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Switching costs in the market for personal current accounts: some evidence for the United Kingdom

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Abstract

This paper provides an analysis of the competitive process in the market for personal current accounts in the United Kingdom. Using survey data, we first describe some stylised developments in this market over our sample period (1996-2001). We find a gradual change in the distribution of market shares over time. This contrasts with a marked dispersion in price, which appears to persist through time. Analysing the evolution of market shares, we address two key questions: (i) are bank market shares responding to price differentials?; (ii) if not, which type of imperfect competition best fits the data? Our conclusions point to the existence of customer switching costs as a key determinant of the nature of competition in the market for personal current accounts. The results of this study are therefore broadly supportive of a number of recent initiatives to facilitate switching bank accounts in the United Kingdom.

Key words: Microeconomics, retail banking, competition, switching, price elasticity.

JEL classification: D12, D43, D83, G21, L13.

Summary

Bank current accounts play a pivotal role in the relationship between a bank and its customers and may serve as a gateway through which banks can cross-sell other products. This paper analyses the competition in the market for personal current accounts in the United Kingdom. Using the Financial Research Survey (FRS) data collected by National Opinion Poll (NOP), we first describe some stylised facts on market shares and prices associated with the current account, such as the interest rate offered on positive balances and the rate charged on overdraft. While the level of concentration has remained high in this market, the market appears to have become gradually more competitive, with building societies and direct banks making some significant inroads during the 1996-2001 period. Against this, we find a marked dispersion in price, which appears to persist through time.

To assess the level of competition in the current account market more formally, we derive the elasticity – that is the sensitivity – of bank market shares with respect to the set of prices that relate to the current account product. This analysis controls for differences in current account characteristics (such as the extent of the branch network) in order to isolate the effect of price differentials on changes in market share. We find a moderate sensitivity of changes in market share to differences in the current account rate across banks. The elasticity of market share with respect to the overdraft rate is considerably lower. Overall our findings are consistent with a moderate degree of imperfect competition in the market for personal current accounts.

We proceed to investigate further the type of friction in this market that best characterises the data. We find a positive relationship between levels of market share and price – again controlling for non-price characteristics. This finding points to the importance of the cost of changing banks and is consistent with dynamic models of competition with switching costs developed recently. The basic intuition is that each bank faces a trade-off: raising the price increases the profit the bank achieves on its existing customer base, but also implies that the bank might lose some of its present customers and is less likely to attract new customers. The bank's current market share determines how this trade-off is resolved. A bank's incentive to raise its price is more pronounced, the larger is the bank's current market share. The model also predicts that the relationship between market share and price should be stronger, the lower the elasticity of demand with respect to price. Consistent with this prediction, we find that the relationship between market share and price is strongest for the overdraft rate, for which the elasticity of demand is lowest.

Since the end of our sample period, there have been several initiatives to facilitate switching. In response to the Cruickshank report in 2000, the government asked a group led by DeAnne Julius to review the Banking Code. One set of recommendations in the report that has since been implemented specifically focuses on ways to facilitate switching accounts. Moreover, the banks have implemented improvements to the logistics of the switching process – eg as regards the exchange of information between the switchers' old and new banks – to improve the speed and the accuracy of the account transfer. In addition to initiatives to reduce the cost of switching, steps have also been taken to increase consumer awareness of the potential benefits of changing banks. Even though it may be too early to assess the impact of these initiatives empirically, the results of this study appear broadly supportive of such initiatives, in that they document empirically the presence of switching costs in the UK market for personal current accounts.

1 Introduction

1.1 Motivation

This paper analyses the competitive process in the UK market for personal current accounts. Bank current accounts play a pivotal role in the relationship between a bank and its customers: current accounts offer access to deposit-holding services, money transmission through cheques and debit facilities. They may also act as a vehicle for credit through overdrafts and facilitate access to savings services. As such, they are important for building relationships between a bank and its customers and may serve as a gateway through which suppliers can cross-sell other banking products (eg savings products).

We first document some stylised facts as regards the developments in the market for personal current accounts over the past few years. We find that the distribution of market shares has changed gradually over time. Against this, there is a marked dispersion in price, which appears to persist through time.[(1)] Analysing further the evolution of market shares, we address two key questions:

(i) Are bank market shares responding to price differentials?
(ii) If not, which type of imperfect competition best fits the data?

In addressing the first question, we analyse the speed of adjustment of market shares in response to price differentials, taking into account the fact that price differentials may well reflect differences in product characteristics. Addressing the second question, we analyse the relationship between the distribution of the levels of market shares and the distribution of prices to distinguish empirically between a number of competing hypotheses as to why this adjustment may be slow.

A large part of the empirical literature that attempts to analyse competition in banking is based on the Structure-Conduct-Performance (SCP) paradigm, which posits a causal relationship between industry structure, the banks' conduct and ultimately their performance. As regards the level of competition in banking markets, overall these studies have not led to firm conclusions.[(2)] While some studies have found a positive link between profitability and measures of market structure, many other studies have failed to find a clear link.[(3)] One major problem with this literature is that it is not built on a firm

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[(1)] Price dispersion may reflect product differentiation, or the presence of some frictions. See Sections 3 and 4 for how we distinguish between these cases.

[(2)] This has also been argued by Gilbert (1984), among others.

[(3)] For a review of studies on bank market structure and competition, see Gilbert (1984) or Berger (1995).

theoretical footing. In particular, a positive relationship has been subject to different interpretations and some economists have argued that the causality between structure and performance is reverse: banks with higher management skills and better technology will have lower costs and therefore higher profits. As a result they will gain large market shares that could result in a higher level of market concentration, see Demsetz (1973).[4] Moreover, the contestable market theory has questioned the link between market concentration and performance by emphasising the importance of entry conditions, instead of market concentration as such, to explain the degree of competition in a market, see Baumol, Panzar and Willig (1982).

Another strand of empirical studies, which is sometimes referred to as the New Empirical Industrial Organisation approach, attempts to estimate a parameter of a structural model that directly measures the degree of imperfect competition. For instance, a number of studies estimate the Panzar-Rosse statistic, which measures the extent to which changes in a bank's input prices are reflected in its revenues, see Panzar and Rosse (1987).[5] Typically, in these studies, the parameter estimates found are subject to substantial variation over time that is hard to interpret as changes in the degree of competition. In addition, while in most cases the evidence has been in favour of imperfect competition, as opposed to perfect competition, the test employed is not sharp enough to distinguish between various types and sources of imperfect competition. Finally, the Panzar-Rosse statistic is estimated at the industry level. This assumes that the degree of competition is the same in each product market in which the banking firms are active. Arguably, however, competitive conditions may vary significantly from one market to another.

Empirical studies focusing on frictions arising at the micro level, such as switching or search costs, are scarce, partly because microdata (ie data at the product or bank customer level) cannot easily be obtained. A few empirical studies have shown that various proxies for those costs can have a significant impact on the price of banking products.[6] For instance, Sharpe (1997), consistent with Calem and Carlino (1991), finds that in the United States, the amount of household migration in a market has a significant influence on rates offered on bank retail deposits. Moreover, Hannan (1991) investigates the relationship between prices and market structure using United States survey data and can thus distinguish between different product markets. However, for European countries, this type

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[4] Berger (1995) proposed a way to distinguish between the different interpretations of the positive link between market structure and performance in banking.

[5] De Bandt and Davis (2000) measure the Panzar-Rosse statistic for several European banking markets.

[6] See Kim, Kliger and Vale (2003) for a short summary of these empirical studies. See Kiser (2002) for a survey on the reasons why US deposit holders switch banks.

of study is rare, owing to the complexity of pricing schedules and the scarcity of price data for bank retail products.

Our study builds directly on recent work by Heffernan (2002), who analyses the pricing behaviour of British banks in UK retail markets and provides one of the few exceptions to the empirical literature in that she distinguishes between different types of imperfect competition. Like her, we attempt to test which model(s) of imperfect competition best describe the UK current account market. However, we devise a different test, which is based on the relationship between the level of a bank's market share and the price it sets. This test allows for a broader set of competing hypotheses as regards the type of friction that may be affecting the competitive process in this market.

1.2 Frictions in the market for personal current accounts

A number of potential frictions may be present in the market for personal current accounts. On the demand side these may be related to switching costs and search costs borne by bank customers. On the supply side they may relate to fixed costs of entry borne by banks (economies of scale).

(i) Switching costs

Switching costs may be defined as those costs that customers incur when switching accounts from one bank to another. Switching costs may have several origins.[7] Switching current account providers may involve transaction costs. Such costs are likely to arise from the need to reroute outgoing direct debits and redirecting inflowing payments. Since switching current account entails customers leaving their established banking relationship, it may also result in an increase in asymmetric information between banks and their customers. Moreover, in some cases, banks may find it in their interest to create artificially or to increase the switching costs their customers face through contractual penalties. One example is the mortgage market, where contracts typically provide early redemption penalties. However, such contractual penalties do not seem to exist in the market for current accounts in the United Kingdom. Moreover, since the end of our sample period there appear to have been attempts to reduce switching costs. As a response to the Cruickshank (2000) report, the government asked a group chaired by DeAnne Julius to make recommendations as regards changes in the Banking Code. One of the recommendations of the study was to make account switching easier.[8] Some banks now offer to smooth the switching process by offering a

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[7] For a taxonomy of switching costs, see Klemperer (1995).

[8] See Julius (2001) for more detail.

'ready-made' kit to customers wishing to switch to them. Moreover, the members of Bankers Automated Clearing Services (BACS) recently introduced an automated system for exchanging information on switching customers' direct debits, reducing technological barriers to and transactions costs of switching.

In principle, customers should be more likely to switch providers if the net benefit from switching (ie the difference between a gross benefit and the cost of switching) is high. Recent research by the UK Financial Services Authority (FSA) has found that even though the current account market showed the highest dispersion in prices in the United Kingdom, the monetary loss from not choosing the cheapest provider was relatively small.[(9)] While the gross direct benefit from switching current accounts may therefore appear limited for the average customer, this may not necessarily be the case when ancillary services such as overdraft and saving facilities are accounted for.[(10)] However, in any case, customers will need to weigh the gross benefit of switching against the cost of switching, when deciding whether to leave their current bank. These costs are difficult to quantify and may well differ across customers. For instance, switching costs may well be higher for customers who expect to use the overdraft facility since, as a result of adverse selection, switchers may not immediately be granted a new overdraft facility.

Our own calculations suggest that switching costs may well be high on average for the current account market when compared to the gross benefit customers can achieve from switching. In particular, data on current account switching behaviour from the NOP-FRS database imply that a representative current account holder would only change banks every 91 years, ie does not switch current account provider during their lifetime.

[(9)] See Financial Services Authority (2002), Table 2, page 15. According to this research, if a consumer chooses to purchase the average priced current account instead of the cheapest, the loss of yield is relatively high (3.4% per annum (p.a)); however, the monetary loss from not choosing the cheapest current account provider, when average balances are taken into account, is relatively small (£26 p.a.) compared to most other products (eg £230 p.a. for a variable-rate mortgage). One caveat to these calculations may be that the expected gross benefits calculated in FSA (2002) only relate to price differentials and may thus only partially reflect the 'true' gross benefits from switching current account providers. In particular, they do not account for potential (non-monetary) improvement in the 'quality' of service (eg new product features, better management by/relationship with the new provider, better access to other products) associated with switching.

[(10)] FSA (2002) finds that rates on overdrafts as well as rates on instant access savings accounts – products that may be linked to current accounts – are characterised by both a high price dispersion (12.8% p.a. and 2.2% p.a. respectively) and a significant monetary loss (£142 p.a. and £117 p.a. respectively).

(ii) Search costs

Switching costs make it costly for customers to leave their existing current account providers. Such costs will thus only be relevant to those customers who already have a current account. There might also be frictions that do not have this feature. These may result in costs that will be incurred by customers when they open a current account for the first time as well as by existing current account holders. *Search costs* are a key example of this type of friction. Search costs are incurred when consumers start looking for the different options in the market that best fit their preferences. Search costs may be incurred either when customers are currently 'attached' to one specific supplier or when they are 'new' customers. Search costs can be substantial if pricing is opaque or products are highly differentiated. For current accounts, search costs may have gone up recently as the complexity and differentiation of products on offer has increased. The net welfare effect of this increased product complexity and differentiation is *a priori* ambiguous: on the one hand, search costs may have increased because complexity makes it more difficult for consumers to apprehend product characteristics; on the other hand, the availability of a wider range of products may increase consumers' welfare.

(iii) Economies of scale

Finally, in addition to switching and search costs, which are primarily demand-related, there might be supply-related factors that would result in the market for personal current accounts to be less than highly competitive. An example is the presence of economies of scale that results from exogenous or endogenous set-up costs. In banking, the costs of setting up and maintaining a network of branches are likely to be substantial, even though recent developments in technology (eg internet banking) may well have reduced the minimum efficient scale for some banks. In addition, banks are known to spend substantial amounts on advertising and branding. This could mean that in equilibrium banking markets are more concentrated than under the assumptions of perfect and frictionless competition, resulting in strategic interaction between providers.

1.3 Outline of paper

The remainder of this paper is organised as follows. We first present some stylised facts on the UK current account market. After describing our data sources (Section 2.1), we show how individual banks' market shares, prices and non-price characteristics have evolved over the sample period (Section 2.2). Section 3 analyses the elasticity of bank-level demand with respect to prices that are associated with current accounts. In Section 4 we provide further evidence related to the type of imperfect competition in this market. Section 5 summarises and concludes the paper.

