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[The influence of product age on pricing decisions: An examination of bank deposit interest rate setting.](#)

Journal of International Financial Markets, Institutions and Money, 31, pp. 216-230.

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Link to published article:

<http://dx.doi.org/10.1016/j.intfin.2014.03.010>

Date deposited: 17th December 2014

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The Influence of Product Age on Pricing Decisions: An Examination of Bank Deposit Interest Rate Setting

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This version: March 2014

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Abstract

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

G21 - Banks; Other Depository Institutions; Micro Finance Institutions; Mortgages

Key Words: Interest rate setting, Switching, Deposits, UK Retail Savings Market

JEL Classification: G21, G22

Acknowledgements

The authors are grateful for helpful suggestions made by participants at the British Accounting Association Conference, Cardiff, March 2010; the Wolpertinger Conference, University of Bangor, September 2010; the 4th International Conference on Computational and Financial Econometrics, University College London, December 2010; the Behavioural Finance and Economic Psychology: Recent Developments Conference, Cass Business School, April 2011; the 2nd International Conference of the Financial Engineering and Banking Society, ESCP Europe Business School in London, June 2012; and attendees at research seminars at the University of Keele Management School and the University of Sheffield Management School. The usual disclaimer applies that all errors and omissions are entirely the responsibility of the authors. The third author would also like to acknowledge financial assistance from the Nuffield Foundation, under award RES/0371/7216.

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

1. Introduction

If depositors are unlikely to switch their bank, can banks extract rent from their existing depositors? This outcome of low customer switching (see Klemperer 1995) has been examined both for the 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 these 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 multi-period model for a standard goods market. In the 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 prices¹. Therefore as the product matures it will be offered to a combination of existing and new customers and the

¹ For deposit accounts a higher price to depositors equates to a lower interest rate.

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 it 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 the 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) 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.

2. 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 (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 three banking services: current accounts, credit services and deposits.

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).

In credit markets different factors are viewed to influence customer switching costs including information disclosure by banks to credit bureaux (Rajan 1992) and the process through which lenders disclose information to credit bureau (Bouckaert and Degryse 2004). The

presence of informational rents and customer ‘lock in’ arising has been empirically tested in many credit markets including US credit cards (Stango 2002) and the provision of firm finance (e.g. Kim *et al* 2003, Barone *et al* 2011). It is reported the influence of switching costs is significant and adds considerably to the costs of lending.

The factors influencing customer switching in instant access deposit markets are different from those influencing switching in current account and credit markets. 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 have limited 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.

3. 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 followed by explanation of how the descriptive and econometric analysis of the research questions is conducted.

3.1. 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. 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 the 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, so quantifying the affect that these characteristics have on the interest rate. 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.

It should be stated the use of product level data also has drawbacks. Unlike Carbo-Valverde *et al* (2011) the number of new and existing depositors which actually use deposit accounts and the market share of different banks is not known.

3.2. Data employed in the study

The data used 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 accounts² for the period January 1989 until December 2011, denoted by a time-index $t = \{1, \dots, T\}$ for 276 months. As this survey has matured, the dataset has become increasingly 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 unique³.

The analysis is simplified by limiting the deposit accounts in the dataset to instant access branch based accounts⁴. Branch based accounts are only selected as interest rate setting for remote access telephone and internet deposit accounts is likely to be very different which could distort the analysis and these accounts may even be viewed as a distinct product market. The selected branch based instant access deposit accounts are indexed $i = \{1, \dots, n\}$ 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. These tiers do not represent interest intervals, rather thresholds for the interest rate: when the balance of the account passes the threshold the whole balance receives

² 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.

³ Other studies which have used smaller scale samples of the MoneyFacts data include: Ashton (2001), Heffernan (2002), Ashton and Letza (2003), Ashton and Hudson (2008), Fuertes and Heffernan (2009).

