EUROPEAN CENTRAL BANK

EUROSYSTEM

A view on recent assessments of digital euro investment costs for the euro area banking sector

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Contents

Executive summary

Over the course of the past year, the banking industry has conducted studies on digital euro investment costs. The European Central Bank (ECB) welcomes the studies – such as those conducted by PricewaterhouseCoopers (PwC), national banking associations and individual banks – and has invited the authors to present their views on potential cost drivers and mitigants.

This note presents a view on those digital euro investment cost studies. The note first documents and emphasises the potential for leveraging synergies and mutualising costs within the payment industry. It then presents the results of an extrapolation analysis based on banking sector estimates adjusted to reflect the digital euro's design. The analysis was conducted with the support of experts from the national central banks, ECB Banking Supervision and external consultancy Roland Berger.

A key finding is that significant cost savings can be achieved by making use of synergies and mutualising costs, which is in line with established practices in the payment industry. This finding also implies that banks would not have to implement the digital euro on a stand-alone basis.

Altogether, the findings suggest that if the potential savings from synergies and cost mutualisation were properly accounted for, the banking industry's own estimates could lie within a range of €4 billion to €5.77 billion in total, or €1 billion to €1.44 billion annually over a four-year period. The costs would thus lie close to the upper boundary estimated by the European Commission in its 2023 impact assessment. In this assessment accompanying the digital euro legislative proposal, the Commission estimated that digital euro investment costs would be between €2.8 billion and €5.4 billion for euro area credit institutions. Based on these extrapolated total figures, digital euro investment costs would also be broadly comparable to those estimated for past initiatives such as the Payment Services Directive (PSD2)[1] and well below those for the Single Euro Payments Area (SEPA). This note deliberately abstracts from "internal" synergies (e.g. reusing existing bank processes like know-your-customer), focusing instead on external synergies and cost mutualisation from outsourcing to central providers or vendors. While internal synergies, identified in Euro Retail Payments Board (ERPB) technical sessions, are expected to materialise they will be further refined in stakeholder discussions. Importantly, this note does not discuss the potential positive impacts of the digital euro on business models, such as compensation mechanisms, the absence of scheme fees, or the opportunities for European bank-led private solutions.

This view on investment costs is provided at the request of co-legislators and is intended as a background for discussions among co-legislators and policymakers on the legislative proposal on the digital euro. It should thus

[1] Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC (OJ L 337, 23.12.2015, p. 35).

support the legislative discussions and help ensure the timely adoption of the legislative proposal.

The Eurosystem also remains open to working with the banking industry towards the shared goal of minimising digital euro investment efforts, reusing existing payment standards and solutions as far as possible, and enabling digital euro standards and solutions to be reused for European payment schemes. This note thus serves a dual purpose. On the one hand it presents a self-contained view on euro area investment costs that takes key factors such as synergies and cost mutualisation into account; on the other hand, it provides a starting point for evidence-driven discussions to ensure these key factors materialise. For this reason, it has been presented in the ERPB to foster a constructive and informed discussion, emphasising the importance of close dialogue with the banking industry as a basis for further reflections.

1 Introduction

This note presents a view on the digital euro investment cost studies conducted by the banking industry. The note (i) assesses and documents the potential for leveraging synergies and mutualising costs in the payment industry, (ii) synthesises available evidence of synergies and cost mutualisation in past and present payment project costs, and (iii) presents the results of a comprehensive investment cost extrapolation analysis. This extrapolation builds on the cost studies conducted by the European banking industry itself and where necessary adjusts the individual estimates made in those studies to reflect the digital euro's design. For the analysis contained in this note, expertise from the national central banks, ECB Banking Supervision and external consultancy Roland Berger was sought.

The analysis points to significant potential for leveraging "external" synergies and cost mutualisation (e.g. making use of a specialised service provider or joining forces to mutualise efforts)[2] **in payment IT developments, in line with market practice in the payment industry. Synergies within banking groups that already rely on a common IT provider and shared governance** – proxied by Institutional Protection Scheme (IPS) membership[3] – **are in a range above 90%** (i.e. the groups' total investments would be less than 10% of stand-alone and isolated investments by individual entities in the group). **Synergies within markets, but outside IPS banking groups, still appear to be significant.** The assessment yields approximate synergy factors for non-IPS banks of, for example, 30% in Germany, 35% in Italy and 30% in France.

While synergies are a key factor contributing to lower investment costs, two other factors also contribute. First, assumptions made in the banking industry's studies – or at least those known to the ECB – are where necessary adjusted to reflect digital euro design decisions. Second, the ECB assessment is based on the euro area bank universe of supervised entities, which better reflects market practices for (payment) IT developments.

The remainder of this note is structured as follows. Section 2 briefly summarises investment cost studies led by the banking sector. Section 3 summarises the main elements of the synergy analysis, which is further elaborated in Annex 1. Section 4 discusses adjustments to banking sector estimates necessary to reflect the digital euro's design. Section 5 describes the data and extrapolation methodology building on the synergy analysis. Section 6 presents results and a sensitivity analysis. Section 7 provides a conclusion.

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2 For ease of readability, the terms "synergies" and "cost mutualisation" are used synonymously throughout the remainder of the note. The assessment also yields one synergy factor capturing both aspects.

3 For information on Institutional Protection Schemes, please refer to the European Parliament ECON Committee's report entitled "Institutional Protection Schemes – What are their differences, strengths, weaknesses, and track records?", March 2022.

2 Available evidence on potential digital euro investment costs

The Eurosystem remains committed to keeping development and potential operational expenses as low as possible, while delivering a digital euro that brings value to consumers and merchants. By reusing existing standards and building on established infrastructures as much as possible, market participants could integrate the digital euro in a cost-effective way. The Rulebook Development Group, in which all stakeholders are represented, is taking this principle into account in its drafting of a single set of rules and standards for the digital euro.

There are inherent limitations to obtaining the comprehensive and granular information required to conduct a precise and exhaustive estimation of the investment costs associated with the digital euro. Achieving such precision would necessitate access to detailed, institution-specific data from individual banks, which is not readily available to the ECB owing to confidentiality constraints and the diversity of banking operations across the euro area. Nonetheless, in recent months the ECB has undertaken significant efforts to gather insights and improve its understanding of the cost implications for banks. These efforts have included engaging in bilateral discussions with a diverse range of banking institutions to explore potential cost drivers and gather qualitative feedback. Additionally, the ECB has initiated dialogues with banks regarding the results of their internal cost assessments, aimed at identifying commonalities and variations in their cost projections.

A study from PricewaterhouseCoopers (PwC), commissioned by the European Credit Sector Agencies (ECSAs)[4], estimated total euro area investment costs of €18 billion based on an extrapolation from a sample of 19 participating banks from nine euro area markets.[5] These costs, spread over a four-year period, were based on different cost estimates for banks in four different size clusters. Investment costs were estimated at €182 million for the largest entities with total assets of more than €1 trillion, at €106 million for large banks with total assets of €100 billion to €1 trillion, at €29 million for medium-sized banks with total assets of €30 billion to €100 billion, and at €9 million for small banks with total assets of less than €30 billion. Total euro area investment cost figures estimated by PwC were derived by multiplying estimates for individual banks in the sample by the number of banks in PwC's own euro area banking universe. Undisclosed synergy factors (i.e. the reduction of estimated investment costs) were applied to partially account for central group-level implementation efforts in PwC's extrapolation to the euro area. Overall, total

4 Composed of the European Banking Federation (EBF), the European Savings and Retail Banking Group (ESBG), and the European Association of Co-operative Banks (EACB).

5 See PWC's "Digital Euro Cost Study", June 2025. The study was based on the digital euro scheme rulebook version 0.8a and assessed the digital euro's impact in a model consisting of three layers: commercial, technical and operational. The offline digital euro and any market synergies were not considered.

investment cost figures appear substantially higher than those quoted by other industry-led studies for individual markets.

Although the PwC study is the only study published to date, the ECB also invited authors of undisclosed banking sector studies and individual bank studies to take part in discussions. The insights gained through these discussions, in particular into undisclosed sector-wide studies, have also been factored into this note. Specifically, these insights offer a more comprehensive and reliable view of the potential cost implications, enable a better understanding of cost structures and allow for the incorporation of these findings into the broader analytical framework presented in this note.

3 Accounting for synergies and cost mutualisation

Today, banks rely to a significant extent on shared solutions in service bundles such as payment channels and accounts, as well as in compliance and operational support. In many markets, national providers and collaborative initiatives that provide common infrastructures also contribute to these shared solutions. The presence of vendors serving multiple institutions across national borders further supports the potential for scaling solutions beyond domestic markets.

In order to reduce the investments needed for the digital euro, banks may thus pursue synergies or cost mutualisation by relying on those shared solutions. The ECB and market stakeholders also acknowledged the importance of synergies and cost mutualisation as part of the "digital euro as a service" offering in the context of the ERPB workstream on the fit of the digital euro.[6]

This analysis aims to quantify potential synergies in the implementation of the digital euro across the euro area banking sector by examining the current set-up of (payment) IT infrastructure. In doing so, it focuses on identifying where banks and payment service providers could reduce individual investment needs by leveraging shared infrastructures, common providers or group-wide solutions. Given the scale of the expected investments, the extent of achievable synergies is a decisive factor for establishing a realistic cost estimate across the euro area. The analysis draws on a combination of structured modelling, expert interviews, vendor assessments and country-specific deep dives into outsourcing patterns. It provides a consolidated view of how synergies vary across markets and service bundles, and how they could materially reduce the overall cost of implementation.

The analysis distinguishes between banking group synergies and market synergies. Banking group synergies capture efficiencies within established integrated groups (e.g. savings banks and cooperative banks) that already share IT and operational platforms (such as Finanz Informatik or Atruvia for German savings and cooperative banks).[7] For the analysis, IPS banks are used as a proxy for integrated banking groups, as they represent a clearly defined set of institutions with common governance and operational ties.

Market synergies, by contrast, measure the potential for cost savings through shared solutions and reliance on common vendors across otherwise independent banks in a given country.[8] For example, major (technical) IT and payment services providers

6 See the ECB presentation entitled "ERPB engagement on digital euro fit in the payment ecosystem", February 2025.

7 Other examples include Erste Digital as provider for savings banks in Austria, RAITEC as provider for Raiffeisen banks in Austria and Rural Servicios Informáticos for Caja Rurals in Spain.

8 This note takes no position on the competitiveness of the IT development market, which boasts few large European or global players. Many domestic markets also have bank-owned vendors, which further alleviates any concerns of potential market power abuse.

are likely to offer services around the digital euro to several banks. In some countries, banks also jointly own technical service providers that may offer the digital euro services centrally (e.g. Bank-Verlag owned by the association of German private banks).

Outsourcing to shared service providers is very common across all European markets for both card issuing and account-to-account (A2A) solutions.[9] In the case of card issuing, most banks either outsource the transaction processing and connectivity infrastructure to established processors, while maintaining the relationship with the customers and the schemes in-house, or outsource the card business entirely to established issuers (e.g. Nexi or Worldline). In the latter model, the bank acts as distributor on behalf of the issuer. Similarly, in most markets A2A solutions have been developed by means of an interbank joint venture (e.g. Bizum), where a central provider handles the IBAN-alias directories, messaging infrastructure and authorisation switch, while banks remain responsible for the transaction clearing and settlement via traditional SEPA (now mostly SCTInst) rails.

This note deliberately abstracts from "internal" synergies[10] stemming from the reuse of existing bank processes, e.g. for know-your-customer, account opening/closing or anti-money laundering purposes. Those have already been identified as key to containing investment costs, particularly in engagements with market stakeholders through the ERPB technical sessions on the digital euro. Consequently, the ECB has also invited the authors of the relevant studies to take part in dedicated discussions on how to reflect the internal synergies in the banking sector's estimations. Further refinements in this regard would be likely to result in more accurate and still lower total investment cost estimates.

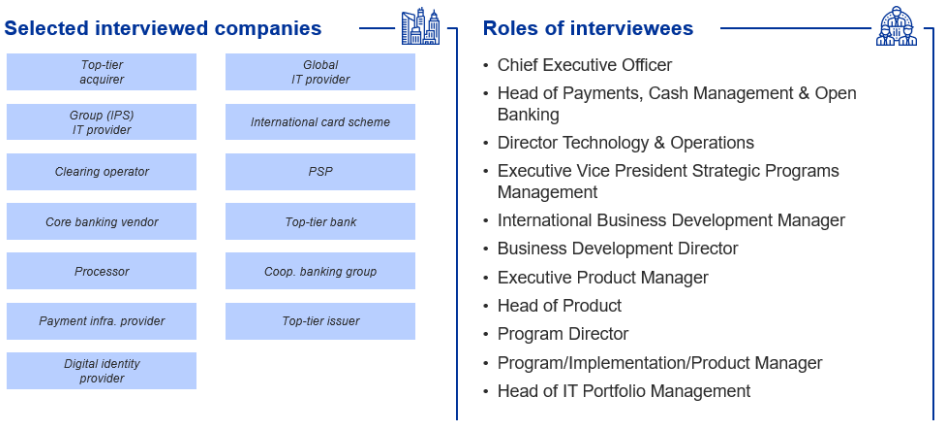
3.1 Methodology and analytical framework

The analysis of cost synergies combines quantitative modelling with qualitative market insights. The starting point is a structured assessment of potential savings that can be achieved through banking group arrangements and through market-wide outsourcing. This modelling is based on publicly available data, Eurosystem statistics and a transparent set of assumptions. To complement and validate the quantitative results, the analysis also draws on insights from more than 20 expert interviews with industry representatives (conducted anonymously via Roland Berger) in managerial roles and extensive professional experience at banks, vendors and market associations across the euro area (Figure 1).

