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Sent in Ten Seconds: Early Evidence on the Impact of the EU Instant Payments Regulation in Luxembourg

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Abstract

This paper provides an empirical assessment of the impact of the European Union's Instant Payments Regulation (IPR) on the use of instant credit transfers in Luxembourg. Using monthly payment service provider (PSP)-level data on customer credit transfers sent between 2022 and 2025, the analysis examines whether the IPR affected sending behaviour following its entry into force in January 2025 and ahead of the October 2025 mandatory sending deadline. The empirical strategy combines difference-in-differences and dynamic event-study models with complementary approaches, including an interrupted time series and a Generalized Synthetic Control Method. Payment institutions and electronic money institutionsare used as a control group.

Between January and October, PSPs subject to the October IPR deadline show an immediate and statistically significant increase in the share of instant credit transfers sent, rising from roughly 0.8-1 percentage point in early 2025 to about 1.5-2 percentage points by late 2025. These effects correspond to several hundred thousand additional instant credit transfers per month due to the IPR, suggesting early operational adjustment and accelerated adoption of instant payments among PSPs in Luxembourg.

Keywords: *retail payments, instant payments, panel study, event study, difference in differences, generalized synthetic control*

JEL Classification: C14, C44, E42, E58, G21, L86

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1 Introduction

Instant payments are intended to modernize the European retail payments landscape by providing a fast and secure means of electronic payment across the EU. The EU's Instant Payments Regulation (IPR)[1] aims to make credit transfers settle in seconds, thereby reducing settlement time. However, speed in execution is not just a means to an end, but an objective that requires planning, coordination, and precision. PSPs in Luxembourg have had to ensure technical readiness with the IPR compliance dates that were firxed, for some PSPSs, in January 2025. From a technical perspective, an instant payment means that within ten seconds of the customer's initiation of the credit transfer, the funds are credited to the payee's account and are thereafter immediately usable by the recipient.

On 13 March 2024, the IPR was adopted by the Parliament and the Council, with entry into force on 8 April 2024. Following its publication in the Official Journal of the European Union, the IPR requires that Payment Service Providers (PSPs), including Electronic Money Institutions (EMIs) and Payment Institutions (PIs)[2], allow customers to *send* instant payments as of October 9, 2025. For *receiving* instant payments, compliance with the Regulation has been mandatory for PSPs since 9 January 2025, while non-bank PSP such as PIs and EMIs in the Eurozone will be required to comply by 9 April 2027.

According to the IPR, the ability to send instant payments must be available to customers twenty-four hours per day and seven days per week. Moreover, once the instant credit transfer is initiated, the beneficiary, or "payee", should receive the funds in ten seconds or less, including outside of regular business hours. The IPR further specifies that the cost of an instant credit transfer cannot exceed the cost for a standard SEPA transfer, with the expectation being that instant payments in the EU will eventually be widely adopted.

When a payer in the EU wishes to send an instant payment, the payment flow also incorporates a Verification of Payee (VoP) service that is intended to help reduce the incidence of payment fraud. When making an instant credit transfer, the payer needs to specify the name of the beneficiary as well as their International Bank Account Number (IBAN). Prior to executing the transfer, the VoP process checks the IBAN and the name of the payee as given by the payer. The responding PSP provides the requesting PSP with a response to the VoP request consisting of a match, close match, no match at all or an indication that the check was not possible. While the VoP service is mandatory, the payer is not bound by the result and may still choose to initiate the credit transfer even if the service returns a no match condition.

[1] Regulation (EU) 2024/886. See `https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202400886`.

[2] An Electronic Money Institution is defined in Directive 2009/110/EC under Article 2(1) as a legal person that has been granted authorization to issue electronic money. A Payment Institution is a legal entity authorized under the Payment Services Directive to provide payment services throughout the EU and is considered as a non-bank.

In line with the IPR imposed deadlines, customers have had the possibility to *receive* instant credit transfers since January 2025 while the *sending* of instant credit transfers has been obligatory for PSPs, since October 9, 2025. Given that the Regulation became applicable in January 2025 and the sending deadline was set for October 2025, an initial assessment of whether Luxembourg PSPs adjusted their sending behaviour in advance of the deadline is warranted. Moreover, given that some PSPs have already been subject to the IPR and other entities (i.e. PIs and EMIs) will be required to comply only at a later date, this latter group constitutes a natural control to test the impact of the IPR on entities that must currently comply with the IPR.

2 Literature Review

The literature on retail payment systems has expanded substantially over the past two decades, reflecting rapid technological change, increasing market integration, and a growing role for public policy. Within the European context, the establishment of the Single Euro Payments Area (SEPA) and the subsequent development of the SEPA Instant Credit Transfer (SCT Inst) scheme represent key milestones in the modernisation of the euro area retail payments landscape. The entry into force of the Instant Payments Regulation in 2025, which mandates instant payment capability for all payment service providers (PSPs), marks a decisive shift from voluntary adoption to a mandatory requirement. This literature review situates the IPR within three closely related strands of research: (i) the economics of payment substitution and coordination; (ii) empirical evidence on SEPA and instant payment diffusion; and (iii) econometric approaches to the evaluation of payment system reforms.

A central strand of the literature treats retail payment systems as two-sided markets characterised by network externalities and coordination frictions. Rochet and Tirole (2002) show that payment platforms must internalise cross-group externalities between users on each side of the market, and that pricing and governance structures can lead to persistence in legacy payment instruments even when more efficient technologies exist. Building on this perspective, Kahn and Roberds (2009) emphasise the role of trust, settlement frictions, and liquidity constraints in shaping payment choices, highlighting that payment preferences often reflect equilibrium outcomes rather than purely technological superiority. While their analysis focuses on payment systems and not payment schemes[3] they nevertheless show that settlement frictions, liquidity constraints, and enforcement limitations determine which payment arrangements are sustainable in equilibrium. In this framework, the persistence and evolution of payment systems reflect coordination under institutional constraints rather than the technological superiority of a given solution.

[3]A payment scheme is the set of rules, standards, and procedures - “the rulebook” - governing how payments are processed, while a payment system is the technical infrastructure and operational network that executes these transactions.

As regards means of payment, empirical evidence from Humphrey et al. (2006) documents substantial cross-country heterogeneity and persistence in the use of cash and paper-based payment instruments, even where electronic payments offer clear cost advantages. Taken together with the equilibrium perspective in the payments literature, these findings frame instant payments as a network subject to coordination frictions, in which adoption requires bilateral readiness among PSPs and usage may expand rapidly once a critical level of adoption is reached.

Beyond coordination and feasibility considerations, the welfare implications of payment system modernisation are also well documented. Humphrey et al. (2006) also show that a shift from paper-based to electronic payment instruments substantially reduces the social cost of payments, reflecting lower processing, clearing, and settlement costs as well as economies of scale that can be achieved when using electronic infrastructures. Combined with the work of Kahn and Roberds (2009), these findings suggest that regulatory and infrastructural changes that relax settlement and liquidity constraints, such as the widespread availability of instant payments, not only enable new payment system equilibria, but also allow the associated efficiency gains from electronic processing to be realised at scale.

The policy and institutional literature on SEPA places these dynamics within the broader objective of creating an integrated and efficient European payments market. Early analytical work links SEPA transfers to declining cross-border transfer costs and increased price convergence among PSPs. Schmiedel et al. (2012) provide quantitative evidence that electronic payment instruments generate substantial social cost savings once scale economies are realised, while Kokkola (2010) documents the active role of the Eurosystem in promoting standardisation, harmonisation, and infrastructure integration. From this perspective, SEPA rulebooks and common messaging standards such as ISO 20022 can be understood as mechanisms that reduce switching costs and facilitate coordinated adoption across jurisdictions and institutions, thereby fostering competition.

More recent policy-oriented research has focused explicitly on the diffusion of fast payment infrastructures and the coordination challenges associated with their deployment. The Bank for International Settlements (BIS) Committee on Payments and Market Infrastructures (2016) provides a comprehensive overview of fast payment systems across jurisdictions and emphasises that their usefulness depends on broad reachability among payment service providers. Incomplete participation, even in the presence of advanced settlement technology, is shown to limit the economic value of fast payments. Building on this insight, the Committee on Payments and Market Infrastructures (2020) provides a detailed stocktake of frictions affecting cross-border payments, including complex intermediation chains, differences in access regimes, misaligned operating hours and limited interoperability across payment systems. The report emphasises that meaningful improvements require coordination across interdependent building blocks, involving both public and private sector actors, in order to enhance the speed, cost, transparency and accessibility of payment services.

The payments-related literature documents that migration toward new payment instruments is typically gradual and subject to behavioural and institutional frictions. Using Dutch consumer data, Kosse (2013) shows that payment behaviour exhibits strong habit persistence, with individuals' payment choices reflecting past usage and background characteristics, including different countries of origin. This evidence reinforces the view that payment innovation does not automatically translate into immediate substitution, and that coordination mechanisms as well as host country characteristics can play an important role in accelerating migration toward more efficient payment instruments.

Evaluating the effects of payment system reforms builds on a well-established econometric literature on causal inference in policy settings. Imbens and Wooldridge (2009) suggest that Difference-in-Differences (DiD) designs remain a standard approach for identifying causal effects in quasi-experimental environments. Where treatment effects are dynamic or treatment timing varies across units, Sun and Abraham (2021) provide a bias-corrected event-study framework that has become a benchmark in applied work. In settings where suitable control groups are limited, synthetic control methods allow for the construction of counterfactual outcomes based on pre-treatment trajectories. Abadie and Gardeazabal (2003) introduce the synthetic control approach, while Abadie et al. (2010) formalise its implementation and inference. Xu (2017) extends this framework through the Generalized Synthetic Control Method, which accommodates multiple treated units and unobserved common factors via interactive fixed effects.

Together, the aforementioned references suggest that using different models can provide a flexible toolkit for assessing the causal impact of regulatory interventions using granular, entity-level data, an approach adopted in this paper to quantify the effect of the Instant Payments Regulation on PSP-level reallocation between regular SEPA credit transfers and instant credit transfers.

3 Data Source and Coverage

This study uses PSP-level retail payment statistics collected by the Banque centrale du Luxembourg under the statistical reporting framework for payments data, also known as the "*Collecte Directe des Données de Paiement*" (CDDP). These data are collected from the reporting entities by the BCL in accordance with the legal reporting framework.

3.1 Customer Credit Transfers Sent

The dataset covers a broad range of payment service providers (PSPs) including banks, payment institutions (PIs) and electronic money institutions (EMIs) operating in Luxembourg. The data consist of PSP level monthly aggregates of customer credit transfers sent over the period spanning 2022-2025 and reported in terms of the number of transactions per payment scheme.

There are four payment scheme categories in the CDDP including regular SEPA credit transfers (*SEPA*), SEPA instant credit transfers (*SCTI*), non-SEPA schemes (*NSEP*) and the remaining category "not applicable" (*NOAP*). The NOAP category includes, for example, ONUS transactions[4] and transactions settled through correspondent banking arrangements where the underlying scheme is not observed.

3.2 Sample Construction

This study is restricted to two of the four key scheme categories, specifically *SEPA* and *SCTI*. As the objective of this assessment is the reallocation of regular *SEPA* customer credit transfers sent to SCT Inst (e.g. *SCTI*), we exclude *NOAP* and *NSEP* transactions. While the data contain both the value and number of transactions, the value not retained since transaction value does not provide an accurate indication of the level of customer adoption of SCT Inst for sending credit transfers. The data exclude any known reporting errors.

This choice is directly motivated by the legal scope and regulatory objective of the Instant Payments Regulation (IPR). The IPR mandates that payment service providers which offer SEPA credit transfers must also offer the possibility to send instant credit transfers, thereby expanding consumer choice in the context of an existing payment instrument. Rather than regulating the overall composition of credit transfer types, the IPR mandates additional choice beyond SEPA credit transfers. Conditioning the analysis solely on SEPA and instant credit transfers therefore isolates the substitution effect that is explicitly addressed by the Regulation, namely the shift from regular to instant execution of credit transfers. By contrast, broader measures that relate SCT Inst transaction numbers to all payment instruments would incorporate adjustments in other credit transfers (e.g. non-SEPA, or "not applicable") that are not regulated by the IPR and would therefore go beyond the immediate objectives of the IPR. Focusing on the share of SCT Inst within total SEPA credit transfers therefore ensures that the estimated effects can be interpreted as changes in end-user usage behaviour that are both policy-relevant and directly attributable to the IPR.