⁴ 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.

interest at the new threshold rate. The MoneyFacts data consists of rates for nine total balance tiers, ranging from £1 to £100,000 but this analysis will focus on just three of these – the rate paid on a small initial investment of £500, on a medium investment of £5,000 and on a large investment of £50,000. Accordingly, two dummy variables are created, $bal5k_{it}$ and $bal50k_{it}$ which will capture the difference in rate paid for a balance of £5,000 and £50,000 respectively, compared to the rate of a £500 deposit (the base category).

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.

3.3. *Econometric Analysis*

To explore research question 1 the total number of months each deposit account has been available to new depositors 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 than 30 months. This variable effectively identifies 'mature' accounts and is denoted age_{it} . To avoid any truncation issues the sample analysed begins 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 accounts⁵. 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 Iyengar 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 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 firm is not a mutual and $size_i$ takes the value 1 if the firm is a small size with only a local or regional branch coverage. Also including an interaction of these binary dummy variables will capture all types of firm available in our data: large mutuals, large banks, small banks and small mutuals.

A full set of binary survey month dummy variables, collectively denoted $\mathbf{time}_t$, is generated to allow temporal variation in the underlying interest rate environment to be accommodated.

As the UK interest rate environment is dynamic it is important to examine if the firm and account characteristics, and so interest rate setting behaviour of the firm, is constant over

⁵ 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.

time. For example, the interest rates paid on new versus mature deposit accounts could differ over time, as could the impact of say a mutual (building society) account versus that offered by a bank. 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 2001⁶ 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-wide low interest rates (around 1%) and a period when some banks have required additional deposit finding (November 2008 to December 2011). A base month is chosen in each period (September 1993, April 2007 and October 2010 respectively) in the subsequent analysis, so avoiding exact collinearity of the time dummies with the constant term⁷.

A drawback of the descriptive analysis is that the results could be influenced by a number of factors such as 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, so some account needs to be taken for both prevailing macroeconomics conditions, and firm and product characteristics, to allow a measurement of *ceteris paribus* effect. The following model is proposed which allows for such an assessment:

$$rate_{it} = \beta_0 + \beta_1 bal5k_{it} + \beta_2 bal50k_{it} + \beta_3 newest_{it} + \beta_4 age_{it} + \beta_5 prods_{it} + \beta_6 bank_i + \beta_7 size_i + \beta_8 (bank_i \times size_i) + \gamma time_t + u_{it} \quad (0)$$

The model is estimated for each of the three time periods which allows for heterogeneity between the sub-periods periods in the estimated β coefficients. This is important as

⁶ 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.

⁷ This is chosen to minimise the size of the date dummy coefficient values.

coefficients may or may not be stable in all base rate regimes. The specification assumes that macroeconomic influences captured in γ are independent of the balance invested, and for ease of interpretation, restricts account specific effects to be the same across all types of firm.

An account specific unobserved fixed effect is also included, and the model estimated using cluster-specific random effects (CSRE) in the sense of Cameron and Trivedi (2005), which is valid under the same assumptions as a GLS based RE estimating procedure⁸. This is necessary since the time-series of product specific interest rates is correlated in that the level of the interest rate following a change is constrained by the rate history for that product. If a product (or suite of products) were introduced to fulfil a particular funding need, for example, the account specific effect would be positive, and identical across time for this product(s).

Given the distribution of interest rates over time is non-normal⁹ the use of standard asymptotic inference may 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.

The base firm category from which all coefficients measure differentials is a large mutual, while the base account type is a standard deposit account which is less than 31 months old, is not the newest account offered by the firm and is from a deposit account portfolio containing fewer than 5 similar accounts, with an initial investment of £500.

⁸ In effect, the error component in (0) is actually $u_{it} = \alpha_i + \varepsilon_{it}$ where α_i is the account specific fixed effect. This specification allows for other product-level fixed effects to be directly measured (such as firm type effects) and has the benefit over standard RE of accommodating within cluster heteroskedasticity. This is implemented in Stata 11.0 using the Rogers (1993) methodology.

