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THE INFLUENCE OF PRODUCT AGE ON PRICING DECISIONS: AN EXAMINATION OF BANK DEPOSIT INTEREST RATE SETTING.

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The Influence of Product Age on Pricing Decisions:
An examination of bank deposit interest rate setting.

Abstract

Do banks extract rent from depositors who hold older deposit accounts? This study addressed this question using product level data of the UK instant access (branch based) deposit market. In the context of a deposit market two research questions related to the conditions necessary for differential pricing for existing and new customers are assessed. Specifically whether more mature or older deposit accounts have lower interest rates and does the newest deposit account in a firm' deposit account portfolio pay an interest rate premium? Empirical support, both descriptive and econometric is provided for both questions. Interest rate setting for new and existing deposit accounts is also significantly influenced by the type of firm supplying deposits with considerable variation in returns observed.

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Introduction

If depositors are unlikely to switch their bank, banks can extract rent from their existing depositors? This outcome of low customer switching (see Klemperer 1995) has been examined both for US (Sharpe 1997, Hannan and Adams 2011) and Spanish banking markets (Carbo-Valverde *et al* 2011). These studies assessed the proportion of in-migration into different geographical regions to determine if regions are characterised by relatively more or fewer new depositors. In all cases banks' aggregate deposit interest rate setting improves with the degree of in-migration suggesting new customers receive better interest rates on deposit accounts than existing customers. This study extends this empirical literature through examining two further research questions emerging from an application of Klemperer's (1995) model to the UK deposit market:

1. Do more mature or older deposit accounts have lower interest rates and,
2. Does the newest deposit account in a firms' deposit account portfolio have an interest rate premium?

Why would a link between the maturity of a deposit account and the interest rate occur? This departure from the law of one price was proposed by Klemperer (1995) in a multistage model. In a first time period, products will be introduced, marketed only to new customers and competitively priced if firms desire to extend market share. In subsequent time periods existing customers emerge and if the market displays real or perceived switching costs, these customers can be charged higher prices. Therefore as the product matures it will be offered to a combination of existing and new customers and the product price will rise. In the context of a deposit market, when a deposit account is being offered for the first time, all depositors will be new depositors and a higher or premium interest rate is expected. If the deposit account is relatively mature and has been offered to the market for many months this account will be used by a mixture of new and existing depositors. Lower interest rates will therefore be expected on more mature deposit accounts. Further discussion of switching models are provided by Office of Fair Trading (2003, 2010, hereafter OFT)

Assessment of this theoretical explanation of deposit interest rate setting behaviour is important for a range of reasons. First, repeated government backed, competition policy investigations in the European Union (hereafter EU), the UK and Australia have reported bank customers are reluctant to switch banks (e.g. European Commission Director General for Competition 2007 [hereafter DG COMP], Independent Commission in

Banking 2011 [hereafter ICB], (the Australian) Senate Economics References Committee 2011 [hereafter SERC]) and that improving levels of customer switching enhances competition in retail banking markets. While markets with low levels of switching may or may not be competitive (see Viard 2007) the presence of real or perceived switching costs has long been viewed to be a barrier to entry, restricting competition in banking markets (OFT 2010). This study contributes to this on-going policy debate by examining a banking market characterised by low customer switching; the response of firms to this environment and whether interest rate setting is significantly influenced by the maturity of the financial services offered to customers.

Secondly, interest rate setting for many financial services, and particularly deposits, has been viewed as 'sluggish', 'sticky', or lagged (e.g. Hannan and Berger 1991, Fuertes and Heffernan 2009) and characterised by high levels of variance (Ashton and Letza 2003, Martin-Oliver *et al* 2008) suggesting factors other than cost influence the setting of interest rates. As it is often assumed that changes in base rates are transmitted to retail interest rates and then into the real economy relatively swiftly, further empirical evidence as to factors, such as low customer switching which may be influencing deposit interest rate setting and the ultimate speed of transmitting monetary policy actions has a wider importance.

Lastly, determining what influences depositor switching has a real importance for banks, as 'core' deposits are a stable form of bank financing (e.g. Cornett *et al* 2011, Huang and Ratnovski 2009) and are important within current and future regulatory regimes (Basel Committee on Banking Supervision 2010). Higher deposit levels and equity funding, and particularly core deposit funding as a proportion of all funding, is significantly associated with increased lending (Cornett *et al* 2011). Indeed most of the US credit contraction during and after 2007 is attributed to reductions of wholesale funding rather than retail deposits.

The empirical assessment of the research questions is undertaken using a large and disaggregated data set of instant access deposit interest rates offered by UK firms between January 1989 and December 2011. We report the age of deposit accounts has a significant negative influence on interest rate setting with older or mature deposit accounts offering lower interest rates. Further, the newest deposit in a firms' deposit account portfolio has significantly higher interest rates. The consumer costs arising from this form of interest rate setting are seen to be high. Interest rate setting behaviour also varies significantly by the type of firm offering the deposit account. It is concluded interest rate setting in the UK instant access deposit market is consistent with distinct

interest rate setting for new and existing customers, firms extracting rent from existing depositors and behaving in accordance with the predictions of Klemperer (1995).

The study is structured in five sections. After this introduction a brief review of pertinent literatures is provided. In section three, the data and methods of analysis are outlined and section four provides the results of the empirical assessment. Conclusions and recommendations are provided in section five.

Literature Review

While the academic and policy literatures addressing customer switching in banking markets are large, this literature may be usefully sub-divided. Initially, many regulatory studies have surveyed customer switching activity in different banking markets. Secondly, an academic literature has examined why low levels of customer switching emerge in banking markets.

2.1 Survey evidence of customer switching in retail banking.

Investigation of the levels of customer switching in banking markets has attracted repeated attention and many surveys have been undertaken to quantify levels of customer switching. Customer switching in current or checking account markets has been most frequently examined. Across the EU 25 member states in 2005, more concentrated banking markets such as the Netherlands and Finland have faced lower switching rates than nations with less concentrated banking markets such as Germany and Spain (DG Comp 2007). In the UK the percentage of customers switching each year has varied from 6% in 2006 (OFT 2008) to 3.8% in 2010 (ICB 2011).

In credit markets evidence of low customer switching is also reported. For the UK the ICB (2011) reported 4% of mortgage customers switched their provider in 2010, falling from over 10% of customers in the mid 2000's. Estimates of low customer switching are also reported for deposit or savings markets internationally. Kiser (2002) reported that the median depositor holds their account for 10 years in the USA. In the UK the percentage of depositors switching their bank was reported to be less than 6% in 2010 (ICB 2011). The level of customer switching in retail banking markets is also lower than that observed in other retail financial services markets and other utility markets such as energy or telephony services (Morgans 2010, OFT 2008).

2.2 Why is consumer switching in retail banking markets so low?

Why consumer switching is so low in these markets has also been repeatedly investigated. This literature can be divided between the types of banking service considered be these current accounts, credit services or deposits.

When considering current accounts most attention has focused on administrative costs, price complexity and cross-selling (DG COMP 2007). The ability of banks to move automated payment arrangements such as direct debits or standing orders without incident is a point of particular customer concern and scepticism (DG COMP 2007, ICB 2011). Policy attention has also been placed on making comparison of current accounts easier for consumers (e.g. European Commission Health and Consumer Directorate General 2012). Subsequently many policy solutions to reduce transactional costs associated with switching banking services have been proposed and applied from the use of redirection services and enhanced customer information (ICB 2011) to the introduction of common procedures and deadlines for transferring accounts between banks (DG COMP 2007). Other contributions have indicated the market power of banks (Gondat-Larralde and Nier 2006), branch location (Cruickshank 2000, OFT 2008) and a lack of meaningful choice (OFT 2008) also limit customer switching in current or checking account markets.