9 Outsourcing has become ubiquitous in many areas of banking; see also the ECB Banking Supervision report entitled "Outsourcing register – Annual horizontal analysis", published in February 2024.

10 In this analysis, the synergy factors are applied consistently to the overall PwC implementation costs, covering the technical, operational, and commercial layers without differentiating between IT-related costs and process or organisational cost components.

Figure 1
Companies and profiles of interviewed experts



3.1.1 Banking group synergies

Synergies are expected to arise within banking groups[11] based on the following rationale.

- If every bank within a group were to implement the digital euro separately, total costs would be the sum of many parallel (i.e. redundant) projects.
- If the group instead develops a common solution or relies on a shared vendor, the effort is carried out once and the solution is reused by all members, avoiding duplication and lowering the overall costs. This model is well established in the industry and already applied in many areas, for example through joint platforms for payments or the use of common core banking systems by banking groups (e.g. Atruvia acting as joint IT provider for German cooperative banks).

The potential savings are measured by comparing:

- **stand-alone costs** – calculated by allocating the PwC size cluster costs individually to each member institution; and
- **group-wide costs** – estimated by allocating the respective PwC size cluster costs to the hypothetical consolidated asset base of the group as a whole.

For example, the German Savings Banks Finance Group (Deutscher Sparkassen- und Giroverband –DSGV) comprises more than 350 local savings banks. If each of these institutions were to implement the digital euro independently, the total cost

[11] As described above, for the purpose of this analysis, Institutional Protection Schemes (IPSs) formally recognised under Article 113(7) of the Capital Requirements Regulation (CRR) have been used as a proxy for banking groups, as they constitute a clearly defined set of institutions bound by common governance and strong operational ties.

would be the sum of all individual estimates. By contrast, a group-wide implementation aligned with the aggregated asset base results in a single consolidated cost. The difference between the two outcomes represents the group synergy. This assessment is supported by external reference points, e.g. the publicly reported DSGV investment cost of around €200 million.[12]

Banking group synergies are expected to be substantial. Ultimately, the exact level depends on how effectively implementation can be coordinated and delivered at group level, an aspect that is further considered in the scenario framework described below.

In the context of the PwC study, there are two reasons why this approach does not lead to double counting of banking group synergies. First, while PwC accounts for banking group synergies in the euro area extrapolation, the estimated costs per size cluster are averaged from only the 19 participating banks and banking groups. The ECB extrapolation builds on these estimates prior to any synergies. Second, the methodology applied to banking group synergies effectively places a floor on estimated investment costs at the level of a hypothetical consolidated group. For example, the DSGV and the National Association of German Cooperative Banks (Bundesverband der Deutschen Volksbanken und Raiffeisenbanken – BVR) – large banks if considered as a consolidated group – would both be estimated at €182 million according to PwC. However, no further synergies would be applied in the extrapolation to the euro area.

3.1.2 Market synergies

Market synergies arise from cost savings achieved through shared outsourcing and the use of systemic vendors. These synergies occur when multiple banks rely on the same external provider instead of developing separate solutions in-house. The extent of market synergies differs across countries and depends on several structural factors (see Table 1 below).

Table 1
Assessment dimension factors

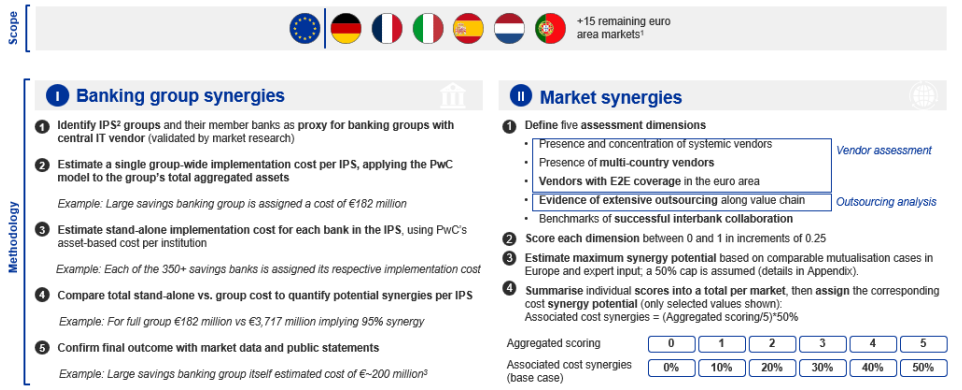
Assessment dimension		Description
Vendor assessment	Vendor concentration	Extent to which a small number of systemic providers cover most of the market
	Presence of multi-country vendors	Availability of providers capable of serving banks across several euro area markets
	End-to-end vendor coverage	Breadth of services offered across the full range of digital euro service bundles
Outsourcing level		Degree to which banks in the market already rely on external providers
History of collaboration		Evidence of past successful interbank cooperation (e.g. shared infrastructure, joint ventures)

[12] See the article in “Handelsblatt” entitled “Das kostet der digitale Euro die Sparkassen”, July 2024 (available in German only).

With the exception of the outsourcing level, each factor is given a score on a five-point scale (high, medium-high, medium, medium-low, low), corresponding to numerical values of 1, 0.75, 0.5, 0.25 and 0. The score for the level of outsourcing is derived separately from a quantitative assessment of market data on real outsourcing practices. Factor scores are added up to make an aggregate score for each euro area market, which is then converted into a single percentage estimate by applying an empirical ceiling of 50%. As a result, the cost synergy potential is equal to 50% × (aggregate score ÷ 5), with the result rounded to the nearest 5 percentage points. Figure 2 summarises the approach for banking group and market synergies.

Figure 2

Summary of banking group and market synergies methodology



1) Including Bulgaria; countries are ordered by payment volumes for retail transactions, derived from ECB data, the SPACE report breakdown and Roland Berger's market assumptions; 2) Institutional Protection Schemes (IPS) under CRR Art. 113(7) defines a contractual or statutory liability arrangement among banks designed to protect the member institutions; 3) Including offline digital euro part, not considered in PwC study.

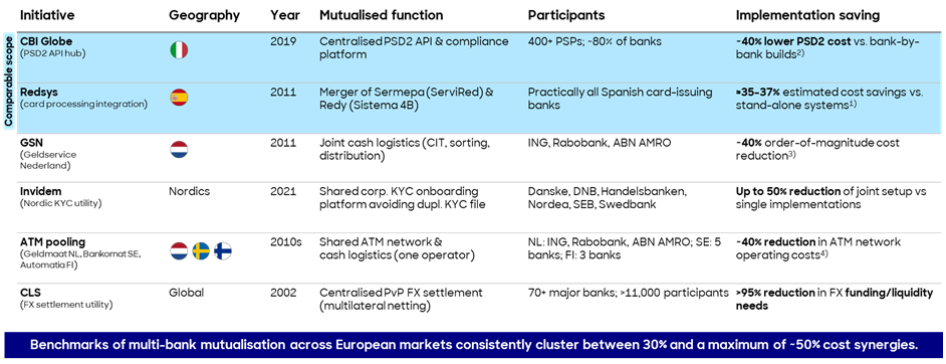
This approach translates heterogeneous vendor landscapes and collaboration practices into a structured comparative framework across euro area markets.

The upper bound of 50% for market synergies is based on market benchmarks (Figure 3) and consultations with market experts. In multi-bank projects where institutions are independent (i.e. not on a single group platform), savings typically level off at about half of what separate bank-by-bank builds would cost. This is because each bank still has activities that cannot be outsourced without major redesign, for example posting to the core ledger, handling customer data, accounting, treasury/liquidity and institution-specific controls.[13]

13 One example supporting this ceiling can be found in the Italian market, where the CBI Globe platform cut PSD2 compliance costs by roughly 40% compared with bank-by-bank solutions thanks to shared connectivity and certification artefacts. See the Roland Berger report from November 2019 entitled "Adapt or die? Why PSD2 has so far failed"; and the IBM MediaCenter news item entitled "CBI Globe expands the integration and efficiency of Italy's payments market." Another example can be found in the Spanish market, where the centralisation of card issuing and processing in Redsys allowed banks to benefit from a common infrastructure, resulting in estimated cost savings of around 35-37% compared with stand-alone systems, owing to recurring synergies of €36.7 million per year compared with an estimated pre-merger cost base of €100 million (see CNMC report, available in Spanish only).

Figure 3

Benchmark of bank mutualisation initiatives across European markets



	Initiative	Geography	Year	Mutualised function	Participants	Implementation saving
Comparable scope	**CBI Globe** (PSD2 API hub)		2019	Centralised PSD2 API & compliance platform	400+ PSPs; ~80% of banks	**~40% lower PSD2 cost** vs. bank-by-bank builds[2]
Comparable scope	**Redsys** (card processing integration)		2011	Merger of Sermepa (ServiRed) & Redy (Sistema 4B)	Practically all Spanish card-issuing banks	**~35-37%** estimated cost savings vs. stand-alone systems[1]
	GSN (Geldservice Nederland)		2011	Joint cash logistics (CIT, sorting, distribution)	ING, Rabobank, ABN AMRO	**~40%** order-of-magnitude cost reduction[3]
	Invidem (Nordic KYC utility)	Nordics	2021	Shared corp. KYC onboarding platform avoiding dupl. KYC file	Danske, DNB, Handelsbanken, Nordea, SEB, Swedbank	**Up to 50% reduction** of joint setup vs single implementations
	ATM pooling (Geldmaat NL, Bankomat SE, Automatia FI)		2010s	Shared ATM network & cash logistics (one operator)	NL: ING, Rabobank, ABN AMRO; SE: 5 banks; FI: 3 banks	**~40% reduction** in ATM network operating costs[4]
	CLS (FX settlement utility)	Global	2002	Centralised PvP FX settlement (multilateral netting)	70+ major banks; >11,000 participants	**>95% reduction** in FX **funding/liquidity needs**

Benchmarks of multi-bank mutualisation across European markets consistently cluster between 30% and a maximum of ~50% cost synergies.

1) €36.7 million annual recurring synergies vs estimated €~100 million pre-merger cost base; 2) Approx. €185 million industry saving; 3) €~35 million saved in first year; 4) E.g., in NL from ~6,400 to ~3,800 ATMs; in SE from ~2,700 to ~1,200.
Sources: FinTech Futures, State of Play in Response to PSD2 in Italy's Banking Sector (2019), Capgemini FS Insights (2020), Global Trade Review, Banks sign up to SWIFT's KYC Registry (2017), BIS Quarterly Review (2015), EPC Paper (2021); Betaalvereniging NL (2020), ACM (Autoriteit Consument & Markt) press; de Volkskrant; DNB MOB report, CNMC findings on Redsys synergies.

The average euro area synergy factor is calculated by weighting each country's individual factor according to the country's share in total euro area retail payment volumes.[14] This approach ensures that both large and small markets are reflected proportionally in the euro area average, while still recognising country-specific characteristics such as reliance on national infrastructure. Overall, the market synergy factors provide a structured and comparable way to quantify cost savings for banks outside IPS structures.

3.1.3 Scenario framework

The analysis applies a scenario framework that distinguishes between low, base and high synergies cases for both IPS banking group synergies and market synergies.

Base synergies case

- A1. **Banking group synergies:** 90-98%, representing the expected range when implementation is coordinated effectively across groups.
- A2. **Average market synergy factor:** 30%, result of the structured scoring across the five assessment dimensions, weighted by retail payments volumes.

Low synergies case

- **Banking group synergies:** 72-78%, reflecting the fact that the synergy factors from the base case are reduced by 20 percentage points to account for challenges in rolling out a central solution across all group members.

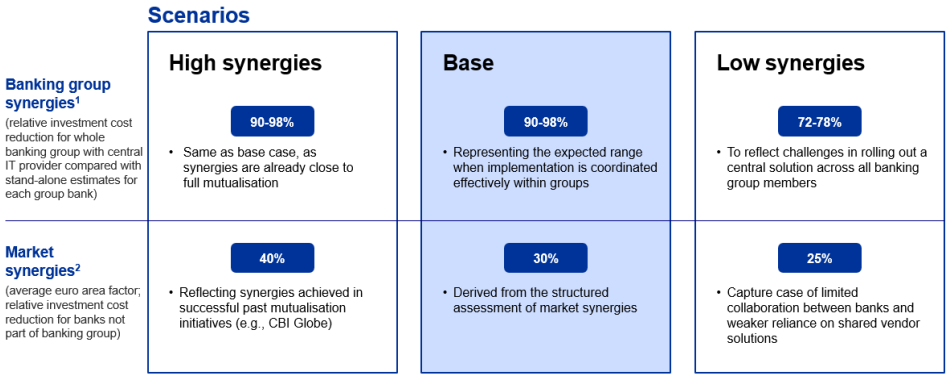
[14] Payment volumes for retail transactions only, based on ECB data, the breakdown given in the ECB's study on the payment attitudes of consumers in the euro area (SPACE) and Roland Berger's market assumptions.

- **Average market synergy factor:** 25%, reduced compared with base case to reflect the risk of limited collaboration between banks and weaker reliance on shared vendors.

