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BANKING ON INATTENTION

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ABSTRACT

We show that depositor inattention gives banks deposit market power, explaining incomplete monetary pass-through and generating interest rate exposure that changes sign over the monetary cycle. We present a dynamic deposit-pricing model in which banks trade off current deposit spreads against future deposit base, with inattention dampening spread-sensitive outflows. Empirically, we measure inattention using differential responses to scheduled versus unscheduled income and show that inattentive depositors withdraw less following rate hikes. The data confirm that banks with more inattentive depositors have lower deposit rates, weaker pass-through, and less spread-sensitive outflows. Our calibration quantifies how inattention shapes pass-through and financial stability.

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1. Introduction

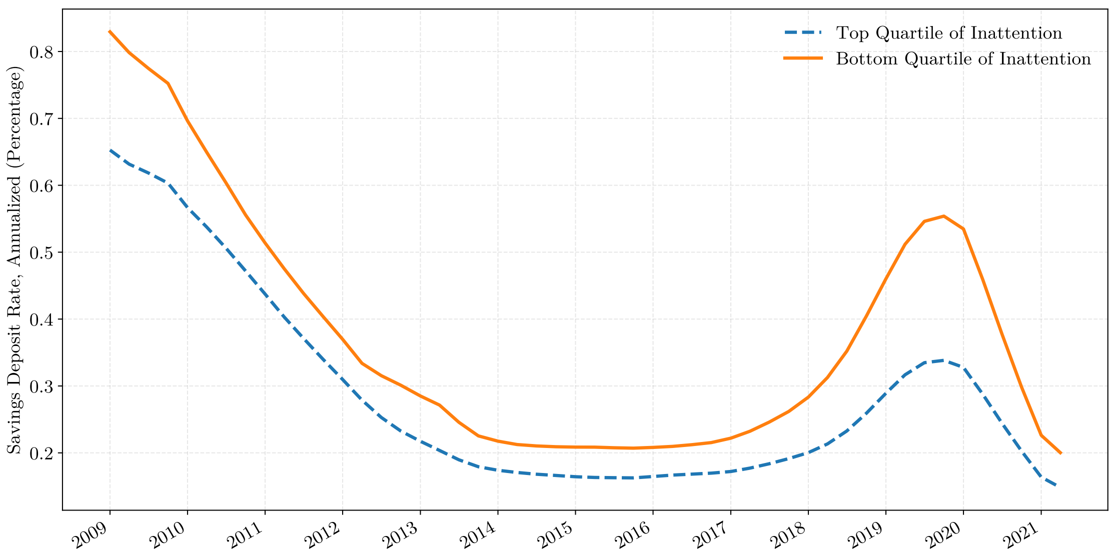
Deposits made up more than 80% of liabilities at U.S. commercial banks in the past decade, and are central to monetary transmission and financial stability. Yet key questions about deposit pricing and risk remain unresolved. What sustains banks' trillion-dollar, low-cost deposit base? Why do deposit spreads widen when monetary policy tightens? And when do deposits create interest rate risk for banks? An influential view attributes these puzzles to banks' market power in deposit markets (Duffie and Krishnamurthy 2016, Drechsler, Savov, and Schnabl 2017), but the origin of that market power is still an open question. We show that inattention is a key source of banks' market power, explaining incomplete pass-through and generating bank interest rate exposure that changes sign over the monetary cycle.

We present evidence and theory of banking on inattention, linking banks' deposit pricing decision to depositor behavior and analyzing its implications for monetary pass-through and financial stability. At the depositor level, we document that depositors are inattentive: they manage deposit accounts infrequently, and more inattentive depositors withdraw less following Fed rate hikes. Across banks, we show that banks with more inattentive depositors pay lower deposit rates, exhibit weaker monetary pass-through, and face less spread-sensitive outflows. In the aggregate, using the empirical estimates, our calibration quantifies how inattention affects deposit franchise value and the stability of deposit funding.

To structure the analysis, we develop a dynamic model of deposit pricing with inattention. In the model, a bank chooses its deposit rate to maximize the present value of profits earned on deposits, that is, its deposit franchise value. The maximization features an intertemporal trade-off: lowering the deposit rate raises the current profit margin (i.e., the deposit spread), but also induces more outflows that shrink the future deposit base, with depositor inattention dampening outflows. As a result, banks with more inattentive depositors optimally pay lower deposit rates. The model also highlights that monetary policy affects this trade-off through the *discounting* of future profits. When the Fed hikes, banks discount the future more heavily and place less weight on outflows, causing them to widen current spreads—that is, to generate incomplete pass-through. This novel discounting channel further predicts that pass-through increases with the policy rate. This state dependence of pass-through is empirically documented (Greenwald, Schulhofer-Wohl, and Younger 2023) and is central in explaining state-dependent effects of monetary policy (Eichenbaum, Puglisi, Rebelo, and Trabandt 2025), but is not generated by the well-known static framework of Drechsler, Savov, and Schnabl (2017) with CES demand, which predicts incomplete but constant pass-through.

The model delivers three testable predictions across banks: banks with more inattentive depositors should post lower deposit rates, exhibit weaker monetary pass-through, and face less spread-sensitive outflows. Using our measure of depositor inattention, described in detail below, Figure 1 shows that banks serving more inattentive depositors consistently pay lower deposit rates, confirming that depositor inattention shapes banks' deposit pricing.

Figure 1: Inattention and deposit rates



We sort banks into quartiles each year according to their deposit-weighted inattention measure. For each quartile we compute the average savings deposit rate, imputed as interest expense on savings deposits divided by the size of savings deposits, using U.S. Call Reports between 2007 and 2021. The figure plots 4-quarter moving averages for top quartile (banks with more inattentive depositors, blue dashed line) against bottom quartile (banks with more attentive depositors, orange solid line).

Our empirical exercise uses a novel combination of proprietary transaction-level bank data, administrative tax filings, and Call Reports, which together let us link the pricing and stability of bank deposits to depositor behavior. We start by inferring depositor inattention by examining how frequently depositors manage their bank accounts. Analyzing transaction data from more than 26 million U.S. depositors, we compare how quickly depositors react to scheduled income (such as salaries) whose arrival date is known, versus unscheduled income (such as tax refunds) whose arrival date is uncertain. Under a frictionless full-attention benchmark, idle balances should be reallocated equally quickly regardless of the income source, whether into higher-yield assets or towards consumption. In the data, however, unscheduled income remains in low-interest bank accounts much longer.

We measure *depositor inattention* as the difference between the response half-lives to unscheduled and scheduled income at the depositor level. This measure captures a within-person comparison of deposit stickiness, differencing out depositor-specific baseline liquidity needs and mitigating confounding bank-specific differences in liquidity services or account-management technology. Besides inattention, we also consider several alternative explanations of the half-life difference. We find the half-life difference is unlikely to be driven purely by consumption: tax refunds are associated with strong spending responses, yet depositors still leave larger residual balances idle in low-interest accounts, pointing to sluggish asset allocation rather than consumption alone. The difference also persists after excluding recurring-payment flows and remains even among depositors whose tax refunds exceed their paychecks, the latter of which is inconsistent with a fixed-adjustment-cost view. Instead, the evidence is most naturally interpreted through inattention, defined broadly as attenuation in people's responses (Gabaix 2019).[1] Consistent with this view, we further document that depositors who respond more slowly to unscheduled income also withdraw less following rate hikes around FOMC announcements. This evidence confirms that depositor inattention attenuates the sensitivity of deposit outflows to the deposit spread and is therefore relevant for bank pricing.

We then extend our in-sample depositor inattention measure to the full U.S. population and aggregate to bank level to test our model predictions. We find that a bank with one-standard-deviation higher depositor inattention offers a 10 bp lower deposit rate and passes through a 1% policy-rate change by about 3 bp less. Our theory of banking on inattention also yields a new instrument for estimating deposit flow sensitivity. It is a key input in determining the deposit franchise value but has been challenging to estimate because deposit rates are set endogenously. Because branch rates in small, peripheral counties follow the bank's rates set in larger markets (Drechsler, Savov, and Schnabl 2017, Begenau and Stafford 2023), and because inattention varies spatially, we address this endogeneity by instrumenting a bank's deposit spread in peripheral counties using the inattention of *other* counties served by the same bank—a leave-one-out design following DellaVigna and Gentzkow (2019). We show that when the deposit spread rises by 1%, a bank with one-standard-deviation higher depositor inattention experiences a 0.54% smaller outflow.

Using the empirical estimates of how inattention affects deposit rates, pass-through, and flow sensitivity, we calibrate the model to quantify the implications of banking on inattention for monetary pass-through and deposit franchise value (DFV). The calibrated model matches the untargeted aggregate moments well, including the average deposit spread, pass-through, and the extent to which pass-through rises in the policy rate. It implies that commercial banks in the U.S. collectively derive about $2.6 trillion DFV from their $5 trillion non-interest-bearing deposits and $10 trillion savings deposits by the end of 2022.

[1] Our paper is agnostic about the microfoundations of inattention. Multiple mechanisms, including cases in which agents are aware of shocks but do not actively adjust, can generate attenuated responses—for example, optimal periodic adjustment under certain cost functions (Duffie and Sun 1990, Gabaix and Laibson 2002, Abel, Eberly, and Panageas 2007, 2013), procrastination due to present bias (O'Donoghue and Rabin 1999, Maxted, Laibson, and Moll 2025), or cognitive uncertainty about the best course of action (Enke and Graeber 2023, Enke, Graeber, Oprea, and Yang 2024).

We next turn to the duration of DFV, which we quantify using the calibrated model. DFV duration is central to banks' interest rate exposure, yet direct estimation is challenging given the limited variation in the policy rate and the lack of a reliable measure of DFV. The model predicts that DFV is *non-monotonic* in the policy rate, implying that banks' interest rate exposure changes sign over the monetary cycle. Consistent with Drechsler, Savov, Schnabl, and Wang (2025), we find that when the policy rate is low, DFV has a negative duration. That is because, in this case, the bank sets a zero deposit rate. An increase in the policy rate raises the profit margin more than it accelerates outflows and increases the discount rate, leading to a higher DFV. However, when the policy rate is high, the duration of DFV turns positive: as the bank optimally sets a positive deposit rate to maximize DFV, balancing between the profit margin and outflows, the envelope theorem suggests that the duration of DFV is only driven by the discount rate. As the discount rate rises, DFV falls. Our baseline calibration suggests that, under the 2.2% policy rate in 2019Q4, if the policy rate increases by 1%, DFV will fall by $280 billion for savings deposits and $180 billion for non-interest-bearing deposits.[2]

Moreover, we use our model to assess how digital banking might affect banks' funding stability by changing depositor attention. We find that a 10% reduction in depositor inattention reduces DFV by about 6.6% for savings deposits and 8.4% for non-interest-bearing deposits, implying an aggregate loss of roughly $186 billion. Hence, we suggest that advances in digital banking that make monitoring more frequent may substantially erode banks' deposit market power.

Finally, we show that banking on inattention also rationalizes the observed asymmetry in short-run deposit-rate adjustments, i.e., rate cuts trigger more banks to adjust than rate hikes (Driscoll and Judson 2013). In fact, we suggest that this asymmetry is explained by the level of the policy rate, rather than the direction of its change. To this end, we enrich our model with short-run sluggishness in resetting deposit rates, following Calvo (1983). At any level of the policy rate, only banks that serve more attentive depositors set positive deposit rates that respond to policy-rate changes. Given a distribution of depositor inattention across banks, the higher the policy rate, the more banks set positive deposit rates. Thus, our model predicts that a larger share of banks will adjust in response to a policy-rate change from a higher initial level. Since rate cuts typically occur from higher policy-rate levels, it appears as if more banks respond to rate cuts than hikes.

[2] We further illustrate in a model extension that fixed operating costs can flip DFV duration from positive to negative even with positive deposit rates (Drechsler, Savov, and Schnabl 2021). Deposit inflows, in contrast, lead to a larger role of future profits, which strengthens the discounting channel and pushes duration positive (DeMarzo, Krishnamurthy, and Nagel 2025).

Literature and contributions. Deposits are the cornerstone of monetary aggregates and the primary source of bank funding. A longstanding banking literature points out several puzzling facts regarding deposits: deposit flows are sticky, deposit rates sit well below the policy rate, monetary policy pass-through to deposit rates is incomplete and rises with the policy rate, and deposit rate adjustments are asymmetric after policy rate hikes and cuts (e.g., Diebold and Sharpe 1990, Hannan and Berger 1991, Neumark and Sharpe 1992, Driscoll and Judson 2013, Greenwald, Schulhofer-Wohl, and Younger 2023). Prior papers provide important insights into some of these facts through search frictions, local market power, deposit size, and depositor sophistication (Duffie and Krishnamurthy 2016, Drechsler, Savov, and Schnabl 2017, d'Avernas, Eisfeldt, Huang, Stanton, and Wallace 2023, Argyle, Iverson, Kotter, Nadauld, and Palmer 2024, Fleckenstein and Longstaff 2024, Yankov 2024). We show that depositor inattention is an important source of banks' market power and provide a coherent explanation for these puzzles.

Our paper complements several contemporaneous studies on deposit stickiness. Egan, Sunderam, Hortacsu, Kaplan, and Yao (2026) estimate a quantitative model of bank competition for "sleepy" deposits and Benetton, Hébert, and McQuade (2026) study the adverse selection among active and sleepy depositors in banks' deposit acquisition. These papers emphasize the extensive margin of deposit demand, i.e., depositors with unit demand switching across banks. We focus on the intensive margin, where deposit balances decline with the deposit spread and the outflow is dampened by depositor inattention. We develop an analytical model of deposit pricing with inattentive depositors, and provide unique cross-sectional evidence that depositor inattention helps explain bank-level deposit pricing and flow sensitivity. Additionally, Eichenbaum, Puglisi, Rebelo, and Trabandt (2025) suggest that the dependence of pass-through on the level of the policy rate generates state-dependent macroeconomic effects of monetary policy. Their analysis is based on a competitive banking model with inattention driven by social dynamics, while ours generates such dependence through monopoly pricing.

We contribute to the classic literature on bank interest rate risk and funding stability (e.g., Diamond and Dybvig 1983, Gorton and Pennacchi 1990, Hanson, Shleifer, Stein, and Vishny 2015, He and Manela 2016, Pérignon, Thesmar, and Vuillemey 2018). Recent work has emphasized the role of depositor behavior in understanding deposit stickiness (Lu, Song, and Zeng 2025, Argyle, Iverson, Kotter, Nadauld, and Palmer 2024), banks' management of deposit funding (Egan, Lewellen, and Sunderam 2022, Bolton, Li, Wang, and Yang 2025), and the implications of funding structure for monetary transmission and financial stability (Gomez, Landier, Sraer, and Thesmar 2021, Abadi, Brunnermeier, and Koby 2023, Jiang, Matvos, Piskorski, and Seru 2024, Begenau, Piazzesi, and Schneider 2025, Blickle, Li, Lu, and Ma 2025, Wang 2025, Begenau, Elenev, and Landvoigt 2026). We develop a unified framework linking depositor behavior to bank deposit pricing and aggregate funding stability, highlighting depositor inattention creates sign-switching interest rate exposure in deposits.

In recent decades, finance has moved beyond frictionless benchmarks to understand the prices of risky assets. An influential strand of literature shows how agents' economizing on attention leads to infrequent portfolio adjustments (e.g., Gabaix and Laibson 2002, Abel, Eberly, and Panageas 2007, 2013) and how such infrequent adjustments affect risk premia, volatility, and monetary transmission to risky asset prices (Duffie and Sun 1990, Duffie 2010, Chien, Cole, and Lustig 2012, Lu and Wu 2025). Building on this line of work, we show that depositors are inattentive in that they manage their bank deposits infrequently, and such inattention affects the demand, supply, and pricing of deposits, a safe asset.[3]

Our results have broader relevance for understanding the pricing and stability of money-like claims, in particular, the variation in the *convenience yield*. Convenience yields vary with the policy rate, which the literature rationalizes with transaction needs, search frictions, limited pledgeability, safe asset scarcity, hedging demand, and limited substitutability (e.g., Baumol 1952, Tobin 1956, Miller and Orr 1966, Poterba and Rotemberg 1986, Kiyotaki and Wright 1993, Holmström and Tirole 1998, Lagos and Wright 2005, Krishnamurthy and Vissing-Jorgensen 2011, Nagel 2016, Jiang, Krishnamurthy, and Lustig 2021, Acharya and Laarits 2023, Krishnamurthy and Li 2023). We show that the variation in deposit spreads can be explained through the discounting margin: when the policy rate rises, banks value future profits less and set larger spreads—more so with a more inattentive deposit base, since inattention dampens the spread sensitivity of outflows.

Our paper also offers a new lens on the impact of digital banking. Digital banking that reduces depositor inattention has important implications for deposit pricing and funding stability (Erel, Liebersohn, Yannelis, and Earnest 2023, Koont 2023, Koont, Santos, and Zingales 2024, Jiang, Yu, and Zhang 2024). Consistent with these findings, we calibrate the model and show that, by reducing depositor inattention, digital banking would substantially erode the deposit franchise value.

We introduce a new approach to measure inattention that extends beyond the banking context. Analyzing transaction-level observational data, we construct a novel measure of inattention based on depositors' reaction-time gaps to scheduled and unscheduled income

[3]Beyond banking, our analytical theory and cross-sectional evidence also contribute to the industrial organization literature which has analyzed the implications of demand-side frictions through pure theoretical analysis (Farrell and Shapiro 1988, Beggs and Klemperer 1992) or structural estimation (Gowrisankaran and Rysman 2012, Honka, Hortaçsu, and Vitorino 2017, Einav, Klopack, and Mahoney 2025, Pakes, Porter, Shepard, and Calder-Wang 2025). Our theory further highlights the novel role of the discount rate in driving the monopolist's pricing by altering their intertemporal trade-off between profit margin and quantity.

events. We show that this measure is informative not only about deposit management, but also other household decisions such as subscription inertia (Einav, Klopack, and Mahoney 2025). We further extend this inattention measure out-of-sample as a function of demographic and socioeconomic characteristics. This approach delivers a scalable, population-wide measure of inattention, complementing existing approaches in behavioral economics to measure inattention, including experiments, structural estimates from revealed preferences, and surveys (see DellaVigna 2009 and Gabaix 2019 for reviews). While we center on banking, a population-wide inattention measure has broad relevance in macro-finance.[4]

The rest of the paper is organized as follows. Section 2 develops a dynamic model of deposit pricing with depositor inattention. Section 3 describes the datasets. Section 4 documents new evidence of depositor inattention and constructs our inattention measure. Section 5 extends the measure population-wide and tests the model's cross-sectional predictions on deposit spreads, pass-through, and flow sensitivity. Section 6 calibrates our model and quantifies the deposit franchise value and interest rate risk. Section 7 concludes.

2. A Model of Banking on Inattention

We develop a dynamic model of deposit pricing to demonstrate how inattention gives rise to bank market power. In maximizing the deposit franchise value (DFV), i.e., the discounted sum of bank profits, the bank trades off current deposit spreads and future deposit base, with deposit outflow modulated by inattention. We present comparative statics of bank's deposit rate, pass-through, and deposit flow sensitivity with respect to depositor inattention as testable predictions. We highlight the key role of monetary policy rate as the discount rate for DFV in this dynamic model, which generates incomplete pass-through and state-dependent interest rate risk—that is, interest rate risk whose sign and magnitude depend on the levels of the policy rate and depositor inattention of the bank.

2.1. Model Setup

We introduce inattentive depositors and set up banks' optimization. We intentionally keep this baseline model minimal and discuss extensions in Section 2.6.

[4]Inattention shapes mortgage refinancing decisions (Andersen, Campbell, Nielsen, and Ramadorai 2020, Berger, Milbradt, Tourre, and Vavra 2024a,b, Byrne, Devine, King, McCarthy, and Palmer 2023, de Silva and Mei 2025), expectations of inflation and unemployment (Coibion and Gorodnichenko 2011, Weber, d'Acunto, Gorodnichenko, and Coibion 2022, Garmaise, Levi, and Lustig 2024, Piccolo and Gorodnichenko 2025), monetary transmission (Gabaix 2020, Afrouzi, Flynn, and Yang 2026), credit card repayments (Scholnick, Massoud, and Saunders 2008), and central bank communication (Coibion, Georgarakos, Gorodnichenko, and Weber 2023, Bauer, Pflueger, and Sunderam 2024), with important welfare and efficiency implications (Farhi and Gabaix 2020, Hébert and La'O 2023, Angeletos and Sastry 2025).

Inattentive depositors. Time runs from $t = 0$ to infinity. Starting from the initial $M_0 > 0$, the deposit balance decays at rate $\tau^{-1}P(\rho - r)$ as

$$\dot{M}_t/M_t = -\underbrace{\tau^{-1}}_{\text{inverse of inattention}} P(\underbrace{\overbrace{\rho_t}^{\text{policy rate}} - \overbrace{r_t}^{\text{deposit rate}}}_{\text{deposit spread}}) \tag{1}$$

That is, the decay rate is lower if depositors are more inattentive or if the deposit spread—the difference between the policy rate ρ_t and the deposit rate r_t—is lower. We consider a withdrawal probability $P(\rho_t - r_t)$ with a finite elasticity.[5] This multiplicative form follows if each depositor has an independent Poisson strike with arrival rate τ^{-1} to manage their account, and upon receiving the strike, they withdraw a fraction $P(\rho_t - r_t)$ of their balances from the bank account to invest in a money market fund that pays the policy rate ρ_t (or equivalently, they withdraw the entire balances with probability P). Since $\tau^{-1}P(\rho_t - r_t)$ is the relevant decay rate governing deposit balance, it can also be interpreted as reflecting that attention may endogenously rise when the deposit spread goes up, in which case τ captures some baseline level of inattention.

We assume that $P(\cdot)$ is an increasing and convex function

$$P(x) = a + \left(\frac{x}{b}\right)^{\gamma}, \; x \in [0, b(1-a)^{1/\gamma}] \tag{2}$$

where a, b, γ parametrize the intercept, slope and curvature, with $a \geq 0, b > 0, \gamma > 1$. The restrictions $b > 0, \gamma > 1$ ensure that $P(x)$ is increasing and convex. The convexity of $P(\cdot)$ is *sufficient and necessary* for the concavity of the bank's profits, and it means that the marginal withdrawal probability $P'(x)$ rises in the spread. A positive a allows for the possibility of withdrawal even when the deposit spread is zero, for example, to fulfill consumption needs.

Banks' optimization and deposit franchise value (DFV). Given the law of motion (1) for balance M_t, the bank chooses a sequence of deposit rates $\{r_t \geq 0\}_{t\geq 0}$, subject to the zero lower bound,[6] to maximize its discounted sum of profits, i.e., the deposit franchise value

[5] We adopt a reduced-form specification of deposit demand with a finite elasticity, and provide a microfoundation via portfolio choice in Appendix B.1. It may arise from other microfoundations, such as cash-in-advance requirements, shopping-time models, and search frictions. While our focus is to show that the demand elasticity is modulated by inattention and discuss its banking implications, distinguishing between microfoundations can be fruitful for future research.

[6] We use zero as the lower bound, but our results go through with a non-zero effective lower bound. In reality banks may post a small positive rate out of other concerns: While there is no federal floor on retail deposit rates, some accounts are explicitly "interest-bearing" (e.g., NOW accounts). Additionally, the CFPB Truth in Savings disclosures (Reg DD) requires banks to pay "interest" and to disclose the APY. Banks may post a de minimis rate to avoid advertising a 0% APY even in a low rate environment—for example, JPMorgan Chase retains a 1 bp interest rate on retail savings accounts from 2014 to 2025.

(DFV), over deposits

$$\max_{\{r_t \geq 0\}_{t\geq 0}} V_0 \equiv \int_0^\infty \mathrm{e}^{-\rho t} \cdot \overbrace{(\rho_t - r_t)}^{\text{profit margin}} \cdot \overbrace{M_t}^{\text{demand}} \,\mathrm{d}t \tag{3}$$

From the law of motion of the deposit balance (1), the bank faces an *intertemporal margin-outflow trade-off*, as a higher profit margin today leads to a faster decay of the deposits, resulting in lower future demand.

Under a constant policy rate, the bank optimally sets a constant deposit rate r,[7] in which case the deposit balance evolves as

$$M_t = \mathrm{e}^{-\tau^{-1}P(\rho - r)t} M_0$$

Plugging this into (3) and expressing DFV in terms of the deposit spread $x \equiv \rho - r$ gives

$$\max_{x \in [0,\rho]} V_0 = \frac{\overbrace{x}^{\substack{\text{profit margin} \\ = \text{deposit spread}}}}{\underbrace{\tau^{-1}P(x)}_{\text{decay rate}} + \underbrace{\rho}_{\substack{\text{discount rate} \\ = \text{policy rate}}}} M_0 \tag{4}$$

As the bank will never set a negative deposit spread (which leads to a negative profit margin), the actual domain of interest is $x \in [0, \rho]$.

2.2. Deposit Rate, Pass-Through, and Flow Sensitivity

We analyze the optimal deposit spread the bank sets and its properties. Under a constant policy rate ρ, the bank optimally sets a constant deposit spread $x \equiv \rho - r \in [0, \rho]$. The marginal change in bank franchise value associated with a marginal change in x is

$$\frac{\partial V_0}{\partial x} = \frac{\overbrace{\tau^{-1}P(x) + \rho}^{\text{gain from higher profit margin}} - \overbrace{x\tau^{-1}P'(x)}^{\text{loss due to faster decay}}}{(\tau^{-1}P(x) + \rho)^2} M_0 \tag{5}$$

In choosing the optimal deposit spread x, the bank trades off the profit margin (deposit spread) and quantity (the size of deposits)— a higher profit margin x brings higher profits holding fixed deposits, but leads to a faster decay of deposit balances. Crucially, the quantity consideration is weaker when depositors are more inattentive (higher τ). If depositors are very inattentive, the profit margin consideration dominates, and the bank sets the highest

[7]The optimality of a constant deposit rate can be seen from Proposition 10 in Appendix B.5 which characterizes the optimal path of r_t under any path of ρ_t.

deposit spread possible by choosing $x = \rho$. If depositors are only moderately inattentive, the bank offers an interior deposit spread $x < \rho$ (i.e., positive rate $r > 0$) to balance the profit margin and quantity considerations. We characterize the optimal deposit rate as follows.

Proposition 1 (Optimal deposit rate and pass-through)**.** *Define the threshold function*

$$u(\rho) \equiv \frac{(\gamma - 1)(\rho/b)^{\gamma} - a}{\rho} \tag{6}$$

which increases in ρ.

1. *If $\tau \geq u(\rho)$, the bank sets a zero deposit rate $r = 0$ and has zero pass-through from the policy rate ρ to deposit rate r.*

2. *If $\tau < u(\rho)$, the bank sets a deposit rate below the policy rate*

$$r = \rho - b \left(\frac{\rho\tau + a}{\gamma - 1} \right)^{1/\gamma} \tag{7}$$

   with the following properties:

   (a) deposit rate comparative statics: *deposit rate is lower with higher inattention, i.e., $\frac{\mathrm{d}r}{\mathrm{d}\tau} < 0$;*

   (b) incomplete pass-through: *the pass-through is between 0 and 1, i.e., $\varepsilon \equiv \frac{\partial r}{\partial \rho} \in (0, 1)$;*

   (c) variable pass-through: *the pass-through increases with the policy rate, i.e., $\frac{\partial \varepsilon}{\partial \rho} > 0$;*

   (d) pass-through comparative statics: *the pass-through is lower with higher inattention, i.e., $\frac{\partial \varepsilon}{\partial \tau} < 0$.*

Proposition 1 predicts that the bank's rate-setting function decreases in depositor inattention τ with a kink. Banks with very inattentive depositors set zero deposit rates and have zero pass-through $\frac{\partial r}{\partial \rho}$. It occurs because if the deposit decay rate responds little to the deposit spread, the bank will set the largest possible spread to profit from a higher profit margin. Banks with moderately inattentive depositors ($\tau < u(\rho)$) choose positive deposit rates, and among them, banks with more inattentive depositors (higher τ) set a lower deposit rate r. The intuition can be seen from the first-order condition (5): with convex $P(x)$, the higher the deposit spread x (i.e., lower r), the larger the loss due to faster decay relative to gain due to profit margin $\tau^{-1}xP'(x) - \tau^{-1}P(x)$. As the difference is weakened by inattention via τ^{-1}, a bank with more inattentive depositors sets a higher deposit spread x, i.e., a lower deposit rate r.

It further suggests that the pass-through from the policy rate ρ to the deposit rate r ($\varepsilon \equiv \frac{\partial r}{\partial \rho}$) is incomplete, increasing in the policy rate ρ, and decreasing in the depositor inattention τ. Incomplete pass-through occurs because the bank trades off current profit margin with decline in future demand. As ρ rises, the bank discounts future more, and thus it increases the spread x to extract more from current deposits. A higher spread x under a higher policy rate ρ means that the pass-through from the policy rate to the deposit rate is incomplete. Further, it predicts that the pass-through ε is higher if the optimal deposit spread x is higher. At a higher x, under a convex $P(x)$, the loss term in the trade-off in (5) is more sensitive to a marginal change in x, which means that x has to change by less in response to a marginal change in ρ. That means the pass-through is higher if the optimal x is higher, which happens when the policy rate ρ is higher and when inattention τ is lower.

In Figure A-1, we plot the optimal deposit rate r and the pass-through $\frac{\partial r}{\partial \rho}$ as functions of inattention τ and policy rate ρ. Both decline in τ and increase in ρ.

Comparing market power in deposit and goods markets. Our model of market power in the deposit market contributes to the industrial organization of the banking sector. Below we clarify where it diverges from canonical models developed for goods markets.

First, the bank optimally sets an additive markdown, rather than a proportional one. The Lerner rule (Lerner 1934) establishes a markup that is *proportional* and inversely related to demand elasticity, in the canonical model which assumes that demand only depends on the monopoly price.[8] Departing from the canonical model, the demand for deposits is sensitive to the deposit spread—the difference between the policy rate ρ and the monopoly price (deposit rate r).This difference leads to an optimal markdown that is *additive*, not proportional.

Second, the pass-through from the policy rate to the deposit rate is incomplete despite an optimal additive markdown, because the policy rate also functions as the discount rate which affects the markdown. Canonical dynamic models of goods markets typically assume a constant discount rate (see Shapiro 1989 for a review). In contrast, policy rate ρ in our model serves an independent role as the discount rate, in addition to entering the profit margin and deposit decay rate via the deposit spread. As ρ rises, the bank discounts the future profits more, creating an incentive to widen today's profit margin to boost current profits. That is, the deposit rate responds less than one-for-one to a policy-rate change.

Proposition 1 highlights the impact of inattention on the bank's rate-setting. Our model also makes predictions on the quantities of deposits. In (1), the deposit decay rate $\tau^{-1}P(\rho-r)$ depends on inattention τ and the deposit spread $\rho - r$, both of which vary across banks.

[8] Certain demand functions, such as logit, can generate an additive markup. However, this occurs not because the proportional Lerner rule is violated, but because the price elasticity of demand itself depends on the price level in a way that cancels out the price term in the proportional markup formula.

Once we solve for the optimal r on τ according to Proposition 1, we can characterize the equilibrium deposit outflow across banks and analyze its dependence on inattention.

Proposition 2 (Deposit flow sensitivity under optimal rate-setting)**.** *Under the optimal deposit spread $x \equiv \rho - r$ characterized in Proposition 1, the deposit flow sensitivity with respect to deposit spread is*

$$-(\Delta t)^{-1}\frac{\partial(\log M_{t+\Delta t} - \log M_t)}{\partial x} = \tau^{-1}P'(x) = \begin{cases} \tau^{-1}\frac{\gamma}{b}\left(\frac{\rho\tau+a}{\gamma-1}\right)^{1-1/\gamma}, & \tau < u(\rho) \\ \tau^{-1}\frac{\gamma}{b}\left(\frac{\rho}{b}\right)^{\gamma-1}, & \tau \geq u(\rho) \end{cases} \tag{8}$$

which is continuous, with its magnitude declining in τ. That is, the deposit flow sensitivity is lower if depositors are more inattentive.

There are two counteracting forces governing the comparative statics of the deposit flow sensitivity with respect to inattention τ. Higher inattention directly lowers the sensitivity via the τ^{-1} terms. However, since the withdrawal probability $P(x)$ is convex and that banks with more inattentive depositors set higher spreads x, the marginal withdrawal probability $P'(x)$ is higher under higher τ. On net, the direct effect dominates, leading to a flow sensitivity whose magnitude declines in τ.[9]

2.3. Deposit Franchise Value and State-Dependent Interest Rate Risk

With our characterization of the optimal rate-setting, we characterize the deposit franchise value and its comparative statics. In particular, we highlight that as the policy rate rises, DFV first increases and then decreases. That is, the sign of DFV duration depends on the level of the policy rate, which generates state-dependent interest rate risk for banks.

Proposition 3 (Deposit franchise value under optimal rate-setting)**.** *Under the optimal deposit spread $x \equiv \rho - r$ characterized in Proposition 1, the bank's DFV $V_0 = \frac{x}{\tau^{-1}P(x)+\rho}M_0$ increases in τ, increases in ρ on $\rho \in [0, u^{-1}(0)]$, and decreases in ρ on $\rho \in (u^{-1}(0), \infty)$. That is, DFV is higher if depositors are more inattentive, and it first rises and then falls as the policy rate increases.*

In terms of the comparative statics with respect to inattention τ, it is intuitive that banks with more inattentive depositors (higher τ) have a higher DFV, since the deposit decay rate $\tau^{-1}P(x)$ is lower for any x they set and thus the bank must make strictly higher profits.