Within the modelling framework, for each entity i and month t, the number of transactions for customer credit transfers sent are aggregated by payment scheme (e.g. SEPA or SCTI) and reshaped into a panel format. Table 1 summarises the variables used to construct

[4]An ONUS transaction is a payment in which the debtor and creditor hold accounts at the same institution. Within the data, these transactions are recorded as "not applicable" unless an existing payment scheme is explicitly specified.

the panel.

Variable	Definition
ENTITY_ID	Unique identifier within the CDDP; prefixes "B" or "P" indicate treated entities (PSPs), while prefixes "W" or "Z" indicate control entities (PIs/EMIs)
PAYMENTSCHEME	Scheme type: *SEPA*, *SCTI*, *NOAP*, *NSEP*; only *SEPA*, *SCTI* are used in this study
METRIC	Transaction measure: *VOLU* (volume) or *VALE* (value in euros), only the former is retained
VALUE_EURO	Transaction amount consistent with METRIC; for VOLU this corresponds to the number of transactions
PERIOD	Monthly time index (YYYYMM)

Table 1: Variables used in the panel construction

3.3 Event Time Framework and Variable Definitions

The IPR deadline for the mandatory *receiving* of instant credit transfers was January 9, 2025 whereas the mandatory deadline for *sending* instant credit transfers was October 9, 2025. Prior to October 2025, PSPs (except for PIs and EMIs) were therefore obliged to *receive* but not to *send* SCT Inst transfers. The model setup therefore exploits this staggered timing of the SCT Inst receiving and sending obligations to assess whether PSPs in Luxembourg allowed customers to send SCT Inst transactions prior to the mandatory October 2025 sending deadline.

Let $i \in \mathcal{I}$ index reporting entities and $t \in \mathcal{T}$ index months. We index the time such that t_0 corresponds to January 2025, the month in which the EU Instant Payments Regulation (IPR) became binding along with PSPs' obligation to *receive* SCTI. The event time, k, which is the time following the implementation of the IPR is subsequently defined as

$$k_{it} \equiv k_t = t - t_0,$$

here k_t is measured in months. In the empirical implementation, the sample is restricted to a symmetric event window $k_t \in [-K, K]$ with $K = 12$.

The dependent variable Y_{it} is a payment-share measure constructed from monthly entity-level aggregates for the different payment schemes. Let A_{it}^{SEPA} and A_{it}^{SCTI} denote the monthly scheme-level number of transactions for entity i in month t for regular SEPA and SCT Inst customer credit transfers sent. The number of transactions, rather than values, are used since transaction values may vary substantially across PSPs and over time and are not explicitly indicative of customer adoption levels.

Define the denominator

$$D_{it}^{\text{SEPA}} = A_{it}^{\text{SEPA}} + A_{it}^{\text{SCTI}} \tag{1}$$

The primary outcome variable in the baseline specification is the share of SCTI within the total

$$Y_{it} = \text{SCTI\_SHARE\_SEPA}_{it} = \frac{A_{it}^{\text{SCTI}}}{D_{it}^{\text{SEPA}}} \tag{2}$$

Using Y_{it} with this construction ensures that the analysis captures solely the evolution of SCTI within the total number of SEPA and SCTI customer credit transfers sent.

3.4 Event time definition

Let T_0 denote the policy implementation month (i.e. January 2025). Define an integer month index $m(t)$ and the corresponding event time:

$$k(t) := m(t) - m(T_0) \tag{3}$$

3.5 Treatment Definition

Treatment in the context of this study means PSPs having to comply with the IPR regulation as of January 2025. The EU Instant Payments Regulation became binding for certain PSPs on 1 January 2025. We treat January 2025 as the intervention date because the Regulation became applicable and receiving reachability became mandatory, potentially triggering PSP operational upgrades and customer interface rollouts that also enabled sending SCT Inst payments prior to the formal October 2025 sending deadline.

We define the treatment group as PSPs that are banks as well as the postal institution, while PI and EMI institutions form the control group that is subject to a much later mandatory IPR compliance date in 2027.

Payment institutions and electronic money institutions may constitute a credible control group for PSPs in this setting provided that, absent the Instant Payments Regulation, their usage of SCT Inst would have evolved in parallel to that of PSPs. This assumption seems plausible for the specific context considered in this paper, namely the share of instant credit transfers within total SEPA credit transfers sent. Both banks and PIs/EMIs operate under the same European Payments Council (EPC) scheme rules and settlement infrastructures and differ primarily in the timing of regulatory obligations under the IPR. Importantly, while banks and the postal institution became subject to mandatory reachability for instant payments as of January 2025, PIs and EMIs were not exposed to a comparable regulatory obligation at that date.

Let the binary group indicator be

$$G_i = \mathbb{1}\{i \in \mathcal{G}_1\} \tag{4}$$

where $\mathcal{G}_1$ denotes the group of PSPs subject to the IPR as of January 2025.

The post-IPR indicator is defined as

$$\text{Post}_t = \mathbb{1}\{t \geq t_0\} \tag{5}$$

In the TWFE specifications, the treatment interaction is defined as

$$\mathcal{D}_{it} = G_i \times \text{Post}_t \tag{6}$$

In the dynamic event study specifications, we compute

$$\text{REL\_TIME}_{it} = \text{month}_t - \text{month}_{\text{Jan 2025}} \tag{7}$$

with the month immediately prior to the IPR implementation serving as the reference period.

Figure 1 provides a graphical illustration of the setup and the event time construction.

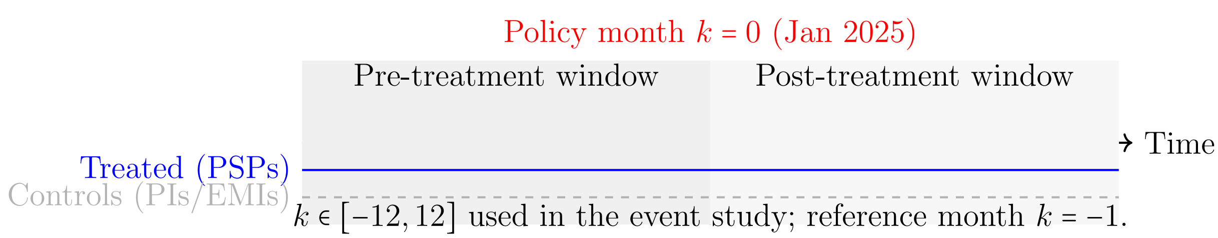

Figure 1: Analytical setup for the January 2025 policy date. Banks are treated from $k \geq 0$. PIs/EMIs serve as controls. Event study estimations use a ± 12 month window with $k = -1$ as the reference period.

4 Methodology and Models

Multiple modelling approaches can be used to assess the impact of the IPR on SEPA customer credit transfers sent following the January 2025 implementation date. These approaches include a static Difference-in-Differences (DiD) model, two way fixed effects (TWFE) event studies, GSCM (Xu (2017)) and interrupted time series (ITS) (Lopez Bernal et al. (2016)). For the purposes of this paper, all of the aforementioned models are used in order to robustly demonstrate that the number of customers *sending* instant credit transfers in Luxembourg increased in a statistically significant manner following the first IPR deadline that only required PSPs to be able to *receive* SCT Inst. This allows us to assess the extent to which Luxembourg PSPs prepared in advance of the October 2025 mandatory SCT Inst sending deadline.

Within the modelling framework, there are PSPs that are subject to the IPR Regulation as of January 2025 and a separate cohort of entities that that are only subject to the IPR regulation at a much later date (i.e. 2027). This latter cohort includes both PIs and EMIs. Therefore, we can construct our treated and control groups using the PSPs subject to the IPR as the treated units and the PIs and EMIs as the untreated control group (that is subject to the IPR only as of 2027).

An important feature of this setting is that the number of treated units is considerably larger than the number of control units. This imbalance does not invalidate the two–way fixed effects (TWFE) specification. Nevertheless, a small pool of controls can limit the precision of the counterfactual scenario, leading to wider standard errors, especially when clustering two ways (i.e. by entity and by period). To address this, we complement the TWFE analysis with a Generalized Synthetic Control Method (GSCM) and Interrupted Time Series (ITS) model. These alternative approaches help to address the small set of untreated units and provide a robustness check on the event study model estimates.

First, a static Difference-in-Differences is used where a single coefficient estimates the average treatment effect across all post-IPR periods. Second, a TWFE event study with relative time interactions is estimated. Such an approach provides time varying coefficients, thereby allowing for a visual inspection of pre-IPR trends and post-IPR effects. Third, a Generalized Synthetic Control Method (GSCM) is applied that constructs latent factors and unit-specific loadings to generate counterfactual scenarios under which the IPR is assumed not to apply to treated entities. Fourth, and last, an Interrupted Time Series (ITS) model is used, which is a segmented regression that models slope and level shifts at IPR implementation. A placebo test is also used to demonstrate that changing the IPR implementation to an earlier hypothetical date has no effect on the share of instant customer credit transfers sent.

The individual models are described in the sections that follow.

4.1 Event study setup

The IPR regulation may induce dynamic adjustments and responses on the part of PSPs and/or consumers. We therefore estimate event study specifications that allow the treatment effect to vary by event time k. In particular, the following models are used to assess the impact of the IPR on customer credit transfers sent prior to the IPR's October 2025 obligatory deadline to send SCT Inst.

Model specification A estimates a static two-way fixed effects difference-in-differences model with a single post-IPR treatment indicator, identifying the average post-January 2025 effect across all post-treatment months. Specification B extends this framework to a TWFE event study design by interacting treatment status with relative-time indicators, allowing treatment effects to vary flexibly over event time.

4.1.1 Specification A: Static Difference-in-Differences

Model Specification A ("Spec A") is constructed as follows:

$$Y_{it} = \alpha_i + \lambda_t + \beta(G_i \times Post_t) + \varepsilon_{it} \tag{8}$$

In equation 8, α_i denotes entity fixed effects and λ_t denotes month fixed effects. The error term is denoted by ε_{it}.

Including entity-level fixed effects helps to absorb time-invariant differences in size, infrastructure preparedness, or business models across PSPs, while time fixed effects capture common monthly shocks affecting all entities. The coefficient of interest, β, measures the *average post-IPR implementation change* in the outcome for PSPs subject to the IPR relative to the control group of PIs and EMIs, net of entity heterogeneity captured by α_i and common month-specific shocks captured by λ_t.

In this specification, β provides an estimate of the *average treatment effect on the treated over the entire post-IPR period.* More precisely, β captures the treated-minus-control difference in the post-January 2025 period relative to the pre-IPR baseline, under the assumption that, absent the IPR, outcomes for treated and control entities would have followed parallel trends. Because Specification A collapses all post-IPR months into a single indicator, it does not allow for dynamic treatment effects over event time. Instead, it summarizes the average effect of the IPR across the full post-implementation window relative to the pre-IPR period.

If included, X_{it} could allow for contemporaneous variation in the shares of other payment schemes. However, as this study focuses on the reallocation of SEPA credit transfers solely towards SCT Inst, these control variables are omitted.