In credit markets different factors are viewed to influence customer switching costs. One such factor is the level of information disclosure by banks to credit bureau, which report the credit worthiness of borrowers to other lenders. This is a critical factor in the lending relationship as limited information disclosure can effectively lock customer to a single lender enabling higher interest rates to be levied (Rajan 1992). Alternatively Bouckaert and Degryse (2004) report the process through which lenders disclose information to credit bureau is more open. While banks provide information to credit bureau on high quality existing customers enabling competition from other banks for these customers, this information provision comes at a cost. New customers accept higher interest rates in order to obtain a high quality information disclosure. Simultaneously customers which are not high quality are often locked into current lending arrangements and subject to informational rents. This process is believed to constrain competition and result in differential interest rate setting for high quality and other borrowers.

The presence of informational rents and customer 'lock in' has been empirically tested in a range of credit markets internationally from US credit cards (Stango 2002) to the provision of firm finance (e.g. Kim *et al* 2003,

Barone *et al* 2011). It has been reported the influence of these switching costs is often significant and can add considerably to the costs of lending. A further less frequently examined factor affecting switching in credit markets are exit costs arising from the termination of lending arrangements. These costs are reported to be a significant feature in reducing credit market switching in the UK and Australia (Cruickshank 2001, SERC 2011).

The factors influencing customer switching in instant access deposit markets are deemed to be different from those influencing switching in current account and credit markets. While many factors are reported as influential in explaining low switching in deposit markets including branch location (Kiser 2002) and the level of ATM charges (Massoud *et al* 2006), administrative and informational explanations of low switching maybe less relevant for this market. Distinct from current accounts, instant access deposit accounts are a relatively homogeneous service, have a simple pricing structure where the benefits of this service are indicated by a single interest rate, are relatively easy to switch and do not carry exit fees. Many of the explanations of low switching forwarded for credit markets such as information disclosure also have reduced applicability for deposit markets. Indeed as Shy (2002) reports determining the scale of switching costs in deposit markets is challenging due to the customer specific nature of these costs.

Data and Methodology

This section begins by considering how the empirical approach adopted in this study differs from current methods of assessing bank responses to low customer switching. Next, the dataset of UK instant access deposit accounts is introduced and explanation how the descriptive and econometric analysis of the research questions is provided.

Developments to past methods.

The approach employed to quantify deposit interest rate setting for markets characterised by low customer switching differs from past approaches (e.g. Sharpe 1997, Hannan and Adams 2011 and Carbo-Valverde *et al* 2011) in a number of regards. As previously stated these studies have examined the proportion of in-migration into different geographical regions to determine if regions are characterised by relatively more or fewer new depositors.

In this study a product level dataset is used to examine whether new and existing customers are offered distinct levels of interest by deposit accounts. This dataset enables aspects of Klemperer (1995) model to be considered, which previously has not been possible. First, the number of deposit accounts offered by an individual firm and the presence of, and interest rate setting for, duplicate or very similar deposit accounts are identified. This enables the examination of the influence of the maturity or age of individual deposit accounts on interest rates setting and also the presence or otherwise of an interest rate premium on the newest deposit account. This development overcomes concerns raised by Carbo-Valverde *et al* (2011) as to the use of blended or aggregate interest rates.

A second development is that deposit account characteristics can be considered in more detail including the type of firm offering the deposit account and the sum deposited. As it is unclear if all firms set interest rates for new and existing customers similarly or if depositors of larger sums have greater incentives to monitor interest rates and switch deposit accounts accordingly, assessment of these features is important. Lastly, while the approach of Sharpe (1997) is well suited to banking markets which can be geographically separated such as the USA and Spain, this form of analysis is not possible when banking markets are centralised and possess a more national character (see Ashton 2001). The use of product level data overcomes this concern.

Equally it should be stated the use product level data also has drawbacks relative to past approaches. Unlike, for example, Carbo-Valverde *et al* (2011) the number of new and existing depositors which actually use deposit accounts or the market share of different banks is not known. Therefore it is acknowledged using product level data has both benefits and drawbacks relative to past studies.

Data employed in the study

The data used in the study is provided by MoneyFacts PLC. This UK based company has collated and published interest rate data on a range of financial services available in the UK since 1988 in a monthly magazine. This retail interest rate data for loans, mortgages and savings products is widely used by the financial press, the financial services industry, regulators and more recently by the academic research community. The interest rate data covers available deposit accounts[1] for the period January 1989 until December 2011, denoted by a time-index $t = \{1,...,T\}$ for 276 months. As this survey has matured, the dataset has become increasingly

[1] Accounts which are classed as "closed issues" i.e. not open for new investment, are not included in our dataset. As the data is used to examine the choice faced by a depositor at any point in time, the exclusion of closed issue accounts does not distort the analysis.

representative of the UK deposit market. While other research has used MoneyFacts data, the time-span and market coverage represented by our particular dataset is unique[2].

The analysis is simplified by limiting the deposit accounts in the dataset to instant access branch based accounts[3]. Branch based accounts (and firms using a physical distribution network) are only selected as interest rate setting for remote access telephone and internet deposit accounts is likely to be very different from branch based accounts, could distort the analysis and may be a distinct product market. The selected branch based instant access deposit accounts are indexed $i = \{1,...,n\}$ for 572 deposit accounts recorded over the sample period (1989 to 2011).

The interest rate offered depends upon the sum or balance deposited, giving rise to 'tiered' interest rate structures. To explore whether the factors correlated with interest rate setting are dependent on the sum deposited, interest rate setting behaviour for three sizes of deposit, namely £500, £5,000 and £50,000 is examined. The rate for deposit account *i* at time *t* is therefore denoted as $r500_{it}$, $r5000_{it}$, $r50000_{it}$ respectively.

3.3 The descriptive assessment of the research questions

In the descriptive assessment the distribution of interest rates offered on deposit accounts is quantified by quartile. Deposit accounts are identified as being within the top quartile (Q1), upper-middle quartile (Q2), lower-middle (Q3), or bottom quartile (Q4) of the interest rate distribution of all deposit accounts at each point in time. Using this identifier it is possible to examine how the percentage of accounts which fall in to each of these quartiles is correlated with various factors including deposit account age, whether the deposit account is the newest within the firms' deposit portfolio or firm type.

To explore research question 1 the total number of months each deposit account has been marketed is calculated. Direct analysis of this variable is complicated as deposit accounts are unobservable prior to January 1989. To overcome this and possible issues of collinearity with variables used to explore research question 2, this variable is translated into a binary dummy taking the value 1 where the account has been observed for more

[2] Other studies which have used smaller scale samples of the MoneyFacts data include: Ashton (2001), Fuertes and Heffernan (2009), Ashton and Hudson (2008), Ashton and Letza (2003), Heffernan (2002).

[3] Although instant access is permitted for some notice accounts, this often incurs a financial penalty typically equal to an amount of interest equal to the days' notice forgone. As this penalty factor is not included in this assessment these accounts are excluded.

than 30 months. This variable effectively identifies 'mature' accounts and is denoted age_{it}. The sample is also truncated to begin in November 1992 ensuring 'mature' accounts are always recorded.

