

# THE IMPACT OF THE 28 APRIL 2025 BLACKOUT ON SPAIN'S PAYMENT SYSTEMS

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### Abstract

This article describes the impact of the 28 April 2025 power blackout in the Iberian Peninsula on both retail and wholesale payment systems, the securities settlement system, the various parties in the payment chain and, in the case of retail payments, the payment instruments and channels used. Retail payment transactions declined sharply, fundamentally as a result of the inability of the underlying commercial or corporate transactions to continue, owing, in turn, to the lack of backup systems. By contrast, Spain's financial infrastructures (especially its payment systems) proved highly resilient and were buttressed by contingency systems that ensured their correct functioning in accordance with the operational continuity requirements set out in the oversight and regulatory frameworks that govern such infrastructures.

**Keywords:** blackout, wholesale payment system, retail payment system, resilience, offline operational backup system, communications, oversight frameworks, payment infrastructures.

## 1 Introduction

On 28 April 2025, the Iberian Peninsula experienced one of the largest power blackouts in its recent history. At 12:33, a sudden drop in electric power automatically cut Spain off from the European power grid, triggering a blackout everywhere in the peninsula, including Portugal, and affecting, albeit to a lesser extent, Andorra and parts of southern France. The power disruption lasted several hours (although its exact duration varied from one geographic area to another) and also affected other essential services such as telecommunications. The outage had an immediate, profound impact on economic activity, testing the resilience of the country's critical infrastructures, including its payment systems, the continuity of which is essential for the economy to perform properly.

In general terms, three key factors account for the blackout's impact on the volume of transactions, especially retail transactions.

The first and most direct was the disruption of the power supply, starting at 12:33 and continuing for several hours, with a gradual, staggered recovery across the country's various territories. In some areas power began to be restored in the late afternoon, whereas in others it was not completely restored until well into the early morning. The outage had an especially strong impact on businesses that depend on equipment requiring a power source. For example, the unavailability of computers, invoicing tools and weighing scales prevented many establishments from remaining open. Activities such as rail transportation, automobile repair, service stations and restaurants were particularly affected, as they could not provide services without electricity.

The second impact was the disruption of communications, the effects of which continued even after power was restored. In numerous areas, connectivity was not re-established until two hours after power had returned, preventing the coordination of production and commercial processes that required an outside connection. The blackout also affected payments, by hindering communication among customers, businesses and financial institutions. Nevertheless, as indicated below, resilience mechanisms were activated, mitigating or eliminating the effect of the outages in some cases.

Lastly, changes were seen in the social habits of retailers and consumers, who reacted to the uncertainty by temporarily closing or by postponing purchases, further reducing the number of transactions during the day.

This article focuses on the blackout's impact on the payments and securities infrastructures supervised by the Banco de España, as well as the underlying transactions processed and settled using those infrastructures.

First we analyse the impact on retail transactions – card payments, cash withdrawals and transfers (ordinary and immediate). We then examine retail transactions, including Iberclear, BME Clearing and TARGET Services, before turning to the regulatory and oversight frameworks applicable to infrastructures in the payments ecosystem. Finally, we conclude with the lessons learned and the next steps to be taken to strengthen the resilience of the payment system overall and thus ensure the continuity of service for users and the smooth operation of the economy.

## 2 Impact of the blackout on retail payments

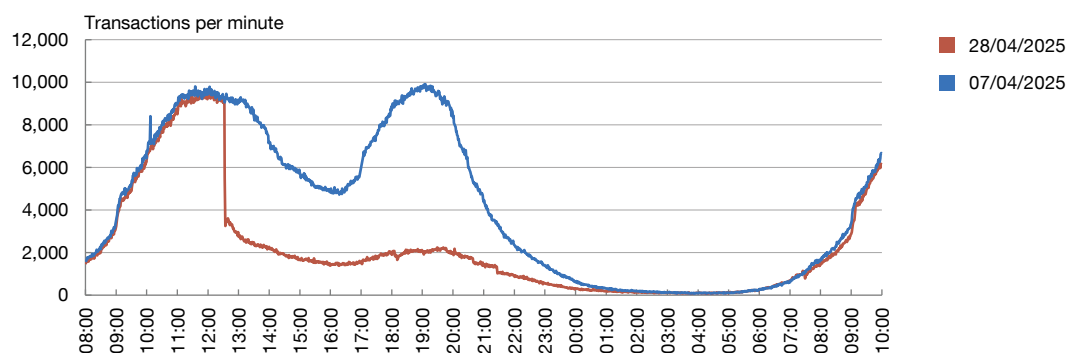
This analysis draws mainly on information from actors and infrastructures under the supervision of Banco de España. It does not include microdata broken down by geographic area or rely on data on the operations of affected sectors (power and telecommunications) not within the remit of the Banco de España. This approach limits the scope of the study.