4.1.2 Specification B: Dynamic TWFE model

To improve precision and stabilize the coefficient estimates at event times that are distant from the IPR implementation date of January 2025, model specification B ("Spec B") may bin event times at the tails of the event time indices:

$$\tilde{k}_t = \begin{cases} -K, & k_t \leq -K, \\ k_t, & -K < k_t < K, \\ K, & k_t \geq K, \end{cases} \qquad \text{with } K = 12.$$

Although we define $K = 12$, the effective window used in estimation is $[k_{\min}, k_{\max}]$ due to data availability and the balanced-panel requirements. Consequently, the binned event study model can be written as

$$Y_{it} = \alpha_i + \lambda_t + \sum_{k \in \tilde{\mathcal{K}}} \tilde{\beta}_k \, \mathbb{1}\{\tilde{k}_t = k\} \cdot G_i + X_{it}' \gamma + \varepsilon_{it}, \qquad k^\star = -1. \tag{9}$$

Here $\tilde{\mathcal{K}}$ indexes the binned event times but it excludes the reference period $k^\star = -1$. Binning in this manner helps to ensure that extreme pre- and post-IPR regulation periods contribute information without generating unstable, high variance coefficients. However, this procedure pools information from the ends of the pre- and post-treatment periods into a single coefficient, which provides a more precise estimate but a slight loss of time resolution of the coefficient β estimates. In both equations (8) and (9), the coefficients can be interpreted as deviations from the reference month $k^\star = -1$. A pattern of near-zero coefficients during the pre-January 2025 periods (i.e. for $k < 0$) supports the parallel-trends assumption. The post-period coefficients ($k \geq 0$) summarize the dynamic treatment effect path post-IPR.

For robustness, we also estimate models outside the TWFE family including a generalized synthetic control model (GSCM) to construct counterfactual scenarios and compare their average treatment effects to TWFE event study paths and an interrupted time series (ITS) model applied to the treated entities. The results of the ITS model are used as an additional check on the TWFE results rather than as the primary estimates of the impact of the IPR.

4.2 Generalized Synthetic Control Method (GSCM)

To complement the TWFE estimates, we apply the Generalized Synthetic Control Method (GSCM) of Xu (2017), which allows for relaxing the parallel trends assumption commonly employed in the difference-in-differences (DiD) approach. The parallel trends assumption assumes that, in the absence of treatment (in this case the IPR), the average paths of both the treated and the control entities would have evolved in parallel. In practice, however, this assumption cannot be directly tested. The GSCM approach directly addresses this problem when parallel trends do not apply. GSCM models the untreated potential outcomes using latent common factors with heterogeneous loadings across PSPs. The GSCM model thus also allows for the construction of a counterfactual scenario in which there is no IPR applied.

The observed outcome Y_{it} for entity i in month t is given by

$$Y_{it} = Y_{it}(0) + \tau_{it} \mathcal{D}_{it}, \tag{10}$$

where $Y_{it}(0)$ denotes the potential outcome for customer credit transfers sent that would be observed in the absence of the IPR, $\mathcal{D}_{it} \in \{0, 1\}$ is a treatment indicator equal to one if PSP i is subject to the IPR in month t, and τ_{it} is the causal effect of the IPR on PSP i in month t.

The counterfactual outcome $Y_{it}(0)$ is modeled using an interactive fixed effects model:

$$Y_{it}(0) = \alpha_i + \lambda_t + \mathbf{f}_t' \boldsymbol{\mu}_i + u_{it}. \tag{11}$$

Here, α_i captures time invariant, entity specific heterogeneity and λ_t captures time specific shocks common to all entities. The vector $\mathbf{f}_t$ represents latent common factors that govern the evolution of outcomes over time in the absence of the IPR (e.g. macroeconomic or broader payment system trends). The vector $\boldsymbol{\mu}_i$ contains the entity specific factor loadings, allowing different entities to respond differently to the same latent factors. The latent factors $\mathbf{f}_t$ affect both treated and untreated units and are assumed to evolve independently of the IPR.

The effect of the IPR, τ_{it}, captures the causal impact of the IPR on entity i during month t. It is estimated only when $\mathcal{D}_{it} = 1$ and measures the deviation of the observed outcome from its counterfactual path as obtained from the factor model. In the post IPR periods, the effect of the IPR on PSPs is recovered as

$$\widehat{\tau}_{it} = Y_{it} - \widehat{Y}_{it}(0), \qquad \text{for } \mathcal{D}_{it} = 1. \tag{12}$$

The latent factors $\mathbf{f}_t$ and the IPR effect τ_{it} are distinct. Here $\mathbf{f}_t$ describes the evolution of outcomes in the absence of the IPR, while τ_{it} captures the additional change in customer credit transfers sent that is attributable solely to the IPR. This separation allows the Generalized Synthetic Control Method to relax the parallel trends assumption and to accommodate any heterogeneous and time varying effects of the IPR across entities and months.

To compare the GSCM ATT path with the TWFE event study coefficients on a common reference point, the model estimated effects can be rebased relative to the reference period $k^\star = -1$:

$$\widehat{\text{ATT}}_t^{\text{rebased}} = \widehat{\text{ATT}}_t - \widehat{\text{ATT}}_{t:k_t = k^\star} \tag{13}$$

4.3 Interrupted Time Series (ITS) Model

To assess the impact of the Instant Payments Regulation (IPR) on the use of instant credit transfers, we also implement an interrupted time series (ITS) model focusing on the treated payment service providers (PSPs). The analysis is conducted at monthly frequency using the treated-group mean of the outcome variable, defined as the share of SCT Inst transactions relative to total SCT Inst and regular SEPA credit transfers as defined by equation 2.

Let Y_{it} denote the outcome for treated PSP i in month t, and let

$$\bar{Y}_t = \frac{1}{N_t} \sum_{i:G_i=1} Y_{it} \tag{14}$$

be the cross-sectional mean among treated PSPs, where N_t is the number of treated entities observed in month t. Time is indexed relative to the intervention date t_0, corresponding to January 2025, and we define event time $k_t = t - t_0$.

For ease of interpretation and comparability with the dynamic TWFE and GSCM specifications, the treated-group mean is rebased to zero in the last pre-IPR period ($k = -1$):

$$\bar{Y}_t^{\text{adj}} = \bar{Y}_t - \bar{Y}_{t:k_t=-1}. \tag{15}$$

The ITS regression is specified as a segmented linear trend model:

$$\bar{Y}_t^{\text{adj}} = \eta + \beta_1 k_t + \beta_2 \mathbb{1}\{k_t \geq 0\} + \beta_3 \max(k_t, 0) + \sum_{m=2}^{12} \delta_m \mathbb{1}\{\text{MOY}_t = m\} + \varepsilon_t, \tag{16}$$

where η is the baseline level at $t+0$, $\mathbb{1}\{k_t \geq 0\}$ is a post-IPR indicator, $\max(k_t, 0)$ captures the post-IPR change in slope, and MOY_t denotes month-of-year fixed effects included to control for seasonality.

In equation (16), β_1 captures the pre-IPR linear trend in the treated-group mean, β_2 measures any immediate level shift at the time of IPR implementation, and β_3 captures a change in the slope of the trend relative to the pre-IPR period. The identifying assumption of the ITS design is that, absent the IPR, the treated-group outcome would have continued to evolve according to its pre-existing linear trend, conditional on seasonality.

The no-IPR counterfactual trajectory is constructed by extrapolating the estimated pre-IPR trend into the post-IPR period while setting β_2 and β_3 to zero:

$$\widehat{\bar{Y}}_t^{\text{cf}} = \widehat{\eta} + \widehat{\beta}_1 k_t + \sum_{m=2}^{12} \widehat{\delta}_m \mathbb{1}\{\text{MOY}_t = m\}. \tag{17}$$

The fitted post-IPR outcome resulting from the ITS model is given by the fitted values of equation (16), while the treatment effect at horizon $t \geq t_0$ is defined as the difference between the observed (rebased) treated mean and the counterfactual

$$\widehat{\tau}_t^{\text{ITS}} = \bar{Y}_t^{\text{adj}} - \widehat{\bar{Y}}_t^{\text{cf}}. \tag{18}$$

In the graphical presentation, the solid line corresponds to the rebased observed treated-group mean $\bar{Y}_t^{\text{adj}}$, while the dashed line represents the extrapolated pre-IPR counterfactual

$\widehat{\widehat{Y}}_t^{\text{cf}}$. The vertical gap between the two lines in the post-IPR period therefore represents the estimated effect of the regulation. Because both series are rebased to zero at $k = -1$, this normalization does not affect the estimated treatment effects in equation (18), which continue to be interpreted in percentage points.

Overall, the ITS framework provides a within-group comparison that attributes deviations from the pre-IPR trend to the regulatory implementation date, under the assumption that no other structural changes coincided with the introduction of the IPR.

4.4 Placebo event study

For the purposes of the placebo event study, the implementation date of the IPR is set to a month that predates the actual IPR implementation, t_0^{pl}. We use a date of June 2024, six months prior to January 2025.

Define the placebo event time

$$k_t^{\text{pl}} = t - t_0^{\text{pl}} \tag{19}$$

so that $k_t^{\text{pl}} = 0$ corresponds to June 2024 and optionally bin at the tails $\tilde{k}_t^{\text{pl}}$ as was done for model specification B. The placebo model specification is similar to that of equation (9)

$$Y_{it} = \alpha_i + \lambda_t + \sum_{k \in \tilde{\mathcal{K}}^{\text{pl}}} \beta_k^{\text{pl}} \, \mathbb{1}\{\tilde{k}_t^{\text{pl}} = k\} \cdot G_i + X_{it}'\gamma + \varepsilon_{it}, \qquad k^\star = -1 \tag{20}$$

The placebo event-study interacts placebo event-time indicators with the original treatment indicator G_i, while untreated entities continue to serve as controls. Given that the selected placebo date is chosen prior to the actual implementation of the IPR, the expectation is that the placebo post-IPR coefficients should be statistically indistinguishable from zero and exhibit no structural break at $k_t^{\text{pl}} = 0$.

It is important to note that across the TWFE, GSCM and ITS model specifications, the estimated coefficients can be interpreted as estimates of the regulatory impact, expressed in percentage points relative to model-specific counterfactuals. In this sense, the outputs of all the models share a common interpretation.

The three modelling approaches outlined above differ primarily in how the counterfactual outcome in the absence of the Instant Payments Regulation is constructed and, consequently, in the sources of variation used for identification. The two-way fixed effects (TWFE) event-study specification identifies the treatment effect by exploiting both cross-sectional variation across PSPs and variation in the share of SCT Inst within PSPs, comparing post-January 2025 changes among treated entities to contemporaneous changes among untreated entities while netting out common time effects and entity fixed effects.

The generalized synthetic control method (GSCM) similarly relies on cross-sectional variation, but constructs a more flexible counterfactual by matching treated entities to a weighted combination of untreated entities and latent common factors estimated from pre-IPR data, thereby allowing for heterogeneous trends across PSPs. In contrast, the interrupted time series (ITS) specification does not exploit cross-sectional variation for identification, as it focuses exclusively on the treated group of PSPs and identifies the regulatory impact from deviations of the treated group's outcome from its own pre-IPR trend. While the ITS approach provides a within-group benchmark, it relies more heavily on extrapolation and stronger assumptions about trend evolution, and therefore serves as a complementary modelling strategy to help to narrow down the range of the IPR impact.

5 Results

The different model specifications allow us to estimate (i) the average post-IPR effect (static TWFE), (ii) dynamic treatment effects (event study), (iii) robustness to latent factor structures (GSCM), and (iv) segmented trend changes (ITS). Taken together, these analyses provide a comprehensive assessment of the reallocation of customer credit transfers sent using SEPA towards SCT Inst transfers following the IPR implementation and, importantly, instant credit transfers sent prior to the October 2025 deadline for sending SCT Inst.

5.1 DiD: Average Post-IPR Effect

Table 2 reports results from a static two-way fixed effects (TWFE) difference-in-differences specification that estimates the average change in the outcome for PSPs subject to the Instant Payments Regulation (IPR) after January 2025, relative to the control group of payment institutions and electronic money institutions. The regression includes entity fixed effects to absorb time-invariant heterogeneity across reporting entities and month fixed effects to capture shocks common to all entities in a given month.

The first column of the table reports standard errors clustered at the entity level, while the second column reports two-way clustered standard errors by entity and time. The similarity of the point estimates and standard errors across these approaches suggests that inference is not particularly sensitive to the error correlation structure.

The coefficient of interest is the interaction term POST × TREATED_GRP. Because the dependent variable is Y_{it} = SCTI_SHARE_SEPA$_{it}$, the point estimate of 0.0133 corresponds to an average post-January 2025 increase of approximately 1.3 percentage points in the share of SCT Inst transactions within total SEPA and instant credit transfers sent (SEPA+SCTI) for treated PSPs, relative to the control group. However, the estimate is not statistically distinguishable from zero at conventional significance levels under either error clustering scheme.