[9] The dependence of r on τ is not a threat for comparative statics if we empirically study flow sensitivity of non-interest-bearing deposits (with $r \equiv 0$). In that case, the flow sensitivity is $(\Delta t)^{-1}\frac{\partial(\log M_{t+\Delta t} - \log M_t)}{\partial \rho} = -\tau^{-1}P'(\rho)$, whose magnitude obviously declines in τ.

Regarding the policy rate ρ, it predicts that DFV increases in ρ when ρ is small (specifically, $\rho < u^{-1}(0)$) and decreases in ρ otherwise. This generates a state-dependent source of interest rate risk: at low policy rates, deposit duration is negative (DFV rises with rates), and at high policy rates, it turns positive (DFV falls with rates). The result is consistent with findings by Ampudia and Van Den Heuvel (2022) on banks' stock price responses to monetary shocks.

To understand this state dependence of the duration of DFV, we start with the case of low policy rate ρ, where the optimal deposit rate is zero, and DFV is given by

$$V_0 = \frac{\overbrace{\rho}^{\text{profit margin}}}{\underbrace{\tau^{-1}P(\rho)}_{\text{deposit decay rate}} + \underbrace{\rho}_{\text{discount rate}}} M_0$$

If the policy rate increases, the profit margin, the deposit decay rate, and the discount rate all go up. The profit margin force increases DFV while the latter two forces decrease it. If the deposit decay rate is independent of ρ, as assumed in Drechsler, Savov, Schnabl, and Wang (2025), the profit margin force dominates the discount rate force, implying a DFV that is increasing in ρ. Under a convex $P(\rho)$, with a small ρ, the deposit decay force is weak and DFV still increases in ρ. This increasing relationship of DFV in ρ is driven by the profit margin. As ρ rises to $\rho \in (u^{-1}(0), u^{-1}(\tau))$ where $r = 0$ still holds, the deposit decay force becomes strong enough to overturn the overall effect, leading to a DFV that decreases in ρ.

As the policy rate ρ rises further to $\rho > u^{-1}(\tau)$, the bank starts setting a positive deposit rate, as characterized in Proposition 1. Hence DFV becomes

$$V_0 = \frac{\overbrace{x}^{\text{profit margin}}}{\underbrace{\tau^{-1}P(x)}_{\text{deposit decay rate}} + \underbrace{\rho}_{\text{discount rate}}} M_0$$

As ρ rises, the optimal deposit spread x widens, and the change in DFV is still governed by the same three forces (the profit margin, the deposit decay rate, and the discount rate). However, in this case, since the deposit spread x is optimally chosen to maximize DFV, it balances the marginal effects of profit margin and the deposit decay rate. That is, though the spread x increases as the policy rate ρ rises, which leads to a higher profit margin and a faster decay rate, two effects cancel out since x is optimally chosen. Hence a marginal increase in ρ affects DFV only through the discount rate. That is an implication of the envelope theorem: in evaluating the comparative statics with respect to the policy rate ρ, we can treat the optimal spread x^* as fixed, i.e., $\frac{\mathrm{d}V_0(x^*(\rho),\rho)}{\mathrm{d}\rho} = \frac{\partial V_0(x^*,\rho)}{\partial \rho} = -\frac{x^*}{(\tau^{-1}P(x)+\rho)^2} M_0$.

Hence, when the deposit rate r is optimally set to be positive under a large ρ, DFV declines in ρ, due to the direct effect of policy rate as the discount rate.

Our analysis of the DFV duration also relates to DeMarzo, Krishnamurthy, and Nagel (2025). A special case they consider is with constant deposit base, which can be nested by setting $\tau \to \infty$ or $P(\cdot) = 0$. In this case, the bank always sets a zero deposit rate and DFV becomes

$$V_0 = \frac{\overbrace{\rho}^{\text{profit margin}}}{\underbrace{\rho}_{\text{discount rate}}} M_0 = M_0$$

which has a zero duration. Figure A-17 illustrates that as τ rises, the DFV duration converges to zero from below (/above), if the policy rate ρ is below (/above) the cutoff $u^{-1}(0)$, consistent with Proposition 3.[10]

Our analysis demonstrates that when the optimal r is an interior solution, in evaluating the duration of DFV, only the direct effect of the policy rate ρ matters. In the baseline model, there is only one direct effect of ρ as the discount rate, and it lowers DFV. We discuss two extensions which may affect the sign of the DFV duration in Section 2.6.

2.4. State-Dependent Short-Run Adjustment

Our previous analysis of the deposit spread, pass-through, deposit flows, and deposit franchise value can be viewed as medium-to-long-run outcomes under banks' optimal rate-setting. In this subsection, we analyze banks' short-run rate adjustment dynamics in response to a policy change under adjustment frictions. We show that, in response to a policy-rate change, rate adjustment speed is state-dependent in the level of the policy rate: in response to a policy-rate change, the higher the prevailing policy rate, the more banks adjust at any point in time. Because rate cuts often start from a high prevailing level while rate hikes tend to start from a low level, this state dependence manifests itself as the "asymmetric" sluggishness documented in the literature.

We consider a distribution of banks with depositor inattention $\tau \in [\underline{\tau}, \overline{\tau}]$ that obeys a cumulative distribution function $F(\cdot)$ with positive mass throughout. We introduce adjustment frictions à la Calvo (1983)—a bank can only adjust its deposit rate when it receives a Poisson strike with intensity θ.

Proposition 4 (Aggregate share of adjusted banks)**.** *In response to a permanent policy*

[10]Further, DeMarzo, Krishnamurthy, and Nagel (2025) highlight that DFV duration is positive when deposits grow. In Appendix B.3, we show that accounting for deposit inflows strengthens the discount channel since a larger share of DFV comes from future profits, pushing DFV duration further positive.

change from ρ to ρ' at time 0, the share of banks that have adjusted their rates by t follows

$$S_t = \underbrace{(1 - e^{-\theta t})}_{\text{Calvo convergence}} \cdot \underbrace{F(u(\bar{\rho}))}_{\text{eventual share}} \tag{9}$$

in which $\bar{\rho} \equiv \max\{\rho, \rho'\}$ is the event-peak rate*—the larger of pre- and post-change rates. Further, at any t, S_t increases in $\bar{\rho}$ for $\bar{\rho} \in (u^{-1}(\underline{\tau}), u^{-1}(\overline{\tau}))$.*

The proposition suggests that the share of banks that have adjusted by time t converges over time to the eventual share after ρ becomes ρ', which increases in the *event-peak rate* $\bar{\rho}$. To understand this result, let us consider the eventual share. Proposition 1 suggests that, under any prevailing policy rate ρ, only banks with $\tau < u(\rho)$ will set a positive deposit rate and the threshold $u(\rho)$ increases in ρ. Hence, banks with $\tau > u(\rho)$ and $\tau > u(\rho')$ will always keep a zero deposit rate before and after the policy change. The other banks set deposit rates that respond to the policy rate, and will adjust when they get a Poisson strike. Thus the eventual share is given by the share of banks falling below the threshold $u(\bar{\rho})$, i.e., $F(u(\bar{\rho}))$, which increases in $\bar{\rho}$. If $\bar{\rho}$ is higher, more banks want to adjust eventually and hence more will adjust by any time t. That is, a higher $\bar{\rho}$ corresponds to a higher S_t.

Further, the theory predicts no particular role of the sign of the policy change beyond its effect on $\bar{\rho}$. Previously, Driscoll and Judson (2013) and others note that the adjustment path S_t is asymmetric across rate cuts and hikes: rate cuts trigger more banks to adjust than rate hikes. We suggest that the different event-peak rates $\bar{\rho}$ between cuts and hikes may lead to the seemingly asymmetric result, since rate cuts often begin from a high rate whereas rate hikes are typically associated with low rates. We illustrate the short-run dynamics graphically in Appendix Figure A-2.

2.5. Empirical Implications

Our model delivers well-known aggregate facts including positive deposit spreads, incomplete and variable pass-through of policy rates, and muted flow sensitivity. In addition, it generates unique, rich cross-sectional predictions linked to depositor inattention. We outline these predictions below to guide the empirical tests and calibration.

Cross-sectional variation in deposit rate, pass-through, and flow sensitivity. Proposition 1 predicts that, across banks, those with more inattentive depositors set a lower deposit rate r (or equivalently, a higher deposit spread x), and have lower pass-through from the policy-rate change to the deposit rate r (or equivalently, higher pass-through into deposit spread x). Proposition 2 suggests that, banks with more inattentive depositors face flows that are less sensitive to changes in deposit spread x.

"Asymmetric" sluggishness from state dependence. Although our central results focus on long-run effects, the model also sheds new light on the short-run rate adjustments following policy-rate changes. Proposition 4 suggests that, more banks will adjust in response to a policy-rate change when the event-peak policy rate $\bar{\rho}$ is higher. Consequently, if we ignore the role of $\bar{\rho}$, policy rate cuts, which often happen under higher prevailing $\bar{\rho}$, can trigger more banks to adjust than policy hikes associated with low $\bar{\rho}$. The state dependence on the level of policy rate generates the observed "asymmetric" sluggishness.

From cross-sectional evidence to aggregate implications. Our model features three parameters (a, b, γ) which govern the level, slope, and curvature of the deposit decay rate $\tau^{-1}P(x)$. These parameters will be informed by the three cross-sectional moments regarding deposit rate, pass-through, and flow sensitivity. Once we calibrate these parameters, we can determine the deposit franchise value and its comparative statics with respect to inattention τ and policy rate ρ (i.e., duration), following Proposition 3. We could further quantify the deposit decay rate, deposit spread, pass-through, and the extent to which pass-through increases with the policy rate.

2.6. Theory Complements

We intentionally develop a minimal baseline model to illustrate a monopoly bank's deposit pricing under depositor inattention. In particular, we evaluate the deposit franchise value based on existing deposits that decay over time. The intertemporal trade-off between current deposit spreads and future deposit base we illustrate will be present in richer analysis of deposit acquisition and bank competition, which we hope to pursue in future research. Here we discuss various aspects of the baseline model and show robustness of its predictions to a few extensions.

Microfoundation of the demand function. While we specify the law of motion of deposits (1) as the minimum way to capture a downward-sloping demand curve, we show in Appendix B.1 that it can be microfounded through a myopic portfolio choice problem between deposits and other competitive savings vehicles. We do not intend that to be a comprehensive characterization of deposit demand, but rather a way to illustrate the basic trade-off between the transactional benefit of bank deposits and the opportunity cost due to lower deposit rates.

Time consistency. We solve the bank's time-0 optimization, i.e., under commitment, but show in Appendix B.2 that the optimal rate setting is time-consistent. That is, if the bank reoptimizes in the future, it will choose the same rate. This occurs because the evolution of deposit balance (1) is assumed to depend on current, but not future, deposit rates. With forward-looking deposit demand, a lack of commitment may erode monopoly profits, as in the durable good monopoly problem (Coase 1972).[11]

A q-theory case of deposit acquisition. In Appendix B.3 we analyze a case with deposit inflows or costly deposit acquisition, which leads to a steady state level of deposits. We show that our predictions on the optimal rate setting remain unchanged in the generalized setting. Intuitively, the mechanism follows from Tobin's q theory of investment. The per-dollar DFV on existing deposits we study corresponds to the marginal q since DFV is linear in initial deposit size M_0. It pins down the optimal size of deposit acquisition (analogous to capital investment) when equalized to the marginal acquisition cost. The bank sets the same rate to maximize DFV per dollar of deposits, regardless of whether it is in the bank or outside the bank.[12]

Inattentive, spread-sensitive deposit inflow. In Appendix B.4, we show that, if we enrich our baseline model by allowing for deposit inflow which also responds to the deposit spread, the comparative statics of deposit pricing with respect to inattention hold in the same direction. Notably, in the baseline model, $\tau^{-1}P(x)$ is the sufficient statistic characterizing the evolution of deposits. It makes the model more tractable but is not essential, as the comparative statics carry over to this extension where τ and $P(x)$ can play separate roles.

Time-varying policy rate. We assume a constant policy rate ρ as the baseline case and study pass-through in response to a permanent shock. Appendix B.5 solves the optimal rate-setting of banks under any arbitrary path of policy rate $\{\rho_t\}_{t\geq 0}$ and shows that predictions of this baseline case carry through. We show that a more transitory policy shock passes more into the deposit rate. This again follows from the role of policy rate as the discount rate in generating incomplete pass-through. Intuitively, if the shock is more transitory, it discounts future profits less and thus incentivizes the bank to raise the deposit rate by more to preserve future deposit base.

Additional direct effects of the policy rate on DFV duration. Our analysis demonstrates that when the optimal deposit rate r is positive, in evaluating the duration of DFV, only the direct effect of the policy rate ρ matters. In the baseline model, there is only one direct effect of ρ as the discount rate, and it lowers DFV. We consider two extensions which may affect the sign of the DFV duration. In Appendix B.6, we incorporate that the

[11]Papers studying the Coase conjecture typically assume a fixed discount rate and abstract away from the role it plays, which we emphasize. An exception is Wu (2024) who studies general equilibrium with endogenous discount rates. Further, this literature typically assumes rational agents who understand the lack of commitment, which could be relaxed in future work.

[12]In reality, banks have more instruments than we consider, such as promotional rates and cash bonuses, to acquire new depositors; see Benetton, Hébert, and McQuade (2026) for a complementary analysis that focuses on acquisition. Further, issuing new deposits may create dilution risk for existing depositors, raising their probability of withdrawal (Jermann and Xiang 2023).

withdrawal probability P may directly depend on ρ beyond its dependence on the spread x as $P(x, \rho)$. If the withdrawal probability exhibits diminishing sensitivity with respect to the policy rate ($P_\rho(x, \rho) < 0$), it counteracts and, under certain conditions, outweighs the direct effect of discount rate on the DFV duration. In Appendix B.7, we allow for operating costs of banks as in Drechsler, Savov, and Schnabl (2021) and Drechsler, Savov, Schnabl, and Wang (2025). We show that a variable operating cost (i.e., cost of serving per dollar of deposits) does not by itself change the sign of the DFV duration, since it is part of the trade-off for banks' rate-setting. However, a large fixed operating cost that is independent of deposit size (e.g., the cost of operating bank branches) may turn the duration of DFV negative, even when the bank sets an interior optimal deposit rate, since a higher discount rate lowers the present value of such a fixed cost.

3. Data

Our empirical analysis integrates five complementary datasets. (i) Transaction-level bank statements from a leading analytics firm track checking and savings accounts for 26 million U.S. depositors between 2014 and 2022, allowing us to construct an individual inattention index. (ii) IRS ZIP Code-income bracket level tax filings merged to 2010 Census ZCTA5 demographics provide nationwide socioeconomic covariates through county identifiers for projecting inattention out of sample from 2007 to 2021. (iii) The FDIC Summary of Deposits (2007-2021) gives annual branch-level deposit sizes for each bank, enabling county-level aggregation of deposit stocks. (iv) FFIEC Call reports (2007-2021) supply quarterly bank-level deposit flows and deposit rates. (v) Weekly RateWatch surveys (2006-2022) record bank-reported yields on $25K money-market deposit accounts, for which we aggregate the data to bank-week averages and consider only the direction (sign) of each weekly rate change. We only use the RateWatch yields for our analysis of short-run rate adjustment. Focusing on the sign of rate changes, rather than the level, insulates our analysis from systematic bank-level reporting bias on rates.

3.1. Transaction-Level Data on Depositors

We analyze checking and savings accounts for over 26 million depositors across depository institutions—including major national banks, numerous regional banks, and credit unions—to construct and validate a depositor inattention measure, and link it to deposit pricing.

These records contain transaction-level details and balances for each depositor's accounts across banks. The granularity of the data allows us to track how depositors respond to different income events by source. We also infer individual characteristics that may shape inattention, such as student loan payments, mortgage payments, entrepreneur status,[13] parental status, marital status, investor status, retirement status, unemployment status, and wage-earner status—along with the level and share for each source of income. Inference follows a rule-based, dictionary approach: we manually standardize transaction strings and map merchants to a stable taxonomy. Table 1 reports the summary statistics. It is worth noting that we report the number of depositors who have at least one transaction that we can confidently classify into the category during the sample period. For reliability, the classifier is intentionally conservative and based on keyword matching on transaction labels. It is not intended to measure the prevalence across the population.

We briefly illustrate the inference of depositor characteristics via two examples below. First, for parental status, we flag depositors with kids based on spending at children's hospitals and childcare providers, and by receipt of Child Tax Credit (CTC) payments, all identified via inbound ACH patterns (addenda codes, and company names, such as Treasury/IRS CTC disbursements). For the size of CTC, we record depositors' average monthly CTC inflows, excluding internal transfers and reversals. Second, to infer gender, using balanced dictionaries of product categories and keywords commonly coded as feminine (e.g., nail spas) or masculine (e.g., barber shops), we classify a depositor as female when purchases mapped to the feminine dictionary exceed those mapped to the masculine dictionary across associated accounts, and vice versa.

Table 1: Depositor characteristics

	N	Mean	SD	Median	25th Pct.	75th Pct.
Salary Income	1,184,345	3,630.01	2,675.84	2,962.55	1,829.40	4,659.46
Social Security	2,448,087	1,702.70	891.86	1,564.43	1,083.93	2,150.00
Tax Refund	9,248,237	2,526.42	2,451.27	1,714.50	947.00	3,299.83
Investment Income	10,508,220	777.86	5,076.71	10.52	-76.10	1,000.00
Mortgage Payment	4,511,503	6,903.94	9,294.51	3,743.73	1,619.88	8,211.62
Student Loan Payment	3,562,205	1,768.47	4,948.08	369.53	119.45	1,125.93
Child Credit	1,760,758	1,356.96	1,805.44	750.00	300.00	1,650.00
Unemployment Insurance	965,849	1,881.26	1,197.66	1,700.00	1,034.00	2,430.50
Balance (by depositor)	27,475,744	16,827.45	2,761,499.64	1,027.58	245.96	6,012.30
Balance (by account)	51,770,567	8,930.69	2,010,437.38	621.06	119.03	3,234.69

This table summarizes the key depositor-level characteristics derived from our transaction data, available from 2014 to 2022. Variables are the monthly averages per depositor in current dollars, summarized over the periods in which a non-zero flow is observed. For example, the tax refund variable is based on months in which tax refunds are received. Investment income consists of pre-classified pension payments and other flows from brokerage accounts. We note that outflows to brokerage accounts that share the pension label appear as negative investment income. The number of observations (N) is the number of depositors (or accounts, when specified) with non-zero flows in that variable at some point during the sample period.

[13] Our inattention measure requires consistent labor or retirement income (e.g., Social Security); this does not exclude depositors who also run side businesses.

3.2. *County-Income-Group Level IRS Tax Filings and County-Level Census Data*

To predict inattention out of sample, we use the administrative tax filings from the IRS, available at the ZIP Code-AGI (adjusted gross income) level, year by year from 2007 to 2021. The IRS tax filings are representative across the country and allow us to project the inattention measure over time nationwide. We construct socioeconomic and demographic characteristics from Form 1040 that match those observable at the individual level from the transaction-level database; we detail the variable construction in Appendix D. To map ZIP Codes to counties, we merge each year's IRS filings with the USPS ZIP Code-FIPS crosswalk (first-quarter snapshot) obtained from HUD's Office of Policy Development and Research. Additionally, we aggregate 2010 Census ZCTA5 data to derive demographic and socioeconomic information, such as ethnicity, gender, homeownership, and family structure, for each county, including key demographic variables available through Missouri Census Data Center as in Mian, Sufi, and Trebbi (2010).

3.3. *County-Level Bank Deposits from FDIC Summary of Deposits*

We use the FDIC's annual Summary of Deposits from 2007 to 2021, which reports each bank branch's total deposits, parent bank (RSSDID), and county as of June 30 of the year.

3.4. *Bank-Level Rates and Flows from Call Reports*

We obtain quarterly non-interest-bearing and savings deposit growth, and calculate the savings deposit rate as interest expense on savings deposits divided by the volume of savings deposits from Call Report filings between 2007 and 2021.

3.5. *Branch-Level Deposit Rates from RateWatch*

Our RateWatch sample reports the yield for new deposit quotes each week, beginning in 2006. We follow the convention in Drechsler, Savov, and Schnabl (2017), focusing on the most widely reported product in the sample period—the $25K money-market deposit accounts. We then aggregate branch observations up to the bank-week level using weekly averages and compute the weekly changes in reported deposit rates. Note that we only use the *sign* of weekly rate changes to analyze the short-run dynamics of bank rate setting. This shields our analysis from any systematic bank-level reporting bias on rate levels.

4. Measuring Depositor Inattention

We document that income with known timing is drawn down from bank accounts quickly, whereas income with unknown timing remains idle on balance twice as long. Motivated by this fact, we develop a measure of inattention using local projections of the gap in reaction times that sidesteps censoring from overlapping income events. We present various robustness checks and confirm that inattentive depositors adjust their balances less in response to monetary policy changes.

4.1. Measuring Inattention as the Reaction-time Gap to Scheduled vs. Unscheduled Income

The model of banking on inattention highlights inattention τ, which can be intuitively interpreted as the frequency at which depositors optimize their deposits. Empirically, we look into depositors' responses to income of different sources and use the reaction-time gap as our measure of inattention. This measure naturally connects to the characterization of inattention in Kahneman (2003, 2011), which distinguishes between responses to different types of tasks: reactions to routine tasks are fast, whereas reactions to non-routine tasks requires attention.

Evidence of inattention from reaction-time gaps. In the U.S., most income is deposited into bank accounts by default.[14]We define *scheduled income* as income with a known receipt date ex ante (e.g., payroll on a fixed schedule) and *unscheduled income* as income for which the exact receipt date is unknown beforehand (e.g., tax refunds). The full-attention, frictionless null hypothesis is that income from either source beyond the amount planned for consumption in a short period of time should be moved equally quickly out of low-interest bank accounts into money market funds with higher returns or other investment vehicles. However, if depositors' attention to bank accounts is limited, the pre-programmable, scheduled income will be withdrawn quickly, whereas unscheduled income will remain in accounts until depositors pay attention.

Ideally, we would estimate depositor reactions to scheduled and unscheduled income controlling for both idiosyncratic, individual fixed effects, and the trend in income growth over time. The dimensionality of our data—millions of depositors observed across thousands of pay cycles—makes such a specification infeasible. We adopt a two-step approach instead: first, we compute each depositor's cumulative net flow around every income payment and scale it by the corresponding payment amount in line with Baugh, Ben-David, Park, and Parker (2021). We then estimate the impulse response functions of the percentage changes in these normalized flows, for scheduled and unscheduled income events separately.

To start with, for each account of depositor i and income type j, we compute the daily cumulative net flows of the account over the 14-day estimation window,

$$f_{ijt}^{\tau} = \sum_{k=0}^{\tau} (\text{inflows}_{ij,t+k} - \text{outflows}_{ij,t+k}), \quad 0 \leq \tau \leq 13,$$

where $\tau = 0$ corresponds to the event date and event time $\tau = 1, 2, \ldots, 13$ represent the

[14]In the U.S., the payment system is solely bank-railed (Duffie 2019).

subsequent dates to avoid overlapping events (given that the majority of labor income is disbursed biweekly or monthly).[15] Income varies in size; we scale these flows by the event-specific income s_{ijt}, and obtain a *normalized flow*: $F^{\tau}_{ijt} = \frac{f^{\tau}_{ijt}}{s_{ijt}}$. For each event time τ, we aggregate the normalized flows to compute depositor i event type j specific averages $\overline{F^{\tau}_{ij}}$, and the standard deviations $\sigma\left(F^{\tau}_{ij}\right)$.[16]

Second, separately for each income type j, we estimate the impulse response function:

$$\overline{F^{\tau}_{ij}} = \sum_{\tau=0}^{13} \beta^{\tau}_{j} \mathbf{I}^{\tau} + \delta_i + \varepsilon_{ij},$$

where $\overline{F^{\tau}_{ij}}$ is depositor i's average normalized flow for income type j at event time τ, $\mathbf{I}^{\tau}$ is a dummy variable for event time τ, δ_i represents depositor-specific fixed effects, and ε_{ij} is the error term. Coefficients β^{τ}_{j} for each event type j trace the cumulative effect of income on balance over event time τ.

Figure 2 shows that on average, depositors deplete half of their scheduled labor income in two weeks after receiving the paychecks, whereas for unscheduled income (tax refund and fiscal checks) about 75% of the income still lingers on the account after two weeks.

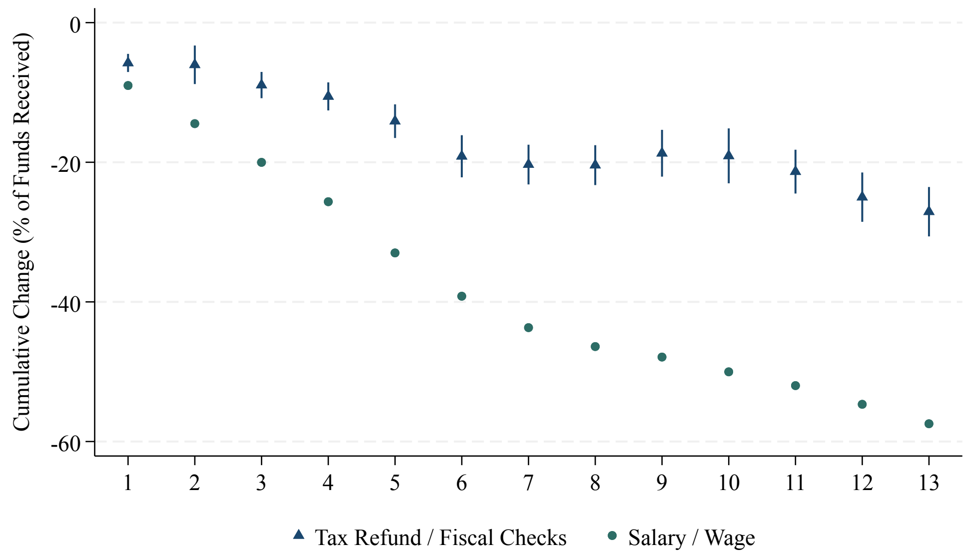
Conceptually, it is worth noting that we study the allocation across assets rather than the consumption-savings decision (for reviews, see Parker 2011, Ramey 2025). Part of the rundown of deposit balances reflects consumption from bank accounts. Our focus, however, is on the remaining amount left in bank balances. Since money market funds typically offer higher returns at comparable liquidity as an alternative saving vehicle, this residual balance represents a suboptimal asset allocation, more so for unscheduled income than for scheduled income. We provide robustness checks in Section 4.2 regarding consumption responses.

Measuring inattention using half-lives. The contrast in depositors' responses to scheduled and unscheduled income suggests a natural depositor-level measure of inattention: the gap in statistical half-lives, that is, the extra time it takes a depositor to deplete half of unscheduled income relative to scheduled income. This measure is censored because our estimation window is limited to 14 days to avoid overlapping income events (e.g., biweekly paychecks). As a result, we do not observe half-lives for depositors who fail to deplete half of the income within that window.

[15] Although depositors often hold multiple accounts, we observe that most depositors receive any given income type j in a given month t in one primary account. For clarity, we therefore suppress the account subscript and pool each depositor's impulse responses across all their accounts.

[16] We use weighted least squares to better account for heteroskedasticity, but the results are robust to using ordinary least squares.

Figure 2: Changes in balances upon receipts of funds



The x-axis represents the number of days after the receipt of funds. The y-axis shows the cumulative change in balance as a *percentage* of the funds received in the corresponding bank account. We compare the impulse responses for two income sources, salary/wages and tax refunds/fiscal checks, using a panel of 26 million depositors observed at the transaction-level between 2014 and 2022. For each individual i and event type j, we first compute the cumulative net flows over a 14-day window, f_{ijt}^{τ} for $0 \leq \tau \leq 13$, where $\tau = 0$ denotes the event date and $\tau = 1, \ldots, 13$ represent subsequent dates. These flows are scaled by the event-specific income s_{ijt} to yield normalized flows across time, $F_{ijt}^{\tau} = f_{ijt}^{\tau}/s_{ijt}$, from which we compute depositor-event type averages $\overline{F_{ij}^{\tau}}$ and their standard deviations $\sigma\left(F_{ij}^{\tau}\right)$. We then estimate the IRF by regressing $\overline{F_{ij}^{\tau}}$ on event-time dummies with depositor fixed effects, i.e., $\overline{F_{ij}^{\tau}} = \sum_{\tau=0}^{13} \beta_j^{\tau} \mathbf{I}^{\tau} + \delta_i + \varepsilon_{ij}$, using weighted least squares with weights $w_{i\tau j} = 1/\sigma\left(F_{ij}^{\tau}\right)^2$. Due to computational limits with the large amount of depositor fixed effects, the graph plots β_j^{τ} estimated using a 1-in-100 random sample (sample size is 241,867 depositors); standard errors are clustered at the depositor level and confidence intervals are constructed via 500 bootstrap replications.

To circumvent this, we apply individual-level local projections up to 180 days:

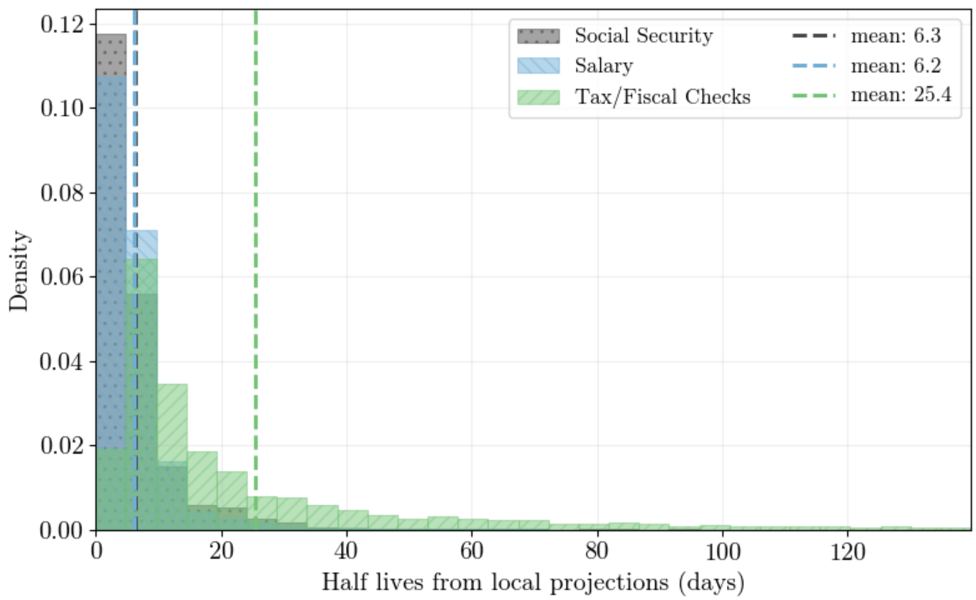
$$y_{i,t+h} - y_{i,t-1} = \alpha_{i,s,h} + \beta_{i,s,h} I_{i,s,t} + \beta_{i,s,h}^{L} L.I_{i,s,t} + \rho_{i,s,h}(y_{i,t-1} - y_{i,t-2}) + \varepsilon_{i,s,t,h},$$

where $y_{i,t+h}$ is the h-period-ahead account balance for depositor i, $\beta_{i,s,h}$ captures the dynamic effect at horizon h of an income event of type s with magnitude $I_{i,s,t}$, and additionally $L.I_{i,s,t}$, the size of the last income event of type s at time t. We include the lagged balance difference $(y_{i,t-1} - y_{i,t-2})$ to account for persistence in balances or time-varying confounders.[17] Income events are indexed by type s, which include tax refunds and fiscal checks for unscheduled income events, and salary and social security income for scheduled income events. We run these local projections separately for each depositor, using an estimation window of 180 days for each depositor (i.e., $h \leq 180$).

[17] We also considered a deterministic trend to capture potential changes over time and the prevailing 30-day flow volatility $\delta_{i,t}$ at time $t-1$. The inattention measure is robust to these alternative specifications.

To capture depositor inattention, we first compute the *half-life* of an income event's effect on balances. We define the half-life for unscheduled events, $\text{HL}_i^{\text{unsch}}$, as the smallest h such that $\beta_{i,s,h} \leq \beta_{i,s,0}/2$, i.e., the time it takes for the effect to decay by at least one half. Note that if a depositor has $\beta_{i,s,0} \notin (0, 1]$, the income flow is either fully transferred out or is not the main event at the time of occurrence, in which case we exclude these depositors. We define HL_i^{sch} analogously for scheduled income.

Figure 3: Distribution of half-lives for scheduled and unscheduled income



We compute half-lives via depositor-level local projections up to $h \leq 180$ days: $y_{i,t+h} - y_{i,t-1} = \alpha_{i,s,h} + \beta_{i,s,h} I_{i,s,t} + \beta^L_{i,s,h} L.I_{i,s,t} + \rho_{i,s,h}(y_{i,t-1} - y_{i,t-2}) + \varepsilon_{i,s,t,h}$, where s indexes salary/Social Security (scheduled) and tax/fiscal checks (unscheduled). For each s, HL_i^s is the smallest h with $\beta_{i,s,h} \leq \beta_{i,s,0}/2$; cases where $\beta_{i,s,0} \notin (0, 1]$ are excluded. We use local projections, instead of statistical half-lives to project half-lives up to 180 days to mitigate censoring from biweekly/monthly pay cycles.

Figure 3 plots the distribution of the half-lives by type of income. Half-lives from scheduled income (salary and Social Security) average about 6 days, whereas half-lives from unscheduled income (tax refunds and fiscal checks) average about 25 days. Across depositors, there is little dispersion in the half-lives of scheduled income and large dispersion in the half-lives of unscheduled income, consistent with the idea that unscheduled income requires attention to manage and people are heterogeneously inattentive.

