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Testing Subscription Inertia: Evidence from India's 2021 Recurring-Payment Rules by RBI

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ABSTRACT

Did the RBI's 2021 recurring-payment rules, which required customers to re-authorise auto-debits, reveal how much subscription retention depended on consumer inertia rather than preference? The study considers the transition period from October 2021 to be a regulatory shock and compares the activity in the months leading up to the shift with the activity in the months following, both in terms of card-based online payments and UPI payments, as well as between credit- and debit-card transactions, by applying an event-study and difference-in-differences framework. RBI card-payment data from public reports and NPCI UPI transaction data for the year 2021 and RBI e-commerce observations of cards made available through May 2022. Online card transactions are a proxy for subscription level churns as these aren't publicly known and are interpreted with caution. There was no evidence of a sudden drop in card activity at the moment reported to happen by the inertia hypothesis. Debit-card transactions grew by 1.81% in the first half of the year as compared to the second half and credit-card transactions grew by 0.79% in the second half when compared to the first half. The difference between the card and UPI was statistically significant, but the pre-existing divergent trends violated the parallel trends assumption. But the evidence does not allow concluding that there is a causal effect of subscription-inertia, but merely at the level of the available proxy to payment.

Keywords: Subscription Inertia, Consumer Inertia, Recurring Payments, RBI E-Mandate, Behavioural Economics, Difference-In-Differences, Event Study, Regulatory Shock

1. INTRODUCTION

There are more than one economic explanations present for the subscription retention in case of banking payment system. A consumer can go on paying because of the utility the customer enjoys from the services, searching costs, switching costs, or renewal without active choice. The first two explanations can be included in the standard consumer choice paradigm but cannot be separated from behavioural persistence by observed renewal. This is the most important to consider when assessing whether a recurring-payment intervention is a displacement of genuine demand or just a replacement of an existing payment program.

Subscription-based digital services have revolutionised the way consumers now buy and keep using products like streaming services, digital publications, and other online platforms. Subscriptions are different from one-off sales and typically require continuous payments, so that services can be maintained with minimal involvement from the consumer after the initial payment (Verma et al., 2025). This payment model makes a pivotal difference between ongoing subscription and a genuine consumer preference. One consumer can be subscribed to a service when it remains valuable for them, while another subscribed one can be due to a lack of attention and procrastination, switching costs or the convenience of keeping an old arrangement. Within the field of behavioural economics, there is a foundation for analysing these mechanisms, particularly including studies on present bias, default bias and consumer inertia (Jha & Sokhatska, 2025). The RBI's recurring-payment system was also an institutional innovation that stipulated for extra authentication and notification for recurring payments (RBI, 2026a). The rollout in 2021 forced the reform of already existing automatic-payment regimes and offered a chance to assess to what extent continuing the subscription was due to passive retention.

1.1 Research Question

Did the RBI's 2021 recurring-payment rules, which required customers to re-authorise auto-debits, reveal how much subscription retention depended on consumer inertia rather than preference?

This study aims to understand if consumer inertia played a significant role in the retention of subscriptions after the RBI's recurring-payment guidelines from 2021, which impact the conditions that allow recurring payments to continue automatically.

The study has three objectives:

1. To see whether the subscription-based payment activity changed after the RBI's rule on recurring payments was implemented in October 2021.
2. To determine if the observed change continued and varied across payment arrangements that are subject to the regulatory requirements and comparatively less subject to regulatory requirements payment channels or markets.
3. To assess whether the evidence supports consumer inertia as a reason for retaining subscribers or whether it is a temporary disruption due to technical or implementation issues.

This rationale comes from the challenges of discerning real customer preference from continuation in traditional subscription data. Observed retention is an imperfect measure of active demand, as is automatic renewal because there is no new decision involved. The RBI's intervention brought about a change in the institutional structure that broke the normal recurring-payment flows, offering an opportunity to study the impact of the change in the nature of the recurring payments on retention (RBI, 2026b). The study adds to the literature on behavioural economics, by linking existing evidence on present bias, status quo effect and limited attention to a large-scale regulatory intervention. It also plays a role in subscription-market research by studying past subscribers, rather than just subscription decisions. Analysis is useful from a policy perspective for the debates about consumer protection and automatic renewal practices. Firm-level churn data is not available, so the study uses overall payment measures as proxy and cautiously interprets results instead of providing a measure of unwanted subscriptions.

2. LITERATURE REVIEW

2.1 Consumer Inertia and Subscription Retention

DellaVigna and Malmendier (2006) demonstrated that the customer behaviour is difficult to reconcile with standard preferences and beliefs. They used contract and attendance data across 7,752 members of three U.S. health clubs over three years, which is hard to reconcile with fully accurate expectations of behaviour in the future. The members who paid a flat monthly fee were relatively light users and were able to save money from other payment options. The authors relate these patterns to issues of self-control and faulty expectations. The relevance of the study for subscription economics is very high as it shows that on-going payment can go hand in hand with low utilisation. It takes individual contracts and attendance, not a regulatory shock, into account, though, and so doesn't directly estimate retention based on automatic renewal.

The second foundation comes from research on defaults. Despite the fact that the basic economic attributes of the 401(k) were the same, Madrian and Shea (2001) demonstrate that automatic enrolment led to a significant rise in 401(k) participation and affected contribution and investment decisions. This is a place far away from digital subscriptions, but nevertheless, it demonstrates that inaction is an important part of what is observed as choice in the real world. It cannot, however, be assumed that because a consumer still has an existing arrangement that he or she is necessarily endorsing it.

This is especially important given automatic renewals that change when to decide. Studies by Einav et al. (2025) and NBER (2023) described whenever an initial subscription decision is made, subsequent payments may not involve a further decision. Therefore, no cancellation does not necessarily indicate service, convenience, or switching costs, or inertia. These mechanisms can be differentiated, if technical payment disruption can be separated from consumer behaviour, when an intervention is forcing customers to take a new positive action.



Figure -1: Subscription lapses around credit card expirations

(Source: NBER, 2023)

Figure 1 depicts the retention rates across cohorts whose payment cards are replaced 12 months after initial subscription. The figure again demonstrates that customer retention rates decrease whenever subscription lapses. This further helps to understand that suppliers can earn higher profits whenever subscribers fail to cancel subscriptions they are not using.