The main effects POST and TREATED_GRP are not separately identified in this specifi-

	(1) Clustered by Entity	(2) Clustered by Entity and Time
POST × TREATED_GRP	0.0133	0.0133
	(0.0096)	(0.0093)
Entity fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Observations	1,283	1,283
Number of entities	70	70
Number of periods	21	21
Adjusted R^2	0.918	0.918
Within R^2	0.004	0.004
RMSE	0.032	0.032

Notes: The table reports two-way fixed effects (TWFE) estimates of the impact of treatment on the outcome variable Y. All specifications include entity and time fixed effects. The coefficient of interest is the interaction term POST×TREATED_GRP. Standard errors are clustered at the entity level in column (1), and two-way clustered at the entity and time levels in column (2). The main effects POST and TREATED_GRP are omitted due to collinearity with the fixed effects structure. None of the reported coefficients are statistically significant at conventional levels.

Table 2: Two-Way Fixed Effects Estimation Results

cation because POST is absorbed by time fixed effects and TREATED_GRP is absorbed by entity fixed effects. The model exhibits a high adjusted R^2, reflecting the explanatory power of the fixed effects, while the within R^2 is low, indicating that the treatment interaction explains only a small fraction of within-entity variation over time.

Taken together, the static TWFE DiD specification provides limited evidence of an average post-January 2025 effect. This finding should be interpreted cautiously, however. First, the static TWFE framework imposes a single average post-treatment effect and therefore cannot capture gradual adjustment dynamics. Second, precision may be limited by the relatively small untreated group and the limited number of time periods available for inference when clustering by time. These considerations motivate the dynamic event-study specifications and factor-based counterfactual approaches (i.e. GSCM), which are better suited to capturing the timing and evolution of the IPR effect over 2025.

5.2 TWFE Event-Study: Dynamic Treatment Effects

Table 3 and Figure 2 present the results from a dynamic two-way fixed effects event study specification, which allows the effect of the IPR on PSPs to vary over time relative to the January IPR implementation date. The coefficients are normalized relative to the period immediately preceding the IPR (i.e. $k = -1$), which serves as the reference period.

Event time k	Estimate	95% CI (Lower)	95% CI (Upper)	p-value	
−9	−0.0040	−0.0131	0.0052	0.3780	
−8	−0.0038	−0.0122	0.0046	0.3580	
−7	−0.0080	−0.0179	0.0018	0.1050	
−6	−0.0038	−0.0113	0.0038	0.3150	
−5	−0.0018	−0.0064	0.0028	0.4160	
−4	−0.0077	−0.0191	0.0036	0.1720	
−3	−0.0021	−0.0055	0.0012	0.1970	
−2	−0.0011	−0.0051	0.0029	0.5680	
0	0.0078	0.0005	0.0150	0.0360	**
1	0.0092	0.0003	0.0182	0.0440	**
2	0.0101	−0.0005	0.0206	0.0600	*
3	0.0083	−0.0030	0.0197	0.1400	
4	0.0098	−0.0050	0.0247	0.1810	
5	0.0111	−0.0080	0.0302	0.2400	
6	0.0068	−0.0141	0.0276	0.5060	
7	0.0130	−0.0085	0.0345	0.2210	
8	0.0112	−0.0157	0.0381	0.3960	

Notes: The table reports dynamic two-way fixed effects estimates from model Specification B (Spec B). Coefficients correspond to interactions between relative event-time indicators and the treated-group indicator, with event time $k = -1$ serving as the reference period. All specifications include entity and time fixed effects. Standard errors are two-way clustered by entity and time. The dependent variable is SCTI_SHARE_SEPA. Significance levels: $^{*}p < 0.10$, $^{**}p < 0.05$.

Table 3: Dynamic Two-Way Fixed Effects Estimates

The pre-IPR coefficients are small and statistically insignificant, with confidence intervals that include zero. This pattern provides no indication of any differences in pre-trends between treated and control entities in the months leading up to the January 2025 IPR implementation, lending support to the parallel trends assumption.

Beginning at the regulatory entry-into-force date ($k = 0$), the coefficient path turns positive and remains so for all observed post-IPR months. In the post-IPR period (e.g. after January 2025), the estimated coefficients are positive across all event times, with point estimates in the range of approximately 0.8 to 1.1 percentage points[5] (see also Table (3)). The coefficient estimates for $k = 0$ and $k = 1$ are statistically significant at the 5% level, while subsequent coefficients remain positive but become progressively subject to greater uncertainty, with confidence intervals widening over time. The coefficient estimates for

[5] A coefficient of 1.2 percentage points means that following the introduction of the Instant Payments Regulation, the share of instant credit transfers in the total SCT Inst and regular SEPA transfers increased by 1.2 percentage points for PSPs subject to the IPR relative to the counterfactual path for which it is assumed that the IPR was not implemented.

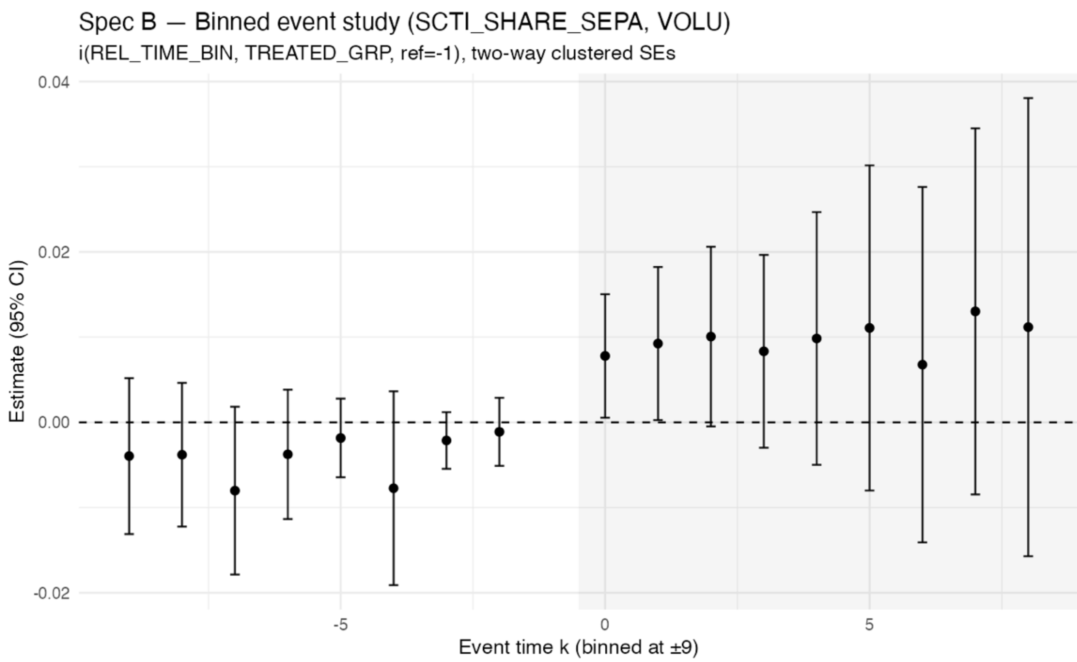

Figure 2: Binned event study estimates for model specification B (Spec B). Estimates are obtained from a TWFE model with entity and month fixed effects and two-way clustered standard errors. Event time is binned at ±9 months, with $k = -1$ as the reference period. The grey shaded area in the chart indicates the post-IPR period event times.

the TWFE model are most precise for event times close to the IPR implementation date given the relatively high number of data points used for the estimate. Coefficient estimates at distant event time horizons are associated with higher uncertainty bands.

The results suggest the presence of an initial upward shift in customer instant credit transfers sent following the IPR, that is consistent with a gradual adoption process rather than an immediate and discrete jump in usage. At the same time, the lack of statistical significance beyond the initial post-IPR months and the widening confidence intervals caution against strong conclusions regarding the persistence or magnitude of the longer-run IPR effects, possibly reflecting the gradual process of customer familiarisation or hesitation with sending SCT Inst and a need to adapt to the new form of credit transfer. Adoption or usage of SCT Inst could be delayed due to consumer preferences for existing credit transfer instruments, lack of awareness or other factors.

Overall, the event-study evidence suggests a modest short-term increase in the share of SCT Inst transactions in SEPA transactions following the IPR, with limited statistical significance at longer horizons. As in the static TWFE specification, the dynamic estimates reflect average effects under the assumptions of the TWFE model, including homogeneous treatment effects. In settings where customer familiarisation dynamics may differ across entities or unfold gradually over time, the TWFE event study estimates may understate heterogeneity in PSPs' responses.

5.3 Generalized Synthetic Control Results

Figure 3 and Table 4 present the results obtained using the Generalized Synthetic Control Method (GSCM). The GSCM framework constructs a counterfactual no-IPR scenario for payment service providers (PSPs) subject to the Instant Payments Regulation (IPR) by modelling untreated potential outcomes as a function of latent common factors with heterogeneous loadings across entities. By allowing for unobserved time-varying shocks that affect PSPs differently, this approach relaxes the parallel-trends assumption implicit in two-way fixed effects (TWFE) models.

Figure 3 plots the observed treated-group mean of the outcome variable together with the GSCM-implied counterfactual trajectory, both shown in levels. In this framework, the average treatment effect on the treated (ATT) at time t is defined as

$$\widehat{\tau}_t^{\mathrm{GSCM}} = \overline{Y}_t^{\mathrm{treated}} - \widehat{\overline{Y}}_t^{(0)}, \tag{21}$$

where $\overline{Y}_t^{\mathrm{treated}}$ denotes the observed mean outcome for treated PSPs and $\widehat{\overline{Y}}_t^{(0)}$ denotes the model-implied counterfactual outcome in the absence of the IPR.

Because Figure 3 is presented in levels, non-zero differences between the treated series and the counterfactual prior to January 2025 reflect level differences implied by the observed data and the estimated latent factor structure. These pre-treatment gaps do not carry a causal interpretation and do not reflect PSPs' anticipatory responses to the Regulation.

In the pre-IPR period, the treated mean and the counterfactual evolve closely together, with no evidence of a systematic divergence or accelerating gap prior to January 2025. This close co-movement indicates that the latent factor structure estimated by the GSCM provides a reasonable fit to the pre-treatment dynamics of the treated PSPs. Following the entry into force of the IPR in January 2025, the treated-group mean increases more rapidly than the counterfactual trajectory. The gap between the two series widens progressively over the post-IPR period, consistent with a gradual adjustment in the share of SCT Inst transactions.