High synergies case

- **Banking group synergies:** 90-98%, maintained at base synergies case levels as synergies are already close to full synergy potential.
- **Average market synergy factor:** 40%, aligned with successful past co-development initiatives (e.g. CBI Globe).

Figure 4
Synergy scenarios of sensitivity analysis



1) E.g., leveraging a single IT vendor serving an entire group, reducing duplication of effort and costs. Proxied by Institutional Protection Scheme membership; 2) E.g., outsourcing to external, systemic/shared vendors and utilities, covering multiple Cis.

3.2 Key results

3.2.1 Banking group synergies

First, banking groups recognised as IPS are evaluated, given that in these set-ups a central IT provider serves a network of member institutions under binding governance and mutual support arrangements. This structure enables a "build once, deploy to many" approach: one integration at the central provider can be rolled out uniformly to members, supported by agile release trains, alongside common controls and pooled operations. Synergy potentials were derived using size-based benchmarks from the PwC study that relate a bank's assets to an expected implementation cost. Applied to the banking groups in scope, this approach yields an indicative average synergy factor per group of about 95%. This order of magnitude for possible banking group synergies has been validated with industry experts.

To reflect uncertainties in group-wide implementation, the analysis also adjusts the banking group synergy factors across scenarios. In the low synergies case, the synergy factors from the base case are reduced by 20 percentage points to

account for challenges in coordinating and rolling out a single solution across many IPS members. This reduces effective synergy factors to a range of 72-78%, depending on group size and structure. By contrast, in the high synergies case, the assumptions remain unchanged compared with the base synergies case, as banking group-wide synergies or cost mutualisation are already close to full potential.

3.2.2 Market synergies

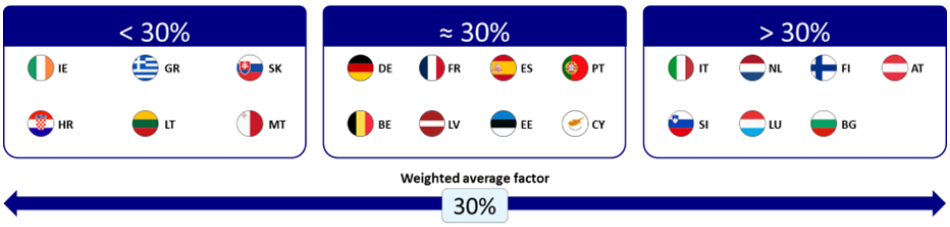
Market synergies capture the potential cost savings for banks outside IPS groups that arise when services are shared through external providers or market-wide infrastructures. These synergies are a function of how concentrated the vendor landscape is, the extent to which providers operate across borders, whether they offer end-to-end coverage, the extent to which banks already outsource and the history of collaboration in a given market. Annex 1 provides detailed information, and an assessment of the different dimensions identified above, i.e. (1) the vendor assessment consisting of (i) vendor concentration, (ii) the presence of multi-country vendors, and (iii) end-to-end vendor coverage; (2) the outsourcing level; (3) the history of collaboration; and (4) exemplary synergies opportunities in the context of the digital euro.

Synergies within markets, but outside banking groups, are still sizeable. The assessment yields approximate synergy factors, i.e. a percentage reduction in the cost of digital euro investments for non-IPS banks within a country of, for example, 30% in Germany, 35% in Italy and 30% in France.[15] The weighted euro area average stands at 30% for market synergies, while market synergy potential differs by country. Out of the 21 countries analysed, six countries show potential below 30%, reflecting more fragmented vendor landscapes, lower outsourcing levels or weaker bank collaboration practices. A second cluster of eight countries is situated around the 30% range, representing medium levels of vendor synergies and shared infrastructures. Finally, seven countries demonstrate higher potential of 35-40%, supported by more concentrated vendor environments and collaborative initiatives that provide common infrastructures. An overview of these clusters is provided in Figure 5 below. Overall, there appear to be clear opportunities to achieve material synergies or cost mutualisation if implementation builds on existing vendor concentration, service bundle outsourcing and collaborative arrangements.

[15] Banking group synergies, proxied by IPS membership, are assumed to take precedence over market synergies. This approach ensures synergies are not counted twice. For example, the German savings banks' provider Finanz Informatik cannot be assumed to provide services to non-savings banks.

Figure 5

Synergy factor clusters



4 Adjustments to PwC's base estimates to correct for design assumptions

Unadjusted cost estimates per size cluster serve as a basis for conservative extrapolation results. However, to accurately reflect the current digital euro design, these estimates and underlying assumptions are validated and adjusted as necessary. PwC shows a breakdown of average costs per "payment layer" and "service bundle" for an average bank amounting to €124 million (see PwC study, page 25). This breakdown is taken as the basis for adjusting estimates as follows.

- **Physical cards, -€6.0 million:** Costs for physical card issuing infrastructure development are stated at €6 million (for the online digital euro only). The card form factor for the digital euro will not differ from that of cards in circulation today. PSPs in scope already have card issuing capabilities in place, and the physical card issuing infrastructure is mostly handled by specialised external providers (see also Annex 1). A reduction is therefore made to the full cost estimate for physical cards.

- **Point-of-sale terminals, -€7.0 million:** Costs for point-of-sale (POS) terminals are estimated at €10 million. This estimate is based on the assumption that the digital euro would require a complete hardware replacement. However, hardware replacements may only be necessary for older terminals. Only legacy chip & PIN terminals would require physical kernel updates or complete replacement. Most of these will already have been phased out within five years owing to lifecycle expiry. Terminals are also replaced in multi-year cycles:[16] the average lifecycle of a POS terminal is 5-7 years. By the time of a potential digital euro launch, a significant share of the POS fleet will have been naturally replaced, reducing incremental costs substantially. Lastly, a shift from traditional to smart POS and Soft POS devices is anticipated. The number of traditional chip & PIN terminals could decline at a compound annual growth rate (CAGR) of around -5%, while the number of smart POS and Soft POS terminals could grow at a CAGR of 15%. By 2030, traditional devices are expected to represent only around 30% of the total POS stock.[17] Mobile/portable POS units in Europe could also to grow at a CAGR of around 13.4% through 2030, outpacing fixed terminals.[18] These newer devices natively support NFC and QR code functionality and can typically be updated via remote software/firmware upgrades, avoiding costly physical changes. As a result, a 70% downward cost adjustment is applied, consistent with the natural refresh cycle of POS

[16] See, for example, "What Is the Average Lifespan of a POS Terminal?" on the ZCS website.

[17] See, for example, the webinar on the website of the Digital Innovation Observatories of the School of Management of the Politecnico di Milano (available in Italian only).

[18] See, for example, "Europe POS Terminal Market Size & Share Analysis - Growth Trends and Forecast (2025- 2030)" on the Mordor Intelligence website.

devices and the structural shift towards upgradable smart POS and Soft POS solutions.

- **ATMs, -€5.1 million:** Estimated costs for ATMs of €9 million assume significant investments for ATM replacements to accommodate NFC and QR code functionality. However, QR code functionality may not require complete ATM replacement, and newer ATMs replacing older machines phased out in natural cycles, for instance, can already support NFC. For example, as early as 2021, around 25% of western European and around 50% of eastern European ATMs already supported NFC/QR functionality.[19] This only leaves a limited need for upgrades. In addition, strict requirements on ATM functionalities are not envisaged,[20] so functionality could be upgraded gradually without the need for large-scale ATM replacements. Lastly, around 20% of ATMs in 2025 are expected to be managed by independent ATM deployers (IADs) as they are outsourced to providers such as Nexi or SIBS Multibanco, or owned by shared utilities (e.g. Geldmaat and Batopin), further reducing direct costs for individual banks (see also Annex 1). ATM upgrade costs are therefore discounted by around 57% overall, reflecting a combination of (i) the trend in the supply of bank-owned ATMs within the next five years (i.e. a reduced bank-owned ATM fleet), taking into account the trend for outsourcing to IADs and utilities, and (ii) the existing presence of NFC/QR-enabled ATMs.

- **Fee calculation component, -€2.0 million:** Costs for fee calculations of €2 million are taken out of the operational layer costs, as the Eurosystem will perform this task (and cover related costs).

Overall, average investment costs are reduced by around 16% (equal to €20.1 million of the total €124 million). **In sum, downward-adjusted investment costs per size cluster are: €152 million for top banks** with total assets or more than €1 trillion, **€89 million for large banks** with total assets of €100 billion to €1 trillion, **€24 million for medium-sized banks** with total assets of €30 billion to €100 billion, and **€8 million for small banks** with total assets of less than €30 billion, spread over a four-year period. Since PwC does not consider the costs of a dedicated offline digital euro in its assessment, these costs are also left out of the ECB's extrapolation.[21] A preliminary cost estimate of dedicated offline functionality is being prepared and could be validated once procurement processes are concluded. Currently, the offline digital euro is expected to leverage on the online digital euro to a large extent. The add-on cost of the offline digital euro is therefore likely to be limited.

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19 See, for example, the SIX Group report on contactless ATM transactions.

20 See also slide 30 of the ECB presentation entitled "ERPB engagement on digital euro fit in the payment ecosystem", February 2025.

21 While PwC indicates that the costs of the offline digital euro cannot be quantified reliably, the PwC study nonetheless presents offline costs in an extreme scenario without providing a verifiable methodology.

5 Data and methodology used to extrapolate cost estimates to the euro area banking sector

The extrapolation of existing banking sector cost estimates is based on a euro area banking universe of 2025 individual entities, 115 of which are significant institutions (SIs) and 1,910 of which are less significant institutions (LSIs).[22] Where applicable, banks are considered at consolidated level.[23] This bank universe thus differs from that of PwC, which included unconsolidated entities. This approach reflects the fact that consolidated banks would generally not pursue separate digital euro developments for each subsidiary.[24] While not all consolidated banking groups may have the capabilities to "develop once, deploy to many" yet, efforts are being made to achieve such capabilities. In addition, digital euro requirements would be known well ahead of any issuance date and those requirements would apply uniformly to all euro area banks, facilitating efficient development within consolidated banks. Adding to the conservativeness of the extrapolation, the estimated investment costs of consolidated banks also tend to be larger on average owing to a higher level of total assets at consolidated level.

Supervisory bank data on participation in Institutional Protection Schemes (IPSs) is used as a proxy for reliance on intragroup IT providers. In total, 294 entities are part of the Austrian cooperative bank IPS, 694 entities are part of the German cooperative bank IPS, 361 entities are part of the German savings bank IPS, 31 entities are part of the Spanish cooperative bank IPS, and 40 entities are part of the Italian cooperative bank IPS. Austrian savings banks are consolidated under Erste Group Bank AG.[25]

Only payment service providers (PSPs) that are mandated to distribute and provide digital euro services in accordance with the draft legislation – and are therefore required to make necessary investments – fall within the scope of the extrapolation exercise. Only credit institutions (CIs) with a retail (payment) business are considered, as only these CIs would be obliged to offer digital euro under the draft regulation.[26] CIs without sight deposits (e.g. investment banks such as Morgan

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22 This euro area banking universe is identical to the banking universe considered in the Eurosystem's work on the methodology used to calibrate digital euro holding limits.

23 All supervised banks in the euro area are listed publicly; see the list of supervised entities on the ECB Banking Supervision website.

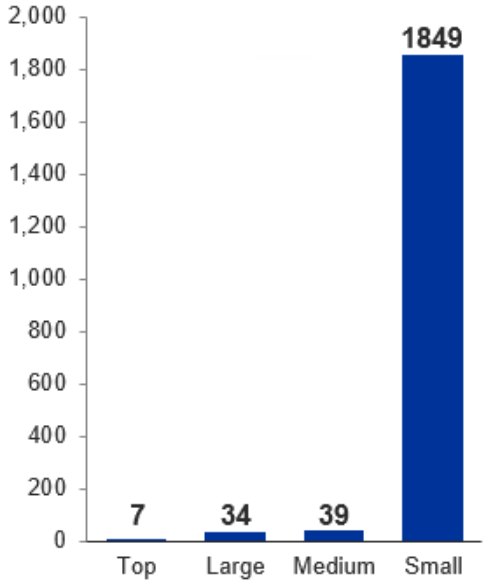
24 PwC reflects this argument partially in the extrapolation to the euro area but does not reflect it in the initial bank sample.

25 A related case is the French Crédit Agricole cooperative group, which is consolidated under Crédit Agricole S.A. This group also relies on payment services provided centrally but does not constitute its own IPS. Crédit Agricole is therefore allocated the investment costs of a top bank following PwC methodology, which implicitly accounts for potentially higher implementation efforts for (large) consolidated banking groups.

26 See Article 14 (1) of the Proposal for a Regulation of the European Parliament and of the Council on the establishment of the digital euro.

Stanley Europe, or development banks such as Sfil) are not in scope, reducing the final bank universe to 1,929 CIs.

Figure 6
Number of euro area retail banks per PwC size cluster



CIs are then mapped to the size clusters by total assets used in the PwC analysis. This translates to total asset thresholds of greater than €1 trillion for the top banks, €100 billion to €1 trillion for large banks, €30 billion to €100 billion for medium-sized banks and less than €30 billion for small banks. Figure 6 shows the final sample of 1,929 euro area retail banks mapped to PwC size clusters.