2 Description of the data

2.1 Data sources

(i) Data on the number of current accounts per bank

The data on the number of current account customers per bank are obtained from NOP (National Opinion Poll). NOP conducts a survey, known as the Financial Research Survey (FRS), among 5,000 individuals selected randomly each month. Polled households are asked detailed questions about the financial products and services they use, such as current accounts, credit cards, savings products, mortgages, loans, etc, as well as their demographic characteristics (age, gender, income, working status, geographic area of living, etc). In particular, households are asked at which bank they hold their main current account.

From this source we were able to obtain the number of current account customers per bank on a half-year basis and derived each bank's market share, in terms of number of customers as a time series between 1996 and 2001.[(11)]

(ii) Data on prices (ie interest rates)

We analyse three rates that are directly, or indirectly, associated with a current account. First, we look at the interest rate offered on positive balances in the customers' current accounts. Second, since most customers would have the option to arrange for an overdraft facility associated with their current account, we analyse the rate a bank charges on authorised overdrafts. Finally, we take account of the possibility that banks may attempt to cross-sell savings products to their current account customers. The distinction between a current account and a savings account is that the latter service does not include money transmission services (through cheques or direct debits). On the other hand, the savings account may offer a better interest rate. When a customer plans to transfer funds regularly from a current account to a saving account, this transfer may be facilitated if both

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[(11)] The NOP FRS data were accessed through the X-Press system. This interface allows access to aggregated data (ie at a bank level), rather than the 'raw' data - ie the data at a (polled) individual level.

accounts are held at the same institution.[12] We thus also include the rate offered on instant access saving accounts in our analysis.

Each month, the *Moneyfacts* review publishes the rates quoted by most UK banks for a series of banking products and services. For the period 1996-2001, we obtained the following three rates:

- the interest rate offered on current accounts (r_{CA}) (£1,000 minimum balance with overdraft facility) by each bank in our sample;

- the interest rates each bank receives on authorised overdrafts (r_{OD}); and

- the interest rate offered on instant access saving accounts (r_{IA}) (£500 minimum balance) by each bank.[13]

We have not been able to obtain a time series on fees applicable to current account services for our sample. This may be related to the fact that over the sample period UK banks typically have not been charging explicit fees for the maintenance of current accounts. They have also not been charging for most common payments-related services, such as the processing of cheques.[14]

(iii) Data on non price current account characteristics

In our analysis we also attempt to take account of non-price characteristics associated with current accounts offered by different providers. Data on the number of branches and the number of ATMs and cash dispensers at a bank level over time were obtained from the British Bankers' Association (BBA) and the Association for Payment Clearing Services (APACS). In addition, we obtained information on the range of transactions (eg standing orders, direct debits, payment of bills, transfers

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[12] From the point of view of the customer, it may be convenient to hold both types of accounts with the same bank, especially if an automatic sweep facility exists between the two accounts.

[13] We have deliberately chosen a higher minimum balance for interest paid on current accounts in relation to that on savings accounts; this can be explained by the difference in transaction services between current accounts and instant access savings accounts: whereas the former offers payment services, which are typically free of charges in the United Kingdom, the latter does not.

[14] See Llewellyn and Drake (1993) for a history of United Kingdom banks' pricing policy for current accounts. In the late 1980s, United Kingdom banks started to pay interest on current accounts. Even though more recently there has been a trend towards the use of explicit charges, most common transactions (such as the processing of cheques, standing orders, etc) are still typically free of charge.

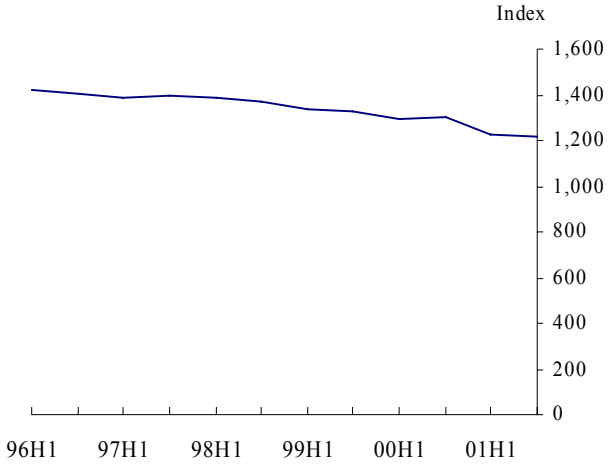
of funds) a current account holder can perform over the phone as well as over the internet. This information was obtained from the *Which?* magazine website. However, unlike the data on branches and ATMs this information relates to a particular point in time (December 2002).

2.2 Stylised facts

(i) Changes in market concentration

The Herfindahl-Hirschmann index[15] records a very gradual decrease from 1,425 to 1,217 over our sample period and suggests that the current account market is moderately concentrated,[16] see Chart 1. The decline in this index suggests that the current account market is very gradually becoming less concentrated.

Chart 1
Herfindahl index (1996–2001)



[15] The Herfindahl-Hirschmann index (HHI) summarises the degree of concentration in the market for current accounts by summing the squared market shares of all banks in our sample. By convention, each market share is multiplied by 100, eg if the market share is 1, it enters as 100. As a result, the HHI ranges from 0 to 10,000.

[16] The US Department of Justice considers a market with a Herfindahl-Hirschmann index (HHI) below 1,000 as unconcentrated; one with an HHI between 1,000 and 1,800 as moderately concentrated and one with an HHI above 1,800 as concentrated.

Charts 2a to 2d help to explain the aggregate development by focusing on the following peer groups:[17][18]

- the 'big four' banks (Barclays, HSBC/Midland, Lloyds TSB and NatWest);
- the 'building societies': this peer group includes one current building society as well as those who demutualised (Abbey National, Alliance & Leicester, Halifax, Nationwide, Northern Rock and Woolwich);
- the 'direct' banks – this group comprises those banks that essentially operate via the phone or the internet (Cahoot, Citibank, First Direct, First-e, Intelligent Finance, Smile and Virgin Direct); and
- the 'other' banks (Bank of Scotland, Clydesdale, the Co-operative Bank, Girobank, Royal Bank of Scotland, Safeway Bank and Yorkshire Bank).

Chart 2a shows that while the combined market share of the 'big four' banks in the market for current accounts is high (64%), it has fallen by some 7 percentage points over the past decade.[19] Building societies – including those that demutualised – have made significant inroads into the market for current accounts, increasing their share by some 9 percentage points over the period, see Chart 2b. Arguably, this development has been helped by strong consumer recognition of their brands. At the same time, 'direct' banks, ie those banks that essentially operate via telephone or other electronic means, have been able to increase their market share quite steeply, albeit from a low base, Chart 2c. The absolute increase, at 1 percentage point, is smaller than that for the former building societies. Thus by 2001 H2 these banks still only accounted for some 2% of all current account

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[17] See also Table A1 in Appendix 1.

[18] Some of the banks in our sample are linked by ownership. In principle, we have kept separate entities in our sample if parent and subsidiary have retained separate retail franchises. For example, we have included NatWest rather than the post-merger RBS Group in the group of the 'big four', since NatWest is considered to have a separate retail franchise from RBS. Adding RBS back onto the figures for NatWest changes the level but not the time profile of the market shares. Similarly, during most of the sample period, Halifax and Bank of Scotland were separate entities. Finally, as regards the 'direct' banks, some of these are subsidiaries of other banks in our sample. For instance, Cahoot is owned by Abbey National, First Direct by HSBC, Intelligent Finance by Halifax and Smile by the Co-operative Bank. Again, in these cases we treat subsidiary and parent as separate retail entities, as 'direct' banks and parent companies have retained separate retail franchises.

[19] Among the 'big four', HSBC/Midland is the only bank not to lose market share in our sample.

holders.[20] Finally, the share of all banks not belonging to these three peer groups (ie Royal Bank of Scotland, Bank of Scotland and small and medium banks such as Clydesdale or Yorkshire Bank) has decreased from 16% to 14% over the sample period, see Chart 2d.

Chart 2a
'Big four', market share (1996–2001)

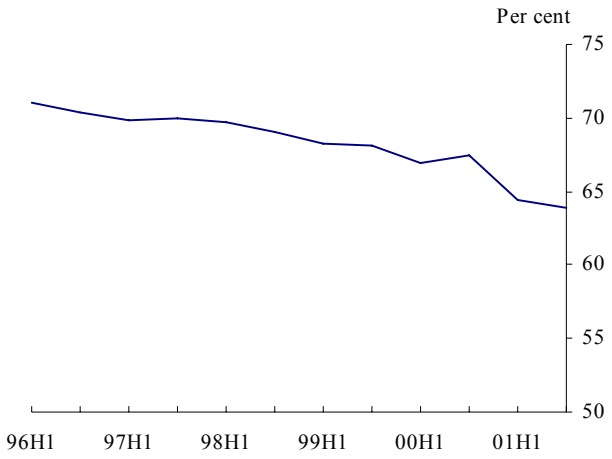


Chart 2b
'Building societies', market share (1996–2001)

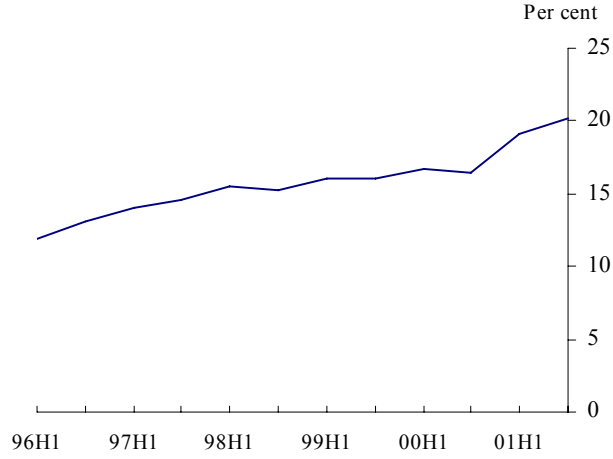


Chart 2c
'Direct' banks, market share (1996–2001)

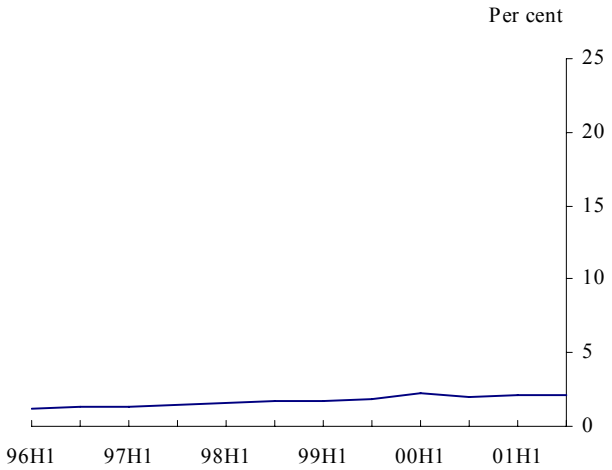
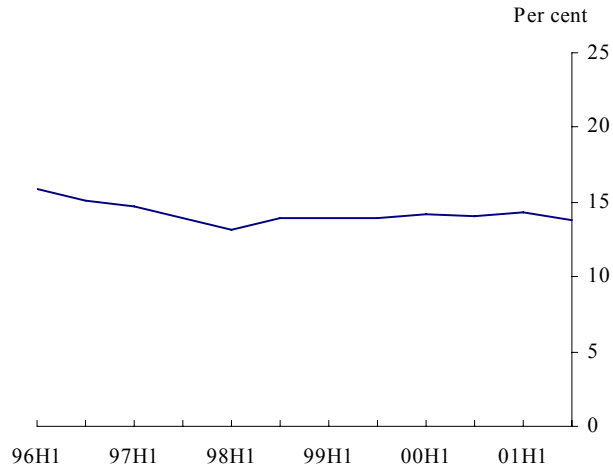


Chart 2d
'Other' banks, market share (1996–2001)

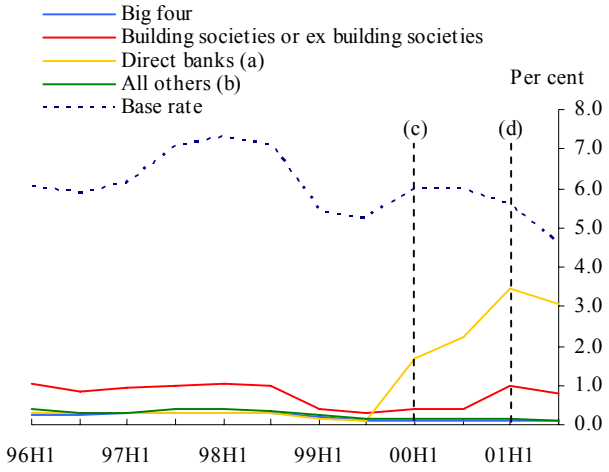


[20] Much of the increase is due to the successful expansion of First Direct, whose market share increased from 1.2% in 1996 H1 to 1.6% in 2001 H2.

