Paying Attention to Banks: Evidence from Offshore Deposits

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Abstract

This paper studies whether retail bank depositors monitor and discipline banks, and finds that they do it intermittently. Using Google search volumes to proxy for attention to banks and exploiting a novel and confidential database on deposit rates, we find that riskier banks are not punished through higher deposit rates on average. However, when depositors pay attention to banks, riskier banks must offer higher deposit rates. This mechanism is significant irrespective of deposit insurance, but its power increases with the credibility of insurance. Our results show that attention to bank risk matters over and above bank risk itself.

KEYWORDS: Liquidity management; market discipline; bank regulation.

JEL CODES: G21; G32.

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Traditionally, the banking literature has assumed that there are two types of retail depositors; insured and uninsured. A key difference between them is that insured depositors lack incentives to monitor banks, therefore they are often described as *inattentive*. As a result, riskier banks with insured depositors are not disciplined through higher deposit funding costs, creating moral hazard (Hanson et al. (2015); Egan et al. (2017)). The existence of *inattentive* depositors has three important corollaries. First, it explains the ability of banks to fund illiquid loans with demandable deposits. Second, it creates the need for micro-prudential bank regulation. Third, it explains the preferential treatment of retail deposits in recent liquidity regulation and the bail-ins in Cyprus or Italy.[1] Yet, concrete evidence of the effect of depositors' attention and deposit insurance on banks' funding costs remains elusive, potentially due to the empirical challenges this endeavour entails.

In particular, there are two empirical challenges that need to be overcome to answer these questions. The first is that there are difficulties in measuring latent factors such as attention. The second is that in general depositors self-select into being insured or not, therefore any attempt to estimate the effect of insurance on outcomes such as market discipline will be biased. In this paper, we introduce two novelties to overcome these challenges. First, to measure depositors' attention we deviate from the traditional banking literature and borrow features from the asset pricing literature. Second, we exploit a peculiarity of the United Kingdom that provides us with a close-to-ideal setting to study the effect of deposit insurance and attention on market discipline.

Our first innovation is the introduction of a measure of attention to the study of market discipline. Following the asset pricing literature, we measure attention towards banks using online search frequencies.[2] We find that attention varies over time, and that it cannot be fully

[1] Hanson et al. (2015); Basel Committee for Banking Supervision (2012); Berger and Turk-Ariss (2015).

[2] The scarcity of research on attention in banking contrasts with rich evidence for the role of time-varying attention for household finance and asset prices (Da et al. (2011); Drake et al. (2012); Ben-Rephael et al. (2017), among others).

explained by observable factors such as media coverage or risk factors. This finding is non-trivial, as it should cause discipline to be intermittent. We test this by exploiting novel deposit rates and inflows data, and find evidence that supports the notion of intermittent discipline. Riskier banks are not punished in normal times; but the more attention a riskier bank attracts, the higher the deposit rates it must offer to attract or retain deposits. We find that this effect is not limited to headline-grabbing shocks –like the run on Northern Rock– or the broader crisis period. and it is not subsumed by the negative media coverage that precedes surges in attention, nor by the deposit outflows that follow them.

Our first set of results adds to existing accounts of the relationship between depositors and banks. We show that depositors' attention and their bearing on banks varies over time, and that attention affects discipline over and above changes to risk. This attention can be driven by news from media or financial markets about a bank, but also by factors orthogonal to financial markets. While several of the peaks in attention to a bank in our data are associated with financial events, we also find multiple cases in which events unrelated to financial news draw attention to a bank.[3] This finding contrasts with important financial intermediation theories where insured depositors are assumed to be either *sleepy* (inattentive to bank risk) or *awake*, and our finding on intermittent discipline is analogue to the evidence that stock prices only reflect fundamentals when investors are attentive (Da et al. (2011)). It illustrates the usefulness of incorporating an explicit measure of depositor attention in tests of depositors' discipline.

Having established that attention and discipline are intermittent, we test whether deposit insurance affects discipline by introducing the second novelty of the paper. We exploit a political quirk in the United Kingdom that makes the selection into insured deposits plausible orthogonal to the factors that affect attention and market discipline. In our setting, a large number of banks

[3]This findings are comparable to those in Hirshleifer and Shumway (2003), Goetzmann et al. (2014), and Edmans et al. (2007) find significant effects of factors such as sunshine, cloudier days, and sport outcomes on financial markets.

offer the same deposit product in the UK ("onshore") and in the British Crown Dependencies (Jersey, Guernsey, and the Isle of Man; "offshore"). The Dependencies' legal and institutional framework is largely similar to the UK, and the majority of offshore banks and depositors are based in the UK. Crucially, however, deposit insurance coverage differs across these jurisdictions. By exploiting this peculiarity, we show that intermittent discipline is not limited to uninsured deposits. However, it is more powerful where insurance is weaker.

A potential concern for this interpretation is that offshore depositors might be more sophisticated, and thus more aware of deposit insurance and bank risk. We first review anecdotal evidence that speaks against the common perception that offshore depositors are richer individuals. Second, we investigate the role of sophistication and wealth more formally by repeating the analysis for deposit products with different minimal deposit amounts, and find similar results.

Our second set of results shows that active attention to risk drives market discipline, even in the presence of deposit insurance. This result might help to reconcile opposing or inconclusive results obtained by numerous studies looking for manifestations of market discipline and the effect of deposit insurance on discipline.[4] While papers such as Calomiris and Powell (2001) and Martinez Peria and Schmukler (2001) find evidence of market discipline, other papers such as Ben-David et al. (2015) find the opposite result. A potential explanation for the opposing findings could be that deposit insurance in emerging markets is not credible, thus depositors still monitor and discipline banks. However, Berger and Turk-Ariss (2015) find evidence of market discipline in both the United States and the European Union.

This paper contributes to several strands of literature. First, it contributes to the literature

[4] Analyses of the relationship between accounting-based bank risk measures and deposit rates include: Hannan and Hanweck (1988); Avery et al. (1988); Gorton and Santomero (1990); Flannery and Sorescu (1996); Park and Peristiani (1998); and Ben-David et al. (2015). Cook and Spellman (1994), Saunders and Wilson (1996), Calomiris and Mason (1994), Goldberg and Hudgins (2002), Martinez Peria and Schmukler (2001); Cubillas et al. (2012); Hasan et al. (2013); Bennett et al. (2015); Acharya and Mora (2015); and Lamers (2015) explore depositor discipline during crisis episodes. Iyer and Puri (2012) and Kelly and O Grada (2000) analyse individual bank-run episodes. Studies focused on individual bank distress include: Billett et al. (1998), Goldberg and Hudgins (2002), Davenport and McDill (2006); Martin et al. (2017); Iyer et al. (2016); and Brown et al. (2013).

on investors' attention, where prior papers have studied the behavior and drivers of stock-market investors' attention and its effects (Barber and Odean (2008); Da et al. (2011), Andrei and Hasler (2014); Yuan (2015); Sicherman et al. (2015); Kacperczyk et al. (2016), Cziraki et al. (2017), among others). These papers find that swings in attention affect trading volumes, share prices, and volatility. To the best of our knowledge, this paper provides the first microeconomic evidence that the extent to which depositors discipline bank behavior fluctuates along with the attention they pay to banks.

Our findings also contribute to the literature on banking and deposit insurance. In the context of banking, the richness of the data on internet search volumes has been largely unexplored to date. Our focus on attention leads to a new result: even in the presence of deposit insurance, market discipline holds in times of high attention to bank risk. Irresberger and Weiss (2015) pursue an idea similar to ours, but only consider aggregate measures of attention and deposits. Thanks to the granularity of our data, we can test the effect of attention on discipline for each bank, isolating confounding macroeconomic events.

Our strategy to identify the role of deposit insurance also departs from the existing literature. Earlier studies have used cross-country differences in insurance coverage, the staggered implementation of deposit insurance schemes across states within a country, or crises episodes. One potential problem with these studies is that the implementation of a deposit insurance scheme is not exogenous. Our unique setting and granular dataset allow us to compare deposit rates for a same product category offered by a same bank at the same time period, and to distinguish otherwise identical insured and uninsured deposits. This leads us to conclude that a form of discipline does exist, particularly so when deposit insurance is weaker.

In summary, our paper makes three key contributions. First, we show that depositors are intermittent monitors, a finding that contrasts traditional banking theory. Second, we show that attention is a key factor driving discipline. Third, we show that depositors discipline banks even

in the presence of deposit insurance.

1 Institutional Background

We focus our study on the UK from 2007 to 2015 for three key reasons. First, the UK banking system is large[5] and underwent a severe shock in 2007-2008 with the run on Northern Rock, the bailout of Lloyds and RBS, and the collapse of UK branches of Icelandic banks. Second, the Bank of England collects data rare in other datasets, such as deposit balances information broken down by types of depositors. Third, the UK also provides variations in deposit insurance across time and jurisdictions (onshore and offshore); this allows us to identify the role of insurance.

1.1 The UK Banking System

The UK financial system is one of the largest. By 2014, UK financial institutions' assets amounted to £13 trillion (£20 trillion with derivatives), 61% of which were held by commercial banks and building societies.[6] As of February 2017, more than 300 commercial banks and 40 building societies were licensed to operate in the UK. Out of those, 156 commercial banks were incorporated in the UK, 77 in the European Economic Area, and 79 elsewhere.[7] In contrast, all the building societies were incorporated in the UK. For brevity, hereinafter we refer to both banks and building societies as "banks".

The current UK deposit insurance scheme was introduced in 2001 by the newly created Financial Services Compensation Scheme (FSCS).[8] It covered deposits up to £35,000 (the first

[5] In 2014, UK banks and other financial institutions total assets amounted to about twelve times UK's GDP, a ratio much higher than that of other countries such as France and Japan, with ratios of five and seven, respectively (Burrows et al. (2015)).