6 Extrapolation of adjusted PwC figures with synergy factors: results and sensitivity analyses

The extrapolation centres around the findings from the synergy analysis in Annex 1 (the "base scenario"). To address uncertainties, both unadjusted and adjusted base estimates are extrapolated in a low synergy scenario and a high synergy scenario. In the base scenario, banking group synergies range from 90% to 98%, and the average weighted market synergy factor is 30%. In the low synergy scenario, the banking group synergies are reduced to a range of 72-78%, and the average weighted market synergy factor is reduced to 25%. In the high synergy scenario, banking group synergies remain at 90-98%,[27] whereas the average market synergy factor is set at 40% to align with realised savings observed in past cost mutualisation initiatives (e.g. CBI Globe).

In the base scenario, adjusted PwC base estimates are extrapolated to a euro area total of €5.77 billion, corresponding to €1.44 billion annually, and are thus close to the European Commission's upper bound. Extrapolations based on other available but undisclosed banking studies lead to considerably lower total costs of €4.0 billion to €4.2 billion, or €1.00 billion to €1.05 billion annually. In the high synergy case, adjusted PwC base estimates also lead to total investment costs (at €5.07 billion) within the Commission's estimated range. Overall, extrapolations of PwC and other banking studies deviate from the Commission's cost range only in a scenario where the industry foregoes substantial synergy potential. Figure 7 illustrates the extrapolation results in both total and annualised terms; Figure 8 shows a comparison with investment cost estimates from PSD2 and SEPA harmonisation.

[27] This approach ensures that extrapolated IPS group investment costs do not fall below estimated costs if all banks of an IPS were consolidated as one larger entity and allocated their respective size cluster cost estimate.

Figure 7

Extrapolated investment costs per scenario, total and yearly over four years

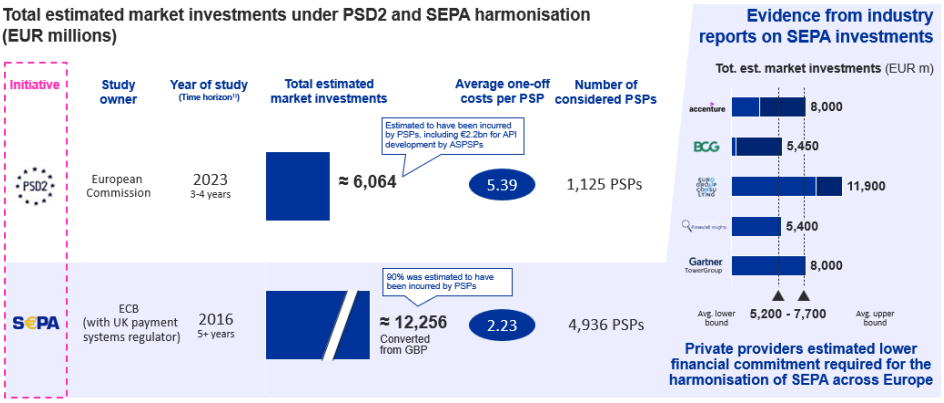
Total implementation costs (EUR billions), spread over a four-year period

Sensitivity analysis

Cost baseline *"which individual estimates are extrapolated to euro area"*	High synergies scenario *"best case with high banking group and market synergies"*	Base scenario *"synergies at expected level based on comprehensive assessment"*	Low synergies scenario *"banking sector foregoes available synergies"*
PwC *(adjusted for incorrect assumptions)*	5.07	**5.77** (1.44 p.a.)	8.49
Other banking studies	*3.5 - 3.7*	***4.0 – 4.2*** *(1.00 p.a.)*	*6.1 – 6.5*

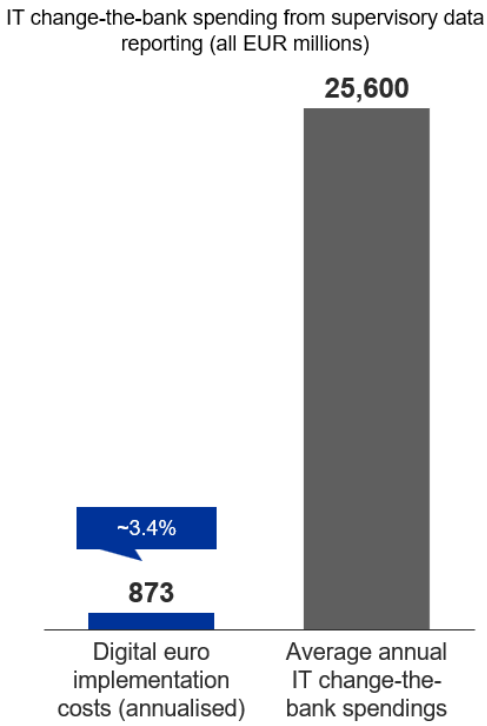
Figure 8

Investment estimates under past payment initiatives



1) Estimation based on duration of legislative process and entry into force as well as proactive behaviour of market participants.
Sources: ECB and European Commission, public information.

Figure 9
Investment Cost Impact on IT Change-the-Bank Spending for Significant Institutions



For illustrative purposes, investment costs can also be interpreted in annual and in relative terms (Figure 9). For example, base scenario extrapolations from adjusted PwC estimates, spread over four years as assumed in the study, represent around 0.7% of the euro area banking universe's net income of approximately €197 billion in 2023. Alternatively, in the case of large European banks (SIs), these **total investment costs represent approximately 3.4%** of average four-year **change-the-bank IT spending**.[28]

[28] Based on supervisory data. See also the ECB Occasional Paper entitled "Understanding the profitability gap between euro area and US global systemically important banks" for a study on US versus euro area banks' annual IT investments; the market estimates of the Boston Consulting Group: and the McKinsey & Company report entitled "Managing bank IT spending: Five questions for tech leaders."

7 Conclusion

Building on the cost studies conducted by the banking industry, this note documents the potential for leveraging synergies and mutualising costs within the payment industry. Banks already make extensive use of shared solutions for payment channels, accounts, compliance and operational support, and the same approach could be taken for the digital euro.

In order to reduce the investment needed for the digital euro, banks may thus pursue synergies or cost mutualisation by relying on these shared solutions.

Altogether, the findings suggest that if synergy and cost mutualisation potential was adequately accounted for, the banking industry's own estimates could lie within a range of €4 billion to €5.77 billion in total, or €1 billion to €1.44 billion annually over a four-year period. This note therefore also confirms the overall plausibility of the Commission's total investment cost estimate of €2.8 billion to €5.4 billion for euro area banks. Even with adjusted PwC base estimates – still an order of magnitude higher than those of other, undisclosed banking studies – the base synergies case leads to total euro area investment costs (at €5.77 billion) close to the Commission's upper bound. In this scenario, extrapolations based on other banking studies' estimates result in total costs well within the Commission's range. In the high synergies case, adjusted estimates are extrapolated to total investment costs within the Commission's estimated range.

Importantly, this note does not discuss the potential positive impact of the digital euro on business models. Key legislative provisions and design features in that regard are (i) the envisaged compensation, similar to fees earned from comparable means of payment; (ii) the absence of scheme and settlement fees, such as those international card schemes levy on issuing banks; and (iii) the possibility of implementing private solutions, owned by European banks, to leverage digital euro acceptance standards and thus increase both use case and geographical scope.

The Eurosystem also remains open to working with the banking industry towards the shared goal of minimising digital euro investment efforts, reusing existing payment standards and solutions as far as possible, and enabling digital euro standards and solutions to be reused for European payment schemes. This note thus serves a dual purpose. On the one hand it presents a self-contained view on euro area investment costs that takes key factors such as synergies and cost mutualisation into account; on the other hand, it provides a starting point for evidence-driven discussions to ensure that these key factors materialise. For this reason, it has been presented in the ERPB to foster a constructive and informed discussion, emphasising the importance of close dialogue with the banking industry as a basis for further reflections.

Annex 1: Assessment of cost synergy for potential digital euro implementation

A1. Market Synergies

Market synergies capture the potential cost savings for banks outside IPS groups that arise when services are shared through external providers or market-wide infrastructure. These synergies are a function of how concentrated the vendor landscape is, how far providers operate across borders, whether they offer end-to-end coverage, the extent to which banks already outsource, and the history of collaboration in a given market. The five dimensions defined in Section 3.1.2. of the main body provide the analytical framework for this assessment: (1) Vendor assessment consisting of (i) Vendor concentration, (ii) Presence of multi-country vendors, and (iii) End-to-end vendor coverage, (2) Outsourcing level; (3) History of collaboration; and (4) Exemplary synergies opportunities in the context of the digital euro.

A1.1. Vendor assessment

Introduction

The assessment covering the first three dimensions is grounded in a detailed vendor assessment. To identify which vendors are most relevant for the digital euro implementation, a four-step assessment was conducted:

A1: Table 1

Vendor assessment framework

#	Step	Description
1	Vendor universe	Broad set of PSPs, processors, IT outsourcers and fintechs active in Europe, including global schemes, bank-owned processors and merchant acquirers.
2	Relevance for outsourcing	Excluded captive processors serving only one banking group and providers not offering outsourcing potential. Excluded scheme operators and pure merchant PSPs.
3	Euro area footprint	Focused on vendors with material presence in the top six euro area markets or national dominance. Excluded players with marginal or non-euro area activity.
4	Final selection – 19 key vendors	Four categories retained: Pan-European champions, Pan-European specialists, National champions, National specialists.

The final set of 19 key vendors reflects those with the greatest relevance for potential outsourcing in the context of the digital euro. The assessment considered two main dimensions:

- **Geographic coverage** – footprint across the top six euro area markets and regional clusters (Northern, Southern, Central/Eastern Europe)

- **Digital euro service bundle coverage** – depth of activities across the seven service bundles defined in the PwC study[29]

This approach ensures that both pan-European players and national providers are captured, highlighting where cross-border synergies and domestic concentration can generate cost savings for the digital euro.

Figure 1 below provides an illustrative overview of the vendor typology and selected examples of players in each category.

A1: Figure 1

Comparative overview of key vendors

The vendor landscape can be grouped into four categories, each offering different cost synergy potential. Pan-European players provide multi-bundle coverage with broad geographic reach, holding a significant market share in certain countries. Their scale positions them as the largest sources of cost synergies, as investments in infrastructure and connectivity can be leveraged across multiple markets.[30] Pan-European specialists are providers concentrated in specific bundles, particularly core banking, but operate across most euro area markets. They enable targeted cost synergies in niche areas where standardisation and vendor consolidation are possible. National players achieve dominant positions in their domestic markets,

[29] Service bundles have been grouped across seven categories, consistent with the three layers (commercial, technical, operational) provided by PwC: customer relationship (incl. customer contracts, legal, marketing, and market launch activities), payment channels, POS and e-commerce, branch and ATM, accounts, liquidity/ interfaces/ risk and compliance, and invoicing and reporting (incl. fee calculation, reporting, data management and processes).

[30] Without prejudice to considerations around e.g. business continuity or concentration risks, see also Annex E1 –Risk management requirements of the rulebook v0.9.; see also https://www.bankingsupervision.europa.eu/press/supervisory-newsletters/newsletter/2024/html/ssm.nl240221.en.html

delivering domestic-scale cost efficiencies but with limited cross-border spillover effects. Finally, national specialists support mid-sized banks with focused services. Their potential synergy impact is confined to narrow segments and geographies, offering efficiency gains locally but minimal impact for wider cross-border synergies. Examples are Bank-Verlag in Germany or Cedacri in Italy.

The ECB discussed avenues for "*Digital euro as a service*" (D€aaS) solutions with PSPs in the context of the ERPB's workstream on the fit of the digital euro in the ecosystem, with joint agreement that D€aaS could lead to reduced investment efforts.[31] For example, liquidity service providers could standardise the connection between banks' core and treasury systems and the digital euro platform via APIs, reducing the need for each bank to build its own liquidity bridge. This model could significantly reduce IT integration complexity and cost, particularly for smaller banks with limited resources.

A1.1.1. Vendor concentration

Market synergies are partly shaped by the extent of vendor concentration, as reliance on a few systemic providers tends to support higher levels of synergies or cost mutualisation. Where a single or a very small number of providers dominate a national market, banks can rely on shared infrastructures and thereby avoid duplication of investment. An illustrative example is SIBS MB in Portugal, which manages the Multibanco scheme, while SIBS FPS is responsible for processing card transactions and operating the MB Way app. Together, these platforms processed close to 13 billion domestic transactions in 2024 (≈11.7 billion via Multibanco and ≈1.2 billion via MB Way), with a further 1.5 billion transactions in international markets, bringing the group total to nearly 15 billion transactions globally.[32] By contrast, in fragmented markets, each institution tends to maintain its own arrangements with multiple smaller providers, limiting the potential for interbank synergies.

In other markets, concentration is achieved through large pan-European players rather than national providers. Worldline holds significant positions in France, Benelux and Slovakia, managing most of payment cards in Europe.[33]

Other markets, by contrast, remain relatively fragmented. In Germany, the vendor landscape is shaped by the diversity of banking institutions relying on different providers, including local vendors such as Bank-Verlag. France also shows a mix of actors, with Worldline alongside domestic providers such as STET, resulting in lower concentration than in Portugal or Netherlands.

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31 See: https://www.ecb.europa.eu/euro/digital_euro/timeline/profuse/shared/pdf/ecb.deprep250218_erpb_Presentation_Fit_in_the_ecosystem_Businessmodel.en.pdf

32 Annual report 2024 - SIBS

33 Corporate Factsheet - Worldline

Overall, vendor concentration tends to support higher synergy or cost mutualisation potential by limiting duplication of infrastructures, though the effect varies considerably by country.