### 2.1 Card transactions

Sistema de Tarjetas y Medios de Pago (STMP) is responsible for clearing most of the card transactions conducted in Spain, with Redsys and Cecabank as the main processors. The interbank settlement of these transactions takes place the day after the transaction (D+1), mainly through the National Electronic Clearing System (SNCE), which is managed by Iberpay.

Payments and cash withdrawals experienced varying levels of disruption on 28 April. The number of transactions fell by about 55% compared with 7 April (deemed the most comparable

Chart 1

**In-person payment transactions at small retailers (a)**

SOURCE: Redsys.

a Transactions during the day as indicated in the legend (from 8:00) and in the early hours of the next day (until 10:00).

day).<sup>1</sup> The intensity of the decline depended on how the transaction was initiated (in-person purchases, e-commerce transactions and ATM withdrawals) and the type of retailer (the sector of activity and its size and infrastructure). The activity recorded on 7 April is also used as a basis for comparison in this article's charts that analyse card payments – in-person and online – ATM cash withdrawals and Bizum payments<sup>2</sup>.

Chart 1 gives the minute-by-minute change in the number of in-person payments at small retailers on 28 April and in the first hours of 29 April. A comparison with the activity recorded on the reference date shows that such stores experienced much lower activity than they otherwise would have, with declines of more than 80% at the most critical moments of the day. This decline was due in part to the fact that many such establishments (for example, a large number of restaurants) closed.

Moreover, the lack of battery power for payment terminals does not appear to have been a major reason for the reduction in card payment transactions, given that they generally have a longer battery life (approximately 72 hours on standby and 24 under average usage conditions) than the length of this blackout<sup>3</sup>.

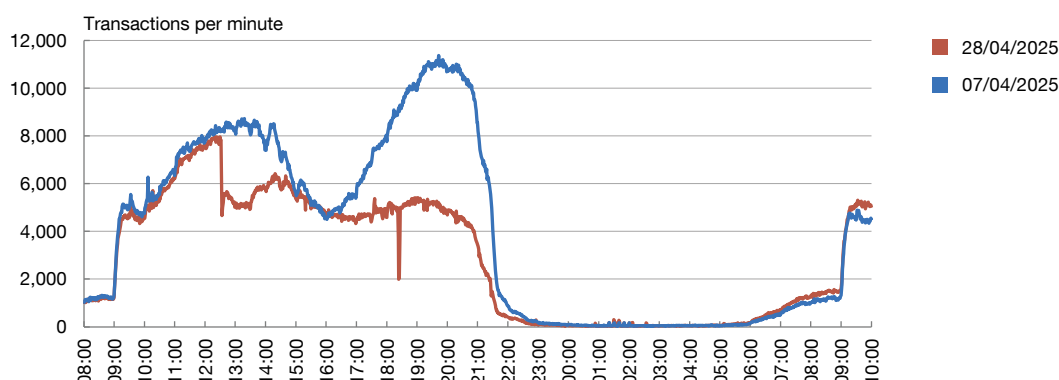
Chart 2 shows the same comparison for transactions at large retailers on the two dates, showing that their activity dropped less sharply. The difference with respect to normal conditions – more pronounced in the late afternoon – likely stemmed more from a contraction in demand or even in supply than from a problem with payment infrastructures, as evidenced by the fact that in the early afternoon there was practically no gap between the number of transactions conducted and the number expected.

1 We selected 7 April 2025 as the reference date because, if not for the blackout, transaction activity on 28 April would likely have been similar to that day – that is, the activity profile observed in the first hours of 28 April, before the blackout, was very similar to that of 7 April. In addition by selecting this date we avoided the distortions associated with Easter Week.

2 The information relating to these transactions – card payments (in-person and online), ATM cash withdrawals and Bizum payments – was provided by Redsys.

3 Source: Redsys.

Chart 2

**In-person payment transactions at large retailers (a)**

SOURCE: Redsys.

a Transactions during the day as indicated in the legend (from 8:00) and in the early hours of the next day (until 10:00).