2.2 Present bias, limited attention and status quo effects

Behavioural economics has identified a number of mechanisms which can result in long-lasting subscriptions. Research by O'Donoghue and Rabin (1999) present biased preferences and demonstrate that time inconsistency can lead to procrastination in a setting where an action entails an immediate cost, the relevance of their results to the present study is clear. This mechanism could be used for subscription cancellation; the subscription is cancelled through effort and attention today while the financial benefit occurs in the future through avoiding payments. Users can then choose to delay the cancellation even when the subsequent subscription is not worth the value of the consumer.

Another explanation is related to the limited attention. Using experimental evidence on information containing tax, Chetty et al. (2009) discover that consumers react less strongly to costs when costs are less salient. While they're talking about tax, the mechanism is applicable to recurring payments as the payment part is divorced from the initial purchase decision. Individual charges might not be as noticeable as an initial purchase when a subscription becomes routine.

Status quo effects are related but not a good indicator of irrationality. A default will lower decision costs, convey a recommendation, or for some reason make the recommended decision easier to uphold. Madrian and Shea's (2001) results thus are not proof of all default behaviour being undesirable consumption. This qualification is relevant to the proposed interpretation: a decrease in retention following re-authorisation would suggest that the retention was impacted by the old payment structure, but it would not mean that all the subscriptions that were cancelled were unwanted in the first place.

Borrower inertia and automatic-renewal contracts are the focus of a model developed by Johnen (2019). The model is useful because it highlights the notion of limited attention and demonstrates how opportunities for picking up inattentive consumers at the expense of the automatic renewal can arise, while opportunities for consumer sophistication and competition can help to temper such effects.

2.3 Automatic renewal and subscription settings

Empirical studies of the last few years offer more direct evidence that automatic renewal has an impact on subscription results. Milleret al.(2025) analysed a big-scale field experiment with over two million newspaper readers in Europe. They randomly presented a contract to consumers with either an active step or an automatic step. There was a significant inertia effect found in this experiment, with automatic renewal leading to higher continuation rates following the promotion, and some consumers anticipating the difficulty of cancellation and changing their initial decisions. The study provides good evidence that the design of the renewal themselves can influence the subscription behaviour as the terms of the contract were experimented.

Its institutional context is, however, not the same as in India. The newspaper experiment alters the contract that is put before a new entrant, while the RBI step in alters existing contracts that are recurring payment ones (RBI, 1988). The Indian episode may thus also provide some indication of the inertia of the existing subscribers as well as their behaviour at subscription formation. Consistently, it is not as tidily experimental because banks, merchants and payment processors required making modifications in the same duration. Any drop in payments that occur right after implementation may be a result of a technical issue, confusion over the customer's part, or an actual cancellation.

A study on selling subscriptions by Einav et al. (2025) offer particularly relevant evidence based on detailed payment-card information. They look at times when cards are changed and that the subscribers have to actively renew payment arrangements. When a person needs to renew, the cancellation rate increases significantly, and the authors are modelling the revenue consequences of inattention and switching costs that arise with the increase. This design is quite similar to proposed RBI setting as both stops automatic continuation.

2.4 RBI recurring payment system

The recurring-payment system set up by the RBI provides a convenient institutional framework for this test. The RBI, in March 2021, has further delayed the timeline of full compliance with its framework for recurring transactions with banks online till September 30, 2021, due to limited progress in bringing the old and new mandates online (TIMES OF INDIA, 2021). The framework included cards, wallets and UPI as well as additional factors of authentication or AFA, customer-notification requirements. On June 16, 2022, RBI further modified the framework allowing subsequent recurring transactions without AFA from ₹5,000 to ₹15,000 (RBI, 2022).

Recent reports of RBI on subscription services revealed the disruption of recurring payments since October 2021 (Webex, 2026). These reports can only show that the implementation was consequential and not whether it was because customers no longer valued a service or whether it was due to payment issues. The research thus requires month-by-month evidence of events, comparison groups that are both affected and unaffected, and pre-trend checks and robustness tests.

2.5 Literature gap

The lack of literature on the subject is not due to the absence of consumer inertia, it is documented in the experimental, contractual, and payment literature. The unresolved question is whether the Indian regulatory action can offer a reliable prediction of the contribution of inertia to the retention of their current subscriptions. It is suggested that one should bring together the behavioural literature with a regulatory natural experiment and consider the number of reductions in aggregate payment as an upper or lower bound or proxy for unwanted subscriptions. Post-October differences that remain after taking away the pre-trends and technical disruption are in line with a meaningful role for automatic-payment inertia. The brief drop-off would be more in line with implementation friction. The separation is important for the analysis of the amount of the observed subscription retention that can reasonably be explained by the default payment method.

3. THEORY AND FRAMEWORK

3.1 Preference-based subscription retention

According to Fidha Nazer et al. (2026), the preference-based subscription retention concept assumes continued subscription to be a result of the consumer's active preference. In this view, the consumer continues to be subscribed because the value of the service to the consumer is greater than the cost of the service and the perceived costs of cancelling or switching to another service. Payment is easy with automatic payment, but the demand for the service is not generated. Consumers who are willing to pay for the service should be ready to continue paying for it if the payment process includes an extra confirmation. The preference model makes the assumption that consumers are aware of the renewal arrangement (Dhivya et al., 2025). Customers can experience the value of the service, and therefore they become attentive enough to finish the necessary re-authorisation when they wish to remain. It also presumes that the extra administration load is a relatively small part of what can be gained from going through the subscription. If that is the case, a change in regulation that would include re-authorization ought to have very little impact on retention under these conditions.

Retention of subscriptions can be expressed as:

$$R_t = \alpha + \beta P_t + \varepsilon_t \quad (1)$$

Here, R_t is the percentage of retained subscriptions at time t , P_t is the underlying preference or perceived service value, α is the baseline retention percentage, β is the relationship between preference and retention, and ε_t is the other factors affecting retention. The model suggests that if preference does not change, then a payment-procedure change itself should not result in a long-lasting drop in R_t .

3.2 Inertia-based subscription retention

According to Henderson et al. (2021), the inertia-based subscription concept reveals that ongoing subscription can signify not just active valuation, but an inclination to stick with an existing agreement due to the fact that switching costs involve attention or effort. Continuation can be the default course of action if it is set to automatic renewal. If the consumer does not actively re-think the subscription, then he may continue paying even if the service does not offer the same value as it should for making an active decision to continue.