The resulting country scores for this dimension are summarised in Table 2 below.

A1: Table 2

Country scores – Vendor concentration

Country	Score	Rationale
Germany	0.5	Payment's connectivity is handled via shared national or EU arrangements, with banks using sector-wide providers (e.g. Bank-Verlag).[34] Core platforms remain heterogeneous, with both proprietary and vendor-based solutions.
France	0.5	Retail clearing is supported by common infrastructures\ (e.g. STET), while institutions outside large groups rely on a mix of proprietary cores and vendor platforms (e.g. Sopra, SAB, Temenos).[35] Cores remain fragmented across the market.
Italy	0.5	Payment's connectivity and network services are provided through shared infrastructure (e.g. CBI for interbank services, Nexi/SIA for SEPA/instant access), while core systems differ between larger banks with in-house solutions and smaller banks using hosted cores (e.g. Cedacri, CSE).[36]
Spain	0.5	Retail payments are supported by national infrastructures (e.g. Iberpay/SNCE for clearing, Redsys for processing/authentication). Large banks often maintain proprietary cores, while smaller institutions rely on vendor-provided platforms.
Netherlands	0.75	Payment's processing is coordinated through shared processors (e.g. Worldline), while core systems remain a mix of proprietary solutions at large banks and vendor cores (e.g. Temenos, Mambu) at smaller ones.[37]
Portugal	0.75	Retail clearing is supported by common infrastructures (e.g. SICOI). Payments services are concentrated in a national interbank platform (e.g. SIBS FPS/ SIBS Multibanco), while larger banks keep independent cores and smaller banks rely on vendor platforms (e.g. Temenos, Mambu).[38]
Belgium	0.5	Large and foreign-owned institutions, holding significant market share, often rely on group IT, while other banks use shared providers (e.g. Worldline for card processing, CEC for domestic payments). ATM and A2A payments are coordinated nationally (e.g. Batopin, Bancontact).
Ireland	0.5	The market mixes domestic and foreign-owned banks, with different vendors used across institutions (e.g. nCino, IBM, Temenos). Card processing is handled by international groups (e.g. Fiserv).
Finland	1	A small set of vendors cover major functions (e.g. Temenos for core banking, Tietoevry for payments, Nets/ Nexi for card services), creating a concentrated environment, especially in payments-related infrastructures.[39]
Austria	0.75	Payment's infrastructure combines group-level IT with external vendors (e.g. ARZ/Accenture, Worldline). Shared infrastructures (e.g. PSA for cards and ATMs) are common, while core platforms remain diverse (e.g. Temenos, Sopra, Oracle).
Greece	0.5	Rerail payments are supported by a national infrastructure (e.g. DIAS).[40] Processing services partially outsourced to pan-european providers (e.g. Nexi, Worldline). Banks use a mix of in-house cores and vendor systems (e.g. Finacle). Smaller banks often rely on external providers for their main systems.
Slovakia	0.5	The market is dominated by foreign-owned subsidiaries using group IT, while smaller banks adopt fragmented vendor solutions (e.g. Temenos, Oracle, Asseco CE). Issuing is handled by regional players (e.g. Nexi CE, First Data).[41]
Croatia	0.5	Subsidiaries of international groups use group IT backbones, while smaller domestic banks rely on common vendors (e.g. Bankart for processing, Temenos for cores). National clearing is centralised through FINA.
Lithuania	0.75	Large Nordic groups operate on group IT, while smaller banks use external providers (e.g. Nets/ Nexi for cards, Temenos for cores). SEPA access is provided by the central bank (CentroLink).[42]

34 See Product overview - Bank-Verlag

35 See Product overview - STET

36 See Company profile - Cedacri

37 See ING/Worldline deal

38 See Card processing - SIBS

39 See Banking software | Tietoevry Banking

40 See Company profile - DIAS

41 See Company Profile - First Data Slovakia

42 See Overview - CentroLink

Latvia	0.75	Nordic groups integrate operations into cross-country IT infrastructures, while domestic banks use external vendors (e.g. Tietoevry, Temenos, Nets/ Nexi, Worldline).[43]
Slovenia	1	Large foreign institutions rely on group-wide IT systems. A small number of providers (e.g. Bankart, Nets/ Nexi) deliver most payment services for the remaining banks, including card processing and clearing. Core systems vary, but payments IT is highly concentrated.
Luxembourg	0.75	Subsidiaries of foreign banks use group IT, while smaller local banks rely on vendors (e.g. Temenos, Avaloq for core, Worldline for card services).
Cyprus	0.75	Domestic card processing is centralised via JCC, while larger banks migrate to international core platforms for core banking (e.g. Temenos, Oracle Flexcube).
Estonia	0.5	Nordic-owned groups (e.g. Swedbank, SEB, Luminor) operate on group IT, while domestic banks rely on vendors (e.g. Nets/ Nexi, Worldline, Tietoevry).
Malta	0.5	A small number of banks each run different systems (e.g. Oracle, HSBC proprietary, ICBS), while SEPA services are provided centrally by MTEUROPAY.[44]
Bulgaria	0.75	Payment's processing and clearing is centralised under Borica, while banks use a range of external vendors for cores (e.g. Temenos, Oracle, Backbase).

A1.1.2. Presence of multi-country vendors

The presence of multi-country vendors affects the extent to which banks not belonging to IPS structures can benefit from cross-border synergies. Where vendors operate across several euro area markets, banks can reuse platforms, certification artefacts and processes, thereby reducing the need for duplicative development. In contrast, where vendors are restricted to one domestic market, opportunities for synergies or cost mutualisation remain confined to the national level.

In addition to pan-European players, there are also pan-European specialists that operate across borders in narrower domains. A prominent example is Temenos, whose core banking and payments platforms are deployed in banks across more than 150 countries worldwide, including a large number of euro area institutions.[45]

Country examples highlight how the presence of multi-country vendors varies across Europe. In Germany, three pan-European players – Nexi, Worldline and Fiserv – are well represented, providing significant potential for cross-border synergies. By contrast, in Spain and Portugal, markets remain more nationally concentrated, with Redsys and SIBS dominating domestic infrastructures and leaving less scope for pan-European vendors to play a systemic role. Figure 2 illustrates the presence of different vendor types in the euro area.

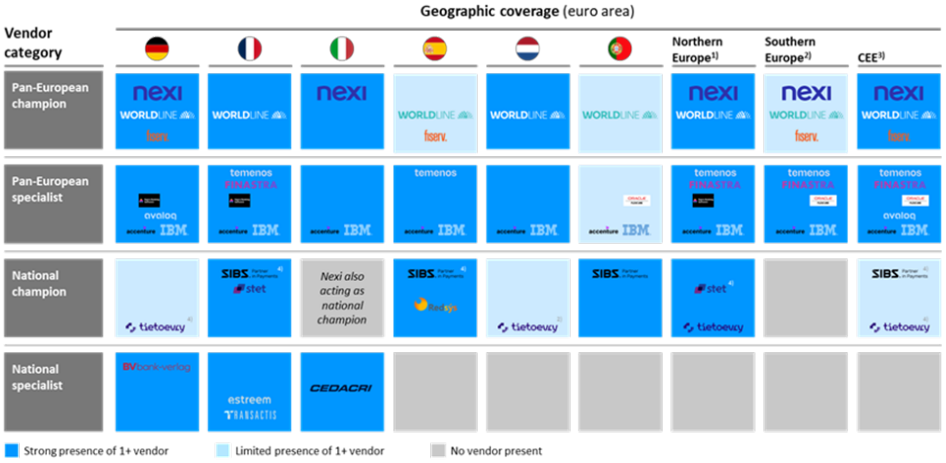
43 See Geographic coverage - Nexi

44 See MTEUROPAY - Central Bank of Malta

45 Product overview - Temenos

A1: Figure 2

Vendor assessment – Presence of different vendor types



1) Finland, Ireland, Belgium and Luxembourg; 2) Greece, Malta and Cyprus; 3) Austria, Slovenia, Slovakia, Estonia, Latvia, Lithuania; 4) Limited presence compared to home market

Overall, the presence of pan-European players and specialists increases the potential for market synergies by extending the possibility to rely on shared vendor platforms beyond national borders. However, the effect is uneven across the euro area, with some markets relying heavily on these players and others remaining more nationally oriented.

The resulting country scores for this dimension are summarised in Table 3 below.

A1: Table 3

Country scores – Presence of multi-country vendors

Country	Score	Rationale
Germany	0.75	Several pan-European processors are active (e.g. Worldline, Nexi, Fiserv), complemented by global IT integrators. Domestic vendors (e.g. Atruvia) remain relevant in core banking, which creates a mixed landscape.
France	0.5	Pan-European vendors are active in the French market (e.g. Worldline, Sopra, Temenos), but their role is complemented by significant reliance on in-house IT centres (e.g. Estreem, Transactis) at major banks.[46] As a result, the presence of multi-country vendors is visible but less dominant compared to other markets.
Italy	0.75	A broader range of pan-European vendors and IT integrators operate in Italy (e.g. Nexi, Accenture, IBM), with many banks relying on external providers for payments and core services. Larger institutions continue to use in-house systems, but vendor penetration is more pronounced than in France.
Spain	0.25	Global IT integrators (e.g. IBM, Accenture) support innovation, although domestic consortia (e.g. Redsys, Iberpay) continue to limit wider entry of pan-European vendors.
Netherlands	0.75	Major banks rely on pan-European processors (e.g. Worldline) while smaller institutions use cross-country core banking providers (e.g. Temenos).[47] This provides broad but varied coverage.
Portugal	0.25	International system integrators (e.g. IBM, Accenture) are active, while national providers (e.g. SIBS) play a strong role and restrict entry of further pan-European vendors.
Belgium	0.75	The market is heavily served by pan-European providers (e.g. Worldline) and supported by global IT integrators (e.g. IBM, Accenture). Core banking platforms from international vendors (e.g. Infosys Finacle) are also present.

46 Press release - Estreem

47 Three major banks select us for Instant Payments | Worldline Global

Ireland	0.5	Large institutions increasingly adopt international vendors (e.g. Temenos, FIS, Fiserv) and system integrators (e.g. Accenture). Vendor coverage is significant across several segments.
Finland	0.75	Nordic and European providers (e.g. Nets/Nexi, Tietoevry) are complemented by global outsourcing partners (e.g. IBM), creating a strong multi-country vendor footprint.
Austria	0.75	Domestic IT consortia remain relevant but are closely tied into international groups (e.g. ARZ with Accenture).[48] The market is heavily served by pan-European providers (e.g. Worldline, Nexi) and supported by global IT integrators (e.g. IBM, Accenture, PPI, Capgemini) on connecting outsourced services to internal bank platforms.
Greece	0.5	Banks are gradually shifting to international vendor platforms (e.g. Finacle), and European processors (e.g. Nexi, Worldline) have entered card and acquiring services.[49]
Slovakia	0.5	Subsidiaries of foreign groups rely on parent IT infrastructures, while international vendors are present in selected areas such as acquiring (e.g. Global Payments for Erste).
Croatia	0.25	Card services are provided by European vendors (e.g. Nets/Nexi), while core banking often runs on group systems. External vendors are used for digital banking upgrades.
Lithuania	0.5	Large Nordic institutions use parent systems, while smaller banks rely on Nordic-wide vendors (e.g. Temenos for core, Nets for processing).
Latvia	0.5	Nordic group subsidiaries rely on internal systems, while domestic banks use regional vendors (e.g. Temenos, Nets, Tietoevry, Worldline).
Slovenia	0.5	International processors are increasingly active (e.g. Nets/Nexi), and foreign acquisitions bring in standardised vendor platforms.
Luxembourg	0.75	The financial sector is highly international, relying on pan-European vendors (e.g. Temenos, Avaloq, Worldline) for core and payments infrastructures.[50]
Cyprus	0.25	Larger banks are migrating to international core banking systems (e.g. Temenos, Oracle Flexcube), while domestic processing remains concentrated with JCC.
Estonia	0.5	Nordic groups rely on shared systems, complemented by external vendors (e.g. Nets/Nexi, Worldline, Tietoevry) to support local banks.
Malta	0.25	Core platforms are provided by international vendors (e.g. Oracle Flexcube, Temenos) or group IT, while card processing shows less pan-European coverage.[51]
Bulgaria	0.5	Core infrastructures rely on international vendors (e.g. Temenos, Oracle Flexcube, Backbase), though domestic players (e.g. Borica) remain central in processing.

A1.1.3. End-to-end vendor coverage

Another factor shaping the potential for market synergies is whether vendors provide end-to-end coverage across all service bundles. Where a single provider can deliver issuing, acquiring, core banking and other service bundles under one roof, banks can avoid contracting and integrating multiple niche vendors. This reduces complexity and enables synergies or cost mutualisation at a broader scale.

Across most euro area markets, no single provider spans the entire value chain from customer-facing systems to the core ledger. Banks generally retain institution-specific solutions for accounts (core banking), customer data, and treasury/liquidity functions. Instead, the most mature shared infrastructures are found in payment channels and connectivity layers such as card issuing, acquiring, POS/e-commerce networks and ATMs.