⁹ The truncation of the interest rate distribution at 0 will heavily contribute to this non-normality.

4. 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 and Table 3 compares interest rate performance relative to whether the account is the newest in the firms' deposit account portfolio. In Table 4 deposit account performance is considered relative to firm type to ascertain if firm level heterogeneity is 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.

4.1. Descriptive statistics

Table 1 shows summary statistics within each of the three time periods, split by the three sums deposited.

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	

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 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 distribution of the data in each tier is shown by the sunflower plots¹⁰ in Figure 1, each of which is overlaid by a graph of the Bank of England base rate.

Figure 1: Tiered Interest Rate Distributions through Time

¹⁰ Flowers (coloured circles) represent density of observations, with more petals (lines within the flowers) and deeper coloured flowers representing increasingly higher densities, as shown by the legend. See Dupont and Plummer (2003) for more details.

Until recently, the bulk of observations in each tier has been below the base rate, though for higher tiers, the difference between the base rate and the modal observation is smaller, suggesting a rightwards shift in the overall probability distribution function of rates across tiers. The distribution would also appear to have become more leptokurtic through time, with a higher density of observations around the mean.

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.

In Table 2 a clear pattern emerges that the age of a deposit account is negatively correlated with the 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 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%
$\chi^2(9)$	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%
$\chi^2(9)$	2083.96			22620.16			12172.52		

Notes:

Highlighting signifies the largest percentage in each quartile across the categories 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 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 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 across the categories 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.

Table 4 records the interest rates offered on deposit accounts by quartile relative to the different types of firm. On average, small banks have deposit accounts within the bottom quartile of the interest rate distribution (Q4). Conversely, large mutuals have a greater percentage of their deposit accounts in the top quartile of the interest rate distribution (Q1).

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			
	Large mutual	Small mutual	Large bank	Small bank	Large mutual	Small mutual	Large bank	Small bank	Large mutual	Small mutual	Large bank	Small 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 across the categories 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.

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.

4.2. *Econometric evidence*

As discussed in section 3, three models are estimated to test the research questions. These models are estimated controlling for firm type heterogeneity, deposit account characteristics, and balance invested, with results reported in Table 5.

Compared to a ‘regular’ account from a product range consisting of less than 5 accounts, where the product is neither newest in the range nor more than 30 months old, a number of findings regarding product characteristics can be summarised from the results shown in Table 5. Considering research question 1 the coefficient estimates for *Age* are statistically significant and negative in all cases. This confirms the finding that the rate paid is negatively correlated with age of the account – accounts over 30 months old pay a significantly smaller rate – and that this finding is robust across time and investment sizes. This mature account ‘penalty’ when compared to a regular account is sizable, and is on average close to 0.5%. For research question 2, the *Newest* coefficient estimate is positive as expected, and is statistically significant (at the 10 percent level) in 8 of 9 cases. This confirms that the newest account in the product portfolio generally pays a rate premium, which compared to a regular account, is around 0.3%, again a sizable amount of ‘benefit’. The coefficient estimates for *Prods* (denoting if the firm offers an above average number of deposit accounts) positive in all cases, and is significant (at the 5 percent level) in 8 out of 9 cases. An account in a portfolio of more than 4 products is therefore likely to be offered at a premium of around 0.4% on average, compared to a regular account.

