

The Effects of Mobile Banking Apps on Financial Decisions: Evidence on Overdrafts and Delinquency

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Abstract:

In an increasingly complex financial environment, making good financial decisions becomes challenging. Mobile banking apps are increasingly used in everyday money management, yet causal evidence on whether they help or hinder financial decisions remains limited. Using a longitudinal panel of 50,000 customers from a major bank for the period 2015–2020, we study how the adoption and usage of the bank app affects overdrafts and delinquency. We combine Coarsened Exact Matching with staggered Difference-in-Differences to address self-selection and heterogeneous adoption timing. Results show that app adoption increases both the incidence and amount of overdraft, and it also raises delinquency amounts, with effects strengthening over time. Effects are larger for app usage in mobile (vs. tablet) devices, and for customers with less online banking experience, lower tenure, and less educated. The findings indicate that financial apps can shape financial decisions in undesired ways, highlighting the need for responsible design and usage.

Key words: *Mobile banking applications; Financial decisions; Cognitive biases and limited attention.*

Track: *Digital Marketing & Social Media*

1. Introduction

Making good financial decisions is essential, not only to ensure a person's economic and financial welfare (French et al., 2020), but also her physical, mental, and emotional wellbeing (Salisbury et al., 2023). Unfortunately, the financial environment that consumers face today, marked by unprecedented levels of uncertainty and volatility, has only increased the complexity and difficulty of financial decisions. These challenges expose individuals to financial vulnerability, characterized by difficulties in saving enough money, managing expenses, planning ahead, or avoiding harmful behaviors such as overspending or chronic indebtedness (Salisbury et al., 2023). Once consumers encounter these difficulties, the consequences escalate as individuals become overwhelmed by emotional distress and lose control of the situation resulting in negative spirals (Leandro and Botelho 2025). Financial education has frequently been prescribed as the remedy, but the accumulated evidence is not very encouraging, with financial education interventions having only marginal positive effects at best (Fernandes et al., 2014). With the rapid development in financial technology, which is transforming the financial service industry, new technologies emerge as alternative ways to help people navigate the complexities surrounding financial decisions. (Agarwal et al., 2025)

Among them, mobile banking applications have gained popularity and rapidly evolved from complementary digital tools to essential interfaces through which individuals actively manage their finances. Features such as quick and easy access to relevant financial information, real-time feedback, interactivity, and personalization can enhance financial knowledge and encourage better decisions (French et al., 2020), although other characteristics such as the small size of the screen – and the resulting limited information that apps can convey compared with other channels – and the prevalent use of the apps for more casual and surface-level browsing can result in less deliberate and less rational decision-making (Hadar et al., 2013). It is thus unclear whether banking apps can help or hinder financial decision making, which thus becomes an important empirical research question. With more than 2.17 billion people worldwide using mobile banking services in 2025 (CoinLaw, 2025), and usage rates reaching almost three quarters of the population in developed countries such as the US and Europe (SQMagazine, 2025), it is critical to understand how the adoption and use of mobile banking apps influence financial decision-making, yet causal evidence on these effects remain absent.

To address this important research question, the present study focuses on two key financial outcomes: overdraft and delinquency, which are linked to important negative consequences for consumers, and investigates how the adoption and usage of mobile banking apps impact the incidence of these outcomes and their magnitude. We also investigate some moderators including the type of device (mobile vs. tablet) and customer characteristics (prior experience with online banking, customer tenure, and education). Using a unique dataset from a major Spanish bank that comprises 50,000 consumers for which we observe their financial decisions and channels used (including the mobile app) during a 5-year period (2015 to 2020), and applying Difference-in-Differences estimation techniques, the results show that adopting the app increases the incidence and amount of overdraft, and the amount of delinquency, with these effects becoming weaker when individuals use the app in tablets (vs. mobile phones), have higher experience using digital banking, have a longer relationship with the bank, and are more educated. These findings contribute to a better theoretical understanding of the impact that mobile apps have on consumer behavior and decision making, and they offer useful advice to consumers and policymakers.

2. Conceptual development

Financial decision-making encompasses choices about saving, borrowing, budgeting, and managing debt, domains that require acquiring and processing complex information and making intertemporal trade-offs. The literature offers two explanations for why individuals frequently make suboptimal financial decisions. One is limited attention (Ben-David et al., 2025; Stango and Zinman 2014): given that the process of acquiring information is complex and/or costly (direct or indirect costs), individuals make financial decisions after considering only a portion of the information available resulting in an incomplete consideration of all relevant information that is needed to make good choices. The other is decision heuristics and biases (Kahneman and Tversky, 1979; Lichtenstein et al., 1982): while traditional economic models assume that individuals behave rationally, extensive behavioral research shows that actual financial behavior systematically departs from these assumptions due to cognitive limitations, emotional influences, and contextual cues (De Bondt and Thaler, 1995). These mechanisms give rise to a range of behavioral biases that distort judgment and hinder effective financial behavior, and among them overconfidence and present bias are probably the most prevalent (Lichtenstein et al., 1981).