Henceforth, we use the difference in half-lives between unscheduled and scheduled income, $\Delta\text{HL}_i = \text{HL}_i^{\text{unsch}} - \text{HL}_i^{\text{sch}}$, as our measure of depositor-level inattention. By construction, ΔHL_i captures each depositor's relative sluggishness in responding to unscheduled versus scheduled income, where the responding time to scheduled income serves as a depositor-level baseline that may capture depositor-specific liquidity needs. The difference in half-lives, ΔHL_i, averages 19 days, with a median of 7 and a standard deviation of 30.

4.2. Robustness Checks and Microfoundations of Inattention

We consider alternative explanations for why depositors react differently to scheduled and unscheduled income and rule out several specific candidates. On balance, the evidence is most consistent with inattention. We use the term "inattention" in a broad sense, following Gabaix (2019), which encompasses multiple microfoundations that all attenuate how people respond to changing conditions, to focus on the common banking implications of inattention.

Individual characteristic, not confounded by bank heterogeneity. We first note that it is measured as an individual characteristic. Banks may differ—for example, some may have better apps or more branches that make account management easier—but such bank heterogeneity does *not* confound our findings, since we compare different income sources within the same individual.

Asset allocation, rather than consumption-savings decision. In interpreting the reaction-time gap, a first concern is that the difference in half-lives of different types of income may only reflect difference in consumption responses. In particular, the permanent income hypothesis implies a low marginal propensity to consume (MPC) out of transitory income—households consume only the return of a one-time inflow. Figure 2 finds that magnitude of withdrawals following tax refunds and fiscal checks far exceeds this benchmark.

Nevertheless, our comparison of half-lives of unscheduled and scheduled income might still reflect heterogeneity in MPC across income types. To assess this empirically, Figure A-8 compares MPCs for tax refunds and salary, averaging across the population. Consistent with Baugh, Ben-David, Park, and Parker (2021), tax refunds are associated with high MPCs, both in consumption categories identified from transaction labels and in restaurant spending, suggesting behavioral "splurging" after unscheduled inflows. The combination of a higher MPC out of tax refunds and larger residual balances left in bank accounts implies that households save less in non-deposit assets from tax refunds. Thus, the asset allocation is more suboptimal with unscheduled income.

One may be concerned that we cannot identify all consumption categories and separate them from savings. To this end, we will show in Section 4.3 that inattentive depositors adjust their balances less in response to monetary policy changes. If consumption is the major driver behind the half-lives of income and if people differ in their liquidity constraints, those who are more constrained or more hand-to-mouth will have a larger MPC and thus a smaller half-life, and will be tagged as attentive by us. However, these people would adjust deposit balances to monetary policy changes by less, not more, contrary to what we find.

Recurring payments. Another identification challenge is that prearranged or recurring payments—auto-payments, direct debits, card-on-file subscriptions, loan payments, and the like—may mechanically speed up the drawdown of scheduled income. If depositors align recurring bill payments with the arrival of regular paychecks (to economize on attention or avoid overdrafts), this scheduling would create a fast drawdown of scheduled income independent of active spending. We select keywords including *autopay*, *automatic payment*, *auto debit*, and related terms in transaction descriptions to flag prearranged transfers and recompute half-lives as before, excluding the flagged flows. After exclusion, scheduled income half-lives rise to about 20 days and unscheduled income half-lives rise to 64 days, suggesting that recurring payments affect both types of income rather than only the scheduled one. We show that the reaction gap between unscheduled and scheduled income events persists and widens, confirming that these recurring payments do not explain the core finding. We report the distribution of the half-lives without recurring payments in Appendix Figure A-10.

Microfoundations of inattention and implications. Our evidence indicates that depositors adjust their balances only intermittently, in line with depositor inattention. It is an intriguing question, but beyond the scope of this paper, to distinguish between the microfoundations of inattention. Nevertheless, as a starting point, we test against one popular form of transaction cost that can generate inertia in behavior, i.e., a *fixed* adjustment cost. A fixed cost implies that larger inflows trigger faster adjustments for the same individual, even if such a fixed cost varies across individuals. To test this, in Appendix E.3 we split the sample of depositors by whether their average tax refund exceeds average salary. Figure A-9 shows that depositors adjust more slowly to tax refunds even when refunds are larger in size, which is inconsistent with a fixed cost view.

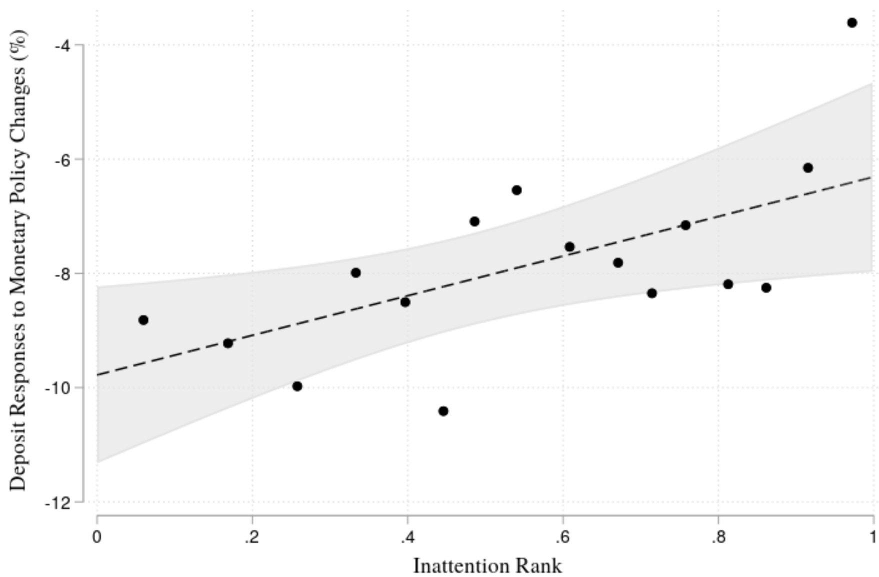
More broadly, depositor inattention may reflect optimal infrequent adjustment under various forms of costs (Duffie and Sun 1990, Gabaix and Laibson 2002, Abel, Eberly, and Panageas 2007, 2013, and Andersen, Campbell, Nielsen, and Ramadorai 2020, among others) or procrastination under present bias (O'Donoghue and Rabin 1999, Maxted, Laibson, and Moll 2025). Further, we do not distinguish between whether depositors pay less attention to unscheduled income than scheduled income, or if they pay attention but find it harder to figure out the best decisions with unscheduled income (Enke and Graeber 2023, Enke, Graeber, Oprea, and Yang 2024).

Different microfoundations may have different welfare implications, depending on whether attention is optimally chosen to economize on some cost, and on the form of that cost, which could be promising for future research. If inattention is optimally chosen in response to changes in the environment—for example, very high inflation or policy rates—different theories may generate subtly different predictions for how inattention adjusts over time. We note that this paper focuses on cross-sectional comparisons across depositors and banks, for which these microfoundations bear very similar banking implications.

4.3. Inattention Dampens Responses to Monetary Policy Changes

Our inattention measure derives from depositor responses to income events, and here we show that it is an important determinant of depositor responses to monetary policy changes, which is a key margin in the bank's deposit pricing decisions.

Figure 4: 2-week deposit responses to policy-rate changes and inattention



Balance changes are the percentage changes in depositor i's total deposit balances from one week before to one week after the FOMC announcement (week defined from Wednesday to Wednesday), and rate changes are the changes in the target Federal Funds rate at the FOMC meeting (in percentage points). We plot each depositor's two-week deposit balance changes (in percentage points) Δm_{iw} to one percentage point hike in the policy rate $\Delta \rho_w$, the regression coefficients from $\Delta m_{iw} = \gamma_i \Delta \rho_w + \varepsilon_{iw}$ against depositor's inattention, measured by ranking $\Delta \mathrm{HL}_i$, which is the projected half-life difference between unscheduled and scheduled income for each depositor i. The individual-level ranks are normalized between 0 and 1, where 1 indicates the highest level of inattention. Deposit balances are calculated by summing all bank account deposits for each depositor, using the values at the end of the sample period. The dashed line is the OLS fit and the shaded area is the associated 95 percent confidence band.

We examine weekly deposit outflows from individual depositors' low-interest transactional accounts (which pay about 2 basis points on average) around FOMC announcements. For each depositor i, we compute their total deposit balance changes Δm_{iw} as a percentage change from one week before FOMC announcement (starting Wednesday) to one week after FOMC announcement, and regress Δm_{iw} on target rate changes $\Delta \rho_w$ (in percentage points). We plot individuals' high-frequency deposit flow responses to policy-rate changes against depositor inattention in Figure 4. We find that inattentive depositors have much smaller deposit flow responses compared with attentive depositors, suggesting that inattention is associated with depositors' responses to policy-rate changes.[18]

Finally, if our measure of inattention reflects a general tendency of sluggish responses, it should correlate with inattentive behaviors in other decisions. Motivated by evidence that inertia prevents consumers from canceling subscriptions (Einav, Klopack, and Mahoney 2025), we examine whether more inattentive depositors remain subscribed for longer after subscription price increases. To test this, we use recurring charges to subscription-based merchants in bank and credit card transaction data to identify subscription payments and detect price increases of at least 5% between consecutive billing periods—discrete changes that are typically unaccompanied by changes in product quality. We measure subscription inertia as the average number of consecutive post-increase billing periods during which a depositor continues paying at approximately the new price level. Appendix Figure A-7 shows more inattentive depositors tend to keep subscriptions for longer after price hikes.

5. Evidence of Banking on Inattention

To test the bank-level model predictions, we project our inattention measure across the population, and aggregate to banks. The projected inattention measure closely replicates the transaction-data-based measure in county-bank deposit growth regressions, preserving the relevant cross-sectional variation while extending coverage beyond the directly observed sample from the transaction data. Banks with more inattentive depositors experience weaker flow sensitivity, charge wider spreads, and exhibit less monetary pass-through. In particular, we estimate deposit flow sensitivity using a new leave-one-out instrument. Additionally, we confirm that the short-run response of rate adjustment to policy changes is driven by the event-peak policy rate.

5.1. *Predicting Inattention Using Public Datasets*

To test the banking implications, we need a bank-level measure of depositor inattention. Rolling up depositor-level inattention to the bank level is challenging for three reasons. First, the proprietary transaction-level data are sparse: many depositors do not have sufficiently long transaction histories to estimate the half-life of their inattention, which is the basis of our measure. Second, the sample is not spatially representative, with coverage that is highly uneven across counties. Third, the data contain no bank identifiers, so we cannot directly aggregate depositor inattention to the bank level. We address these issues in two steps. We first estimate the inattention measure in-sample and fit it on observable depositor and local characteristics, then use this function to project inattention onto the full population, yielding a county-level inattention index. We then aggregate this county-level inattention

[18] The results are robust to adding consumption volatility (measured as 12-month prevailing standard deviation of spending scaled by average spending).

to banks using branch-level deposit balances, assuming banks operating in the same county are exposed to broadly similar local depositor pools following Drechsler, Savov, and Schnabl (2017).[19]

Projecting inattention onto characteristics. Below, we summarize the steps to extend inattention from depositors in sample to the population. We begin by constructing a merged dataset that includes county–income-group averages of inattention, along with corresponding demographic and socioeconomic outcomes. In this step, we aggregate individual inattention measures by computing a weighted average. For each county–income-group cell (c, g), we define the income-weighted inattention as $\alpha_{c,g} = \frac{\sum_{i \in (c,g)} \text{Income}_i \times \log(\Delta \text{HL}_i)}{\sum_{i \in (c,g)} \text{Income}_i}$; we standardize $\alpha_{c,g}$ to serve as the target variable for prediction.[20]

We predict the standardized inattention $\alpha_{c,g}$ with a gradient boosting algorithm using features derived from our transaction data with demographic variables from the 2010 ZCTA-level Census via county FIPS codes (see Figure A-3 for a summary of variables across datasets). Because some of the explanatory variables are highly skewed, we apply a log transformation when the skewness exceeds 3 and include county-level averages to capture potential social interactions that can affect depositor inattention (Eichenbaum, Puglisi, Rebelo, and Trabandt 2025). We split the merged dataset into an 80% training set and a 20% test set, employ five-fold cross-validation, and use randomized hyperparameter tuning to select the best model. The model produces predicted inattention levels $A(X_{c,g})$, where $X_{c,g}$ represents county-level socioeconomic and demographic characteristics.

We evaluate the selected model on the test dataset, where it explains approximately 72% of the out-of-sample variation in inattention, $\alpha_{c,g}$. The gradient boosting algorithm is highly effective at capturing meaningful variation in inattention by modeling flexible, non-linear interactions among demographic and socioeconomic variables. However, this complexity makes it difficult to pinpoint which variables are most useful in predicting inattention. To understand which variables matter most, we perform a permutation test that reveals investment-related variables are the strongest independent predictors, with a 2.9% drop in out-of-sample R^2 when permuted (see Figure A-4 in the appendix for details).

Finally, we apply the tuned model to all counties in the U.S. annually from 2007 to 2021. A detailed flowchart showing the estimation pipeline is provided in Figure A-3 of

[19] Supporting this assumption, variation in bank-county-year deposit outflows is more strongly explained by county-year effects than by bank effects.

[20] The raw half-life gap ΔHL_i is strictly positive and right-skewed as a fraction of depositors wait weeks or months, who then dominate the loss function used in our gradient boosting regression. We accordingly transform the target variable to improve the predictive accuracy. The log scale compresses extreme values, stabilizes variance, and yields a distribution that is close to normal.

the appendix. Since our proprietary dataset does not cover the entire U.S. population, we map in-sample explanatory variables in the model to corresponding variables derived from administrative tax filings from the IRS (substituting dataset (a) with dataset (b) in Figure A-3). Specifically, we extract measures from IRS Form 1040 corresponding to variables in the proprietary dataset. For example, to construct an "investment income" measure, we sum up reported net capital gains, dividends (ordinary and qualified), taxable interest, and, in some years, components of retirement income, which mirrors the investment income variable inferred from the transaction data. A complete list of variables derived from IRS tax filings, including their composite constructions, is provided in Table A-1. These variables are reported at ZIP Code–income-group level; we aggregate them to the county–income-group level (the same level at which the predictive inattention model $A(X_{c,g})$ is trained). That is, for each county–income-group cell (c, g) in year t, we obtain the predicted inattention $\hat{\alpha}_{c,g,t} = A(X_{c,g,t})$.

Argyle, Iverson, Kotter, Nadauld, and Palmer (2024) highlight that depositors with larger balances are more rate-insensitive. Consistent with their findings, we show that inattentive depositors tend to have higher balances (Figure A-6). Moreover, we show that balance (as well as income) adds little to predict inattention, suggesting that it is likely a symptom of inattention rather than a cause. To demonstrate that, we compare two models: our baseline model built on demographics and income shares, and an enhanced model that additionally includes balance and income levels. The improvement in both the training-set and the out-of-sample R^2 from including balance and income levels is marginal and statistically insignificant (Figure A-5). In short, inattention correlates with the size of deposit balances, but is not predicted by it.

County-level inattention. We measure county–level inattention as an AGI-weighted average of county–income-group–level inattention

$$\alpha_{ct} = \frac{\sum_g \mathrm{AGI}_{cgt} \hat{\alpha}_{cgt}}{\sum_g \mathrm{AGI}_{cgt}},$$

where AGI_{cgt} is the total adjusted gross income in income group g for county c in year t from IRS tax filings. We visualize the map of county-level inattention in Figure A-11.

Bank-level inattention. Assuming that bank branches in the same locale face the same group of depositors as in Drechsler, Savov, and Schnabl (2017), using deposit-weighted averages of county-level inattention α_{ct}, we obtain bank-level inattention

$$\alpha_{bt} = \frac{\sum_c \text{Total Deposits}_{cbt} \hat{\alpha}_{ct}}{\sum_c \text{Total Deposits}_{cbt}},$$

where Total Deposits$_{cbt}$ is deposits in county c for bank b in year t from Summary of Deposits.

Validation of the projected inattention measure. We show that the projected inattention measure gives nearly the same result as the transaction-data-based measure in county-bank deposit growth regressions.[21] Appendix Table A-2 shows that in both cases, the interaction between county-level inattention and the annual change in the policy rate is statistically significant and similar in magnitude, suggesting that inattention dampens the rate sensitivity of deposit outflows. This suggests that the projected measure preserves the relevant cross-county variation while extending coverage beyond the transaction-data sample.

5.2. Cross-Sectional Evidence on Deposit Rate and Pass-Through

We test Proposition 1 which predicts that banks serving a more inattentive depositor base have a wider deposit spread and a higher spread beta.

Deposit spread. Deposit spread is on average higher for banks with more inattentive depositors. In Figure 5(a), we plot the bank-level deposit spread in savings deposits against the inattention in depositor base at the last quarter of 2019, during which period the prevailing policy rate is close to the target 2%.[22] Consistent with the model, banks with more inattentive depositors set larger spreads (or equivalently, lower deposit rates). Additionally, the model predicts a policy-rate-dependent inattention breakpoint at $\tau = u(\rho)$, above which banks set a zero deposit rate. Consistent with this, Figure 5(a) plateaus at high τ. We report a linear fit for simplicity, since most banks are in the interior rate-setting region in 2019Q4. Banks with 1 s.d. higher depositor inattention set a 10 bp lower deposit rate.

Deposit spread beta. We estimate bank-level savings deposit spread beta from

$$\rho_t - r_{bt} = \sum_{k=-4}^{0} \beta_k \rho_{t+k} + c_b + \epsilon_{bt},$$

where r_{bt} is the rate offered by bank b on its savings deposits in quarter t, and c_b is a constant, following Drechsler, Savov, and Schnabl (2017). Figure 5(b) shows that banks with more inattentive depositors have lower pass-through to deposit rates: banks with 1 s.d. higher depositor inattention pass through a 1 pp rate change about 3 bp less.

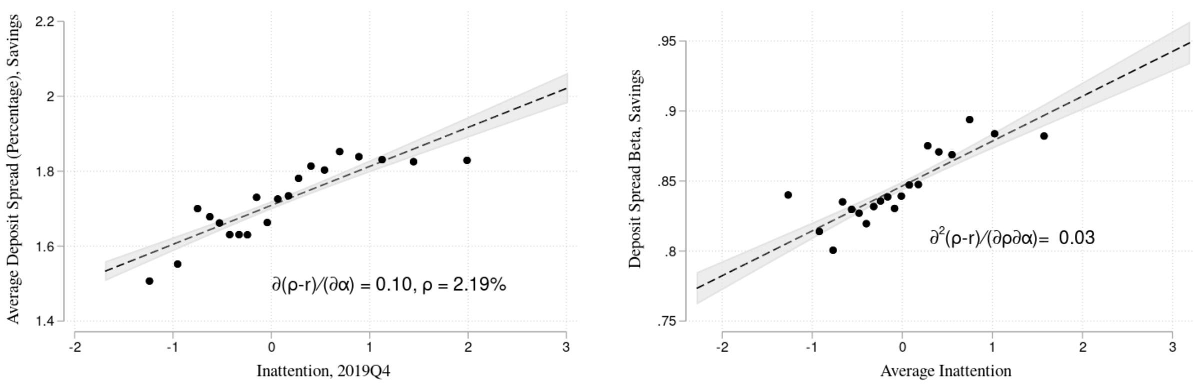
For robustness, Table A-3 reports regression results of deposit spread and spread beta on

[21] We compare at county-bank level since aggregating to the bank level would collapse the spatial variation that identifies the projection's contribution. Moreover, because the observed subsample covers only about one-third of U.S. counties, banks are selected on geography and branch-network characteristics, making bank-level comparisons between the observed and projected measures difficult to interpret.

[22] We plot the average deposit spread against average bank-level inattention during sample period in Figure A-13 and the finding is similar.

Figure 5: Deposit spread, deposit spread beta and inattention

(a) Deposit spread (b) Deposit spread beta



Panel (a) demonstrates the relation between the level of spread and bank-level inattention at 2019Q4, at which point in time the policy rate is at 2.2%. Panel (b) shows deposit spread beta, defined as the sum of five-quarter lagged coefficients from regressing the savings deposit spread on past policy rates. The sample consists of all banks from Call Reports between 2008 and 2021, with at least 40 quarters of observations. Shaded area is the 95% confidence interval.

inattention, where we also control for banks' local market power, bank size, capital ratio, and non-deposit ratio to account for competition and bank-level scale, solvency, and funding-mix differences that may affect pricing and flows.

5.3. Cross-Sectional Evidence on Deposit Flow Sensitivity

Equation (1) postulates that more inattentive depositors are less responsive to the deposit spread. When banks optimally set a deposit rate, Proposition 2 predicts that deposit demand is less sensitive to spreads for banks with more inattentive depositors. We test these predictions using two complementary measures of deposit flow sensitivity.[23]

First, we consider a special type of deposits, the non-interest-bearing deposits, for which the deposit rate is mechanically fixed at zero. In that case, changes in the policy rate translate one-for-one into changes in the deposit spread, so the estimated *flow beta* is a direct reduced-form measure of flow sensitivity.

Second, we turn to the broader set of savings deposits for which banks actively set rates. There, spreads respond endogenously to deposit demand, so flows and prices are jointly determined in equilibrium. To isolate the causal effect of spreads on flows, we use a leave-one-out (LOO) spread instrument.

[23]Beyond testing our model's predictions, measuring flow sensitivity is of broader interest but difficult because of the simultaneity of price and quantity: previous work addresses the endogeneity of deposit rates using bank-specific monetary policy pass-through (Egan, Hortaçsu, and Matvos 2017), a Berry-Levinsohn-Pakes-style instrument based on rival banks' characteristics (Egan, Lewellen, and Sunderam 2022), and supply-side shifters such as salaries and non-interest expenses (Xiao 2020, Whited, Wu, and Xiao 2022).

Reduced-form flow sensitivity from non-interest-bearing deposits. For these deposits, policy-rate changes map directly into deposit spread changes, allowing us to use the response of deposit flows as a reduced-form measure of flow sensitivity. Following Drechsler, Savov, and Schnabl (2017), we summarize this response with a bank-level *flow beta*, defined as the cumulative response of non-interest-bearing deposit growth to policy-rate changes over the previous five quarters. We find that banks with more inattentive depositor bases have lower flow sensitivity: a one-standard-deviation increase in depositor inattention is associated with a 0.46% smaller outflow response to a 1 pp increase in the policy rate (Figure A-12).

Instrumented flow sensitivity under optimal rate setting. Deposit flow sensitivity is of broad interest but challenging to estimate in the literature. Deposit spreads respond to demand, while deposit demand also responds to spreads. This simultaneity makes the bank-level spread endogenous, so a naive regression of deposit flows on spreads would confound deposit demand with the bank's own pricing response.

Our instrument is motivated by Proposition 1, which implies the following approximation to the bank's rate-setting rule:

$$x_{bt} = \beta_0 + \beta_1 \alpha_{bt} + \beta_2 \alpha_{bt} \rho_t + \beta_3 \rho_t + \delta_b + \upsilon_{bt}, \tag{10}$$

where the deposit spread of bank b at quarter t is $x_{bt} = \rho_t - r_{bt}$, and r_{bt} is the savings deposit rate, measured as the ratio of interest expenses to savings deposits from Call Reports. The bank-level deposit-weighted inattention is

$$\alpha_{bt} = \sum_c w_{cbt} \alpha_{ct},$$

where w_{cbt} is bank b's deposit weight in county c in quarter t.

Equation (10) highlights the source of endogeneity: bank b chooses its spread x_{bt} as a function of depositor inattention α_{bt} and the policy rate ρ_t. Since depositor inattention also affects deposit flows, variation in observed spreads may reflect both deposit demand and the bank's endogenous pricing response. To isolate variation in spreads that is driven by bank-level pricing but not mechanically by local demand in county j, we construct a leave-one-out (LOO) instrument using depositor inattention in the other counties served by the same bank.

The identifying variation comes from combining the rate-setting equation with uniform pricing across a bank's branch network. In multi-county banks, posted deposit rates are often set uniformly or by a small number of rate-setting branches, so the rate faced by depositors in county j depends on depositor inattention in the bank's other markets.[24] This creates relevance: variation in other counties' inattention shifts the bank's chosen spread and therefore the spread faced in county j. At the same time, because county j is excluded from the instrument, local demand shocks in county j do not mechanically enter the predicted spread. The exclusion restriction is valid under the assumption that depositor inattention of county j is not systematically related to inattention in other counties the bank serves. We further focus on peripheral counties that account for only a small share of bank b's deposits. Since such counties are unlikely to materially affect the bank's pricing decision based on deposit-weighted inattention across counties, the resulting LOO instrument provides strong first-stage variation in the deposit spread in peripheral counties, as we show below.

Empirically, we proxy peripheral counties as those accounting for less than 50% of a bank's total deposits among banks operating in more than 10 counties; the results are robust to alternative cutoff choices. We further include time-by-region fixed effects in the fully saturated specification to absorb region-specific shocks that vary over time and could otherwise confound this exclusion restriction.

We implement this research design in three steps. First, we estimate the bank-quarter rate-setting equation in (10). Second, for each county j served by bank b, we form the leave-one-out inattention measure. Third, we plug this LOO measure into the estimated rate-setting equation to obtain the predicted spread. We then use x_{jbt}^{LOO} as an instrument for the deposit spread faced by county j at bank b in quarter t.

We report results in detail below. First, Column 1 of Table 2 reports the bank-level rate-setting regression from estimating (10): deposit spreads increase with the policy rate, with a bank's deposit-weighted inattention, and with their interaction.

Second, taking the fitted coefficients from (10), we construct the LOO rate instrument for the deposit spread at the bank-county level:

$$x_{jbt}^{LOO} = \hat{\beta}_0 + \hat{\beta}_1 \alpha_{-j,bt} + \hat{\beta}_2 \alpha_{-j,bt} \rho_t + \hat{\beta}_3 \rho_t + \hat{\delta}_b,$$

where $\alpha_{-j,bt} = \frac{\sum_{c \neq j} w_{cbt} \alpha_{ct}}{1 - w_{jbt}}$ is the inattention the bank b faces weighted by deposit sizes in counties other than j.

We then estimate banks' deposit flow sensitivity using a two-stage least-square specification, proxying rates and their interactions with inattention and local market power as highlighted in Drechsler, Savov, and Schnabl (2017) using the LOO instrument x_{jbt}^{LOO}. We

[24] Banks may set a single uniform rate (Begenau and Stafford 2023) or delegate pricing to a few rate-setting branches (Drechsler, Savov, and Schnabl 2017). Our research design works in both settings, as we do not analyze major branches and focus on the minor branches which follow the lead rate.

include additional bank, county, and state-year fixed effects to account for idiosyncratic and trending deposit growth.

In the first-stage regressions, we treat Δx_{jbt}, $\alpha_{bt}\Delta x_{jbt}$, and $\text{HHI}_{jt}\Delta x_{jbt}$ as endogenous and instrument them with the leave-one-out instruments, controlling for county level concentration, and bank, county, and state-year fixed effects that appear in both stages:

$$\begin{aligned}
\Delta x_{jbt} &= \eta_1\alpha_{bt}\Delta x_{jbt}^{LOO} + \eta_2\Delta x_{jbt}^{LOO} + \eta_3\alpha_{bt} + \eta_4\text{HHI}_{jt} + \eta_5\text{HHI}_{jt}\Delta x_{jbt}^{LOO} + \delta_j + \delta_b + \delta_{s(j)t} + \epsilon_{jbt}, \\
\alpha_{bt}\Delta x_{jbt} &= \theta_1\alpha_{bt}\Delta x_{jbt}^{LOO} + \theta_2\Delta x_{jbt}^{LOO} + \theta_3\alpha_{bt} + \theta_4\text{HHI}_{jt} + \theta_5\text{HHI}_{jt}\Delta x_{jbt}^{LOO} + \delta_j + \delta_b + \delta_{s(j)t} + \epsilon_{jbt}, \\
\text{HHI}_{jt}\Delta x_{jbt} &= \iota_1\alpha_{bt}\Delta x_{jbt}^{LOO} + \iota_2\Delta x_{jbt}^{LOO} + \iota_3\alpha_{bt} + \iota_4\text{HHI}_{jt} + \iota_5\text{HHI}_{jt}\Delta x_{jbt}^{LOO} + \delta_j + \delta_b + \delta_{s(j)t} + \epsilon_{jbt},
\end{aligned}$$

And in the second stage, we estimate the sensitivity of deposit outflows to the instrumented variables related to rate spread ($\widehat{\Delta x_{jbt}}$, $\widehat{\alpha_{bt}\Delta x_{jbt}}$, and $\widehat{\text{HHI}_{jt}\Delta x_{jbt}}$):

$$\Delta \log m_{jbt} = \zeta_1\widehat{\Delta x_{jbt}} + \zeta_2\widehat{\alpha_{bt}\Delta x_{jbt}} + \zeta_3\alpha_{bt} + \zeta_4\widehat{\text{HHI}_{jt}\Delta x_{jbt}} + \zeta_5\text{HHI}_{jt} + \delta_j + \delta_b + \delta_{s(j)t} + \varepsilon_{jbt}.$$

We report the estimated results in Table 2. The leave-one-out instrument is a generated regressor, and we report bootstrapped standard errors throughout the specifications, sampling clusters of banks. The leave-one-out rate instruments along with bank-level inattention and county-level HHI, and bank, county, and state-year fixed effects, explain 96% of the variation in bank rate and its interaction with inattention. In the second stage, we show that deposit outflows are larger in counties with higher deposit spread. Column 5 indicates that a 1% rise in the annualized deposit spread leads to smaller deposit outflows in counties with inattentive depositors. Columns 6-7 show that outflows' rate sensitivity is robustly lower with higher inattention, with bank-year controls that absorb bank-level trends in deposit growth, and additional county-level fixed effects that account for idiosyncratic deposit growth. For the calibration, we use the fully saturated estimate from column 7, that one s.d. higher inattention leads to 0.56% less outflows with 1% higher spread.

5.4. "Asymmetric" Sluggishness from State Dependence

Our model predicts that a monetary policy change at a higher prevailing level of policy rate triggers more banks to adjust. We test it by tracking when banks reprice their money market deposit accounts (MMDAs) around FOMC announcements.

Weekly rate adjustment data are obtained from RateWatch, which reports the MMDA rates that banks post each week by account size. Following Drechsler, Savov, and Schnabl (2017), we focus on $25,000 accounts, which is also the most populated category in our sample. We emphasize the frequency of adjustments for two reasons. First, errors in rate

Table 2: Deposit flow sensitivity and inattention

		First Stages			Second Stage		
	Spread (x_{bt})	ΔSpread (Δx_{jbt})	Inatt.·ΔSpread ($\alpha_{jbt} \cdot \Delta x_{jbt}$)	HHI · ΔSpread ($\text{HHI}_{jt} \cdot \Delta x_{jbt}$)	ΔLog(Deposits) ($\Delta \log m_{jbt}$)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ρ_t	0.761***						
	(0.002)						
$\alpha_{bt} \cdot \rho_t$	0.003*						
	(0.002)						
α_{bt}	0.058***						
	(0.004)						
Δx_{jbt}^{LOO}		-0.788**	1.869	1.022**			
		(0.608)	(0.243)	(0.312)			
$\alpha_{jbt} \cdot \Delta x_{jbt}^{LOO}$		0.001	1.023***	-0.001			
		(0.002)	(0.008)	(0.001)			
$\text{HHI}_{jt} \cdot \Delta x_{jbt}^{LOO}$		0.008*	0.003	1.046***			
		(0.002)	(0.001)	(0.009)			
$\widehat{\alpha_{jbt} \cdot \Delta x_{jbt}}$					0.543***	0.477***	0.560***
					(0.116)	(0.080)	(0.088)
$\widehat{\text{HHI}_{jt} \cdot \Delta x_{jbt}}$					0.438	0.642*	0.515**
					(0.228)	(0.248)	(0.198)
$\widehat{\Delta x_{jbt}}$					0.106	0.000	0.000
					(30.910)	(0.000)	(0.000)
HHI_{jt}		0.005	-0.012***	0.024***	0.687**	0.715***	0.692***
		(0.002)	(0.002)	(0.003)	(0.360)	(0.354)	(0.348)
α_{jbt}		0.004	0.051***	-0.012***	1.192***	1.096***	1.036***
		(0.001)	(0.004)	(0.002)	(0.221)	(0.219)	(0.199)
Observations	95,296	146,753	146,753	146,753	146,753	146,753	146,753
Adjusted R^2	0.90	0.98	0.96	0.97			
F-stat			281.10				
Bank f.e.	Y	Y	Y	Y	Y	Y	Y
County f.e.	N	Y	Y	Y	Y	Y	Y
Year f.e.	N	Y	Y	Y	Y	Y	Y
State-Year f.e.	N	Y	Y	Y	Y	Y	N
Bank-Year f.e.	N	N	N	N	N	Y	N

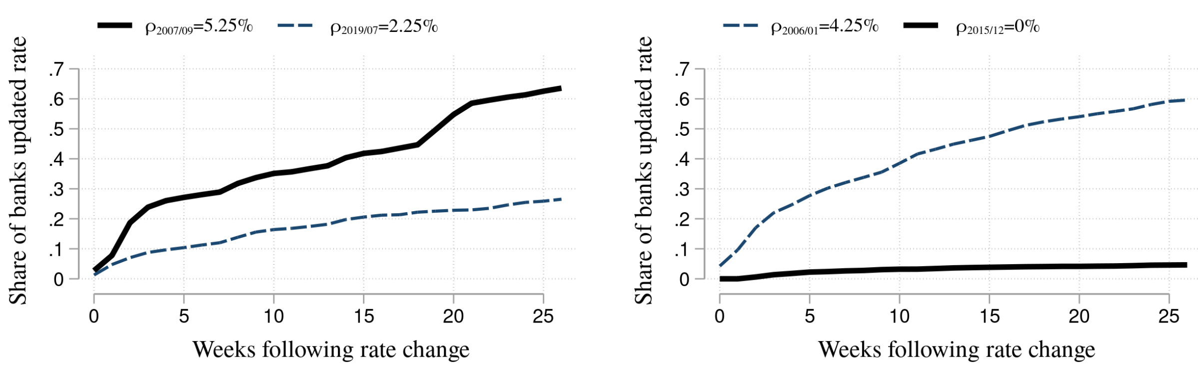
Deposit spread is $x_{bt} = \rho_t - r_{bt}$, where ρ_t is the policy rate and r_{bt} is bank b' s savings deposit rate from Call Reports (interest expense on savings deposits divided by savings deposits). County-bank deposits m_{jbt} come from the FDIC Summary of Deposits, and $\Delta \log m_{jbt}$ is the annual log change in deposits for bank b in county j. County concentration HHI_{jt} is computed from FDIC Summary of Deposits. Inattention α_{jbt} denotes the inattention measure for depositors of bank b in county j at time t. Bank-level deposit-weighted inattention is $\alpha_{bt} = \sum_c w_{cbt}\alpha_{ct}$, where w_{cbt} is bank b's deposit share in county c (with $\sum_c w_{cbt} = 1$). Column (1) reports OLS estimates of $x_{bt} = \beta_0 + \beta_1\alpha_{bt} + \beta_2\alpha_{bt}\rho_t + \beta_3\rho_t + \delta_b + \upsilon_{bt}$, including bank fixed effects δ_b. Using the fitted coefficients from column (1), we construct the predicted LOO spread for county j as $x_{jbt}^{\text{LOO}} = \hat{\beta}_0 + \hat{\beta}_1\alpha_{-j,bt} + \hat{\beta}_2\alpha_{-j,bt}\rho_t + \hat{\beta}_3\rho_t + \hat{\delta}_b, \quad \alpha_{-j,bt} = \frac{\sum_{c \neq j} w_{cbt}\alpha_{ct}}{1 - w_{jbt}}$. We use $\Delta x_{jbt}^{\text{LOO}}$ and its interactions with α_{jbt} and HHI_{jt} as instruments for Δx_{jbt}, $\alpha_{jbt} \cdot \Delta x_{jbt}$, and $\text{HHI}_{jt} \cdot \Delta x_{jbt}$, respectively. Columns (2)-(4) report the corresponding first-stage regressions; columns (5)-(7) report second-stage estimates with dependent variable $\Delta \log m_{jbt}$. All 2SLS specifications include bank and county fixed effects and year fixed effects; columns (2)–(6) additionally include state-year fixed effects; column (6) additionally includes bank×year fixed effects (as indicated in the table). The 2SLS sample is restricted to multi-county banks and peripheral counties (banks operating in more than 10 counties; county share $w_{jbt} < 0.5$). For columns (2)-(7), standard errors are based on 500 bootstrap replications resampling banks. Significance levels: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

levels in RateWatch quotes do not distort the timing or sign of changes, so bank-specific biases drop out. Second, earlier work on rate adjustment stickiness (e.g., Driscoll and Judson 2013) also relies on frequency measures.