Table 5: Interest Rate Setting Behaviour Model Estimates

Panel A: Nov 1992 - Jan 2001	£500			£5,000			£50,000		
	Coef.	Std. Err.	P-Val.	Coef.	Std. Err.	P-Val.	Coef.	Std. Err.	P-Val.
Newest	0.2601	(0.1716)	0.130	0.2583	(0.1352)	0.056 *	0.2019	(0.1038)	0.052 *
Prods	0.7108	(0.2841)	0.012 **	0.4861	(0.2194)	0.027 **	0.0741	(0.2146)	0.730
Age	-0.3681	(0.1148)	0.001 ***	-0.3206	(0.0931)	0.001 ***	-0.1468	(0.0770)	0.057 *
Large Bank	-0.8305	(0.3292)	0.012 **	-0.9817	(0.2258)	0.000 ***	-1.0542	(0.2618)	0.000 ***
Small Mutual	0.0991	(0.2826)	0.726	0.3212	(0.1780)	0.071 *	0.3095	(0.1813)	0.088 *
Small Bank	-0.0357	(0.3255)	0.913	0.5369	(0.2799)	0.055 *	0.5926	(0.2961)	0.045 **
Constant	3.9404	(0.1616)	0.000 ***						
Differential				0.6173	(0.0969)	0.000 ***	1.4085	(0.1060)	0.000 ***
Number of Obs	33060								
R ²	0.4112								
Number of clusters	294								

Panel B: Feb 2001 - Oct 2008	£500			£5,000			£50,000		
	Coef.	Std. Err.	P-Val.	Coef.	Std. Err.	P-Val.	Coef.	Std. Err.	P-Val.
Newest	0.3366	(0.1534)	0.028 **	0.3330	(0.1464)	0.023 **	0.2510	(0.1314)	0.056 *
Prods	0.4789	(0.1468)	0.001 ***	0.5507	(0.1312)	0.000 ***	0.2961	(0.1091)	0.007 ***
Age	-0.6097	(0.1210)	0.000 ***	-0.7848	(0.1192)	0.000 ***	-0.7294	(0.1087)	0.000 ***
Large Bank	-0.8168	(0.3804)	0.032 **	-0.7812	(0.3254)	0.016 **	-0.6961	(0.3030)	0.022 **
Small Mutual	0.7938	(0.3168)	0.012 **	0.7354	(0.2234)	0.001 ***	0.5779	(0.2069)	0.005 ***
Small Bank	0.4751	(0.4995)	0.342	0.4022	(0.3868)	0.298	0.4812	(0.3677)	0.191
Constant	2.8093	(0.1540)	0.000 ***						
Differential				0.5274	(0.1059)	0.000 ***	1.1284	(0.1224)	0.000 ***
Number of Obs	39279								
R ²	0.4107								
Number of clusters	324								

Panel C: Nov 2008 - Dec 2011	£500			£5,000			£50,000		
	Coef.	Std. Err.	P-Val.	Coef.	Std. Err.	P-Val.	Coef.	Std. Err.	P-Val.
Newest	0.3486	(0.1835)	0.057 *	0.3104	(0.1444)	0.032 **	0.3587	(0.1385)	0.010 **
Prods	0.2138	(0.0936)	0.022 **	0.2182	(0.0991)	0.028 **	0.2296	(0.1013)	0.023 **
Age	-0.2994	(0.1693)	0.077 *	-0.4828	(0.1471)	0.001 ***	-0.4128	(0.1421)	0.004 ***
Large Bank	-0.2992	(0.2151)	0.164	-0.3030	(0.1967)	0.123	-0.2831	(0.1995)	0.156
Small Mutual	0.4879	(0.1685)	0.004 ***	0.5458	(0.1550)	0.000 ***	0.4435	(0.1682)	0.008 ***
Small Bank	0.4326	(0.2999)	0.149	0.3228	(0.2670)	0.227	0.2410	(0.2584)	0.351
Constant	0.4159	(0.1722)	0.016 **						
Differential				0.2243	(0.0781)	0.004 ***	0.3465	(0.0884)	0.000 ***
Number of Obs.	16478								
R ²	0.3950								
Clusters	253								

Notes: The models estimated are shown by (0), employing CSRE and a cluster-robust bootstrap. The base category is a large mutual with a product range of less than 5 accounts, where the account is less than 31 months old and is not the newest product, and there is £500 invested. In panel A, the base month is September 1993, in panel B it is April 2007 while in panel C it is October 2010. 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. A full set of monthly dummy variables is included, with coefficient values excluded from the table above, but being shown graphically in Figure 2.

