant to reiterate that during the earlier part of the sample period building societies were forced, due to the pressures from members for plc conversion, to demonstrate the inherent advantages associated with their mutual corporate form. As we have seen from the DEA and Malmquist analysis, this resulted in relatively poor performance during the period 1995 to 1998 in the context of the revenue / cost DEA specification adopted.

There are a number of reasons, however, why this powerful competitive impact exerted by the mutual building society sector would not be expected to persist. Firstly, the plc conversion process itself implied that the mutual building society

sector lost most of its larger institutions, accounting for more than 65% of industry assets. As mentioned previously, following the eventual conversion of the Bradford and Bingley building society in 2000, the Nationwide became the only remaining large mutual building society. This is extremely significant in terms of the competitive environment in the UK retail banking market, and especially the mortgage market, as the Halifax had been the acknowledged market leader and "price setter" in this latter market. Hence, it may be argued that, once the majority of the larger building societies had converted to plc status, the remaining building societies no longer had sufficient market share to influence interest rate and margin setting as they had hitherto. Furthermore, as the conversion wave came to an end during 1998/99, the pressure on building societies to demonstrate the benefits of mutuality via the margin advantage, etc, also consequently declined. Indeed, we have already seen that the relative performance of the building society sector improved considerably, according to both the DEA and Malmquist analysis, during the latter part of the sample period. In turn, this suggests that the mutual building society sector had become more profit oriented during this later period and was therefore exerting less competitive pressure on lending margins, etc.

Finally, it should be noted that much of the anecdotal evidence concerning the recent increased competitiveness in the UK retail banking market has centred around the potential impact of the many new entrants and the consequent increase in the contestability of UK banking. While the activities of these new entrants has undoubtedly had (and will continue to have) a powerful impact on the UK retail banking market, it is important not to overstate their impact to date. Firstly, for many of the new entrants, and particularly the retailers, financial services represent marginal business, and hence the impact of these various new entrants is still relatively small in terms of market share. It should be acknowledged, however, that this does not preclude them having a potentially powerful impact on pricing behaviour according to the contestable market theory. Secondly, while the supermarkets are often highlighted as being significant new entrants into the retail banking market, in reality most of the supermarkets have entered this market via partnerships with incumbent banks (for example, Tesco/Bank of Scotland, and Sainsburys/Royal Bank of Scotland). Hence, it is debatable whether these supermarket banks do actually represent genuine new entrants. Once again, however, it must be acknowledged that the use of new delivery channels and new technology has fundamentally altered what might be termed the "economics of banking". Hence, as emphasised previously, incumbent banks have

had to respond to this "changing economics of banking" via rationalisation, mergers and the strategic deployment of new technology.

5. Conclusions

This study provides important new evidence on the impact of corporate ownership structure and corporate governance on efficiency, productivity change and competition in the UK retail financial services marketplace. Specifically, by utilising a panel data sample of banks, building societies and building societies which converted from mutual to plc status during the sample period, we are able to gain valuable insights into the economics of mutual versus plc retail financial services institutions. We are also able to analyse the implications of plc conversion, and hence changes in corporate ownership structure, on the relative financial performance of the incumbents and on the competitive structure of the marketplace.

One of the most significant findings to emerge from the study is that differential corporate ownership structures can have significant impacts on financial performance. Furthermore, the plc conversion process itself can have a powerful impact, both on the converters themselves, but also on the remaining mutual institutions. The results also confirmed that mutual financial institutions have considerable latitude in respect of their corporate objectives, and that UK building societies used this latitude to alternate between objectives which were closer to those of their plc competitors and objectives closer to the spirit of mutuality. In contrast, the only non-plc bank in the sample, the Co-op bank, appeared to behave more consistently in a non-profit maximising fashion.

The results also indicated that corporate ownership structure appears to have a profound influence on technological innovation and deployment. In the earlier part of the sample period, for example, the large UK banks were clearly at the forefront of technological change and positive frontier shift, with the mutual building societies, the subsequent converters, and the Co-op bank, all exhibiting technological regress. In the latter part of the sample period, however, the converted building societies also began to exhibit positive levels of productivity growth associated with technological change. Furthermore, although the mutual and non-plc institutions were still not at the forefront of technological change, they appeared to have exhibited considerable relative improvement from a relatively low base.

Finally, tests of the competitive structure using the Panzar – Rosse (1987) statistic revealed the UK retail banking / retail financial services marketplace to be

monopolistically competitive. Somewhat surprisingly, tests conducted over separate sub-samples suggest that this market has become less, rather that more, competitive in recent years. In turn, this suggests that, to date, the impact of the conversion process, in respect of reducing the degree of competition, has tended to outweigh the combined effects of new entrants, new technology and deregulation.