(ii) Changes in prices

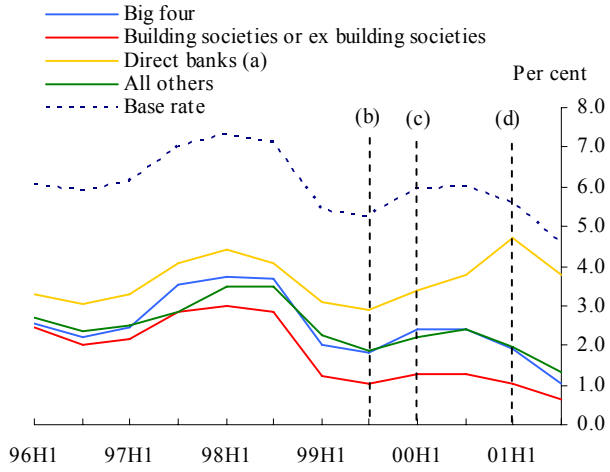
Charts 3a to 3c show how the average interest rates quoted by banks within each of the four peer groups defined in Table A1 (see Appendix 1) have evolved over time.

Chart 3a
Average current account rates within bank categories (1996-2001)



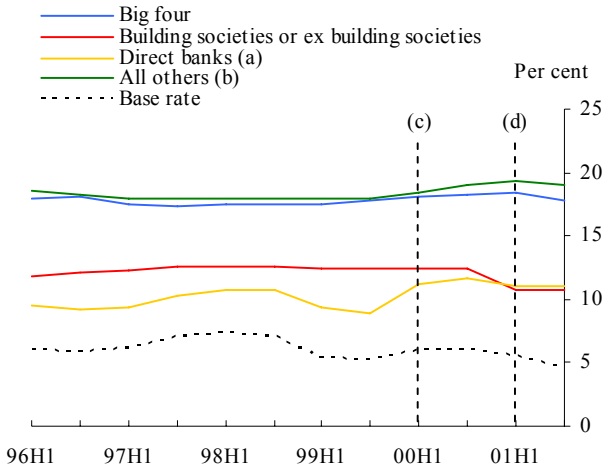
[a] Virgin Direct rate not available.
[b] Co-operative Bank and Safeway rates not available.
[c] Citibank and Smile enter 'direct' banks.
[d] Cahoot, First-e and Intelligent Finance enter 'direct' banks.

Chart 3b
Average instant access saving rates within bank categories (1996-2001)



[a] Cahoot rate not available.
[b] Virgin Direct enters 'direct' banks.
[c] Citibank and Smile enter 'direct' banks.
[d] First-e and Intelligent Finance enter 'direct' banks.

Chart 3c
Average overdraft rates within bank categories (1996-2001)



[a] Virgin Direct and First-e rates not available.
[b] Safeway rate not available.
[c] Citibank and Smile enter 'direct' banks.
[d] Cahoot and Intelligent Finance enter 'direct' banks.

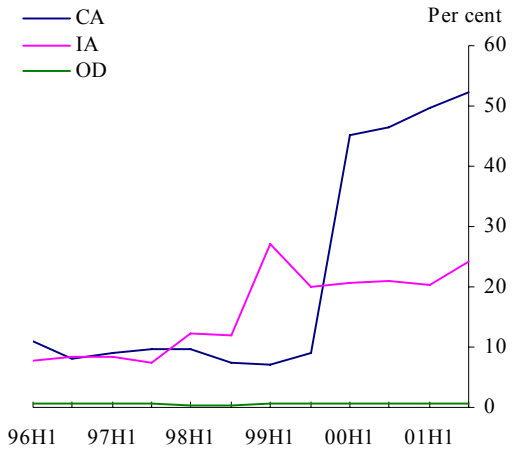
The 'big four' banks and the 'other' category show a similar pattern over time for each of the three rates. For these two groups, rates on both current accounts and overdrafts hardly vary over the period despite significant movements in the Bank of England's base rate. Those institutions turn out to offer the lowest rates on current accounts and charge the highest rates on overdrafts. 'Direct' banks, on the other hand, tend to charge significantly lower rates on overdrafts than the rest of the sample and offer the highest rates on both current and saving accounts. Current or former building societies also offer significantly lower overdraft rates and slightly higher current account rates than the 'big four' banks. In view of this, perhaps surprisingly, these institutions offer among the lowest rates on instant access saving accounts.

In Chart 4, the (scaled) difference between the best and the worst rates offered on current accounts (CA), instant access savings accounts (IA) and charged on overdrafts (OD) is computed over time. Finally, Charts 5a and 5b show the cross-sectional standard deviation of those three rates over time (in Chart 5b, scaled by each average rate). These charts suggest that price differentials do not vary much through time, at least until the end of 1999. The apparent lack of variation through time is confirmed when the standard deviation of each variable of interest is decomposed into a 'between group' – ie cross-sectional – component, and a 'within group' – ie time series – component: for most

variables, the 'between group' standard deviation is considerably larger than the 'within group' standard deviation (see Table C1 in Appendix 1). In addition, the price dispersion is proportionally more pronounced in the case of the current account rate than the overdraft rate – the coefficient of variation for the current account rate (1.54) is significantly larger than that for the overdraft rate (0.24).[21]

In sum, price behaviour varies markedly by bank peer group. Price dispersion in general and across peer groups in particular has increased since 1999 for current accounts and instant access savings accounts. This is mainly due to new 'direct' banks offering higher rates. Price dispersion has remained high throughout the period for overdrafts.

Chart 4
Difference between best and worst rates, scaled by the worst rate (1996-2001)



[21] The coefficient of variation adjusts for differences in the mean of the series.

Chart 5a
Cross-sectional standard deviation of rates (1996-2001)

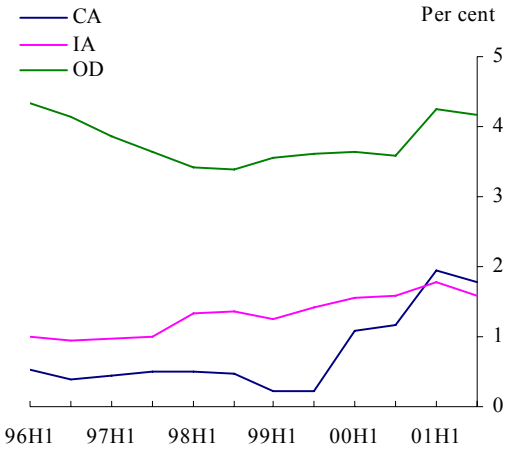
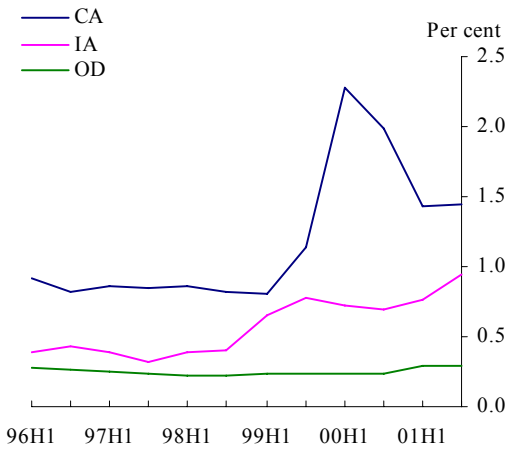


Chart 5b
Cross-sectional standard deviation scaled by the average rate (1996-2001)



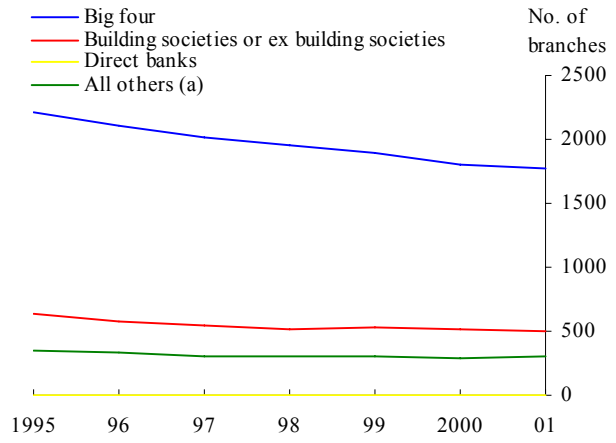
(iii) Account characteristics

A key factor that could account for price dispersion across banks is differences in current account characteristics. For example, the 'direct' banks may need to offer a better price since they do not offer the same range of services as traditional 'bricks and mortar' banks. However, measuring the characteristics attached to a product is a difficult task, first because one needs to pick the characteristics that matter for customers and second because of the scarcity of data on those different qualitative characteristics. We focus on four current account characteristics: (i) the extent of the branch network; (ii) the density of ATMs; (iii) the range of transactions a customer can effect over the phone; and (iv) the range of transactions a customer can realise over the internet.

First, some customers may value relationship banking and a personal contact with their bank manager. The extent of a bank's branch network may indicate the extent of relationship banking offered by the bank. Chart 6a shows the distribution of the number of branches by peer group over time. For the 'direct' banks (except Citibank which has some branches in the United Kingdom) as well as for Safeway Bank (ie one of the 'other' banks), a number of zero branches is recorded. The other three groups display a continuous decline over the period, especially so for the 'big four' banks. However, within this category, the relatively stable number of HSBC branches contrasts with the significant decline (-25%) seen for NatWest and Lloyds TSB over the period. Chart 6b gives the distribution of the number of branches at a bank level (averaged over time). For our empirical

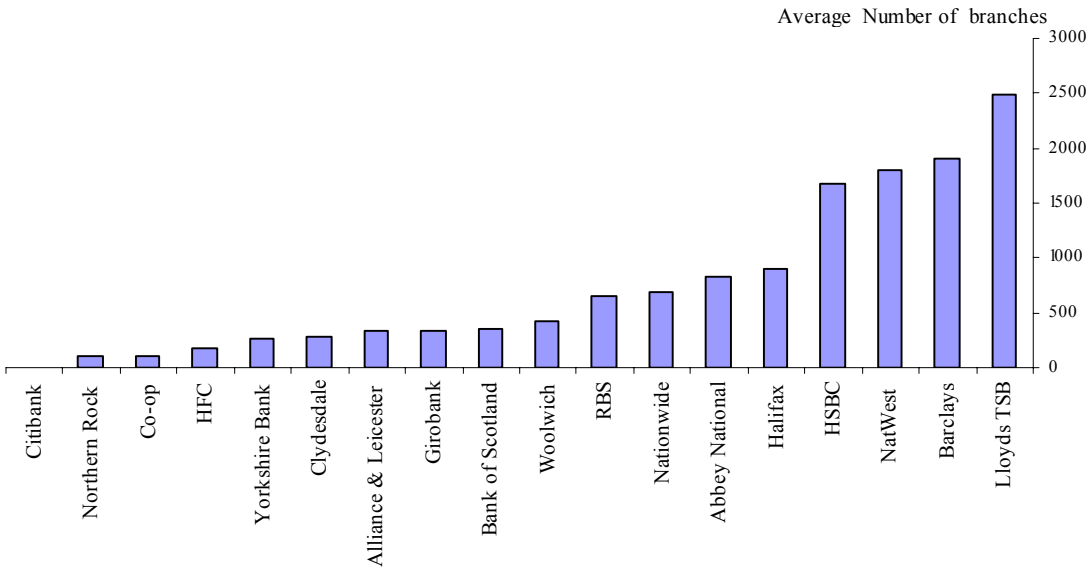
analysis we scale the number of branches by the number of a bank's customers and use this number as a proxy for the extent of relationship banking.

Chart 6a
Average number of branches by peer group (1995-2001)



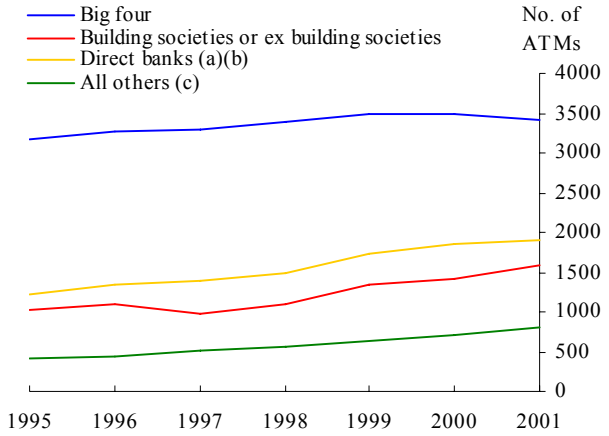
(a) Excluding Safeway.

Chart 6b
Average number of branches over the period (1995-2001)



Second, customers may value ease of access to their funds. The density of a bank's ATM network and hence the average proximity of an ATM to the customer may be indicative of the convenience of cash management associated with the account.[22] Note that since customers of 'direct' banks may use the ATM network of their parent firm (eg the Abbey National network for Cahoot customers) at no cost, we allocate the number of ATMs owned by a 'direct' bank's parent company to that 'direct' bank. Chart 7a shows the distribution of the number of cash dispensers and ATMs by peer group over time and Chart 7b displays the data at a bank level and averaged over time. Almost all banks in our sample maintained (eg Barclays, Lloyds TSB) or significantly increased (eg Bank of Scotland, Abbey National and RBS by more than 50%) their network over the period. In Sections 3 and 4, we use the (logarithm of the) number of ATMs each bank owns as a measure of the density of its ATM network and as proxy for ease of cash management.