To illustrate, Redsys in Spain and SIBS in Portugal deliver broad coverage across payment channels, POS/ATM networks and connectivity. Similarly, Worldline in the

48 ARZ/Accenture - Austria

49 Infosys signs Greece's Aspis Bank to Finacle

50 Avaloq onboards Deutsche Bank Luxembourg - Press releases - Insights - Avaloq

51 Bank of Valletta Modernising Core Banking Software with Oracle FSS's Flexcube

Netherlands provides centralised processing and connectivity for most banks. These players enable strong bundle-level synergies even if they stop short of core ledger systems. Among the pan-European players, Worldline, Nexi and Fiserv combine issuing, acquiring, POS/e-commerce services and processing, giving non-IPS banks fewer integration points to manage.

Specialists, by contrast, focus on specific layers. Temenos and Finastra provide widely adopted platforms for accounts, payments hubs and treasury, while national IT providers in smaller markets often limit their scope to card processing or compliance.

Examples from different markets highlight this variation. In Italy, Nexi's services cover most of the bundles relevant for payments, making it the closest case to end-to-end coverage in the euro area. In Spain and Portugal, national players ensure high coverage of shared connectivity layers, but each bank still maintains its own account and treasury systems. In the Netherlands, Worldline supports broad bundle coverage through payments, switching and clearing, while banks retain their own cores. In smaller markets such as Latvia, reliance on local providers results in fragmented coverage, with most banks contracting multiple vendors to cover different bundles.

Overall, synergy or cost mutualisation potential is highest where markets are served by providers that cover multiple bundles, particularly in the connectivity and payment channel layers.

The resulting country scores for this dimension are summarised in Table 4 below.

A1: Table 4

Country scores – End-to-end vendor coverage

Country	Score	Rationale
Germany	0.5	External vendors support connectivity, security and regulatory interfaces (e.g. Bank-Verlag, AML/KYC vendors), but core and customer systems remain fragmented across institutions.
France	0.5	Shared infrastructures provide connectivity and overlays (e.g. STET, SEPAmail, Paylib), though full-stack coverage across core and customer systems remains limited and differs by bank.
Italy	0.75	Cooperative services cover significant parts of the stack for non-group banks (e.g. CBI, Cedacri, CSE), while large institutions continue to operate bespoke cores, limiting full market-wide coverage.
Spain	0.5	National providers offer shared infrastructures for connectivity and authentication (e.g. Iberpay, Redsys, Bizum), but core and ledger systems remain largely bank specific.
Netherlands	0.5	Shared layers exist for connectivity and online payment overlays (e.g. iDEAL, SEPA/instant gateways), while core and general ledger systems are still managed separately within banks.
Portugal	0.5	Shared platforms support connectivity and digital channels (e.g. SIBS/MB WAY), while core and accounting remain on bank systems, limiting full-stack provision.
Belgium	0.5	Vendors provide coverage for payments (e.g. Worldline for SEPA and cards), but no provider delivers end-to-end stacks spanning core and customer systems.
Ireland	0	Institutions rely on different vendors across the value chain (e.g. AIB with nCino, BoI with IBM, Fiserv for cards), and no end-to-end solution spans multiple banks.
Finland	0.75	A small pool of vendors provides broad suites (e.g. Temenos, Tietoevry, Nets), offering near full-stack coverage for many institutions, although some large banks retain their own cores.[52]
Austria	0.5	External vendors (e.g. ARZ/Accenture, Worldline, Temenos) provide significant coverage for payments, but no single end-to-end provider spans all functions.
Greece	0.25	Payments are centralised via DIAS, complemented by specialised vendors (e.g. Finacle for core). End-to-end coverage remains partial, as banks manage parts of the stack separately.

52 Products - Temenos

Slovakia	0.5	Smaller institutions rely on fragmented vendor solutions (e.g. Asseco for core, Nexi for issuing), meaning no full-stack provision across the sector.[53]
Croatia	0	Group IT systems dominate, while local vendors (e.g. Bankart, Temenos) provide selected modules. No vendor covers the entire stack.
Lithuania	0.25	A mix of vendors (e.g. Nets, Temenos) can jointly cover most segments, but no provider delivers a full end-to-end solution across the market.
Latvia	0.25	Regional vendors (e.g. Tietoevry, Temenos, Nets) cover parts of the payments and core stack, but end-to-end provision remains fragmented.
Slovenia	0.5	Bankart covers a broad share of payments-related services (e.g. cards, switching, clearing), but core and compliance processes remain separately managed by banks.
Luxembourg	0.25	International vendors (e.g. Temenos, Avaloq, Worldline) provide important components, yet end-to-end coverage across core and back-office functions is not comprehensive.
Cyprus	0.25	Vendors cover selected segments (e.g. JCC for payments, Temenos/Oracle for core), but no full-stack solution exists across institutions.
Estonia	0.25	Vendors (e.g. Nets, Worldline, Tietoevry) are active across different segments, though coverage remains modular rather than end-to-end.
Malta	0	No vendor provides full end-to-end solution; systems remain siloed per bank.
Bulgaria	0.25	No single vendor provides full coverage; banks adopt modular vendor approach (Temenos, Oracle, Borica).[54]

A1.2. Outsourcing level

Introduction

The degree of outsourcing across payments and banking processes is a key determinant of potential synergies or cost mutualisation. Banks that externalise their processes are inherently dependent on external vendors for the key developments needed for the digital euro roll-out. The depth of this reliance on external providers directly influences the opportunities for interbank synergies, as higher outsourcing intensity increases the likelihood of the reliance of the country's banks on common vendor-provided platforms.

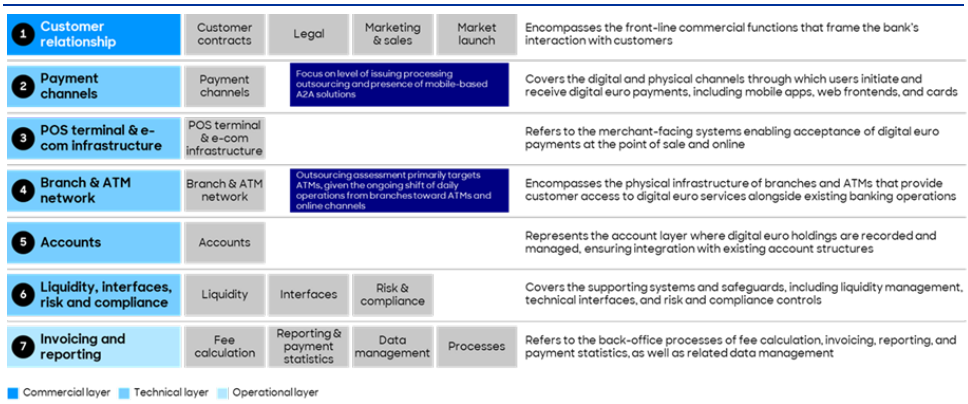
The methodology for the outsourcing analysis has been structured in a three-step approach and is based on the PwC service bundles framework to ensure consistency with the overall methodology for the cost synergy assessment. As a first step, the service bundles have been grouped across seven categories, consistent with the three layers (commercial, technical, operational) provided by PwC: (i) customer relationship (incl. customer contracts, legal, marketing, and market launch activities); (ii) payment channels; (iii) POS and e-commerce; (iv) branch and ATM; (v) accounts; (vi) liquidity/ interfaces/ risk and compliance; (vii) and invoicing and reporting (incl. fee calculation, reporting, data management and processes).

53 Press release - Asseco

54 Products and Services | BORICA AD

A1: Figure 3

Service bundles overview



Second, each service bundle has been assessed to identify the outsourcing level. Particular emphasis was placed on the technical layer, which represents the largest cost component in the PwC study and the processes where banks typically tend to outsource a large share of their processes. For this layer, the evaluation was predominantly quantitative, supported by indicators such as the share of outsourced issuing and processing volumes and other measurable cost drivers. In particular:

- **Payment channels:**[55] The top issuers were identified on the basis of their processed issuing volumes.[56] For each of these institutions, which together account for more than 70%[57] of total issuing volumes in the country, an analysis of the current issuing model was carried out, distinguishing between insourced setups, outsourced processing, and distribution models. This assessment was based on publicly available data and on disclosures contained in the financial statements of the issuers themselves or of the major processing providers. Institutions operating on a fully insourced model were assigned a score of 0, while those relying on outsourcing were assigned a score of 1. An overall country-level score was calculated as a weighted average of the outsourcing scores, with the weight corresponding to each issuer's share of the country's issuing volumes. Finally, a cross-market weighted average score has been determined on the basis of the total issuing volumes registered for each country.

- **POS terminal & e-commerce infrastructure:** For the acquiring side, a combined qualitative and quantitative approach was applied. The qualitative analysis considered: i) the acquiring set-up of the major banks in each market; ii) the role and market share of non-bank acquirers, iii) publicly available information on deals involving the outsourcing of acquiring operations and key performance

55 Outsourcing levels on payment channels have been assessed quantitatively only for the card issuing processes, which typically represent one of the most outsourced processes in banking operations. A qualitative assessment of available A2A solutions per each country has been developed to determine the potential outsourcing of front-ends by banks.

56 As reported in the Euromonitor, Financial Cards and Payments report per country, Table 15 – Number of cards by issuer

57 Total issuing volumes as reported in the ECB statistic "Value of card payments, All, sent - SCA: total for SCA and non-SCA, issuer location: domestic, acquirer location: domestic, POS location: world"

indicators (KPIs) disclosed in the financial statements of leading vendors. On the basis of this assessment, a percentage score of the outsourcing level was assigned to each country. Finally, a cross-market weighted average score was calculated, using total acquiring volumes[58] per country as the weighting factor.

- **Branch and ATM network:**[59] For the ATM assessment, a combined qualitative and quantitative approach was employed. The qualitative analysis focused on two dimensions of outsourcing practices observed across markets. The first was strategic outsourcing, which examined the ownership structure of ATMs, distinguishing between bank-owned networks, ATM-as-a-Service models and pooling arrangements, as well as the share of terminals operated by IADs. The second was operational outsourcing, which covered cash replenishment, servicing, and maintenance activities. Each factor was scored on a five-point scale (high, medium-high, medium, medium-low, low), corresponding respectively to numerical values of 1, 0.75, 0.5, 0.25 and 0. The overall country score was then derived as a weighted average[60] of the two dimensions of outsourcing. Finally, a cross-market weighted average score was calculated using the total number of ATMs[61] deployed in each country as the weighting factor.

The commercial and operational layers were assessed qualitatively, drawing from publicly available information on market practices and expert judgement. For each of these service bundles, a score between 0 (fully in-house) and 1 (fully outsourced) was assigned to illustrate the share of process outsourcing typically observable in the country.

Finally, the overall country-level outsourcing score has been determined by subsequently weighting the seven scores obtained for the identified bundles by the relative cost share of that bundle in the PwC model. The analysis therefore yields a cost-adjusted outsourcing score that reflects the average intensity of outsourcing agreements. This provides a consistent and comparable benchmark across markets, allowing meaningful cross-country comparisons of banks' reliance on external providers and highlighting where structural differences in outsourcing may translate into cost synergies or constraints in the implementation of the digital euro.

Results

The level of outsourcing in banking IT and payment operations is a key determinant of potential synergies or cost mutualisation for the implementation of the digital euro. In markets where outsourcing is already extensive and concentrated around shared providers, banks are better positioned to make use of existing infrastructures and

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58 Based on ECB database "Total value of card payments – All, received - SCA: total for SCA and non-SCA, acquirer location: domestic, POS location: World, Annual"

59 The outsourcing potential has been assessed on ATMs only; Branch impact from digital euro is considered limited as most are transitioning towards cashless operations, automating cash handling via ATMs

60 Strategic outsourcing weighted at 90%, while operational outsourcing at 10%

61 Based on ECB database "Number of terminals provided by resident PSPs - ATM, with a cash withdrawal function, from: Domestic; to: World"

collectively develop new platforms, reducing duplicative investments. Conversely, in markets where banks rely more heavily on in-house systems, such as France, the scope for synergies is more limited, as integration requires overcoming fragmented proprietary setups.