[6] Like US savings and loans, building societies focus mainly on deposit-taking and mortgage lending.

[7] Foreign banks are authorized to accept deposits through a branch or subsidiary in the UK.

[8] Deposit insurance was first implemented in the UK under the 1979 Banking Act in response to the European Economic Community Directive 77/780/EEC and the Secondary Banking crisis in the early 1970s. The insurance covered 75% of the deposited amount, up to £10,000, and with maturities up to five years. In 1987, the limit was increased to £20,000, with a similar covered percentage. In 1995, coverage was extended to protect 90% of

£2,000 tranche was fully guaranteed, and the remaining £33,000 were covered to 90%). The maximum deposit amount protected was revised upwards three times during the 2007-2009 crisis, raising the total amount payable and increasing the coverage from 90% to 100%. The limits were modified thereafter, as a response to changes in the Sterling to Euro exchange rate (see Table 1). Interestingly, the protection offered is per UK deposit-taking license, and not per account or bank. For instance, a depositor with two accounts in two banks operating under different licenses is protected up to £170,000. If the two banks operate under the same license (for instance the Bank of Scotland and Halifax), the insurance would cover only to £85,000. Since its inception, the FSCS has paid out over £26 billion to over four million individuals, most notably after several banks like Northern Rock and Bradford & Bingley failed during the crisis.

1.2 The offshore Crown Dependencies

The Bailiwicks of Jersey and Guernsey –located in the English Channel– and the Isle of Man –in the Irish Sea– are autonomous jurisdictions that are geographically close to England (Figure 1) and formally owned by the British Crown. However, they remain self-governing territories and are not part of the UK or European Union. They have independent legislative and executive powers and authorities, including for banking supervision. These jurisdictions are not represented in the UK Parliament, and their relationship with the UK is exclusively through the Crown, the Queen being the formal head of state. Still, the Dependencies' legal systems are based on English common law, their currencies are pegged to the pound sterling, and their inhabitants are British citizens. In addition, their banking systems are closely tied to the British banking system.

eligible deposits.

1.3 The UK and Crown Dependencies Banking Systems

Each Crown Dependency has its own banking system, with multiple characteristics that are key for our study of the effect of deposit insurance on market discipline. First, the UK and Crown Dependencies banking systems are closely tied. For instance, 30 of 47 banks operating in the Isle of Man by March 2007 were UK-based. Second, a large fraction of offshore deposits (those held in one of the three Crown Dependencies) is held by small retail depositors, the focus of our study. For instance, as of 2007 £50.1 of £59.2 billion in Isle of Man deposits were held by retail customers[9], and the numbers in the other Dependencies are similar.[10]. Moreover, 69% of these depositors have balances lower or equal to £20,000.[11] Finally, UK-based depositors account for a large fraction of deposits in Dependencies; for instance, UK depositors held 27.4% of all retail deposit balances in Jersey, against 7.6% for Jersey residents.[12] Similarly, UK depositors held 32% of Isle of Man non-bank deposits in 2007, against 31% for local residents.[13] Overall, these figures suggest that Crown Dependencies' banks are heavily operated by UK banks for the benefit of UK-based retail depositors. Consistent, offshore deposit products are reported alongside onshore deposit products in financial advice magazines for retail depositors like Moneyfacts.

UK retail depositors hold offshore bank accounts for multiple reasons. One benefit for holding an offshore deposit is that of convenience, since some of the accounts allow depositors to transact in multiple currencies.[14] Other reasons include regulatory issues. Following anti-terrorism and anti-money-laundering regulations, an individual requires a UK domicile to open

[9] Isle of Man Financial Supervision Commission Annual Report 2006-2007

[10] In Jersey, there were 48 banks by 2007 - 17 of them UK-based - with total deposits of £212.3 billion. In Guernsey total deposits amounted to £119.1 billion, of which £92.7 were held by individuals and companies. By 2007, 47 banks operated in Guernsey, of which 18 were UK-based.

[11] Isle of Man: Financial Sector Assessment Program Update - Financial System Stability Assessment, International Monetary Fund, 2009.

[12] Jersey Financial Commission, 2007

[13] Isle of Man Financial Supervision Commission's 2006-2007 Annual Report.

[14] For instance, see e.g. http://www.thisismoney.co.uk/money/saving/article-2266425/Five-best-offshore-current-accounts.html, https://moneyfacts.co.uk/offshore/offshore-bank-accounts/.

a bank account onshore. Thus, offshore depositors also include UK citizens that happened to work abroad and are not UK residents anymore. Despite common perceptions, there are no tax advantages for offshore retail depositors with offshore accounts.[15]

1.4 UK Onshore and Offshore Deposit Insurance

The previous subsection shows that the banking system in the UK and its Crown Dependencies are closely related. However, a subtle difference is key for our study. Depositors in the Crown Dependencies do not enjoy the same deposit insurance that depositors in the UK have. In this subsection, we explain the differences between both insurance schemes.

While the UK implemented the first deposit insurance scheme in the late 1970s, the Crown Dependencies did not have one until after the financial crisis. Guernsey was the first one to do so, on November 26th, 2008. It covered up to £50,000 per qualifying deposit and bank, with total payout capped at £100 million in any five year period.[16] The Jersey insurance was launched on November 6th, 2009, with a similar coverage and payout cap.[17] Then, the Isle of Man introduced its scheme on October 23rd, 2010. Its coverage is similar, but does not feature an explicit payout cap. However, the scheme's websites warns that "...in the event of a very large covered bank failing the Deposit Compensation Scheme is unlikely to be in a position to provide the full amount of compensation due to you in a timely manner.[18]

Comparing the £100 million payout caps to total deposit balances suggests that this warning might equally apply to the insurance funds of the other two Dependencies. In Guernsey, there were £39 billion in retail deposits split across 29 banks in 2015. In Jersey, 26 banking institutions held total deposits over £130 billion in 2014. These numbers raise a question of whether £100

[15] While taxes on interest earnings are automatically deducted from onshore deposit accounts, these taxes are perceived on an annual basis on offshore balance.

[16] http://www.dcs.gg/about-the-schemehttp://www.dcs.gg/about-the-scheme

[17] www.gov.je/Industry/Finance/DepositProtection/Pages/Overview.aspx

[18] https://www.iomfsa.im/consumer-material/isle-of-man-depositors-compensation-scheme-dcs/, accessed on August 2nd 2018.

million would suffice to insure offshore deposits as promised by their authorities.

An additional risk is that the Dependencies' insurance is not pre-funded, unlike the UK FSCS. This means that offshore authorities would first need to collect insurance contributions from banks after a default event. The "up-streaming" of offshore deposits might further exacerbate this risk. Because deposit balances held offshore largely exceed local investment opportunities, the bulk of offshore deposits are transferred back to the UK parent balance sheet.[19] Thus, banks' assets in the Crown Dependencies largely consist of intra-bank loans. The collapse of Icelandic banks in 2008 illustrated that offshore authorities might struggle to force banks to repatriate liquidity into the Dependencies in order to repay offshore depositors.[20] The case of Northern Rock further makes it clear that UK regulators are unlikely to step in to repay offshore depositors in an instance where offshore insurance proved insufficient to address the failure of a UK bank, since the FSCS does not cover offshore deposits, even if held with a UK bank. [21]

This section shows that while the onshore and offshore banking systems are closely related in terms of the banks that operate in them and the customers they serve, one key difference is the coverage that the respective deposit insurance schemes provide to depositors on each jurisdiction.

2 Data, Sample, and Variable Definitions

Our analysis uses five main sources of data. In the following subsections, we describe them.

[19] Jersey Finance estimates that £120 of £200 held in Jersey banks is up-streamed to UK banks

[20] http://www.telegraph.co.uk/finance/personalfinance/savings/3216489/Financial-crisis-Britains-offshore-investors-stand-to-lose-hundreds-of-millions-of-pounds-on-the-Icelandic-banks-meltdown.html

[21] The Isle of Man webpage reminds that "Deposit compensation schemes in the UK, Ireland or elsewhere do not cover deposits with banks or building societies in the Isle of Man". http://www.iomfsa.im/investor/depcomp.xml

2.1 Deposit rates

Our deposit rates data is collected on a daily basis by the Moneyfacts Group and published on its website and monthly magazine. This periodical was first published in 1988 to facilitate comparison across a large number of retail deposit and mortgage products. The data we obtained reports daily rates for over 41,000 deposit products offered in mainland UK and offshore by 240 different banks between January 2007 and August 2015. Since other measures used in our tests have a weekly frequency, we use rates posted on each Monday in the main regressions.

For each deposit product, Moneyfacts reports rates offered for up to seven buckets of minimum deposit amounts: £1,000, £,5,000, £10,000, £25,000, £50,000, £100,000, and £125,000. Our main analysis focuses on rates for £10,000-minimum deposits as this category has the largest number of observations overall. In addition to rates, the data reports the following product characteristics: product type (savings account, cash ISA, variable, etc.), interest rate type (variable or fixed), interest rate payment frequency, term (sight, time, etc.), withdrawal notice requirement, and access type (branch, or internet/telephone-only). We use each of these characteristics and combine them to group products into categories; this allows us to trace identical products across time – even if their name changes– and to compare their rates across banks through product-time fixed effects.

Table 2 describes the product characteristics (columns 1 and 2), and the number of products for a given category onshore and offshore (columns 3 and 4). We categorize products into [492] unique combinations of characteristics. As an illustration, one of these categories includes sight deposits with a variable rate, monthly interest payment, no withdrawal notice, and branch access, offered by different banks.