This model is inspired by the work in behavioural economics on the present bias, status quo effect, and limited attention. For instance, Automatic Payment Programs can play a role in ongoing payment, as demonstrated by Della Vigna and Malmendier (2006). The mechanism is not that consumers don't like the service, but that the arrangement decreases the need to make an active choice. The inertia model assumes that some consumers are oblivious to renewal, that there is a positive cost associated with cancelling or re-authorising, or that consumers delay decisions because they are not immediately rewarding. These consumers have to make a conscious effort to maintain the automatic-payment system when it is interrupted. Some might terminate their subscriptions even if they would otherwise have continued.

A basic illustration is:

$$R_t = \alpha + \beta P_t - \gamma I_t + \varepsilon_t \quad (2)$$

Here, I_t is the strength of the inertia retention component, and γ is the effect of inertia on retention observed. According to the model, eliminating or depressing the passive continuation mechanism should decrease retention, especially among consumers who continued their subscription because they were unaware of the mechanism or because they do not know what to do if they wish to withdraw.

3.3 Regulatory shock and theoretical identification

Two explanations can be differentiated in the institutional framework of the RBI's recurring-payment system. The theoretical comparison does not make the assumption that all cancellations after the regulatory change are measures of inertia (Einav et al., 2025). A drop could also be due to temporary payment friction, to technical implementation issues, or to misguided consumer confusion and other factors existing at the same time. The difference is theoretical and relates to the size and duration of the change.

The October 2021 enforcement period is therefore being considered as a time of change in the payment process as defined by the framework. The preference model suggests that retention should remain unchanged; those actively interested in the service would have an incentive to go through the necessary step for payment (Dhivya et al., 2025). According to the inertia model, retention should decrease as passive continuation is no longer automatic and can drop below the previous trend (Henderson et al., 2021).

The framework gives rise to two hypotheses that can be tested:

- H1 (preference): Subscription retention changes little when re-authorization is required.
- H2 (inertia): Retention drops sharply at enforcement and stays below the pre-rule trend.

The research and analysis can address whether the observed changes are more consistent with an unchanging active preference or with the possibility of an important effect of consumer inertia. Persistence in this case is also a significant factor, since a short-lived shift might indicate friction in implementation, while a long-lasting shift away from the pre-rule trend might be more in line with the inertia model's mechanism.

- **Key independent variable:** RBI recurring-payment regulation
- **Comparison variable (group):** Unaffected payment channel/ External market
- **Mediating variable:** Consumer behaviour
- **Dependent variable:** Subscription retention

- **Control variables:** Time fixed effects, Platform fixed effects, User characterisation, Macroeconomic factors.

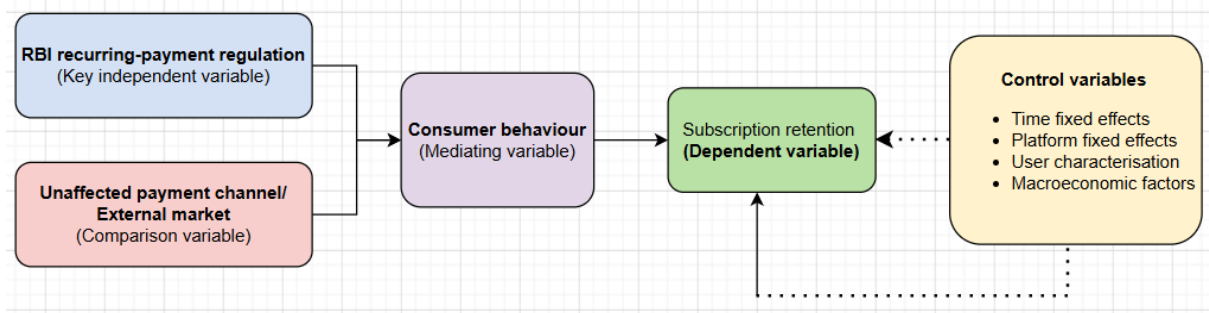


Figure -2: Difference-in-difference study design
(Source: created in draw.io)

4. DATA AND METHODOLOGY

4.1 Research designing and sources of dataset

The study examines whether the automatic recurring-payment disruption in case of e-mandate implementation by RBI in 2021 is in line with consumer inertia in subscription markets. Analysis is conducted around the regulatory change as an institutional shock and the payment activity before and after October 2021 is analysed. It is an approach that fits with the research requirement for the identification strategy to separate the effects of the intervention from the effects of natural variation in payment activity, and with the explicit recognition of the limitations associated with the use of proxy measures. The dataset is associated with the RBI's October 2021 data of ATM, PoS, and card payment statistics. It helps to compare between affected and less-affected payment channels, analysis of persistence, analysis of pre-trends, and at least two robustness checks.

This data is a combination of two monthly payment series made public for India. The first is card-based online transactions. The RBI's Bank-wise ATM/PoS/Card Statistics categorise card transactions made on the point-of-sale terminals and e-commerce and other online transactions (RBI, 2025). India's RBI series data has been adopted from India Digital Payments Report (2021) and monthly observations of transaction volumes in 2021 have been included. The second data set is the monthly Unified Payments Interface (UPI) monthly series which is reported by the National Payments Corporation of India (NPCI) in number of transactions in millions and in Indian rupees (crore) (NPCI, 2025). The UPI series offers a comparison payment mechanism that did not experience the same disruption from cards. NPCI's product statistics recognise that the key metrics of activity on the network are the volume and value of transactions made every month.

The issue with the regulation is related to recurring payments on cards. In the 2019 framework, the RBI allowed e-mandates for recurring card transactions as long as they are authenticated at the time of giving mandate, change of mandate, cancellation of mandate, and first transaction, along with pre-transaction notification. If the conditions prescribed were met, subsequent transactions could take place without additional authentication. Compliance was extended to September 30, 2021 and the implementation requirements came into effect from October 2021. But importantly, it was not all payment channels that were covered by the framework; it was card-based recurring arrangements.