While Figure 3 provides an intuitive illustration of divergence in levels, causal interpretation is more evident when focusing directly on the ATT. For comparability with TWFE event-study estimates, the GSCM ATT series is therefore rebased to zero in the final pre-IPR period ($k = -1$),

$$\widetilde{\tau}_k^{\mathrm{GSCM}} = \widehat{\tau}_k^{\mathrm{GSCM}} - \widehat{\tau}_{-1}^{\mathrm{GSCM}}, \qquad \widetilde{\tau}_{-1}^{\mathrm{GSCM}} = 0.$$

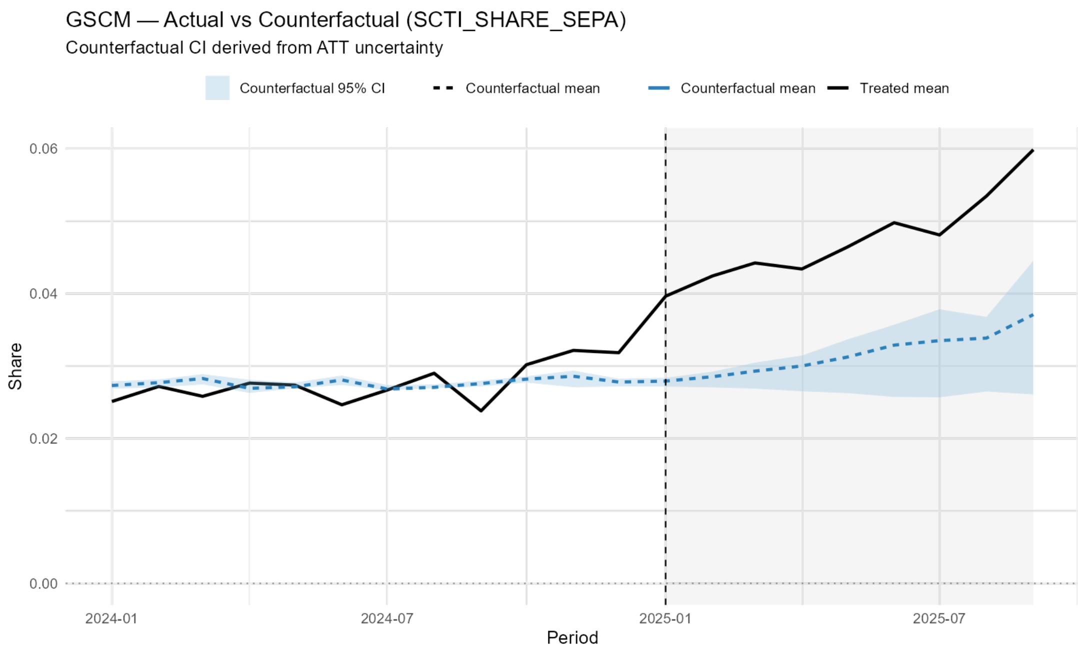

Figure 3: Generalized synthetic control results for SCT Inst transactions as a share of total SCT Inst and SEPA transactions. The solid line shows the treated-group mean, while the dashed line shows the GSCM-implied counterfactual. Shaded areas around the dashed line denote 95% confidence intervals for the counterfactual. The vertical dashed line indicates January 2025. The shaded light grey area in the chart indicates the post-IPR period.

This transformation involves only a level shift and does not affect the temporal profile of the estimated effects or their associated uncertainty.

Figure 4 plots the rebased GSCM ATT over event time, together with 95% confidence intervals derived from a bootstrap procedure. In the pre-IPR period, the rebased ATT fluctuates just under zero (due to the rebasing) and does not display a systematic upward trend, providing no evidence of anticipatory increases in SCT Inst usage prior to January 2025. From the entry into force of the IPR onward, the ATT becomes positive, with an estimated impact of approximately 0.8 percentage points at $k = 0$. The effect then rises gradually over time, reaching around 1.0 to 1.3 percentage points in mid-2025 and approaching nearly 2 percentage points by the end of the observed post-IPR window.

Confidence intervals widen at longer horizons, reflecting increasing uncertainty as the counterfactual projection extends further beyond the pre-treatment period used to identify the latent factor structure. Nevertheless, the point estimates remain consistently positive throughout the post-IPR period. Taken together, the GSCM results indicate a sustained and progressive reallocation of customer credit transfers sent from regular SEPA credit transfers towards instant payments following the entry into force of the IPR and prior to the mandatory October sending deadline.

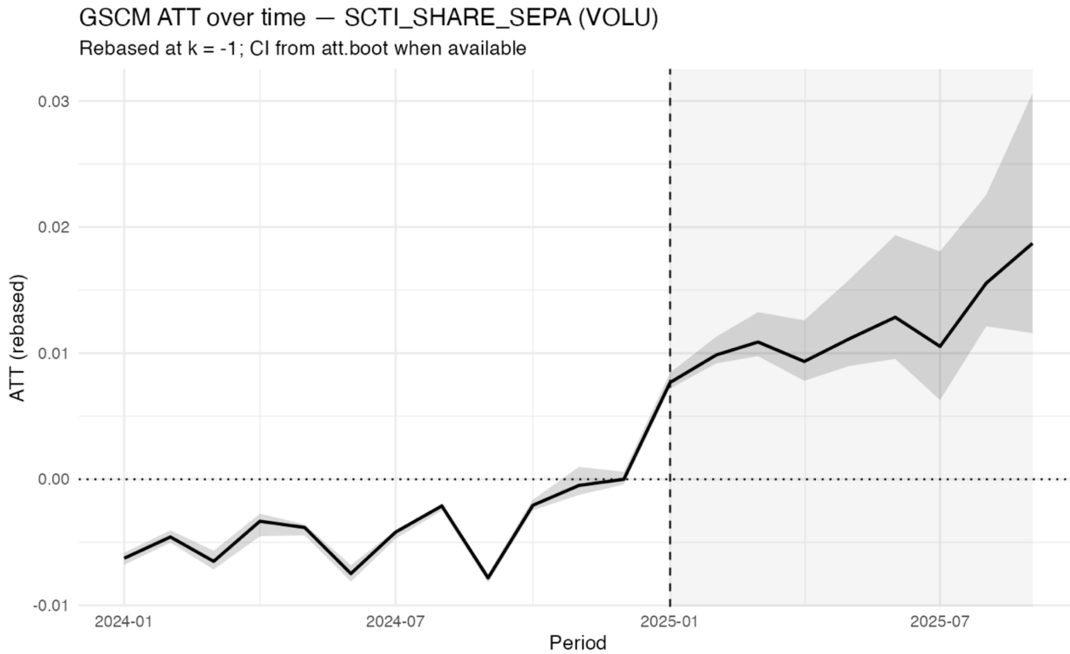

Figure 4: Generalized Synthetic Control Method (GSCM) estimates of the Average Treatment Effect on the Treated (ATT) for the share of SCT Inst transactions relative to total SCT Inst and SEPA credit transfers (number of transactions). The ATT series is rebased to the final pre-IPR period ($k = -1$). Shaded areas denote 95% confidence intervals. The vertical dashed line marks the January 2025 entry into force of the Instant Payments Regulation.

Table 4 reports the corresponding rebased GSCM ATT estimates by event time, k. In the pre-IPR period, the ATT estimates are generally small in magnitude and fluctuate around zero once normalised to $k = -1$. Several pre-treatment estimates are statistically different from zero, which reflects the fact that GSCM does not impose zero pre-treatment effects and allows for level differences between treated units and their synthetic controls. Importantly, the pre-treatment ATT path does not display a systematic upward trend approaching January 2025, supporting the absence of material increases in SCT Inst usage prior to the IPR implementation.

From January 2025 onward, the GSCM estimates exhibit a clear and persistent positive shift. The ATT becomes positive at $k = 0$, with magnitudes of roughly 0.8 to 1.0 percentage points in the first months following implementation, and continues to rise gradually over time. At longer horizons, the estimated effect is nearly 2 percentage points. Confidence intervals widen at longer horizons, reflecting increasing uncertainty as the counterfactual scenario extends further beyond the pre-treatment period used to identify the latent factor. Nevertheless, the point estimates remain positive throughout the post-IPR period, indicating a reallocation of customer credit transfers from regular SEPA towards instant payments following the entry into force of the IPR.

Event time k	GSCM ATT	95% CI (Lower)	95% CI (Upper)
−12	−0.0022	−0.0028	−0.0018
−11	−0.0005	−0.0010	0.0001
−10	−0.0025	−0.0031	−0.0017
−9	0.0007	−0.0004	0.0013
−8	0.0002	−0.0004	0.0004
−7	−0.0034	−0.0040	−0.0027
−6	−0.0001	−0.0007	0.0000
−5	0.0019	0.0016	0.0021
−4	−0.0038	−0.0042	−0.0034
−3	0.0020	0.0016	0.0025
−2	0.0036	0.0028	0.0051
−1	0.0000	−0.0005	0.0006
0	0.0077	0.0072	0.0084
1	0.0099	0.0092	0.0113
2	0.0109	0.0097	0.0133
3	0.0093	0.0079	0.0128
4	0.0111	0.0087	0.0161
5	0.0129	0.0100	0.0200
6	0.0105	0.0062	0.0184
7	0.0156	0.0126	0.0229
8	0.0187	0.0113	0.0297

Notes: This table reports period-specific estimates of the Average Treatment Effect on the Treated (ATT) from the Generalized Synthetic Control Method (GSCM). Event time k is measured in months relative to the January 2025 IPR implementation date. The period $k = -1$ serves as the reference period for recentering the ATT series. Confidence intervals are 95% intervals as reported by the GSCM procedure. The dependent variable is the share of SCT Inst transactions in total SCT Inst and SEPA transactions, measured in terms of number of transactions.

Table 4: Generalized Synthetic Control Estimates by Event Time (ATT)

Figure 5 plots the estimated latent common factor extracted by the Generalized Synthetic Control Method (GSCM) for the outcome variable measuring the share of SCT Inst transactions in total SCT Inst and SEPA credit transfers. In the GSCM framework, outcomes are decomposed into unit-specific fixed effects, time effects, and a set of unobserved common factors that capture time-varying shocks affecting all entities, albeit with different intensities. These latent factors summarise common underlying dynamics in payment behaviour that are not directly observed but are inferred from the joint evolution of outcomes across treated and control entities. The factor plotted in Figure 5 therefore represents an estimated common time-varying component in SCT Inst usage that helps explain any observed co-movements across PSPs.

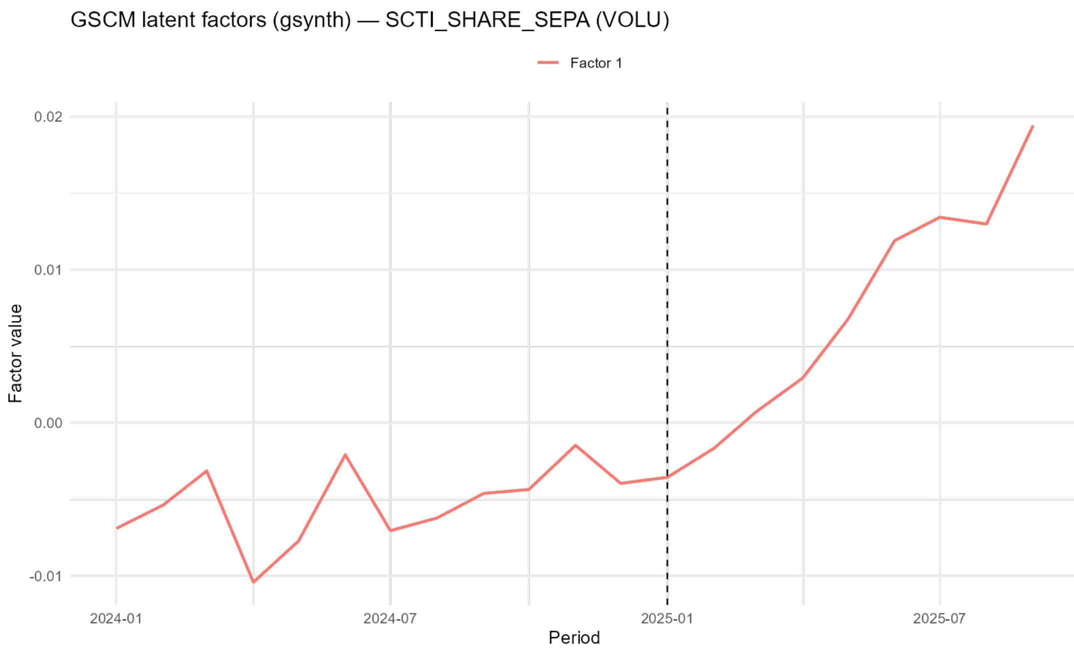

Figure 5: Estimated latent common factor from the Generalized Synthetic Control Method (GSCM). The figure shows the time path of the latent factor underlying the share of SCT Inst transactions in total SCT Inst and SEPA customer credit transfers (number of transactions). The dashed vertical line denotes the January 2025 entry into force of the Instant Payments Regulation (IPR).

In the period prior to the IPR implementation, the latent factor fluctuates with slightly negative values and does not display a sustained upward trend. This pattern suggests that, before January 2025, there was no strong common factor driving SCT Inst shares upward across PSPs beyond normal month-to-month variation. Importantly, the absence of a pronounced pre-IPR upward trend in the latent factor is consistent with the main identifying assumption of the GSCM model that while levels may differ across entities, the pre-IPR dynamics can be adequately captured by a combination of common factors and unit-specific loadings.