The better performance of payments operations among large establishments was due, first, to that fact that they more frequently have backup power systems. According to a representative sample of retailers surveyed by the Banco de España, larger establishments within a given sector tended to have generators allowing them to continue operations, whereas small local retailers lacking such capacity had to shutter.

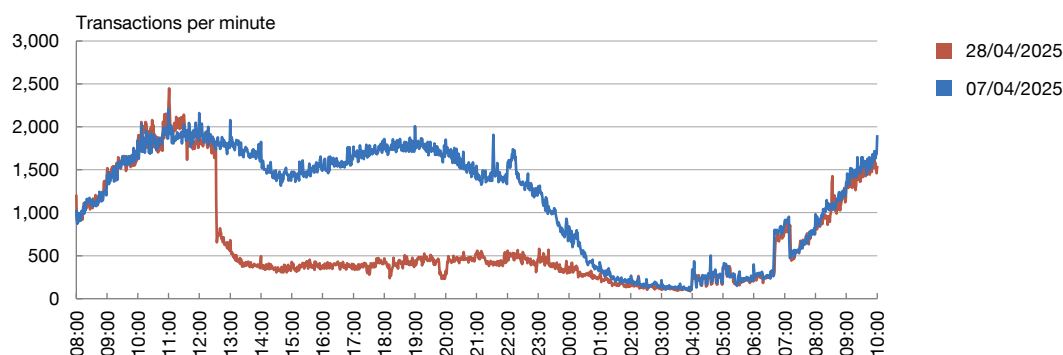
Second, the possibility of authorising transactions offline had an influence. This offline functionality, based on the use of the Europay Mastercard Visa (EMV) standard in payment cards containing a chip – and with enhanced security (chip and PIN) – allows card transactions to be authorised even without a network connection enabling communication between the retailer’s payment service provider (PSP) and that of the customer (purchaser). This technology allows the retailer’s point of sale (POS) terminal to verify the payment instrument’s authenticity – that is, that the card is genuine (not cloned) – and that the correct PIN has been entered. This enables the payment to be made with no need for a network connection. To this end, the issuer must have configured operating parameters in the chip authorising this type of transactions and the maximum permitted amount.

In addition, in some cases stand-alone terminals were available, allowing not only for items to be charged but also for invoices to be issued and posted, ensuring the administrative continuity of a sale. The combinations of contingency measures helped large establishments to largely maintain their operations, and in some cases even to absorb part of the demand from other retailers.

Chart 3 compares e-commerce transactions on the two dates. There was a sharp, sustained decline during the hours that the blackout lasted, because communications had been partially severed and retailers’ servers also experienced a power outage, preventing goods and services from being properly put up for sale.

Chart 3

## Payment transactions in e-commerce (a)



SOURCE: Redsys.

a Transactions during the day as indicated in the legend (from 8:00) and in the early hours of the next day (until 10:00).

As noted, the various business sectors were not affected evenly, with the impact on each sector determined by its degree of reliance on the power grid. Consequently, in sectors highly reliant on the power grid, such as rail transport or food services, the decline was more pronounced.

Table 1 gives the differences in the level of activity between the two dates, by sector and retailer size.

The payment systems and the various actors that make up the payment chain have contingency mechanisms for events such as that of 28 April, in order to ensure uninterrupted operations and mitigate negative impacts on payments. In some cases, these mechanisms made up for, or mitigated the effects of, the widespread lack of power.

For their part, the processors<sup>4</sup> have robust redundancy and contingency systems in order to deal with short episodes such as this one (redundant systems of transaction and communications servers as well as alternative power sources).

The availability of alternative power sources enabled the processors' internal systems to continue operating. There were, however, disruptions in the communications (from external suppliers) needed for the normal conducting of business. Most payments at retailers in Spain are made with cards that have an embedded EMV chip in online mode. As such, a request is sent in real time from the purchasing environment (the retailer's PSP that facilitates the acceptance of card payments) to the issuing bank in order for the customer to be authenticated and for the transaction to be authorised, verifying the available balance and analysing the risk of fraud. This requires having a suitable communications system.

<sup>4</sup> Providers of critical system services that manage and channel payment operations among retailers, PSPs and other payment chain actors.