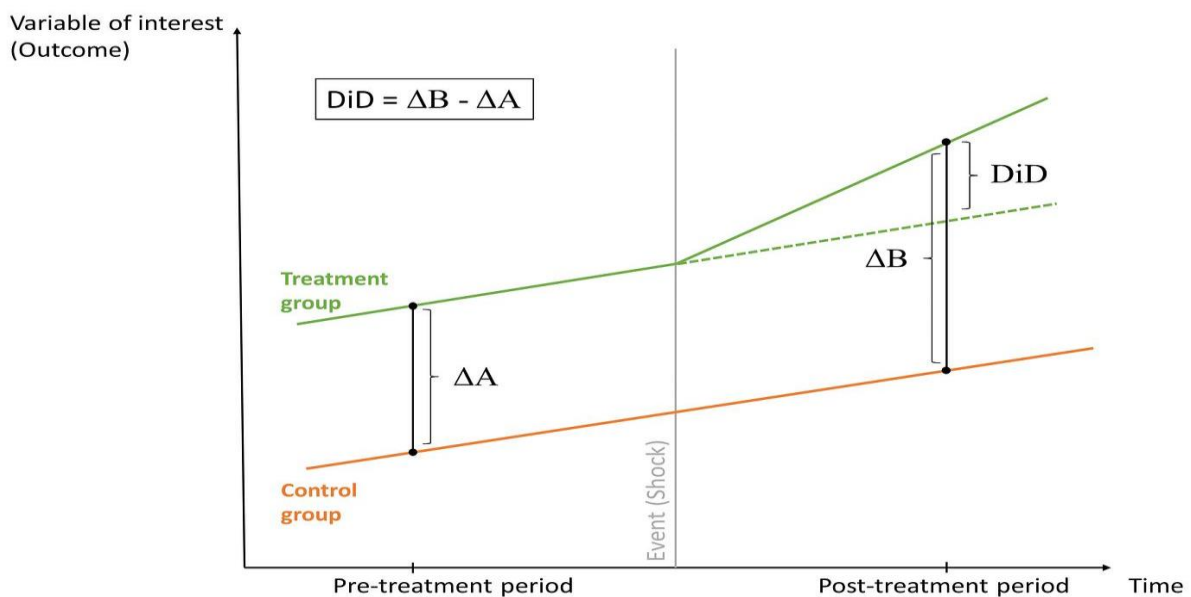


Figure -3: Concept of difference-in-difference study design
(Source: self developed)

The recurrency payments system was very large. In June 2022, RBI stated that over 6.25 crore e-mandates have been registered under the framework with domestic and over 3,400 international merchants. The RBI also defined recurring payments as subscriptions, insurance premiums and education fees, making the definition relevant to subscriptions.

4.2 Main empirical dataset

There are 12 observations in the main monthly dataset for 2021 (from January to December). The volume of transactions observed in the card network is in millions, and the volume of transactions observed in the network UPI is also in millions.

Online card transaction activity reported as e-commerce and other online transaction activity is defined as card variables. The dataset contains both debit-card and credit-card activity. It's therefore not a measure of actual subscription retention, but rather a measure of payment activity. This distinction is relevant as RBI card statistics published are not based on the individual transactions. The card measure is then used as a proxy for the payment environment in which recurring card subscriptions were seen, rather than the actual (or retained) number of card subscriptions.

The comparison channel is provided by the UPI series. UPI AutoPay was already available as recurring payments functionality and the card disruption in October 2021 didn't impact UPI and NACH payments exactly the same. Thus, UPI offers an unimpacted digital-payment yardstick. But, the UPI transaction process covers payments made from people to people and payments made by merchants. This is therefore a general comparison, and not a direct counterfactual of subscriptions. This restriction is reflected on the interpretation, rather than a hidden restriction.

Table -1: RBI monthly payment dataset, 2021

Month	Credit-card e-commerce & other online volume (million)	Debit-card e-commerce & other online volume (million)	Combined card online volume (million)	UPI volume (million)
January	81	158	239	2,302.73
February	75	145	220	2,292.90
March	87	154	241	2,731.68
April	79	144	223	2,641.06
May	83	144	227	2,539.57
June	85	146	231	2,807.51
July	91	150	241	3,247.82
August	93	147	240	3,555.55
September	89	144	233	3,654.30
October	108	149	257	4,218.65
November	95	129	224	4,186.48
December	101	129	230	4,566.30

(Source: RBI, 2025; India Digital Payments Report, 2021; NPCI, 2025)

The dataset also reveals why the study can't just conclude that all actions made as card payments are simply considered churn in subscription. In September, there were 233 million combined card transactions online, rising to 257 million in October and dropping to 224 million in November, for instance. Credit card online activity grew for the month of October, but then shrank in the month that followed, as did debit card online activity. It is important to consider each movement individually and not take one aggregate movement as a sign of consumer cancellation.

4.3 Descriptive statistics

Table -2: Statistical summary

Variable	N	Mean	Median	Minimum	Maximum	Unit
Credit-card online volume	12	88.92	88.00	75	108	million transactions
Debit-card online volume	12	144.92	145.50	129	158	million transactions
Combined card online volume	12	233.83	232.00	220	257	million transactions
UPI transaction volume	12	3,228.71	3,027.67	2,292.90	4,566.30	million transactions

(Source: calculated from table 1)

The descriptive statistics show that there was significant growth in UPI activity during 2021, but the card online activity was within a relatively low range. The size difference does not necessarily mean that one channel is more economically significant, as these are two different payment environments. The main variables of the principal analysis are not monetary values and so no inflation adjustment is necessary. In the event that the transactions are subsequently analysed, they will be recognized as being nominal rupee values and adjusted to real rupee values with the help of an explicitly stated Indian price index.

4.4 Supplementary consumer evidence

The monthly payment data is not mechanically aggregated with a separate consumer survey to give contextual evidence. In October 2021, the survey included 40,000 responses in 302 districts of India. Of the consumers who paid for an app in the last year, 46% said they were improperly billed or over billed by the app and 48% said they didn't know if the app was being billed by an Indian or foreign company. These observations suggest a high level of uncertainty about payment, and also a lack of awareness of consumers during this period, but these observations do not directly measure subscription retention or subscription inertia. They are not used as a treatment-effect data set but are used only as additional information about levels of consumer attention and complexity of payment.

4.5 Variable construction

The dependent outcome is card payment activity online (CARD), which is defined as the number of monthly card e-commerce transactions and other online transactions. Subscription-level retention is not explicitly reported in the public data from the RBI

and is therefore treated as being a proxy in the CARD data. The proxy is suitable for investigating if the payment environment around the regulatory intervention differed, but cannot separate out the subscription payments from regular online transactions.

The principal treatment indicator POST is “0” for January to September 2021 and “1” for October to December 2021. TREAT is used to identify the channel of card payment that is vulnerable to the card e-mandate requirements by the RBI. UPI has been identified as one of the less impacted comparison channels. The interaction of (POST × TREAT) is the critical interaction that has been measured.