For the tightening cycle starting in 2015, defined by the first hike announcement of December 2015 and extending through 2019, only a small fraction of banks raised MMDA rates. In contrast, following the first rate cut of September 2007 in the 2007-2010 easing cycle, rate reductions were implemented promptly. We plot the "first cut" and "first hike" in solid black in Figure 6. These patterns reproduce the well-known "asymmetric rate-setting" evidence highlighted by Driscoll and Judson (2013). Consistent with our rate-level interpretation, however, we find that for hikes occurring at similarly high prevailing policy rates, e.g. January 2006, the fraction of banks that update and the speed of those updates are close to the cut in September 2007. Adding another cut episode in 2019 that starts from 2.25%, it becomes clear that the ranking of these episodes follows the prevailing level of policy rate, rather than its direction of change.

Figure 6: "Asymmetric" deposit rate adjustments

(a) Rate cuts (b) Rate hikes



The figure plots the cumulative share of U.S. commercial banks that change the reported rate in the same direction as the policy rate changes on $25,000 money market deposit accounts (MMDAs) in the weeks surrounding FOMC announcements. Week 0 is the week of the FOMC announcement (vertical dashed line). Left panel: the rate cuts of two easing cycles. Right panel: the rate hikes of two tightening cycles. MMDA quotes come from RateWatch.

6. Calibration of Pass-Through and Interest Rate Risk

We calibrate the model parameters using empirical estimates to inform the level and, more importantly, comparative statics of the monetary policy pass-through and deposit franchise value (DFV). The duration of DFV is of particular importance to both banks and policymakers, yet it is challenging to estimate empirically.

6.1. Calibration and Implied Incomplete and Variable Pass-Through

The model parameters we need to calibrate are (a, b, γ) which govern the intercept, slope and curvature of the withdrawal probability $P(x) = a + \left(\frac{x}{b}\right)^\gamma$ in (2).

Identifying inattention τ. The key variable in our model is the depositor inattention τ, which mediates the decay rate $\tau^{-1}P$ of the *deposit balance*. However, our measure of depositor inattention derives from the half-lives of *income*. In Section 4.3, we confirm that our inattention measure correlates with the sensitivity of deposit balances to monetary policy changes. Our cross-sectional evidence in Section 5 further attests to the informativeness of our inattention measure. A concern is that our inattention measure correlates with but misstates the level of the theory-required τ, since the half-lives of income are in weeks and plausibly much lower than those of balances. Nonetheless, since we calibrate parameters governing P using cross-sectional variation in τ which we discuss next, a proportional misstatement would leave the calibrated decay rate $\tau^{-1}P$ unchanged. A separate concern is that inattention τ may be measured with errors, leading to an attenuation bias of our empirical estimates in Section 5, which we address towards the end of this subsection.

Model parameters informed by cross-sectional moments. Our model delivers unique cross-sectional predictions for deposit rates, pass-through, and flow sensitivity across banks, which we estimate in Section 5. We use these three estimates to calibrate parameters (a, b, γ).

Proposition 5 (Calibration)**.** *Given (τ, ρ) which satisfy $\tau < u(\rho)$, the comparative statics of the deposit spread, deposit spread pass-through, and the flow sensitivity with respect to inattention τ are governed by the model parameters (a, b, γ) as, with $x \equiv \rho - r$,*

$$d_1 \equiv \frac{\partial x}{\partial \tau} = \frac{b\rho}{\gamma}\,\frac{(a+\rho\tau)^{1/\gamma-1}}{(\gamma-1)^{1/\gamma}}, \quad d_2 \equiv \frac{\partial^2 x}{\partial\rho\partial\tau} = \frac{b(a\gamma+\rho\tau)}{\gamma^2}\,\frac{(a+\rho\tau)^{1/\gamma-2}}{(\gamma-1)^{1/\gamma}},$$
$$d_3 \equiv (\Delta t)^{-1}\frac{\partial^2(\log M_{t+\Delta t} - \log M_t)}{\partial x \partial \tau} = \frac{(a\gamma+\rho\tau)}{b\tau^2}\,\frac{(a+\rho\tau)^{-1/\gamma}}{(\gamma-1)^{1-1/\gamma}}$$

Conversely, the model parameters (a, b, γ) are pinned down by these three moments as

$$\gamma = 1 + \frac{\rho^2 d_2}{\tau^2\, d_1^2 d_3}, \quad a = \rho\tau\,\frac{\gamma\rho - d_1/d_2}{\gamma(d_1/d_2 - \rho)}, \quad b = \frac{d_1\gamma}{\rho}\frac{(\gamma-1)^{1/\gamma}}{(a+\rho\tau)^{1/\gamma-1}} \tag{11}$$

This proposition suggests that we can determine model parameters (a, b, γ) using empirical moments (d_1, d_2, d_3). Note that the theory-predicted moments (d_1, d_2, d_3) vary with (τ, ρ). As a back-of-the-envelope calibration, we treat our empirical moments $(\hat{d}_1, \hat{d}_2, \hat{d}_3)$ as reflecting the theory-predicted moments at the average inattention $\bar{\tau}$ during the sample period and policy rate ρ_{2019Q4} in 2019Q4. Hence

$$\gamma \approx 1 + \frac{\rho_{2019Q4}^2 \hat{d}_2}{\bar{\tau}^2 \hat{d}_1^2 \hat{d}_3}, \; a \approx \rho_{2019Q4}\bar{\tau} \frac{\gamma\rho_{2019Q4} - \hat{d}_1/\hat{d}_2}{\gamma(\hat{d}_1/\hat{d}_2 - \rho_{2019Q4})}, \; b \approx \frac{\hat{d}_1 \gamma}{\rho_{2019Q4}} \frac{(\gamma-1)^{1/\gamma}}{(a + \rho_{2019Q4}\bar{\tau})^{1/\gamma - 1}} \tag{12}$$

We collect the empirical moments and calibrated model parameters in Table 3. For the empirical moments, in Section 5 we have estimated these three regressions: the level of the deposit spread, the deposit spread beta, and the deposit flow sensitivity to spread with respect to the standardized projected inattention $Z_\alpha \equiv \frac{\alpha - \bar{\alpha}}{\text{SD}(\alpha)}$, where $\text{SD}(\alpha)$ is the cross-sectional standard deviation of α averaged across years (Figure 5, Table 2). Further, the projected inattention α is linked to the model parameter τ through $\tau = 1 + \frac{180\, e^\alpha}{\text{HL}^{\text{sch}}}$. We translate the regression coefficients with respect to Z_α into moments $(\hat{d}_1, \hat{d}_2, \hat{d}_3)$ with respect to τ.[25] Then we use (12) to calibrate model parameters (γ, b, a). Figure A-14 plots the calibrated deposit decay rate $\bar{\tau}^{-1}P(x)$ as a function of the deposit spread x.

Table 3: Cross-sectional moments and calibration

Moment / Parameter	Symbol	Value
Policy rate	ρ_{2019Q4}	0.022
Average inattention	$\bar{\tau}$	2.60
Deposit spread v. inattention†	$\hat{d}_1$	0.0025
Deposit beta v. inattention†	$\hat{d}_2$	0.075
Deposit flow sensitivity v. inattention††	$\hat{d}_3$	1.4
Calibrated withdrawal probability $P(\rho - r) = a + ((\rho - r)/b)^\gamma$		
Curvature	γ	1.61
Slope	b	0.048
Intercept	a	0.0068

† Estimated in Figure 5; note that changes in spread levels with respect to changes in inattention are evaluated in 2019Q4. †† Estimated in Table 2. All α-related coefficients in Figure 5 and Table 2 are obtained for one-standard-deviation changes in α and converted to per-unit changes in τ using $\sigma(\alpha) = 0.25$ together with the $\hat{\alpha} \to \tau$ mapping in the text. Rates and flows are annualized.

In our application, we consider two types of deposit accounts in practice: savings deposits which pay positive interest rates for which we set the theory-implied optimal r, and the non-interest-bearing (NIB) deposits which pay zero interest rates.[26]

[25] Take the regression of deposit spread for example. Let β_Z denote the semi-elasticity of deposit spread r with respect to Z_α: $\frac{\partial r}{\partial Z_\alpha} = \beta_Z$. Because $Z_\alpha = \frac{\alpha - \bar{\alpha}}{\text{SD}(\alpha)}$, we have $\frac{\partial r}{\partial \alpha} = \frac{\beta_Z}{\text{SD}(\alpha)}$. The projected inattention α maps to model parameter τ via $\tau = 1 + \frac{180\, e^\alpha}{\text{HL}^{\text{sch}}}$ and hence $\frac{d\alpha}{d\tau} = \frac{1}{\tau - 1}$. The chain rule yields $\frac{\partial r}{\partial \tau} = \frac{\beta_Z}{\text{SD}(\alpha)} \frac{1}{\tau - 1}$.

[26] Regulation Q barred interest on demand deposits until 2011, and large non-interest-bearing (NIB) deposits persist throughout 2008-2022, accounting for roughly one-third to one-half of savings deposits (Figure A-19).

Aggregate implications on deposit spread and pass-through. Though our calibration is disciplined entirely by cross-sectional estimates with respect to inattention, it makes aggregate predictions that align reasonably well with the untargeted data moments. Table 4 summarizes the results. First, the calibration implies an average decay rate of 5.9% for the savings deposits in aggregate, in line with the literature—Drechsler, Savov, Schnabl, and Wang (2025) survey papers and industry reports suggesting a decay rate around 10%, Eichenbaum, Puglisi, Rebelo, and Trabandt (2025) estimate a decay rate of roughly 5% in a quantitative model, and Egan, Sunderam, Hortacsu, Kaplan, and Yao (2026) document a decay rate of about 10% using microdata. Second, this model generates an average deposit spread of 1.29% and an average pass-through of 0.61, similar to the data moments. Finally, relative to the seminal model of Drechsler, Savov, and Schnabl (2017) which predicts constant pass-through, our model allows pass-through to vary with the policy rate, consistent with the state-dependent monetary policy pass-through highlighted in Greenwald, Schulhofer-Wohl, and Younger (2023) and Eichenbaum, Puglisi, Rebelo, and Trabandt (2025). We estimate that a 1% increase in the policy rate is associated with a 4.6% increase in pass-through in the data and a 7.5% increase in the model. Two estimates are both statistically significant at 1% level and indistinguishable from one another.

Table 4: Untargeted aggregate time-series moments

Untargeted moments, savings deposits	Data	Model
Annual deposit decay rate	$\sim 10\%^{\dagger}$	$5.9\%^{\dagger}$
Average deposit spread	1.62%	1.29%
Average pass-through	0.42	0.61
OLS coef., pass-through on policy rate	4.6^{***}	7.5^{***}
	(1.6)	(2.1)

This table reports data and model-implied moments for savings deposits. † The data moment for average deposit decay rate is the number used by Drechsler, Savov, Schnabl, and Wang (2025) after surveying previous papers and industry reports. The model moment is the arithmetic average of the time series of theory-implied decay rate $\bar{\tau}^{-1}P(x_t)$. The data moment for deposit spread is constructed from: (i) a time series of the savings deposit rate r_t, computed from quarterly Call Reports for 1987–2023 and aggregated across banks using savings-deposit sizes as weights; and (ii) the policy rate ρ_t, defined as the quarterly average effective federal funds rate (EFFR). The data deposit spread is $\rho_t - r_t$. The model deposit spread is $\rho_t - r_t^m$, where the model-implied r_t^m is obtained by feeding the observed EFFR series ρ_t into the model under average inattention $\bar{\tau}$. Quarter-q pass-through is estimated using 12-quarter rolling regressions: $r_t = \sum_{k=-5}^{0} \gamma_k^q \rho_{t+k} + c_t + \epsilon_t, t = q-11, ..., q$ and then aggregating the coefficients as $\sum_{k=-5}^{0} \gamma_k^q$. We compute this object separately using the data series r_t and the model-implied r_t^m. We report the deposit-weighted average deposit spreads and pass-through for both the data and model-implied series. To quantify how pass-through varies with the policy rate, we regress $\sum_{k=-5}^{0} \gamma_k^q$ on ρ_q from 1987 to 2023, for both the data- and model-based pass-through measures. We report Newey-West standard errors with 11 lags to account for serial correlation. *** indicates a p-value less than 0.01.

Robustness of calibration. One concern of our calibration is that our inattention measure τ is noisy, which will introduce an attenuation bias to our estimated moments $(\hat{d}_1, \hat{d}_2, \hat{d}_3)$.

In particular, since they are all cross-sectional sensitivities with respect to inattention τ, they may be understated by a common scaling factor k that is larger if the measurement error is larger. As a robustness exercise, Figure A-15 plots the theory-implied deposit decay rate ($\tau^{-1}P$), per-dollar DFV (V_0/M_0), its sensitivity to inattention ($\frac{\partial \log V_0}{\partial \log \tau}$), and its dollar duration ($-\frac{\partial (V_0/M_0)}{\partial \rho}$), as functions of k. Our baseline calibration corresponds to $k = 1$ and the plots suggest that the predictions are fairly stable as k varies from one to two.

6.2. Deposit Franchise Value

We compute the deposit franchise value separately for savings deposits with positive deposit rates and for non-interest-bearing (NIB) deposits in the aggregate. We then further examine the deposit franchise value across banks.

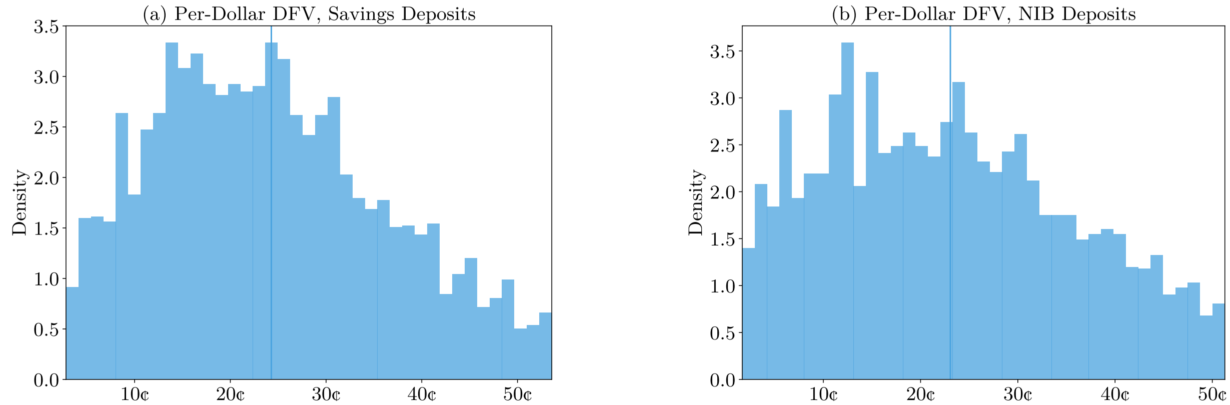
The aggregate deposit franchise value. Our calibration suggests a DFV of 18 cents per dollar of savings deposits. For the NIB deposits, we find a DFV of 16 cents per dollar of deposits. By the end of 2022, U.S. banks held roughly \$10 trillion in savings deposits and \$5 trillion in NIB deposits, which collectively lead to about \$2.6 trillion of aggregate DFV.

As a comparison, Appendix F.8 collects our estimates of banks' observed willingness to pay based on bonuses and promotional rate offers. Banks' observed willingness to pay is of similar magnitude to, but typically below, our calibrated DFV per dollar. While these calibrated numbers are to be taken with a grain of salt, they are consistent in that, as banks have market power, the cost of attracting deposits may not exceed the profit.

The cross-section of deposit franchise value. We summarize the cross-section of deposit franchise value using bank-level deposit data for the last quarter of 2019. We report per-dollar DFV, which is the object relevant for our comparative statics, and *total* DFV to document the scale and concentration of franchise value across banks. In the calibration, we hold (a, b, γ) fixed across banks, which allows us to highlight the role of inattention though it may understate the actual cross-sectional heterogeneity.

Figure 7 shows the cross-sectional distributions of DFV per dollar of deposits, $v^k_{0,i}$, across banks indexed by i and deposit type indexed by k (savings and non-interest-bearing). Total DFV $V^k_{0,i} = M^k_{0,i} v^k_{0,i}$ reflects both DFV per dollar, and the size of deposits. In the last quarter of 2019, the six largest institutions account for roughly one half of aggregate DFV for both savings and non-interest-bearing deposits, reflecting deposit concentration. We list the top six banks by total DFV for savings and non-interest-bearing deposits in Table A-4, which shows the size of DFV is highly concentrated at the very top of the bank size distribution. In addition, Appendix F.4 shows the positive correlation between the per-dollar DFV and market capitalization relative to deposit size in the cross section of banks.

Figure 7: The cross-section of per-dollar deposit franchise value, 2019Q4



Bank-level inattention $\alpha_{i,2019}$ is constructed by aggregating county-level inattention $\alpha_{c,2019}$ with 2019 deposit weights $w_{ic,2019}$ from the Summary of Deposits: $\alpha_{i,2019} = \sum_c w_{ic,2019}\, \alpha_{c,2019}, \qquad w_{ic,2019} \equiv \frac{\text{deposits}_{ic,2019}}{\sum_{c'} \text{deposits}_{ic',2019}}$. We then use $\alpha_{i,2019}$ to compute the bank-level DFV as detailed in Section 6.1.

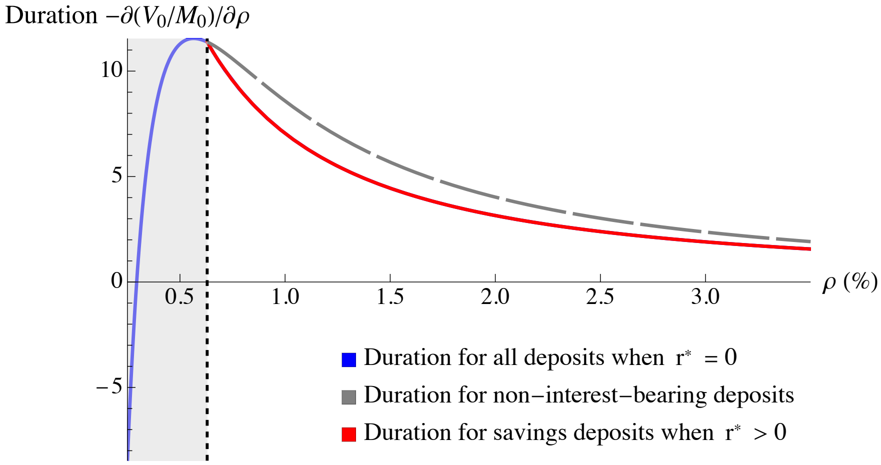
6.3. *Dollar Duration of Deposit Franchise Value*

We evaluate the dollar duration of per-dollar DFV, $-\frac{\mathrm{d}V_0/M_0}{\mathrm{d}\rho}$. Under the 2.2% policy rate in 2019Q4, the dollar duration of savings deposits is 2.8 and that of NIB deposits is 3.6. That means, if the policy rate increases by 1% from 2.2%, DFV will fall by 2.8 cents per dollar of deposits for savings deposits and by 3.6 cents per dollar for NIB deposits. That is \$280 billion for savings deposits and \$180 billion for non-interest-bearing deposits in total.

Figure 8 traces out the duration of two types of deposits as ρ varies. When the policy rate is sufficiently low, banks optimally post a zero rate for all deposits. In this case, the duration of deposit franchise is *negative*: an increase in the policy rate raises the spread one-for-one but since inattentive depositors are insensitive to rate and do not withdraw much faster, the net present value rises. Deposits therefore hedge interest rate risk, as emphasized by Drechsler, Savov, and Schnabl (2021) and Drechsler, Savov, Schnabl, and Wang (2025). For example, under the calibration, at a policy rate of $\rho = 25$ bp, $-\frac{\mathrm{d}V_0/M_0}{\mathrm{d}\rho} = -8.5$, that is, a 1% rise in policy rate adds 8.5 cents per dollar of franchise value, i.e. a *negative* duration.

As the policy rate ρ increases, the DFV duration turns positive. When ρ is between 30 bp and 63 bp, banks still post a zero deposit rate, but as ρ rises, deposit outflow accelerates and DFV decreases. When the policy rate is high enough ($\rho > 63$ bp), banks optimally pay a positive deposit rate. In this case, duration of savings deposits is lower than NIB deposits.

Figure 8: Duration of DFV

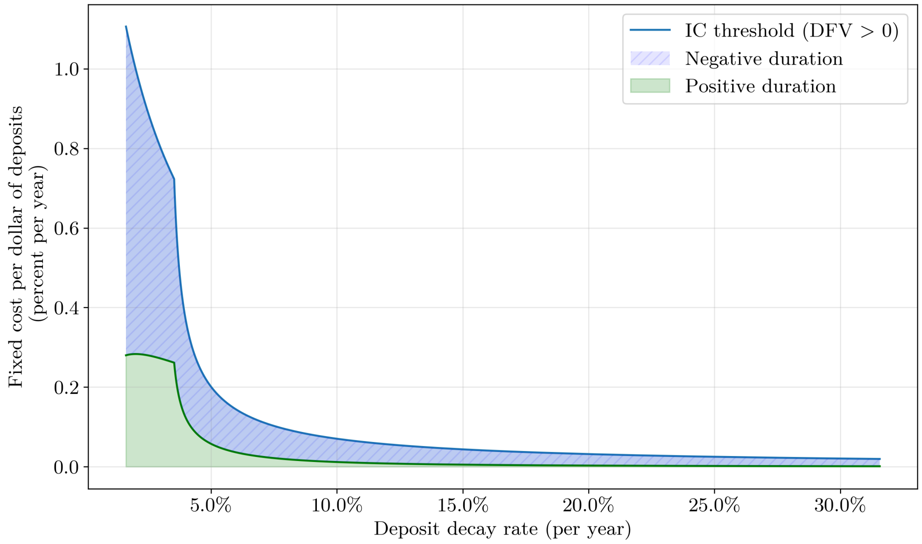


The figure plots the model-implied per-dollar DFV duration for non-interest-bearing (NIB) and savings deposits over policy rates ρ. Durations are computed from the baseline calibration summarized in Table 3. At very low rates ($\rho < 30$ bp) banks optimally post a zero deposit rate, franchise value rises as rates fall, generating a *negative* duration for both deposit types. For intermediate rates (30 bp $\leq \rho \leq$ 63 bp) outside options become attractive and outflows start; at this point the duration turns positive while posted deposit rates remain at zero. Once the policy rate exceeds 63 bp, banks optimally pay a positive deposit rate for savings deposits; the duration of savings deposits then drops below that of NIB deposits because banks can adjust the savings rate to trade off margin against attentive outflows, whereas NIB accounts must still pay zero.

Operating costs and duration. Discussions above abstract from operating costs, yet these can play an important role in the duration of DFV, as suggested by Drechsler, Savov, and Schnabl (2021), DeMarzo, Krishnamurthy, and Nagel (2025) and Drechsler, Savov, Schnabl, and Wang (2025). We analyze theoretically how variable and fixed operating costs affect the DFV duration in Appendix B.7. In summary, when the bank optimally sets an interior deposit rate, variable operating costs per se do *not* affect the sign of the DFV duration. By contrast, sufficiently high *per-period fixed operating costs for existing deposits* can make the DFV duration negative: a higher policy rate as the discount rate lowers the present value of those future fixed costs. It is empirically challenging to allocate banks' operating expenses between deposits and other business lines (such as lending), or to separate fixed from variable costs.[27] We instead build on our baseline calibration to show how fixed operating costs can flip the sign of DFV durations, depending on depositor inattention and the policy rate. We start by analyzing how fixed operating costs per dollar of existing deposits affect DFV durations across banks with different levels of depositor inattention at a given policy rate. Figure 9 plots, against the annual deposit decay rate, two cost thresholds (percent

[27]For example, DeMarzo, Krishnamurthy, and Nagel (2025) measure franchise operating costs (covering *both* loans and deposits) as the sum of salaries, premises, and other non-interest expenses net of deposit service charges, card fees, and related offsets, which include both the variable and the fix costs.

Figure 9: DFV duration with fixed costs, varying inattention



This figure plots the fixed operating cost per dollar of deposits (percent per year) against bank-level theory-implied decay rate calibrated in Section 6.1, using the 2019Q4 policy rate. Blue line indicates the incentive-compatible (IC) threshold corresponding to zero DFV, with costs below which the bank operates a profitable deposit business for existing deposits. Fixed costs above (/below) the green line imply a negative (/positive) duration.

per dollar per year): the level where DFV equals zero (blue line) and the level where DFV duration equals zero (green line), using the end-of-2019 calibration in Section 6.1. The deposit decay rate is implied by the theory-implied optimal deposit rate and declines with depositor inattention (lower decay corresponds to higher inattention). When inattention is high (low decay), the optimal deposit rate is zero, and banks can sustain relatively large fixed costs while still earning profits from existing deposits. As depositors become more attentive, banks begin paying a positive deposit rate, and the maximum sustainable fixed cost falls. The blue curve is the zero-DFV-duration frontier: DFV is positive only below this curve; above it, banks would not continue serving existing depositors. The green curve gives the fixed cost at which the DFV duration is zero at a given decay rate. When per-period fixed costs are high (blue-hatched region above the green curve), the duration is *negative*; when fixed costs are low (below the green curve), the duration is positive.

More generally, we examine how fixed operating costs change the sign and size of DFV duration for banks under varying policy rates in Appendix F.6, complementing existing work on time-varying deposit funding stability (Blickle, Li, Lu, and Ma 2025).

6.4. Effects of Digital Banking through Depositor Inattention

Recent work shows that online banks exhibit greater pass-through (Erel, Liebersohn, Yannelis, and Earnest 2023), mobile apps increase deposit outflows and reduce DFV (Koont

2023, Koont, Santos, and Zingales 2024), digital disruption sorts banks by depositor tech-savviness (Jiang, Yu, and Zhang 2024), and open banking spurs competition (Babina et al. 2025). Complementing these empirical findings, we assess the impact of digital banking through our model: by reducing depositor inattention, these technologies can make deposit demand more elastic and reduce DFV.

For savings deposits, the elasticity of DFV with respect to inattention under our calibration is $\frac{\partial \log V_0}{\partial \log \tau} = 0.66$. For NIB deposits, the calibrated sensitivity is 0.84. These elasticities imply that a 10% reduction in inattention τ reduces the deposit franchise value of savings deposits by roughly 6.6% and that of NIB deposits by roughly 8.4%. In other words, a 10% reduction in inattention wipes out about $186 billion of aggregate DFV.

6.5. Demographics, Inattention, and the Deposit Franchise

In Section 5, we forecast transformed depositor inattention α_{ct} using a flexible non-linear model. To summarize which characteristics are most predictive directionally, we fit a sparse linear model on 2010 county demographics with $\alpha_{c,2010}$ as the target. It selects a concise set of predictive covariates and produces signs indicating whether an increase in a predictor is associated with more or less attention. We summarize a few informative covariates below. First, counties with larger shares of women tend to be more attentive (lower inattention). Age structure also matters, and having more children is associated with higher inattention. These associations are descriptive rather than causal; illustrative magnitudes and full estimates are in Table A-6. The correlation between demographics and inattention suggests potential distributional effects of monetary policy and digital banking.

7. Conclusion

Depositor inattention plays an important role in banks' market power in deposit markets. Drawing on billions of transaction records for millions of depositors, we document that depositors are inattentive in that they manage their bank accounts infrequently, and that inattention varies across depositors. We develop a dynamic model in which inattention grants banks market power over depositors, modulating an intertemporal trade-off: raising the spread today boosts profits, but lowers the deposit base in the future as depositors withdraw. The model predicts, and the data confirm, that inattention explains variations in spreads, monetary pass-through, and deposit flow sensitivity across banks.

The paper delivers two aggregate implications for banking and monetary economics. First, pass-through is incomplete, declines if depositors are more inattentive, and rises with the level of the policy rate. Thus, the strength of monetary transmission through the deposits channel depends on where the economy sits in the monetary cycle and the inattention in banks' deposit base. Second, deposit franchise value is non-monotonic in the policy rate: tightening raises it near the zero lower bound but reduces it at high rates, leading to state dependence in banks' funding stability, especially for banks with highly inattentive depositors.

Our findings point to several directions for future research. Understanding how depositor attention fluctuates over the business cycle and with economic uncertainty could shed light on the time variation in banks' funding stability. Moreover, the welfare implications of depositor inattention depend on whether higher deposit rates compensate households for the opportunity cost of paying attention. Another promising next direction is to study the effects of regulation and market design on depositor attention (Piazzesi and Schneider 2020), as well as their implications for the trade-off between financial stability and consumer welfare.

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Online Appendix for
"Banking on Inattention"

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April 26, 2026

A. Illustrative Figures

A.1. Properties of Optimal Rate and Pass-Through

Figure A-1 panels (a) and (b) show that both the optimal deposit rate r and the pass-through $\partial r/\partial\rho$ decline in τ, and each is zero once $\tau \geq u(\rho)$, as suggested by Proposition 1. Panels (c)-(d) show that $r(\rho)$ is increasing and convex, while the pass-through $\partial r/\partial\rho$ rises with ρ. The increase in pass-through with respect to ρ is consistent with evidence reported in Greenwald, Schulhofer-Wohl, and Younger (2023).

A.2. Short-run Adjustment Dynamics

Figure A-2 illustrates the short-run adjustment dynamics. On the left, we plot the optimal deposit rate under a policy rate of 2% and 2.25% respectively. Imagine the policy rate rises from 2% to 2.25%, or falls from 2.25% to 2%, the banks above the threshold $u(\bar{\rho})$ set zero deposit rates and those below the threshold want to adjust. On the right, we show that the share of adjustment S_t is higher under higher event-peak rate $\bar{\rho}$.