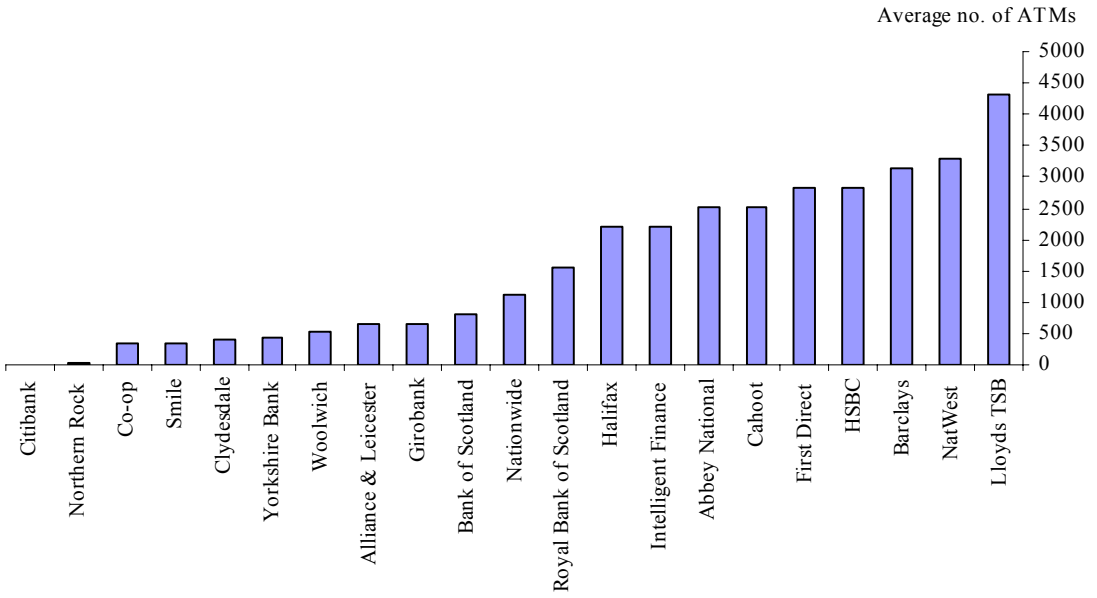
Chart 7a
Average number of ATMs by peer group (1995-2001)



(a) Direct banks' number of ATMs are parents' number of ATMs.
(b) Excluding First-e and Virgin Direct.
(c) Excluding Girobank and Safeway.

[22] In July 2000, members of the LINK network abolished the so-called 'disloyalty charges' that were imposed by card issuers as a penalty on customers for using another member's ATM. Even though few operators have since made use of this possibility, ATM operators remained entitled to impose a surcharge on customers for use of their ATMs. Overall, this means that for most customers, the ATMs of their own bank may have been the preferred means of access to ATM services during most of the sample period.

Chart 7b
Average number of ATMs by bank (1995-2001)



Finally, customers may value remote access to their current account. In particular, the range of current account transactions that customers can perform over the phone and over the internet respectively is used to proxy for ease of remote access. The Phone (Internet respectively) index can take values between 0 and 13 (0 and 11 respectively) and reflects the number of operations related to standing orders, direct debits, bill payments, transfers and ordering a customer can perform remotely. The higher the number of operations a bank customer can perform remotely, the higher the value of the index. Charts 8 and 9 show the distribution of the two indices in December 2002.

Chart 8
Phone index (end-2002)

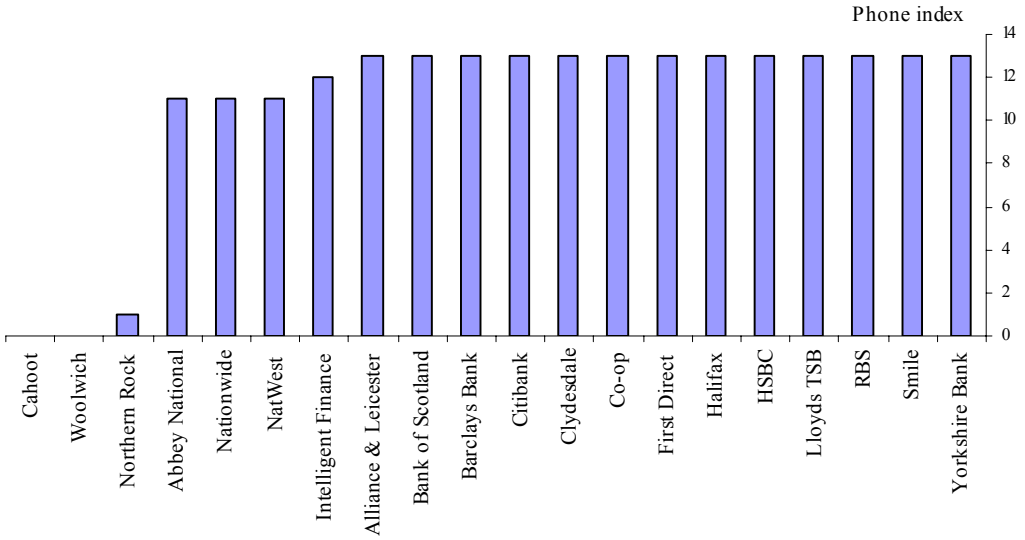
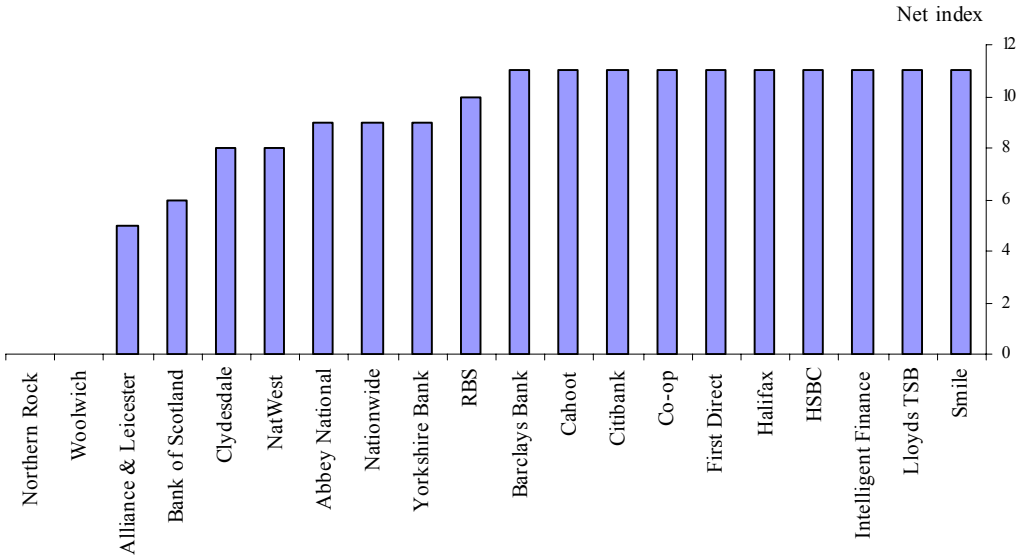


Chart 9
Internet index (end-2002)



In sum, as regards stylised developments for non-price characteristics in the market for current accounts, from Charts 6a and 7a, as well as 8 and 9 it appears that branches are gradually becoming less important for retail banking. By reducing their branch network, commercial banks are likely to have achieved sizable reductions in their operating costs. At the same time, new information

technology developments appear to have allowed banks to create new, cheaper ways to attract customers (ie ATMs, phone and internet banking). By the end of the sample period (2001), most banks chose to deliver their products and services through multiple channels, including the internet and telephone. Reductions in the fixed costs of providing retail services might also explain why we observe the entry of new players in the later part of the period (eg Virgin Direct).

3 Determinants of changes in market share

3.1 Background

The analysis carried out in the previous section shows that there is a gradual adjustment in bank market shares over time. It also shows that over the same period price dispersion seems to persist. In this section, we check whether and how fast adjustments in market shares result in response to differences in price and non-price characteristics.

Absent capacity constraints, adjustments in market shares are driven by choices made by depositors who choose their current account provider, taking as given the 'price' (ie the interest rate) and other non-price characteristics offered by the bank. To measure how fast market shares vary in response to price differentials, we estimate the semi-elasticity of bank-level demand for current accounts with respect to the three interest rates that are linked to a current account. This approach is close to the one adopted by Amel and Hannan (1999) for US deposits and Ayuso and Martinez (2004) for Spanish deposits. The value of the semi-elasticities is indicative of the level of competition in the market for current accounts. In a highly competitive market, the (firm-level) elasticity of demand with respect to price is very high – in theory, infinite. Therefore, any price differential should trigger dramatic changes in market shares almost instantaneously. However, if competitive pressures are less acute because of the presence of frictions in the market, then the price elasticity of demand could be low.

This analysis needs to control for non-price product characteristics. Current accounts are likely to be non-homogenous products, and characteristics may significantly differ from one current account to another. Price differentials could thus be related to differences in quality, with high quality providers able to sustain a higher price. In this case, the measured effect of price differentials on changes in market share could be small even if the market is close to perfect competition (zero at the limit if

price differentials simply reflect differences in quality). Moreover, new product characteristics – eg phone or internet banking – may imply a different sort of relationship between a bank and its customers. Thus, some people would change banks if those new products better suited their preferences, even if there was no price difference between the two types of product. If these quality differences are correlated with differences in prices, they need to be controlled for to avoid omitted variable biases.

3.2 Regression model

In order to measure the dependence of bank-level demand on prices, we estimate the following regression model:[23]

$$\Delta MS_{it}^{CA} = \alpha + \beta . RD_{it}^{j} + \sum_{k=1}^{4} \delta^{k} . Q_{it}^{k} \qquad (\mathbf{1})$$

where:

- ΔMS_{it}^{CA} is the relative change (ie in per cent) in bank *i*'s market share on the current account market measured on a half-year basis, between the end of half-year *t*-1 and the end of half-year *t*.

- RD^{j}_{it} is the absolute difference (ie in percentage points) between bank *i*'s rate and the average rate quoted by the rest of the market, averaged over half-year *t*. We focus on three different rates: the rate paid on positive balances on current accounts (*j=CA*); the pre-authorised overdraft rate (*j=OD*); and the rate paid on instant access savings accounts (*j=IA*).

- Q^{k}_{it} are the four non-price characteristics measured at a bank level: the number of branches per customer in half-year *t*; the (logarithm of the) number of automated teller machines (ATMs) in

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[23] See Amel and Hannan (1999) for a theoretical framework that justifies using the changes in market shares to capture short-run adjustments in demand from a partial adjustment framework. The estimated equation can also be considered as consistent with the market share equation (equation (3.2), page 37) in Kim *et al* (2003) and captures the speed of adjustment in market shares as a function of prices set by the banks. It is conceivable that there is a long-run equilibrium relationship between market shares and prices – potentially involving equal market shares and zero price dispersion – that could be captured alongside the short-run adjustment using an error correction model. However, our data series are too short to estimate such a model meaningfully.

half-year t; and the two indices (assumed to be constant over the period) reflecting the range of transactions a current account customer can perform over the phone as well as over the internet.[24]

The definition of the variables in (**1**) can be found in Table B1 in Appendix 1. Note that the price is set by the bank and is exogenous from the point of view of the depositors. The customer, in turn, makes the choice between various providers, determining bank-level demand and changes in market shares. The absolute value of coefficient β in equation (**1**) can thus be interpreted as a semi-elasticity of demand – how market shares vary as a function of the price dispersion in the market.[25] In the case where a market is highly competitive, any price differential that is unrelated to quality differentials should trigger a significant change in market share – ie, the coefficient β should be significantly different from zero and its value, in absolute terms, should be high. However, if a market is less competitive, then the (absolute) value of β should be low.

We further hypothesise that there should be a negative relationship between changes in market shares and price differentials. Since current account and savings rates are paid by the bank to the customer, whereas overdraft rates are paid by the customer, the expected sign for the coefficient of savings and current rates is the reverse of the expected sign on the overdraft rate. A bank offering a high rate on its current account (or on its instant access savings account) should see its market share increase. Such a positive relationship should be stronger, the more elastic bank-level demand. Similarly, a bank charging a lower overdraft rate than the market should see its market share increase. This negative relationship should be stronger, the more elastic bank-level demand. This translates into the following hypotheses:

(**h1**) A high level of competition would lead to $\beta^{CA}>0$, $\beta^{IA}>0$ and $\beta^{OD}<0$ and large absolute values of these coefficients.

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[24] Given the high correlation between these two indices, only one of them is used in multivariate regressions.

[25] The coefficient β in equation (**1**) can be interpreted as a semi-elasticity because the independent variable RD_i is the absolute difference rather than the relative difference between prices.

(**h2**) The presence of frictions in the market would lead to $\beta^{CA}>0$, $\beta^{IA}>0$ and $\beta^{OD}<0$ and small absolute values of these coefficients. In an extreme case, market shares would not respond to rate differentials (ie each coefficient β would be zero).

Unfortunately, there is no 'accepted' threshold below which competition in a market would be considered as 'low' and above which it would be considered as 'high' – indeed, there is a continuum of situations between those two extremes. However, we examine the responsiveness of banks' market shares on the current account market in response to several rate differentials. This allows us to compare elasticities across rates: the current account and overdraft rates – both directly linked to current accounts – as well as the instant access savings rate. In the latter case, the coefficient β can be interpreted as a cross-elasticity between the current account and the savings markets.