Table -3: Role of variables

Variable	Role	Definition
CARD	Dependent variable	Monthly card online transaction volume
POST	Time indicator	0 for January to September 2021; 1 for October to December 2021
TREAT	Treatment indicator	Card-based payment channel
UPI	Comparison outcome	Monthly UPI transaction volume
POST × TREAT	Main interaction	Differential post-intervention change
Month	Time control	Monthly time indicators
Channel	Fixed effect	Card/UPI channel distinction

(Source: self created)

4.6 Event-Study and Difference-in-Differences Method

The first is an event-study which puts each month in comparison to the October 2021 intervention. September 2021 is used as a baseline month. The intent is to see if the payment series treated started to change from the pre-intervention path around the regulatory change. Pre-rule months are needed to make the handbook appear to be unbiased and parallel pre-trends are needed to ensure that the treatment and comparison groups are comparable.

The event-study specification is:

$$Y_{it} = \alpha + \sum_k \beta_k (\text{TREAT}_i \times \text{EventMonth}_k) + \mu_i + \lambda_t + \varepsilon_{it} \quad (3)$$

Here, Y_{it} is the payment activity for channel i in month t , EventMonth_k is the months since October 2021, TREAT is the card channel, μ_i is the channel effects, λ_t are common time effects, and ε_{it} is the error term. The difference between the treated and the comparison channel at a given point from the intervention is each β_k .

The difference in differences specification is:

$$Y_{it} = \alpha + \beta_1 \text{POST}_t + \beta_2 \text{TREAT}_i + \beta_3 (\text{POST}_t \times \text{TREAT}_i) + \mu_i + \lambda_t + \varepsilon_{it} \quad (4)$$

The main coefficient of interest is β_3 . If there was a negative and continued β_3 , this would be a sign that the activity on the card based website had decreased compared to the comparison channel after the launch, reflecting disruption of automatic payment processes. But such an estimate would not necessarily prove that consumers cancelled their subscription due to inertia, since CARD is a general online-payment proxy.

4.7 Persistence and Robustness

The extended series for card e-commerce transactions sourced from RBI are used to measure persistence, spanning October 2021 to May 2022.

Table -4: e-commerce volume of both credit and debit card transactions

Month	e-commerce volume of debit card (transactions in lakh rupees)	e-commerce volume of credit card (transactions in lakh rupees)
October 2021	1,250.34	775.28
November 2021	1,098.94	743.01
December 2021	1,063.97	769.57
January 2022	1,063.28	749.43
February 2022	947.87	698.29
March 2022	995.69	844.72
April 2022	973.13	818.36
May 2022	995.85	895.01

(Source: RBI, 2025)

There are two robustness tests that are required. Firstly, the analysis is based on the shorter timeframe of October 2021 to December 2021 compared with October 2021 to May 2022 to see if any movement made after October 2021 is temporary or permanent. Second, credit card/debit card online activity is analysed separately from the traditional measure of both credit card and debit card activity. A result that comes up in both series would give a better result than a move that is only in one type of card.

4.8 Data Quality, Cleaning and Identification Limits

Each observation is made in the data log, showing where it came from, when it was made, the unit used for measuring the observation, and any transformations applied to the unit. This research extraction was last checked on 4 October 2026. Observations were standardized to a common calendar-month timeframe and volumes were kept in published units. Where there was no information, no observations were made as zeros.

The key assumption in the principal identification is that the trends in the treated card channel and comparison UPI channel would have been reasonably similar had the channel not been regulated. This is a limiting assumption as UPI was gaining considerable

traction as compared to card payments during 2021. The comparison is therefore used as a benchmark, and is not considered as a perfect counterfactual.

The design can detect any differential change in payments activity following the regulatory intervention. It can't see if a particular consumer has cancelled due to inertia, a clear preference, technical issues, insufficient funds or any other reason. The empirical approach can therefore show an association that is compatible with the inertia model, but it will not be able to prove the psychological motive that explains each subscription choice. This may be important because correlation between the regulatory change and the payment activity does not constitute causation.

5. RESULTS AND FINDINGS

5.1 Main Finding

There was no dramatic drop in overall online card transactions following the October 2021 regulations. The average of combined card transactions online during January to September 2021 was 232.78 million rupees. On the other hand, the card transaction during October to December 2021 was 237.00 million rupees, which was accounted for a 1.81% rise in transactions. Combined volume on online card transactions increased from 233 million rupees in October to 257 million in October, and then decreased to 224 million in November and 230 million in December. Hence, the first month time series cannot be compared against the immediate drop-off anticipated by H2.

This is economically significant as the overall payment measure of the card does not result in a significant contraction in payments at the regulatory date. It's not a first-cut at a subscription retention figure, though. RBI card statistics are not used to identify subscriptions, but instead for online and ecommerce transactions in general. Thus, the result is only about the payment-activity proxy and not the percentage of subscriptions lost or gained.

5.2 Aggregate Card Activity

The pre- and post-regulation averages are given in below Table 5. The difference between the pre-period and post-period card means is 4.22 million transactions per month. The conventional standard error of this mean difference is about 6.02 million, which gives a 95% confidence interval of about 7.58 to 16.02 million. There is no clear statistical difference between observed and expected change in the interval, which contains the value zero, in terms of this simple descriptive comparison.

In simple terms, the overall series of aggregates was fairly flat over the period of regulation. It rose in October, fell in November and did not begin to fall again until December, when it fell slightly short of October. The data thus do not offer any evidence for a statistically clearly visible overall break in the volume of online transactions with cards immediately after October 2021.

Table -5: Pre- and Post-October 2021 Payment Activity

Measure	Pre-period mean	Post-period mean	Change	Interpretation
Combined card online volume	232.78m	237.00m	+4.22m (+1.81%)	Small increase
UPI volume	2,863.68m	4,323.81m	+1,460.13m (+50.99%)	Large increase
Credit-card online volume	84.78m	101.33m	+16.56m (+19.53%)	Increase
Debit-card online volume	148.00m	135.67m	-12.33m (-8.33%)	Decline

(Source: calculated)

The two series have been drawn as indices, with values in January 2021 being 100. As the figure illustrates, UPI has grown quite positively in 2021 while online card activity has had a much flatter path. The difference is apparent before October, and important for identification.

5.3 Credit- and Debit-Card Results

The aggregate card result hides an intriguing distinction between the credit and debit card. Online transactions using credit cards rose by 19.53% to 101.33 million transactions in the October-December period compared to the previous period. October stood out with the highest number of transactions at 108 million. Online transactions with debit cards increased at a dull pace of 8.33% to 135.67 million, albeit from a comparatively low base.