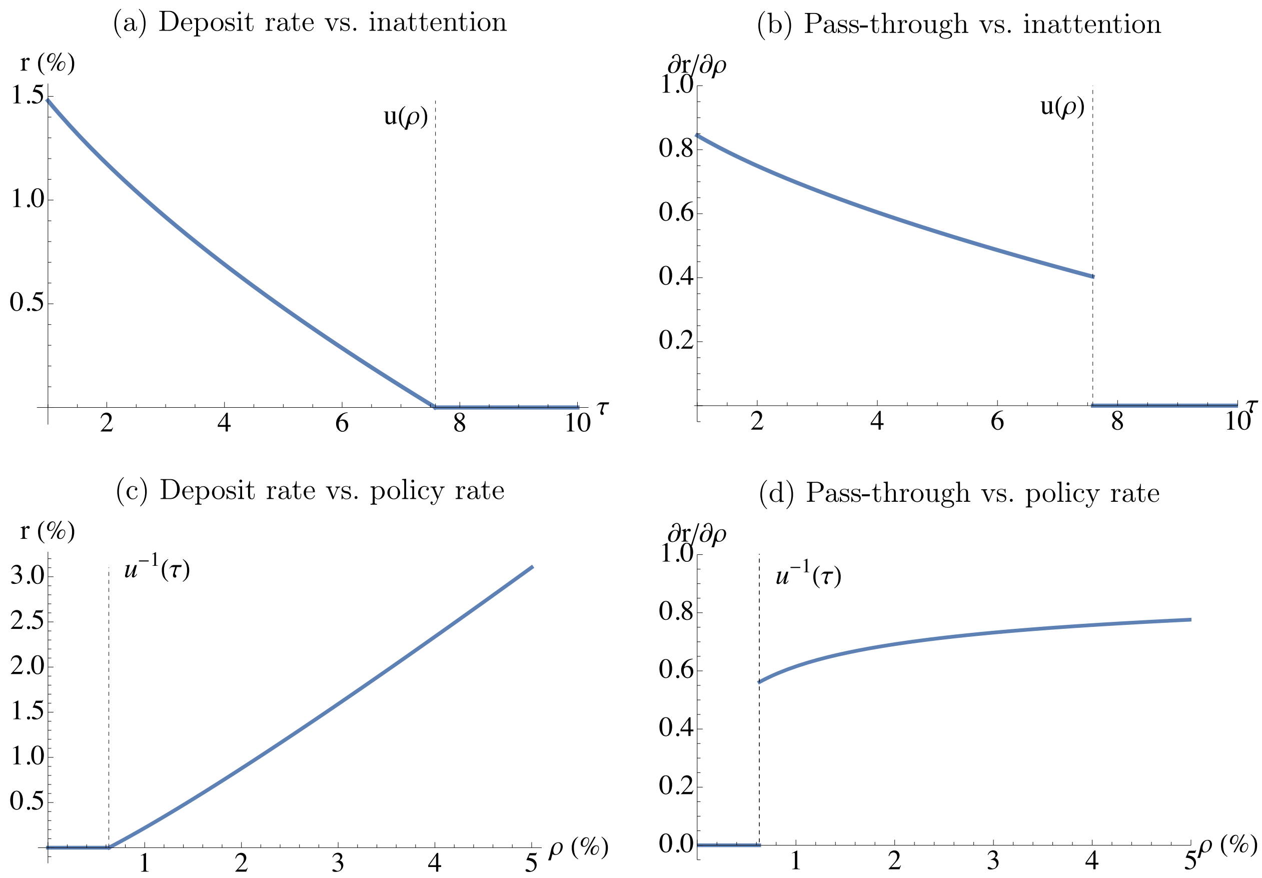


Figure A-1: Banks' rate setting: comparative statics in τ and ρ

Panels (a) and (b) plot the optimal deposit rate r and the pass-through $\partial r/\partial\rho$ as functions of inattention τ, for the calibrated parameters in Section 6 and policy rate $\rho = 2.2\%$, as implied by Proposition 1. The vertical dashed line marks the threshold $u(\rho)$; beyond it both objects are zero. Panels (c) and (d) hold $\tau = 2.6$ and vary ρ. In (c) $r(\rho)$ is increasing and convex, while in (d) pass-through increases in ρ but at a decreasing rate (concave).

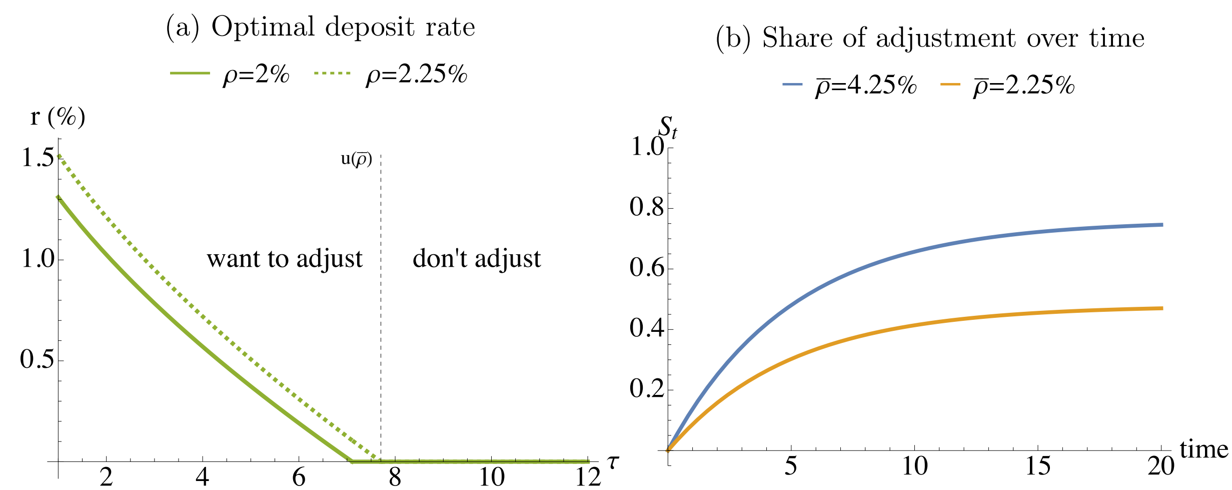


Figure A-2: Short-run dynamics

Panel (a) plots the optimal deposit rate r under two different policy rates as functions of inattention τ as predicted by Proposition 1, under the calibrated parameters in Section 6. Panel (b) plots the share of banks that have adjusted by time t in response to a time-0 policy change under two different event-peak policy rate $\bar{\rho}$ as predicted by Proposition 4.

B. Theory Complements

B.1. A Microfoundation of the Reduced-Form Demand Function

While the demand function (1) is specified for tractability, it can be microfounded through a myopic portfolio choice problem as follows. We do not intend it to be a comprehensive characterization of real-life portfolio choice, but rather a way to clarify the basic trade-off behind deposit demand.

At each point of time t, $\tau^{-1}\mathrm{d}t$ share of depositors reoptimize their deposit balances, whereas the rest maintain the same balance. For depositors who reoptimize their balance m, they allocate money between the bank account and a money market fund, choosing q share in the bank account and transferring the rest to the money market fund which pays a deposit spread $x > 0$ relative to the bank account. (In equilibrium, the monopoly bank will always choose a positive deposit spread x.) However, transactions of random size sm arrive at Poisson rate ν with $s \sim G(s)$ of full support on $[0, \bar{s}]$, and if transaction need exceeds the bank balance, the depositor must liquidate the money market fund at cost k per dollar of short fall. Hence they maximize the instantaneous monetary returns as

$$\max_{q} \quad (1-q)m \cdot x\mathrm{d}t - \kappa\,\mathrm{E}[\max(sm - qm, 0)] \cdot \nu\mathrm{d}t$$

or equivalently, with $g(s)$ being the probability density function

$$\max_{q} \quad x(1-q) - \nu\kappa \int_{\min\{q,\bar{s}\}}^{\bar{s}} (s-q)g(s)\mathrm{d}s \tag{13}$$

The optimal q^* depends on the deposit spread x, which gives rise to the aggregate law of motion for deposits (1) as follows.

Proposition 6. *The myopic portfolio choice implies that the aggregate deposits decay at a constant rate as*

$$\dot{M}_t/M_t = -\tau^{-1}P(x)$$

with a withdrawal probability $P(x)$ that increases in x, and when $g' > 0$ (conditional on having transaction needs exceeding deposits, larger transactions are more likely), is convex.

In particular, if $G(s) = 1 - (1 - s/\bar{s})^{1/\gamma}$, the implied withdrawal probability $P(x)$ has the functional form of (2) with $a = 1 - \bar{s}, b = \nu\kappa(\bar{s})^{-1/\gamma}$, which is convex if and only if $\gamma > 1$.

B.2. Time Consistency

Here we analyze a monopoly bank's optimal pricing under discretion. We show that it coincides with the optimal pricing under commitment analyzed in the baseline model, suggesting that it is time-consistent.

Specifically, suppose that the bank switches control whenever a Poisson strike with intensity Λ hits. At each point of time τ, the bank maximizes

$$V(M_\tau) \equiv \max_{\{r_{\tau+t}\geq 0\}_{t\geq 0}} \mathrm{E}\left[\int_0^s \mathrm{e}^{-\rho t}\left(\rho - r_{\tau+t}\right) M_{\tau+t}\mathrm{d}t + \mathrm{e}^{-\rho s} V(M_{\tau+s})\right] \tag{14}$$

where the expectation $\mathrm{E}[\cdot]$ is taken over all possible time horizon $s \geq 0$ over which the bank can commit to deposit rates, subject to law of motion (1). Under the Poisson assumption, the expected horizon of commitment is Λ^{-1}. It simplifies to

$$V(M_\tau) = \max_{\{r_{\tau+t}\geq 0\}_{t\geq 0}} \int_0^\infty \mathrm{e}^{-(\rho+\Lambda)t}\left[\left(\rho - r_{\tau+t}\right) M_{\tau+t} + \Lambda V(M_{\tau+t})\right]\mathrm{d}t \tag{15}$$

Proposition 7. *Given any switching probability Λ (and hence any expected horizon of commitment), each time-τ bank sets the same constant deposit rate as characterized by Proposition 1. That is, the optimal rate setting is time-consistent.*

In the baseline model, the optimal rate setting is time-consistent, since the constraint (1) is not forward-looking.

B.3. Deposit Inflow and Steady State Deposit Balance

Here we extend the baseline model to allow for deposit inflow, potentially subject to an acquisition cost paid by the bank, and study its implications for deposit balance.

Specifically, we replace (1, 3) by assuming that the deposit balance evolves according to

$$\dot{M}_t = -\tau^{-1} P(x_t) M_t + I_t \tag{16}$$

and the deposit franchise value is

$$V_0 = \max_{\{r_t\geq 0, I_t\geq 0\}_{t\geq 0}} \int_0^\infty \mathrm{e}^{-\rho t}(x_t M_t - C(I_t))\mathrm{d}t \tag{17}$$

in which I_t is the deposit inflow and $C(I_t)$ is the acquisition cost. We consider two cases:

a) *Constant free inflow I.* This can be due to direct deposits of income. In this case, we fix $I_t \equiv I, C(I_t) \equiv 0$.

b) *Quadratic acquisition cost* $C(I_t) = \frac{\kappa}{2} I_t^2$. This will give rise to an interior solution of acquisition I_t.

Proposition 8. *i. (Deposit rate) The bank charges a deposit rate r that is the same as characterized in Proposition 1.*

ii. (Deposit inflow and balance) The deposit balance evolves as

$$M_t = \frac{I}{\delta}(1 - e^{-\delta t}) + M_0 e^{-\delta t} \tag{18}$$

in which $\delta = \tau^{-1}P(\rho - r)$ is the decay rate and I a) is the constant in the constant-free-inflow case, or b) satisfies in the quadratic-acquisition-cost case

$$\underbrace{\kappa I}_{\text{marginal cost}} = \underbrace{\frac{\rho - r}{\tau^{-1}P(\rho - r) + \rho}}_{\substack{\text{marginal benefit} \\ = \text{per-dollar DFV of initial deposits}}} \tag{19}$$

In the quadratic-acquisition-cost case, both the inflow I and the steady-state deposit balance I/δ increase in inattention τ and decreases in the policy rate ρ.

iii. (Deposit flow sensitivity) The deposit flow sensitivity holding fixed inflow I is the same as characterized in Proposition 2.

iv. (Deposit franchise value) The deposit franchise value (DFV) equals

$$V_0 = \frac{\rho - r}{\tau^{-1}P(\rho - r) + \rho}\left(M_0 + \frac{I}{\rho}\right) - \frac{C(I)}{\rho} \tag{20}$$

which increases in τ. When the deposit spread is interior, i.e., $r \in (0, \rho)$, DFV decreases in the policy rate ρ in both the case of constant free inflow and that of quadratic acquisition cost.

This proposition generalizes the main results in the baseline model to incorporate inflows. It first suggests that in the presence of deposit inflows, the optimal deposit rate is the same as in the baseline model. That is, the rate-setting is decoupled from the optimal acquisition. The reason is that the deposit franchise value is linear in the initial deposit balance M_0. Thus the bank sets the deposit rate to maximize the discounted profits from each dollar of deposits in the same way, no matter whether it is inside the bank or outside the bank (but can be acquired).

It is this per-dollar DFV of initial deposits that pins down the optimal size of acquisition. The intuition is the same as the classic investment-q problem, where the marginal cost of investment equals the marginal q, once we recognize that the per-dollar DFV of initial deposits is the average q and corresponds to the marginal q since DFV is linear in initial deposit size M_0. As the bank attracts a constant deposit inflow I, the deposit balance converges from its initial level M_0 to its steady state level I/δ. Both the deposit inflow I and the steady-state deposit balance I/δ are higher if the depositors are more inattentive (higher τ) or if the policy rate ρ is lower.

Last, in terms of the deposit franchise value taking into account inflows, it is higher if inattention τ is higher, since the bank must strictly do better when facing a slower decay rate in (16). When the optimal deposit rate r is interior, we can evaluate the duration of DFV by treating the deposit spread $\rho - r$ and the inflow I as fixed, since they are optimally chosen to maximize DFV. In that case, the higher the policy rate, the lower DFV, due to a higher discount rate on future profits.

B.4. Inattentive, Spread-Sensitive Deposit Inflow

Here we consider deposit inflow from inattentive depositors who respond to the deposit spread. Compared to the baseline model, here inattention τ and withdrawal probability $P(x)$ (which embeds the demand elasticity) play separate roles. Still, we show that the same comparative statics of deposit rate and pass-through with respect to depositor inattention hold as in the baseline model.

Specifically, we assume that the deposit balance M_t evolves from M_0 as

$$\dot{M}_t = -\tau^{-1}P(x)M_t + \tau^{-1}(1 - P(x))(I - M_t) = -\tau^{-1}[(1 - P(x))I - M_t] \tag{21}$$

with $x = \rho - r$. The idea is that there is a pool of potential depositors with dollar amount I and, at time t, an amount M_t is held in the bank. At any point in time t, τ^{-1} share of the depositors at the bank optimize and move P share of their money out, while τ^{-1} share of the non-bank depositors optimize and move $(1 - P)$ share of their money into the bank.

Compared to the baseline model where $\tau^{-1}P(x)$ is the sufficient statistic governing exponential decay of the deposit M_0, here we allow τ and $P(x)$ to play independent roles capturing inattention and demand elasticity respectively. In this model, the deposit balance converges from M_0 to $(1 - P(x))I$. We assume $P(x)$ follows the same functional form as (2) and the bank maximizes the deposit franchise value (3). We establish below that the same comparative statics of deposit pricing hold as in the baseline model.

Proposition 9. *Define the threshold function*

$$u(\rho) \equiv \frac{(\gamma + 1)(\rho/b)^\gamma - (1 - a)}{\rho M_0/I} \tag{22}$$

which increases in ρ.

1. *If $\tau \geq u(\rho)$, the bank sets a zero deposit rate $r = 0$ and has zero pass-through from the policy rate ρ to deposit rate r.*

2. *If $\tau < u(\rho)$, the bank sets a deposit rate below the policy rate*

$$r = \rho - b\left(\frac{\rho\tau M_0/I + 1 - a}{\gamma + 1}\right)^{1/\gamma} \tag{23}$$

with the following properties:

(a) deposit rate comparative statics: *deposit rate is lower with higher inattention, i.e., $\frac{\mathrm{d}r}{\mathrm{d}\tau} < 0$;*

(b) incomplete pass-through: *the pass-through is between 0 and 1, i.e., $\varepsilon \equiv \frac{\partial r}{\partial \rho} \in (0, 1)$;*

(c) variable pass-through: *the pass-through increases with the policy rate, i.e., $\frac{\partial \varepsilon}{\partial \rho} > 0$;*

(d) pass-through comparative statics: *the pass-through is lower with higher inattention, i.e., $\frac{\partial \varepsilon}{\partial \tau} < 0$.*

To understand these results, we discuss the deposit pricing decision. The deposit franchise value is

$$V_0 = \underbrace{x}_{\text{profit margin}} \cdot \left[\underbrace{\frac{(1 - P(x))I\tau^{-1}}{\rho(\rho + \tau^{-1})}}_{\text{long-run deposit base}} + \underbrace{\frac{M_0}{\rho + \tau^{-1}}}_{\text{existing deposit base}}\right] \tag{24}$$

Raising the deposit spread x leads to a higher profit margin, but it lowers the long-run deposit base. So the optimal x strikes a balance.

Under higher depositor inattention τ, the long-run deposit base becomes less important because it takes longer to reach. As a result, the bank chooses a higher deposit spread x to maximize DFV, i.e., a lower deposit rate.

If the policy rate ρ increases, the bank cares less about the long-run deposit base, and thus raises the deposit spread x to earn margin on the existing deposit base. That is, as ρ rises, the deposit spread x goes up, which implies that the pass-through is incomplete.

B.5. Time-Varying Policy Rate

Here we consider a time-varying policy rate ρ_t and pass-through of a transitory change in the policy rate. We show that the comparative statics of the deposit rate r_t and pass-through with respect to inattention continues to hold with the same sign, and the pass-through is smaller when the policy change is more persistent.

We assume a time-varying policy rate ρ_t that is always positive and converges to a positive level $\rho > 0$ as $t \to \infty$. The deposit franchise value in (3) the bank optimizes becomes, with $x_t \equiv \rho_t - r_t$,

$$\max_{\{x_t \in [0,\rho_t]\}_{t\geq 0}} V_0 = \int_0^\infty \mathrm{e}^{-\int_{s=0}^t \rho_s \mathrm{d}s} x_t M_t \mathrm{d}t \tag{25}$$

which is still subject to the law of motion (1) for the deposit base.

Proposition 10 (Optimal deposit rate and pass-through)**.** *When the bank sets an optimal interior deposit rate $r_t \in (0, \rho_t)$, the associated deposit spread $x_t = \rho_t - r_t$ satisfies the following differential equation*

$$\frac{(\gamma-1)\dot{x}_t}{x_t} = \tau^{-1}\left[(\gamma-1)\left(\frac{x_t}{b}\right)^\gamma - a\right] - \rho_t \tag{26}$$

or equivalently, in the integral form,

$$x_t^{-\gamma} = \tau^{-1}\frac{\gamma}{b^\gamma}\int_t^\infty \exp\left\{-\frac{\gamma}{\gamma-1}\int_t^s (\rho_u + a\tau^{-1})\mathrm{d}u\right\}\mathrm{d}s \tag{27}$$

The optimal deposit rate r_t has the following properties:

(a) the deposit rate r_t is lower when τ is higher, i.e., $\frac{\partial r_t}{\partial \tau} < 0$;

(b) the intertemporal pass-through $\frac{\partial r_t}{\partial \rho_s}$ for $s > t$ is negative and infinitesimal.

Formula (27) characterizes the optimal deposit spread x_t as a forward-looking discounted sum. As in the baseline model, the intuition arises from the intertemporal margin-outflow trade-off a bank faces: at each point of time t, a higher spread x_t means a higher profit margin, which raises the instantaneous profits, but accelerates the outflow, leading to a smaller deposit base in the future. The importance of the outflow consideration depends on the future profit margin and future discount rate, and hence hinges on the future policy rate ρ_s with $s > t$. Therefore, the optimal deposit spread x_t responds to all future policy rates. Nonetheless, we show that, banks with more inattentive depositors (higher τ) set higher deposit spreads x_t, i.e., lower deposit rates r_t. Finally, future rate hikes make the bank care less about its future deposit base, so it optimally lowers today's deposit rate to enjoy a higher spread now, producing negative intertemporal pass-through.

A further implication of (27) is that, the path of optimal deposit spread x_t is continuous, even if the path of the policy rate ρ_t is discontinuous.[28] In setting the deposit spread x_t,

[28] If the policy rate ρ_t is discontinuous and the deposit spread x_t is continuous, the deposit rate $r_t = \rho_t - x_t$ is discontinuous and jumps whenever ρ_t jumps.

the bank trades off profit margin and deposit outflow, which matters for future profits. The future path of policy rate ρ_u governs the discounting factor between current t and any future s, i.e., $\mathrm{e}^{-\int_t^s \rho_u \mathrm{d}u}$. Even if the path of ρ_u is discontinuous, the discounting factor between t and future s, which is an integral, is continuous in s. Hence the optimal path of deposit spread x_t is continuous.

By the same intertemporal margin-outflow trade-off logic, if future policy rate ρ_s goes up, the bank discounts future profits more and hence infinitesimally raises its current profit margin x_t (i.e., lowers its current deposit rate r_t) to raise current profits while tolerating a larger outflow.

Proposition 11 (Pass-through of transitory shock)**.** *In response to a small transitory policy rate shock around a steady state $\rho_t = \rho + \Delta\rho \mathrm{e}^{-\phi t}$, the optimal interior deposit spread satisfies $r_t = r + \Delta r \mathrm{e}^{-\phi t}$, with the steady-state deposit rate*

$$r = \rho - b\left(\frac{\rho\tau + a}{\gamma - 1}\right)^{1/\gamma} \tag{28}$$

which coincides with (7), and pass-through

$$\frac{\Delta r}{\Delta \rho} = 1 - \frac{x}{\phi(\gamma - 1) + \tau^{-1}\gamma(\rho\tau + a)} \tag{29}$$

which is lower when inattention τ is higher or when the policy shock is more persistent (smaller ϕ).

This proposition formalizes the pass-through in response to a transitory shock. It suggests that, when inattention τ is higher, the pass-through is smaller, as in the baseline case with a permanent policy shock (nested by $\phi = 0$).

In addition, when the shock is more persistent (smaller ϕ), the pass-through into deposit rate is smaller. At a high level, the intuition is that a more persistent policy shock discounts future profits more for the bank and hence incentivizes the bank to set a larger deposit spread now to increase current profits. We could also connect this result to Proposition 10. From the viewpoint of time t, such a transitory policy shock consists of a change in the time-t policy rate ρ_t as well as a series of changes in future policy rate ρ_s. In response to any change in the future policy rate ρ_s, the bank will infinitesimally lower the current deposit rate r_t. Therefore, the more persistent the policy shock, the smaller the increase in the current deposit rate r_t.

B.6. Deposit Decay Rate Dependent on Deposit Spread and Policy Rate

Here we consider an extension of the baseline model to take into account potential direct dependence of the withdrawal probability on the policy rate, i.e., $P(x, \rho)$. Such a direct dependence may affect the sign of the deposit franchise value duration.

Specifically, we assume that deposits decay at

$$\dot{M}_t/M_t = -\tau^{-1}P(x, \rho) \tag{30}$$

in which $x \equiv \rho - r$ is the deposit spread and ρ is the policy rate with a more general functional form for the withdrawal probability P than (2)

$$P(x, \rho) = a + \frac{x^\gamma \rho^{-\eta}}{b^\gamma} \tag{31}$$

with $a \geq 0, b > 0, \gamma > 1, \gamma > \eta \geq 0$. As in the baseline model, $\gamma > 1$ ensures the convexity of withdrawal probability P in x and hence the concavity of the bank's profits function. We consider $\eta > 0$ to be an extension of the baseline model to incorporate potential diminishing sensitivity of depositors—given the same deposit spread x, the higher the policy rate, the smaller the withdrawal probability. Further, $\gamma > \eta$ ensures that $P(\rho - r, \rho)$ increases in ρ as long as $r \in [0, \rho]$—withdrawal rate increases in the policy rate when the deposit rate r is held fixed.

The bank maximizes the deposit franchise value as follows, which generalizes (4)

$$\max_{x \in [0,\rho]} V_0 = \frac{x}{\tau^{-1}P(x, \rho) + \rho} M_0 \tag{32}$$

We extend the propositions in Section 2.2 under an additional condition $\gamma > 1 + \eta$. We show that the comparative statics of deposit rate, pass-through, and deposit flow sensitivity continue to be true, whereas the duration of DFV may be flipped to negative even when banks charge positive deposit rates.

Proposition 12. *i. (Optimal deposit rate and pass-through) Define the threshold function*

$$u(\rho) = \frac{(\gamma - 1)\rho^{\gamma - \eta}/b^\gamma - a}{\rho} \tag{33}$$

which increases in ρ. If $\tau > u(\rho)$, the bank sets $r = 0$. If $\tau \leq u(\rho)$, the bank sets a positive deposit rate

$$r = \rho - b\left(\frac{(\rho\tau + a)\rho^\eta}{\gamma - 1}\right)^{1/\gamma} \tag{34}$$

which satisfies $\frac{\partial r}{\partial \tau} < 0$, $\frac{\partial r}{\partial \rho} \in (0,1)$, $\frac{\partial^2 r}{\partial \rho \partial \tau} < 0$.

ii. *(Deposit flow sensitivity) The deposit flow sensitivity with respect to deposit spread* $(\Delta t)^{-1} \frac{\partial(\log M_{t+\Delta t} - \log M_t)}{\partial x}$ *declines in magnitude in* τ.

iii. *(Deposit franchise value) The deposit franchise value increases in* τ. *Further, when* $\tau < \min\{u(\rho), \frac{a\eta}{\rho(\gamma-1-\eta)}\}$, *the bank charges an optimal* $r > 0$ *while its deposit franchise value increases in* ρ.

In particular, Proposition 12 suggests that, in the presence of the direct effect of ρ on withdrawal probability $P(x,\rho)$, DFV may increase in the policy rate ρ even when the bank optimally sets a positive deposit rate r. In this case, a higher ρ decelerates the outflow, which dominates the effect of higher discount rate and leads to an increase in DFV.

B.7. Variable and Fixed Operating Costs

Here we consider an extension of the baseline model to take into account variable operating costs (Drechsler, Savov, Schnabl, and Wang 2025) and fixed operating costs (Drechsler, Savov, and Schnabl 2021, DeMarzo, Krishnamurthy, and Nagel 2025), and show that the former by itself does not change the sign of the DFV duration whereas the latter may.

Specifically, we assume that the deposit franchise value follows, extending (3),

$$\max_{\{r_t \geq 0\}_{t\geq 0}} V_0 \equiv \int_0^\infty \mathrm{e}^{-\rho t} \left[(\rho_t - r_t - c)M_t - F\right] \mathrm{d}t \tag{35}$$

in which $c \geq 0$ stands for a variable operating cost per dollar of deposit and $F \geq 0$ represents a fixed operating cost which applies regardless of the deposit size (e.g., operating a bank branch).

We extend the propositions in Section 2.2. We show that the comparative statics of deposit rate, pass-through, and deposit flow sensitivity continue to be true. Further, when banks charge positive deposit rates, the presence of variable operating cost does not affect the sign of the DFV duration, whereas the existence of fixed operating cost makes the DFV duration more negative.

Proposition 13. i. *(Optimal deposit rate and pass-through) Define the threshold function*

$$u(\rho) = \frac{(\gamma-1)\rho^{\gamma-1} - c\gamma\rho^{\gamma-2} - ab^\gamma \rho^{-1}}{b^\gamma} \tag{36}$$

which increases in ρ *as long as* $\rho > c$. *If* $\tau > u(\rho)$, *the bank sets* $r = 0$. *If* $\tau \leq u(\rho)$, *the* *bank sets a positive deposit rate that satisfies*

$$-(\gamma-1)(\rho-r)^{\gamma}+c\gamma(\rho-r)^{\gamma-1}+(a+\rho\tau)b^{\gamma}=0 \tag{37}$$

which satisfies $\frac{\partial r}{\partial \tau}<0, \frac{\partial r}{\partial \rho}\in(0,1), \frac{\partial^2 r}{\partial\rho\partial\tau}<0.$

ii. *(Deposit flow sensitivity) The deposit flow sensitivity with respect to deposit spread* $(\Delta t)^{-1}\frac{\partial(\log M_{t+\Delta t}-\log M_t)}{\partial x}$ *declines in magnitude in* τ.

iii. *(Deposit franchise value) The deposit franchise value increases in* τ. *Further, the bank charges an optimal* $r>0$ *while its deposit franchise value increases in* ρ, *when* $\tau<u(\rho)$ *and the fixed operating cost is large relative to the deposit size such that*

$$\frac{F}{M_0}>\frac{(\rho-r-c)\rho^2}{(\tau^{-1}P(\rho-r)+\rho)^2} \tag{38}$$

This proposition suggests that, the presence of the variable operating cost c by itself does not alter the sign of the DFV duration. That is because the bank optimally sets the deposit rate, taking into account the variable operating cost. However, a large enough fixed operating cost F can overturn the sign of the DFV duration relative to the baseline model, since a higher discount rate lowers the present value of such a fixed operating cost.

C. Proofs

C.1. Proofs for the Baseline Model

Proof of Proposition 1. First, to establish the interior solution, we notice from (5) that

$$\left.\frac{\partial V_0}{\partial x}\right|_{x=0}=\frac{1}{\rho+\tau^{-1}a}M_0>0$$

which means that the optimal $x>0$. Without constraint $x^*\leq\rho$, the optimal x satisfies

$$\frac{\partial V_0}{\partial x}=\frac{\rho+\tau^{-1}P(x)-\tau^{-1}xP'(x)}{(\tau^{-1}P(x)+\rho)^2}M_0=0$$

And the 2nd-order derivative evaluated at this optimal x is

$$\left.\frac{\partial^2 V_0}{\partial x^2}\right|_{x^*}=\frac{-\tau^{-1}xP''(x)}{(\tau^{-1}P(x)+\rho)^2}M_0 \tag{39}$$

which is negative since P is convex. Thus V_0 increases from $x = 0$ until the optimal x and then decreases afterward. This optimal x satisfies

$$xP'(x) - P(x) = \rho\tau$$

or equivalently,

$$r = \rho - Q^{-1}(\rho\tau) \tag{40}$$

in which $Q^{-1}(\cdot)$ is defined implicitly by

$$Q(x) \equiv xP'(x) - P(x) = (\gamma - 1)\left(\frac{x}{b}\right)^{\gamma} - a \tag{41}$$

and hence $Q^{-1}(y) = b\left(\frac{y+a}{\gamma-1}\right)^{1/\gamma}$ and

$$r = \rho - b\left(\frac{\rho\tau + a}{\gamma - 1}\right)^{1/\gamma} \tag{42}$$

Thus, the bank sets an interior $r \in (0, \rho)$ when $\rho > Q^{-1}(\rho\tau)$, which simplifies to

$$\tau < \frac{(\gamma - 1)(\rho/b)^{\gamma} - a}{\rho} \tag{43}$$

The RHS is increasing in ρ and denoted as $u(\rho)$ in the proposition for simplicity.

Regarding the comparative statics:

(a) For $\frac{\partial r}{\partial \tau}$, from (40), we have $\frac{\partial r}{\partial \tau} = -(Q^{-1})'\rho$. Further, from (41), we have $Q' = xP''$ and hence $(Q^{-1})' = \frac{1}{Q'} = \frac{1}{xP''}$. Hence, $\frac{\partial r}{\partial \tau} = -\frac{1}{xP''}\rho$ which is negative since $P'' > 0$.

(b) For $\varepsilon \equiv \frac{\partial r}{\partial \rho}$, from (40, 41), we have

$$\varepsilon \equiv \frac{\partial r}{\partial \rho} = 1 - (Q^{-1})'\tau = 1 - \frac{1}{xP''}\tau \tag{44}$$

which is less than one if $P'' > 0$. To verify that, we plug in $x = b\left(\frac{\rho\tau+a}{\gamma-1}\right)^{1/\gamma}$ and get

$$\varepsilon = 1 - \frac{b\tau}{\gamma(\gamma - 1)^{1/\gamma}(\rho\tau + a)^{1-1/\gamma}}$$

which is decreasing in τ. Then we use (43) to bound it as

$$\varepsilon > 1 - \frac{b/\rho}{\gamma(\gamma-1)^{1/\gamma}} \frac{(\gamma-1)(\rho/b)^{\gamma} - a}{(\gamma-1)^{1-1/\gamma}(\rho/b)^{\gamma-1}} = 1 - \frac{1}{\gamma} + \frac{a}{\gamma(\gamma-1)(\rho/b)^{\gamma}}$$

which is positive since $a \geq 0, \gamma > 1$.

(c) For $\frac{\partial \varepsilon}{\partial \rho} > 0$, from (44), we have

$$\frac{\partial \varepsilon}{\partial \rho} = -(Q^{-1})'' \tau^2$$

The inverse function Q^{-1} satisfies

$$(Q^{-1})' = \frac{1}{Q'}$$
$$(Q^{-1})'' = -\frac{Q''}{(Q')^3}$$

Hence we get

$$\frac{\partial \varepsilon}{\partial \rho} = \frac{Q''}{(Q')^3} \tau^2$$

which is positive if Q is convex since $Q' = xP'' > 0$. Q is indeed convex as $\gamma > 1$, seen from (41).