A1: Figure 4

Outsourcing levels overview for six main markets by retail payment volumes[62]

	Outsourcing level top 6 markets	Germany	France	Italy	Spain	Netherlands	Portugal	Summary
1 Customer relationship	0.30[1]	0.25	0.25	0.50	0.50	0.25	0.50	• Low-medium outsourcing with focus on marketing agencies and law firms
2 Payment channels	0.62	0.85	0.20	0.70	0.90	1.00	1.0	• High outsourcing mostly to major cross-EU players • French banks as outliers
3 POS terminal & e-com infrastructure	0.60	0.80	0.40	0.90	0.40	1.00	1.00	• High outsourcing with only FR/ES still managing parts in house
4 Branch & ATM network	0.55	0.30	0.70	0.60	0.40	1.00	1.00	• ATM outsourcing mostly limited to operations; banks still own and run networks in major markets
5 Accounts	0.30[1]	0.25	0.25	0.50	0.25	0.25	0.50	• Account mgmt. remains in-house, outsourcing limited to smaller banks
6 Liquidity, interfaces, risk and compliance	0.40[1]	0.25	0.25	0.50	0.50	0.25	0.50	• Liquidity in-house, vendor reliance for connectivity and compliance tools
7 Invoicing and reporting	0.50[1]	0.25	0.25	0.75	0.50	0.25	0.50	• In-house systems comple-mented by use of vendor solutions
Weighted average	0.45[1]	0.40	0.30	0.60	0.50	0.50	0.70	

The outsourcing assessment of the European markets analysed reveals a medium overall level of reliance on external providers, with a large share of the markets showing a score close to 0.5. The highest levels of outsourcing (score higher than 0.7) can be observed in the smaller markets (e.g. Portugal, Slovenia, Lithuania, Luxembourg, Cyprus, Estonia, Bulgaria), where a limited number of banks operates within the market, and usually create national providers (e.g. SIBS for Portugal, Bankart for Slovenia, Borica for Bulgaria) or rely on common providers (e.g. Worldline for Luxembourg, JCC for Cyprus, NETS/ Nexi for Lithuania). Conversely, the lowest levels of outsourcing are observed in France, where the largest banks typically have proprietary IT factories and inter-banks joint ventures that have been specifically established to develop and manage payment solutions (e.g. Estreem, joint venture between Groupe BPCE and BNP Paribas, Transactis, joint venture between Societe Generale and La Banque Postale) that develop most IT systems for the parent companies, and act as processors for card and SEPA transactions also for foreign subsidiaries.[63]

Outsourcing is most developed in-service bundles directly linked to payments (payment channels/ card issuing, acquiring and POS/e-commerce infrastructure) where large pan-European players and specialists, such as Nexi in Italy and Germany, Worldline in the Netherlands, Belgium and Luxembourg support a large number of institutions across Europe. National players, such as SIBS in Portugal,

62 Payment volumes for retail transactions only, based on ECB data, the breakdown provided in the ECB's study on the payment attitudes of consumers in the euro area (SPACE) and Roland Berger's market assumptions

63 For example Estreem, JV of BNP and BPCE, has announced plans to migrate all processing services of both groups, both domestically and internationally (BNP Paribas and BPCE create Estreem, new French leader and major European actor in payment processing - BNP Paribas)

Bankart in Slovenia, Redsys in Spain, Borica in Bulgaria, centralise issuing and processing services in their home markets.

Figures 5 and 6 illustrate the level of outsourcing related to payment channels (card processing) and POS and e-commerce (acquiring) service bundles for the six main euro area markets by retail payment volumes (as defined in footnote 14).

A1: Figure 5

Outsourcing level – Payment channels (focus on card issuing processing)

Market	Total issuing vol.[1] [2024, EUR bn]	Share (6 markets)	% in-sourced	% out-sourced[2]	Key findings
Germany	425	32%	0.2	0.8	• While large IPS issue and process card payments internally, other private and commercial banks outsource mostly to Nexi (e.g., Deutsche Bank, Commerzbank) and Worldline (e.g., ING DiBa)
France	740	20%	0.8	0.2	• Large French banks, issue and process card payments via internal payment factories (e.g., Estreem as a JV between BNP and BPCE) • Smaller and foreign banks outsource, mostly to Worldline
Italy	317	18%	0.3	0.7	• Most Italian banks outsource or sold their processing business to Nexi • Poste (largest Italian issuer) and subsidiaries of the French groups maintain processing in house (i.e., Postepay for Poste)
Spain	316	18%	0.1	0.9	• All major Spanish banks outsource card issuing and processing to Redsys (interbank consortium) • Subsidiaries of foreign banks rely on internal group processing
Netherlands	159	8%	0.0	1.0	• Most dutch banks outsource card issuing and processing to Wordline (former interbank consortium). Rabobank recently switched to ACI. • Subsidiaries of foreign banks rely on internal group processing
Portugal	135	4%	0.0	1.0	• All Portuguese banks rely on central provider SIBS[2] for card issuing and processing
Total/ Weighted average[3]	2,093	100%	0.4 (weight. avg.)	0.6 (weight. avg.)	

1) Based on ECB database «Value of card payments – All, sent - SCA: total for SCA and non-SCA, issuer location: domestic, Acquirer location: domestic, POS location: World, Annual; 2) Issuing volumes outsourced to external processors based on total cards issued by bank (Euromonitor data) and average yearly transaction volume per card; 3) Weighted on issuing volumes by country
Sources: ECB

A1: Figure 6

Outsourcing level – POS terminals & e-com infrastructure

Market	Total acquir. vol.[1] [2024, EUR bn]	Share (6 markets)	% in-sourced	% out-sourced[2]	Key findings
Germany	333	13%	0.2	0.8	• Major banks largely sold acquiring business (e.g., Concardis sold to Nexi) - Larger banks re-enter, partly via JVs (e.g., Deutsche Bank) • Worldline, Computop and Unzer dominating e-com (>75% market share)
France	1,316	50%	0.6	0.4	• Big banks (e.g., BNP Paribas, Société Général) still manage acquiring/terminals in-house • Some merchants contract with banks for acquiring (excl. acceptance)
Italy	313	12%	0.1	0.9	• Most Italian banks sold their acquiring portfolios to Nexi (e.g. Intesa Sanpaolo 2019, BPER, Monte dei Paschi) • Nexi dominates POS and e-com infrastructure (>70% market share)
Spain	312	12%	0.6	0.4	• Large banks still deploy and manage terminals internally: Santander (Getnet), CaixaBank (Comercia Global Payments), BBVA, Sabadell • Smaller banks outsource to large acquirers
Netherlands	219	8%	0.0	1.0	• All three major banks (ABN, ING, Rabobank) no longer manage any POS terminals or e-com infrastructure • E-com acceptance dominated by Adyen, Mollie, Buckaroo and Worldline
Portugal	150	6%	0.0	1.0	• Banks depend on SIBS for POS network operation and e-com infrastructure (MB Way, gateways) • SIBS operating national POS network controlling ~500k POS terminals
Total/ Weighted average[3]	1,845	100%	0.4 (weight. avg.)	0.6 (weight. avg.)	

1) Based on ECB database "Total value of card payments – All, received - SCA: total for SCA and non-SCA, acquirer location: domestic, POS location: World, Annual"; 2) Acquiring volumes outsourced to external acquirers/processors based on indicative market shares (trx. volume); 3) Weighted on acquiring volumes by country
Sources: ECB

In addition to card issuing and processing services, in all major markets, banks have also jointly developed multi-bank A2A payment solutions (e.g. giropay, now discontinued, in Germany, Paylib in France, iDEAL in the Netherlands, Bancomat Pay in Italy, Bizum in Spain, MBWay in Portugal) outsourcing and centralising user directory and processing services for A2A transactions to a shared provider.[64] These shared A2A solutions represent a significant synergy or cost mutualisation potential

64 In September 2025, EPI (Wero) and EuroPA (Bancomat Pay, Bizum, MBWay have announced plans to ensure complete pan-EU interoperability among all the A2A solutions participating to either association (EuroPA-EPI)

for digital euro front end developments: Banks could reuse and adapt the already developed front end interfaces, APIs and connections to digital euro specifications, with limited impacts on other bank systems; additionally, the A2A central providers could even promote higher level of synergies by developing the digital euro as a service offering, where all digital euro integration would be developed by the central provider, which would then offer it to participating banks as a "co-branded" or "white-label" solution.

On ATMs, outsourcing levels are mixed across the different geographies, where in some markets national providers pooling or managing ATMs for all the banks in the market (e.g. Geldemaat[65] in the Netherlands, Batopin[66] in Belgium, SIBS[67] in Portugal, PSA in Austria,[68] Cash Services[69] in France) are present, while in the other geographies banks maintain strategic ownership of the ATMs, while outsourcing the cash handling and maintenance operations.

By contrast, functions such as customer relationship management, account management, and liquidity systems remain largely managed internally within banking groups and developed accordingly to the specifications of each, limiting the potential for shared developments.

The resulting country scores for this dimension are summarised in Table 5 below.

A1: Table 5

Country scores – Outsourcing levels

Country	Score	Rationale
Germany	0.4	Technical layer (issuing and acquiring processing, ATMs) mostly outsourced to pan-european providers (e.g. Nexi, Wordline) and national specialists (e.g. Bank-Verlag for girocard processing). Accounts and cores managed in-house for larger commercial banks, while outsourced to pan-european specialists (e.g, Temenos, Avaloq) for the smaller fintechs. Commercial and operational layers mostly managed in-house.
France	0.3	Large banks manage most services in-house via internal IT and interbank JV (e.g. Estreem, Transactis for processing, Cash services for ATMs). Outsourcing limited to smaller institutions, and compliance and connectivity services.
Italy	0.6	Technical layer (issuing and acquiring processing, ATMs) mostly outsourced across all bank sizes, typically to pan-european champions (e.g. Nexi). Core banking providers are consistent across regional banks (e.g. Cedacri, CSE), while larger banks manage accounts internally, with some innovation projects underway (e.g. Isybank on Tought Machine). Commercial and operational layers for all banks mostly managed in-house.
Spain	0.5	Technical and operational layer (issuing and acquiring processing) outsourced to national providers (e.g.Redsys, Iberpay, Bizum). Accounts and cores, ATMs and acquiring infrastructure still managed mostly in-house. Operational layer in part outsourced for smaller banks (e.g. Redsys reporting services), while commercial layer mostly managed in-house.

65 Geldemaat has been managing since 2019 all ATMs for ABN AMRO, ING, and Rabobank, with a single brand and software (https://www.geldmaat.nl/en/about-us/organisation/)

66 Batopin operates a network of independent ATMs under the brand CASH, to provide access to cash in locations where banks are closing branches and ATMs (Batopin). Current members are Belfius, BNP Fortis, ING, KBC, CBC, Fintro

67 SIBS operates and manages all ATMs for Portuguese banks via the Multibanco network (ATM network management - SIBS), also providing a network of independent ATMs via the ATM express brand (https://atmexpress.sibs.com/en/)

68 PSA is a bank joint-sector provider managing the Bankomat system for ATMs on behalf of all Austrian banks (Home – PSA)

69 Cash services is a JV of BNP Paribas, Credit Mutuel, CIC and Societe generale for ATM management (Accueil | Cash Services)

Netherlands	0.5	Technical layer (issuing and acquiring processing, ATMs) highly outsourced to centralised providers (e.g. Worldline, Geldeemat) or international providers (e.g. ACI worldwide).[70] Front end pooled via iDEAL, (now Wero) solution Accounts and cores in-house for larger banks, while outsourced for smaller banks and fintechs. Commercial and operational layer still managed in-house.
Portugal	0.7	Technical layer (issuing and acquiring processing, ATMs) mostly outsourced across all bank sizes to national providers (e.g. SIBS FPS for card processing, SIBS Multibanco for domestic card scheme and ATMs). Accounts and cores for larger banks, as well as commercial and operational layers for all banks mostly managed in-house.
Belgium	0.5	Technical layer (issuing and acquiring processing, ATMs) mostly outsourced to common providers (e.g. Worldline, Batopin). Accounts and cores for larger banks, as well as commercial and operational layers mostly managed in-house.
Ireland	0.5	Technical layer, in particular card issuing and acquiring is typically outsourced, mostly to Fiserv. Accounts and cores used to be developed internally, but banks are externalising to pan-European specialists (e.g. Temenos). Commercial and operational layers managed in-house.
Finland	0.5	The largest banks manage most services internally, with the exception of acquiring, typically outsourced (e.g. Nordea, which sold its acquiring arm to NETS).[71] Other domestic banks outsource the Technical and Operational layers, including accounts, keeping only the commercial layer in-house.
Austria	0.5	Technical layer (issuing and acquiring processing, ATMs) mostly outsourced across all bank sizes to national provider (PSA). Accounts are mixed, with larger banks (e.g. Erste, Raiffeisen) maintaining proprietary systems, while smaller/ cooperative banks outsourcing.[72] Commercial and operational layers mostly managed in-house.
Greece	0.5	Larger banks used to cover most process internally. Technical layer is gradually being outsourced, in particular merchant acquiring,[73] and ATMs (managed via DIAS). Some banks are also outsourcing core account systems.[74] Commercial and operational layers remain typically managed in-house.
Slovakia	0.5	Technical layer (issuing and acquiring processing) typically outsourced to international vendors,[75] while ATMs managed via national provider (Monilogi). Accounts typically managed internally, especially for large foreign groups, as well as commercial and operational layers.
Croatia	0.5	Technical layer (issuing and acquiring processing) typically outsourced to international vendors (e.g. Nets/ Nexi) or national champions (e.g. Bankart). ATMs and accounts typically managed internally, especially for large foreign groups, as well as commercial and operational layers.
Lithuania	0.75	Technical layer (issuing and acquiring processing) typically outsourced to international vendors (e.g.Worldline,[76] Nets/ Nexi). ATMs managed via a pan-baltic JV[77] Accounts typically managed internally, especially for large foreign groups, as well as commercial and operational layers.
Latvia	0.75	Technical layer (issuing and acquiring processing) typically outsourced to international vendors (e.g. Nets/ Nexi).[78] ATMs are managed internally by each of the major banks. Accounts typically managed internally, especially for large foreign groups, while outsourced for domestic banks (e.g. Temenos[79] at Citadele). Most of the commercial and operational layers are internalised.