The average is not as informative as the monthly pattern. Online volume of the debit card did not collapse in October, rising from 144 million to 149 million. It then dropped to 129 million both in November and December. The November and December levels were about 10.4% lower when compared with the September level.

There is no similar drop-off in credit-card transactions. In October it increased to 108 million, dropped back to 95 million in November and climbed back up to 101 million in December. There are thus two trajectories in the treated card space (as depicted in Figure 4 below). The decline in the use of debit cards is in line with a shock after the implementation, but there is no October fall and the increase in the use of credit cards at the same time makes it difficult to read the evidence as a uniform regulatory shock.

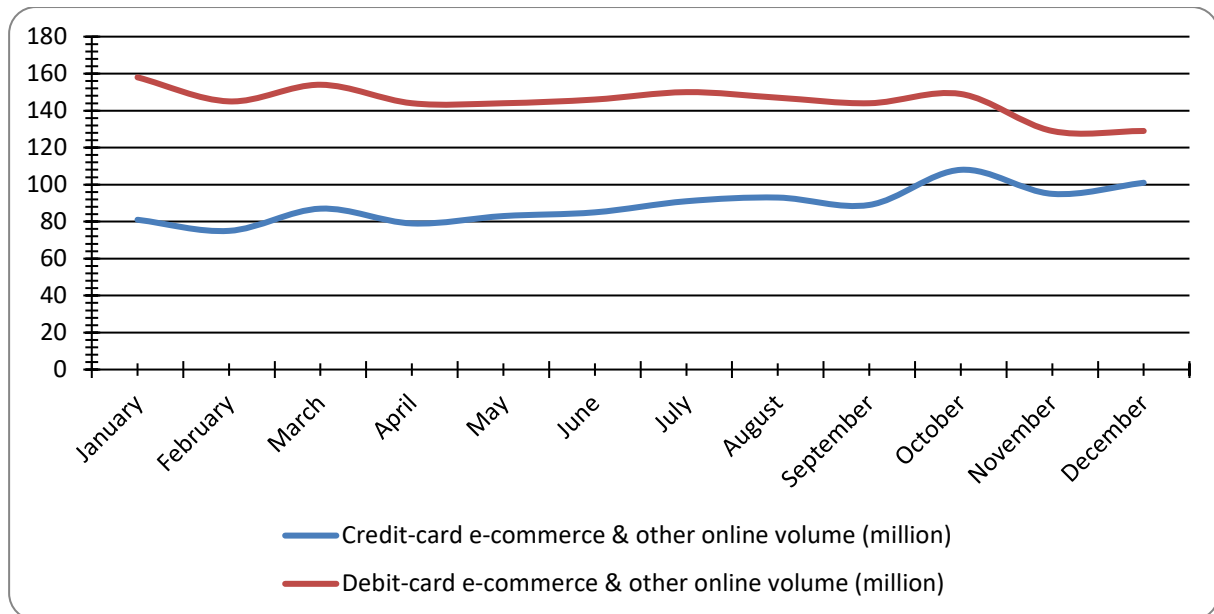


Figure -4: Comparison of debit card and credit transactions; January 2021- December 2021
(Source: self generated)

Table -6: Card-Channel Changes

	Comparison	Change
Credit card	September 2021- October 2021	+21.35%
	October 2021- November 2021	-12.04%
	September 2021- December 2021	+13.48%
Debit card	September 2021- October 2021	+3.47%
	October 2021- November 2021	-13.42%
	September 2021- December 2021	-10.42%

(Source: calculated)

To put it simply, the sharpest decline is in debit-card online sales not at the enforcement month, but after October. This was less good evidence of an immediate inertia shock than a big break in October.

5.4 Comparison with UPI

UPI offers another payment-channel alternative that is less affected. The volume rose from an index of 100 in January to 183.20 in October and 198.30 in December. The average number of transactions per month rose from 2,863.68 million transactions in January–September to 4,323.81 million transactions in October–December, or 50.99%.

A simple difference-in-differences calculation reveals a coefficient of -0.408 log points, with the conventional standard error of 0.078 and 95% confidence interval of $(-0.560$ to $-0.256)$. This represents a relative decline of 33.5% in card activity when compared with UPI, during the pre/post comparison period.

This is a statistically significant estimate from zero with standard errors that are calculated in a conventional way (without clustering). However, statistical significance is not a causal validity. Card activity had been on the rise for the UPI series even before October. Thus the definition of parallel treatment and comparison series is not met. This means that this estimate is presented as a descriptive change relative to the baseline, and is not a credible causal estimate of the RBI effect.

5.5 Parallel Pre-Trends

The pre-trend test is the most significant qualification to the comparison result. The slope of the log ratio of the number of transactions with cards to UPI transactions is about -0.056 log points per month from January through September 2021, with a 95% confidence interval of $(-0.070$, $-0.042)$ and a standard error of 0.006. The slope is significantly different from zero.

The two payment channels were already drifting apart beforehand October 2021. UPI grew at a significant pace and card online continued to grow relatively. As the comparison group was not treated in a parallel way, the post October difference is not the sole effect of the intervention by the RBI, which is clearly depicted in the Figure 5 below. The difference seen in October can be seen several months earlier, thus partly reflecting differences in growth prior to the change in regulation.