In principle, several estimation techniques are available to study the relationship between changes in market share and price differentials using our panel data set. We can analyse the time-series dimension of the data and use a 'within units' or fixed-effect estimator, or analyse the cross-sectional dimension of the data and use a 'between units' estimator. Finally, it is possible to exploit both time and cross-sectional dimensions by pooling the data. As we saw in Section 2, price differentials do not appear to vary much through time and the changes in market share appeared to be steady. This lack of variation through time is confirmed when the standard deviation of each variable of interest is decomposed into a 'between group' – ie cross-sectional – component, and a 'within group' – ie time-series – component: for most variables, the 'between group' standard deviation is considerably larger than the 'within group' standard deviation (see Table C1 in Appendix 1).

We thus chose to carry out between-effect and pooled estimations.[(26)] Our benchmark regressions are performed by first averaging each variable over the 1996-2001 period and by then regressing time averages of the change in market share on time averages of the price differential and other variables ('between' regressions). In addition, we estimated pooled equations that take account of both the time dimension and the cross-sectional dimension of the data set in a symmetric way. The advantage of pooling the data is an increase in the number of observations. But such a procedure may also have some drawbacks. In our sample, regression diagnostic tests performed on pooled regressions

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[(26)] Since the change in market share appears to be gradual, a time series that is ranging from 1996 to 2001 was deemed too short to study successfully the dynamics of the relationship in subperiods.

indicated relatively poor properties for those estimators, including non-normal residuals and heteroskedasticity. Since diagnostic test for the 'between' estimations yielded better results in these respects, we comment mainly on the 'between' regressions. That said, most of the results described in the main text are confirmed by pooled regressions, shown in Appendix 2.

3.3 Results

Our analysis suggests that on average over the 1996-2001 period, changes in market share are sensitive to current account rates, but less sensitive to the other two rates. This is a plausible result given that the current account rate would be the rate most people focus on when choosing their current account provider. Importantly, these results appear to be robust to the inclusion of current account characteristics.

We started by carrying out simple correlation analysis. The three charts below plot each of the three rate differentials against changes in bank market share in the current account market, implicitly assuming that price differentials are unrelated to product characteristics. Nonetheless, if the elasticity of demand with respect to each rate were high, one would tend to observe a relatively flat relationship between the two variables – ie a small price differential would trigger a large change in market share. On the contrary, in the case where the price elasticity of bank-level demand is very low, one would observe a very steep, almost vertical line.

Chart 8a
Average change in CA market share and CA rate differentials

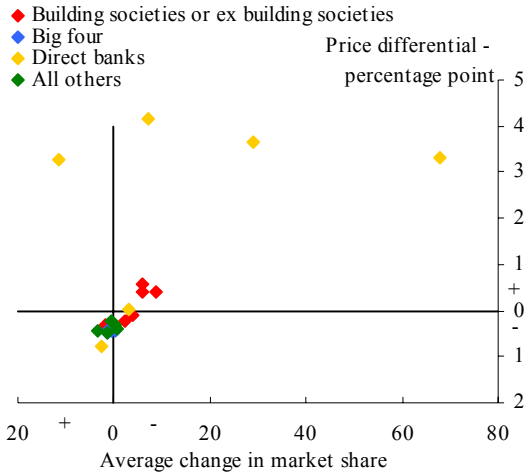


Chart 8b
Average change in CA market share and IA rate differentials

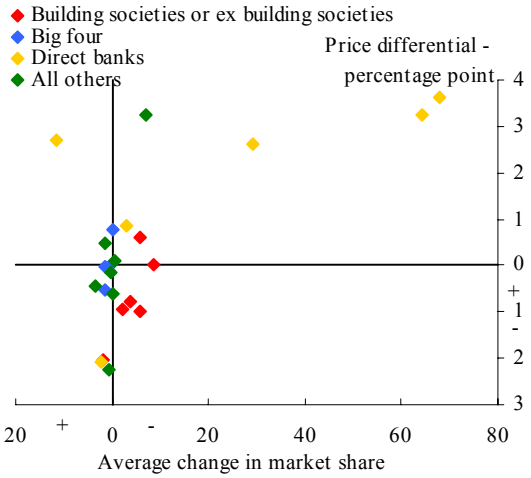
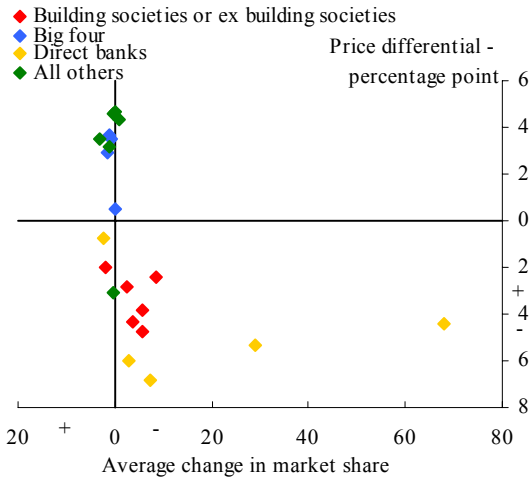


Chart 8c
Average change in CA market share and OD rate differentials



Charts 8b and 8c suggest a steep relationship between changes in market share and rate differentials for the savings rate (a steep, upward sloping line) and for the overdraft rate (a steep, downward sloping line). This is consistent with a low elasticity of demand with respect to those two rates.

Chart 8a suggests a flatter relationship. This would imply a larger elasticity with respect to the CA rate. Indeed, the relationship observed in the CA rate case is somewhere between a very flat and a very steep curve.

The charts also allow us to check whether the data are consistent with our assumptions on the sign of the relationship between the changes in bank market share and each price differential (ie $\beta^{CA}>0$, $\beta^{IA}>0$ and $\beta^{OD}<0$). Note that there does indeed appear to be a positive relationship for the current account and the savings rate differentials, and a negative one in the case of the overdraft rate, as expected.

Finally, the charts reveal that some of the 'direct' banks in our sample may be potential outliers[27] and may exercise a significant impact on the measured relationship between changes in market share and rates linked to current accounts. Hence, we performed all regressions both including and excluding all 'direct' banks to check for the robustness of our results. The regression diagnostics give better results (in terms of normality of residuals, homoskedasticity) for the latter regressions.

Table A below summarises univariate and multivariate regressions performed before introducing product characteristic variables in equation (**1**). The percentage change in market share of current accounts is regressed on a constant and on one rate differential at a time in columns (1) to (3) and on multiple rates simultaneously in the last two columns ((4a) and (4b)). We perform each regression on two different samples, by first including the seven 'direct' banks (eg (1a)), and then excluding them (eg (1b)).

To the extent that relative price and current account quality are not related, differences in relative price appear to explain a large part of the changes in market share, especially when the 'direct' banks are excluded. Indeed, focusing on the regressions that display the best fit (ie when all 'direct' banks are excluded) the current account rate differential coefficient is positive and significant (β^{CA}=8.7) and the explanatory power of the regression, as measured by the adjusted R-squared, is high, at 82%, regression (1b). In regression (2b), the instant access savings rate differential coefficient (β^{IA}) is also significant and positive, but its value is much smaller, compared with the CA rate coefficient in regression (1b). Finally, the coefficient of the overdraft rate differential (β^{OD}) is negative as expected

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[27] This is confirmed by statistical tests.

but significant only when the other rate differentials are not included simultaneously in the regression. This suggests that the overdraft rate differential may partially proxy for the current account rate differential in regressions (3a) and (3b).

We re-estimate the regression by including all three rate differentials simultaneously (see regressions (4a) and (4b)). Including the savings and the overdraft rate differentials together with the current account rate differential does not increase the explanatory power of the regression as compared to the case when the CA rate alone is included (see (1b)). Banks' market shares still significantly react to current account differentials (β^{CA}=7.1), but much less to instant access savings rate differentials or overdraft rate differentials ($\beta^{CA} > \beta^{IA} > |\beta^{OD}|$). In fact, both β^{IA} and β^{OD} are not significantly different from zero. Note however, that the interpretation for the zero coefficient differs across the two cases: in the case of the overdraft rate, we are examining the demand-price relationship for a single product (the current account). By contrast, in the case of the savings rate, we are examining the demand-price relationship across two different products (the current account and the savings account). In this case the coefficient is indicative of a zero or very low cross-price elasticity between the savings account and the current account. In other words, customers pay little attention to the rate on savings accounts when choosing their current account provider.

It is possible that price differentials partially reflect differences in current account characteristics.[28] We thus introduce the non-price current account characteristics (described in the previous section) as specified in equation (**1**) - one at a time in columns 5 to 8 and simultaneously in the last two columns (9a) and (9b) in Table B. Given the small size of our sample, we face a trade-off: if we wish to account for product characteristics as thoroughly as possible, we are left with a relatively small number of degrees of freedom.

The results suggest that some characteristics significantly influence changes in market share, in particular the extent of a bank's ATM network and the extent to which some operations can be

[28] As a first step we include a dummy variable that takes the value 1 if the bank is a 'direct' bank, and 0 otherwise. This dummy turns out not to be significant, suggesting that when price differentials are accounted for, the differences in product characteristics between the two groups do not of themselves lead to changes in market share. The results of these regressions are not shown in the paper but are available on demand.

performed remotely.[29] Nonetheless, the coefficient β^{CA} is positive and significant (β^{CA}=6.7 in column (9b)). It is interesting to note that the value of β^{CA} is slightly reduced when 'direct' banks are excluded from the sample (regression (9b) compared with regression (9a)) as was the case when no account characteristics were accounted for. However, the value of β^{CA} is not very sensitive to the introduction of product characteristics in the regression when 'direct' banks are excluded (regression (9b) in Table B compared with regression (4b) in Table A). When product characteristics are accounted for the differences in the savings rate and in the overdraft rate do not appear to influence the changes in market share, just as in Table A.

In addition to judging the statistical significance of our results, it is possible to assess their economic impact. Based on the results of regression (9b) and the value of the coefficient β^{CA} (ie 6.7), we find that a 'traditional' bank offering a current account rate 30 basis points (ie one standard deviation) higher than its rivals would increase its market share by 2 (= 6.7*0.3) percentage points over six months. This means that a bank maintaining such a differential for its current account rate throughout the period (1996-2001) would increase its market share by 24.5 percentage points – or, inverting this and assuming that the relationship between changes in market share and price differentials does not evolve over time, it would take 18 years for such a bank to double its market share if it were to maintain such a price differential throughout this period).[30]

The regression (9b) also suggests that a bank that offers an instant access savings rate higher or an overdraft rate lower than its rivals offer on average would not experience any significant increase in market share for current accounts relative to the average.

As a check on these benchmark results, we also estimated regressions that exploit both the time and the cross-section dimensions of our data set (ie pooled regressions). The pooled regression results (shown in Table A2 in Appendix 2) are very similar to the ones shown in Tables A and B: β^{CA} is always positive and significant, though slightly smaller (around 5) than what we find in Tables A and

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[29] In principle, the number of ATMs could be endogenous – banks facing an increase in their customer base may need to increase their ATM network. This would pose a problem in particular in a regression of the change in market share on the changes in the number of ATMs. However, our benchmark results are based on a regression of the change in market share on the level of ATMs, so that endogeneity is less likely to be a major issue.

[30] $(1+0.02)^{11}=1.24$ or $(1+0.02)^{36}\approx 2$.

B. The other small difference we obtain concerns the coefficient β^{OD} in Table B that sometimes becomes significant when the data are pooled.

To summarise our findings:

- β^{CA} is positive and significant and this result still holds when product characteristics are taken into account. The value of β^{CA} changes very little (from 7.1 to 6.7) when current account characteristics are introduced in the regression carried out on the sample that includes only traditional 'bricks and mortar' banks (ie excluding 'direct' banks).

- β^{IA} is positive but much smaller than β^{CA} when product characteristics are left out of the regression. However, when current account quality is taken into account, the IA saving rate differential does not influence changes in banks' market share for current accounts.

- β^{OD} is usually negative but not significantly different from zero for most specifications.

In a market where competition is high, firm-level elasticity with respect to price is, in theory, infinite. However, if the presence of frictions significantly dampens competitive pressures, then the price elasticity could be very low. In an extreme case, market shares could be unresponsive to price differentials across firms. We found that a bank offering a current account rate higher than its rivals by one standard deviation would double its market share in about 18 years – ie a relatively slow adjustment in market share. Therefore we conclude that overall, there is only a moderate sensitivity of changes in market share with respect to price. The results appear consistent with the hypothesis that there may be some frictions in the market for personal current accounts.

Table A: Changes in the current account market share as a function of rate differentials (when product characteristics are not accounted for)

Dependent variable	(1) ΔMS^{CA} (a)		(2) ΔMS^{CA} (a)		(3) ΔMS^{CA} (a)		(4) ΔMS^{CA} (a)	
	All banks (1a)	Excluding 'direct' banks (1b)	All banks (2a)	Excluding 'direct' banks (2b)	All banks (3a)	Excluding 'direct' banks (3b)	All banks (4a)	Excluding 'direct' banks (4b)
CA rate differential RD^{CA}	5.65	**8.74*** **					**9.92***	**7.12*** **
(P-value)	(0.141)	(0.000)					(0.054)	(0.003)
IA rate differential RD^{IA}			**7.32** **	**1.09** **			2.37	0.61
(P-value)			(0.031)	(0.014)			(0.226)	(0.186)
OD rate differential RD^{OD}					**-1.69** **	**-0.61*** **	-0.05	-0.21
(P-value)					(0.045)	(0.002)	(0.902)	(0.195)
Adjusted R-squared	26.5%	82%	37.3%	9.3%	14.1%	40.6%	78.1%	81.1%
R	0.55	0.91	0.63	0.39	-0.43	-0.67		
Observations	21	15	23	17	21	16	19	15
F-test	Not rejected	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**
Shapiro-Wilk Test (normality of residuals)	Rejected	**Not rejected**	Rejected	**Not rejected**	Rejected	**Not rejected**	Rejected	**Not rejected**

*** denotes statistical significance at 1% level, ** at 5% level, * at 10% level. (a) Ordinary least squares estimations are obtained from cross-sectional regressions using data averaged over the period (with robust estimates of standard errors). P-values in parentheses.