2.2 Bank ownership

Moneyfacts classifies deposit products by bank. However, a depositor is ultimately exposed to the default risk of the bank that owns the deposit taking license, or parent bank. In order to identify each banks' parent, we use the Who Owns Whom tables published in the monthly Moneyfacts magazine. These tables provide information on groups of banks operating under a same deposit-taking license. For instance, AA Financial Services, Aviva, BM Savings, and Bank of Scotland all operate under the license of Lloyds Banking Group. Thus, depositors in those banks are subject to the default risk of the Lloyds Banking Group. This information allows us to group the 240 banks in our database into 106 different banking groups. For robustness, we trace mergers and acquisitions to identify changes in the licenses under which each bank operates by manually tracking changes in the Who Owns Whom tables across time.

2.3 Bank risk and controls

To measure the risk a depositor is exposed to, we use data from the quarterly reports filed by all UK banks regulated by the Bank of England's Prudential Regulation Authority (PRA). A potential hurdle is that bank risk is inherently multi-dimensional, and different depositors can put weight on different risk indicators (Berger and Turk-Ariss (2015)). Given the evidence from the 2007-2009 global financial crisis, we focus our attention on proxies for funding liquidity and solvency risk. Funding liquidity risk imposed strains on banks' deposit-taking during the crisis (Acharya and Mora (2015)); this exposes depositors to the risk of delays to insurance payouts or outright bank default, as the case of Northern Rock illustrates (Shin (2009)). Solvency risk exposes depositors to the risk of bank failure, for instance if bank capital is insufficient to cover loan losses (Berger and Bouwman (2013)).

Our preferred measure of funding liquidity risk, *Stable Funding*, is the ratio of a bank's total liabilities in the form of deposits held by individuals. This measure exploits the Bank

of England's "AL" form, which breaks down a bank's deposit balances into type of holders. The idea behind the measure is that individual deposits are typically less flighty than wholesale deposits, as demonstrated during the crisis (Cornett et al. (2011)) and embedded in Basel III liquidity requirements (BIS, 2013). A higher ratio of deposits by individuals to total assets thus reflects a lower liquidity risk. For robustness, we explore alternative measures of Stable Funding.

Our preferred measure of solvency risk, *Capitalisation*, is the ratio of Tier 1 capital to total assets, as is standard in the literature. In addition -and to control for other dimensions of bank risk- we include the usual CAMEL metrics: Assets Quality (Provisions over Assets and Concentration of Loan Portfolios), Management Capability (Assets Growth), Earnings (Return on Assets), and Liquidity (Cash to Assets). Moreover, we control for size, as measured by the log of total assets.[22] One challenge associated with balance-sheet measures is that they are updated at quarterly frequency. Because our measure of attention varies at a weekly frequency, we alternatively measure bank risk using weekly CDS prices collected from Bloomberg. One drawback for this approach is that CDS prices exist for a small subset of banks.

While the Bank of England's data is confidential, it is important to note that retail depositors can retrieve information similar to our two preferred risk metrics from banks' own reports. For instance, the 2006 Annual Report by Northern Rock reports both a wholesale funding and capital ratio. While it is unlikely that these proxies reflect the exact same set of information that individuals retrieve when searching information on a given bank in Google, our identification only requires that these metrics are correlated with the information set available to retail depositors.

[22]Larger banks may face better access to alternative sources of funding such as wholesale and interbank deposits. This is for instance because larger banks are less opaque and thus face fewer frictions in external finance markets (Stein, 1998). Larger banks may also benefit from an implicit Too-Big-Too-Fail guarantee (Imai, 2006, Jacewitz and Pogach (2018)) or may have better operating technology (Park and Pennacchi (2008)).

2.4 Deposit Flows

Deposit flows data is collected monthly by the Bank of England from different banks using the Effective interest rates (ER) form. The sample of banks is updated regularly so that it covers at least 75% of total deposit-taking activities in each sector of the UK economy. Therefore, the largest UK banks are always included, but the coverage of smaller banks might change over time. The number of banks reporting at each month varies between 20 (September 2015) and 30 (September 2004). There are 26 reporting banks for the average month.

The ER data reports deposit balances, interest flow, and annualized interest rates for 49 categories of depositors or depositor-type-maturity combinations. For our analysis, we first aggregate deposit balances across the following sectors: individuals; government; public firms; financial firms; and private firms. Table 3 shows that individuals are the biggest source of deposit funding overall, with 51% of aggregate monthly balances on average, followed by financial firms (40%), and private firms (15%). Second, we break down deposits by individuals across main types of deposits. Within individual deposits, sight deposits (including current accounts) account for 64% of aggregate individual deposit balances on average, followed by fixed-maturity deposits (19%) and deposits redeemable at notice (17%).

2.5 Depositors' Attention

Following Da et al. (2011), we use data from Google Trends to proxy for depositors' attention. The website reports an index of the relative popularity of searches for a given term or combination of terms, and search volume data can be broken down by geographies. We thus focus on searches by UK-based individuals only.

Data is available at daily, weekly or monthly frequency depending on search volumes. For instance, daily data is available for common search terms like "banks", but data for less usual combinations like "Skipton Building Society" is only weekly. Thus, our study is limited to weekly

data. The data is normalized over the 0-100 interval, with 100 corresponding the maximum search query share during that period. Query shares are defined as the ratio of searches for a given term, relative to all searches. Therefore, it is an indicator of relative popularity; it can decline even if absolute level of attention remains constant. Numbers are normalized to 0 when search volume falls below a minimum threshold.

Figure 2 plots the search volumes for the term "Deposit insurance". The index peaks during salient episodes of the UK crisis, like the run on Northern Rock or the nationalisation of Lloyds and Royal Bank of Scotland. This pattern indicates the data can help capturing active searches for information about bank risk; in contrast, potential alternative measures like the number of news articles on a given bank may be misleading, because it is unclear whether these articles are actually read at all (Barber and Odean (2008)).

We collect data for each bank in our database from 2007 to 2015. We focus on search terms that unambiguously refer to a given bank. For instance, we retrieve search data for the term "Derbyshire Building Society" and not "Derbyshire", since the latter would likely capture searches for information on the Derbyshire county. Following Da et al. (2011), we transform raw data into a measure of abnormal attention for a given bank, measured as the (log) search frequency for bank i on week t, minus the (log) of the median search frequency over the previous four weeks for that same bank.

$$AbnAttention_{i,t} = log(frequency_{i,t}) - log(median\ freq_{i,[t-1w,\ldots,t-4w]}) \tag{1}$$

Figure 3 illustrates the behavior of our measure during the 2007 run on Northern Rock, a bank that relied heavily on wholesale funding. On August 9th, 2007, interbank money markets froze, causing a large funding gap for Northern Rock; on August 13th, the bank informed the UK Financial Services Authority that it had lost access to funding, but this information was not

disclosed publically. Consistent, the Google Search index does not show any abnormal search activity on that day. On September 14th, however, the Bank of England publicly announced the provision of emergency liquidity assistance to Northern Rock; this triggered a bank run, as illustrated by the wide media coverage of lines outside branches. The Google Search index reaches a peak on that day, consistent with attention to the bank's risk shooting up. Importantly the index does not react at all during the preceding days, despite the run on the bank's wholesale funds being so severe that the bank had depleted its entire liquid asset buffer before the retail run even started (Shin (2009)). This suggests that our index is not conflated by the attention of wholesale depositors.

3 Attention and Deposit Flows

In order to validate our interpretation of the Google search data, we start by exploring the link between attention, bank risk, and inflows and outflows of deposits from UK banks. While deposit flow data is coarser than our deposit rate data –it does not distinguish between deposit size and jurisdiction (onshore vs. offshore)– and it covers only a subset of all UK banks at monthly frequency, high-level deposit balance dynamics can help clarifying the information contained in our measure of attention, and the mechanism through which swings in attention might impact deposit rates and volumes.

In particular, in this section we seek to verify that our attention measure (i) captures the behavior of retail depositors and not that of other bank creditors such as wholesale depositors, and (ii) is associated with searches or concern about the riskiness of banks, as opposed to more common searches such as branch opening times. To do so, we run the following model:

$$\Delta DepositBalance_{i,t} = \beta_1 Risk_{i,t-1} + \beta_2 Attention_{i,t-1} + \beta_3 Risk_{i,t-1} \times Attention_{i,t-1} + \delta_t + \theta_i + \epsilon_{i,t} \quad (2)$$

where $\Delta DepositBalance_{i,t}$ is the log of the first difference of deposit balances in a given bank and month. $Risk_{i,t-1}$ is a measure of this bank's funding liquidity (or capital) risk, and $Attention_{i,t-1}$ is the abnormal attention received by this bank. We include two sets of fixed effects. First, time fixed effects (δ_t) to control for common shocks to deposits. Second, bank fixed effects (θ_i) to control for bank specific characteristics. Our main interest is in β_3; this coefficient measures how the relationship between risk and deposit rates varies with attention.

To verify that our measure of attention captures that of retail depositors, we estimate the equation above separately for five categories of depositors (individuals; government; public firms; financial firms; and private firms), and three deposit types held by individual depositors (sight deposits, fixed deposits, notice deposits). We cluster standard errors by banks. Table 4 reports the results.

The first key finding is that *Attention* has a statistically significant effect on changes in individual deposit balances, but not on deposit volumes held by firms, banks, or government authorities. This supports the notion that Google searches capture the behavior of individuals (or retail depositors), since firms or banks plausible use other sources of information. Da et al. (2011) similarly find that Google search for US stock tickers capture information demand by relatively unsophisticated retail investors. This finding also mitigates concerns around omitted variable biases, for instance the possibility that Google searches are a symptom of broader swings in attention by all types of agents including wholesale depositors. In this case, we should find an effect of attention on wholesale deposits. Having found no effect supports the idea that wholesale depositors use other sources of information.

A second key finding is that (i) increases in *Attention* are associated with a decrease in

individual deposits balances, and (ii) this effect is weaker for banks with lower funding liquidity risk (more Stable Funding). The riskier a bank, the higher the effect of surges in attention on outflows of deposits by individuals. Specifically, a one-standard deviation shock in the level of attention (+34%) results in a bank in the lowest decile in terms of funding stability to lose around 2% of deposits made by individuals.