This study focuses on mobile banking apps, which present a number of features and capabilities that make them unique compared with other channels. These include portability, ubiquity, immediacy, personalization, and interactivity, which enable a continuous and seamless integration of this channel into daily routines (Stocchi et al., 2022). For example, portability and ubiquitous connectivity allow users to access services anytime and anywhere, dissolving spatial and temporal barriers and enabling real-time engagement and transactional convenience (Siau et al., 2001). Immediacy enables the delivery of instant feedback and rapid response cycles, facilitating the access to updated information within seconds (Shankar et al., 2016). Personalization allows apps to tailor content, recommendations, and interfaces to individual behaviors and preferences (Missaoui et al., 2019., Alghizzawi et al., 2023), and location-based services can adapt experiences to users' physical and situational contexts (McLean et al., 2020). Interactivity can strengthen customer engagement through touch-based and gesture-driven interfaces that create intuitive and immersive experiences, combining functional and experiential value (Huang et al., 2019). Another key feature is the small size of the screen, as compared with other channels (e.g., desktop), which can limit the amount of information that can be provided. This imposes a higher cognitive load on consumers, as it leads to visual complexity, and restricts the ability to evaluate and process the information adequately (Ghose et al., 2013).

Our study aims to understand whether mobile apps can alter financial decision making. We focus on two key financial outcomes: overdraft and delinquency. An overdraft occurs when the balance in a checking account falls below zero because a transaction exceeds the available funds (Stango and Zinman, 2014; Ben-David et al., 2025), while delinquency refers to being late in debt repayment. These two outcomes have negative downstream consequences for consumers' economic and financial wellbeing, and are relevant from a theoretical, practical, and societal perspective. In addition to investigating the impact of app adoption on the incidence and magnitude of overdraft and delinquency, we aim to investigate the heterogeneity of these effects, focusing on a number of theoretically relevant moderators that include the device type (mobile vs. tablet) and consumer characteristics (prior experience with online banking, tenure, and education). Building on the previous discussion about the nature of financial decision making (influenced by limited attention and cognitive biases) and on the aforementioned technological affordances of mobile applications, we now discuss the extent to which mobile apps can impact overdraft and delinquency.

Mobile apps and limited attention. The unique features that mobile apps present, discussed previously, suggest that they can make access to information less costly and thus promote more frequent information acquisition (Carlin et al., 2023). This is possible because specific features including portability, real-time connectivity, and immediacy reduce informational frictions by allowing users to access balances, payment alerts, and spending records whenever they are needed, thereby helping mitigate attentional lapses. Other features such as automatic reminders, push notifications, and goal-tracking dashboards lower the costs of monitoring finances, transforming abstract long-term objectives into concrete and trackable steps, and provide structured feedback, which may reduce the likelihood of overdrafts or missed obligations. Mobile app adoption can thus support attention, discipline, and long-term planning, reducing the extent to which limited attention impairs decisions.

Mobile apps and cognitive biases. On the other hand, these same characteristics of mobile apps can amplify cognitive biases in ways that distort judgment and promote impulsive or overly optimistic decisions. The immediacy and frictionless nature of one-tap transactions reinforce present bias by making spending easier and more salient than saving, while continuous exposure to available credit lines or positive performance indicators heightens overconfidence and the illusion of control (Wang et al., 2023; Stocchi et al., 2018). Interactivity and tactile engagement intensify emotional responses and perceived ownership, encouraging spontaneous actions. Moreover, frequent, short, and context-dependent mobile interactions can compress decision-making time, leaving users more susceptible to heuristics and emotional reactions, and excessive reliance on automated features may weaken active oversight, making it harder to detect emerging financial risks.

Given the previous discussion, mobile apps can either improve (limited attention effect dominates the cognitive biases effect), worsen (cognitive biases effect dominates the limited attention effect) or have no effect on (limited attention and cognitive biases effects cancel each other out) financial decisions (overdraft and delinquency). In addition to investigating the main effect of app adoption on financial decisions, we also investigate the extent to which the effect is heterogeneous by considering theoretically relevant moderators. First, we investigate whether the device (tablet vs. mobile) that users employ to engage with the app matters, as these devices differ in some key features discussed previously, such as the size of the screen (bigger for tablets) and portability (higher for mobile phones). Second, we consider individual characteristics: (1) user experience with online banking (this channel is more closely related to mobile apps than other banking channels e.g., branch); (2) customer

tenure (it may influence consumer knowledge of the bank and its products and services as well as their trust and confidence); and (3) education (higher educated customers can have an important advantage to navigate the complex financial environment).