Following the entry into force of the IPR in January 2025, the latent factor exhibits a clear and persistent upward shift. The factor increases steadily over the post-IPR period, indicating the emergence of a common underlying driver that acts to increase the share of SCT Inst transactions across PSPs. This upward movement aligns closely with the timing of the regulatory implementation and suggests that the IPR generated a system wide shift toward greater instant payment usage for customer credit transfers sent, rather than isolated changes confined to a small subset of institutions. In the GSCM framework, this factor captures the component of the post-IPR adjustment that is common across entities, while differences in the observed outcomes across PSPs are explained by heterogeneous factor loadings. The gradual nature of the increase further suggests that the regulatory effect of the IPR unfolded progressively, consistent with heterogeneous levels of operational readiness, gradual service activation, and incremental customer adoption.

The corresponding GSCM ATT estimates discussed above reflect the interaction between this common latent factor and the entity-specific factor loadings thereby isolating the portion of the observed post-IPR increase that can be causally attributed to the IPR.

5.4 Comparison of GSCM and TWFE Dynamic Effects

The dynamic treatment effects obtained from the Generalized Synthetic Control Method (GSCM) and from the two-way fixed effects (TWFE) event-study specification (Spec B) are not directly comparable in levels. TWFE event-study coefficients are estimated relative to a reference period, with the coefficient for the last pre-treatment month ($k = -1$) normalised to zero by construction. In contrast, the GSCM framework delivers period-specific estimates of the average treatment effect on the treated (ATT) in levels, without imposing a zero-mean restriction in the pre-treatment period. As a result, pre-IPR GSCM estimates need not be centred at zero.

To ensure comparability between the two approaches, the GSCM ATT series is rebased by subtracting its value in the reference period ($k = -1$) from all event-time estimates. The transformed GSCM series plotted in Figure 6 is therefore given by

$$\widetilde{\tau}_k^{\mathrm{GSCM}} = \widehat{\tau}_k^{\mathrm{GSCM}} - \widehat{\tau}_{-1}^{\mathrm{GSCM}},$$

such that $\widetilde{\tau}_{-1}^{\mathrm{GSCM}} = 0$. The same transformation is applied to the corresponding confidence intervals. This rebasing affects only the level of the GSCM estimates and leaves their temporal pattern and statistical uncertainty unchanged. After normalisation, both the GSCM and TWFE series can be interpreted as changes in the share of SCT Inst transactions relative to total SCT Inst and SEPA credit transfers.

Figure 6 provides a direct comparison between the IPR effects estimated using GSCM and those obtained from the TWFE event-study specification. Both models are estimated using the same set of PSPs and are subject to identical minimum requirements on the length of the pre- and post-IPR windows. The TWFE specification uses binned event-time indicators at the tails (±9 months), while the GSCM estimates are reported at each event time relative to the IPR implementation date.

The figure plots the estimated treatment effects as a function of event time, with shaded areas representing 95% confidence intervals. The vertical dashed line denotes the January 2025 IPR implementation date, while the horizontal dashed line indicates zero. Both series are normalised relative to the final pre-IPR month.

In the pre-treatment period, both the GSCM and TWFE estimates fluctuate just under zero and do not display a systematic upward or downward trend in the months leading

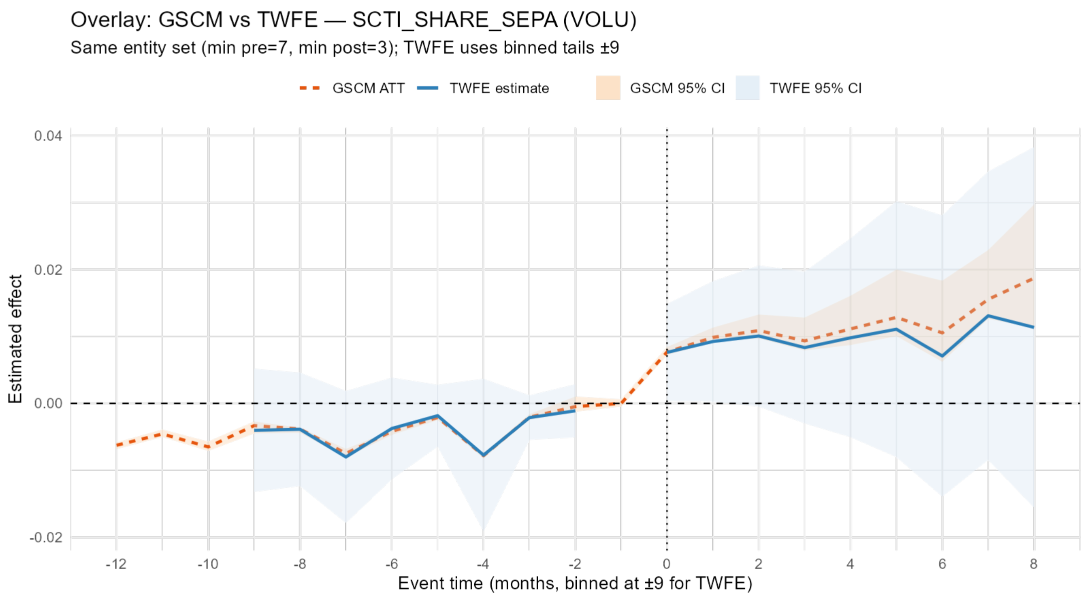

Figure 6: Comparison of GSCM and TWFE dynamic effects for SCT Inst as a share of total SCT Inst and SEPA credit transfers sent. The figure overlays recentered GSCM average treatment effects on the treated with TWFE event-study coefficients (Specification B). Shaded areas denote 95% confidence intervals. The vertical dashed line marks the January 2025 IPR implementation date.

up to the IPR. While the GSCM series exhibits some small non-zero deviations prior to treatment, these movements are broadly stable and do not suggest any persistent divergence between treated PSPs and their synthetic controls. The TWFE event-study coefficients show a similar pattern, with confidence intervals generally encompassing zero. Taken together, the pre-treatment dynamics do not provide evidence of any differential trends immediately prior to January 2025.

From the IPR implementation date onward, both models exhibit a clear positive shift. At $k = 0$, the GSCM and TWFE estimates increase and remain positive throughout the post-IPR window. The two series track each other closely in magnitude, particularly during the early post-treatment months, with estimated effects on the order of one percentage point. At longer horizons, both estimates continue to increase, although the TWFE confidence intervals widen more rapidly.

Despite their close alignment, the two approaches display some differences. The GSCM estimates follow a relatively smooth trajectory over time, consistent with the underlying factor-based counterfactual that allows for heterogeneous exposure to latent common shocks across PSPs. By contrast, the TWFE estimates exhibit greater month-to-month variation and wider confidence intervals, particularly at longer horizons, likely reflecting homogeneous treatment effects and parallel-trends assumptions.

Overall, the overlay figure shows a high degree of coherence between the GSCM and TWFE estimates. Both methods point to a gradual and persistent increase in the share of SCT Inst transactions sent following the January 2025 implementation of the IPR. While the magnitude of the effect is modest, it is nevertheless economically meaningful and robust across specifications, particularly as it reflects SCT Inst customer credit transfers sent prior to the IPR imposed sending deadline of October 2025. The convergence of results across two different estimation strategies strengthens the interpretation that the observed post-IPR increase reflects a genuine regulatory effect rather than model-specific artefacts.

These dynamics suggest that the IPR triggered a progressive reallocation of customer credit transfers sent from regular SEPA credit transfers towards SCT Inst credit transfers among treated PSPs. Rather than inducing an abrupt one-off jump, the Regulation appears to have resulted in a gradual adjustment process, consistent with an environment characterized by heterogeneous operational readiness among PSPs, incremental service roll-out, and progressive customer uptake in advance of the mandatory October 2025 compliance deadline.

5.5 Interrupted Time Series results

Figure 7 presents evidence from an interrupted time series (ITS) analysis focusing on the treated group and the share of SCT Inst out of the total amount of credit transfers sent and measured as the number of transactions. The figure plots the treated-group mean (solid line) together with a counterfactual path (dashed line) obtained by extrapolating the estimated pre-IPR linear trend into the post-intervention period. Both series are rebased to zero in the month immediately preceding the implementation of the Instant Payments Regulation (IPR), denoted by $k = -1$.

Prior to January 2025, the treated PSP series exhibits a relatively stable trajectory with modest month-on-month fluctuations and no visible evidence of a structural break. The counterfactual path closely tracks the observed series throughout the pre-treatment period, indicating that a linear segmented-trend specification provides a good approximation of pre-IPR dynamics.

At the implementation date of the IPR ($k = 0$), the treated-group mean displays an immediate upward deviation relative to the extrapolated pre-policy trend. In the first month following implementation, the observed share of SCT Inst transactions increases by approximately 0.6 to 0.8 percentage points relative to the pre-trend benchmark. This immediate level shift is followed by a persistent and widening gap between the observed series and the counterfactual, indicating a sustained increase in the use of instant payments relative to regular SEPA credit transfers.

By six months after implementation, the cumulative deviation reaches approximately 1.2

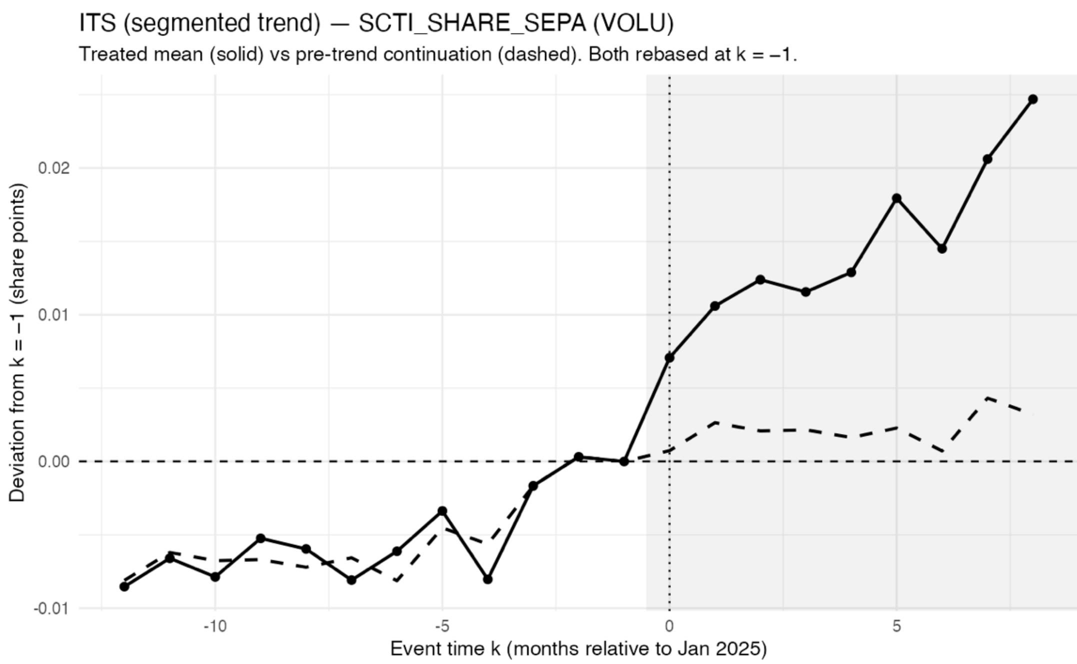

Figure 7: Interrupted time series results for SCTI_SHARE_SEPA (number of transactions). The solid line shows the treated-group mean, while the dashed line shows the counterfactual continuation of the pre-policy trend. Both series are rebased at $k = -1$. The vertical line marks January 2025.

to 1.5 percentage points, rising further to around 2 to 2.5 percentage points by eight to nine months post-IPR. Given the relatively low baseline share of instant payments prior to the regulation, these magnitudes are economically meaningful and point to a substantial reallocation of customer credit transfers from regular SEPA to SCT Inst. Because the ITS counterfactual is constructed by extrapolating the pre-IPR trend, post-IPR deviations accumulate over time when the observed trajectory persistently diverges from that trend. As a result, the ITS estimates should be interpreted as an upper-bound, rather than as directly comparable estimates to TWFE or GSCM effects.