Table 1  
**Card payment transactions by economic sector**

| €m                                | 28/04/2025 | 07/04/2025 | Change (%) |
|-----------------------------------|------------|------------|------------|
| Large distribution firms and food | 147.0      | 225.0      | -35        |
| Retail trade (a)                  | 45.0       | 148.0      | -69        |
| Other (a)                         | 35.0       | 129.0      | -73        |
| Travel and entertainment (a)      | 28.0       | 64.0       | -56        |
| Restaurants                       | 26.0       | 69.0       | -62        |
| Supermarkets                      | 17.0       | 46.0       | -63        |
| Petrol stations                   | 23.0       | 43.0       | -46        |
| Hotels                            | 19.0       | 32.0       | -41        |
| Passenger transport by railway    | 0.2        | 0.8        | -73        |
| Total (b)                         | 340.2      | 756.8      | -55        |

SOURCE: Redsys.

- a** "Retail trade" includes retail trade, cleaning supplies stores and jewellery shops. "Other" includes hospitals and medical appointments, automotive (sales and repairs), low-cost items, government services, advertising agencies and management companies, State lotteries, tax payments, telephone top-ups and mail and telephone orders. "Travel and entertainment" includes travel agencies, vehicle rentals, casinos and leisure.
- b** Cumulative amount of card payments from 12:00 (noon) until the end of the day.

During the blackout, communications (whether reliant on wired or wireless networks) were affected, although to varying degrees and for different lengths of time. Consequently, in addition to the redundancy of communications providers, some large retailers also resorted to offline functionality, as described above.

Moreover, PSPs that perform acquisition services for retailers and issuance services for card holders also have access to contingency mechanisms and alternative power sources.

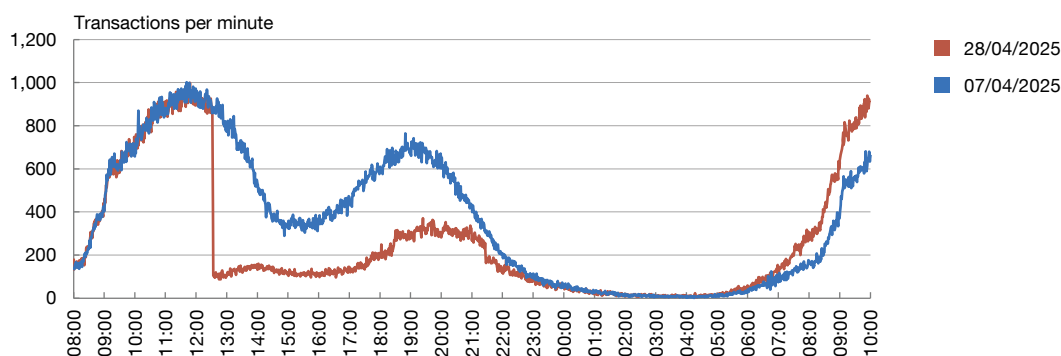
The information analysed leads to various conclusions. First, retailers responded in a variety of ways, depending on their capacity. Some large retailers were able both to maintain their business activity (by having alternative power generation systems, and to successfully initiate their own payment operations), by relying on contingency measures (such as offline operations), in order to overcome a potential communications disruption. Nevertheless, the vast majority of small retailers lack such measures and hence were unable to conduct business operations.

In addition, payments infrastructures and their critical-services providers functioned properly, thanks to their contingency systems, allowing the transactions that took place to be processed, cleared and settled.

## 2.2 ATM cash withdrawals

Cash withdrawals from ATMs are only carried out in online mode, meaning that they cannot take place if communications networks are down. During the blackout, the lack of both power

Chart 4  
ATM cash withdrawals (a)



SOURCE: Redsys.

a Transactions during the day as indicated in the legend (from 8:00) and in the early hours of the next day (until 10:00).

and connectivity prevented most ATMs from working. Only a small share (less than 4%)<sup>5</sup> have an alternative power source<sup>6</sup> and could still be used (if network connectivity was also maintained). Similarly, early on 29 April, once power and communications had been restored across most of the country, there was a noticeable rebound in cash withdrawals at ATMs, likely because cash became more appealing as a contingency payment method and as a precaution against potential further blackouts. Chart 4 compares cash withdrawals on 28 April 2025 with those on 7 April 2025.