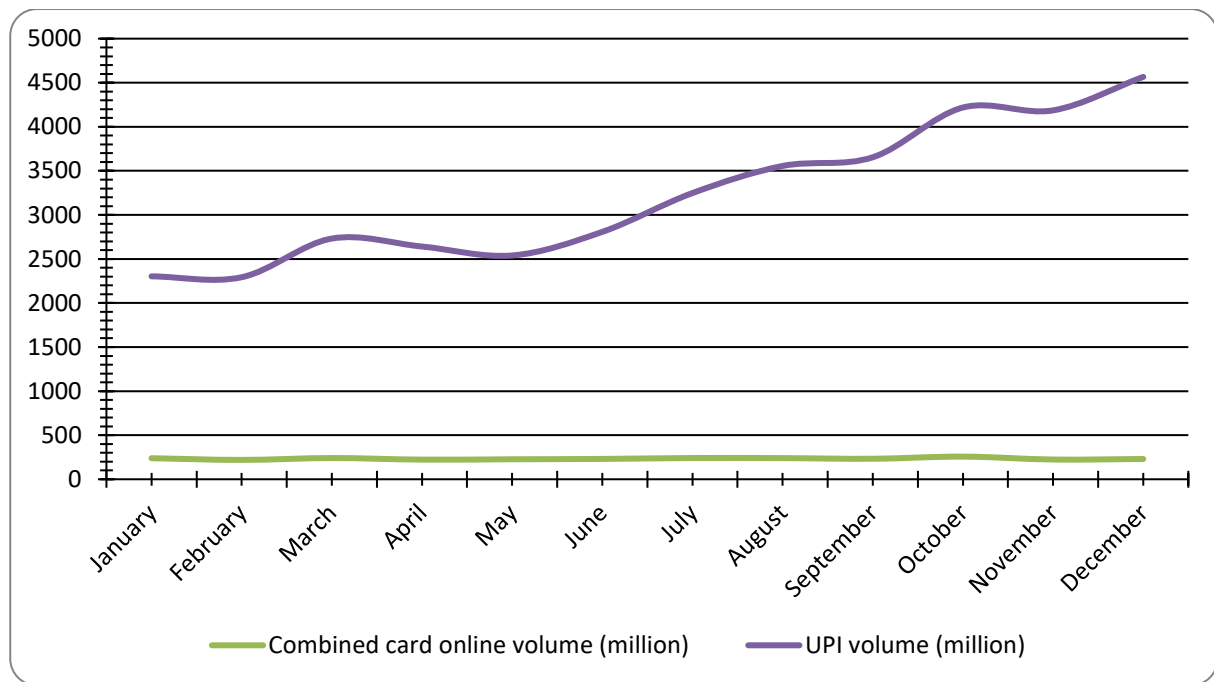


Figure -5: Comparison of online card transactions and UPI transactions
(Source: self generated)

They were found to be persistent and have extended results.

A longer term check on persistence comes from October 2021 - May 2022 card e-commerce data. Debit-card e-commerce volume was 1,250.34 lakh transactions in October 2021 and 995.85 lakh in May 2022, a decline of 20.36%. The value of credit-card e-commerce rose by 15.45% from 775.28 lakh to 895.01 lakh in the year.

The debit series continued to be lower than during October and ended at 947.87 lakh during the reported post-period, but recovered partly. The credit series also declined initially, by February reaching 698.29 lakh, but then surged to 895.01 lakh by May. As can be seen in Figure 6 below, persistence varied between the different types of cards.

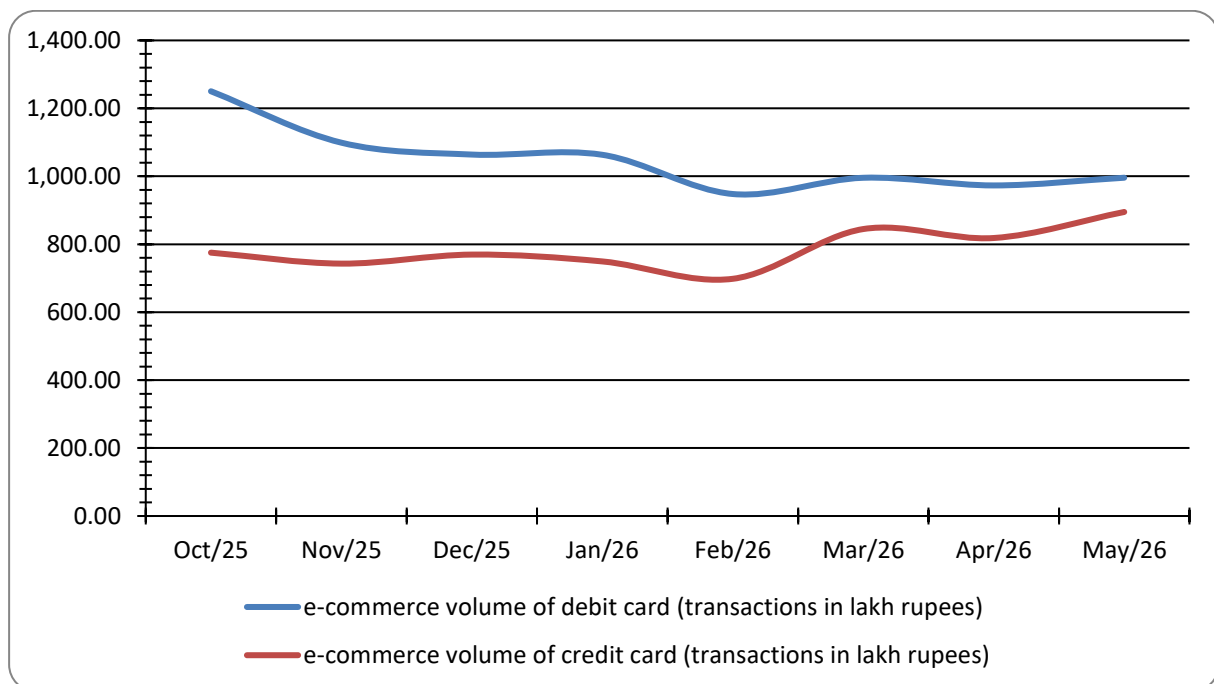


Figure -6: Comparison of debit card and credit transactions; October 2021- May 2022
(Source: self generated)

The results indicate that card-payment activity continued after October, but it is not clear that the persistence is due to subscription inertia. The extended series remains a general e-commerce measure and other payment, economic or platform-specific factors may have influenced that.

5.6 Results against the Hypotheses

The results are not very informative on the available aggregate proxy for H2. H2 expects retention to experience a significant decline at enforcement and be lower than the pre-rule trend. Online activity with aggregates, however, surged in October, and in the last quarter followed a slight upswing over the levels of activity throughout the preceding nine months. Debit-card activity fell following October, but it wasn't immediate, and in the same period, credit-card activity rose.

The evidence is thus more consistent with H1 than H2, at the level of aggregate volume of card payments; there was no apparent collapse of the aggregate at the point when the regulatory requirements came into effect. But, the available outcome for H1 is not direct subscription retention, which means it can't be confirmed. It is clear from the available public payment data that a sharp retention drop to support H2 was not revealed.

5.7 Economic Significance

It is important to distinguish between the statistical significance and economic significance. Under traditional standard errors, the simple card-versus-UPI relative estimate is statistically significant, but lacks economic interpretation as a measure of an RBI effect due to the violation of the parallel trends condition. On the other hand, the 1.81% growth in combined card activity is economically insignificant and not statistically distinguishable from no growth.

It's a more noticeable economic decline on the debit-card side, especially in the longer-term data, but it can't be said to be due to subscription inertia from these overall numbers. The evidence thus offers no defensible measure of the percentage of subscriptions based on inertia.