Overall, while these results are indicative only, they support our usage of Google search data as a proxy for retail depositors' demand for information about a bank's risk. In addition, they provide evidence of the existence of market discipline via withdrawals of deposits.

3.1 Newspaper Coverage

A potential concern is that the our measure of *Attention* might be capturing the supply of information by the media. In order to control for supply, we construct a weekly index of newspaper coverage for each bank in our sample. To this end, we retrieve from Factiva all the newspaper articles that mention each of the banks in our sample between 2007 and 2015. We keep articles published in the UK and discard articles mentioning the bank name but not related to banking news.[23]

For each article, we follow the literature and construct an index of tonality by using the dictionary made available by Loughran and McDonald (2011), the standard in the finance literature. The dictionary provides a list of words with positive and negative connotation. For each article a on bank i published at date t, we compute:

[23]For instance, Barclays bank sponsored the English football Premier League for several years. Thus, many articles mention Barclays in the context of sports events. In order to filter out these articles, we drop articles containing a series of sports-related words like "football".

$$Article\,Negativity_{a,i,t} = \frac{Count\,Negative\,Words_{a,i,t} - Count\,Positive\,Words_{a,i,t}}{Count\,Words_{a,i,t}} \quad (3)$$

We aggregate information at the bank-week level by averaging the index of *Article Negativity* for all the articles that mention one bank during a week. To account for the number of articles that are supplied within a week, we then construct our preferred newspaper coverage index as follows:

$$Negative\,Coverage_{i,t} = Mean\,Article\,Negativity_{i,t} \times Count\,Articles_{i,t} \quad (4)$$

The index weights the number of articles by their negativity; the more articles, and the more negative the tone in these articles, the higher the Negative Coverage index the bank receives. For robustness, we also explore Mean Article Negativity and Count Articles as separate indicators of newspaper coverage.

3.2 The Drivers of Attention

Given our main interest, we concentrate on determinants of attention that vary by bank and time, as opposed to aggregate drivers of attention such as policy rates. Following Da et al. (2011), we start by exploring contemporaneous correlation between *Attention* and our indicators of banks' coverage in the media and financial markets. Table A1 shows that *Attention* is positively correlated with measures of newspaper coverage and sentiment, as well as with CDS prices. Periods of heightened online searches thus coincide with times in which the media pays increased attention and displays more negative sentiments towards banks, and in which investors demand higher credit risk premia against banks. However, the correlations are relatively low; this suggests that *Attention* is not subsumed by confounding measures.

To formally test this assertion and to better understand the lead-lag relationship between these variables, we estimate a panel vector autoregressive (PVAR) model using weekly data for three key variables of interest: Attention, Negative Coverage, and CDS. We include four lags for each variable, and impose no restrictions to estimate the coefficients. In addition, we apply the standard Helmert transformation to eliminate any time-invariant effects.

We report the results in Table A2. For brevity, we only report the coefficients for the first lag of each explanatory variable. We find that *Attention* lags behind Negative Coverage and CDS. More specifically, the coefficients reported in Panel A show that Attention responds positively to one-week lags of negative newspaper coverage and CDS prices. By contrast, newspaper coverage (Panel B) and CDS prices (Panel C) do not respond to lagged Attention, suggesting that it is unlikely that depositors are informed ahead of media or financial markets. In addition, Panel C shows that CDS prices do not respond to media coverage. These results are consistent with two potential alternatives. First, that financial markets absorb information faster than media and retail depositors. Second, that they have private information. This finding is analogue to evidence that institutional stock market investors' attention leads retail investors' (Ben-Rephael et al. (2017)).

We then focus on the drivers of attention and ask whether *Attention* only surges during headline-grabbing episodes of panic or bank defaults. In our sample period, the only established case of retail depositors' run during is the September 2007 run on Northern Rock. We find that our measure of *Attention* does not peak for any other bank in our sample on this day. In general, we find that *Attention* reaches its peak for several banks during the fall of 2008, consistent with heightened general concern about bank risks in that period. However, for the majority of banks in our sample the maximum search query is observed outside of the August 2007-December 2008 period. To better understand the drivers of attention, we manually look for anecdotal evidence explaining the observed peaks, and find stories unrelated to immediate stress for a majority

of occurrences. These stories range from strategic plan announcements to three instances of computer glitches. These patterns suggest that surges in *Attention* can be driven by events unrelated to systemic banking crises. In the regressions below, we establish more formally that our key results are not specific to the crisis period.

4 Attention, Bank Risk, and Deposit Rates

Having established the usefulness of Google data as a proxy for retail depositors' attention to banks, we move on to our main test of the relationship between bank risk and deposit rates, and how this link varies with depositors' attention. Our empirical specification is:

$$Rate_{i,p,j,t} = \beta_1 Risk_{i,t-1} + \beta_2 Attention_{i,t-1} + \beta_3 Risk_{i,t-1} \times Attention_{i,t-1} + \\ + \gamma Controls_{i,t-1} + \delta_{p,t} + \theta_{i,j} + \epsilon_{i,p,j,t} \quad (5)$$

where $Rate_{i,p,j,t}$ is the rate offered by bank i for product p in jurisdiction j and week t. $Risk_{i,t-1}$ is a measure of this bank's (liquidity or capital) risk, and $Attention_{i,t-1}$ is the abnormal attention received by this bank, lagged by one week. Controls include the usual set of CAMEL variables used in the literature. Our main interest is in β_3; this coefficient measures how the relationship between risk and deposit rates varies with attention.

We estimate the model with Ordinary Least Squares; the standard errors are clustered at the bank level. We include two sets of fixed effects. First, product-time fixed effects ($\delta_{p,t}$) to control for changes in demand for a given product over time. For instance, higher demand for higher-yielding products when the yield curve increases, or higher demand on the part of banks for products with longer withdrawal notice in times of systemic liquidity stress. These fixed effects also absorb time-invariant product characteristics, as well as common time trends and

shocks such as periods of aggregate stress. Second, we include bank-jurisdiction fixed effects ($\theta_{i,j}$) to control for time-invariant differences across banks (organizational structure, geographic focus, offshore presence, etc.) and jurisdictions (bank-location clientele characteristics, etc.), and for a bank's average behavior in a given jurisdiction.

4.1 Baseline Results

We first test whether bank risk is associated with higher rates on average, consistent with the existence of depositors discipline. To do so, we run the model above without controlling for *Attention* and its interactions. Table 5 reports the results. We find no indications of a significant depositor discipline mechanism. The coefficients on *Stable Funding* has no statistically significant relationship with deposit rates. Similar to Ben-David et al. (2015), we find the coefficient on *Capitalisation* to be positively correlated with deposit rates, meaning that better capitalized banks pay higher rates. In Column 2, our results suggest that CDS spreads –a timely proxy for banks' risk– is not significantly correlated with deposit rates either.

Next, we introduce our measure of *Attention*. The results are reported in Columns 3 and 4, where we find that the parameter estimate for stable funding risk remains insignificant. By contrast, the parameter estimate for Attention is positive and statistically significant. In other words, banks receiving more attention from retail depositors offer higher rates on average, after controlling for risk. This is also the case when controlling for a given bank's newspaper coverage, as shown in Column 4. These findings suggests that the relationship between attention and deposit rates is attributable in part to changes in the *demand* for information only.

At face value, the positive relationship between Attention and deposit rates further mitigates the concern that our measure of attention captures searches for information like branch opening times and location, available deposit products, or electronic-banking online address. If these channels dominated empirically, the correlation between deposit rates and *Attention* would be

zero.

In Table 6 we report the results of our preferred specification, which includes interaction terms between *Attention* and proxies for bank risk. The key finding in Column 1 is that the parameter estimate for *Attention* remains positive and significant, but those for the interactions between *Attention* and bank risk are negative and statistically significant. That is, surges in attention coincide with banks increasing deposit rates on average, but this mechanism is weaker for less risky banks (i.e. banks with higher Stable Funding and Capitalisation ratios). This finding suggests that the link between attention and deposit rates is not indiscriminate. Instead, our results are consistent with the notion that increases in the demand for information about a bank leads to a stronger disciplining mechanism for riskier banks.

In Column 2, we find that the coefficients for *News* and its interaction with bank risk are statistically insignificant. This is consistent with studies finding that published information does not necessarily affect share prices as long as investors do not pay attention to it (Huberman and Regev (2001)). Consistent with this interpretation, the results in column 3 show that controlling for news supply does not change the parameter estimates for *Attention* and its interaction with bank risk proxies. In other words, while the demand and supply for information might be correlated, the former dominates empirically. From these results, we conclude that the attention-driven depositor discipline mechanism is partially attributable to changes in the *demand* for information only.

Finally, the results reported in columns 4 to 6 show that our key conclusion is robust to using a higher-frequency risk proxy in the form of individual bank CDS prices. The parameter for *Attention* x CDS is positive and statistically significant; this indicates that surges in attention are associated with increases in deposit rates for banks with higher CDS prices. This finding reinforces the interpretation that increases in attention are conducive to depositor discipline, and that our key finding is not explained by the frequency of accounting-based risk measures.

4.2 Alternative Deposit Sizes

To test whether our results are driven by the more sophisticated investors, we exploit an interesting attribute of our database. For each deposit product, Moneyfacts reports rates for up to seven different buckets of minimum deposit amount that range between £1,000 and £150,000.[24] We proxy sophistication with wealth and run our baseline specification for different deposit tiers. On each one of the columns of Table 7, we report the key parameter of interest for Attention x Stable Funding, β_3, obtained on each of the deposit tiers. The parameter estimates for Attention x Stable Funding reported suggest that our key finding is significant for all deposit categories.