## 2.3 SEPA instruments

The SNCE, which is managed by Iberpay, processes and settles account-to-account payments conducted with SEPA instruments (transfers, instant transfers and direct debits)<sup>7</sup> as well as other types of transactions. The SNCE has robust resilience mechanisms in place to ensure operational continuity in the event of disruptions. During the blackout, the SNCE operated normally without service interruptions. However, there were occasional delays at certain times of the day as a result of external incidents affecting the end users' environments,

Although the mobile applications of major Spanish banks remained operational thanks to the backup systems in their corporate headquarters, the widespread lack of connectivity

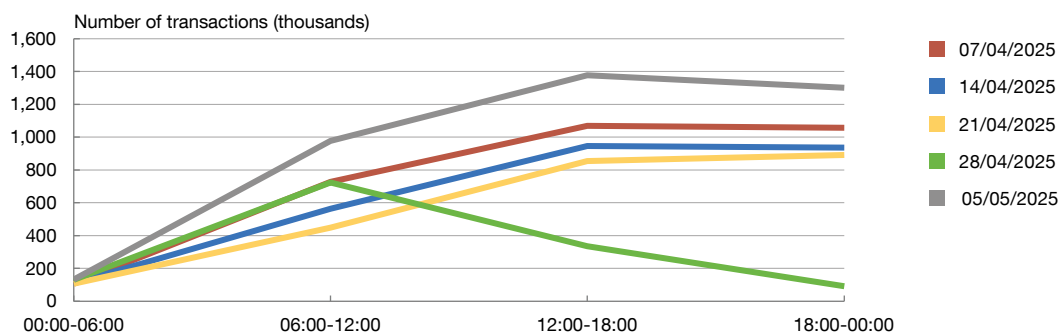
5 The estimated percentage is based on data provided by PSP associations: the Spanish Banking Association, the Spanish Confederation of Savings Banks and the Spanish Association of Credit Cooperatives.

6 According to the information from the main PSP associations, an ATM generally has a limited amount of operating time during an interruption of the external power supply. Most are equipped with an uninterruptible power supply that allows the machine to continue to function for a short time, typically between 10 and 20 minutes. This window is intended to give the ATM time to perform a controlled shutdown, preventing damage from sudden power cuts and protecting it from potential electrical fluctuations. However, there are exceptions: in certain cases, especially at locations with auxiliary generators, ATMs can function without mains power supply for up to 96 hours. Moreover, in very specific scenarios where a continuous fuel supply is guaranteed, some can operate indefinitely.

7 Although not for transactions between customers of the same bank, which are settled internally by that bank.



Chart 5

**Immediate payments settled in the SNCE**

SOURCE: Banco de España using SNCE data.

significantly impacted services requiring real-time interaction. Consequently, customers were unable to access their online banking or mobile applications normally owing to communications and internet outages, often preventing them from initiating transactions that would later have been processed by the SNCE.

Among the subsystems, the greatest impact was observed in the instant transfers subsystem, which operates in real time. This was caused by the user environment for payment services being unavailable owing to connectivity and/or power supply issues. However, late in the afternoon, the blackout's impact reached infrastructure on the back of simultaneous problems with communication channels affecting both primary and alternative providers, hindering the complete recovery of connectivity during that period.

Chart 5 illustrates the decline in the number of instant transfers settled by the SNCE in the course of 28 April compared to activity recorded on nearby and comparable dates.

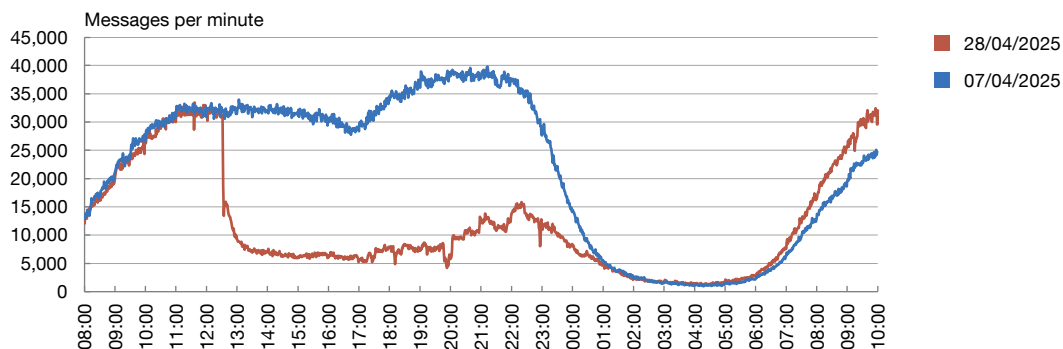
There was no significant drop in the total volume of SEPA ordinary transfers. However, a change in the settlement pattern was noted: on 28 April, 33% of transfers were settled on the same day (D), compared with 20% on average for the month as a whole.

It is important to note that the settlement of SEPA ordinary transfers in the SNCE occurs in six cycles each day: the first three allow for settlement on the same day (D) while the last three settle operations the following day (D+1). Therefore, the greater relative weight of same-day settlement on the day of the blackout could suggest that transactions linked to the later cycles in the day may have experienced some impact, as the blackout began at 12:33, affecting the cycles that settle on D+1, which take place after that time.