In general, there is no single, consistent payment response as found in the inertia hypothesis but rather a mixed response. The answer to that is not that subscription inertia was found or not, but rather that the aggregate payment evidence available is not singular enough to be able to find subscription inertia.

6. DISCUSSION AND LIMITATIONS

The evidence from the data analysis is non-conclusive as to whether the subscription loss was caused by the regulatory change or else. After October 2021, the aggregate volume of transactions on online cards rose slightly, but the series of debit cards dropped later, and credit-card transactions rose. The central finding is thus more in line with H1 (the preference hypothesis) than H2 (the inertia hypothesis) when looking at the level of the available payment-activity proxy. The evidence, however, cannot be used to prove that consumer preference outweighed inertia in the subscription market because the public data do not identify what level of subscription it was, nor do the two treatment and comparison series meet parallel trends.

The discovery helps propel the behavioural literature to its next level of qualification. The use of defaults and inertia shows that defaulting can have a significant impact on economic behaviour. Madrian and Shea's (2001) evidence demonstrates that the economic characteristics of a savings plan can have no impact on participation, but that such participation can still change significantly when automatic enrolment is applied. In a similar fashion, DellaVigna and Malmendier's (2006) analysis of gym contracts demonstrates that consumers can sign up for contracts whose payments are not aligned with their subsequent attendance, giving them evidence for a lack of attention and self-control. There were no findings that contradict the existence of these behavioural mechanisms in the present results. Rather, they suggest that a widespread payment-system shock is not enough to establish their relevance in quantifying their role in Indian subscription retention.

The reason for the contrasting outcome is one of the types of institutional intervention. The RBI framework did not just move from automatic renewal to all consumers having to opt in to each subscription monthly. The framework allowed for repeated card transactions, which needed to be authenticated and subject to other requirements, such as authentication at the time of card registration, modification, revocation and first card transaction; and authenticated subsequent transactions under certain conditions. The latter regulatory framework also provided for further changes to the permissible level of subsequent transactions without further authentication. This resulted in the payment environment having changed in October 2021, albeit not in a 'pure' way in which all automatic-renewal defaults were taken out.

The second constraint is with respect to the outcome. The principal dataset is not subscription retention metric, it's on online card transactions. That causes measurement error since the transactions he observes are not just ordinary e-commerce transactions, but also subscription related payments. Some actual subscribers may thus be "masked" in movements in unrelated online purchases. This restriction is likely to dampen, not isolate, the impact of inertia effect rather than be a good measure of its size. If a significant drop in the number of aggregates is not observed, it should not be taken as an indication that no subscriptions were impacted.

The third limitation is related with the comparison group. The less impacted payment benchmark was UPI, but the transaction volume for UPI grew much faster than for cards in 2021. The pre-period log-ratio trend was non-zero statistically, implying that the two series had already started to diverge prior to October. This is a non-parallel trends violation of the difference-in-differences interpretation. The direction of causal bias is thus not mechanically positive or negative and is subject to the biases of the pre-existing differential growth. The outcome, therefore, should be regarded as an evidence-based description of the RBI intervention and not as an estimate of that intervention.

The fourth restriction is associated with the accumulation. Available data is national monthly payment data, not detailed per customer. The analysis cannot be performed as consumers may have aggregated and missing data due to consumer migration. It also avoids customer segmenting those who have a good service preference from those who are inattentive or procrastinating. This creates noise and attenuation in the behavioural interpretation as the theoretical mechanism takes place at the individual level, but the main outcome is at the payment-system level.

Another problem is that there are other changes of the same period. Online payments are experiencing rapid structural growth, especially UPI, digital consumption and payment behavior were still impacted by the evolving pandemic landscape. Such factors can have an impact on the number of transactions without regard to the framework of recurring payments. Some of this is addressed by month effects and by an analysis of the cards separately from the channel, but not fully eliminated. The other influence is largely just noise and potential confounding in the estimated relationship.

Despite the above limitations the findings have a clear policy implication. There is no evidence to draw such a conclusion about automatic recurring payments systematically holding customers back from subscriptions or that better payment authentication

leads to significant reductions in unwanted subscriptions. The behavioural literature has, however, an explanation for why policy makers should take note that passive continuation can be relevant. Hence, policies that enhance advance notification, transparency and cancel-ability of recurring arrangements can be argued as consumer-protection policies, but there is no evidence at present to justify ascribing a specific magnitude of welfare gain to these policies.

The findings also indicate that there is a need to separate payment security from consumer choice for regulatory consideration. The introduction of RBI's framework was not only to lower the persistence of subscriptions, but also to provide a balance between convenience and the security of the transaction. The payment data that were observed do not indicate that the intervention caused just a drop in online card activity. The idea of assessing policy based on a reduction in recurring payments should be rejected as a standard method of measuring welfare improvement; and treating ongoing payments as proof of consumer preference should also be rejected.

Future studies should be able to access subscription information at the firm level or at the customer level, including information on renewal attempts, successful payments, cancellations, and re-authorisations. Such data could be used to test the behavioural mechanism directly, instead of through payment statistics.

7. CONCLUSION

The study examined the question of whether the RBI's 2021 recurring-payment guidelines identified that there was a significant element of consumer inertia in the subscription retention process. There is not much evidence to support this claim. The net effect of the decline did not seem to be so immediate or sharp as the inertia hypothesis predicted; instead, while debit-card activity fell after October, credit-card activity rose.

The primary evidence was from the Indian payment information, which included monthly records of online transactions using cards and UPI activity. Prior to October 2021, the average number of combined cards transactions per month was 232.78 million, which is a mere 1.81% more than 237.00 million after October 2021. Debit-card online transactions then fell, though not because of a regulatory break, but after October. Credit-card activity was headed in the opposite direction. The long-term data on the cards also did not reveal a consistent pattern of a post-regulation decline.

This comparison was statistically significant, but UPI has been on a different trajectory compared with the other payment channel since October 2021. The parallel-trends condition is therefore not met and the difference-in-differences estimate is not a good causal estimate of the regulatory effect.

Based on the data analysis and evidence found, the results favour H1 more than H2. As a whole, the study demonstrates the challenges of detecting consumer inertia using payment data. The magnitude of behavioural inertia will influence subscription decisions, but direct evidence of how this happens at the subscription level will be needed. The broader conundrum is that regulatory shocks can be very useful lenses to examine behavioural mechanisms, but to be credible, the outcome measures and comparison groups should be as close as possible to the theoretical mechanism.

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