To explore research question 2 two binary dummy variables are created. The first denoted $newest_{it}$ takes the value 1 if the account is the newest in the firm's deposit account portfolio. The second variable is denoted $prods_{it}$ and takes the value 1 if the firm offers a number of deposit accounts above that typically observed in the data; approximately 4 accounts[4]. This variable is included as a control for when firms offer relatively low or high numbers of deposit accounts, as the length of the 'product line' or scope of the product portfolio has been previously associated with pricing in financial services markets (see Iyangar and Kamenica 2010 and Kamenica 2008).

The analysis also allows for heterogeneity according to firm type, namely whether the firm is mutually owned (mutual banks are often termed building societies in the UK) or otherwise and whether it is a large bank with a national branch network, or a small, regional bank. These two dummies are denoted $bank_i$ and $size_i$ respectively. $bank_i$ takes the value 1 if the bank is not a mutual and $size_i$ takes the value 1 if the bank is a small size with only a local or regional branch coverage. These binary dummy variables capture all types of firm available in our data: large building societies, large banks, small banks and small building societies.

As the UK interest rate environment is dynamic it is also important to examine if interest rate setting behaviour is constant over time. Although a full set of dummy variables are included in the analysis to accommodate time variation in the underlying interest rate, the interest rates paid on new and mature deposit accounts could differ over time. To address this possibility the dataset is split into three time periods based on the Bank of England base rate. The first time period is the high interest rate period between November 1992 and January 2001[5] when the base rate fluctuated between 5 and 7.5%. The second time period is when interest rates were generally lower (between 4% and 6%) between February 2001 to October 2008. The final time period covers a time of world-

[4] Accounts which are from established firms at the beginning of the sample are not coded as newest, though all accounts from new firm start-ups introduced during the sample period are, until a newer account supersedes them.
[5] The very beginning of the sample, January 1989 to October 1992, was excluded to reduce bias in the age dummy variable, and also since interest rates were much higher in this period compared with the period post November 1992.

wide low interest rates (around 1%) and a period when some banks have required additional deposit finding (November 2008 to December 2011).

3.4 Econometric Analysis

A concern underlying the descriptive analysis is that the results could be influenced by the type of firm and the number of duplicate deposit accounts offered at any one time. Indeed the results could reflect strategic or competitive positioning by different types of firms. To control for these concerns nine models are estimated. These models all have a similar structure and reflect the three time periods and the three interest rates tiers or deposit quantities ($r500_{it}$, $r5000_{it}$, $r50000_{it}$). For variables such as the interest rate, a superscript *m* for the period; e.g. $r500_{it}^{m}$, where $m = \{1,2,3\}$ is included. The set of survey month dummies covering each month in each sub-period is given the *m* superscript $\mathbf{time}_{\mathbf{t}}^{m}$. To allow the maximum possible firm heterogeneity all variables describing deposit account characteristics ($newest_{it}$, age_{it} and $size_{it}$) are interacted with both firm type dummies and their cross-products (e.g. $bank_i$, $size_i$ and $bank_i \times size_i$)[6]. Therefore for the £500 deposited in the second time period the model would be written as:

$$\begin{aligned} r500_{it}^{2} &= \alpha_i + \beta_0 + \beta_1 newest_{it} + \beta_2 age_{it} + \beta_3 prods_{it} + \beta_4 bank_i + \beta_5 size_i \\ &+ \beta_6 \left(age_{it} \times bank_i \right) + \beta_7 \left(age_{it} \times size_i \right) + \beta_8 \left(age_{it} \times bank_i \times size_i \right) \\ &+ \beta_9 \left(bank_i \times size_i \right) + \beta_{10} \left(prods_{it} \times bank_i \right) + \beta_{11} \left(prods_{it} \times size_i \right) \\ &+ \beta_{12} \left(prods_{it} \times bank_i \times size_i \right) + \gamma_1 \mathbf{time}_{\mathbf{t}}^{2} + u_{it} \end{aligned} \tag{1}$$

The other eight models reflect different sums deposited and time periods. This specification allows heterogeneity between the sub-periods periods in the estimated β coefficients. This is important as coefficients may or may not be stable in all base rate regimes[7]. The vector of time dummy coefficients $\boldsymbol{\gamma}$ in this specification is not constrained to be identical across sums deposited permitting a more robust analysis of firm type heterogeneity. A deposit account specific (individual) effect term α_i is also included as it cannot be assumed all deposit accounts have the same intercept term.

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[6] The interactions between $newest_{it}$ and, $bank_i$, $size_i$ and $bank_i \times size_i$ were initially included in the specification but were found to be insignificant in all cases so were not included in any model finally estimated, hence are not shown in this specification.

[7] The $product_i \times bank_i \times size_i$ interaction is also excluded in the first period as there are no accounts which satisfy this condition.

As estimating the deposit account specific effects directly would require a full set of account dummies (fixed effects) to be included, a random effect framework is used where by the error terms are corrected for the correlation across time caused by the α_i. The Rogers (1991) methodology is used to control for this correlation (or clustering) during estimation so correcting the estimated standard-errors. Given the distribution of interest rates over time is non-normal[8] the use of standard asymptotic inference can be misleading. Accordingly, all estimated statistics are bootstrapped with 500 replications using a cluster robust bootstrap technique accommodating the individual deposit account effects in the resampling routine. In estimating the specifications outlined above, a number of the firm type and deposit account interactions are jointly insignificant at the 10% level. Specifically the *Age* and firm type interactions are insignificant for all sums deposited in the second and third time periods; these interaction terms are dropped from the final models estimated.

The model estimates are also used to infer the relative costs of deposit account characteristics (age_{it} $newest_{it}$ and $prods_{it}$) by firm type for the three sums deposited. This is undertaken by summarising the differences in the types of firm relative to a base firm, a base month, and base deposit account. In each sub-period the base month is the first month in the period, (November 1992, February 2001 and November 2008 respectively). In all cases the base bank is a large building society, while the base account type is a standard deposit account which is less than 61 months old, is not the newest account offered by the bank and is from a deposit account portfolio containing fewer than average deposit accounts.

Results

This section reports the descriptive and econometric results and is concluded with estimation of the depositor costs resulting from the observed interest rate setting behaviours of firms. Descriptive results are reported in Tables 1 to 4 and Figure 1. Summary statistics of the dataset are provided in Table 1. Tables 2 to 4 examine deposit account performance by considering the level of interest offered on a deposit account using quartiles of the interest rate distribution of all accounts within each time period. Table 2 reports deposit account performance compared to the age of the deposit account (age_{it}) and Table 3 compares interest rate performance relative to whether the account is the newest in the firms' deposit account portfolio ($newest_{it}$). In Table 4 deposit account performance is considered relative to firm type to ascertain if firm level heterogeneity is

[8] The truncation of the interest rate distribution at 0 will heavily contribute to this non-normality.

influential. Lastly the distribution over time of interest rates offered on accounts for different sums deposited or tiers is summarised in Figure 1. The econometric assessment is reported in Table 5 and in Table 6 we report estimates of interest rate setting behaviour for the nine models controlling for the influence of firm type.