### 2.3.1 Bizum payments

Bizum transactions (based on instant transfers) were heavily affected. There was a drop in traffic of over 75%, as shown in Chart 6, which compares the traffic recorded during the

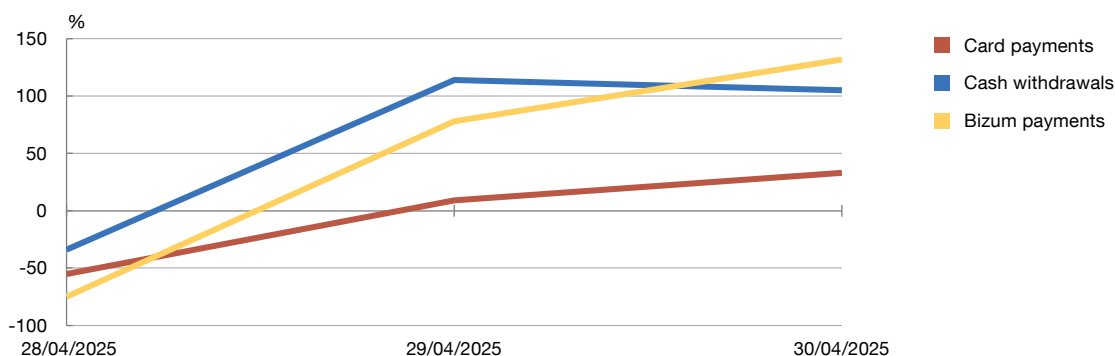
Chart 6  
Bizum payments (a)



SOURCE: Redsys.

a Transactions during the day as indicated in the legend (from 8:00) and in the early hours of the next day (until 10:00).

Chart 7  
Rebound by transaction type



SOURCE: Redsys.

blackout with that expected on an equivalent normal day. Such a sharp fall is mainly down to this payment method being highly dependent on customers' devices, with the loss of connectivity caused by the communications failure preventing transactions from being initiated.

## 2.4 Recovery profile in the following days

Chart 7 shows the daily percentage drop and subsequent recovery for card payments, cash withdrawals and Bizum transactions. Activity on 22 and 23 April 2025 was taken as a benchmark to estimate the scale of the rebound on 29 and 30 April. As with the choice of 7 April as the baseline to estimate the change in transaction activity during the blackout, these dates are considered to have a similar activity profile to what would have been expected for the two days after 28 April under normal conditions, that is, absent the blackout.

As can be seen, there was a very significant fall across all three types of transactions: card payments (-55%), cash withdrawals (-34%) and Bizum payments (-75%). In all cases there was a pick-up in the two subsequent days, probably to meet unmet demand on the day of the blackout: card purchases rose by 9% and 33%, cash withdrawals by 114% and 105% and Bizum transactions by 78% and 132%, respectively. This rebound did not fully offset the fall in card payments, but it did in Bizum activity and particularly so in cash withdrawals.

### 3 Wholesale payment systems and securities settlement systems

Eurosystem TARGET Services (T2, TARGET2-Securities and TARGET Instant Payment Settlement)<sup>8</sup> operated normally throughout the day (Chart 8), with no incidents recorded. It should be borne in mind that the technology platform for TARGET Services is located in Italy and Germany and was, therefore, unaffected. The Banco de España, as the operator of TARGET-BE, activated the contingency mechanisms for such situations. In addition, participating institutions had contingency measures in place at their head offices.<sup>9</sup>

As for financial market infrastructures for securities, Iberclear and BME Clearing also operated without incident during the day thanks to activation of their contingency plans. Iberclear, whose operations are settled on the Eurosystem T2S platform, requested a delay in the platform's delivery-versus-payment settlement closing time as a preventive measure, which did not affect the platform's end-of-day closing time.

### 4 Regulatory and oversight frameworks for financial market infrastructures

In general, the sound performance of financial infrastructures within the payments ecosystem during the blackout is in part explained by the oversight and supervisory frameworks applied to them. These are intended to strengthen the security and efficiency of operations and place a strong focus on operational continuity. Among other things, they include provisions aimed at ensuring that infrastructures have a robust operational risk management framework with suitable systems, policies, procedures and controls to identify, control and manage this type of risk.