Importantly, the counterfactual path evolves smoothly through the implementation date, by construction ruling out explanations based on pre-existing trends or seasonality. The ITS results therefore are consistent with the TWFE findings in terms of timing and direction by providing within-group evidence of an immediate and persistent increase in SCT Inst usage following the IPR implementation, despite the formal compliance deadline for sending SCT Inst being October 2025.

5.6 Placebo Test

As a falsification exercise, we use model Specification B to estimate a placebo event study in which the policy implementation date is artificially set to a pre-regulation month, in this case June 2024. The specification mirrors the baseline event study model, including entity and calendar-month fixed effects, but replaces the true implementation date with the placebo date.

Figure 8 shows the resulting coefficient path. The placebo estimates are small in magnitude and statistically indistinguishable from zero both before and after the placebo date of June 2024. In particular, there is no evidence of a discontinuity or systematic divergence in the post-placebo date period.

The placebo estimates show no systematic post-IPR effects. Coefficients remain small and statistically indistinguishable from zero throughout the event window, and no persistent pattern emerges following the placebo implementation date. This absence of treatment effects strengthens the causal interpretation of the main results and suggests that the post-2025 dynamics are not driven by unrelated contemporaneous trends or pre-existing adjustments but rather the effect of the IPR.

6 Translating Share Effects into Implied Number of Transactions

This section explains how the event study estimates from model Specification B are converted from the model estimated coefficients into the implied number of transactions to

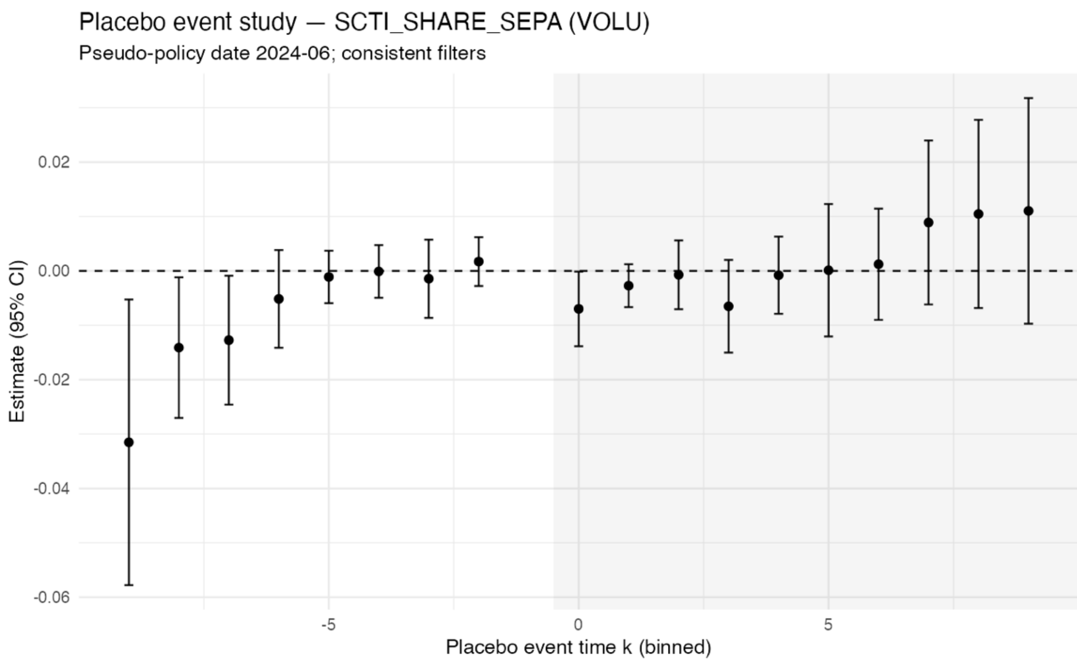

Figure 8: Placebo event study estimates for SCTI_SHARE_SEPA using a pseudo-policy date of June 2024.

gauge the increase in SCT Inst customer credit transfers sent following the January 2025 IPR implementation date and, more importantly, to determine whether there was a statistically significant increase in these transactions prior to the mandatory sending date of October 2025. This allows for interpreting any change in the SCT Inst share after January 2025 in an economically meaningful way.

6.1 Estimating the transaction impact of the IPR

The event study specifications estimate treatment effects (e.g. IPR effect) on payment *shares*, rather than on the number of transactions directly given that we have defined the share of SCT Inst transactions according to equation 2. In model Specification B, each coefficient $\widehat{\beta}_k$ captures the average treatment effect on the treated (ATT) at event time k, measured in percentage points of the outcome share Y_{it}.

To assess the economic magnitude of these estimated share effects in terms of the number of transactions, we convert the model coefficient estimates of Specification B into implied changes in the number of instant credit transfers sent. The conversion exploits the definition of the share variable. More specifically, when the outcome is defined as the share of instant credit transfers within total SEPA and SCT Inst credit transfers, we have from equation 1

$$Y_{it} = \frac{A_{it}^{\text{SCTI}}}{A_{it}^{\text{SEPA}} + A_{it}^{\text{SCTI}}} \tag{22}$$

Let D_{it} denote the denominator of the share measure Y_{it}. For the share of customer instant credit transfers sent as the total of SEPA and SCT Inst customer credit transfers sent this is given as

$$D_{it} = A_{it}^{\text{SEPA}} + A_{it}^{\text{SCTI}} \tag{23}$$

For each event time k, we compute the treated-group aggregate denominator

$$D_k^{\text{treated}} = \sum_{i \in \mathcal{G}_1} D_{it(k)} \tag{24}$$

where $t(k)$ denotes the calendar month corresponding to event time k.

The implied change in the number of instant credit transfer transactions at event time k is therefore given by

$$\widehat{\Delta A}_k^{\text{SCTI}} = \widehat{\beta}_k \times D_k^{\text{treated}}. \tag{25}$$

The expression in equation 25 translates the estimated share increase $\widehat{\beta}_k$ into an absolute change in the number of transactions by scaling it with the observed size of the treated group total number of credit transfers sent at event time k. The result subsequently provides an estimate of the share of SCT Inst customer credit transfers sent as a result of the IPR.

The associated uncertainty bands for the implied transaction effects are obtained by applying the same transformation to the respective confidence intervals $\widehat{\beta}_k$, that is,

$$\widehat{\Delta A}_{k,\ell}^{\text{SCTI}} = \widehat{\beta}_{k,\ell} \times D_k^{\text{treated}}, \qquad \widehat{\Delta A}_{k,u}^{\text{SCTI}} = \widehat{\beta}_{k,u} \times D_k^{\text{treated}},$$

where $(\widehat{\beta}_{k,\ell}, \widehat{\beta}_{k,u})$ denote the lower and upper bounds of the 95% confidence interval for the associated event study coefficient.

Because the analysis is conducted using the number of transactions, the resulting implied values can therefore be interpreted as changes in the number of customer instant credit transfers sent. These calculations allow for translating the model estimated coefficients into the number of customer instant credit transfers sent after January and due to the IPR implementation, despite the mandatory SCT Inst sending deadline being in October 2025.

6.2 Implied Number of Transactions

The model outputs have shown that for all three modelling approaches — dynamic TWFE, interrupted time series (ITS), and generalized synthetic control (GSCM) — the results point to a clear increase in the use of SCT Inst customer credit transfers sent among treated PSPs following the entry into force of the Instant Payments Regulation (IPR) in January 2025. For all models, the post-January estimates are uniformly positive in magnitude, indicating a reallocation of customer credit transfers away from regular SEPA transfers toward instant credit transfers that coincides with the regulatory implementation date. Moreover, the increase in the number of SCT Inst transactions sent occurs prior to the October 2025 implementation deadline.

To express the model estimated post-IPR share effects in an economically interpretable manner, Table 5 reports the implied number of SCT Inst customer credit transfers sent by treated PSPs in each month after January 2025. The figures are obtained by converting the model-implied percentage-point effects on SCTI_SHARE_SEPA into transaction counts using contemporaneous treated-group denominators and the scaling procedure described in the previous section. The table therefore provides a month-by-month aggregate measure of the increase in SCT Inst customer credit transfers sent that is attributable to the IPR according to each respective modelling approach.

Month	TWFE (dynamic, ref $k = -1$)	ITS (rebased at $k = -1$)	GSCM (ATT rebased at $k = -1$)
2025-01	252,887	205,466	249,086
2025-02	257,550	221,492	274,571
2025-03	304,750	311,902	329,400
2025-04	249,755	281,569	279,808
2025-05	309,885	354,135	350,242
2025-06	341,232	482,392	395,698
2025-07	224,727	457,685	349,759
2025-08	382,736	478,756	457,083
2025-09	340,560	654,941	570,181

Notes: Figures are implied changes in the number of SCT Inst transactions (VOLU) for treated entities, obtained by multiplying model-implied share effects by the treated-group denominator consistent with the share definition (SCTI_SHARE_SEPA ⇒ SCTI+SEPA). TWFE estimates are taken from the binned event-study specification (REL_TIME_BIN) and applied month-by-month using the contemporaneous treated-group denominator. GSCM implied transactions are computed from the rebased ATT (ATT_rebased), to ensure comparability with TWFE and ITS normalisation at $k = -1$.

Table 5: Implied incremental SCT Inst transactions due to the Instant Payments Regulation (post-Jan 2025, treated aggregate).

In terms of magnitude, the three models deliver effects of comparable order, despite relying on different identifying assumptions. When translated into transaction counts, the implied increase in SCT Inst transactions attributable to the IPR typically lies in the range of approximately 200,000 to around 350,000 additional credit transfers per month in the early post-IPR period, rising further over the course of 2025. The dynamic TWFE event-study specification yields month-to-month variation in the implied effects, reflecting its reliance on within-entity variation net of time fixed effects. The GSCM estimates are similar in level and timing to the TWFE results, while allowing for heterogeneous latent dynamics and non-parallel pre-treatment trends. By contrast, the ITS specification produces a more steeply increasing post-IPR profile, consistent with cumulative deviations from an extrapolated pre-IPR trend in the share of SCT Inst customer credit transfers sent in the total of SCT Inst and SEPA transfers.

Table 6 reports the corresponding post-IPR effects expressed in percentage points, illustrating the monthly increase in the share of SCT Inst customer credit transfers relative to total SEPA and SCT Inst transfers under each model.

Month	**TWFE**	**ITS**	**GSCM**
2025–01	0.78	0.63	0.77
2025–02	0.92	0.80	0.99
2025–03	1.01	1.03	1.09
2025–04	0.83	0.94	0.93
2025–05	0.98	1.13	1.11
2025–06	1.11	1.57	1.29
2025–07	0.68	1.38	1.05
2025–08	1.30	1.63	1.56
2025–09	1.12	2.15	1.87

Notes: Entries report the estimated increase in the share of SCT Inst transactions relative to total SCT Inst and regular SEPA credit transfers, expressed in percentage points. All estimates are normalised to the last pre-IPR period ($k = -1$). TWFE results are based on the binned event-study specification. ITS estimates correspond to deviations from the extrapolated pre-IPR trend for the treated mean. GSCM estimates report the rebased average treatment effect on the treated relative to a synthetic counterfactual.

Table 6: Post-January 2025 impact on SCT Inst share (percentage points)

The GSCM estimates indicate a steadily increasing post-IPR effect on the SCT Inst share, rising from approximately 0.8 percentage points in January 2025 to nearly 1.9 percentage points by September 2025. These magnitudes are close to, and in several months slightly above, the corresponding TWFE estimates, reflecting the ability of the GSCM framework to accommodate heterogeneous adjustment paths while maintaining a comparable normalization. The ITS estimates exhibit a more pronounced increase at longer horizons, consistent with the accumulation of deviations from an extrapolated pre-IPR trend.

The larger implied transaction effects obtained from the ITS specification reflect the cumulative nature of deviations from a linearly extrapolated pre-IPR trend. While the TWFE and GSCM estimates capture discrete percentage-point shifts in the SCT Inst/SEPA reallocation relative to a fixed pre-IPR reference period ($k = -1$), the ITS counterfactual is constructed by extending the estimated pre-IPR trend of the treated-group mean into the post-IPR period. When the post-regulation path exhibits persistent level and slope deviations relative to this extrapolated path, the implied gap between observed outcomes and the counterfactual widens over time. When translated into transaction counts using contemporaneous denominators, this accumulation yields larger implied effects at longer horizons.