Table B: Changes in the current account market share as a function of all rate differentials and product characteristic variable(s)

Dependent variable	$\Delta MS^{CA\,(a)}$ (5)		$\Delta MS^{CA\,(a)}$ (6)		$\Delta MS^{CA\,(a)}$ (7)		$\Delta MS^{CA\,(a)}$ (8)		$\Delta MS^{CA\,(a)}$ (9)	
	All banks (5a)	Excl. 'direct' banks (5b)	All banks (6a)	Excl. 'direct' banks (6b)	All banks (7a)	Excl. 'direct' banks (7b)	All banks (8a)	Excl. 'direct' banks (8b)	All banks (9a)	Excl. 'direct' banks (9b)
CA rate differential RD^{CA}	**9.93*** (0.067)	**7.88 ***** (0.008)	**9.92**** (0.048)	**7.82***** (0.001)	9.23 (0.104)	**7.87***** (0.002)	**9.53 *** (0.087)	**7.22 ***** (0.005)	8.73 (0.143)	**6.68**** (0.025)
IA rate differential RD^{IA}	2.24 (0.336)	0.41 (0.385)	2.37 (0.244)	-0.07 (0.873)	3.32 (0.364)	-0.11 (0.849)	2.96 (0.369)	0.07 (0.899)	3.52 (0.391)	-0.67 (0.352)
OD rate differential RD^{OD}	-0.06 (0.890)	-0.21 (0.249)	-0.05 (0.902)	-0.16 (0.394)	0.02 (0.962)	**-0.24*** (0.059)	-0.02 (0.959)	-0.27 (0.130)	0.03 (0.958)	-0.15 (0.118)
Number branches/customer	-0.81 (0.828)	-1.36 (0.441)							-2.94 (0.637)	**5.11**** (0.021)
Log (Number ATMs)			-0.01 (0.996)	**1.73**** (0.019)					-0.51 (0.839)	**2.71**** (0.012)
Phone index					-0.24 (0.652)	**0.23*** (0.059)			-0.46 (0.524)	**0.34***** (0.000)
Net index							-0.11 (0.818)	**0.22*** (0.065)		
Adjusted R-squared	76.6%	80.5%	76.6%	85.5%	76.4%	83.6%	76.2%	82%	72.5%	89.7%
Number observations	19	15	19	15	18	14	18	14	18	14
F-test	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected** (limit case)	**Rejected**
Shapiro Swilk test (normality of residuals)	Rejected	**Not rejected**	Rejected	**Not rejected**	Rejected	Rejected	Rejected	**Not rejected**	Rejected	**Not rejected**

*** denotes statistical significance at 1% level, ** at 5% level, * at 10% level. [(a)] Ordinary least squares estimations are obtained from cross-sectional regressions using data averaged over the period (with robust estimates of standard errors). P-values in parentheses.

4 Determinants of prices

4.1 Background

In this section we attempt to distinguish empirically between a number of different hypotheses regarding the nature of competition in the market for personal current accounts. The starting point is the observation that there is a high degree of price dispersion between providers which appears to persist through time. Price dispersion may be an indication of some form of imperfect competition. For example, price dispersion can be sustained in a dynamic model of competition where customers face switching costs, as developed by Kim, Kliger and Vale (2003). Alternatively, price dispersion is a feature of models with search costs, see for instance Stigler (1961) or Salop and Stiglitz (1977).[(31)] But it could also be consistent with perfect competition or imperfect competition without switching or search costs, when there are different market segments that are differentiated by different levels of quality.

The key to distinguishing empirically between different models of imperfect competition is to draw out the implications of these models for the relationship between observables. In particular, it turns out that these different models have different predictions as to the empirical relationship between individual bank market shares and prices.

Under the model of dynamic competition with **switching costs** (Kim, Kliger and Vale (2003)), it can be shown that there is a positive relationship between a firm's market share and the price it charges its customers. That is, a larger bank would tend to charge a higher price. In the context of current account balances, this means that a larger bank would offer a lower rate on positive balances and a higher rate on overdrafts. The reason is that when customers face switching costs, banks face a trade-off.[(32)] Charging a high price (ie offering a low rate on positive balances and charging a high rate on overdraft) increases the profit a bank makes on its existing customer base. On the other hand, a high price lowers the chance of attracting new customers and may also result in the bank losing customers. A bank's market share at the end of the previous period determines the price it sets, ie how this trade-off is resolved. Banks with low initial market shares charge a low price (offer high

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[(31)] Heffernan (2002) argues that price dispersion in UK retail banking markets is related to this type of imperfect competition.

[(32)] This trade-off would be eliminated if the bank could price discriminate between existing and new customers.

rates or charge low overdraft rates) in order to attract new customers. Banks that start with a high market share charge high prices (offer low rates on current accounts and charge high rates on overdraft) in order to increase the profit on existing customers. Notice that this is worthwhile for a bank with high market share even though it means that the bank loses some of its existing customers. Moreover, the positive relationship between price and (previous) market share should be stronger, the lower the elasticity of demand with respect to price, that is the less sensitive consumers are with respect to price.

The Salop and Stiglitz (1977) model of **search costs** (but no switching costs) implies a negative relationship between market share and price in equilibrium. In a nutshell, each period the firm that offers the better deal attracts the most customers. In this model there are two groups of consumers, those with high search costs and those with low search costs. Those who have high search costs do not search for the lowest price but choose a provider at random. Those who have low search costs incur this cost and choose the lowest price provider. Salop and Stiglitz show that a two-price equilibrium may exist where one of two firms charges a high price and the other firm offers a low price.[(33)] The firm charging the high price is able to attract half of the customers with high search costs but none of the informed customers. The firm charging the low price attracts all other consumers, that is, half of the uninformed and all of the informed customers. For any distribution of informed and uninformed customers this implies that a high market share is associated with a low price in equilibrium. Finally, decreasing unit costs ensure that both types of firms earn the same profit in equilibrium.[(34)] In the context of the current account market the implication is that banks with large market shares ought to be the banks offering high current account rates and/or low overdraft rates.

Finally, under standard assumptions of **perfect competition** or **oligopoly without search or switching costs**, there should not be any particular relationship between market share and price. In a perfectly competitive market, it is assumed that there are numerous firms, each being so small that it cannot influence other providers' actions. If the products offered are homogenous, firms are

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[(33)] The low price is equal to the competitive price – ie the price that would prevail in the absence of search costs.

[(34)] It is assumed that entry occurs as long as profits are positive. Thus, in equilibrium, every firm earns zero profit.

price-takers and all charge the same price, set to equate (marginal) costs. In such an environment, there should be no price dispersion and consequently no link between price and market share.

In an oligopolistic environment in the absence of switching or search costs, a firm's action may influence its rivals' behaviour – ie there may be some strategic interdependence between the firms in the market. For instance, in a Cournot setting, firms may choose to produce different quantities depending on their costs and taking into account the strategy chosen by their rivals. However, the price set by each firm is read off the aggregate, industry demand schedule. If products differ along the quality dimension, price dispersion may emerge across different quality levels. But in such a framework, again, there is no reason to believe that there should be a relationship between price and market share.[35]

4.2 Regression model

In order to distinguish between the various models of competition we estimate the following regression:

$$R_{it}^{j} = a + b.MS_{it-1}^{CA} + \sum_{k=1}^{4} \delta^{k}.Q_{it}^{k} \qquad \textbf{(2)}$$

where:

- R^{j}_{it} is the rate j quoted by bank i, averaged over half-year t. We analyse three different rates: the rate on positive balances on current accounts *(j=CA)*; the pre-authorised overdraft rate *(j=OD)*; and the rate on instant access savings accounts *(j=IA)*.

- $MS^{CA}_{it\text{-}1}$ is the level of bank i's market share on the current account market measured in the previous half-year t-1.

Q^{k}_{it} are four non-price characteristics measured at a bank level over time: the number of branches per customer in half-year t; the (logarithm of) number of ATMs in half-year t; and two indices (assumed to be constant over time) reflecting the range of transactions a current account customer can perform over the phone as well as over the internet.

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[35] Various complications may arise from particular assumption on the distribution of income and willingness to pay.

The implication of each model of competition for the relationship between prices and market shares gives rise to the following set of competing hypotheses as regards the nature of competition in the market for current account:

(**H1**) Switching costs: $b<0$ for CA rates and instant access savings rates and $b>0$ for overdraft rates.

(**H2**) Search costs: $b>0$ for CA rates and instant access savings rates and $b<0$ for overdraft rates.

(**H3**) Perfect competition/Cournot: $b=0$

Note that under the switching costs hypothesis, a bank's market share is predetermined when it sets its price as a function of its current market share. Under the search costs hypothesis, both current period's market share and price are endogenous and equation **(2)** would thus represent a reduced-form equilibrium relationship.

The predicted signs of the coefficients for the current account and overdraft rates follow directly from the discussion above. But with respect to the instant access savings rate, there is a clear implication as regards the coefficient on market shares in the current account market only if the two markets are sufficiently closely related. A close relationship might arise either because banks bundle savings accounts and current account products or because customers prefer a joint provider. In the absence of such a link between the two markets one would not expect there to be any relationship between rates paid on instant access savings accounts and market shares in the current account market, ie in this case $b=0$ for the instant access rate.

As in Section 3, we comment on regressions that are performed on averages across time. Again, the rationale is that the 'between group' – ie cross-sectional – variation turns out to be considerably higher that the 'within group' – ie time-series – variation for the main variables of interest. That said, pooled OLS regressions were also performed and can be found in Appendix 2. The results of the two sets of regressions are qualitatively similar.

4.3 Results

Our main findings are that $b<0$ for CA rates, $b>0$ for overdraft rates and $b=0$ for IA savings rates. Interestingly, the size of effect is larger for overdraft rates than for CA rates.

Chart 9a
Average level of CA market share and average current account rate

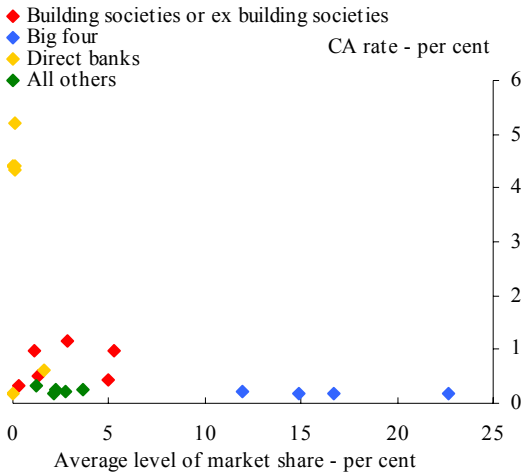


Chart 9b
Average level of CA market share and average instant access rate

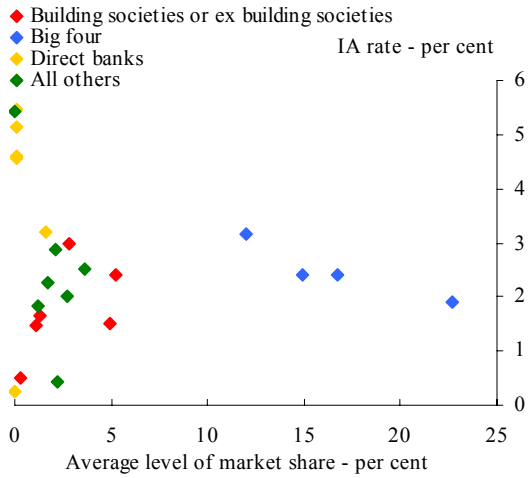
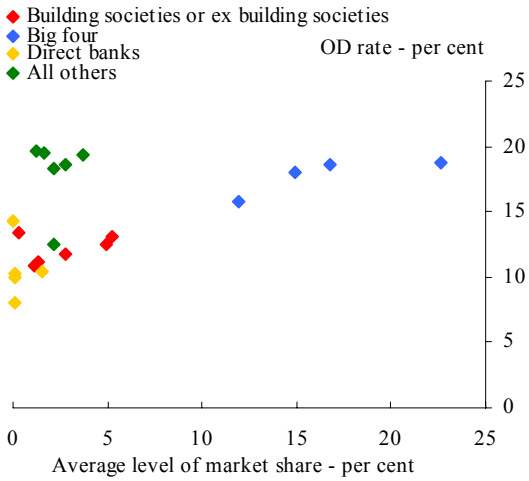


Chart 9c
Average level of CA market share and average overdraft rate



Charts 9a, 9b and 9c show plots of the market shares of the banks in our sample against rates on current accounts, savings accounts and overdrafts respectively. Chart 9a suggests a negative relationship between current account rates and market shares. This relationship appears somewhat weaker if some of the 'direct' banks are excluded. Chart 9b shows no clear relationship between savings rates and market shares for current accounts. That said, it is striking that among the 'big four' banks, the larger the market share the lower the instant access savings rate. Also, in line with the pattern for current account rates, the highest rates on instant access accounts are offered by new entrants. But overall, there does not appear to be a strong negative relationship between market share in the current account market and the instant savings rate offered by banks. By contrast, Chart 9c shows a pronounced positive relationship between market shares and rates charged on overdrafts, with the largest banks charging the highest rates.[36] Moreover, it does not appear from Chart 9c that 'direct' banks exert a strong influence on the overall relationship.