3. Data and methodology

This study investigates the impact of the adoption of a mobile banking app by customers of a major Spanish retail bank on their financial decisions. The collaborating bank provided access to a unique dataset that contains detailed information about individual customers' monthly financial positions and transactions for a representative sample of 50,000 consumers who are tracked over the period 2015 until 2020. The data include detailed information on account balances, channels used by customers to check for information and transact, overdraft and delinquency measures, as well as demographic profiles. Importantly, the data include the precise app adoption dates for customers who have adopted the app during the observation period (among the 50,000 bank customers, 17,809, or 35.6% of the sample, adopted the app).

Our primary interest lies in understanding how the adoption of the mobile app influences the quality of the financial decisions made by customers through its impact on overdraft usage and delinquency behavior. We specifically focus on two dimensions for each outcome variable: incidence (probability of the event) and magnitude (monetary amount). To be able to derive causal insights, we must overcome a number of important challenges. A first challenge is that early adopters of the mobile app are likely systematically different from later or non-adopters (e.g., more tech-savvy, financially active, or financially distressed). To address self-selection and improve the comparability between the treated and untreated groups, we employ Coarsened Exact Matching (CEM) prior to implementing a difference-in-differences analysis. We match treated customers (app adopters) to non-treated customers (non-adopters) based on their pre-treatment characteristics measured during the period before the app launch (January 2015 - August 2016). The matching covariates encompass a comprehensive set of customer profiles based on pre-treatment financial conditions, channel-usage intensity (branch, ATM, e-bank, PC), demographics, and local macroeconomic indicators. The CEM procedure creates a balanced sample by pruning observations from both groups that lack comparable counterpart in the other group.

Another key challenge concerns the staggered timing of customers' app adoption, as they adopted the app at different points in time. This requires an empirical strategy that

accommodates heterogeneous treatment effects across groups and over time. We therefore employ a staggered Difference-in-Differences (DID) design following the group-time average treatment effect framework of Callaway and Sant’Anna (2021). Adoption cohorts (g) are defined by the half-year in which a customer first used the app (e.g., Cohort 1: September–December 2016; Cohort 2: January–June 2017; Cohort 3: July–December 2017; etc.). Customers who have not yet adopted in a given period serve as the control group for each cohort-time cell, maximizing the effective sample size while maintaining a valid counterfactual. We estimate the model using the Callaway and Sant’Anna (2021) multiple-period DID estimator (the CS estimator), which is well suited to our setting because it allows for treatment effect heterogeneity and remains robust when parallel trends hold only conditionally on pre-treatment covariates. To incorporate the covariate balance achieved through Coarsened Exact Matching (CEM) and improve efficiency, we use a doubly robust estimation approach.

4. Study findings

The CEM procedure helped improve covariate balance for most variables under the 0.25 bias reduction threshold. The resulting matched sample comprises 12,623 adopters and 23,567 non-adopters, which forms the basis for all subsequent analyses. The results of the staggered DID estimation are shown in Table 1. We confirm that the parallel trends assumption holds for all our models. As can be seen in the table, when considering the overall ATT effects, the results reveal that, for overdraft, app adoption significantly increases both overdraft incidence and overdraft amount. For delinquency, the results show no significant effect of app adoption on the incidence of delinquency, but a positive and significant effect on amount. When considering the treatment effect by length of exposure (“Dynamic ATT aggregation”), all four outcomes, overdraft incidence, overdraft amount, delinquency incidence, and delinquency amount, are statistically significant, suggesting that the treatment effect of app adoption is not merely transitory but persist over time.

Additional analyses reveal substantial heterogeneity in the overall ATT across customer groups. Beginning with the type of device, app-only adopters exhibit larger increases in overdraft incidence and overdraft amounts, as well as a higher delinquency amount, compared with tablet-or-multi-device adopters, whose effects are notably smaller. Regarding consumer characteristics, the results show that the effects of app adoption become stronger (i.e., increased incidence of overdraft and higher amounts of overdraft and delinquency) for customers with less prior online banking experience than for more

experienced online banking users, whose effects are weaker or insignificant. Likewise, the effects are stronger for low-tenure relative to high-tenure adopters, and for low-educated compared with high-educated customers.