Results show that in addition to *Age*, *Newness*, and number of *Products*, firm effects are influential in interest rate setting. Relative to a large mutual bank, the coefficient estimate on *Large Bank* shows that these firm set interest rates statistically significantly lower in the first two periods (about 0.7% less on average across all time periods) and the coefficient estimate on *Small Bank* shows that these banks set interest rates higher (0.4% more, on average). In the last period, the coefficient estimate on *Small Mutual* shows that these firms offer a rate premium (0.5% across on average across all time periods) perhaps suggesting that competition has driven margins lower and reduced variation in pricing across firm types. On average, these firm effects suggest that there is a distinct cost associated with limited consumer search – considering only high street firms has a negative impact on rates if only high street banks are approached, and ignoring smaller firms which do not operate on all high streets, ignores the sizable rate advantage such firms offer.

Lastly, while the differential for the constant term shows the reward for holding larger deposit balances has reduced through time (with the base rate) there is still a statically significant difference between rates offered for the at the £5,000 and £50,000 tiers, (showed by the *Differential* coefficient estimates) compared to the £500 tier (showed by the *Constant* term coefficient estimates for the base period). This is not surprising as firms are likely to be passing on the lower cost involved in administering accounts with larger balances in the form of higher rates paid on such balances.

The γ date dummy coefficients estimates which capture macroeconomic effects through time are plotted as a bar chart in Figure 2 against the prevailing Bank of England base rate. These coefficients measure the difference between the constant term in the base period with all other periods in the sample. Although these coefficients are estimated separately on the three

sub-samples, they are shown together for compactness, separated by a vertical line. Figure 2 shows that these date differentials are predominantly negative, meaning the average rate in each period is often lower than in the base period (reflected by the constant term). It is interesting to note falls in the base rate appear to lead to a corresponding future fall in the date coefficient values of larger magnitude than rises in the base rate do, suggesting upward stickiness in product interest rates. It should be noted that although the confidence interval shows most date effects are significant, though this will not change the significance of the differentials in terms of product or firm characteristics described previously. The graph confirms, as should be expected, that a primary driver in the movement of retail interest rates is the base rate.

Figure 2: Survey Month Dummy Coefficient Values

The costs of these identified interest rate setting practices are economically significant 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 (over a year these would indicate monetary benefits of £10, £75 and £750 respectively). The monetary benefits of switching accounts accruing over even a short period of time for the accounts with larger balances are large compared to the task costs involved in searching for and switching to a new deposit account.¹¹

4.3 *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. A second approach uses an econometric model to examine *ceteris paribus* effects and confirms that deposit account age, ‘newness’ and number of similar products are key determinants of deposit interest rates, with a clear role for firm type in product pricing mechanisms. Interest rate setting behaviour in the UK retail instant access deposit market is consistent, therefore, with the research questions, and so supportive of the Klemperer (1995) model.

5. **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. Two research questions are examined: do more mature accounts attract lower interest rates and

¹¹ Previous work estimating search costs in various consumer markets (see for example, Hong and Shum, 2006) shows them to be of the order of a few tens of pounds at most.

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 receive significantly lower interest rates and the newest deposit accounts offered by a firm receive significantly higher interest rates. 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 (Basel Committee on Banking Supervision 2010). While recognising the prudential benefits of low levels of deposit account switching, this market feature sits uncomfortably with the prevailing competition policy. Within the EU, competition policy indicates low depositor switching is a behaviour requiring change.

How such inequitable and complex policy situations can be addressed has provoked considerable 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 and Hoffman 2004, Erturk *et al* 2007). Such change in isolation will not resolve incentives for banks to develop perceptions that switching costs are high to benefit from customer inertia. 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 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 a change would 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 in the manner observed in this study. To conclude this is clearly an area for further research both internationally and within other banking markets.

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