Table C shows the results of regressions of each of the three rates on market shares in the current account market. To account for potential outliers, regressions were estimated both on the whole sample of banks and on a restricted sample, excluding the 'direct' banks. Columns 10a and 10b confirm that the larger a bank's market share in the current account market, the lower the rate it offers on current account balances. 'Direct' banks, which exhibit the lowest market shares and offer the highest rates, contribute to this relationship. But while excluding these banks results in a drop in the size of the coefficient, the result stays significant at the 5% level when 'direct' banks are excluded. By contrast, insignificant coefficients in columns 11a and 11b suggest that there is no linear relationship between rates offered on savings products and the market shares in the current account market. Finally, columns 12a and 12b shows a strong positive relationship between market shares for current accounts and rates charged on overdrafts. This relationship is significant at the 1% level when the regression is run on the whole sample and stays significant at the 5% level when 'direct' banks are excluded.

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[36] The linear relationship appears almost exact when no account is taken of the cluster of banks that includes RBS, BOS, Yorkshire Bank, the Co-operative Bank and Clydesdale Bank. Most of these banks are regional, with much of their branch network concentrated in particular areas – eg Scotland for RBS and BOS. The share of these banks in their respective regional market may well be larger than their national market share. Adjusting for this, the linear relationship between market shares and overdraft rates may actually be stronger than it appears from Chart 9c.

To investigate further the robustness of these findings we run regressions of both the current account rate and the overdraft rate on the bank's market share and a number of control variables. As argued above, current accounts may be vertically differentiated products: different banks may offer different levels of quality and service. And banks that offer a superior level of quality may be able to charge their customers a higher price. If quality and market share are correlated this may result in an omitted variable bias. For instance, in the regressions that do not include the number of ATMs, it is possible that the market share variable proxies, at least partially, for the extent of a bank's ATM network. In order to address these potential biases we re-estimate the effect of the bank's market share on the rate it offers on current account balances and overdrafts, including the same proxies for quality that were used in Section 3.

The results in Table D show a number of regressions of the current account rate that include proxies for quality in addition to the market share as explanatory variables. In most of these regressions the coefficient on market share stays significantly negative, typically at the 5% level. In line with the results in Table C we find that the coefficient on the bank's market share is smaller in absolute value when the regression is run on the restricted sample excluding 'direct' banks. But for both the regressions on the whole sample and on the restricted sample the size of the coefficient is comparable with the size of those coefficients in Table C. In particular, the coefficient is close to -0.1 for regressions on the whole sample and close to -0.03 for the sample excluding 'direct' banks. The result for the whole sample suggests that a bank whose market share is larger than that of a comparable bank by 6.5 percentage points (ie one standard deviation) would offer a current account rate some 65 basis points lower than the comparable bank. Based on the regressions when 'direct' banks are excluded (and for a bank with a market share larger by one standard deviation) the estimate is 21 basis points.

Table E shows regressions of the overdraft rate on market share in addition to proxies of quality. Again, in most of the regressions the coefficient retains a significantly positive sign, typically at the 1% level, suggesting that any omitted variable bias arising from disregarding the quality dimension would have been mild. Likewise, regressions of the savings rate that include non-price characteristics alongside market shares confirmed the previous findings (results not shown).

In sum, the regressions of both the current account rate and the overdraft rate on market shares lend support to the hypothesis of imperfect competition related to switching costs. As for the savings rate,

the evidence is more mixed. Our preferred interpretation is that the market for instant access savings rates is unrelated to the market for current accounts. In particular, the results in Section 3 suggested that the cross-price elasticity of the bank-level demand for current accounts with respect to the bank's rate on its savings product was essentially zero. In the regression of the savings rate on market shares we again find no relationship. These two findings taken together may well indicate that consumers are able to unbundle their choice of savings account provider and their choice of current account provider.

The switching cost model stipulates that the less reactive to price differentials bank customers are, the bigger banks' incentive to raise their price, given that the erosion of their customer base due to a price increase will be limited. We can therefore test for an additional hypothesis related to the switching cost model:

(**H1**') The lower the price elasticity of demand (ie the absolute value of coefficient β in equation **(1)** in Section 3), the stronger the relationship between level of market share and price.

In regressions of the overdraft rate the absolute size of the coefficient on market share is larger than the coefficient in the regression of the current account rate. For instance, the coefficient of 0.3 in column (22a) is three times bigger than the (absolute) value of the coefficient (0.1) in column (17a). This suggests that the relationship between market share and the overdraft rate is stronger overall than that between market share and the current account rate.

It is useful to interpret this in view of the results in Section 3. There it was found that the firm-level elasticity of demand with respect to the overdraft rate was smaller than that of the current account rate. In the presence of switching costs larger banks have an incentive to increase the price in order to increase the profit they achieve on their existing customer base. For a profit-maximising bank this incentive will be stronger the lower the elasticity of demand with respect to price, ie the lower the loss in the customer base resulting from an increase in price. Since demand was found to be less elastic with respect to the overdraft rate than with respect to the current account rate, the incentive on the part of large banks to increase the overdraft rate would be more pronounced than the incentive to reduce the current account rate. These results thus provide further evidence consistent with the hypothesis of switching costs.

Table C: Rates as a function of the level of current account market shares (when product characteristics are not accounted for)

Dependent variables	(10) CA rate (R^{CA}) [(a)]		(11) IA rate (R^{IA}) [(a)]		(12) OD rate (R^{OD}) [(a)]	
	All banks (10a)	Excluding 'direct' banks (10b)	All banks (11a)	Excluding 'direct' banks (11b)	All banks (12a)	Excluding 'direct' banks (12b)
Lagged level of CA MS (P-value)	**-0.101**** (0.023)	**-0.018**** (0.024)				
Lagged level of CA MS (P-value)			-0.039 (0.244)	0.007 (0.846)		
Lagged level of CA MS (P-value)					**0.287***** (0.000)	**0.184**** (0.024)
Adjusted R-squared	11.0%	8.3%	2.7%	0%	20.0%	8.1%
R	-0.39	-0.39	-0.17	0.04	0.49	0.38
Observations	21	15	23	17	21	16
F-test	**Ho rejected**	**Ho rejected**	Not rejected	Not rejected	**Ho rejected**	**Ho rejected**
Shapiro-Wilk Test (normality of residuals)	Ho rejected	Ho rejected	**Not rejected**	Ho rejected	Ho rejected	**Not rejected**

*** denotes statistical significance at 1% level, ** at 5% level, * at 10% level. [(a)] Ordinary least squares estimations are obtained from cross-sectional regressions using data averaged over the period (with robust estimates of standard errors). P-values in parentheses.

Table D: Current account rate (R^{CA}) as a function of levels of current account market shares and product characteristics variable(s)

Dependent variable	(13) Current account rate[(a)]		(14) Current account rate[(a)]		(15) Current account rate[(a)]		(16) Current account rate[(a)]		(17) Current account rate[(a)]	
	All banks (13a)	Excl. 'direct' banks (13b)	All banks (14a)	Excl. 'direct' banks (14b)	All banks (15a)	Excl. 'direct' banks (15b)	All banks (16a)	Excl. 'direct' banks (16b)	All banks (17a)	Excl. 'direct' banks (17b)
Lagged level of CA market share (MS^{CA})	**-0.11***** (0.004)	-0.003 (0.626)	**-0.14**** (0.029)	**-0.03*** (0.035)	**-0.07*** (0.086)	**-0.02*** (0.061)	**-0.13**** (0.024)	-0.02 (0.183)	**-0.10**** (0.017)	**-0.02**** (0.049)
Number branches/customer	**-2.26**** (0.013)	**0.53*** (0.080)							**-2.49***** (0.002)	0.85*** (0.004)
Log (Number ATMs)			**1.03*** (0.063)	0.28 (0.124)					**0.64*** (0.088)	**0.54**** (0.013)
Phone index					-0.22 (0.459)	-0.04 (0.503)			**-0.46***** (0.000)	
Net index							**0.57*** (0.052)	0.011 (0.920)		
Adjusted R-squared	41.5%	21.8%	18.6%	11.7%	9.9%	7.3%	27.5%	2.6%	61.8%	52.2%
Number observations	21	15	20	15	19	14	19	14	19	14
F-test	**Rejected**	**Rejected**	**Rejected** (limit case)	**Rejected** (limit case)	Not rejected	**Rejected** (limit case)	**Rejected** (limit case)	**Rejected** (limit case)	**Rejected**	**Rejected**
Shapiro Swilk test (normality of residuals)	**Not rejected**	Rejected	Rejected	**Not rejected**	Rejected	**Not rejected**	**Not rejected**	Rejected	**Not rejected**	**Not rejected**

*** denotes statistical significance at 1% level, ** at 5% level, * at 10% level. [(a)] Ordinary least squares estimations are obtained from cross-sectional regressions using data averaged over the period (with robust estimates of standard errors). P-values in parentheses.

Table E: Overdraft rate (R^{OD}) as a function of levels of market shares and product characteristics variable(s)

Dependent variable	(18) Overdraft rate[(a)]		(19) Overdraft rate[(a)]		(20) Overdraft rate[(a)]		(21) Overdraft rate[(a)]		(22) Overdraft rate[(a)]	
	All banks (18a)	Excl. 'direct' banks (18b)	All banks (19a)	Excl. 'direct' banks (19b)	All banks (20a)	Excl. 'direct' banks (20b)	All banks (21a)	Excl. 'direct' banks (21b)	All banks (22a)	Excl. 'direct' banks (22b)
Lagged level of CA market share (MS^{CA})	**0.29***** (0.000)	0.04 (0.581)	**0.39***** (0.000)	**0.27*** (0.060)	**0.22***** (0.010)	0.10 (0.270)	**0.31***** (0.001)	0.07 (0.543)	**0.31***** (0.004)	**0.32**** (0.012)
Number branches/customers	1.04 (0.583)	**-5.85***** (0.001)							2.24 (0.247)	
Log (Number ATMs)			**-2.00*** (0.072)	-1.55 (0.508)					-1.71 (0.146)	**-4.97*** (0.008)
Phone index					**0.82*** (0.052)	**0.92**** (0.032)			**1.05**** (0.012)	**1.52***** (0.003)
Net index							-0.43 (0.498)	0.86 (0.253)		
Adjusted R-squared	17%	31.7%	24.9%	4.2%	28.8%	21.1%	16.8%	7.4%	36.7%	41.3%
Number observations	21	16	21	16	20	15	20	15	20	15
F-test	**Rejected**	**Rejected**	**Rejected**	**Rejected** (limit case)	**Rejected**	**Rejected**	**Rejected**	**Rejected** (limit case)	**Rejected**	**Rejected**
Shapiro Swilk test (normality of residuals)	Rejected	**Not rejected**	Rejected	**Not rejected**	**Not rejected**	**Not rejected**	Rejected	**Not rejected**	**Not rejected**	**Not rejected**

*** denotes statistical significance at 1% level, ** at 5% level, * at 10% level. [(a)] Ordinary least squares estimations are obtained from cross-sectional regressions using data averaged over the period (with robust estimates of standard errors). P-values in parentheses.

5 Conclusions

This study provides an analysis of the competitive process in the market for personal current accounts in the United Kingdom. Analysing the evolution of banks' market shares and prices, we address two key questions:

(i) Are bank market shares responding to price differentials?

(ii) If not, which type of imperfect competition best fits the data?

Using the NOP-Financial Research Survey data, we first describe some stylised facts on market shares and prices in the UK market for personal current accounts. While the level of concentration has remained high in this market, the market appears to have become gradually more competitive, with building societies and direct banks making some significant inroads during the 1996-2001 period. Against this, we find a marked dispersion in price, which appears to persist through time.

To assess the level of competition in the current account market more formally, we derive the elasticity of bank-level demand with respect to a set of prices that relate to the current account product, such as the interest rate offered on positive balances and the rate charged on overdraft. This analysis controls for differences in current account characteristics (such as the extent of the branch network) in order to isolate the effect of price differentials on changes in market share. We find a moderate sensitivity of changes in market share to differences in the current account rate across banks. The elasticity of bank-level demand with respect to the overdraft rate is considerably lower. Overall our findings are consistent with a moderate degree of imperfection competition in the market for personal current accounts.

In order to explain the observed persistence of price dispersion, we consider three candidate models of imperfect competition: the dynamic model of switching costs by Kim, Kliger and Vale (2003), the model of search costs developed by Salop and Stiglitz (1977), and the standard oligopoly model with differentiated products. It turns out that, while each of these models is consistent with price dispersion, they have different implications as regards the relationship between individual bank market shares and prices. In particular, switching costs should result in a positive relationship

between market shares and prices, whereas under search costs, there should be a negative relationship. And under the standard oligopoly model there should be no relationship between market share and price.