Descriptive statistics

Table 1 shows summary statistics within each of the three time periods, split by the three sums deposited. Considering £500 deposited there were on average 97 instant access branch-based deposit accounts during the first period (November 1992 – January 2001). During the subsequent time periods this number of deposit accounts has increased markedly. The standard-deviation reports the largest fluctuations in the numbers of deposit accounts occurred during the first time period. The number of firms offering instant access branch deposit services has remained relatively consistent over the entire sample period at between 75 and 82 firms. On average, the number of deposit accounts offered by each firm rises from an average of around 2 to 4 deposit accounts over time and the average age of a deposit account increases between the first and second time periods.

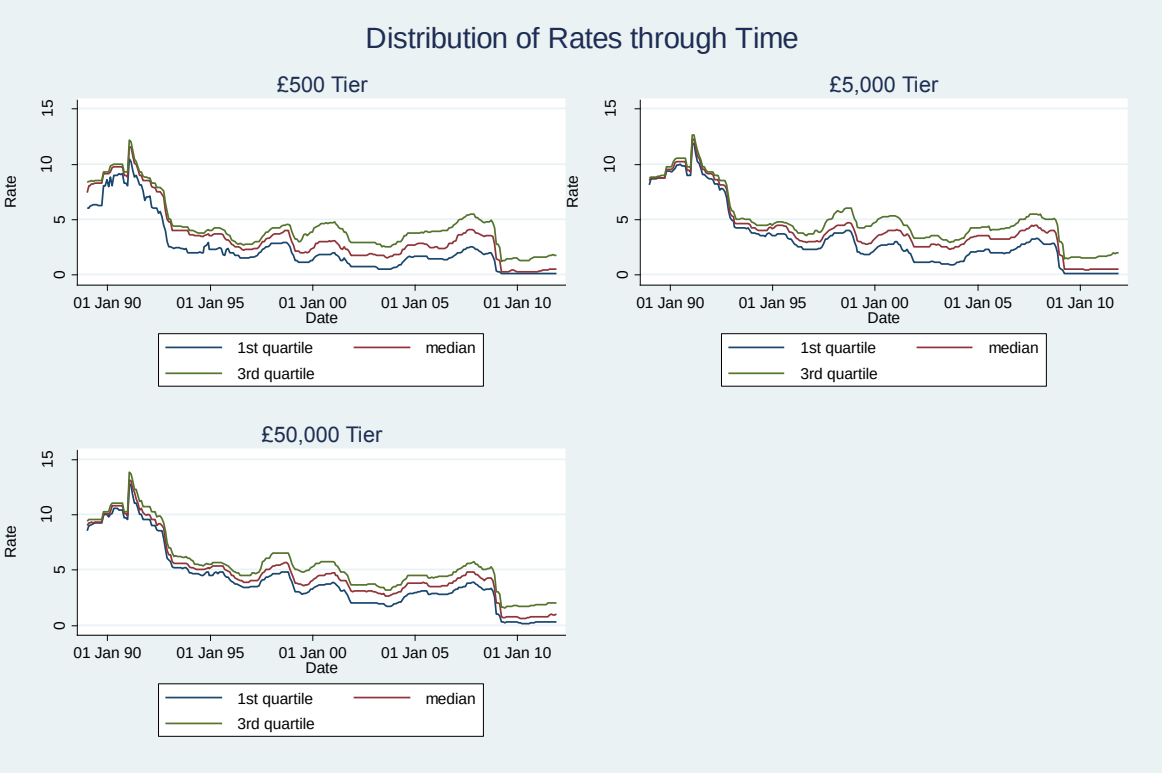
Rows 5 to 7 of Table 1 show the differences in the interest rate environment in the 3 time periods. A graphical representation of the quartiles over time for the three quantities deposited is provided in Figure 1. For most time periods, there is a slight left skew with the mean account interest rate smaller than the median rate, indicating there are more deposit accounts offering relatively lower rates of interest. The interquartile range remains relatively consistent through time at around 2% and is smaller for the higher sums deposited (1.5% on average). Finally, comparing deposit balances (£500, £5,000 and £50,000) more deposit accounts are available for larger balances and on average these larger balances attract higher interest rates.

Table 1: General Summary Statistics

	£500 deposited					
	Nov 1992 - Jan 2001		Feb 2001 - Oct 2008		Nov 2008 - Dec 2011	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
No of deposit accounts	96.86	24.77	125.91	5.47	128.87	6.27
No of firms	73.10	8.29	68.06	2.64	67.47	1.86
No of products offered by each firm	2.08	0.76	4.49	0.57	3.92	0.23
Average age of product	43.17	9.05	76.45	11.80	86.28	3.87
Average 25th percentile rate	2.07	0.54	1.38	0.58	0.19	0.31
Average 50th percentile rate	3.20	0.74	2.58	0.74	0.56	0.68
Average 75th percentile rate	3.92	0.69	3.82	0.88	1.73	0.74
Months in period	99		93		38	
	£5,000 deposited					
	Nov 1992 - Jan 2001		Feb 2001 - Oct 2008		Nov 2008 - Dec 2011	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
No of deposit account	117.38	31.12	147.27	8.28	151.74	6.65
No of firms	81.64	8.52	74.96	2.56	74.58	2.07
No of products offered by each firm	2.12	0.74	4.38	0.50	3.84	0.23
Average age of product	43.30	9.55	74.91	10.38	80.36	3.38
Average 25th percentile rate	3.20	0.84	1.96	0.72	0.25	0.50
Average 50th percentile rate	3.92	0.73	3.30	0.62	0.75	0.73
Average 75th percentile rate	4.78	0.68	4.16	0.77	1.89	0.78
Months in period	99		93		38	
	£50,000 deposited					
	Nov 1992 - Jan 2001		Feb 2001 - Oct 2008		Nov 2008 - Dec 2011	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
No of deposit accounts	119.70	30.81	149.17	8.56	153.03	7.10
No of firms	81.73	8.52	75.05	2.56	74.58	2.07
No of products offered by each firm	2.13	0.73	4.36	0.50	3.85	0.22
Average age of product	43.05	9.55	74.41	10.27	79.80	3.56
Average 25th percentile rate	4.20	0.79	2.73	0.63	0.42	0.60
Average 50th percentile rate	4.83	0.75	3.64	0.61	0.99	0.73
Average 75th percentile rate	5.61	0.72	4.37	0.72	2.02	0.74
Months in period	99		93		38	

An analysis of deposit account *Age* versus interest rate performance is shown in Table 2. Here the quartiles of the deposit account interest rate distribution for the three time periods are compared to the age of the deposit account in years; for accounts which are one year old, between 2 and 5 years old and over 6 years old. The percentage of all deposit accounts within these three 'age' groups is reported.

Figure 1: Tiered Interest Rate Distributions through Time



In Table 2 a clear pattern emerges that the age of a deposit account is negatively correlated with interest rates offered. The percentage of deposit accounts in quartile 1 representing the most competitive deposit accounts decreases with account age for all sums deposited in all time periods. A very similar pattern is seen when quartiles 1 and 2 are considered together. In contrast, the percentage of deposit accounts in quartile 4, representing the least competitive accounts, increases with account age for all sums deposited in all time periods. In all cases deposit accounts which are over 6 years old are clustered in the bottom two quartiles of interest rates offered. This tabulation therefore lends support to research question 1; more mature or older deposit accounts have lower interest rates.