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Table 1

UK Main Retail Financial Intermediaries Pure Technical Efficiency (PTE)

	1995	1996	1997	1998	1999	2000	2001
Building Societies							
Cheshire	100.00	100.00	93.30	75.00	97.40	89.10	100.00
Leeds and Holbeck	100.00	100.00	91.60	90.50	91.90	91.30	96.50
Nationwide	93.30	99.80	78.40	79.90	84.40	89.10	88.10
Newcastle	90.00	80.60	79.50	80.00	78.80	81.20	81.10
Portman	89.70	84.70	84.20	88.50	91.20	100.00	100.00
Scarborough	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Skipton	100.00	94.60	98.50	93.50	100.00	100.00	100.00
Yorkshire	100.00	77.80	80.50	89.00	93.60	100.00	98.20
Mean PTE Score	96.63	92.19	88.25	87.55	92.16	93.84	95.49
Converted Building Societies							
Alliance and Leicester	100.00	98.60	97.20	100.00	100.00	100.00	95.10
Halifax	100.00	100.00	100.00	100.00	100.00	100.00	87.50
Woolwich	89.40	96.00	98.80	100.00	100.00	90.70	84.90
Mean PTE Score	96.47	98.20	98.67	100.00	100.00	96.90	89.17
Retail Banks							
Abbey National	100.00	100.00	93.10	99.40	100.00	100.00	100.00
Bank of Scotland	99.10	87.60	89.40	92.40	94.30	98.40	98.10
Barclays	100.00	100.00	100.00	94.70	98.80	100.00	100.00
Clydesdale Bank	76.70	77.60	86.20	94.40	98.30	100.00	100.00
Co Op Bank	77.30	72.90	67.20	67.80	79.40	73.90	83.40
HSBC Bank	89.60	93.50	100.00	91.70	96.60	98.50	96.60
Lloyds (TSB)	91.30	100.00	88.50	97.80	100.00	100.00	100.00
Natwest	78.00	86.10	82.40	82.30	100.00	91.40	94.80
Yorkshire Bank	100.00	77.80	80.50	89.00	93.60	100.00	98.20
Mean PTE Score	88.49	90.01	89.33	89.03	95.54	95.80	96.99

Table 2

UK Main Retail Financial Intermediaries Scale Efficiency (SE)

	1995	1996	1997	1998	1999	2000	2001
Building Societies							
Cheshire	crs	crs	irs	irs	irs	irs	crs
Leeds and Holbeck	crs	crs	irs	irs	irs	irs	irs
Nationwide	drs	drs	irs	crs	crs	crs	drs
Newcastle	irs	irs	irs	irs	irs	irs	irs
Portman	drs	drs	drs	drs	irs	crs	crs
Scarborough	irs	irs	irs	irs	irs	crs	irs
Skipton	irs	irs	drs	irs	crs	crs	crs
Yorkshire	crs	irs	irs	drs	drs	crs	drs
Mean SE Score	96.25	96.01	98.06	95.95	96.76	99.29	96.99
Converted Building Societies							
Alliance and Leicester	crs	drs	drs	crs	crs	crs	drs
Halifax	drs	drs	crs	drs	drs	drs	drs
Woolwich	drs	crs	drs	crs	crs	crs	drs
Mean SE Score	97.67	97.70	99.77	99.40	97.73	96.77	94.77
Retail Banks							
Abbey National	crs	crs	crs	drs	drs	crs	crs
Bank of Scotland	drs	drs	drs	drs	drs	drs	drs
Barclays	drs	drs	drs	drs	drs	drs	drs
Clydesdale Bank	crs	crs	irs	crs	crs	crs	crs
Co Op Bank	drs	drs	drs	drs	irs	drs	irs
HSBC Bank	drs	drs	crs	drs	drs	drs	drs
Lloyds (TSB)	drs	drs	drs	drs	drs	crs	drs
Natwest	drs	drs	drs	drs	drs	drs	drs
Yorkshire Bank	crs	irs	irs	drs	drs	crs	drs
Mean SE Score	96.8	95.59	93.23	93.03	96.20	95.53	92.23

crs, drs and irs denotes constant returns to scale, decreasing returns to scale and increasing returns to scale respectively.