Importantly, the timing of the response is informative from a policy perspective. All three models indicate that the increase in SCT Inst credit transfers sent begins immediately in January 2025, coinciding with the entry into force of the IPR, despite the formal deadline for mandatory sending compliance being October 2025. This pattern points to anticipatory adjustment by Luxembourg PSPs rather than a purely deadline-driven response. Such behaviour seems consistent with early operational readiness, reputational considerations, and signalling effects, and highlights how regulation imposed entry-into-force dates and associated operational obligations can influence PSP behaviour well ahead of binding compliance deadlines.

Taken together, the convergence of evidence across TWFE, GSCM, and ITS strengthens the empirical findings. While the monthly evolution of the estimated impact differs across models, as expected given their distinct identifying assumptions, the direction, timing, and magnitude of the effects are consistent. The results provide evidence that the IPR has had a measurable and meaningful impact on the composition of customer credit transfers sent by treated PSPs in Luxembourg prior to the October 2025 deadline. In the case of Luxembourg, this early adjustment reflects an expansion in SCT Inst usage as a share of total credit transfers sent in the months following the Regulation's entry into force.

Figure 9 presents the implied change in the number of SCT Inst transactions attributable to the Instant Payments Regulation (IPR) between January 2025 and October 2025. The results are derived from the dynamic two-way fixed effects (TWFE) event-study specification. The underlying outcome is the share of SCT Inst transactions relative to total SCT Inst and regular SEPA credit transfers estimated with entity and time fixed effects and normalised to the last pre-IPR period ($k = -1$). Implied transaction counts are obtained by multiplying the estimated share effects by the contemporaneous treated-group denominator and aggregated across treated entities.

In the pre-IPR period, the implied transaction effects fluctuate around zero and are generally statistically indistinguishable from zero, notwithstanding some imprecision in the earliest bins due to limited data in the pre-IPR months. This pattern is consistent with the absence of pre-IPR SCT Inst trends and supports the assumption that treated and control entities followed comparable dynamics prior to January 2025.

Following the entry into force of the IPR, the implied effects turn positive and persist throughout the post-IPR horizon. The point estimates indicate a sustained increase in the number of SCTI transactions for treated PSPs, with monthly implied increases on the order of several hundred thousand transactions. While confidence intervals widen at

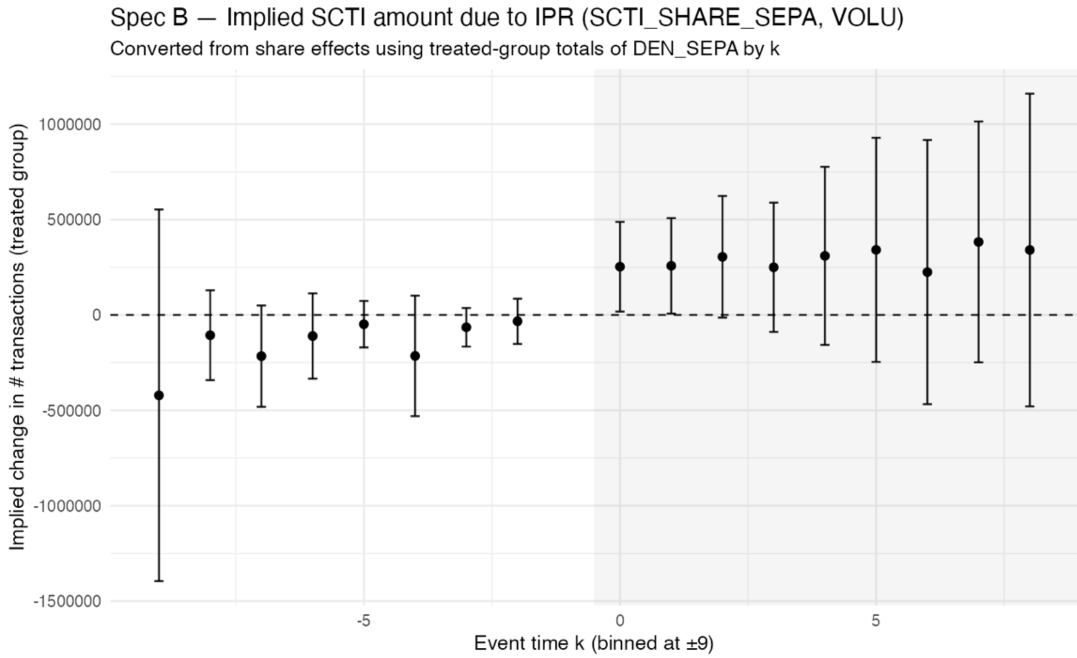

Figure 9: Implied change in the number of SCT Inst transactions derived from Spec B estimates. Share effects are converted using treated-group total number of SEPA and SCT Inst credit transfers by event time. Error bars reflect 95% confidence intervals.

longer horizons—reflecting reduced effective sample size, the post-IPR estimates remain predominantly positive, pointing to a persistent substitution from regular SEPA credit transfers towards SCT Inst transactions.

Figure 10 translates the GSCM share-based estimates into the number of transactions by expressing the estimated average treatment effect on the treated (ATT) in terms of the implied number of additional SCT Inst customer credit transfers sent by treated PSPs. The series is constructed by multiplying the GSCM-implied change in the share of SCT Inst transactions relative to total SCT Inst and SEPA credit transfers by the contemporaneous treated-group transaction denominator. The confidence intervals are also translated in a similar manner as described previously.

In the pre-IPR period, the implied effects fluctuate around zero and are generally small in magnitude, consistent with the absence of anticipatory increases in instant payment usage. From January 2025 onward, the implied effects turn positive and increase progressively over time. The point estimates suggest that there are several hundred thousand additional SCT Inst credit transfers sent transactions per month attributable to the IPR, with confidence intervals widening at longer horizons as the counterfactual projection extends further beyond the pre-treatment period. Overall, Figure 10 illustrates a sustained and meaningful reallocation of customer credit transfers from regular SEPA transfers

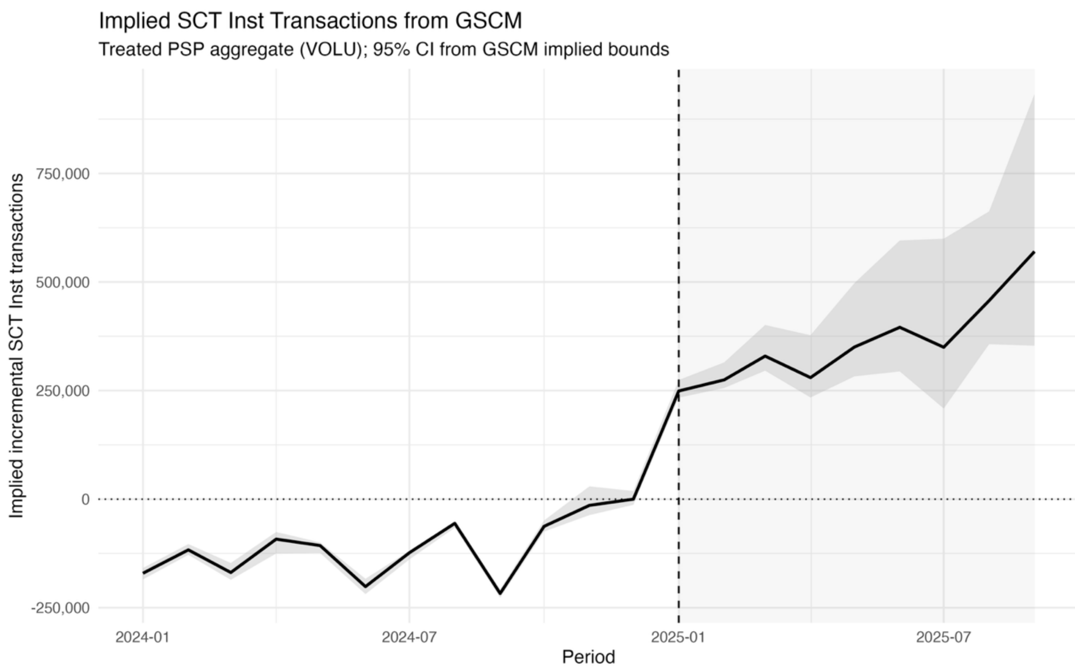

Figure 10: Implied incremental SCT Inst transactions from the Generalized Synthetic Control Method (GSCM). The figure reports the implied change in the number of SCT Inst customer credit transfers sent by treated PSPs, obtained by scaling the GSCM average treatment effect on the treated (ATT) for `SCTI_SHARE_SEPA` with the contemporaneous treated-group transaction denominator. Shaded areas denote 95% confidence intervals derived from the GSCM implied bounds. The vertical dashed line marks the January 2025 entry into force of the Instant Payments Regulation (IPR), and the horizontal dotted line indicates zero.

towards instant payments following the entry into force of the IPR.

Overall, the dynamic TWFE results and GSCM results provide evidence of a measurable increase in SCT Inst usage for sending credit transfers following the January 2025 IPR implementation, with the magnitude of the implied transaction effects rising over the course of 2025. These estimates should be interpreted as incremental effects relative to the pre-IPR baseline and are directly comparable to the corresponding ITS and GSCM results as shown in Table 5.

7 Conclusion

Overall, the combined evidence from the TWFE event study, the Generalised Synthetic Control Method, and complementary analyses points to a reallocation from regular SEPA credit transfers towards SCT Inst transactions in the initial months following the IPR implementation in Luxembourg. The evidence from the different model specifications all exhibit a positive post-January increase in instant customer credit transfers sent, with the clearest statistical significance being concentrated in the early post-IPR months and consistent magnitudes across TWFE and GSCM. The timing of the estimated effects suggests that, at least in Luxembourg, the Regulation seems to have helped foster the adoption of instant payments for customer credit transfers sent.

More specifically, we find that the January 2025 Instant Payments Regulation is associated with a statistically and economically meaningful increase in the share of instant credit transfers sent within the total number of customer credit transfers sent in Luxembourg and, importantly, prior to the October 2025 deadline for sending SCT Inst as a mandatory requirement. Within six months of the policy entering into force, PSPs subject to the IPR — comprising both banks and the postal institution — exhibit an increase in the relative share of instant customer credit transfers sent on the order of around one to two percentage points, depending on the counterfactual construction, relative to the pre-IPR baseline. These effects persist over the first few months, consistent with a structural increase in customer uptake rather than a transitory phenomenon.

More broadly, recent developments at the European level suggest that the effects documented in this paper may extend beyond scheme-level reallocation of customer credit transfers sent. In particular, the growing uptake of European Payments Initiative's (EPI) consumer solution, Wero, may suggest that pan-European payment initiatives can begin to achieve a broad user base once instant credit transfers are widely available as a reliable settlement layer. This evolution seems consistent with the view that universal instant credit transfer reachability lowers coordination frictions for new services. Once a large share of PSPs are reachable on SCT Inst rails, new entrants can build their services without simultaneously having to deal with settlement reachability. In this context, the Instant Payments Regulation may be interpreted not only as accelerating substitution within SEPA credit transfers, but also as an enabling coordination mechanism that reduces entry barriers for pan-European payment services built on common rails, thereby helping to foster competition.

Following the entry into force of the IPR, a reduction in settlement delay in the context of instant payments has been partly achieved through a progressive shift in customers' use of the newly available instant payment option for sending credit transfers. This evolution reflects, in part, Luxembourg PSPs having begun to adapt their infrastructures, procedures, and customer interfaces in response to — *and in advance of* — the IPR imposed sending deadline. In this sense, the Regulation did not merely impose a technical execution requirement, it seems to have altered the baseline for sending credit transfers in Luxembourg.

Taken together, the evidence from the TWFE, GSCM, and complementary analyses suggests that, at least in Luxembourg, the IPR has begun to achieve its intended goal of fostering the use of instant credit transfers within the Luxembourg retail payments landscape. All the evidence in this study suggests that when regulatory mandates align with technological readiness among PSPs settlement delay, quite literally, is “gone in seconds” and well before the final Regulation imposed deadline of October 2025.

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