Table 3 shows deposit account interest rate quartiles relative to whether the account is the newest in the deposit account portfolio offered by the firm. The table provides evidence that the newest accounts provide more competitive interest rates. The percentage of the newest accounts in quartile 1, the most competitive quartile, exceeds the percentage of other accounts in that quartile in every time period and for every sum deposited. The percentage of the newest accounts in quartile 4, the most uncompetitive quartile, is generally less than the percentage of the other accounts. Similarly, when quartiles 3 and 4 are considered together the newer accounts

appear less frequently in almost every case. Overall this table lends support to research question 2; the newest deposit account in a firms' deposit account portfolio pays an interest rate premium.

Table 2: Deposit Account Performance versus Age of Deposit Account

Age of deposit account / Interest rate distribution	£500 deposited								
	Nov 1992 - Jan 2001			Feb 2001 - Oct 2008			Nov 2008 - Dec 2011		
	1 yr.	2–5 yrs.	6+ yr.s	1 yr.	2–5 yrs	6+ yr.s	1 yr.	2–5 yr.s	6+ yr.s
Q1 (Highest Quartile)	**28.92%**	20.57%	15.74%	**23.15%**	19.33%	3.69%	**29.20%**	17.58%	6.82%
Q2 (Higher Middle)	26.86%	27.05%	**27.83%**	**34.62%**	31.23%	15.46%	29.13%	**29.89%**	18.22%
Q3 (Lower Middle)	22.89%	**28.28%**	26.50%	31.67%	**33.35%**	32.31%	30.60%	45.22%	**57.40%**
Q4 (Lowest)	21.33%	24.10%	**29.93%**	10.56%	16.09%	**48.54%**	11.07%	7.31%	**17.55%**
$\chi^2(9)$	186.63			16893.19			6538.83		
	£5,000 deposited								
Q1 (Highest Quartile)	**23.07%**	12.48%	7.27%	**29.79%**	15.90%	4.11%	**34.94%**	15.99%	5.82%
Q2 (Higher Middle)	28.58%	**29.65%**	28.35%	30.72%	**31.30%**	11.39%	28.71%	**30.44%**	15.75%
Q3 (Lower Middle)	20.00%	27.96%	**35.66%**	26.78%	**34.97%**	29.76%	27.92%	41.30%	**53.90%**
Q4 (Lowest)	28.35%	**29.91%**	28.72%	12.71%	17.83%	**54.75%**	8.43%	12.27%	**24.53%**
χ^2 (9)	2767.72			14573.49			12555.43		
	£50,000 deposited								
Q1 (Highest Quartile)	**21.89%**	13.59%	7.03%	**30.45%**	15.99%	5.51%	**32.35%**	14.35%	6.38%
Q2 (Higher Middle)	27.51%	27.94%	**33.07%**	**31.97%**	31.17%	9.41%	32.87%	**36.09%**	19.60%
Q3 (Lower Middle)	20.87%	27.94%	**35.01%**	24.86%	**34.76%**	31.47%	18.94%	23.95%	**35.49%**
Q4 (Lowest)	29.72%	**30.54%**	24.88%	12.73%	18.08%	**53.61%**	15.84%	25.61%	**38.53%**
χ^2 (9)	2083.96			22620.16			12172.52		

Notes:
Highlighting signifies the largest percentage in each quartile in each time period. Percentages represent the average percentage of deposit accounts, at each point in time which fall in to that category – hence columns add to 100%. The χ^2 statistic relates to the hypothesis of joint equality of all independent cells in each period

Table 4 records the interest rates offered on deposit accounts by quartile relative to the different types of firm. In this table LBS denotes large building societies, SmBS denotes small building societies, LBank denotes large banks and SmBank denotes small banks. On average, small banks (SmBank) have deposit accounts within the bottom quartile of the interest rate distribution (Q4). Conversely, large building societies (HSBS) have a greater percentage of their deposit accounts in the top quartile of the interest rate distribution (Q1).

Table 3: Deposit Account Performance for Newest Deposit Account in Firms' Portfolio

Newest account / Interest rate distribution	£500 deposited					
	Nov 1992 - Jan 2001		Feb 2001 - Oct 2008		Nov 2008 - Dec 2011	
	Yes	No	Yes	No	Yes	No
Q1 (Highest Quartile)	**22.38%**	19.12%	**17.17%**	10.46%	**24.00%**	8.70%
Q2 (Higher Middle)	25.54%	**27.24%**	**29.38%**	22.25%	**28.94%**	21.32%
Q3 (Lower Middle)	**29.68%**	26.34%	30.20%	**31.95%**	37.06%	**55.69%**
Q4 (Lowest)	22.40%	**27.30%**	23.25%	**35.35%**	10.01%	**14.29%**
$\chi^2(6)$	132.32		2805.09		7460.37	
	£5,000 deposited					
Q1 (Highest Quartile)	**16.67%**	11.36%	**19.28%**	9.16%	**22.79%**	8.93%
Q2 (Higher Middle)	24.30%	**29.53%**	**22.58%**	21.11%	**27.65%**	20.89%
Q3 (Lower Middle)	28.55%	**29.17%**	**33.20%**	29.87%	35.16%	**51.25%**
Q4 (Lowest)	**30.47%**	29.94%	24.94%	**39.86%**	14.41%	**18.94%**
$\chi^2(6)$	1250.55		3806.62		10452.39	
	£50,000 deposited					
Q1 (Highest Quartile)	**17.07%**	11.68%	**19.68%**	9.88%	**20.50%**	9.28%
Q2 (Higher Middle)	**28.71%**	28.49%	**25.93%**	18.22%	**34.34%**	24.12%
Q3 (Lower Middle)	22.85%	**30.62%**	31.45%	**31.79%**	24.01%	**31.47%**
Q4 (Lowest)	**31.38%**	29.21%	22.93%	**40.11%**	21.14%	**35.13%**
$\chi^2(6)$	1124.11		3686.24		3937.42	

Notes:
Highlighting signifies the largest percentage in each quartile in each time period. Percentages represent the average percentage of deposit accounts at each point in time, which fall into that category – hence columns add to 100%. The χ^2 statistic relates to the hypothesis of joint equality of all independent cells in each period.

To conclude, this descriptive analysis indicates deposit account age, if the deposit account is the newest deposit account in the firms' portfolio and firm type are all correlated with deposit interest rate setting. In the next section an econometric analysis is outlined allowing for tests of *ceteris paribus* effects having controlled for firm and deposit account factors.