From the standpoint of the oversight function, standards apply that are developed by the Eurosystem and draw on international principles relevant to financial market infrastructures.<sup>10</sup> For payment systems, the applicable framework depends on their systemic importance, which is determined by size, relative volume of national and euro area transactions, the significance of their cross-border activity and potential relevance as a node used for settling from other infrastructures.

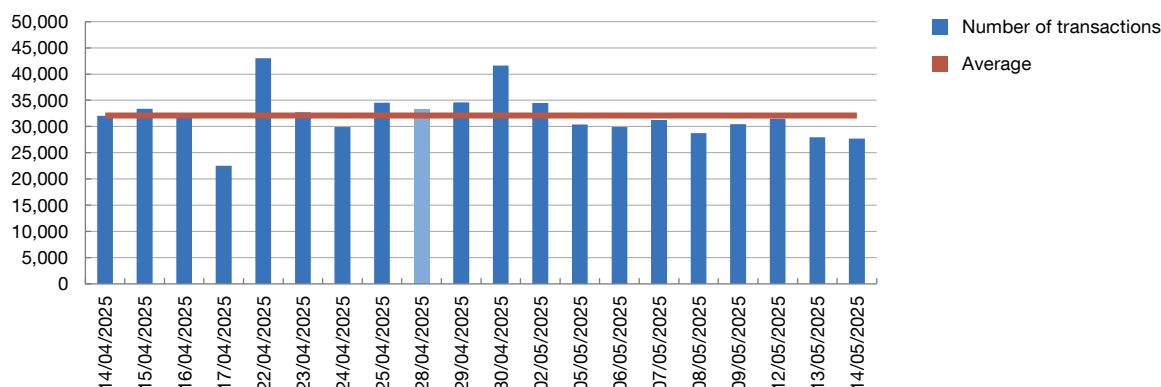
8 T2 is the real-time gross settlement system operated by the Eurosystem. Participants in this service can send and receive payment orders in euro and other currencies, which are processed and settled in central bank money. T2 settles payments related to the Eurosystem's monetary policy operations, as well as interbank and trade transactions. TARGET2-Securities (T2S) is a centralised securities settlement platform. Lastly, TIPS is the platform for settling instant payments in euro and other currencies.

9 Source: Banco de España, TARGET Services.

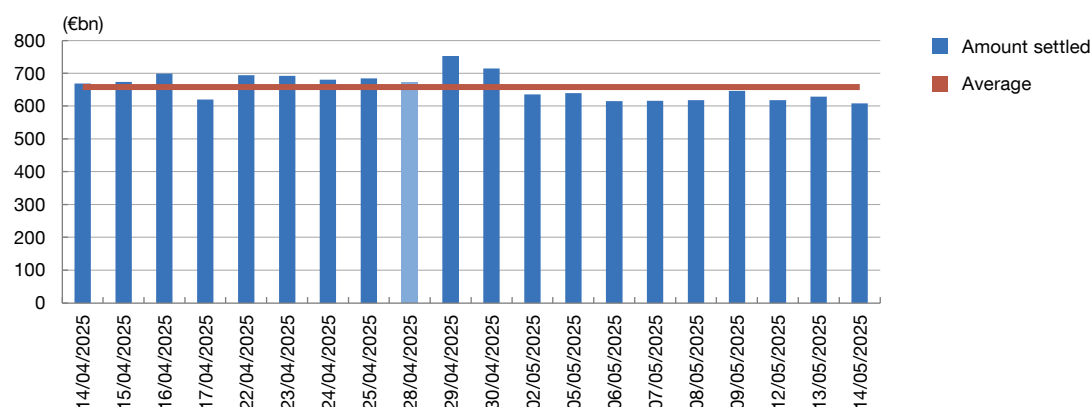
10 See the April 2012 CPSS-IOSCO document "Principles for financial market infrastructures".

Chart 8  
**TARGET-BE transfers**

8.a TARGET-BE transfers



8.b Daily transaction amounts settled in TARGET-BE



SOURCE: Banco de España and TARGET Services.

For payment systems designated as systemically important, Regulation (EU) 2025/1355 of the European Central Bank (ECB) of 2 July 2025 on oversight requirements for systemically important payment systems<sup>11</sup> applies. It was recently approved and updates previous versions to include, among other things, heightened requirements that bolster cyber resilience and manage outsourcing risk. This framework generally applies to TARGET Services. In other words, for systemically important payment systems a prescriptive approach is used, unlike the oversight frameworks applied to other payment systems.