4.3 Potential Alternative Explanations

The main challenge to our interpretation of the results is that *Attention* could proxy a number of factors whose interaction with bank risk could determine bank deposit rates. Alternatively, bank risk might proxy for other factors which might affect deposit rates. We introduce additional controls and their interactions with Stable Funding and Attention to further support our interpretation.

In this section, we test for five potential explanations. First, that attention proxies for systemic risk, or periods in which bank funding might be strained regardless of attention (Acharya and Mora (2015)). We thus introduce three proxies for aggregate financial stress, the one-year Libor-OIS spread, the average of UK banks' CDS price, and a Crisis dummy which is set to one between September 2007 and October 2009, as well as the interactions between these proxies with Attention and bank risk proxies. We present the results in Table 8. The coefficients in columns 1 to 3 show that none of these additional controls change our estimate of Attention x Stable Funding. This suggests that our key result is driven by bank-level variation in attention,

[24] Our baseline specification uses the rate on £10,000-minimum deposits, since this is the category for which we have the most data points.

not broader events of market volatility.

Another possibility is that Attention proxies for extreme manifestations of individual bank distress that our measures of bank risk might not capture in a timely way. Using the subsample of listed banks, we additionally control for the lagged return and the squared return for potential non-linearities. While our sample size is significantly reduced, the results reported in columns 4 and 5 show that our main conclusion remains significant at the 10% level when these controls are included.

Next, since we showed previously that surges in Attention coincided with outflows of retail deposits. it could be that our results simply reflect riskier banks increasing interest rates to address deposit outflows, as opposed to also addressing the surge in depositor concerns motivating these outflows. We test this hypothesis by adding a control for inflows of deposits into 32 banks in our sample. The results in column 6 show that adding this control does not affect the parameter estimates for Attention and its interaction with bank risk. This suggests that banks' response to surges in attention is not subsumed by contemporaneous deposit outflows.

An additional concern is that our measures of bank solvency and funding liquidity are correlated with banks' size. For instance, larger banks could use a larger share of wholesale funding and have lower capitalization ratios. This would lead us to capture the effect of size on rates, and not the effect of risk. To address this concern, in column 7 we control for bank size and its interactions with Stable Funding and Attention, and show that this does not change our key conclusion. Similarly, bank solvency and funding liquidity might be correlated with banks' investment opportunities. Thus, banks might vary their deposit rates along with changes in their investment opportunities. To proxy for investment opportunities, we follow Ben-David et al. (2015) and use the quarterly change in log total assets. The results in column 8 indicate that including this additional control does not change our main result.

A final challenge is that changes in attention might be subject to seasonality effects. For

instance, we observe that attention is systematically lower in December. While in our main specification we include month fixed effects, for additional robustness we create a dummy for each week of the year, and interact it with Stable Funding and Attention. The results reported in column 9 show that these additional controls do not change our conclusion.

5 The role of Deposit Insurance

The previous sections have established that surges in attention to banks are associated with higher deposit rates offered by riskier banks. This result begs a question of why depositors discipline banks when deposits insurance is available. In this section, we thus explore how deposit insurance affects the relationship between attention, risk, and deposit rates.

5.1 UK Deposit Insurance

We start by exploring variation in mainland UK deposit coverage across time and deposit categories. In October 2008, the FSCS increased the coverage of UK deposit insurance from £35,000 to £50,000 (Table 1). This limit increase might have reduced the differential risk to depositors associated with holding larger deposits, relative to those below the insurance limit. In turn, this lower differential risk might have altered the effect of surges in attention on the link between bank risk and deposit rates. To test this idea, we repeat the baseline regression for different deposits, while allowing explanatory variables to take different values before and after October 2008. While we cannot directly observe deposit balances -and therefore whether a deposit is insured- we exploit the richness of the Moneyfacts data to test the effect of risk on rates for different deposit tiers.

One difficulty is that the October 2008 policy change coincides with a number of other public interventions into the banking system, as well as with the acceleration of the global financial crisis. In order to sharpen our identification, we use as dependent variable the spread between

the rate on different deposit tiers and the rate on deposits with a minimum of £5,000.

Our prior is that this spread must decrease with the October 2008 policy change because the insurance revision makes the coverage of large and small deposits relatively more similar. Columns 3 to 6 in Table 9 confirm this intuition. Before October 2008, Attention x Stable Funding is negative and statistically significant, as was the case in our baseline regression. But the coefficient becomes insignificant after this period. In other words, holders of larger deposits at riskier banks cashed in a significant risk premium during the pre-October 2008 period, before the policy change reduced the risk differential between large and small deposits. By contrast, column 1 shows that the spread between £5,000 and £1,000 minimum deposit does not change after the policy change; this is consistent with fact that these two deposits are equally fully covered before and after October 2008.

It must be noted that the insignificance of Stable Funding x Attention after October 2008 in this regression does not mean that attention-driven depositor discipline vanishes altogether during that period. This period is relatively long, so this result can mask substantial heterogeneities. This said, these results stand in stark contrast with the existing evidence of financial crises as "wake-up calls" conducive to a strengthening of market discipline (Martinez Peria and Schmukler (2001)).

5.2 Offshore Deposit Insurance

Next, we further explore the role of deposit insurance by exploiting the particularity that the coverage and funding of the deposit insurance schemes for offshore accounts is weaker, relative to the onshore insurance scheme.

5.3 Analysis

To test whether deposit insurance affects the relationship between rates, attention, and risk, we expand the baseline empirical model with the inclusion of a dummy variable ($Offshore_{i,p}$), that is set to 1 if a given deposit product is offered in one of the three offshore Crown Dependencies, and 0 otherwise. Our model is as follows:

$$\begin{aligned} Rate_{i,p,j,t} = \beta_1 Risk_{i,t-1} + \beta_2 Attention_{i,t-1} + \beta_3 Risk_{i,t-1} \times Attention_{i,t-1} \\ + \beta_4 Offshore_{i,p} \times Attention_{i,t-1} + \beta_5 Offshore_{i,p} \times Risk_{i,t-1} + \\ \beta_6 Offshore_{i,p} \times Risk_{i,t-1} \times Attention_{i,t-1} + \gamma Controls_{i,t-1} + \delta_{p,t} + \theta_{i,j} + \epsilon_{i,p,j,t} \end{aligned} \tag{6}$$

Our main interest is in coefficient β_6. This coefficient measures how the discipline mechanism established in the previous section differs between mainland UK and the Crown Dependencies. We are also interested in β_3, that captures the relationship between deposit rates and bank risk in mainland UK. If the relatively stronger deposit insurance coverage in mainland UK undermines depositor discipline, we would expect this parameter to be insignificant.

A key advantage of our setting is that depositors in a given bank are subject to the same bank risk regardless of whether their deposit is onshore or offshore. For instance, account holders at Northern Rock in the UK and in Guernsey were subject to the risk of default of Northern Rock. Crucially however, onshore depositors are shielded from this risk by insurance, while offshore depositors are not. As a result, after the run on Northern Rock, the FSCS insured depositors in the UK, while those with accounts at Northern Rock (Guernsey) Limited suffered important losses. In addition, in our setting most depositors do not self-select into being insured or uninsured. The selection is determined by depositors' characteristics that are

plausible orthogonal to factors that could affect market discipline.

We report the results of the analysis in Table 10. Column 1 reports the results of a simplified version of the model above which only includes interactions between bank risk proxies and the *Offshore* dummy. This allows us to explore whether depositor discipline differs across jurisdictions on average -that is, irrespective of swings in depositors attention-. The results support this hypothesis on balance: the parameter estimates for Offshore x Stable Funding and Offshore x Capitalisation are both negative. In other words, relative to the situation in mainland UK, riskier banks must offer higher deposit rates on offshore accounts, regardless of attention.

Column 2 reports the results of our preferred specification, which includes interaction terms between bank risk, *Offshore*, and *Attention*. One first observation is that the depositor discipline mechanism established in the previous section survives in this regression. Specifically, the coefficients for Attention x Stable Funding and Attention x Capitalisation remain negative and statistically significant; surges in attention are thus associated with higher deposit rates, and this relationship is stronger when bank risk is higher. Unlike in the previous section, however, the interpretation of this coefficient in this regression is specific to mainland UK. In other words, this finding indicates that a form of market discipline operates even in mainland UK, despite the more comprehensive deposit insurance coverage, relative to offshore.

We now focus on our variable of interest, the triple interaction between attention, bank risk, and the offshore dummy. Consistent with our key hypothesis, the parameter estimate for this term is negative and significant. This indicates that the disciplining effect whereby riskier banks offer higher deposit rates when they receive higher attention from retail depositors is stronger in an environment where deposit insurance is weaker.

It could be argued that onshore and offshore depositors are not comparable, and that the difference found responds to their characteristics and not to the weakness of the offshore deposit

insurance. We address this concern in multiple ways. First, the stylized facts reported in Section 1 speak against the notion that offshore deposits are larger. Second, in order to formally rule out alternative explanations such as exchange rate risks, we drop non-Sterling deposits from the sample for this regression. Third, to address the concern that offshore depositors could still be more sophisticated on average, our regressions include jurisdiction fixed effects, therefore this heterogeneity would not bias our results as long as it does not vary over time.

However, a potential concern is that onshore and offshore depositors could also be systematically different in their ability to assess bank risk when depositor attention increases. While we cannot directly test this empirically, we rely again on the richness of the Moneyfacts database and focus on an indirect tests. If our results are driven by offshore depositors' sophistication, the difference between onshore and offshore depositor discipline should be significant irrespective of whether a given deposit amount is likely to be covered by deposit insurance. Our results in Table 11, where we repeat the study for different deposit tiers, show that this is not the case. The interaction term between bank risk, attention, and the offshore is insignificant for small deposit amounts (columns 1-2), for which differences in insurance coverage should matter the least.