Table 4: Deposit Account Performance versus Firm Type

Firm Type / Interest rate dist.	£500 deposited											
	Nov 1992 - Jan 2001				Feb 2001 - Oct 2008				Nov 2008 - Dec 2011			
	LBS	SmBS	LBank	Sm Bank	LBS	Sm BS	LBank	Sm Bank	LBS	Sm BS	LBank	Sm Bank
Q1	24.34%	**24.81%**	9.10%	12.50%	**21.82%**	12.33%	7.13%	14.44%	**22.28%**	11.90%	9.86%	15.21%
Q2	29.31%	**31.36%**	23.05%	11.51%	29.20%	**36.41%**	15.92%	14.58%	30.56%	**36.10%**	13.04%	17.47%
Q3	22.37%	25.08%	**33.11%**	28.91%	26.05%	28.27%	**34.32%**	28.31%	22.74%	**33.65%**	24.30%	22.20%
Q4	23.98%	18.76%	34.74%	**47.09%**	22.93%	22.99%	42.63%	**42.67%**	24.41%	18.35%	**52.80%**	45.11%
$\chi^2(12)$	2791.28				4528.29				3850.86			
	£5,000 deposited											
Q1	**31.85%**	7.84%	17.13%	10.87%	**24.52%**	9.94%	9.75%	12.09%	**24.67%**	10.95%	12.06%	8.34%
Q2	27.25%	23.71%	**30.29%**	9.08%	**33.65%**	18.35%	33.23%	8.15%	**33.41%**	16.33%	30.38%	17.10%
Q3	27.56%	**35.96%**	19.27%	21.00%	26.53%	**34.06%**	26.48%	20.85%	25.23%	**33.95%**	27.59%	30.50%
Q4	13.35%	32.49%	33.31%	**59.05%**	15.30%	37.65%	30.54%	**58.91%**	16.69%	**38.77%**	29.97%	44.06%
$\chi^2(12)$	5924.2				6638.32				6095.06			
	£50,000 deposited											
Q1	**22.24%**	9.57%	26.21%	13.86%	20.88%	9.88%	**24.40%**	14.12%	**22.44%**	10.31%	21.10%	8.94%
Q2	33.56%	20.56%	20.68%	**33.67%**	**36.05%**	19.53%	29.67%	19.85%	**35.20%**	25.16%	31.87%	27.56%
Q3	40.39%	**56.16%**	37.41%	32.96%	36.93%	**51.37%**	31.05%	41.06%	14.57%	**33.00%**	22.17%	31.88%
Q4	3.82%	13.71%	15.69%	**19.50%**	6.13%	19.22%	14.88%	**24.97%**	27.79%	31.53%	24.85%	**31.62%**
$\chi^2(12)$	7031.17				10740.35				7931.7			

Notes:
Highlighting signifies the largest percentage in each quartile in each time period. Percentages represent the average percentage of deposit accounts at each point in time,which fall in to that category – hence columns add to 100%. The χ^2 statistic relates to the hypothesis of joint equality of all independent cells in each period.

Econometric evidence

As discussed in section 3, nine models are estimated to test the research questions. These models are estimated controlling for firm type heterogeneity and deposit account characteristics and reported in Table 5. Differences in coefficient estimates for particular firm and deposit account types are summarised in Table 6.

Within Table 5 a number of findings are reported. Considering research question 1 the coefficient estimates for *Age* are statistically significant and negative in all cases within the last two time periods (Feb 2001- Oct. 2008 and Nov. 2008- Dec 2011). In the first time period *Age* is only significant and negative when £5,000 is deposited and other cases is insignificant. For research question 2, the *Newest* coefficient estimate is positive as expected in all cases and statistically significant in 8 of 9 cases.

Table 5: Interest Rate Setting Behaviour Model Estimates

Panel A: Nov 1992 - Jan 2001	£500 deposited			£5,000 deposited			£50,000 deposited		
	Coef.	Std. Err.	Prob.	Coef.	Std. Err.	Prob.	Coef.	Std. Err.	Prob.
Newest	0.172	(0.160)	0.280	0.227	(0.134)	0.091 *	0.222	(0.126)	0.077 *
Prods	0.629	(0.662)	0.342	0.790	(0.432)	0.068 *	0.717	(0.366)	0.050 *
Prods x Bank	-0.304	(0.716)	0.671	-0.619	(0.497)	0.213	-0.922	(0.446)	0.039 **
Prods x Size	0.125	(0.785)	0.874	-0.145	(0.508)	0.776	-0.345	(0.454)	0.447
Age	-0.817	(0.656)	0.213	-0.730	(0.366)	0.046 **	-0.429	(0.298)	0.149
Age x Bank	-0.157	(0.704)	0.823	-0.341	(0.422)	0.419	-0.414	(0.368)	0.260
Age x Size	0.459	(0.674)	0.496	0.584	(0.375)	0.120	0.503	(0.307)	0.101
Age x Bank x Size	0.684	(0.771)	0.375	0.592	(0.506)	0.242	0.690	(0.434)	0.114
Bank	-0.733	(0.426)	0.085 *	-0.743	(0.341)	0.029 **	-0.715	(0.308)	0.020 **
Bank x Size	-0.384	(0.511)	0.452	0.217	(0.410)	0.596	0.172	(0.393)	0.662
Size	-0.368	(0.405)	0.363	-0.634	(0.304)	0.037 **	-0.544	(0.283)	0.054 *
Constant	5.739	(0.456)	0.000 ***	7.143	(0.325)	0.000 ***	7.984	(0.305)	0.000 ***
Number of obs.	9,589			11,621			11,850		
Adj. R^2	0.249			0.338			0.350		
Clusters	244			289			294		
Panel B: Feb 2001 - Oct 2008	£500 deposited			£5,000 deposited			£50,000 deposited		
	Coef.	Std. Err.	Prob.	Coef.	Std. Err.	Prob.	Coef.	Std. Err.	Prob.
Newest	0.354	(0.135)	0.009 ***	0.340	(0.147)	0.021 **	0.260	(0.125)	0.037 **
Prods	-0.218	(0.381)	0.567	0.243	(0.301)	0.420	0.313	(0.260)	0.229
Prods x Bank	0.465	(0.555)	0.403	0.291	(0.477)	0.542	-0.074	(0.400)	0.854
Prods x Size	0.900	(0.411)	0.029 **	0.389	(0.344)	0.258	0.004	(0.284)	0.989
Prods x Bank x Size	-0.238	(0.914)	0.795	-0.212	(0.631)	0.737	0.230	(0.524)	0.660
Age	-0.601	(0.129)	0.000 ***	-0.785	(0.128)	0.000 ***	-0.716	(0.121)	0.000 ***
Bank	-1.100	(0.471)	0.019 **	-0.960	(0.424)	0.024 **	-0.663	(0.366)	0.070 *
Bank x Size	0.810	(0.552)	0.142	0.599	(0.470)	0.203	0.443	(0.440)	0.314
Size	-1.284	(0.350)	0.000 ***	-0.948	(0.315)	0.003 ***	-0.580	(0.285)	0.042 **
Constant	4.160	(0.358)	0.000 ***	4.542	(0.325)	0.000 ***	4.871	(0.300)	0.000 ***
Number of obs.	11,710			13,696			13,873		
Adj. R^2	0.3564			0.3747			0.3598		
Clusters	259			317			324		
Panel C: Nov 2008 - Dec 2011	£500 deposited			£5,000 deposited			£50,000 deposited		
	Coef.	Std. Err.	Prob.	Coef.	Std. Err.	Prob.	Coef.	Std. Err.	Prob.
Newest	0.371	(0.177)	0.036 **	0.320	(0.130)	0.014 **	0.368	(0.122)	0.003 ***
Prods	0.286	(0.306)	0.349	0.414	(0.296)	0.162	0.491	(0.309)	0.113
Prods x Bank	0.225	(0.428)	0.599	-0.022	(0.389)	0.954	-0.093	(0.401)	0.817
Prods x Size	-0.166	(0.328)	0.613	-0.320	(0.320)	0.317	-0.404	(0.334)	0.226
Prods x Bank x Size	1.392	(0.466)	0.003 ***	1.614	(0.435)	0.000 ***	1.613	(0.459)	0.000 ***
Age	-0.281	(0.170)	0.098 *	-0.486	(0.128)	0.000 ***	-0.423	(0.122)	0.001 ***
Bank	-0.414	(0.337)	0.219	-0.254	(0.349)	0.466	-0.188	(0.361)	0.602
Bank x Size	0.444	(0.367)	0.226	0.182	(0.370)	0.622	0.056	(0.383)	0.883
Size	-0.407	(0.247)	0.100	-0.370	(0.267)	0.166	-0.217	(0.268)	0.417
Constant	2.932	(0.275)	0.000 ***	3.449	(0.291)	0.000 ***	3.664	(0.274)	0.000 ***
Number of obs	4,897			5,766			5,815		
Adj R^2	0.3402			0.4029			0.433		
Clusters:	205			249			253		

Notes: The base category is a large building society with a product range of less than 5 accounts, where the account is less than 31 months old and is not the newest product. In panel A, the base month is Nov 1992, in panel B it is Feb 2001 while in panel C it is Nov 2008. This

base product category is reflected in the constant term, from which all other coefficients measure departures. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. All statistics are bootstrapped using a cluster robust bootstrap controlling for the individual account effect. A full set of monthly dummy variables is included as shown, but coefficient values are excluded from the table above.