Table 3

UK Main Retail Financial Intermediaries Overall Efficiency (OE)

	1995	1996	1997	1998	1999	2000	2001
Building Societies							
Cheshire	100.00	100.00	92.00	74.80	95.50	88.60	100.00
Leeds and Holbeck	100.00	100.00	91.50	87.60	89.70	89.50	95.70
Nationwide	90.40	98.90	78.30	79.90	94.40	89.10	87.70
Newcastle	85.60	75.70	75.60	75.90	75.10	78.50	78.60
Portman	85.80	81.10	83.30	87.90	91.00	100.00	100.00
Scarborough	84.90	81.50	93.50	78.70	84.30	100.00	80.40
Skipton	97.50	93.10	98.40	92.90	100.00	100.00	100.00
Yorkshire	100.00	77.40	79.50	88.20	92.70	100.00	98.10
Mean OE Score	93.03	88.46	86.51	83.24	89.09	93.21	92.56
Converted Building Societies							
Alliance and Leicester	100.00	96.80	96.70	100.00	100.00	100.00	94.10
Halifax	95.60	94.90	100.00	98.20	93.20	90.30	77.70
Woolwich	87.00	96.00	98.60	100.00	100.00	90.70	81.90
Mean OE Score	94.20	95.90	98.43	99.40	97.73	93.67	84.57
Retail Banks							
Abbey National	100.00	100.00	92.90	98.90	98.60	100.00	100.00
Bank of Scotland	94.30	83.80	84.90	87.00	89.00	92.10	81.90
Barclays	87.10	92.10	88.60	84.80	93.40	98.00	91.10
Clydesdale Bank	76.70	77.60	86.10	94.30	98.20	100.00	100.00
Co Op Bank	72.90	70.80	64.10	66.20	79.30	72.20	83.30
HSBC Bank	85.20	87.80	100.00	88.40	91.50	86.80	79.80
Lloyds (TSB)	89.10	98.40	72.50	77.00	93.50	100.00	93.90
Natwest	75.20	73.70	66.60	67.00	91.40	75.30	75.10
Yorkshire Bank	100.00	77.40	79.50	88.20	92.70	100.00	98.10
Mean OE Score	84.88	86.04	83.40	82.71	91.81	91.60	89.46

Table 4.

Mean Total Factor Productivity Change (Relative to Previous Year) for UK Financial Intermediaries

	1996	1997	1998	1999	2000	2001
Retail Banks	0.9726	0.9960	1.1059	1.1960	1.0176	1.0371
Building Societies	0.8709	0.9953	0.8779	0.9776	1.0404	1.0335
Converters	1.0057	1.0330	1.0287	0.9743	0.9570	0.90003

Table 5.

Malmquist Productivity Change Decompositions for UK Converters.

Year	effch	techch	ptech	sech	tfpch
1997	1.1220	0.9217	1.0800	1.0420	1.0330
1998	1.0457	0.9830	1.0203	1.0253	1.0287
2000	0.9863	0.9703	1.0000	0.9863	0.9570
2001	0.8830	1.0243	0.9517	0.9277	0.9003

Table 6

H Statistic Equilibrium and Market Test Equations Parameter Estimates

	estimate	std. error	estimate	std. error
Constant	-0.7460	0.6221	0.9074**	0.2070
α_1 LP_1	0.1799**	0.0814	0.2334**	0.0196
α_2 LP_2	-0.1341**	0.0622	0.0397**	0.0234
α_3 LP_3	0.0921	0.1150	0.3938**	0.0389
β_1 D_1	0.0601	0.0644	-0.0339	0.0238
β_2 D_2	-0.6363**	0.0794	-0.1638**	0.0338
δ_1 $\ln Z_1$	-0.0245	0.0194	0.9483**	0.0080
δ_2 $\ln Z_2$	0.0383**	0.0182	0.0193**	0.0095
δ_3 $\ln Z_3$	0.6679**	0.1255	0.1659**	0.0355
R2	0.6785		0.9979	
Std. error of regression	0.2585		0.0809	

standard errors corrected using White heteroscedastic consistent errors in parentheses.
** denotes significant at the 5% and * at the 10% critical level.

Table 7

H Statistic Results for UK Financial Intermediaries

	1995 - 1997	1999 - 2001	1995 – 2001
Equilibrium Test	0.2939	0.2753	0.1379
Market Test	0.8038 [ab]	0.6094 [ab]	0.6669 [ab]

[a] denotes rejection of the null hypothesis (F test) that H statistic is equal to zero 5% critical level.
[b] denotes rejection of the null hypothesis (F test) that H statistic is equal to one at the 5% critical level.