(d) For $\frac{\partial \varepsilon}{\partial \tau} < 0$, from (44), we have

$$\frac{\partial \varepsilon}{\partial \tau} = -(Q^{-1})' - (Q^{-1})'' \rho\tau = -(Q^{-1})' - (Q^{-1})'' Q$$

Plugging in $(Q^{-1})', (Q^{-1})''$, we get

$$\frac{\partial \varepsilon}{\partial \tau} = -\frac{1}{Q'} + \frac{QQ''}{(Q')^3} = \frac{QQ'' - (Q')^2}{(Q')^3}$$

which is negative if $QQ'' - (Q')^2 < 0$ since $Q' = xP'' > 0$. To establish that, we plug in (41) and get

$$QQ'' - (Q')^2 = -\frac{\gamma(\gamma-1)^2}{b^2} \left(\frac{x}{b}\right)^{2\gamma-2} - a\frac{\gamma(\gamma-1)^2}{b^2} \left(\frac{x}{b}\right)^{\gamma-2} < 0$$

□

Proof of Proposition 2. For $\tau \geq u(\rho)$, we have $r = 0$ and thus the deposit flow sensitivity with respect to deposit spread is

$$(\Delta t)^{-1}\frac{\partial(\log M_{t+\Delta t} - \log M_t)}{\partial(\rho - r)} = -\tau^{-1}P'(\rho) = -\tau^{-1}\frac{\gamma}{b}\left(\frac{\rho}{b}\right)^{\gamma-1}$$

For $\tau < u(\rho)$, we plug in the optimal r from Proposition 1 and get

$$(\Delta t)^{-1}\frac{\partial(\log M_{t+\Delta t} - \log M_t)}{\partial(\rho - r)} = -\tau^{-1}P'(\rho - r) = -\tau^{-1}\frac{\gamma}{b}\left(\frac{\rho\tau + a}{\gamma - 1}\right)^{1-1/\gamma}$$

The absolute value declines in τ. □

Proof of Proposition 3. For $\rho < u^{-1}(\tau)$, we have

$$V_0 = \frac{\rho}{\rho + \tau^{-1}P(\rho)}M_0$$

and hence

$$\frac{\mathrm{d}V_0}{\mathrm{d}\tau} = \frac{\rho\tau^{-2}P(\rho)}{[\rho + \tau^{-1}P(\rho)]^2}M_0 > 0$$

$$\frac{\mathrm{d}V_0}{\mathrm{d}\rho} = \frac{\tau^{-1}\left[P(\rho) - \rho P'(\rho)\right]}{\left[\rho + \tau^{-1}P(\rho)\right]^2}M_0 = \frac{\tau^{-1}\left[a - (\gamma - 1)(\rho/b)^{\gamma}\right]}{\left[\rho + \tau^{-1}P(\rho)\right]^2}M_0$$

the latter of which is positive when $\rho < b\left(\frac{a}{\gamma-1}\right)^{1/\gamma} = u^{-1}(0)$.

For $\rho > u^{-1}(\tau)$, we have

$$V_0 = \frac{x}{\rho + \tau^{-1}P(x)}M_0$$

which $x = x^*(\rho, \tau)$ optimally chosen to maximize V_0. Hence, DFV satisfies

$$\frac{\mathrm{d}V_0^*}{\mathrm{d}\tau} = \frac{\partial V_0}{\partial x}\frac{\partial x^*}{\partial \tau} + \frac{\partial V_0}{\partial \tau} = \frac{\partial V_0}{\partial \tau} = \frac{x\tau^{-2}P(x)}{[\rho + \tau^{-1}P(x)]^2}M_0 > 0$$

where the first term drops out since $\frac{\partial V_0}{\partial x} = 0$ at x^*, which is essentially the envelope theorem. The same holds for $\frac{\mathrm{d}V_0^*}{\mathrm{d}\rho}$

$$\frac{\mathrm{d}V_0^*}{\mathrm{d}\rho} = -\frac{x}{[\rho + \tau^{-1}P(x)]^2}M_0 < 0$$

□

Proof of Proposition 4. Before the change in policy rate, banks set their optimal rate ρ established in Proposition 1. After the policy-rate change, when a bank receives a Poisson strike to adjust their deposit rate, they will set the optimal deposit rate under ρ'. Further, according to Proposition 1, with $u(\rho) \equiv \frac{(\gamma-1)(\rho/b)^\gamma - a}{\rho}$, only banks with $\tau < u(\rho)$ will set a positive rate under ρ and only those with $\tau < u(\rho')$ will set a positive rate under ρ'. Thus, with $\bar{\rho} \equiv \max\{\rho, \rho'\}$, banks with $\tau > u(\bar{\rho})$ will set a zero rate before and after the shock, and those with $\tau < u(\bar{\rho})$ will adjust their rate after shock. As banks can only adjust when they receive a Poisson strike with intensity θ, the share of banks that have adjusted their deposit rates hence follows

$$S_t = (1 - \mathrm{e}^{-\theta t})F(u(\bar{\rho}))$$

Since $u(\rho) \equiv \frac{(\gamma-1)(\rho/b)^\gamma - a}{\rho} = (\gamma - 1)b^{-\gamma}\rho^{\gamma-1} - a\rho^{-1}$ increases in ρ, so is $F(u(\rho))$. Thus S_t increases in $\bar{\rho}$. □

Proof of Proposition 5. These expressions follow directly by taking derivatives of results in Propositions 1 and 2. □

C.2. Proofs for Theory Complements

Proof of Proposition 6. As long as $x > 0$, the reoptimizing depositors will never choose $q > \bar{s}$. Thus (13) simplifies to

$$\max_q \quad x(1 - q) - \nu\kappa \int_q^{\bar{s}} (s - q)g(s)\mathrm{d}s$$

The FOC is

$$-x + \nu\kappa[1 - G(q)] = 0 \tag{45}$$

and the SOC is

$$-\nu\kappa g(q) < 0 \tag{46}$$

which holds automatically since $g(\cdot)$ is the CDF of full support.

The optimal $q^*(x)$ satisfies

$$q^*(x) = G^{-1}\left(1 - \frac{x}{\nu\kappa}\right)$$

which implies

$$(q^*)'(x) = -\frac{1}{\nu\kappa g(q^*)} < 0$$
$$(q^*)''(x) = -\frac{g'(q^*)}{\nu^2\kappa^2(g(q^*))^3}$$

$q^*(x)$ is concave if and only if $g' > 0$, meaning that conditional on having transaction needs exceeding deposits, larger transactions are more likely.

In the aggregate, we have

$$\mathrm{d}M_t = -\tau^{-1}(1 - q^*(x))M_t\mathrm{d}t$$

which, compared to (1), implies a withdrawal probability $P(x) = 1 - \theta q^*(x)$

Further, if $G(s) = 1 - (1 - s/\bar{s})^{1/\gamma}$, we would have

$$q^*(x) = \bar{s}\left[1 - \left(\frac{x}{\nu\kappa}\right)^\gamma\right]$$

and thus

$$P(x) = 1 - \theta q^*(x) = 1 - \bar{s} + \bar{s}\left(\frac{x}{\nu\kappa}\right)^\gamma$$

which maps into (2) with $a = 1 - \bar{s}, b = \nu\kappa(\bar{s})^{-1/\gamma}$. □

Proof of Proposition 7. It suffices to show that the optimal rate setting from Proposition 1 and the implied deposit franchise value $V(\cdot)$ solves the optimization problem under discretion. Since M_τ is the only state variable that matters for time-τ bank, without loss of generality we analyze the time-0 bank's optimization.

First we simplify (14) to (15).

$$\begin{aligned}
V_0 &\equiv \max_{\{r_t\geq 0\}_{t\geq 0}} \mathrm{E}_0\left[\int_0^s \mathrm{e}^{-\rho t}(\rho - r_t)M_t\mathrm{d}t + \mathrm{e}^{-\rho s}V_s\right] \\
&= \max_{\{r_t\geq 0\}_{t\geq 0}} \int_0^\infty \Lambda\mathrm{e}^{-\Lambda s}\left[\int_0^s \mathrm{e}^{-\rho t}(\rho - r_t)M_t\mathrm{d}t + \mathrm{e}^{-\rho s}V_s\right]\mathrm{d}s \\
&= \max_{\{r_t\geq 0\}_{t\geq 0}} \int_0^\infty\int_0^s \Lambda\mathrm{e}^{-\Lambda s}\mathrm{e}^{-\rho t}(\rho - r_t)M_t\mathrm{d}t\mathrm{d}s + \int_0^\infty \Lambda\mathrm{e}^{-(\rho+\Lambda)s}V_s\mathrm{d}s \\
&= \max_{\{r_t\geq 0\}_{t\geq 0}} \int_0^\infty\int_t^\infty \Lambda\mathrm{e}^{-\Lambda s}\mathrm{e}^{-\rho t}(\rho - r_t)M_t\mathrm{d}s\mathrm{d}t + \int_0^\infty \Lambda\mathrm{e}^{-(\rho+\Lambda)t}V_t\mathrm{d}t \\
&= \max_{\{r_t\geq 0\}_{t\geq 0}} \int_0^\infty \mathrm{e}^{-(\rho+\Lambda)t}\left[(\rho - r_t)M_t + \Lambda V_t\right]\mathrm{d}t
\end{aligned}$$

We note that this optimization problem is equivalent to choosing the deposit spread $x_t = \rho - r_t \in (-\infty, \rho]$ instead of the deposit rate $r_t \in [0, \infty)$ for

$$V_0 = \max_{\{x_t \leq \rho\}_{t\geq 0}} \int_0^\infty \mathrm{e}^{-(\rho+\Lambda)t}(x_t M_t + \Lambda V_t)\mathrm{d}t$$

with

$$\dot{M}_t = -\tau^{-1}P(x_t)M_t$$

Now we verify that the value function implied by the optimal rate setting in Proposition 1. Denote the optimal deposit spread as x^* which satisfies

$$\rho + \tau^{-1}P(x^*) = \tau^{-1}x^*P'(x^*) \tag{47}$$

if $\rho + \tau^{-1}P(\rho) < \tau^{-1}\rho P'(\rho)$ and equals ρ otherwise. The implied $V_t = \frac{x^*}{\tau^{-1}P(x^*)+\rho}M_t$

Suppose the bank sets $x_t = x$, then $M_t = \mathrm{e}^{-\tau^{-1}P(x)}M_0$, and

$$\tilde{V}_0 = \int_0^\infty \mathrm{e}^{-(\rho+\Lambda)t}\left(x + \Lambda\frac{x^*}{P(x^*)+\rho}\right)\mathrm{e}^{-P(x)t}\mathrm{d}t = \frac{x + \Lambda\frac{x^*}{\tau^{-1}P(x^*)+\rho}}{\tau^{-1}P(x)+\rho+\Lambda}$$

which implies the first-order condition

$$\frac{\partial\tilde{V}_0}{\partial x} = \frac{\tau^{-1}P(x) + \rho - x\tau^{-1}P'(x) + \Lambda\frac{\tau^{-1}P(x^*)+\rho-x^*\tau^{-1}P'(x^*)}{\tau^{-1}P(x^*)+\rho}}{(\tau^{-1}P(x)+\rho+\Lambda)^2} = 0 \tag{48}$$

When $\rho + \tau^{-1}P(\rho) < \tau^{-1}\rho P'(\rho)$, (47) solves (48) as well, meaning that the optimal x is x^*. And the second-order derivative at the optimum is negative since

$$\left.\frac{\partial^2\tilde{V}_0}{\partial x^2}\right|_{x^*} = \frac{-\tau^{-1}x^*P''(x^*) - \Lambda\frac{x^*}{\tau^{-1}P(x^*)+\rho}\tau^{-1}P''(x^*)}{(\tau^{-1}P(x^*)+\rho+\Lambda)^2} < 0$$

When $\rho + \tau^{-1}P(\rho) \geq \tau^{-1}\rho P'(\rho)$, we have $x^* = \rho$ and $\frac{\partial\tilde{V}_0}{\partial x}|_\rho > 0$, implying that the optimal x should also be ρ. □

Proof of Proposition 8. To start with, we analyze the optimal rate setting. The current value Hamiltonian is

$$\mathcal{H}(I_t, x_t, \lambda_t) = x_t M_t - C(I_t) + \lambda_t(-\tau^{-1}P(x_t)M_t + I_t)$$

The optimality conditions are

$$0 = \mathcal{H}_x = M_t - \lambda_t \tau^{-1} P'(x_t) M_t \tag{49}$$

$$0 = \mathcal{H}_I = -C'(I_t) + \lambda_t \tag{50}$$

$$\rho\lambda_t - \dot{\lambda}_t = \mathcal{H}_M = x_t - \lambda_t \tau^{-1} P(x_t) \tag{51}$$

From (49) we can determine

$$\lambda_t = \frac{1}{\tau^{-1} P'(x_t)}$$

which is the marginal value of one dollar of deposit inside the bank.

Plugging this into (51) yields

$$\frac{P''(x_t)}{P'(x_t)} \dot{x}_t = \tau^{-1} x_t P'(x_t) - \tau^{-1} P(x_t) - \rho$$

If ρ is constant, x_t is constant too and is the same as in Proposition 1. (This can be seen explicitly from Proposition 10 which solves this ODE and expresses x_t as an integral of future ρ_s for $s \geq t$.)

In the case of quadratic acquisition cost, (50) yields

$$C'(I_t) = \frac{1}{\tau^{-1} P'(x)} = \frac{x}{\tau^{-1} P(x) + \rho}$$

which means I_t is a constant equal to $I = (C')^{-1}\left(\frac{1}{\tau^{-1} P'(x)}\right)$. Thus, the bank acquires the same amount of depositors at each point in time. The inflow I increases in τ since $\tau^{-1} P'(x)$ decreases in τ, despite that x increases in τ. I decreases in ρ since x increases in ρ.

In the case of constant free inflow, (50) is dropped, $I_t \equiv I$ is fixed, and the same law of motion applies to M_t.

Consequently, its deposit balance under (16) is solved by, with $\delta = \tau^{-1} P(\rho - r)$,

$$M_t = \frac{I}{\delta}(1 - \mathrm{e}^{-\delta t}) + M_0 \mathrm{e}^{-\delta t}$$

which approaches the steady state level

$$\frac{I}{\delta} = \frac{1}{\kappa \tau^{-1} P'(x) \tau^{-1} P(x)} = \frac{b(\gamma - 1)}{\gamma} \frac{\tau^2}{a\gamma + \rho\tau} \left(\frac{\rho\tau + a}{\gamma - 1}\right)^{-\frac{\gamma - 1}{\gamma}}$$

which increases in τ. Further, it decreases in ρ since x increases in ρ.

Given the law of motion (16), if we hold the inflow I fixed, the local flow sensitivity is

$$(\Delta t)^{-1}\frac{\partial(\log M_{t+\Delta t} - \log M_t)}{\partial x} = -\tau^{-1}P'(x)$$

which is the same as in Proposition 2.

To characterize the deposit franchise value, we plug (18) into (17) and get

$$\begin{aligned} V_0 &= x\left[\int_0^\infty \mathrm{e}^{-\rho t}\frac{I}{\delta} + \int_0^\infty \mathrm{e}^{-\rho t}\left(M_0 - \frac{I}{\delta}\right)\mathrm{e}^{-\delta t}\right]\mathrm{d}t - \int_0^\infty \mathrm{e}^{-\rho t}C(I)\mathrm{d}t \\ &= x\left[\frac{I}{\delta\rho} + \left(M_0 - \frac{I}{\delta}\right)\frac{1}{\delta+\rho}\right] - \frac{C(I)}{\rho} \\ &= \frac{x}{\delta+\rho}\left(M_0 + \frac{I}{\rho}\right) - \frac{C(I)}{\rho} \end{aligned}$$

As a higher τ lowers the outflow in (16), the bank makes a strictly higher profit, hence DFV increasing in τ.

When the deposit spread x is interior, applying the envelope theorem gives

$$\frac{\mathrm{d}V_0}{\mathrm{d}\rho} = -\frac{x}{(\delta+\rho)^2}\left(M_0 + \frac{I}{\rho}\right) - \frac{1}{\rho^2}\left(\frac{x}{\delta+\rho}I - C(I)\right)$$

In that calculation, since I and x (which drives δ) are optimally chosen to maximize DFV, we hold them fixed in evaluating the comparative statics. The first term is negative. The second term is negative in both constant-free-inflow case and convex-acquisition cost case. The latter is because $C(I)$ is convex and $C'(I) = \frac{x}{\delta+\rho}$. The economic intuition is that the marginal cost is higher than the average cost under a convex acquisition cost. □

Proof of Proposition 9. Fix $x = \rho - r$. The deposit balance evolves according to

$$M_t = (1 - P(x))I + [M_0 - (1 - P(x))I]\, e^{-t/\tau} \tag{52}$$

Therefore, the bank's value from choosing x is

$$V_0(x) = x\int_0^\infty e^{-\rho t}M_t\, dt = x\left[\frac{(1-P(x))I}{\rho} + \frac{M_0 - (1-P(x))I}{\rho + \tau^{-1}}\right] = \frac{x}{1+\rho\tau}\left[\tau M_0 + \frac{I}{\rho}(1 - P(x))\right] \tag{53}$$

The FOC is

$$\frac{1}{1+\rho\tau}\left[\tau M_0 + \frac{I}{\rho}(1 - P(x) - xP'(x))\right] = 0 \tag{54}$$

and the SOC is

$$-\frac{1}{1+\rho\tau}\frac{I}{\rho}[2P'(x) + xP''(x)] < 0 \tag{55}$$

since $P(x)$ is increasing and convex.

Substituting $P(x) = a + \left(\frac{x}{b}\right)^{\gamma}$, the unconstrained maximizer

$$\hat{x} = b\left(\frac{\rho\tau M_0/I + 1 - a}{\gamma + 1}\right)^{1/\gamma} \tag{56}$$

Because $x = \rho - r$ and $r \geq 0$, the relevant constraint is $x \leq \rho$. Hence, $x^* = \min\{\rho, \hat{x}\}$

The bank sets $r = 0$ exactly when $\hat{x} \geq \rho$ which simplifies to

$$\tau \geq \frac{(\gamma+1)(\rho/b)^{\gamma} - (1-a)}{\rho M_0/I} \equiv u(\rho)$$

This corner choice implies zero pass-through.

Now suppose $\tau < u(\rho)$. Then $\hat{x} < \rho$, so the optimum is interior, at

$$r = \rho - \hat{x} = \rho - b\left(\frac{\rho\tau M_0/I + 1 - a}{\gamma + 1}\right)^{1/\gamma}$$

Hence, the deposit rate is strictly below the policy rate.

In terms of the comparative statics, let

$$\kappa \equiv \frac{M_0}{I}, \qquad q \equiv \rho\tau\kappa + 1 - a$$

Then, in the interior region,

$$x^* = b\left(\frac{q}{\gamma+1}\right)^{1/\gamma}, \qquad r = \rho - x^*$$

First, differentiating x^* with respect to τ gives

$$\frac{\partial x^*}{\partial \tau} = \frac{x^*}{\gamma q}\rho\kappa > 0$$

Thus the deposit rate is lower with higher inattention.

Second, pass-through is

$$\varepsilon \equiv \frac{\partial r}{\partial \rho} = 1 - \frac{\partial x^*}{\partial \rho} = 1 - \frac{x^* \tau \kappa}{\gamma q} < 1$$

To show $\varepsilon > 0$, note that the interior region implies $x^* < \rho$. Also, $\rho \tau \kappa \leq q$. Therefore,

$$\frac{x^* \tau \kappa}{\gamma q} = \frac{x^*}{\rho} \frac{\rho \tau \kappa}{\gamma q} < \frac{1}{\gamma} < 1$$

because $\gamma > 1$. Hence, $\varepsilon > 0$.

Third, because

$$x^* = b \left(\frac{q}{\gamma + 1} \right)^{1/\gamma}, \qquad q = \rho \tau \kappa + 1 - a$$

we have

$$\frac{\partial^2 x^*}{\partial \rho^2} = \frac{b}{(\gamma + 1)^{1/\gamma}} \frac{1}{\gamma} \left(\frac{1}{\gamma} - 1 \right) (\tau \kappa)^2 q^{1/\gamma - 2}$$

Since $\gamma > 1$, we have $\frac{\partial^2 x^*}{\partial \rho^2} < 0$, which implies $\frac{\partial \varepsilon}{\partial \rho} > 0$, i.e., the pass-through increases with the policy rate.

Fourth, using

$$\frac{\partial x^*}{\partial \rho} = \frac{b}{\gamma (\gamma + 1)^{1/\gamma}} \tau \kappa q^{1/\gamma - 1}$$

differentiate with respect to τ:

$$\frac{\partial}{\partial \tau} \left(\frac{\partial x^*}{\partial \rho} \right) = \frac{b \kappa}{\gamma (\gamma + 1)^{1/\gamma}} q^{1/\gamma - 1} \left[1 + \left(\frac{1}{\gamma} - 1 \right) \frac{\rho \tau \kappa}{q} \right]$$

The bracketed term is $1 - \frac{\gamma - 1}{\gamma} \frac{\rho \tau \kappa}{q}$. Because $0 \leq \frac{\rho \tau \kappa}{q} \leq 1$ we have $1 - \frac{\gamma - 1}{\gamma} \frac{\rho \tau \kappa}{q} \geq 1 - \frac{\gamma - 1}{\gamma} = \frac{1}{\gamma} > 0$ Therefore, $\frac{\partial}{\partial \tau} \left(\frac{\partial x^*}{\partial \rho} \right) > 0$. Thus pass-through is lower with higher inattention.

Finally, we show that $u(\rho)$ is increasing. We can rewrite

$$u(\rho) = \frac{(\gamma + 1)(\rho / b)^\gamma - (1 - a)}{\rho M_0 / I} = \frac{I}{M_0} \left[\frac{\gamma + 1}{b^\gamma} \rho^{\gamma - 1} - \frac{1 - a}{\rho} \right]$$

As the first term in the bracket increases in ρ and the second declines in ρ, their difference increases in ρ. □

Proof of Proposition 10. The current-value Hamiltonian is

$$\mathcal{H} = x_t M_t - \lambda_t \tau^{-1} P(x_t) M_t$$

and the optimality conditions are, when the optimal x_t is interior,

$$\begin{aligned} 0 = \mathcal{H}_x &= M_t - \lambda_t \tau^{-1} P'(x_t) M_t \\ \rho_t \lambda_t - \dot{\lambda}_t = \mathcal{H}_M &= x_t - \lambda_t \tau^{-1} P(x_t) \end{aligned}$$

From the former we can determine

$$\lambda_t = \frac{1}{\tau^{-1} P'(x_t)}$$

Plugging this into the latter yields

$$\begin{aligned} \rho_t \frac{1}{\tau^{-1} P'(x_t)} + \frac{P''(x_t)}{\tau^{-1}(P'(x_t))^2} \dot{x}_t &= x_t - \frac{P(x_t)}{P'(x_t)} \\ \frac{P''(x_t)}{P'(x_t)} \dot{x}_t &= \tau^{-1} x_t P'(x_t) - \tau^{-1} P(x_t) - \rho_t \\ (\gamma - 1) \frac{\dot{x}_t}{x_t} &= \tau^{-1} \left[(\gamma - 1) \left(\frac{x_t}{b} \right)^{\gamma} - a \right] - \rho_t \end{aligned}$$

This is a Bernoulli differential equation which can be solved with variable substitution $z_t = x_t^{-\gamma}$ as

$$\dot{z}_t - \frac{\gamma}{\gamma - 1} (\rho_t + \tau^{-1} a) z_t + \tau^{-1} \frac{\gamma}{b^{\gamma}} = 0$$

This is a linear differential equation and the only solution that satisfies the transversality condition is

$$z_t = \tau^{-1} \frac{\gamma}{b^{\gamma}} \int_t^{\infty} \exp \left\{ -\frac{\gamma}{\gamma - 1} \int_t^s (\rho_u + a\tau^{-1}) \mathrm{d}u \right\} \mathrm{d}s$$

In terms of the comparative statics w.r.t. τ, we rewrite z_t as

$$\begin{aligned} z_t &= \int_0^{\infty} \tau^{-1} \frac{\gamma}{b^{\gamma}} \exp \left\{ -\frac{\gamma a y}{\tau(\gamma - 1)} \right\} \cdot \exp \left\{ -\frac{\gamma \int_t^{t+y} \rho_u \mathrm{d}u}{\gamma - 1} \right\} \mathrm{d}y \\ &= \frac{\gamma - 1}{a b^{\gamma}} \int_0^{\infty} \left[\frac{\gamma a}{\tau(\gamma - 1)} \mathrm{e}^{-\frac{\gamma a y}{\tau(\gamma - 1)}} \right] \cdot \left[\mathrm{e}^{-\int_t^{t+y} \frac{\gamma \rho_u}{\gamma - 1} \mathrm{d}u} \right] \mathrm{d}y \end{aligned}$$

which can be viewed as an expectation

$$z_t = \frac{\gamma - 1}{ab^\gamma} \, \mathrm{E}[g(y)] = \frac{\gamma - 1}{ab^\gamma} \int_0^\infty f(y) g(y) \mathrm{d}y$$

under the probability density function $f(y) \equiv \frac{\gamma a}{\tau(\gamma-1)} \mathrm{e}^{-\frac{\gamma a y}{\tau(\gamma-1)}}$ of an exponential distribution with a rate parameter $\frac{\gamma a}{\tau(y-1)}$ and $g(y) \equiv \mathrm{e}^{-\int_t^{t+y} \frac{\gamma \rho_u}{\gamma-1} \mathrm{d}u}$.

If τ goes up, the rate parameter of the exponential distribution $f(y)$ goes down, shifting the distribution to the right in the sense of first-order stochastic dominance. As $g(y)$ declines in y, z_t as an expectation goes down as τ goes up. Since r_t increases in z_t, r_t falls in τ.

Similarly, for the pass-through of policy rate at $s > t$ into z_t, we have $\frac{\partial z_t}{\partial \rho_s}$ to be infinitesimal and satisfy

$$\frac{\partial z_t}{\partial \rho_s} \propto - \int_{s-t}^\infty f(y) g(y) \mathrm{d}y$$

Since r_t increases in z_t, the intertemporal pass-through $\frac{\partial r_t}{\partial \rho_s}$ for $s > t$ is negative and infinitesimal. □

Proof of Proposition 11. As $t \to \infty$, x_t converges to x which satisfies

$$\tau^{-1}[(\gamma - 1)(x/b)^\gamma - a] - \rho = 0$$

which determines

$$x = b \left(\frac{\rho \tau + a}{\gamma - 1} \right)^{1/\gamma}$$

We plug $\rho_t = \rho + \Delta \rho \mathrm{e}^{-\phi t}$ into (26) and expand to the first order in $\Delta \rho$,

$$(\gamma - 1)(-\phi) \frac{\Delta x}{x} \mathrm{e}^{-\phi t} = \tau^{-1} \gamma (\gamma - 1) \frac{x^{\gamma - 1}}{b^\gamma} \Delta x \mathrm{e}^{-\phi t} - \Delta \rho \mathrm{e}^{-\phi t}$$

which determines

$$\Delta x = \left[(\gamma - 1) \frac{\phi}{x} + \tau^{-1} \gamma (\gamma - 1) \frac{x^{\gamma - 1}}{b^\gamma} \right]^{-1} \Delta \rho = \frac{x}{(\gamma - 1)\phi + \gamma \rho + \tau^{-1} \gamma a} \Delta \rho$$

which increases in τ and decreases in ϕ. That means, $r_t = \rho_t - x_t = r + \Delta r \mathrm{e}^{-\phi t}$ with steady-state level

$$r = \rho - x = \rho - b\left(\frac{\rho\tau + a}{\gamma - 1}\right)^{1/\gamma}$$

which coincides with (7) and pass-through

$$\frac{\Delta r}{\Delta \rho} = 1 - \frac{\Delta x}{\Delta \rho} = 1 - \frac{x}{(\gamma - 1)\phi + \gamma\rho + \tau^{-1}\gamma a}$$

which increases in ϕ and decreases in τ, the latter since the numerator x increases in τ and the denominator decreases in τ. □

Proof of Proposition 12. Regarding the rate-setting, the FOC is, with $x = \rho - r$,

$$\tau^{-1}P(x, \rho) + \rho - \tau^{-1}xP_x(x, \rho) = 0$$

which determines

$$x = \min\left\{\rho, b\left(\frac{(\rho\tau + a)\rho^{\eta}}{\gamma - 1}\right)^{1/\gamma}\right\}$$

Equivalently, the optimal x obtains the interior solution

$$x = b\left(\frac{(\rho\tau + a)\rho^{\eta}}{\gamma - 1}\right)^{1/\gamma} \tag{57}$$

if and only if $\tau \leq u(\rho)$ with

$$u(\rho) \equiv \frac{(\gamma - 1)\rho^{\gamma-\eta}/b^{\gamma} - a}{\rho} \tag{58}$$

which increases in ρ as long as $\gamma > 1 + \eta$. Obviously, $\frac{\partial x}{\partial \tau} > 0$, $\frac{\partial x}{\partial \rho} > 0$, and $\frac{\partial^2 x}{\partial \rho \partial \tau} > 0$. To verify $\frac{\partial x}{\partial \rho} < 1$, we notice $\frac{\partial x}{\partial \rho} = \frac{x}{\gamma}\left(\frac{\rho\tau}{a+\rho\tau} + \eta\right)$ increases in τ since both x and $\frac{\tau}{a+\rho\tau}$ increase in τ. Hence $\frac{\partial x}{\partial \rho} \leq \frac{\partial x}{\partial \rho}|_{\tau=u(\rho)} = \frac{1}{\gamma}\left(1 + \eta - \frac{ab^{\gamma}}{(\gamma-1)\rho^{\gamma-\eta}}\right)$, which is less than one as long as $\gamma > 1 + \eta$.

Regarding the flow sensitivity

$$(\Delta t)^{-1}\frac{\partial(\log M_{t+\Delta t} - \log M_t)}{\partial x} = -\tau^{-1}P_x(x, \rho) = \begin{cases} -\tau^{-1}\frac{\gamma}{b}\left(\frac{\rho\tau+a}{\gamma-1}\right)^{1-1/\gamma}\rho^{-\eta/\gamma}, & \tau < u(\rho) \\ -\tau^{-1}\frac{\gamma}{b}\left(\frac{\rho}{b}\right)^{\gamma-1}\rho^{-\eta}, & \tau \geq u(\rho) \end{cases}$$

which is continuous in τ since x is continuous in τ. Obviously, on $\tau \geq u(\rho)$, its magnitude declines in τ. For $\tau < u(\rho)$, its magnitude is proportional to $(\rho + a\tau^{-1})(\rho\tau + a)^{-1/\gamma}$ which declines in τ since $a \geq 0$.

Regarding the deposit franchise value, it strictly increases in τ since DFV under any x is higher. In terms of its duration under an interior x when $\tau \geq u(\rho)$, we have from the envelope theorem

$$\frac{\mathrm{d}V_0/M_0}{\mathrm{d}\rho} = -\frac{x}{(\tau^{-1}P(x,\rho)+\rho)^2}(\tau^{-1}P_\rho(x,\rho)+1) = \left(\frac{\eta}{\gamma-1}\left(1+\frac{a}{\rho\tau}\right)-1\right)\frac{x}{(\tau^{-1}P(x,\rho)+\rho)^2}$$

which is positive if $\tau < \frac{a}{\rho}\frac{\eta}{\gamma-1-\eta}$, in which case the direct effect of ρ on $P(x,\rho)$ dominates the direct effect of ρ as the discount rate in driving DFV. □

Proof of Proposition 13. Under a constant policy rate, DFV in (35) becomes

$$V_0 = \frac{x-c}{\tau^{-1}P(x)+\rho}M_0 - \frac{F}{\rho}$$

with $x = \rho - r$.

Taking the FOC w.r.t. x yields

$$h(x) = -(\gamma-1)x^\gamma + c\gamma x^{\gamma-1} + (a+\rho\tau)b^\gamma \tag{59}$$

which pins down x as an implicit function when x is interior. Next we use the implicit function theorem to determine the comparative statics. We have

$$h'(x) = -\gamma(\gamma-1)x^{\gamma-2}(x-c) < 0 \tag{60}$$

and

$$h''(x) = -\gamma(\gamma-1)x^{\gamma-3}[(\gamma-1)x-(\gamma-2)c] < 0 \tag{61}$$

Using the implicit function theorem, we get

$$\frac{\partial x}{\partial \tau} = -\frac{\partial h/\partial\tau}{h'(x)} = -\frac{\rho b^\gamma}{h'(x)} > 0$$

Hence there exists a threshold $\tau = u(\rho)$ such that $x = \rho$. We can characterize such a threshold as

$$u(\rho) = \frac{(\gamma-1)\rho^{\gamma-1} - c\gamma\rho^{\gamma-2} - ab^\gamma\rho^{-1}}{b^\gamma}$$

Further,

$$u'(\rho) = \frac{\rho^{\gamma-3}(\rho + \gamma(\gamma-2)(\rho - c)) + ab^\gamma \rho^{-2}}{b^\gamma}$$

which is positive as long as $\rho > c$. That is, $u(\rho)$ increases in ρ as long as $\rho > c$.

In terms of the pass-through we have

$$\frac{\partial x}{\partial \rho} = -\frac{\partial h/\partial \rho}{h'(x)} = -\frac{\tau b^\gamma}{h'(x)} > 0$$

which means $\frac{\partial r}{\partial \rho} < 1$. Further, we show that $\frac{\partial x}{\partial \rho} < 1$ which implies $\frac{\partial r}{\partial \rho} > 0$. To establish that, we need to show

$$\tau b^\gamma < -h'(x) = \gamma(\gamma-1)x^{\gamma-2}(x-c)$$

Using (59), we get $\tau b^\gamma < \rho^{-1}[(\gamma-1)x^\gamma - c\gamma x^{\gamma-1}]$. It suffices to show

$$\begin{aligned}\rho^{-1}[(\gamma-1)x^\gamma - c\gamma x^{\gamma-1}] &< \gamma(\gamma-1)x^{\gamma-2}(x-c)\\ (\gamma-1)x^2 - c\gamma x &< \rho\gamma(\gamma-1)(x-c)\\ (\gamma-1)(x-c)(x-\rho\gamma) - cx &< 0\end{aligned}$$

which holds since $0 \le c < x \le \rho < \gamma\rho$.