70 Rabobank launched in 2024 a new issuing platform powered by ACI worldwide for its credit and debit card portfolio (Rabobank – ACI worldwide)

71 Nordea Merchant Acquiring sold to NETS in 2017 (Nets acquires Nordea Merchant Acquiring)

72 Volksbanken and Hypobanken Group outsource cores to ARZ, now owned by Accenture (Accenture to acquire ARZ)

73 Alpha bank sold its acquiring business to Nexi (Alpha-Nexi), and Worldline acquired Cardlink (Worldline-Cardlink)

74 Pireus bank launched a core systems innovation project with Fiserv (Piraeus Bank live on Fiserv Solution), while national bank of Greece moved to Infosys Finacle (National Bank of Greece deploys Infosys Finacle core banking system)

75 Global Payments manages acquiring for Erste Group (Global Payments and CaixaBank Joint Venture with Erste Group Bank in Central and Eastern Europe starts its operations). Nexi CE also has strong presence in the country

76 Worldline acquired First Data Baltics, a merchant acquiring provider operating in the region (Worldline-First Data Baltics)

77 Nordea and Sampo Bank operate a pan-baltic joint ATM network. In 2024, Nordea sold its share of ATMs across the region to Euronet (Euronet Expands Baltic ATM Network Through Swedbank Partnership)

78 Nets has a dedicated office in Estonia through which its serves major institutions across the Baltic area. As an example, it entered into a partnership with BluOr Bank for card issuing processing in 2025 (BluOr Bank & Nets launch partnership)

79 Citadele Bank to Implement a Major IT System Upgrade

Slovenia	0.75	Technical layer (front ends, issuing and acquiring processing, ATMs) outsourced across most banks to national providers (e.g. Bankart). Accounts are mixed, with larger foreign banks maintaining proprietary systems, while domestic banks outsourcing (e.g. to Temenos, Oracle). Commercial and operational layers mostly managed in-house for all banks.
Luxembourg	0.75	Technical layer (issuing and acquiring processing) outsourced across most banks to central shared provider (e.g. Worldline). Front ends outsourced via Digicash-Payconiq. ATM networks shared via Bancomat. Accounts are mixed, with larger foreign banks maintaining proprietary systems, while domestic banks outsourcing (e.g. to Temenos, Avaloq). Commercial and operational layers mostly managed in-house, especially by foreign banks.
Cyprus	0.75	Technical layer (issuing and acquiring processing) outsourced across most banks to national provider (JCC). Front end also outsourced for some banks (e.g. Backbase for Hellenic bank).[80] Accounts are mixed, with some banks managing internally and other via vendors (e.g. Temenos), while commercial and operational layers are mostly managed in-house.
Estonia	0.75	Technical layer (issuing and acquiring processing, ATMs) outsourced across to pan-european players (e.g. Nets/Nexi, Worldline). Accounts are mixed, with larger foreign banks maintaining proprietary systems. Commercial and operational layers are mostly managed in-house.
Malta	0.5	Technical layer (issuing and acquiring processing) outsourced across most banks. Accounts outsourced to international providers across most banks (e.g. Oracle for BOV, BML's ICBS for APS). ATMs mostly owned by banks. Commercial and operational layers are mostly managed in-house.
Bulgaria	0.75	Technical layer (issuing and acquiring processing, ATMs) outsourced to national provider (Borica). Accounts outsourced to international providers across most banks (e.g. Temenos, Oracle, Backbase). ATMs mostly owned by banks. Commercial and operational layers are mostly managed in-house.

A1.3. History of collaboration

The history of interbank collaboration represents a critical factor in assessing the likelihood of synergies or cost mutualisation for the digital euro. Markets where banks have traditionally relied on jointly developed infrastructures, either for large regulatory programmes such as PSD2 or for operational purposes like ATM networks and payment processing, demonstrate a higher propensity to pool resources in the future.

Countries with the highest scores include for example Germany, where banks jointly own the girocard network and have jointly developed Wero for A2A payments, Italy, where banks have jointly owned the Bancomat network for a long period and have collaborated via CBI for joint developments for PSD2 services, the Netherlands, where banks jointly owned equens for payment processing, Geldeemat for ATM management and developed iDEAL for A2A payments, or Spain and Portugal, which have national providers for payment processing national champions (Redsys, SIBS), providing processing services at no additional margin to all shareholder banks, and set the benchmark for near-universal adoption of a shared platform with Bizum. These countries all score highest, as their institutionalised collaboration reduces fragmentation and increases the likelihood of common digital euro developments.

By contrast, countries such as Ireland, Greece, Slovakia, and Croatia, have less experience in sector-wide projects, with collaboration mainly limited to compliance-driven initiatives or EU-level mandates rather than domestically created infrastructure. Finally, a handful of markets, such as Lithuania and Malta, score lowest, as banks have historically pursued more fragmented approaches, with little evidence of sector-wide platforms. In these markets, the absence of established

[80] Backbase | Hellenic Bank Debuts Cutting Edge Retail Banking App in…

cooperation structures suggests that banks may be less able to align quickly on shared digital euro solutions, limiting the synergy potential compared to more collaborative peers.

The resulting country scores for this dimension are summarised in Table 6 below.

A1: Table 6

Country scores – History of collaboration

Country	Score	Rationale
Germany	1	Long tradition collaboration (girocard, EBICS) and strong collective standards across private banks (Bank-Verlag).
France	1	Longstanding multi-bank coordination via Cartes Bancaires, Paylib[81] and STET.
Italy	1	Longstanding multi-bank coordination via CBI network (e.g. PSD2 services development) and card scheme (Bancomat).
Spain	1	Joint venture for payment processing (Redsys),[82] as well as sustained multi-bank initiatives with broad participation and common governance (e.g. Bizum).
Netherlands	1	Strong record of joint infrastructures such as iDEAL for A2A payments, equens for processing, Geldeemat[83] for ATMs.
Portugal	1	Decades of joint infrastructures (Multibanco, MB WAY) with universal participation.
Belgium	0.75	Collaboration history is high. Belgian banks mutually invested in the Bancontact initiative as well as the Batopin for ATM management.
Ireland	0.5	Medium history of collaboration. Attempted development of Sync payments, a joint venture of four banks to create a real-time mobile payments app.
Finland	1	Joint projects such as Automatia ATM pooling,[84] to jointly owned payment networks, to creating shared credit registries.
Austria	0.75	Strong record of sector collaboration. PSA[85] is a cooperative initiative of the Austrian banks to manage ATM network and card processing operations.
Greece	0.5	Greek Banks have a collaboration history under DIAS (JV of the Greek banking association).
Slovakia	0.5	Slovakian bank mutually own Monilogi for ATM management and cash handling.
Croatia	0.5	Collaboration is moderate (e.g. 11 out of the 15 national banks opted for Bankart solution for PSD2 services).[86]
Lithuania	0.25	Collaboration among banks remains limited but is gradually emerging. A memorandum of understanding on shared ATM usage marks a first coordinated effort to join forces.
Latvia	0.75	Collaboration has been mainly driven by Latvijas Banka, which has developed and provided shared infrastructures to support interbank cooperation (e.g. instant payment service (EKS), instant link registry).
Slovenia	1	Banks jointly own Bankart, a multi-bank payment processing provider, and Flik national A2A instant payment scheme, which involved all major banks aligning on a payment solution. While the back-end infrastructure is shared across all banks, front end implementation differs: some relying on the stand-alone Flik app provided by Bankart, others integrating Flik directly into their own mobile apps.

81 Paylib has been launched by a consortium of banks (https://www.finextra.com/newsarticle/32103/french-banks-to-introduce-p2p-mobile-payments) in 2018 and is now migrating to Wero

82 Redsys is a joint venture of the major Spanish banks (e.g. Santander, CaixaBank, BBVA, Sabadell and others) dedicated to payment processing and issuing/ innovation services (e.g., it runs the Bizum phone-IBAN directory) - Sobre nosotros - Redsys

83 Geldemaat has been managing since 2019 all ATMs for ABN AMRO, ING, and Rabobank, with a single brand and software (https://www.geldmaat.nl/en/about-us/organisation/)

84 Automatia operates the joint ATM network Otto. All banks operating in Finland are served by Automatia (https://otto.fi/en/automatia/)

85 PSA is collectively owned by all major Austrian banks (https://www.psa.at/) and provides card and ATM services, as well as product innovation for the shareholding banks

86 https://www.ibm.com/case-studies/bankart

Luxembourg	1	Collective investments in the Digicash initiative, as well as in the open banking platform LUXHUB.[87]
Cyprus	1	High track record of collaboration, with JCC as a multi-bank processing provider.[88]
Estonia	0.75	Banks share a tradition of collaboration through jointly governed digital infrastructure (SK ID Solutions AS), co-owned by two major banks and a telecom operator, and through state-backed platforms such as X-Road and the national eID system acting as enabler.
Malta	0	No significant collaboration among banks.
Bulgaria	1	Decades of joint infrastructure operation via BORICA,[89] which is owned by 19 domestic banks.

A1.4. Exemplary synergies opportunities in the context of the digital euro

The synergies and cost mutualisation identified in this annex may also be applicable in the context of the digital euro. Even if core functions such as settlement are provided directly via the digital euro service platform (DESP) by the Eurosystem, there remain substantial opportunities for shared implementation among banks and PSPs. In many cases, existing joint ventures, shared processors, and multi-bank platforms can be leveraged to avoid duplication of investments and enable faster, more efficient roll-out.

Some adaptation may be required to align with specific digital euro requirements, but established joint ventures, national service providers, and pan-European vendors already create favourable conditions for collective solutions.

A2. Key results for market synergies

This chapter summarises the main findings of the cost synergy assessment. It presents both the country-specific scores across the assessment dimensions and the resulting estimates of synergy or cost mutualisation potential. The results provide a comparative view across markets and allow for a structured discussion of the cost-saving opportunities under different scenarios.

A2.1. Cost synergy potential – Base synergies case

The first step of the analysis is the base synergies case assessment. It combines the country-level scoring of the five dimensions and translates it into the percentage score for derived cost synergy potential (see methodology in Section A1 above). This section provides the country-specific results for each dimension, highlighting how

87 Luxhub was founded in 2018 by BCEE, BGL BNP Paribas, Banque Raiffeisen and POST Luxembourg to jointly develop PSD2 open banking solutions (https://luxhub.com/about-us-open-banking/)

88 JCC offers issuing, acquiring and ATM services to most banks in Cyprus (https://www.jcc.com.cy/about-jcc/)

89 Borica, collectively owned by 19 banks, has developed and nowadays provides and operates the technology infrastructure of the Bulgarian payment industry (https://www.borica.bg/en)

variations in vendor concentration, multi-country presence and outsourcing levels shape the relative potential for cost savings.

A2: Table 7

Country-specific scores and cost synergy potential (Base synergies case)

Country	Vendor concentration	Presence of multi-country vendors	E2E vendor coverage	Outsourcing level	History of collaboration	Total score	Cost synergy potential
Germany	0.5	0.75	0.5	0.4	1	3.15	30%
France	0.5	0.5	0.5	0.3	1	2.8	30%
Italy	0.5	0.75	0.75	0.6	1	3.6	35%
Spain	0.5	0.25	0.5	0.5	1	2.75	30%
Netherlands	0.75	0.75	0.5	0.5	1	3.5	35%
Portugal	0.75	0.25	0.5	0.7	1	3.2	30%
Belgium	0.5	0.75	0.5	0.5	0.75	3	30%
Ireland	0.5	0.5	0	0.5	0.5	2	20%
Finland	1	0.75	0.75	0.5	1	4	40%
Austria	0.75	0.75	0.5	0.5	0.75	3.25	35%
Greece	0.5	0.5	0.25	0.5	0.5	2.25	25%
Slovakia	0.5	0.5	0.5	0.5	0.5	2.5	25%
Croatia	0.5	0.25	0	0.5	0.5	1.75	20%
Lithuania	0.75	0.5	0.25	0.75	0.25	2.5	25%
Latvia	0.75	0.5	0.25	0.75	0.75	3	30%
Slovenia	1	0.5	0.5	1	1	4	40%
Luxembourg	0.75	0.75	0.25	0.75	1	3.5	35%
Cyprus	0.75	0.25	0.25	0.75	1	3	30%
Estonia	0.5	0.5	0.25	0.75	0.75	2.75	30%
Malta	0.5	0.25	0	0.5	0	1.25	15%
Bulgaria	0.75	0.5	0.25	0.75	1	3.25	35%
Weighted average[90]	0.55	0.61	0.51	0.47	0.93	3.07	30%

A2.2. Cost synergy potential – Other scenarios

To account for uncertainty in the underlying assumptions, the analysis also considers a range of outcomes. This section compares the base synergies case estimates with a low synergy and a high synergy case, thereby illustrating the bandwidth of possible synergy potentials. The comparison provides a robust view of the upside and downside risks surrounding the base synergies case results.

[90] Weighted by total retail payment volume per country based on exact (not rounded) numbers

A2: Table 8

Country-specific cost synergy potential (All scenarios)

Country	Base synergies case	Low synergies case	High synergies case
Germany	30%	25%	40%
France	30%	20%	35%
Italy	35%	30%	45%
Spain	30%	20%	35%
Netherlands	35%	25%	45%
Portugal	30%	25%	40%
Belgium	30%	25%	40%
Ireland	20%	15%	25%
Finland	40%	30%	50%
Austria	35%	25%	40%
Greece	25%	15%	30%
Slovakia	25%	20%	35%
Croatia	20%	15%	25%
Lithuania	25%	20%	30%
Latvia	30%	20%	35%
Slovenia	40%	30%	50%
Luxembourg	35%	25%	45%
Cyprus	30%	25%	40%
Estonia	30%	20%	35%
Malta	15%	10%	15%
Bulgaria	35%	25%	40%
Weighted average	30%	25%	40%

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French banking giants to form major European payment processor JV

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For specific terminology please refer to the ECB glossary (available in English only).