For the UK market for personal current accounts we find a positive relationship between market share and price, which points to the importance of switching costs in this market and is consistent with the model of competition described in Kim, Kliger and Vale (2003). The basic intuition is that each bank faces a trade-off: raising the price increases the profit the bank achieves on its existing customer base, but also implies that the bank might be losing more customers. The bank's current market share determines how this trade-off is resolved. A bank's incentive to raise its price is more pronounced, the larger is the bank's current market share. The model also predicts that the relationship between market share and price should be stronger, the lower the elasticity of demand with respect to price. Consistent with this prediction, we find that the relationship between market share and price is strongest for the overdraft rate, for which the elasticity of demand is lowest.

Since the end of our sample period, there have been several initiatives to facilitate switching. In response to the Cruickshank report (2000), the government asked a group led by DeAnne Julius to review the Banking Code. One set of recommendations in the report (see Julius (2001)) that has since been implemented specifically focuses on ways to facilitate switching account. The banks have implemented improvements to the logistics of the switching process – eg as regards the exchange of information between the switchers' old and the new banks – to improve the speed and the accuracy of the account transfer. Steps have also been taken to increase consumer awareness of the potential benefits of changing banks (see eg Financial Services Authority (2002)). Even though it may be too early to assess the impact of these initiatives empirically, the results of this study would appear broadly supportive of such initiatives, in that the study points to the presence of switching costs in the UK market for personal current accounts over the period considered (1996-2001).

Appendix 1

Table A1: Bank identities and peer groups

Category	Bank name	Entry date
Big four	Barclays	96H1
	HSBC	96H1
	Lloyds TSB	96H1
	NatWest	96H1
Building societies (or ex building societies)	Abbey National	96H1
	Alliance and Leicester	96H1
	Halifax	96H1
	Nationwide	96H1
	Northern Rock	96H1
	Woolwich	96H1
Direct banks	Cahoot	01H1
	Citibank	00H1
	First Direct	96H1
	First-e	01H1
	Intelligent Finance	01H1
	Smile	00H1
	Virgin Direct	99H2
Other banks	Bank of Scotland	96H1
	Clydesdale	96H1
	The Co-operative Bank	96H1
	Giro	96H1
	RBS	96H1
	Safeway	98H1
	Yorkshire Bank	96H1

Table B1: Variable definition

Variable name	Definition
MS^{CA}_{it}	Level of bank *i*'s market share in the current account market measured in half-year *t*
ΔMS^{CA}_{it}	Relative change in bank *i*'s market share in the current account market between end of half-year *t*-1 and end of half-year *t*
R_{it}:	
- R^{CA}_{it}	Level of the interest paid by bank *i* on current accounts (CA) averaged over half-year *t*
- R^{IA}_{it}	Level of the interest paid by bank *i* on instant access savings accounts (IA) averaged over half-year *t*
- R^{OD}_{it}	Level of the interest paid by bank *i* on overdrafts (OD) in half-year *t*
RD_{it}:	
- RD^{CA}_{it}	Absolute difference (in percentage points) between the interest paid by bank *i* on current accounts and the average of the CA rates paid by its competitors in half-year *t*
- RD^{IA}_{it}	Absolute difference between the interest paid by bank *i* on instant access savings accounts and the average of the IA rates paid by its competitors in half-year *t*
- RD^{OD}_{it}	Absolute difference between the interest charged by bank *i* on overdrafts and the average of the OD rates charged by its competitors in half-year *t*
Q_{it}:	
- Nber branches/Customer$_{it}$	Number of bank *i*'s branches divided by the number of its customers, in half-year *t*
- Log (Nber ATMs)$_{it}$	Logarithm of the number of bank *i*'s ATMs in half-year *t*
- Phone index$_i$	Index that can take any integer value between 0 and 13 to reflect the number of operations relating to standing orders, direct debits, bill payments, transfers and ordering a customer of bank *i* can perform over the phone (calculated for December 2002)
- Net index$_i$	Index that can take any integer value between 0 and 11 to reflect the number of operations relating to standing orders, direct debits, bill payments, transfers and ordering a customer of bank *i* can perform over the internet (calculated for December 2002)

Table C1: Descriptive statistic of the panel data set

Variable	Mean	Min	Max	Overall standard deviation	'Between' standard deviation[(a)]	'Within' standard deviation[(a)]	Coeff. of variation[(b)]
ΔMS^{CA}_{it}	2.22	-29.50	67.77	12.43	18.29	10.00	5.60
MS^{CA}_{it}	6.11	0.04	23.85	6.74	6.70	0.52	1.10
R^{CA}_{it}	0.52	0.10	4.75	0.80	1.24	0.45	1.54
R^{IA}_{it}	2.24	0.20	5.02	1.20	1.20	0.87	0.54
R^{OD}_{it}	15.22	8.90	21.55	3.66	3.71	1.02	0.24
RD^{CA}_{it}	-0.11	-1.35	4.42	0.85	1.15	0.56	-7.73
RD^{IA}_{it}	-0.18	-2.91	3.58	1.02	1.40	0.47	-5.67
RD^{OD}_{it}	-0.06	-6.95	6.43	3.88	3.86	1.07	-64.67
Nber branches per Customer$_{it}$	0.68	0	2.11	0.41	0.42	0.16	0.60
Log (Nber ATMs)$_{it}$	3.04	1.08	3.65	0.54	0.68	0.07	0.18
Phone_index$_i$	10.95	0	13	4.16	3.98	0	0.38
Net index$_i$	7.98	0	11	3.59	3.57	0	0.45

[(a)] The standard deviation of each variable is decomposed into a 'between group' – ie cross-sectional – component, and a 'within group' – ie. time-series – component.[(b)] The coefficient of variation is defined by the ratio of the standard deviation to the mean.

Appendix 2

Pooled OLS estimations

Table A2: Pooled OLS estimations on the changes in market share and the three rate differentials

Dependent variable	ΔMS^{CA}							
	All obs.	Excl. drct bks[(a)]	All obs.	Excl. drct bks[(a)]	All obs.	Excl. drct bks[(a)]	All obs.	Excl. drct bks[(a)]
RD^{CA}	**5.33*** ** (0.003)	**4.54*** ** (0.002)	**5.25** ** (0.011)	**4.05** ** (0.022)	**4.82** ** (0.019)	**3.90** ** (0.028)	**5.72*** ** (0.001)	**4.39*** ** (0.001)
RD^{IA}	0.65 (0.485)	0.45 (0.596)	0.74 (0.369)	0.28 (0.733)	1.14 (0.385)	-0.14 (0.852)	0.22 (0.848)	-0.15 (0.901)
RD^{OD}	**-0.50*** (0.056)	**-0.63** ** (0.035)	**-0.46** ** (0.012)	**-0.48** ** (0.023)	**-0.50*** ** (0.007)	**-0.58*** ** (0.002)	-0.40 (0.171)	**-0.66** ** (0.031)
Number branch/cust	**-4.94*** (0.051)	**-4.82** ** (0.015)					-6.70 (0.113)	-5.86 (0.236)
Log (Number ATM)			**2.74** ** (0.025)	**2.01*** (0.056)			2.05 (0.350)	0.25 (0.917)
Phone index					0.11 (0.596)	0.27 (0.128)	-0.42 (0.218)	-0.08 (0.783)
Observations	175	161	175	161	167	153	167	153
Adj. R-squared	20.6%	11.1%	19.7%	9.7%	19.6%	10.4%	22%	11.3%
F-test	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**
Residuals Normality	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected

All results are corrected with the CLUSTER option. The CLUSTER option in the econometrics software STATA relaxes the assumption that observations are independent within groups, but still maintains that the observations are independent across groups. Ordinary least squares estimations with robust estimates of standard errors are carried out on pooled data. *** denotes statistical significance at 1% level, ** at 5% level, * at 10% level. P-values shown in parentheses. [(a)] The observations relating to 'direct' banks are excluded from the sample.

Table B2: Pooled OLS estimations on the CA rate and the level of market share

Dependent variable	R^{CA}							
	All obs.	Excl. drct banks	All obs.	Excl. drct banks	All obs.	Excl. drct banks	All obs.	Excl. drct banks
Lagged MS^{CA}	**-0.04**** (0.029)	0.002 (0.761)	**-0.05***** (0.009)	**-0.03**** (0.028)	**-0.03**** (0.039)	**-0.01**** (0.041)	**-0.05***** (0.020)	-0.02 (0.128)
Base rate	-0.04 (0.644)	0.08 (0.227)	-0.04 (0.752)	0.13 (0.133)	-0.04 (0.734)	0.14 (0.155)	0.04 (0.675)	0.10 (0.122)
Number branch/cust	-0.45 (0.366)	0.51 (0.108)					-0.61 (0.337)	**0.68**** (0.076)
Log (Number ATM)			**0.36**** (0.024)	0.21 (0.168)			**0.43*** (0.053)	**0.45***** (0.009)
Phone index					-0.05 (0.574)	-0.04 (0.441)	**-0.19*** (0.084)	-0.01 (0.792)
Observations	183	162	181	162	173	154	173	154
Adj. R-squared	8.9%	13.8%	8.3%	8.4%	5.6%	8.9%	14.8%	20.25%
F-test	**Rejected** (limit case)	**Rejected**	**Rejected**	**Rejected** (limit case)	**Rejected** (limit case)	**Rejected** (limit case)	**Rejected**	**Rejected**
Residuals Normality	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected

Base rate is the Bank of England base rate. All results are corrected with the CLUSTER option. The CLUSTER option in STATA relaxes the assumption that observations are independent within groups, but still maintains that the observations are independent across groups. Ordinary least squares estimations with robust estimates of standard errors are carried out on pooled data. *** denotes statistical significance at 1% level, ** at 5%level, * at 10% level. P-values in parentheses.

Table C2: Pooled OLS estimations on the IA rate and the level of market share

Dependent variable	R^{IA}							
	All obs.	Excl. drct banks	All obs.	Excl. drct banks	All obs.	Excl. drct banks	All obs.	Excl. drct banks
Lagged MS^{CA}	-0.03 (0.119)	-0.02 (0.613)	**-0.04*** (0.052)	-0.02 (0.489)	-0.01 (0.639)	0.006 (0.745)	**-0.04**** (0.029)	-0.01 (0.679)
Base rate	**0.90***** **(0.000)**	**0.99***** (0.000)	**0.89***** (0.000)	**0.97***** (0.000)	**0.89***** (0.000)	**0.99***** (0.000)	**0.98***** (0.000)	**0.99***** (0.000)
Number branch/cust	**-1.78***** (0.002)	**-1.37*** (0.100)					-0.48 (0.285)	0.32 (0.454)
Log (Number ATM)			**1.17***** (0.000)	**0.94**** (0.020)			**0.77**** (0.020)	0.50 (0.210)
Phone index					**0.30***** (0.003)	**0.25***** (0.008)	0.11 (0.203)	**0.24**** (0.037)
Observations	203	180	188	172	180	164	180	164
Adj. R-squared	40.33%	40.8%	44.4%	51.3%	49.4%	62.5%	56.3%	64.7%
F-test	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**	**Rejected**
Residuals Normality	**Not rejected**	**Not rejected**	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected

Base rate is the Bank of England base rate. All results are corrected with the CLUSTER option. The CLUSTER option in STATA relaxes the assumption that observations are independent within groups, but still maintains that the observations are independent across groups. Ordinary least squares estimations with robust estimates of standard errors are carried out on pooled data. *** denotes statistical significance at 1% level, ** at 5% level, * at 10% level. P-values in parentheses.

Table D2: Pooled OLS on the OD rate and the level of market share

Dependent variable	R^{OD}							
	All obs.	Excl. drct banks	All obs.	Excl. drct banks	All obs.	Excl. drct banks	All obs.	Excl. drct banks
Lagged MS^{CA}	**0.20**** (0.023)	0.06 (0.370)	**0.31***** (0.002)	**0.24**** (0.046)	**0.17**** (0.049)	0.10 (0.237)	**0.31**** (0.002)	**0.24**** (0.006)
Base rate	0.37 (0.211)	**0.45**** (0.045)	0.19 (0.350)	0.04 (0.859)	0.30 (0.122)	0.15 (0.377)	0.08 (0.751)	0.18 (0.417)
Number branch/cust	-1.11 (0.591)	**-4.65***** (0.002)					0.91 (0.700)	-2.97 (0.218)
Log (Number ATM)			-1.78 (0.189)	-1.22 (0.526)			**-3.12**** (0.049)	**-4.13**** (0.009)
Phone index					**0.74*** (0.052)	**0.93**** (0.020)	**1.22 **** (0.030)	0.98 (0.154)
Observations	192	173	192	173	184	165	184	165
Adj. R-squared	16.7%	30.3%	20.3%	12.8%	24.6%	28.3%	38.4%	48.7%
F-test	**Rejected**	**Rejected**	**Rejected**	Not rejected	**Rejected**	**Rejected**	**Rejected**	**Rejected**
Residuals Normality	Rejected	**Not rejected**	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected

Base rate is the Bank of England base rate. All results are corrected with the CLUSTER option. The CLUSTER option in STATA relaxes the assumption that observations are independent within groups, but still maintains that the observations are independent across groups. Ordinary least squares estimations with robust estimates of standard errors are carried out on pooled data. *** denotes statistical significance at 1% level, ** at 5% level, * at 10% level. P-values in parentheses.

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