6 Conclusion

This paper empirically shows that retail depositors' discipline fluctuates over time along with changes in the attention individuals pay to banks. This intermittent monitoring feature might help reconcile opposing findings in the existing literature on depositors' discipline. If discipline varies with depositors' attention to banks, failing to control explicitly for swings in attention can yield misleading estimates of depositor discipline.

This finding also contributes to financial intermediation theory. Traditional models to date

either abstract from attention altogether, or assume that i) agents are informed passively through sunspots (Diamond and Dybvig (1983)) or ii) remain permanently either informed or uninformed (Chari and Jagannathan (1988); Chen, 1999). Our results suggest that models where depositors' attention fluctuates over time might be closer to the dynamics observed in the data.

Finally, the question we address in this paper is also critical for policymakers. Individual deposits remain the dominant source of bank funding in post-crisis banking systems, and assumptions about the sensitivity of retail deposit rates and volumes to bank risk keep on being at the heart of the rationale for micro-prudential bank regulation. The increases in deposit insurance coverage, following the 2007-2009 global financial crisis, might have exacerbated the moral hazard problem (Berger and Turk-Ariss (2015); Lambert et al. (2015)).

Thus, one important issue to discuss is whether authorities should increase depositors' attention to bank risk through disclosure. Answering this question might require a finer distinction between stabilising and destabilising swings in depositor attention, whereby depositors could over-react to noisy public signals (Flannery (2001); Huang and Ratnovski (2011)). This issue provides promising avenues for future research.

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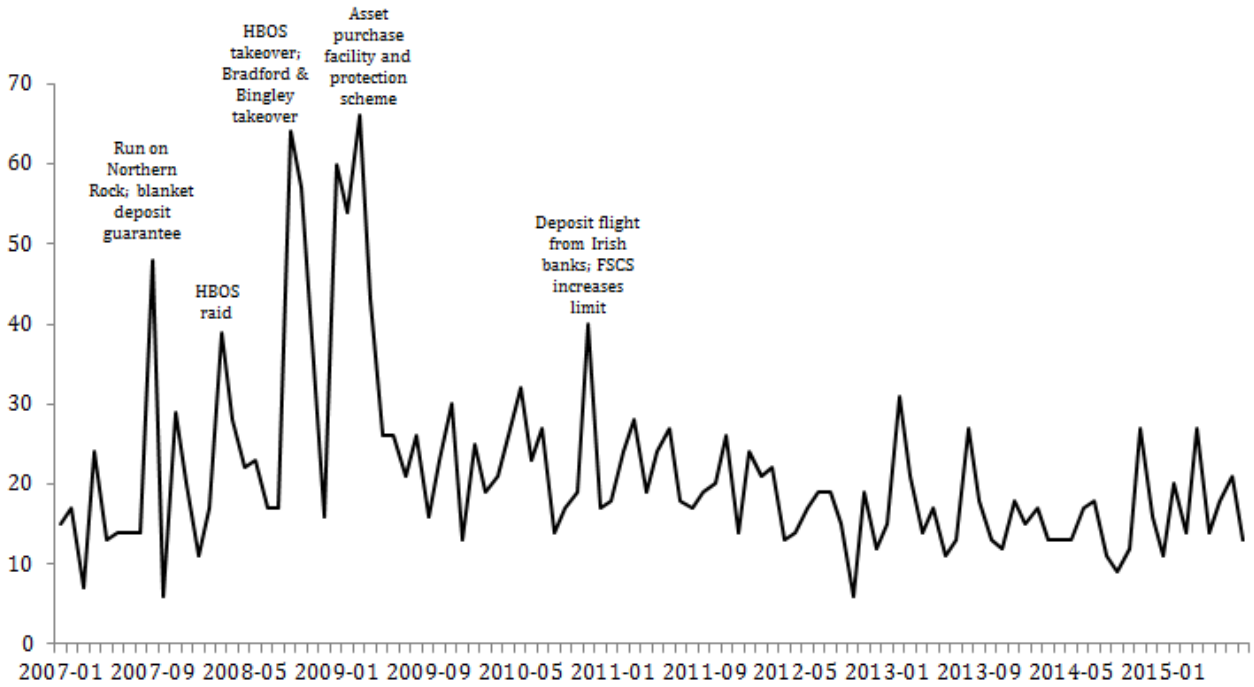
Figures and Tables

Figure 1 THE CROWN DEPENDENCIES

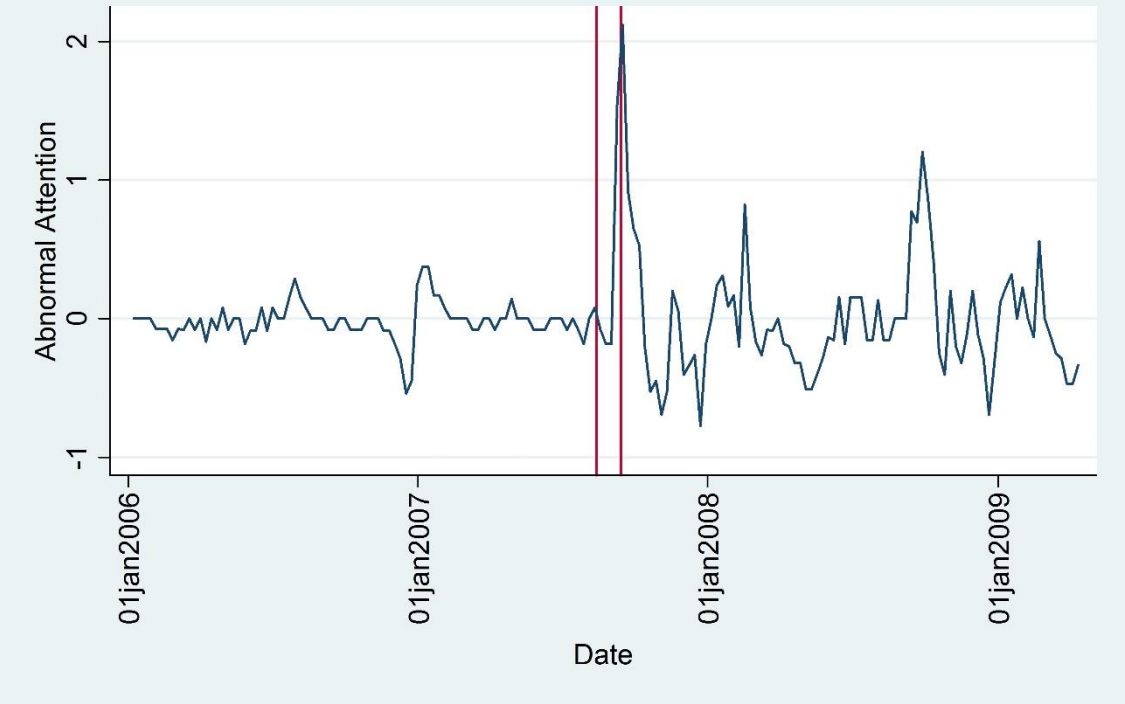
This Figure shows the location of the three Crown Dependencies: Isle of Man, Jersey, and Guernsey. The Crown Dependencies are self-governing territories that are not part of the UK or the EU, and each jurisdiction has its own independent laws, elections, and representative bodies. These territories are not represented in the UK Parliament, and their relationship with the UK is exclusively through the Crown, since the Queen is the head of state.

Figure 2 GOOGLE SEARCH FREQUENCY FOR "DEPOSIT INSURANCE" IN THE UK



This Figure plots the weekly search frequency for the term "deposit insurance" in the United Kingdom. Values are normalized from 0 to 100, whereby 100 corresponds to the maximum search frequency over the sample period. Source: Google Trends.

Figure 3 GOOGLE SEARCHES FOR "NORTHERN ROCK" IN THE UK



This Figure plots our measure of abnormal attention for Northern Rock, the first bank in the UK to suffer a run in more than a century. On August 9 2007 (first vertical line), short term funding froze, and a few days later -on August 13- the bank informed the regulator about the funding problems. It was not until September 14 (second vertical line) that the Bank of England provided funding for the bank and announced publicly its support, triggering a bank run. Source: authors' calculation based on Google Trends.

Table 1 UK DEPOSIT INSURANCE HISTORICAL COMPENSATION LIMITS

Date	Maximum Deposit Amount Coverage	Covered Deposit Payout (% Deposit)	Covered Deposit Payout (£)
July 1982	£10,000	75%	£7,500
May 1987	£20,000	75%	£15,000
July 1995	£20,000	90%	£18,000
December 2001	£35,000	100% of first £2,000, 90% of the following £33,000	£31,700
October 2007	£35,000	100%	£35,000
October 2008	£50,000	100%	£50,000
December 2010	£85,000	100%	£85,000
July 2015	£75,000	100%	£75,000
January 2017	£85,000	100%	£85,000

This table reports changes in the United Kingdom deposit insurance coverage over time. Covered deposit amounts are per person and banking group. Source: Financial Services Compensation Scheme.