Table 1: Effect of app adoption on overdraft and delinquency: Group-time overall treatment effect and the treatment effect by length of exposure

Treated group	Treatment effect	Overdraft incidence	Overdraft amount	Delinquency incidence	Delinquency amount
Main effect					
App adopters	Overall ATT	0.0100*	0.0341*	0.0010	0.0076*
	Dynamic ATT	0.0151*	0.0472*	0.0019*	0.0106*
Moderator: Device					
App-only adopters	Overall ATT	0.0104*	0.0354*	0.0013	0.0088*
	Dynamic ATT	0.0174*	0.054*	0.0029*	0.0143*
Tab-only or both adopters	Overall ATT	0.0078*	0.0281*	-0.0009	-0.0000
	Dynamic ATT	0.0079*	0.0257	-0.0018	-0.0039
Moderator: Prior Online banking usage					
High-online-banking-usage adopters	Overall ATT	0.0066*	0.0281*	-0.0036	0.0015
	Dynamic ATT	0.0095**	0.0358*	-0.0053	0.0000
Low-online-banking-usage adopters	Overall ATT	0.0134*	0.04*	0.0004	0.0126*
	Dynamic ATT	0.0213*	0.0616*	0.0028	0.0263*
Moderator: Tenure length					
High-tenure adopters	Overall ATT	0.0037	0.0237*	0.0009	0.0084
	Dynamic ATT	0.0036	0.0215*	-0.0003	0.0013
Low-tenure adopters	Overall ATT	0.0159*	0.0439*	0.001	0.006
	Dynamic ATT	0.0241*	0.0668*	0.0034*	0.0165*
Moderator: Education					
More educated adopters	Overall ATT	0.0084*	0.0329*	0.0008	0.0096
	Dynamic ATT	0.0137*	0.0491*	0.0015	0.0115
Less educated adopters	Overall ATT	0.0118*	0.0356*	0.0011	0.0047
	Dynamic ATT	0.0165*	0.0455*	0.0021	0.0086
Note: (1) The overall ATT reflects the group-time overall treatment effect and the dynamic ATT aggregation reflects the treatment effect by length of exposure. (2) The asterisk (*) indicates statistical significant at the 5% level (i.e., the 95% confidence interval does not include zero).					

5. Discussion

The present study provides early causal evidence on the effects of mobile banking app adoption and usage on two financial outcomes, overdraft and delinquency, which have negative downstream consequences on consumers' financial wellbeing. In doing so it advances current knowledge in several important ways. First, the study highlights the complex role that mobile banking apps play in shaping consumer financial decision-making. While prior research has frequently characterized mobile apps as instruments

capable of improving consumer decision making mostly in the commercial domain (Liu and Sese 2022; McLean et al 2020), in an uncertain and volatile context such as financial markets, which requires deep processing and analysis of complex information, mobile apps can impair decisions. Despite the ability of mobile apps to reduce information acquisition costs and facilitate access to information, these apps may at the same time magnify cognitive biases such as the tendency towards impulsive behavior, overconfidence, or present bias (Stocchi et al., 2018), which ultimately distort financial behavior (Stango & Zinman, 2014), making consumers more prone to errors or mistakes that, once committed, spiral down with escalating consequences (Leandro and Botelho 2025). These results complement emerging evidence that digital and mobile financial tools can both enhance control and increase vulnerability, depending on users' cognitive constraints and behavioral tendencies (Stocchi et al., 2022; Salisbury et al., 2023). Another important contribution of this study is the demonstration that these effects are nuanced, and that not all consumer groups are affected equally by mobile app adoption. We found that the negative impact of mobile app adoption on financial outcomes were less severe for individuals who use the app in tablets, who have more experience managing their finances online, who have a longer relationship with the bank, and who are more educated.

This study offers important practical and public policy implications. As consumers navigate an increasingly complex financial system, making good decisions becomes a necessity to ensure economic and financial wellbeing. The perceived lack of effectiveness of many governmental or public initiatives to improve financial education (Fernandes et al., 2014) coupled with the rapid development of financial technologies that promise to transform the financial services industry and consumers' experiences, is leading consumers to enthusiastically embrace these technologies. Our study sends a warning sign as it demonstrates that when it comes to mobile apps, a widely adopted channel by consumers to manage their finances, the quality of consumer decisions can decrease. Thus, our study recommends that financial apps should not be viewed merely as neutral information channels but as tools capable of significantly modify behavioral patterns and responses by consumers in unintended ways. Fostering usage practices that promote reflection, awareness, and long-term planning, particularly among users with limited education or less digitally literate (Salisbury et al., 2023) can thus be the focus of educational interventions. Overall, our findings call for responsible app use and design, as mobile financial platforms increasingly shape the opportunities, and vulnerabilities, embedded in everyday financial decisions.

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