Other results from Table 5 are reported. The coefficient estimates for *Bank*, recording whether a bank is not mutually owned or otherwise are significant and negative for all cases in the first two time periods (Nov.1992-Jan 2001, Feb 2001 to Oct. 2008). This indicates within this period non-mutual banks provide significantly lower interest rates on instant access deposit accounts. The coefficient estimates for *Size*, denoting if the bank is small or otherwise is significant and negative in 5 of 9 cases. This indicates smaller banks offer lower interest rates particularly in the first two time periods.

The coefficient estimates for *Prods* (denoting if the firm offers an above average number of deposit accounts) is significant in only two cases. Few of the interaction coefficient estimates are significant. One notable exception is the *Prods* x *Bank* x *Size* coefficient estimates in the final time period (Nov. 2008 – Dec 2011) which are significant and positive for all deposit quantities, indicating small, non-mutual banks offer higher interest rates for larger sums deposited at this time. Overall it can be stated that in addition to *Age* and *Newness*, firm effects are influential in interest rate setting. Lastly, model fit statistics indicate while these models do explain variation in the data, other influences or dependencies may exist within the data.

Table 6 reports the influence of deposit account characteristics (*Age*, *Newest* and *Prods*) on firm type. Considering research question 1 firm type differences between coefficient estimates of the *Age* variable are statistically significant in 8 of 9 cases and display substantial variation in how different types of firm set interest rates. For example considering large banks when £500 is deposited in the first time period (Nov. 1992-Jan. 2001), the effect of *Age* leads to interest rates 1.7% lower than the base bank (large building societies). Indeed in 8 of 9 cases the effect of *Age* leads to lower interest rates than large building societies for small banks and small building societies for all sums deposited and in all time periods (the distinct case is large banks in the last time period [Nov. 2008-Dec 2011]). The greatest negative values appear to occur in the second time period (Feb. 2001 – Oct 2008) for small banks where the age effect is -2.2%, -2.0% and -1.5% for the £500, £5,000 and £50,000 deposited respectively. Therefore the effect of deposit account *Age* or maturity of interest rate setting varies by firm type and has the greatest negative effect within the second time period for small banks.

Table 6: Firm and Deposit Account Type Differentials

Panel A: Nov 1992 - Jan 2001	£500 deposited				£5,000 deposited				£50,000 deposited			
	Coef	χ^2	P-Value		Coef	χ^2	P-Value		Coef	χ^2	P-Value	
Age - Is the deposit account greater than 30 months old?												
Large bank	-1.707	13.93	0.000	***	-1.814	22.99	0.000	***	-1.558	20.99	0.000	***
Small BS	-0.726	3.28	0.070	*	-0.780	6.16	0.013	**	-0.470	2.85	0.091	*
Small bank	-1.317	8.16	0.004	***	-1.055	7.52	0.006	***	-0.741	4.25	0.039	**
Newest – Is the deposit account, the last one issued by the firm?												
Large bank	-0.560	1.46	0.228		-0.516	1.89	0.169		-0.493	2.15	0.143	
Small BS	-0.196	0.18	0.668		-0.407	1.34	0.247		-0.322	1.00	0.318	
Small bank	-1.313	7.10	0.008	***	-0.933	5.27	0.022	**	-0.864	5.05	0.025	**
Prods – Does the firm have above average number of deposit accounts in its deposit account portfolio?												
Large bank	-0.408	0.51	0.474		-0.572	1.85	0.173		-0.920	4.57	0.033	
Small BS	0.386	0.54	0.463		0.011	0.00	0.980		-0.172	0.25	0.620	
Small bank	-1.036	1.57	0.210		-1.134	3.87	0.049	**	-1.637	9.03	0.003	***
Panel B: Feb 2001 - Oct 2008	£500 deposited				£5,000 deposited				£50,000 deposited			
	Coef	χ^2	P-Value		Coef	χ^2	P-Value		Coef	χ^2	P-Value	
Age - Is the deposit account greater than 30 months old?												
Large bank	-1.701	11.94	0.001	***	-1.744	15.47	0.000	***	-1.378	12.30	0.001	***
Small BS	-1.886	27.12	0.000	***	-1.733	27.34	0.000	***	-1.295	18.37	0.000	***
Small bank	-2.175	27.52	0.000	***	-2.093	30.96	0.000	***	-1.515	18.20	0.000	***
Newest – the last deposit account issued by the firm												
Large bank	-0.745	2.19	0.139		-0.620	1.95	0.163		-0.403	1.06	0.304	
Small BS	-0.930	5.70	0.017	**	-0.608	2.98	0.084	*	-0.320	1.02	0.313	
Small bank	-1.220	7.92	0.005	***	-0.969	6.07	0.014	**	-0.540	2.13	0.144	
Prods – the total number of deposit accounts in the firms portfolio												
Large bank	-0.853	3.92	0.048	**	-0.426	1.19	0.275		-0.424	1.36	0.244	
Small BS	-0.603	2.78	0.096	*	-0.317	0.92	0.337		-0.263	0.74	0.391	
Small bank	-0.666	0.78	0.376		-0.598	1.81	0.178		-0.327	1.06	0.304	
Panel C: Nov 2008 - Dec 2011	£500 deposited				£5,000 deposited				£50,000 deposited			
	Coef	χ^2	P-Value		Coef	χ^2	P-Value		Coef	χ^2	P-Value	
Age - Is the deposit account greater than 30 months old?												
Large bank	-0.696	3.61	0.057	*	-0.740	4.02	0.045	**	-0.611	2.63	0.105	
Small BS	-0.688	5.42	0.020	**	-0.856	8.60	0.003	**	-0.640	5.06	0.025	**
Small bank	-0.658	4.41	0.036	**	-0.928	8.17	0.004	***	-0.772	5.96	0.015	**
Newest – the last deposit account issued by the firm												
Large bank	-0.043	0.01	0.907		0.066	0.03	0.853		0.179	0.24	0.625	
Small BS	-0.036	0.01	0.908		-0.050	0.03	0.862		0.150	0.26	0.609	
Small bank	-0.006	0.00	0.985		-0.122	0.15	0.695		0.018	0.00	0.953	
Prods – the total number of deposit accounts in the firms portfolio												
Large bank	0.097	0.10	0.748		0.138	0.21	0.646		0.210	0.46	0.497	
Small BS	-0.287	1.35	0.245		-0.276	1.09	0.297		-0.131	0.24	0.626	
Small bank	1.361	26.07	0.000	***	1.244	15.93	0.000	***	1.258	18.98	0.000	***

Notes:

Table shows combined firm type and product characteristics as a total difference compared to a standard high-street building society product. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. All statistics are bootstrapped using a cluster robust bootstrap controlling for the individual account effect.