Moreover, in terms of the comparative statics of pass-through w.r.t. inattention

$$\frac{\partial^2 x}{\partial \rho \partial \tau} = -b^\gamma \frac{h'(x) - \tau h''(x)\frac{\partial x}{\partial \tau}}{(h'(x))^2} = -b^\gamma \frac{(h'(x))^2 + \tau\rho b^\gamma h''(x)}{(h'(x))^3}$$

Since $h'(x) < 0$, its sign depends on the numerator $B = (h'(x))^2 + \tau\rho b^\gamma h''(x)$. Using (59), we get

$$\begin{aligned}B &= (h'(x))^2 + [(\gamma-1)x^\gamma - c\gamma x^{\gamma-2}]h''(x) - ab^\gamma h''(x)\\ &= \gamma^2(\gamma-1)^2 x^{2\gamma-4}(x-c)^2 - \gamma(\gamma-1)x^{2\gamma-4}[(\gamma-1)x - c\gamma][(\gamma-1)x - (\gamma-2)c] - ab^\gamma h''(x)\\ &= \gamma(\gamma-1)x^{2\gamma-4}[(\gamma-1)(x-c)^2 + c^2] - ab^\gamma h''(x)\end{aligned}$$

which is positive since the first term is positive and $h''(x) < 0$. That is, $\frac{\partial^2 x}{\partial \rho \partial \tau} > 0$.

The flow sensitivity at the interior solution is $-\tau^{-1}P'(x) = -\tau^{-1}\gamma x^{\gamma-1}/b^\gamma$. We show that its magnitude declines in τ. We need

$$\frac{\mathrm{d}\log(\tau^{-1}P'(x))}{\mathrm{d}\log\tau} = -1 + (\gamma-1)\frac{\tau}{x}\frac{\partial x}{\partial \tau} < 1$$

That is

$$\frac{(\gamma-1)\tau}{x}\frac{\rho b^{\gamma}}{-h'(x)} < 1$$

Using (59) and (60), we simplify it to

$$\begin{aligned} \frac{(\gamma-1)\tau}{x}\frac{\rho b^{\gamma}}{(\gamma-1)x^{-1}(x^{\gamma}+(a+\rho\tau)b^{\gamma})} &< 1 \\ \frac{\rho\tau b^{\gamma}}{x^{\gamma}+(a+\rho\tau)b^{\gamma}} &< 1 \end{aligned}$$

which holds.

As for the duration of DFV, when the banks charge an optimal x to maximize DFV, we have the envelope theorem as

$$\frac{\partial V_0}{\partial \rho} = -\frac{x-c}{(\tau^{-1}P(x)+\rho)^2}M_0 + \frac{F}{\rho^2}$$

which is positive when

$$\frac{F}{M_0} > \frac{(x-c)\rho^2}{(\tau^{-1}P(x)+\rho)^2}$$

□

D. Data Appendix

For privacy considerations, we do not publicly disseminate the transaction-level keyword dictionary for the construction of depositor characteristics. Below we tabulate the construction of county-income-group level socioeconomic demographic variables from IRS tax filings in Table A-1.

Name	**Aggregate Metric**	**IRS Code (Years Available)**
Returns	Sum	n1(2007–2021)
Exemptions	Sum	n2(2007–2021)
Single	Simple Averages/Shares	MARS1(2013–2021)
Joint	Simple Averages/Shares	MARS2(2007–2021)
Salaries	Simple/Weighted Averages/Shares	00200(2007–2021)
Investment Income	Simple/Weighted Averages/Shares	00300(2007–2021)+00600(2007–2021) +00650(2008–2021) +23900(2007–2008) +01000(2009–2021) +01400(2007–2021) +01700(2007–2017,2019–2021) +01400(2007–2017,2019–2021) +01750(2018)
Business Income	Simple/Weighted Averages/Shares	00900(2007–2021)
Unemployment	Simple/Weighted Averages/Shares	02300(2007–2021)
Social Security	Simple/Weighted Averages/Shares	02500(2007–2021)
Tax Payment	Simple/Weighted Averages/Shares	18425(2007–2021)
		11900(2007–2008,“gt0”)+11901(2009–2021)
Tax Refund	Simple/Weighted Averages/Shares	00700(2007–2021)
		11900(2007–2008,“lt0”)+11902(2009–2021)
Mortgage	Simple/Weighted Averages/Shares	18500+19300(2007–2021);number of returns avail. 2007&2009-2021
Child	Simple/Weighted Averages/Shares	07220(2007–2017)+07225(2018–2021);number of returns avail. 2007&2009-2021
Student Loan	Simple/Weighted Averages/Shares	03210(2013–2021)

Table A-1: IRS-Derived Measures Matching Variables Inferred from Transactional Data

IRS 5-digits are reported with total amount (A) and numbers of filings (N) in each year between 2007 – 2021 except for 2008 where numbers of filings are not available. Each variable is computed as both a simple and a weighted average, and as shares out of total income (for amount) or number of returns. Composite measures (e.g., Regular Income, Retirement Income) are defined by the sum of IRS fields (or max – when computing numbers of returns).

E. Additional Empirical Results

E.1. Projecting the Inattention Measure Using Observables

Summary of the projection procedure. Figure A-3 outlines each estimation stage with the variables used for estimation.

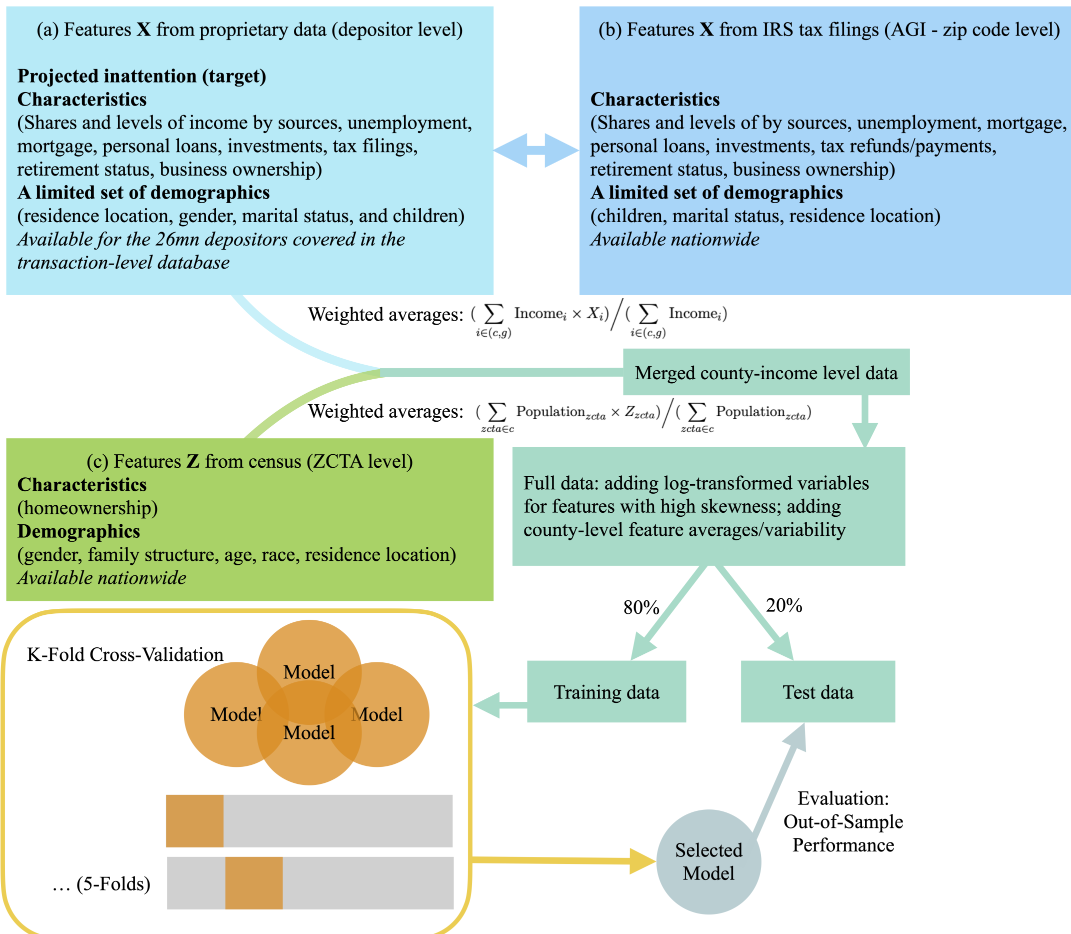


Figure A-3: Predicting inattention: Data and estimation steps

This chart lays out the data and method we use to predict inattention. We combine proprietary data (**a**) and census data (**c**) to create a merged dataset that includes both the county–income-group inattention and demographic and socioeconomic features to train a gradient boosting algorithm. Since variables can be highly skewed, we apply a log transformation when the skewness is above 3, and include county-level averages to account for local social interaction effects.

We then split the merged dataset into an 80% training set and a 20% test set; for the training set, we perform five-fold cross-validation and use randomized hyperparameter tuning to select the best model within the training dataset. We evaluate this selected model using the test dataset and report the out-of-sample performance.

Finally, we apply this model on a national scale using publicly available micro-level IRS (**b**) to substitute for proprietary data (**a**), and census data (**c**) for the years 2007 to 2021, providing a comprehensive measure of inattention across time and location.

Key predictors of inattention For illustrative purposes, we perform a permutation test in which we randomly shuffle each feature and compute the average drop in R^2 over five trials. Although this method does not capture the combined or non-linear importance of features that work together, it provides useful insight into the *independent* contribution of each variable. Figure A-4 shows that several features cause a significant reduction in R^2 when permuted. The investment–related variables which capture average income share from investments, and shares of individuals with investment incomes are the most important independent contributors; permuting this group alone leads to a 2.9% drop in the overall out-of-sample R^2 of the pretrained model.

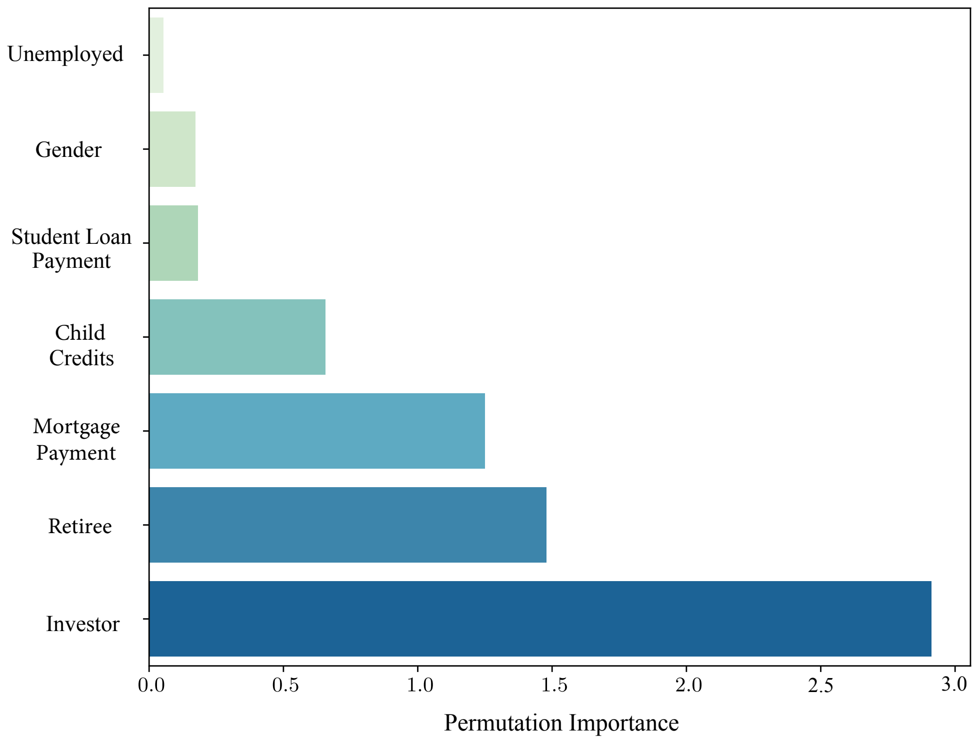


Figure A-4: Variables predicting inattention

To isolate the relative importance of each variable, we perform a permutation test in which we randomly shuffle each feature and compute the average drop in R^2 over five trials. Note that this method underestimates the importance of features that interact non-linearly or work in tandem with other variables. We then display the top seven feature groups that *independently* contribute the most to the drop in R^2, with each group representing a set of related candidate features (e.g., share of investment as a percentage of total income, log-transformed values, local averages, etc.). Investor includes the number/share of depositors with brokerage account transactions and share of net investment income out of total income. Retiree (unemployed) includes the number/share of depositors with Social Security (unemployment benefits) credit transactions and share of Social Security income out of total income. Mortgage (or student loans) payment includes the number/share of depositors with mortgage payment (or student loans) transactions. Child credits include the number/share of depositors with child tax credit transactions and share of child tax credits out of total income. Share/number of female/male uses inferred gender codes as described in Section 3.1. In public data, gender is approximated by county-level census demographics.

Predicting inattention using level vs. share variables. We run a head-to-head comparison between two predictive models, to see if the size of deposit balances would improve in-sample explanatory power and out-of-sample predictions of inattention. The statistical model used above, built on demographic data and the *shares* of income by source (e.g., investment, salary) over total income, instead of *levels* of total income, explains about 85% of the variation in the training data, with a standard error of 6.1% reflecting the uncertainty across trials. We then expand the model by adding balance and income level variables, such as the size of balances, levels of income by source, loans, and mortgages. As shown in Figure A-5, the expanded model increases the in-sample explanatory power to 88%, but the improvement in out-of-sample performance is marginal: the test R^2 improved only insignificantly from 72.2% (with s.d. of 2.0%) to 73.6% (with s.d. of 1.9%), meaning that balance size and income levels barely add predictive power.

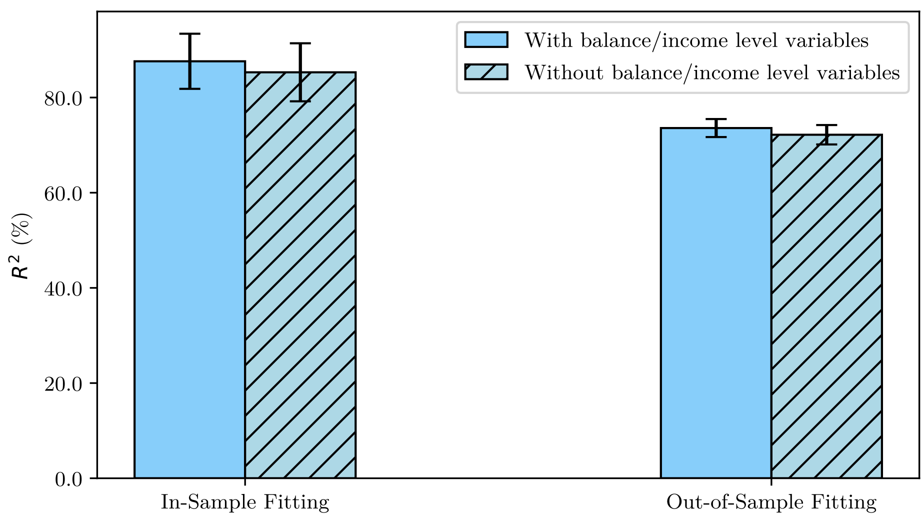


Figure A-5: Levels of income and balance only marginally improve inattention predictions

This graph compares in-sample and out-of-sample explanatory power (R^2 in percentages) in two models: one model (left) includes additional *level* variables, such as balance sizes, income levels by sources of income, total income, loans, and mortgages; the other (in stripe pattern) uses only demographic transformations and income shares. For each model, we compute and plot the mean R^2 and its standard deviation (the error bar) across 100 random trials. The left set of bars displays the training (in-sample) performance, while the right set shows the test (out-of-sample) performance. The visualization illustrates that although there is a slight increase in both training and test R^2 when balance/income level variables are included, these additional variables do not significantly improve the model's fit.

E.2. Correlation Between Inattention and Deposit Balance

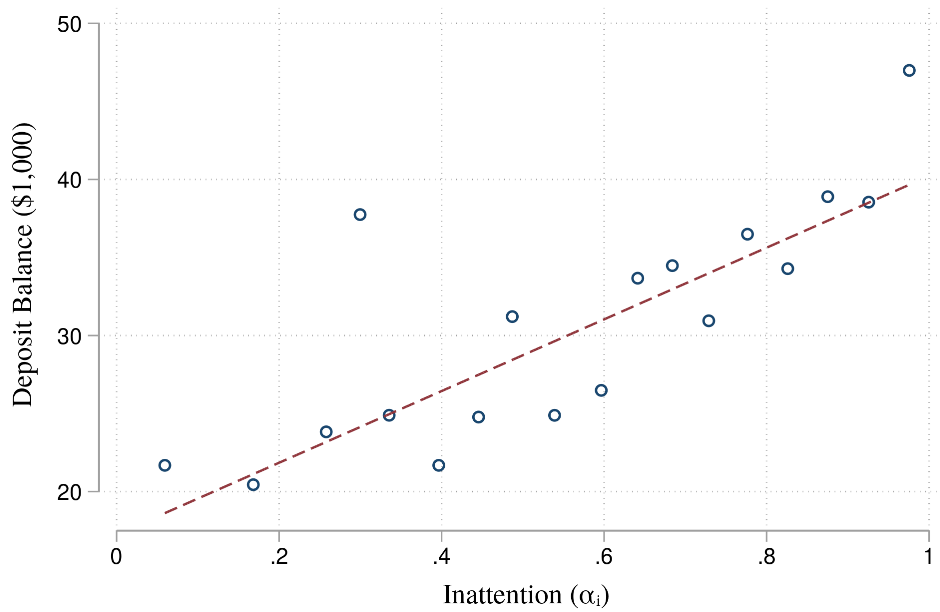


Figure A-6: Inattention and deposit balance

This plot displays the correlation between depositor–level inattention and deposit balances. Inattention is measured by ranking ΔHL_i, which is the projected half-life difference between unscheduled and scheduled income for each depositor i. The individual-level ranks are normalized between 0 and 1, where 1 indicates the highest level of inattention. Deposit balances are calculated by summing all bank account deposits for each depositor, using the values at the end of the sample period.

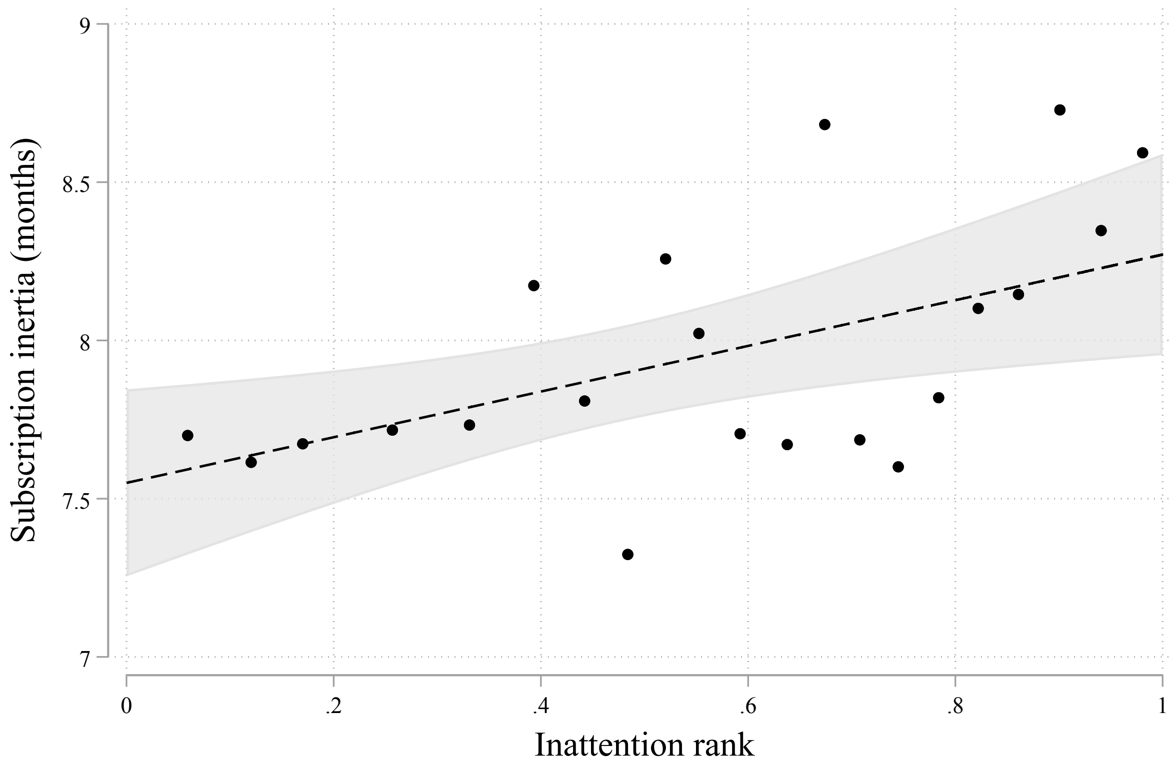


Figure A-7: Subscription inertia and inattention

Subscription inertia (months) measures the average number of consecutive billing periods during which a depositor continues paying after a price increase event. A price increase event is defined as a transition between stable-price runs for the same merchant in which the new price exceeds the old by at least 5%.

Depositor inattention and subscription inertia.

Validation of the projected inattention across banks and counties. Does the projected inattention measure preserve the information in the measure obtained from transaction-level data? We compare county-bank-level annual deposit growth using the observed inattention and the the projected inattention *county-level* inattention to locations outside the transaction data spatial footprint. In Table A-2, we regress county-bank-level annual deposit growth,

$$\Delta m_{bct} = \beta_0 \, \Delta\rho_t + \beta_1 \, \alpha_{ct} \cdot \Delta\rho_t + \beta_2 \, \alpha_{ct} + \beta_3 \, \mathrm{HHI}_{ct} \cdot \Delta\rho_t + \beta_4 \, \mathrm{HHI}_{ct} + \delta_b + \delta_t + \varepsilon_{bct},$$

on the annual change in the federal funds rate $\Delta\rho_t$ and its interaction with county-level inattention (α_{ct} or the projected $\hat{\alpha}_{ct}$). We control for local market concentration proxied by the county deposit-market Herfindahl index (Drechsler, Savov, and Schnabl 2017). Bank and year fixed effects account for bank-level confounds and common trends in deposit growth.

Panel (a) uses the inattention measure observed directly in the subset of counties covered by the transaction-level data; panel (b) replicates the exercise with the projected measure from the projection method above, which is available for all U.S. counties but restricted for the subsample of counties in panel (a) for comparison. The interaction $\alpha_{ct} \times \Delta\rho_t$ is significant and of similar magnitude, indicating that higher inattention dampens the spread sensitivity of deposit outflows, consistent with the in-sample measure from transaction-level data. This validation shows that the projected measure retains the relevant cross-sectional variation in inattention while expanding coverage from the transaction-data footprint to the population.

	(a) Using observed α			(b) Using projected $\hat{\alpha}$		
	(1)	(2)	(3)	(4)	(5)	(6)
$\alpha \times \Delta\rho$	0.189***	0.189***	0.192***			
	(0.038)	(0.039)	(0.040)			
$\hat{\alpha} \times \Delta\rho$				0.243**	0.158**	0.156**
				(0.075)	(0.062)	(0.066)
HHI $\times\Delta\rho$			0.214			0.054
			(0.503)			(0.539)
Bank f.e.	N	Y	Y	N	Y	Y
Time f.e.	Y	Y	Y	Y	Y	Y
Observations	123,622	123,622	123,622	123,609	123,609	123,609

Table A-2: Deposit flows in the cross section

Δm_{bct} is the log-difference in deposits for bank b in county c during year t. The specification is $\Delta m_{bct} = \beta_0 \, \Delta\rho_t + \beta_1 \, (\alpha_{ct} \times \Delta\rho_t) + \beta_2 \, \alpha_{ct} + \beta_3 \, (\text{HHI}_{ct} \times \Delta\rho_t) + \beta_4 \, \text{HHI}_{ct} + \delta_b + \delta_t + \varepsilon_{bct}$, where $\Delta\rho_t$ is the annual change in the policy rate, α_{ct} is county-level depositor inattention, and HHI_{ct} is the county-level deposit Herfindahl–Hirschman index. Panel (a) uses α_{ct} observed directly from transaction data. Panel (b) uses $\hat{\alpha}_{ct}$ projected from bank-branch and county demographic characteristics, restricted to the subsample of counties with transaction-data coverage. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

E.3. Reactions to Scheduled versus Unscheduled Income

Marginal propensity to consume. We estimate spending responses in consumption and restaurant categories to tax refunds and compare them with responses to scheduled paychecks. Panel (a) of Figure A-8 plots consumption responses to scheduled versus unscheduled income; panel (b) shows restaurant spending. Following Baugh, Ben-David, Park, and Parker (2021), who use transaction-level data from the same provider, we define consumption as outflows in: gas, restaurants, retail, groceries, cash, entertainment, health care, travel, utilities, miscellaneous bills (e.g., gym memberships), and health insurance. Restaurant spending comprises outflows to restaurants. Note these categories do not exhaust total consumption: many payments occur via checks or ACH transfers that may mix saving and spending and cannot be reliably classified from transaction labels.

(a) Consumption response

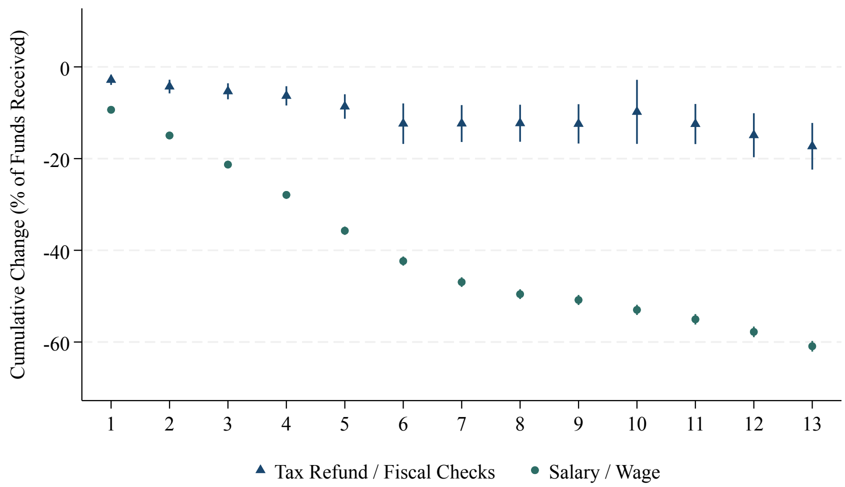
(b) Restaurant response

Figure A-8: Marginal propensity to consume

This figure plots consumption responses to scheduled and unscheduled income following the same methodology in Figure 2.

Subsample analysis based on relative size of two income types. Figure A-9 plots the balance-decay paths following scheduled and unscheduled income for two subsamples split by the relative size of unscheduled income compared with scheduled income. Panel (a) shows responses from the sample of depositors with average tax refunds larger than salary and wage income, and Panel (b) shows responses from the sample of depositors with average tax refunds smaller than salary and wage income.

(a) Average Tax Refunds > Average Paycheck



(b) Average Tax Refunds ≤ Average Paycheck

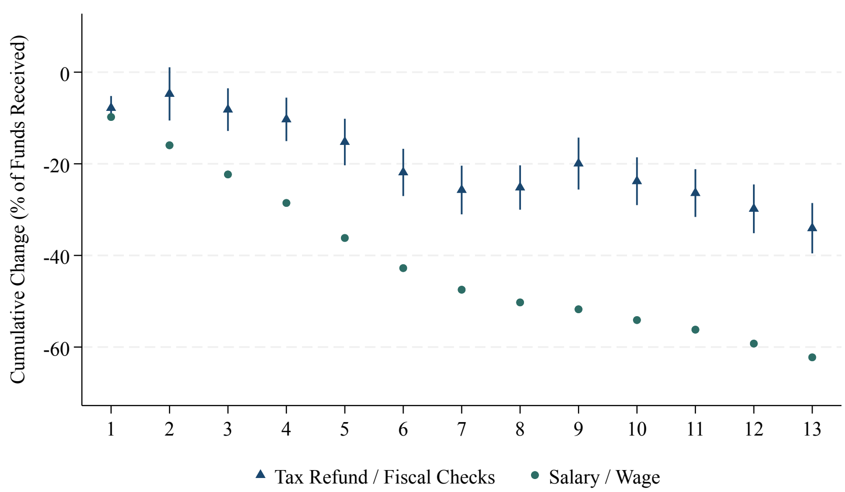


Figure A-9: Subsample analysis by income sizes

This figure plots the decay of balances to scheduled and unscheduled income, in two subsamples, following the same methodology in Figure 2.

Reaction time differences excluding mechnical prearranged transfers and automated payments

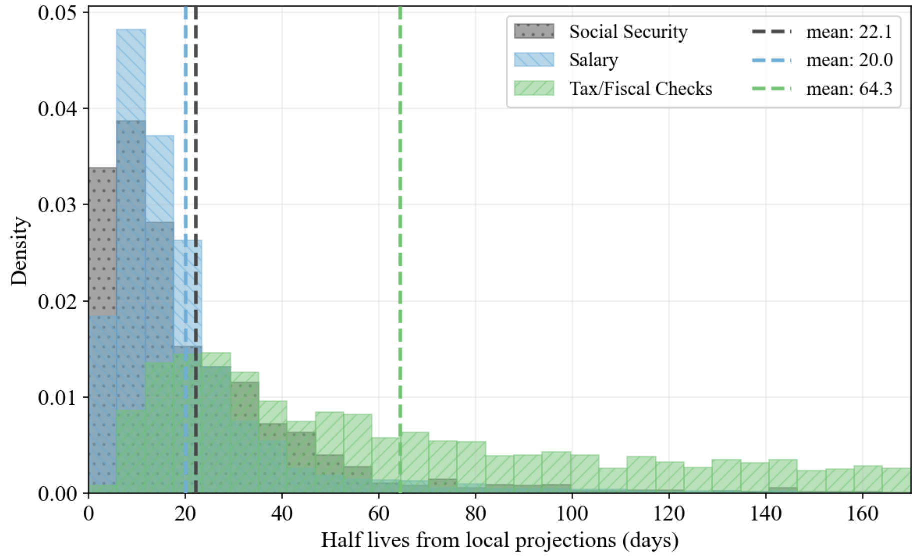


Figure A-10: Distribution of half-lives after excluding prearranged transfers

This histogram summarizes half-lives recomputed from depositor-level local projections as in Figure 3, but restrict outflows to exclude transactions classified as recurring or prearranged (e.g., direct debits, auto-pay, credit card, loan, and mortgage payments).

E.4. The Spatial Variation in Depositor Inattention

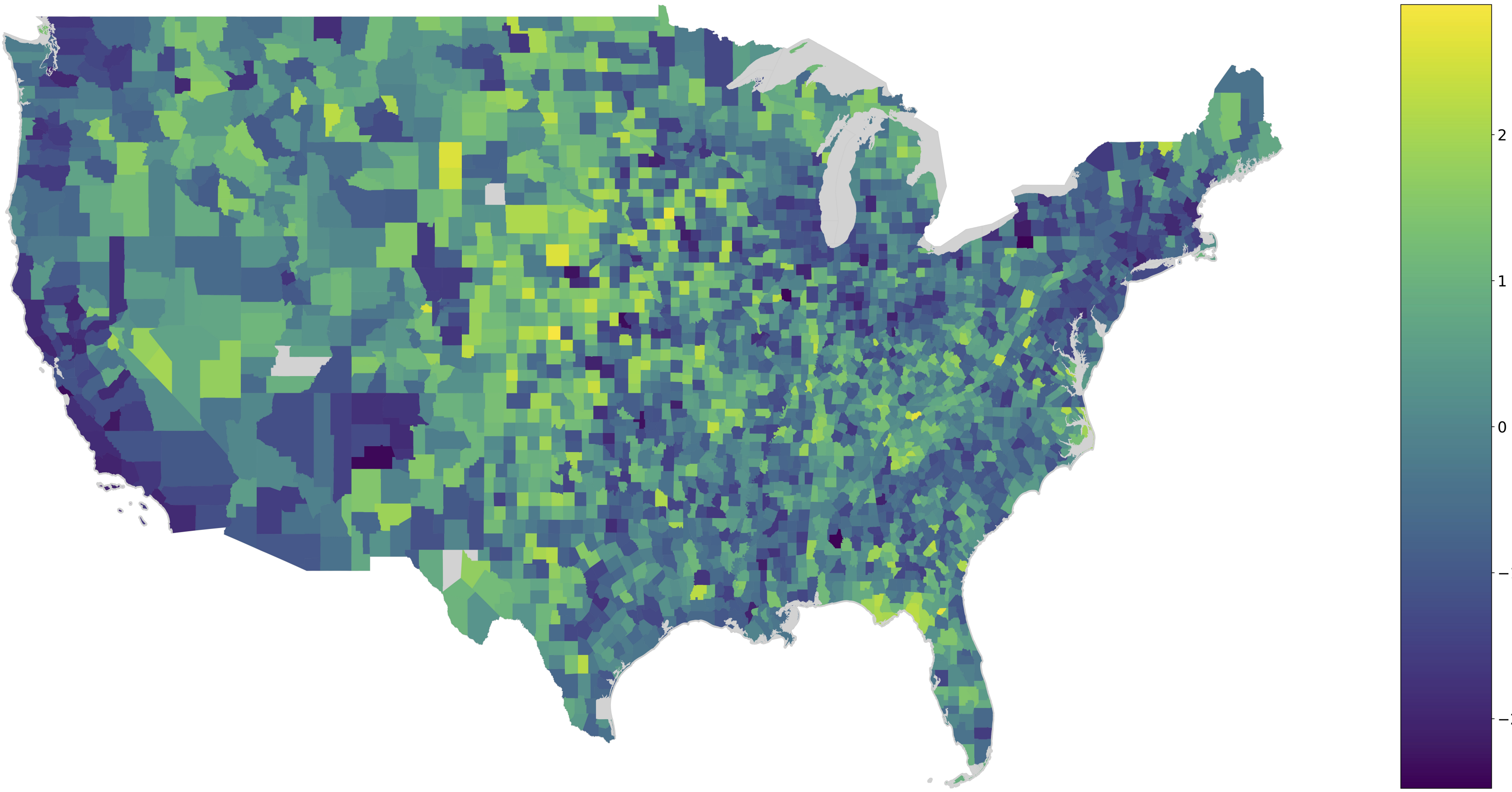


Figure A-11: Mapping inattentive depositors

This map displays the spatial distribution of the predicted county-level inattention, α_{ct}, for the year 2018. Each county's predicted inattention is weighted by its total deposits, which are calculated as the sum of branch-level deposits reported by the FDIC in 2018. In counties without deposit data, we instead plot the simple average inattention for that area. Lighter (yellow) color with larger value of α_{ct} indicates a higher degree of inattention.