For non-systemically important retail payment systems at the domestic level, the relevant Eurosystem oversight framework applicable to retail payment system<sup>12</sup> has been established. The framework comprises all the standards that must be met by a payment system as a

<sup>11</sup> See Regulation (EU) 2025/1355 of the European Central Bank of 2 July 2025 on oversight requirements for systemically important payment systems (ECB/2025/22).

<sup>12</sup> See ECB document “Revised oversight framework for retail payment systems”.

function of its relative domestic importance. If its market share is 25% or higher of total euro-denominated payments by volume at Member State level, it is classified as a prominently important retail payment system (PIRPS); otherwise, it is designated an other retail payment system (ORPS). In Spain, the SNCE is classified as an ORPS and the system managed by STMP as a PIRPS.

To establish full oversight of all actors in the payment chain, the Eurosystem has developed a framework applicable to payment instruments, arrangements and schemes known as the PISA framework.<sup>13</sup> At present, this framework applies to Bizum, as it is classified as a payment arrangement.

Separately, in Spain there are also domestic regulations that set requirements for the various actors that comprise the payment chain. From the standpoint of operational resilience, Article 4 of Royal Decree-Law 8/2023 of 27 December 2023 is noteworthy, which lays down obligations on the management of information and communication technology risk for operators of payment systems, payment schemes, electronic payment arrangements, payment processors and other technological or technical service providers that offer services in Spain. In particular, such institutions must comply with the obligations laid down in Chapter II of Regulation (EU) 2022/2554 of the European Parliament and of the Council of 14 December 2022.

## 5 Lessons learned and conclusions

The blackout on 28 April 2025 acted as a stress test for the payments ecosystem in Spain.

In general, payments in large retailers were less affected than in small retailers because the latter lacked contingency measures for power supply and communications failures. Cash withdrawals were severely affected because most ATMs did not have alternative power sources.

Although the impact was significant in terms of consumption and retail operations, the resilience of critical infrastructures, thanks to their redundant architecture and the activation of backup mechanisms, demonstrated their capacity for operational continuity.

However, although infrastructures and PSPs have resilience mechanisms required by oversight and regulatory frameworks, it is worth considering whether there is scope for improvement for similar situations or in even more extreme scenarios.

One measure that could be considered is the extension of offline card payment functionality. Its use in Spain is limited and concentrated mainly in some large retailers that possess this capability and activate it during brief communications outages.

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<sup>13</sup> See the November 2021 ECB document “Eurosystem oversight framework for electronic payment instruments, schemes and arrangements”.

However, extending this solution to the retail sector as a whole would require a coordinated strategy among issuers, acquirers, processors and regulators. Such a strategy would require, among other adjustments, adjusting card parameters and establishing a framework that defines activation scenarios, priority sectors and the applicable liability regime. Other European countries, such as Estonia, have made progress in this direction, deeming such functionality to potentially play a key role in payment continuity in emergencies, especially in essential sectors such as food, fuel and pharmaceuticals. In this regard, moving towards broader availability and standardisation of offline operations could constitute a cornerstone of the national payment system resilience strategy.

For large retailers, the sector could consider adopting a code of good practice based on lessons learned to extend and improve some of the measures already used in some cases, such as offline functionality or use of a dual communications carrier with physically separated routing.

To achieve a comprehensive action plan, the same exercise should be carried out with regard to other instruments used in retail payments.

Turning to cash, installing generators in ATMs appears costly and could entail security and logistical risks in crisis situations according to discussions with stakeholders in the sector. An alternative would be to install ATMs in critical locations to provide minimum services in emergencies. To complement these efforts, awareness campaigns could be considered to encourage households to keep a small cash reserve to cover a minimum of expenses during disruptions and to inform them of the importance of having alternative means of payment on hand.

In addition, it is worth reflecting on the advisability of putting measures in place concerning stakeholders other than infrastructure operators, PSPs and retailers, such as communications or energy providers. The experience of the blackout shows that payment system resilience cannot be addressed in isolation. Operational continuity demands a holistic view that considers interdependencies among different participants in the payment chain and in adjacent sectors, as well as coordination and communication mechanisms that make it possible to trigger joint responses in crisis scenarios.

As a result, the Banco de España, as part of its work on the National Payments Committee, which includes representatives of the various actors relevant to payments on both the supply and demand sides, is coordinating consideration of the possibility of promoting measures that strengthen system-wide resilience in crises like the blackout as part of a possible retail payments strategy in Spain. To this end, public-private cooperation is essential as a means of marshalling the efforts of the major stakeholders in the payments ecosystem.

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