Table 2 DEPOSIT ACCOUNTS CHARACTERISTICS

Characteristic	*Categories*	*N (onshore)*	*N (offshore)*
Account	Cash ISA	7,851	
	Cash Junior ISA	514	
	Children	2,973	
	Fixed	13,318	1,333
	Regular Savings	1,501	
	Regular Savings Children	161	
	Regular Savings ISA	33	
	Regular Savings Junior ISA	13	
	Variable	24,242	4,857
Rate type	Fixed Rate	17,173	1,356
	Fixed Rate then Variable Rate	155	23
	Variable Rate	33,278	4,811
Interest rate paid	Yearly	996	82
	Anniversary	6,481	319
	In Advance	1	
	Monthly	14,322	2,386
	On Closure	3	329
	On Maturity	3,775	424
	On Maturity (Compounded Annually)	190	70
	On Request		6
	Quarterly	1,262	811
	Yearly	23,576	1,763
Term	Sight deposit	32,082	4,810
	Less than one year	6,215	647
	Between one and two years	5,196	320
	Between two and three years	3,960	293
	Between three and four years	1,400	31
	More than four years	1,753	89

Table 2 DEPOSIT ACCOUNTS CHARACTERISTICS (CONTINUED)

Notice	None	6271	399
	Immediate	27247	3603
	Less than one month	3082	342
	Between one and two months	2152	422
	Between two and three months	2224	229
	Between three and four months	589	205
	More than four months	377	109
	Full term	8664	881
Branch Access	No	14252	3095
	Yes	36354	3095

This table reports characteristics used to group deposit products into categories (columns 1 and 2), as well as the total number of weekly observation for onshore deposits (column 3) and offshore deposits (column 4) in a given deposit product category. Source: authors' calculation based on Moneyfacts data for all UK banks, 2007-2015.

Table 3 SHARE OF AGGREGATE DEPOSIT BALANCES

	Average	Standard Deviation
Panel A – Depositor Type		
Individuals	0.51	0.13
Government	0.02	0.004
Public Firms	0.001	0.0004
Financial Firms	0.30	0.16
Private Firms	0.15	0.03
Panel B – Individual Deposit Type		
Sight	0.64	0.06
Notice	0.17	0.01
Fixed	0.19	0.05
Fixed <1 year	0.06	0.02
Fixed 1-2 years	0.07	0.04
Fixed >2 years	0.05	0.03

This table reports the average (column 1) and standard deviation (column 2) of the aggregate fraction of UK deposit balances held by a given depositor type (Panel A) or individual deposit type (Panel B).

Table 4 DEPOSIT BALANCES, BANK RISK, AND DEPOSITOR ATTENTION

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A – Depositor Types						
Depositor Type:	Individuals	Government	Public Firms	Financial Firms	Private Firms	All
Stable Funding	-0.04	-0.25	-0.22	-0.06	-0.24*	-0.08
	(0.05)	(0.19)	(0.97)	(0.24)	(0.14)	(0.07)
Attention	-0.09**	0.06	-0.16	-0.23	-0.07	-0.14**
	(0.04)	(0.16)	(0.78)	(0.20)	(0.12)	(0.07)
Attention x Stable Funding	0.15**	0.05	0.29	0.21	0.12	0.21**
	(0.07)	(0.26)	(1.32)	(0.32)	(0.19)	(0.10)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	951	891	398	935	908	951

Panel B – Individual Depositor Types						
	(1)	(2)	(3)	(4)	(5)	(6)
Individual Deposit Type:	Sight	Fixed				Notice
		All	<=1 year	1-2 years	>2 years	
Stable Funding	0.02	-0.08	-0.39**	0.09	-0.16	0.12
	(0.34)	(-0.69)	(-2.22)	(0.41)	(-0.62)	(0.67)
Attention	-0.01	-0.22*	-0.33*	-0.30	-0.06	0.18
	(-1.56)	(-1.91)	(-1.95)	(-1.38)	(-0.25)	(0.94)
Attention x Stable Funding	0.17**	0.41**	0.58**	0.51*	0.17	-0.17
	(2.00)	(2.51)	(2.46)	(1.70)	(0.48)	(-0.69)
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	840	840	834	840	831	788

Notes – This table reports the results of an OLS regression of Δ *Deposit Balance*$_{i,t}$ (the log change in deposit volume held by bank *i* during month *t*) against proxies for bank risk and retail depositors attention to banks, run separately for different types of depositors (Panel A) and individual deposit types (Panel B) *Capitalisation* is Tier 1 Equity/Total Assets. *Stable Funding* is Retail Deposits/Total Liabilities. *Attention* is the relative Google search frequency for the bank's name, in deviation from its monthly average. The sample includes 39 UK-headquartered

commercial banks and building societies from 2007m1 to 2015m1. Standard errors are clustered by bank. Stars indicate significance at 1 (***), 5 (**) and 10% (*) confidence level, respectively.

Table 5 DEPOSIT RATES AND BANK RISK

	(1)	(2)	(3)	(4)
Dependent variable:	*Deposit Rate*$_{i,p,j,t}$			
Capitalisation$_{i,t}$	2.64***		2.64***	2.27***
	(1.35)		(1.36)	(0.75)
Stable Funding$_{i,t}$	-0.76		-0.76	-0.45
	(0.49)		(0.49)	(0.46)
CDS$_{i,t}$		-0.00		
		(-0.03)		
Attention$_{i,t}$			0.03**	0.05***
			(0.01)	(0.02)
News$_{i,t}$				-0.08
				(0.06)
Product-month FE	Yes	Yes	Yes	Yes
Bank-jurisdiction FE	Yes	Yes	Yes	Yes
Observations	204,030	42,633	204,030	144,452
R^2	0.84	0.81	0.84	0.85

Notes – This table reports the results of an OLS regression of *Deposit rate*$_{p,j,i,t}$ (the rate offered for deposit product *p* with minimum deposit amount of £10,000 in jurisdiction *j* by bank *i* during week *t*) against proxies for bank risk and retail depositors attention to banks. *Capitalisation* is Tier 1 Equity/Total Assets. *Stable Funding* is Retail Deposits/Total Liabilities. *CDS* is the CDS bank spread, in deviation from monthly average. *Attention* is the relative Google search frequency for the bank's name, in deviation from its monthly average. *News* is [x]. The sample includes all UK-headquartered commercial banks and building societies from 2007q1 to 2015q1. Standard errors are clustered by bank. Stars indicate significance at 1 (***), 5 (**) and 10% (*) confidence level, respectively.

Table 6 MAIN RESULTS

	(1)	(2)	(3)	(4)
Dependent variable:	*Deposit Rate*$_{i,p,j,t}$			
Capital	2.63***	2.26***	2.24***	
	(1.35)	(0.75)	(0.75)	
Stable Funding	-0.76	-0.46	-0.46	
	(0.49)	(0.46)	(0.46)	
CDS				-0.03
				(0.03)
Attention	0.27***		0.35***	0.05***
	(0.09)		(0.11)	(0.02)
Attention x Stable Funding	-0.25***		-0.31***	
	(0.08)		(0.10)	
Attention x Capital	-0.87*		-1.07	
	(0.46)		(0.79)	
Attention x CDS				0.19**
				(0.09)
News		-0.10	-0.28	
		(0.18)	(0.20)	
News x Stable Funding		-0.00	0.08	
		(0.17)	(0.20)	
News x Capital		0.67	1.50	
		(0.94)	(1.25)	
Product-month FE	Yes	Yes	Yes	Yes
Bank-jurisdiction FE	Yes	Yes	Yes	Yes
R^2	0.84	0.85	0.85	0.88
Observations	204,030	144,452	144,452	42,633

Notes – This table reports the results of an OLS regression of *Deposit rate*$_{p,j,i,t}$ (the rate offered for deposit product *p* with minimum deposit amount of £10,000 in jurisdiction *j* by bank *i* during week *t*) against proxies for bank risk and retail depositors attention to banks. *Capitalisation* is Tier 1 Equity/Total Assets. *Stable Funding* is Retail Deposits/Total Liabilities. *CDS* is the CDS bank spread, in deviation from monthly average. *Attention* is the relative Google search frequency for the bank's name, in deviation from its monthly average. *News* is [x]. The sample includes all UK-headquartered commercial banks and building societies from 2007q1 to 2015q1. Standard errors are clustered by bank. Stars indicate significance at 1 (***), 5 (**) and 10% (*) confidence level, respectively.

Table 7 ALTERNATIVE DEPOSIT SIZES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Minimum Deposit Amount:						
	1k	5k	25k	50k	100k	125k	150k
Attention x Stable Funding	-0.23*	-0.21*	-0.26**	-0.29**	-0.26**	-0.27**	-0.27**
	(0.09)	(0.08)	(0.08)	(0.09)	(0.09)	(0.09)	(0.09)
Product-Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Jurisdiction FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	168,916	195,399	204,745	194,813	192,300	190,215	190,215
R^2	0.84	0.84	0.84	0.84	0.84	0.85	0.84

Notes – This table reports the results of an OLS regression of *Deposit rate*$_{p,j,i,t}$ (the rate offered for deposit product *p* with minimum deposit amount of £10,000 (unless otherwise indicated in the top row) in jurisdiction *j* by bank *i* during week *t*) against proxies for bank risk and retail depositors attention to banks. *Stable Funding* is Retail Deposits/Total *Liabilities*. *Attention* is the relative Google search frequency for the bank's name, in deviation from its monthly average. Controls included but not reported are: *Capitalisation* (Tier 1 Equity/Total Assets), *Attention*, and *Attention x Capitalisation*. The sample includes all UK-headquartered commercial banks and building societies from 2007q1 to 2015q1. Standard errors are clustered by bank. Stars indicate significance at 1 (***), 5 (**) and 10% (*) confidence level, respectively.