Considering research question 2, the *Newest* variable estimates vary by time period. In the first time-period, large banks and small building societies do not have a significantly different interest rate premium for the 'newest' deposit accounts. Small banks by contrast offer a significantly lower level of interest rate premium than large building societies by 1.3%, 0.93% and 0.86%, for £500, £5,000 and £50,000 respectively. In the second time period, small building societies and small banks offer a significantly lower interest rate premiums for the newest deposit account, again by values which decline with the sum deposited. Lastly in the third time period (Nov. 2008-Dec 2011) there are no significant differences in the interest rate premium paid for newest accounts between firm types. Considering the influence of the whether the firm offers more or less than the average number of deposit accounts (*Prods*), firm type is an important determinant in a limited number of cases. In the first time period, offering a higher than average number of deposit accounts is associated with a lower interest rate for small banks when £5,000 and £50,000 is deposited. In the second time period, significant values are recorded only for large banks and small building societies when £500 is deposited. In the third time period, offering above average numbers of deposit accounts is associated with higher interest rates for small banks.

4.3 The Effect of these Interest Rate Setting Practices for Depositors

Very simple numerical calculations can indicate the costs of these identified interest rate setting practices for individual depositors. The descriptive analysis shows that the difference between a good (upper quartile) and bad (lower quartile) account is approximately 2% for accounts with an opening balance of £500 or more and 1.5% for accounts with an opening balance of £5,000 or £50,000. These differences therefore provide a reasonable estimate of the benefits of a depositor switching to an optimal account. A monetary value of the task costs involved in searching for a new deposit account and then switching might be of the order of a few tens of pounds[9]. If the monetary benefits over the next year after undertaking a switching exercise are calculated the following is obtained:

Minimum Deposit (£)	Income gain over next year from switching[10]
£500	2% x 500 = £10
£5,000	1.5% x 5,000 = £75
£50,000	1.5% x 50,000 = £750

[9] This is an approximate but conservative (high) estimate based on previous work estimating search costs in various consumer markets (see for example, Hong and Shum, 2006).

[10] The possible gain cited is the difference between the minimum and maximum rate shown in Table 1.

Given plausible discount factors it is clear the value of switching would exceed the monetary value of the switching for accounts with larger deposits. This result is considerably strengthened if periods of more than one year are considered. Thus the losses from not switching are substantial particularly for depositors with large balances.

4.4 Summary of results

Overall the analysis has taken a two-stage approach. First a descriptive analysis found evidence for deposit account age and the newest deposit account having negative and positive relationships with interest rate setting respectively. Firm type is also seen to influence interest rate setting. A second approach uses an econometric model to examine *ceteris paribus* effects and confirms that deposit account age and 'newness' are key determinants of deposit interest rates even in the presence of firm type heterogeneity. Having controlled for this heterogeneity evidence that interest rate setting behaviour in the UK retail instant access deposit market is consistent with the research questions and supportive of the Klemperer (1995) model is reported. Lastly substantial depositor costs arising from the observed interest rate setting policies are reported.

Conclusions

This paper examines deposit interest rate setting within a market characterised by low levels of customer switching and assesses if banks extract rent from their existing depositors? Specifically two research questions are examined: do more mature accounts attract lower interest rates and does the newest account in the deposit account portfolio of a firm attract an interest rate premium? In an empirical assessment of a large sample of UK retail instant access deposit accounts between 1989 and 2011 both questions are borne out by the data. Older or more mature deposit accounts are receiving significantly lower interest rates and the newest deposit accounts offered by a firm are receiving significantly higher interest rates. These influences are robust to the influence of other factors including firm type and interaction of these factors. In light of these findings, it is important to outline policy implications and offer potential solutions to remedy or alleviate these outcomes.

The implications of differential interest rate setting for new and existing depositors as identified in this study are important from both prudential financial regulation and competition policy perspectives. From a prudential regulation perspective, it is important to allow banks access to a stable and low cost source of funding in the form of retail deposits which are held at the same bank over repeated time periods. The current low levels of

depositor switching clearly assists this aim. This benefit is also institutionalised within prudential regulation through the definition of stable and less stable deposits by the Basel III agreement (Basel Committee on Banking Supervision 2010). Stable deposits are defined as retail deposits protected by a deposit insurance scheme, where the bank has an existing relationship with the customer or a deposit within checking or current account. Less stable deposits are those deposits from high net worth and sophisticated depositors and internet distributed deposit accounts where switching is expected to be higher. As stable and less stable deposits are associated with lower and higher levels of 'run-off' during stress scenarios, holding a higher proportion of stable deposits has risk management benefits for banks. Therefore encouraging depositors not to switch deposit accounts and develop long term banking relationships assists individual banks and provides benefits for the stability of the entire banking system.

While recognising the prudential benefits of low levels of deposit account switching, this market feature sits uncomfortably with current competition policy. Within the EU, current competition policy indicates low depositor switching is a behaviour requiring change. As previously discussed, low depositor switching is associated with less competition in banking markets and depositors receiving lower returns than they might expect. These competitive concerns are exacerbated by the behaviour of depository firm. Far from recognising and rewarding the prudential benefits of low depositor switching, depository firms alternatively choose to punish existing depositors through lower returns on older deposit accounts. Therefore despite the benefits of financial stability being shared by all, competition authorities would be expected to continue intervention in these markets as the costs of providing stable deposits fall on a sub-set of depositors; those depositors which do not switch deposit accounts frequently.

How such inequitable and complex policy situations can be addressed has provoked considerable prior debate. It is often been proposed low depositor switching arises from unsophisticated and dis-interested depositors. Greater financial education is therefore widely advocated internationally to overcome this concern (see Fox 2004, Erturk *et al* 2007). Such change in isolation will not resolve incentives for banks to develop perceptions that switching costs are high. Indeed if uninformed and dis-interested depositors assist firm profitability the benefits of financial education can be limited by firms (Subrahmanyam 2009) applying marketing policies of obfuscation (Carlin and Manso 2011) and increasing product complexity (Carlin 2008).

Two changes supplementary to financial education are therefore proposed to improve returns received by existing depositors. Initially it is important for depositors to improve their decision making skills and enhance switching in this market. To engender this outcome increasing the number of market decisions may be helpful. Therefore informing customers regularly of the interest rates of deposit accounts both held and also provided by the incumbent bank would assist this process. Such information provision allowing a comparative comparison of the banks deposit interest rates would at least encourage switching of deposit accounts within the firm. Secondly, a process where a depositor could opt to have their funds automatically switched to the best interest rate offered by the deposit provider would also provide advantages to many customers. Such changes would act to reduce the differential between new and existing customers, while retaining the prudential benefits of depositors remaining with the same firm over prolonged period of time. We acknowledge this change involves greater interest costs for firms which set interest rates distinctly for new and existing depositors in the manner observed in this study and fail to acknowledge the prudential benefits of existing depositors. To conclude this is clearly an area for further research both internationally and within other banking markets.

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