E.5. *Cross-Sectional Evidence on Pricing and Flows*

Flow sensitivity from non-interest-bearing deposits. For non-interest-bearing deposits, the deposit rate is zero by construction. Hence a change in the policy rate is also a change in the deposit spread. We estimate the bank-level response of deposit flows to spread changes from

$$\Delta \log m_{bt} = \sum_{k=-4}^{0} \beta_k^f \Delta\rho_{t+k} + c_b + \epsilon_{bt},$$

where $\Delta \log m_{bt}$ is the growth of non-interest-bearing deposits for bank b in quarter t, $\Delta\rho_t$ is the quarterly change in the policy rate, and c_b is a bank constant. Following Drechsler, Savov, and Schnabl (2017), we define the *flow beta* as $\sum_{k=-4}^{0} \beta_k^f$. Because the deposit rate on checking deposits is fixed at zero, this flow beta directly measures the sensitivity of deposit outflows to a 1 pp increase in the deposit spread over the previous five quarters. In other words, in this setting, flow beta is a reduced-form measure of the flow sensitivity in our model.

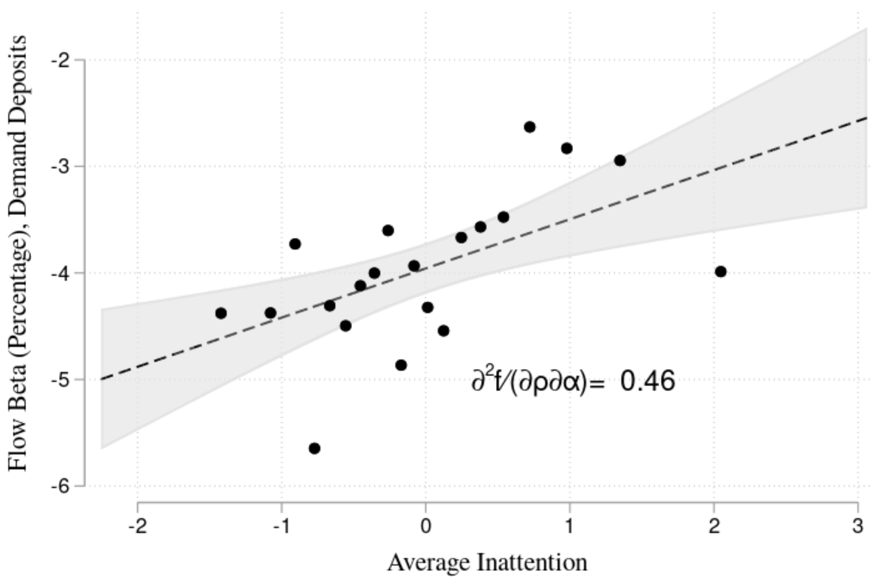


Figure A-12: Flow beta and inattention

Banks are sorted by the average standardized inattention of their depositors during the sample period. Flow beta is the sum of coefficients from a five-quarter lagged regression of *non-interest-bearing* deposit growth on policy-rate changes; it measures the % change in deposits triggered by a 1 pp increase in the deposit spread. The sample consists of all banks from Call Reports between 2008 and 2021, with at least 40 quarters of observations. Shaded area is the 95% confidence interval.

Figure A-12 shows that banks with more inattentive depositor bases have lower flow sensitivity. Quantitatively, a one-standard-deviation increase in depositor inattention is associated with a 0.46% smaller outflow response of non-interest-bearing deposits to a 1 pp increase in the policy rate.

Cross-sectional regression with controls Table A-3 reports the cross-sectional estimates on bank flow beta, spread beta, and spread with respect to standardized inattention plotted in Figure 5.

	Spread Beta		Spread		NIB Flow Beta	
	(1)	(2)	(3)	(4)	(5)	(6)
Inattention (std.)	0.032***	0.019***	0.094***	0.064***	0.460***	0.245*
	(0.002)	(0.002)	(0.006)	(0.007)	(0.129)	(0.140)
Assets		0.026		0.267***		-5.046**
		(0.030)		(0.061)		(2.277)
Equity Ratio		0.045		-0.326		-3.125
		(0.088)		(0.252)		(4.591)
Non-Deposit Ratio		-0.484***		-1.291***		-9.328***
		(0.052)		(0.141)		(2.812)
HHI		0.136***		0.283***		2.538***
		(0.015)		(0.042)		(0.961)
Observations	5204	5204	4558	4558	5206	5206
Adjusted R2	0.031	0.103	0.048	0.105	0.002	0.009

Table A-3: Cross-sectional evidence on deposit spread beta, spread, and flow beta

This table reports the cross-sectional estimates on bank flow beta, spread beta, and spread with respect to standardized inattention plotted in Figure 5. Column 1-2 report results on deposit spread beta, corresponding to Figure 5(b); columns 3-4 report results on deposit spread levels, corresponding to Figure 5(a); columns 5-6 report results on flow betas, corresponding to Figure A-12. Controls include HHI (deposit-weighted bank-level HHI averages during the sample period), equity ratio (for omitted-variable bias from solvency/fundamentals), non-deposit ratio (proxy for wholesale funding dependence and liquidity risk). Significance levels: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

E.6. Average Spread and Inattention

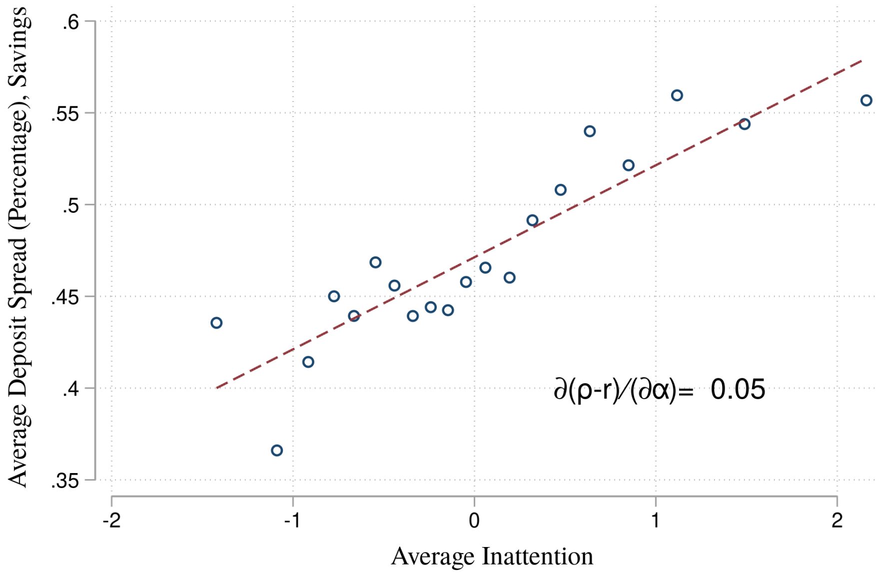


Figure A-13: Average spread and inattention

F. Additional Calibration Results

F.1. Calibrated $P(\cdot)$ and Deposit Decay Rate

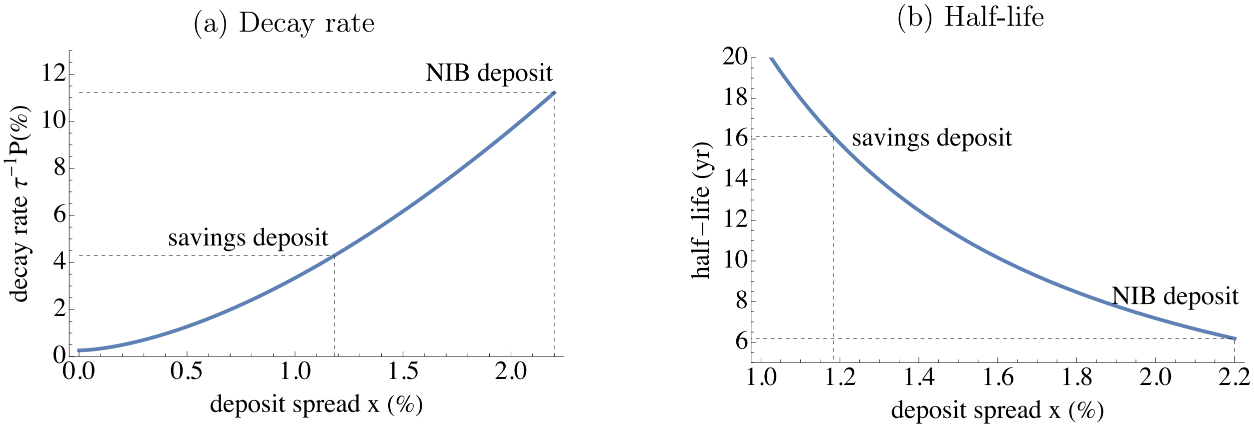


Figure A-14: Calibrated decay rate and half-life

Panels (a) and (b) plot the decay rate $\tau^{-1}P(x)$ and the implied half-life, both in annual terms, under our calibrated parameters (a, b, γ).

Figure A-14 plots the calibrated annual decay rate $\tau^{-1}P(x)$ as a function of the deposit spread x on the left and the implied half-life in annual terms on the right, under a 2.2% policy rate in 2019Q4.

F.2. Robustness of Calibration

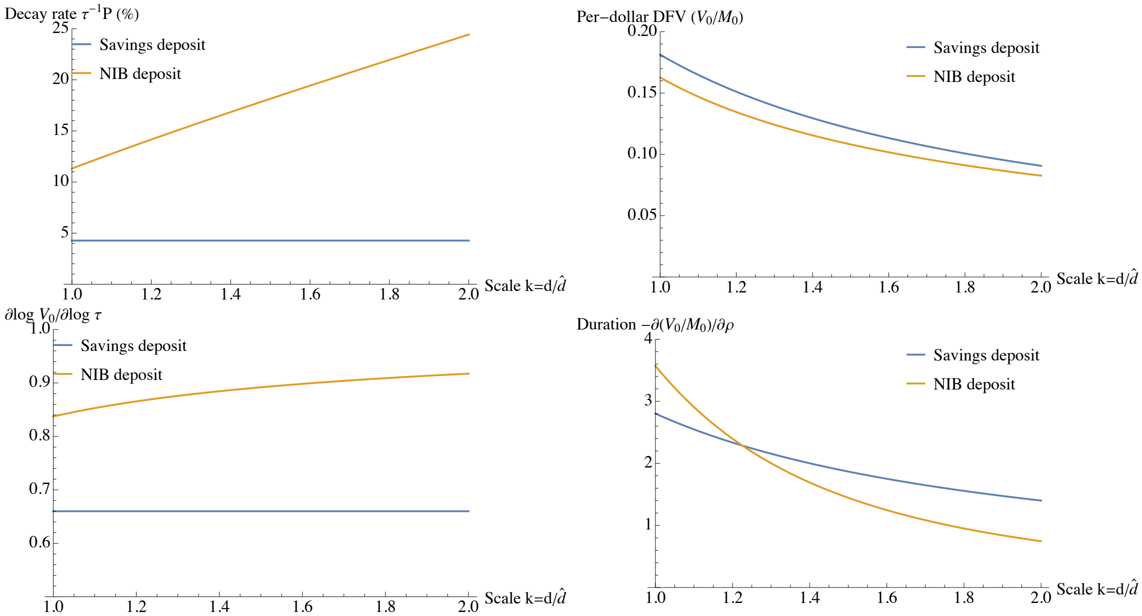


Figure A-15: Theoretical predictions against estimation moments

The four panels plot the theory-predicted objects of interest against a scaling factor $k = d/\hat{d}$, correcting the attenuation bias by assuming that the true moments (d_1, d_2, d_3) are k times larger than the estimated moments $(\hat{d}_1, \hat{d}_2, \hat{d}_3)$. The panels show: (a) annual deposit decay rate $\tau^{-1}P$, (b) per-dollar DFV $\frac{V_0}{M_0}$, (c) its log sensitivity to inattention $\frac{\partial V_0}{\partial \tau}$, and (d) its dollar duration $-\frac{\partial(V_0/M_0)}{\partial \rho}$, for savings deposits and NIB deposits. For each value of k, we use (12) to calibrate model parameters (γ, b, a) and then calculate the relevant object accordingly. A flat line means that the relevant object is invariant to a common attenuation bias across three moments.

F.3. Banks with the Largest DFV

(a) Savings deposits			(b) Non-interest-bearing deposits		
Bank Name	DFV (bn)	DFV (¢/$)	Bank Name	DFV (mn)	DFV (¢/$)
Wells Fargo	147.11	13.59	Wells Fargo	45.30	11.35
Bank of America	141.36	12.38	Bank of America	44.77	10.06
JPMorgan Chase	102.65	10.88	JPMorgan Chase	34.01	8.51
SunTrust and BB&T	54.25	19.27	SunTrust and BB&T	16.44	17.68
TD Bank	35.26	14.46	PNC Bank	10.04	13.73
Citibank	34.94	10.31	BNY Mellon	9.96	18.32

Table A-4: Banks with largest deposit franchise value, 2019Q4

Size of bank-level savings deposits D_i^s and non-interest-bearing deposits D_i are from Call Reports. Bank-level inattention $\alpha_{i,2019}$ is constructed by aggregating county-level inattention projections with 2019 deposit weights from the FDIC Summary of Deposits: $\alpha_{i,2019} = \sum_c w_{ic,2019}\, \alpha_{c,2019}, \quad w_{ic,2019} \equiv \frac{\text{deposits}_{ic,2019}}{\sum_{c'} \text{deposits}_{ic',2019}}$, which is then used to compute the bank-level inattention index τ_i as detailed in Section 6.1.

F.4. Bank-Level DFV and Market Capitalization

We compare our DFV estimates with the market capitalization of banks. For each publicly traded bank holding company, we compute the market capitalization per dollar of deposits.[29] Figure A-16 plots it against DFV per dollar of deposits, which is the deposit-weighted average of DFV of savings and non-interest deposits. We show that banks with more valuable deposit franchises tend to have higher market capitalization per dollar of deposits.

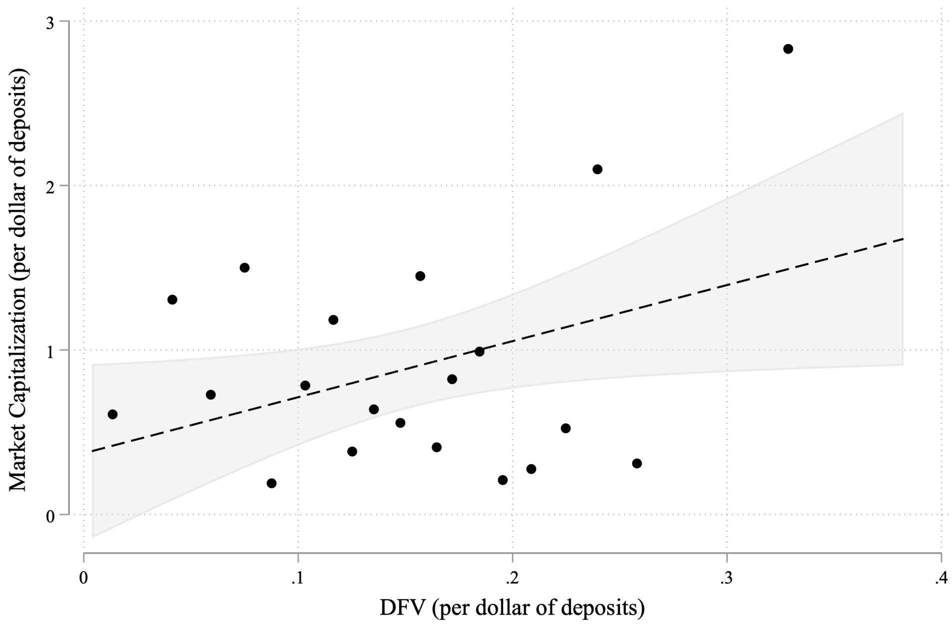


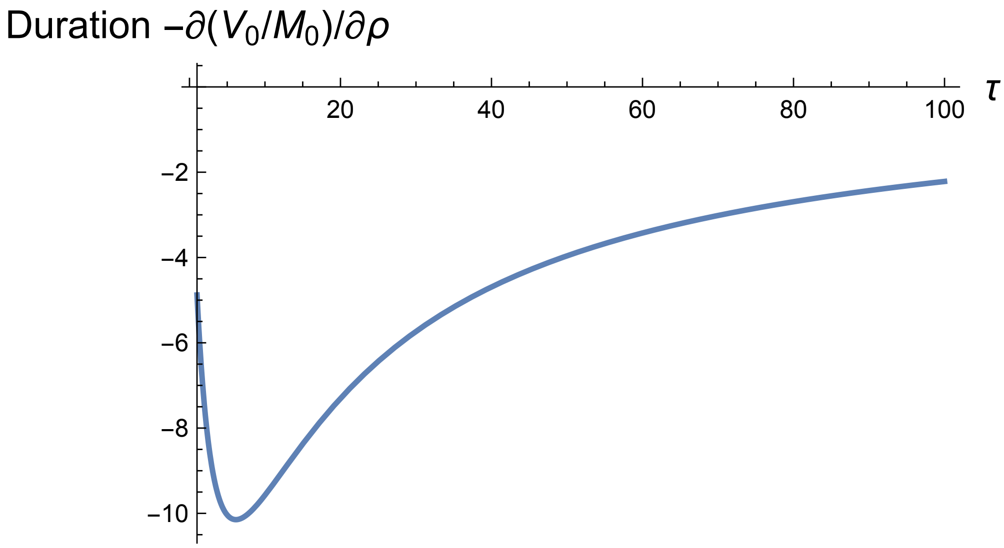
Figure A-16: DFV v. market capitalization

This figure plots market capitalization per dollar of deposits against DFV per dollar of deposits, using data from 2019Q4. DFV per dollar of deposits is the deposit-weighted average of DFV of savings and non-interest-bearing deposits. The dashed line is the OLS fit and the shaded area is the associated 95 percent confidence band.

[29]We thank the authors of DeMarzo, Krishnamurthy, and Nagel (2025) for sharing their code.

F.5. DFV Duration and Inattention

(a) Duration of savings account against τ, under $\rho = 0.25\%$



(b) Duration of savings account against τ, under $\rho = 2.2\%$

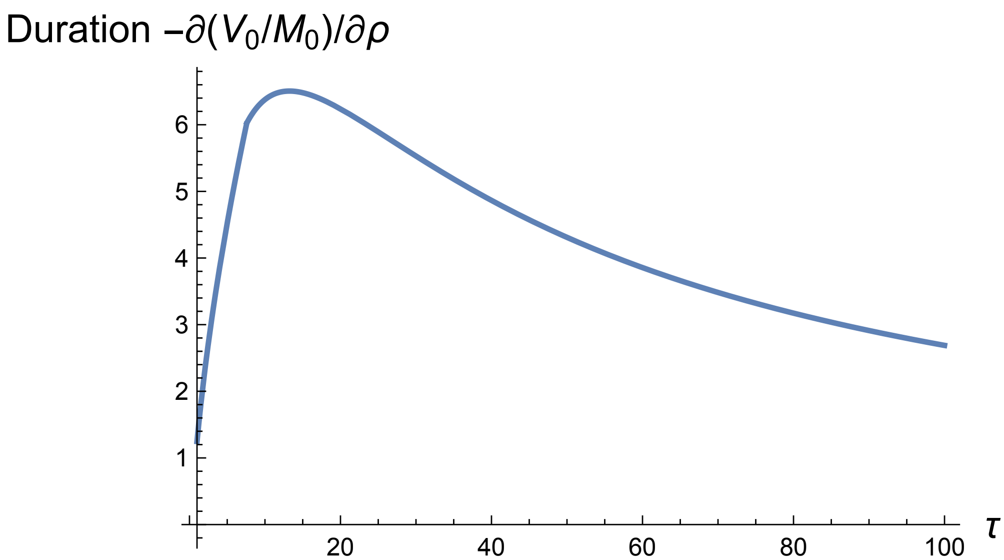


Figure A-17: Duration against inattention

Panel (a) plots the deposit franchise value duration of savings account under a low policy rate $\rho < u^{-1}(0)$, as a function of inattention τ. Panel (b) plots the same function under a high policy rate $\rho > u^{-1}(0)$.

F.6. DFV Duration with Fixed Costs as Function of Inattention and Policy Rates

In the baseline calibration, Figure 8 summarizes the DFV duration for a given level of inattention and zero fixed cost. Figure A-18 now turns that slice into a 3D map with varying fixed operating costs and inattention levels. In this figure, the blue surface is the zero-DFV frontier; banks operate the deposit business only below this surface. Inside this viable region, the blue wedge collects combinations where the duration of DFV is negative, and the green region is where the duration is positive. Panel (a) covers states where the bank optimally keeps the deposit rate at zero; panel (b) covers states where the bank pays a positive rate. With sufficiently large fixed costs, the DFV duration is negative over a wide range of policy rates in both cases. This is because the cost-discounting effect dominates: a higher policy rate reduces the present value of costs, so DFV rises.

Figure A-18 highlights that for a given distribution of costs and inattention, a higher policy rate expands the number of banks with a positive DFV duration. These findings complement existing evidence on time-varying deposit funding stability (Blickle, Li, Lu, and Ma 2025) from a valuation perspective: at higher levels of policy rates, more banks shift into a positive DFV duration, increasing the aggregate interest rate risk in the banking sector.

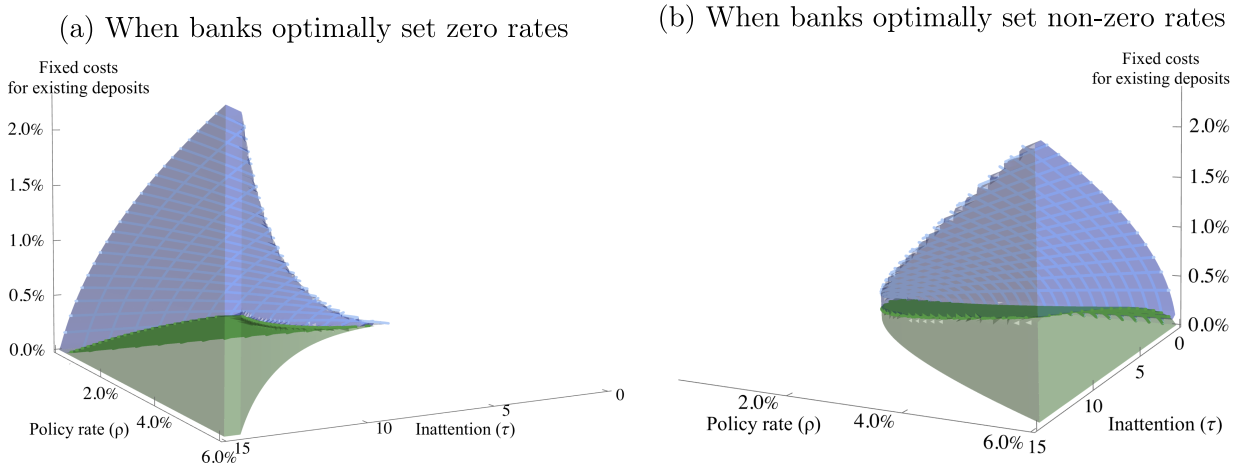


Figure A-18: DFV duration with fixed costs as function of inattention and policy rate

Blue wired surface is the zero-DFV frontier (banks continue serving depositors only if the fixed costs to service existing deposits are below this surface). Banks may charge a zero deposit rate when depositors are sufficiently inattentive given the policy rate, which corresponds to panel a; panel b summarizes the case when the bank optimally chooses a non-zero deposit rate. Within this set, the blue wedge marks where the duration of DFV is negative; the remaining green volume has a positive duration. The fixed costs to service existing deposits are in percent per dollar of deposits per year, and the policy rate (ρ) is the annualized policy rate in percentage terms; τ is the inattention parameter. Calibration of DFV follows Section 6.1.

F.7. Non-Interest-Bearing Deposit Size

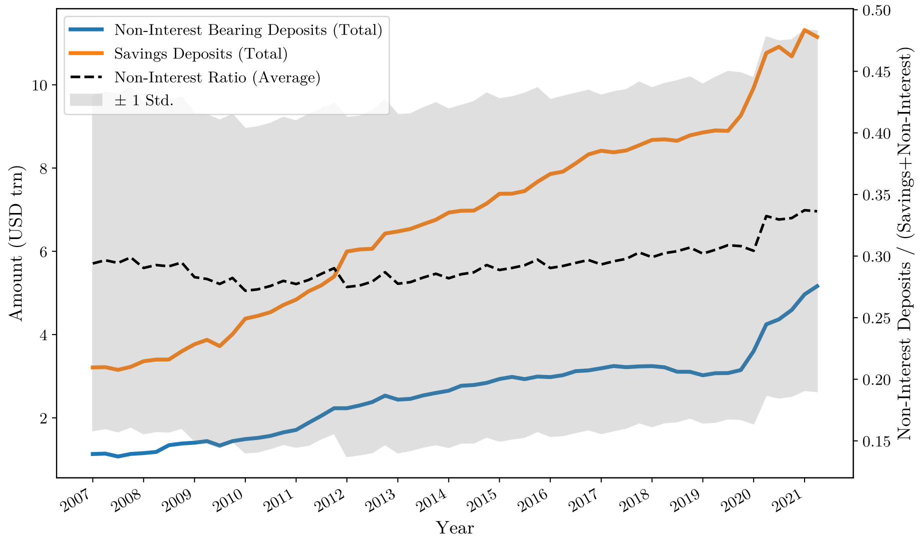


Figure A-19: Size of non-interest bearing deposits over time

The figure plots the time variation of core retail deposits using Call Report data. The left-hand axis plots the aggregate stock of non-interest-bearing deposits (NIB) and savings deposits (solid orange). The right-hand axis shows the non-interest-deposit ratio as NIB / (NIB + Savings), averaged across banks each quarter (black dashed). The grey band represents +/- one within-quarter standard deviation of this ratio across banks, illustrating the cross-sectional dispersion in reliance on zero-rate funding.

F.8. Banks' Willingness-to-Pay for an Inattentive Depositor

Banks' willingness-to-pay (WTP) for a new depositor must not exceed the present value of the profit it expects to earn from that customer's deposit balances. Under our baseline calibration, an averagely inattentive savings depositor yields about \$0.18 of franchise value per dollar, implying a bank would pay at most 18 cents per dollar for new deposits. Below, we discuss why our DFV implied willingness-to-pay is only a theoretical upper bound of banks' true WTP for two reasons.

First, banks cannot directly observe a new depositor's inattention level ex ante; depositors attracted by promotional rates might be more rate-sensitive and attentive than the average existing depositors. Thus banks need to discount the \$0.18-per-dollar franchise value by the probability that the customer will remain inattentive. As a simple back-of-the-envelope calculation, let $p \in [0, 1]$ denote the share of promo-induced new customers who ultimately behave like the average inattentive depositor ($\bar{\tau}$). Expected value per dollar of balance is then $p \times 0.18$. For instance, if only $p = 0.5$ of new depositors stay beyond the teaser period, the bank values a \$10,000 account at $0.5 \times 0.18 \times 10000 = \$900$, and will not spend more than \$900 in up-front incentives.

In practice, banks often screen depositors—such as asking for "qualifying activities" (e.g., direct deposits or maintaining a large balance every day) or residence in specific areas—and offer front-loaded cash bonuses or temporary rate bumps that hopefully lock in inattentive depositors. Table A-5 summarizes some representative promotional offers as of 2025 and converts them into empirical WTP estimates under a conservative assumption that *promo seekers depart immediately after the minimum period required for the promotion* (i.e., $p = 0$). Chase's 20 cents per dollar suggests it anticipates a higher-than-average depositor inattention among those responding to its offer; except for Chase, empirical WTPs cluster between 1 and 8 cents per dollar, far below the 18 cents per dollar maximum implied by DFV. In addition, entry to the deposit market is not competitive. Starting a new bank in the U.S. faces regulatory hurdles; from 2010 to 2023, the U.S. has averaged six new banks per year despite having more than 4,000 incumbents. Entry barriers suggest incumbent banks rarely need to pay fully competitive rates to attract deposits away from rivals, pushing acquisition costs well below the deposit franchise value of new deposits.

Finally, when would the deposit franchise value *equal* banks' WTP for a new dollar of deposits? In a frictionless, perfectly competitive deposit market, competition drives the expected net profit on each new dollar to zero, and DFV equals WTP if banks expect that the average promotion takers are as inattentive as their existing customers. Note that even with perfect competition, the cross-sectional heterogeneity of depositors still bear

Bank	Incentive	Eligibility	Cost	WTP (¢/$)
U.S. Bank	$400 cash bonus	$5,000 direct deposits	$400	8.0
Chase	$300 cash bonus	$1,500 daily balance[a]	$300	20.0
PNC	$400 cash bonus	$5,000 direct deposits	$400	8.0
TD Bank	$200 cash bonus	$10,000 daily balance[b]	$200	2.0
Citibank	promo rate, 4.25% (3mo)	$25,000 daily balance	≈ $266	1.1
SoFi	promo rate, 4.00% (6mo) +$300[c]	$5,000 direct deposits	≈ 310	3.1
Wells Fargo	promo rate, 4.60% (12mo)	$10,000 daily balance	≈ $460	4.6

Table A-5: Promotional offers for depositor acquisition

[a] Chase also allows qualification via $500 of direct deposits within 90 days; using that threshold would imply a WTP of 60 cents per $1. We report the more conservative $1.5k balance requirement.
[b] TD Bank's offer is valid for *selected states* only.
[c] SoFi has an additional 0.20pp rate boost for six months, which adds about $10 of extra interest on a $10k balance; the one-time cash bonus is up to $300 depending on the size of direct deposits.
Note that promotions often have multiple tiers of cash/rate bonuses, in which case we report only the maximum promotion available applied to the maximum balance/direct deposit tier.

important redistribution implications: as long as banks cannot perfectly price discriminate (i.e., depositor types are not fully known), cross-subsidies may persist across demographic groups, with the attentive depositors more than compensated by banks' promotions and others pay more for banks' franchise value.

F.9. Demographics and Inattention

	β_α	$s.e._\alpha$	β_τ	$s.e._\tau$	Mean	SD
	(1)	(2)	(3)	(4)	(5)	(6)
% Under 18	0.061	0.008	0.022	0.003	23.542	3.042
% Black	0.009	0.003	0.003	0.001	8.864	13.690
% Householder	0.205	0.009	0.070	0.003	39.074	3.236
% Female	-0.231	0.011	-0.077	0.004	50.070	1.942
% Asian	-0.027	0.007	-0.008	0.002	1.233	2.493
% White (Non-Hispanic)	-0.013	0.001	-0.004	0.000	78.080	18.896
% Renter	-0.020	0.003	-0.006	0.001	28.118	7.169
% Unmarried Partner	-0.334	0.037	-0.113	0.012	2.401	0.543
% Single Moms	-0.165	0.021	-0.054	0.007	6.418	2.066
$\bar{\tau}_{2010}$					2.346	0.322

Table A-6: Post-LASSO OLS: Demographics and inattention

All demographic covariates are expressed as percentages of the county population and are constructed from the 2010 Decennial Census five-digit ZIP Code Tabulation Area (ZCTA) file available through Missouri Census Data Center. For each variable we compute a population-weighted average across all ZCTAs within a county. % Under 18 is the share of residents younger than 18; % Black, % Asian, and % Non-Hispanic White are the shares of individuals who identify with those single-race categories, the latter excluding any Hispanic or Latino origin; % Female is the share of residents identifying as female; % Householder is the share of adults listed as the householder of their housing unit; % Renter Occupied is the share of occupied housing units that are rented rather than owned; % Unmarried Partner denotes households in which the householder cohabits with an unmarried partner; and % Single Moms denotes families headed by a female householder with own children under 18 and no spouse present. The dependent variables are two alternative measures of depositor inattention: $\alpha_{c,2010}$, the predicted annual inattention measure at county level detailed in Section 5, and $\tau_{c,2010} = 1 + \frac{180\, e^{\alpha}_{c,2010}}{\text{HL}^{\text{sch}}}$, the inattention measured in days corresponding to model parameter. Columns 1-2 present coefficients (β_α) and robust standard errors from an OLS regression of $\alpha_{c,2010}$ on the demographic variables selected by the post-LASSO procedure; Columns 3-4 repeat the regression using $\tau_{c,2010}$; Columns 5-6 report county-level means and standard deviations for each covariate as well as $\tau_{c,2010}$.