Table 8 ALTERNATIVE EXPLANATIONS

Alternative explanation:	**Systemic panic**			**Bank distress**			**Other explanations**		
Additional control (X):	Libor - OIS spread	Mean CDS	Crisis	Stock Return	Stock Volatility	Deposit flows	Bank Size	Asset Growth	Week Dummies
Stable Funding * Attention	-0.19**	-0.24**	-0.20**	-0.51*	-0.52*	-0.23***	-0.41***	-0.25***	-0.58**
	(0.08)	(0.08)	(0.09)	(0.28)	(0.28)	(0.05)	(0.13)	(0.08)	0.04
Stable Funding * X	0.07**	0.01	0.04	0.76**	1.19	-0.36*	-0.02**	0.00	
	(0.03)	(0.00)	(0.04)	(0.29)	(0.95)	(0.19)	(0.01)	(0.04)	
Product-Month	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Jurisdiction	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	204,140	204,140	204,140	13,869	13,869	115,996	204,140	204,140	204,140
R^2	0.84	0.84	0.84	0.91	0.91	0.87	0.84	0.84	0.84

Notes – This table reports the results of an OLS regression of *Deposit rate*$_{p,j,i,t}$ (the rate offered for deposit product *p* with minimum deposit amount of £10,000 in jurisdiction *j* by bank *i* during week *t*) against proxies for bank risk and retail depositors attention to banks. *Stable Funding* is Retail Deposits/Total *Liabilities*. *Attention* is the relative Google search frequency for the bank's name, in deviation from its monthly average. Controls included but not reported are: *Capitalisation* (Tier 1 Equity/Total Assets), *Attention, Attention x Capitalisation, X* (as defined on top of each column) and *X*Attention*. *Mean CDS* is the unweighted average UK bank CDS price. *Crisis* is one between September 2007 and October 2009, and 0 otherwise. *Stock Return* is the daily return on the bank's share. *Stock Volatility* is the bank's daily squared return. *Number Articles* is the log number of UK newspaper articles about the bank. *Articles Sentiment* is negative words-positive words/article length. *Bank Size* is log of total assets. *Asset Growth* is the log quarterly change in total asset. *Weekly dummies* is a set of fixed effects of each week during a year. The sample includes all UK-headquartered commercial banks and building societies from 2007q1 to 2015q1. Standard errors are clustered by bank. Stars indicate significance at 1 (***), 5 (**) and 10% (*) confidence level, respectively.

Table 9 MAINLAND UK DEPOSIT INSURANCE

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable = Spread between rate on:	5k-1k	10k-5k	25k-5k	50k-5k	100k-5k	125k-5k
Stable Funding x I(t<=2008.10)	0.02	-0.05	0.08	0.09	0.24	0.28
	(0.15)	(0.08)	(0.14)	(0.20)	(0.24)	(0.24)
Attention x I(t<=2008.10)	0.03	0.04*	0.11***	0.14**	0.21**	0.21**
	(0.06)	(0.03)	(0.03)	(0.06)	(0.08)	(0.08)
Attention x Stable Funding x I(t<=2008.10)	-0.07	-0.09*	-0.21***	-0.30**	-0.43***	-0.42***
	(0.11)	(0.05)	(0.07)	(0.12)	(0.16)	(0.16)
Stable Funding x I(t>2008.10)	-0.31**	0.10**	0.22**	0.22*	0.25	0.28*
	(0.13)	(0.04)	(0.10)	(0.13)	(0.15)	(0.16)
Attention x I(t>2008.10)	0.01	-0.01	-0.00	-0.01	-0.02	-0.01
	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
Attention x Stable Funding x I(t>2008.10)	-0.01	0.01	0.00	0.01	0.03	0.02
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Observations	177021	200079	200079	189962	187317	185159

Notes – This table reports the results of an OLS regression of *Deposit rate*$_{p,j,i,t}$ (the rate offered for deposit product *p* with minimum deposit amount of £10,000 in jurisdiction *j* by bank *i* during week *t*) against proxies for bank risk and retail depositors attention to banks. *Stable Funding* is Retail Deposits/Total *Liabilities*. *Attention* is the relative Google search frequency for the bank's name, in deviation from its monthly average. Controls included but not reported are: *Capitalisation* (Tier 1 Equity/Total Assets), *Attention*, *Attention x Capitalisation*, and X (as defined on top of each column). The sample includes all UK-headquartered commercial banks and building societies from 2007q1 to 2015q1. Standard errors are clustered by bank. Stars indicate significance at 1 (***), 5 (**) and 10% (*) confidence level, respectively.

Table 10 OFFSHORE VS. ONSHORE DEPOSITS

	(1)	(2)
Dependent Variable:	*Deposit Rate*$_{i,p,j,t}$	
Capitalisation	2.64**	2.63**
	(1.32)	(1.32)
Stable Funding	-0.76	-0.76
	(0.51)	(0.51)
Offshore x Stable Funding	-1.85	-1.81
	(1.45)	(1.43)
Offshore x Capitalisation	-7.09***	-6.93***
	(1.41)	(1.40)
Attention		0.25**
		(0.10)
Offshore x Attention		1.64***
		(0.41)
Attention x Stable Funding		-0.23**
		(0.09)
Attention x Capitalisation		-0.73
		(0.48)
Offshore x Attention x Stable Funding		-1.58***
		(0.36)
Offshore x Attention x Capitalisation		-8.02***
		(2.80)
Product-month FE	Yes	Yes
Bank-jurisdiction FE	Yes	Yes
R^2	0.84	0.84
Observations	203,021	203,021

Notes – This table reports the results of an OLS regression of *Deposit rate*$_{p,j,i,t}$ (the rate offered for a £10,000 minimum deposit in product *p* offered in jurisdiction *j* by UK bank *i* during week *t*) against proxies for bank risk, and retail depositors attention to banks. *Capitalisation* is the ratio of bank Tier 1 equity to total assets. *Stable Funding* is the ratio of deposits by individuals to total assets. *Attention* is the relative Google search frequency for the bank's name, in deviation from its monthly average. *Offshore* is 1 if a given deposit product is offered by a UK bank in an offshore jurisdiction, and 0 otherwise. The sample includes all UK commercial banks and building societies from 2007q1 to 2015q1. Non-Sterling deposit accounts are excluded from the sample. Standard errors are clustered by bank. Stars indicate significance at 1 (***), 5 (**) and 10% (*) confidence level, respectively.

Table 11 OFFSHORE VS. ONSHORE COMPARISON FOR DIFFERENT DEPOSIT SIZES

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable=rate for minimum deposit amount:	1k	5k	25k	50k	100k	125k	150k
Offshore x Attention x Capitalisation	1.34	3.69	-4.61*	-3.89*	-3.37*	-3.30*	-3.72*
	(9.88)	(7.78)	(2.65)	(2.12)	(1.96)	(2.0)	(2.14)
Offshore x Attention x Stable Funding	-0.66	-0.3	-1.09***	-1.36***	-1.32***	-1.29***	-1.27***
	(0.79)	(0.4)	(0.34)	(0.37)	(0.38)	(0.4)	(0.4)
Product-month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank-jurisdiction FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	168916	195399	204745	194813	192300	190215	190215
R^2	0.835	0.843	0.839	0.837	0.843	0.845	0.845

Notes – This table reports the results of an OLS regression of *Deposit rate*$_{p,j,i,t}$ (the rate offered for deposit product *p* in jurisdiction *j* by bank *i* during week *t*) against proxies for bank risk, and retail depositors attention to banks. The top row indicates the minimum-deposit bucket for which the dependent variable is measured. *Capitalisation* is the ratio of bank Tier 1 equity to total assets. *Stable Funding* is the ratio of deposits by individuals to total assets. *Attention* is the relative Google search frequency for the bank's name, in deviation from its monthly average. *Offshore* is 1 if a given deposit product is offered by a UK bank in an offshore jurisdiction, and 0 otherwise. Controls included but not reported are: *Attention, Attention x Stable Funding, Attention x Capitalisation, Offshore x Stable Funding, Offshore x Capitalisation,* and *Offshore x Attention.* The sample includes all UK commercial banks and building societies from 2007q1 to 2015q1. Standard errors are clustered by bank. Stars indicate significance at 1 (***), 5 (**) and 10% (*) confidence level, respectively.

APPENDIX TABLES

Table A1 – Contemporaneous Correlations

	Attention	Negative Coverage	Number Articles	Articles Negativity	CDS prices
Attention	1				
Negative Coverage	0.02	1			
Number Articles	0.11	0.26	1		
Articles Negativity	0.03	0.73	0.10	1	
CDS prices	0.03	-0.03	0.09	-0.07	1

Table A2 – Panel VAR model

	(1) Coefficient	(2) Standard error
Panel A: Newspaper Coverage $_t$		
$News_{t-1}$	0.41***	0.09
$Attention_{t-1}$	-0.01	0.02
CDS_{t-1}	-0.001***	0.0002
Panel B: Attention $_t$		
$News_{t-1}$	0.15**	0.07
$Attention_{t-1}$	0.67***	0.04
CDS_{t-1}	0.001***	0.00
Panel C: CDS Prices $_t$		
$News_{t-1}$	31.27	33.23
$Attention_{t-1}$	5.50	14.92
CDS_{t-1}	0.60**	0.28

Table A3 – SUMMARY STATISTICS – DEPOSIT RATES REGRESSIONS

Variable	Mean	Std. Dev.
Deposit rate	2.008	1.508
Capitalisation	0.081	0.031
Stable Funding	0.634	0.190
Attention	-0.004	0.181
Attention * Stable Funding	-0.002	0.129
Attention * Capitalisation	0.000	0.015
Exposure to Real Estate	0.093	0.077
Exposure to Banks	0.164	0.165
Exposure to Insurance	0.003	0.006
Provision Flows	0.001	0.001
Provision Stock	0.005	0.005
Asset growth	0.111	0.281
Cash	0.054	0.039
Log Size	17.946	1.703

Table A4 SUMMARY STATISTICS – DEPOSIT BALANCES REGRESSIONS

Variable	Mean	Std. Dev.
Δ Sight	0.005	0.062
Δ Fixed	0.011	0.118
Δ Fixed 1	0.001	0.175
Δ Fixed 2	0.024	0.218
Δ Fixed 3	0.038	0.252
Δ Notice	0.013	0.170
Δ Individuals	0.006	0.054
Δ Government	0.013	0.208
Δ Public Firms	0.006	0.712
Δ Banks	-0.005	0.269
Δ Private Firms	0.004	0.138
Δ Total	0.003	0.084
Attention	0.150	0.200
Stable Funding	0.552	0.207
Attention x Stable Funding	0.088	0.131