

The digital euro from a consumer, retailer and industry perspective

Study commissioned by the
National Association of German
Cooperative Banks (BVR)
August, 2024



List of abbreviations

AML	Anti Money Laundering
ASPSP	Account Servicing Payment Service Provider
ATM	Automated Teller Machine
B2B	Business-to-Business
B2G	Business-to-Government
B2P	Business-to-Person
BIS	Bank for International Settlements
BVR	Bundesverband der Deutschen Volksbanken und Raiffeisenbanken e.V. (National Association of German Cooperative Banks)
CBDC	Central Bank Digital Currency
CFT	Combating the Financing of Terrorism
C2B	Consumer-to-Business
C2C	Consumer-to-Consumer (see P2P)
D€	Digital Euro
DEAN	Digital Euro Account Number
D€-R	Proposal of the EU-Kommission on a Regulation of the D€
DK	Deutsche Kreditwirtschaft (German Banking Industry)
EBA	European Banking Association
ECON	Committee on Economic and Monetary Affairs of the EU Parliament
EPI	European Payments Initiative
EUDIW	European Digital Identity Wallet
ECB	European Central Bank
FES	Front-end Services
G2B	Government-to-Business
G2G	Government-to-Government
G2P	Government-to-Person
IBAN	International Bank Account Number
IF-R	Interchange Fee Regulation
IPF	Inter-PSP Fee
SME	Small and medium-sized enterprises
KYC	Know-Your-Customer
LIBE	Ausschuss für bürgerliche Freiheiten, Justiz und Inneres (EU Parliament)
MSC	Merchant Service Charge
M2M	Machine-to-Machine
NFC	Near Field Communication
NFU	Non-financial corporations
PIS	Payment Initiation Service Provider

POI	Point of Interaction
POS	Point of Sale
PSD	Payment Services Directive
PSP	Payment Service Provider
PSR	Payment Services Regulation
P2G	Person-to-Government
P2B	Person-to-Business
P2M	Person-to-Merchant
P2P	Peer-to-Peer (Person-to-Person) (see C2C)
Retail CBDC	General Purpose Central Bank Digital Currency
RTS	Regulatory Technical Standards
SCA	Strong Customer Authentication
SCT	SEPA Credit Transfer
SDD	SEPA Direct Debit
SDK	Software Development Kit
SEPA	Single Euro Payments Area
SEPA Inst	SEPA Instant Payments
TARGET	Trans-European Automated Real-time Gross Settlement Express Transfer System
TIPS	TARGET Instant Payment Settlement
VR	Volks- und Raiffeisenbanken
Wholesale CBDC	Central Bank Digital Currency for Interbank Settlement

Contents

Management summary	3
1 Introduction	6
2 New types of digital central bank money	7
3 General structural components	8
3.1 Overview	8
3.2 Use cases and user groups	12
3.2.1 The ECB's perspective	12
3.2.2 The EU Commission's perspective	13
3.3 The role of payment service providers for end customers	15
3.3.1 D€ payment services	15
3.3.2 PSPs – rights and obligations	16
3.3.3 Non-digital euro payment accounts	18
3.3.3.1 (De)funding	18
3.3.3.2 Exemption from charges	19
3.3.3.3 D€ accounts without a non-digital euro payment account	20
3.4 Form factor	22
3.4.1 Front-end services (FES)	23
3.4.1.1 Freedom of choice	23
3.4.1.2 The "app" payment instrument as a minimum requirement	24
3.4.1.3 Payment card as an optional additional instrument	26
3.5 Offline use	27
3.5.1 Introduction	27
3.5.2 Definition	27
3.5.3 Bearer instrument	28
3.5.4 Bearer instruments as an (additional) payment instrument?	30
3.5.5 No "full anonymity"	30
3.5.6 Limitation	31
3.5.7 Time of introduction	33
3.5.8 Acceptance	33
3.6 Non-financial companies	35
3.7 Compensation model	37
3.7.1 Basics of the compensation model	37

3.7.1.1	Methodological issues	37
3.7.1.2	No clear requirements for applying the inter-PSP fee (IPF)	39
3.7.2	Regulation of fees	40
3.7.2.1	Regulation of fees: General requirements.....	41
3.7.2.2	Determining the costs within the meaning of Art. 17 (2a) of the D€-R.....	42
3.7.2.3	Determining the fees for alternative payment schemes.....	43
3.7.2.4	Funding and defunding.....	44
3.7.2.5	Further settlement models on the side of the merchant PSP.....	45
3.7.2.6	Permissibility of fees not based on transactions.....	45
3.7.3	The offline compensation model	46
3.7.4	The particular importance of fraud costs	47
3.7.5	The compensation model: urgent need for revision	51
3.7.6	Appendix: holistic approach.....	52
3.8	Remuneration and interest	56
3.9	Overview of current regulations: (un)certainities and contradictions	58
4	Implications for consumers, merchants and non-financial companies	60
4.1	Consumers.....	60
4.2	Merchants	64
4.3	Non-financial enterprises (except merchants)	67
4.4	Conclusion: doubts about the use case	68
	Bibliography	70

Authors:

Hugo Godschalk (PaySys Consultancy; hgodschalk@paysys.de)

Malte Krüger (Aschaffenburg Technical University of Applied Sciences; malte.krueger@th-ab.de)

Franz Seitz (Amberg-Weiden Technical University of Applied Sciences; f.seitz@oth-aw.de)

PaySys Consultancy GmbH

Im Uhrig 7

60433 Frankfurt/Main, Germany

Phone: +49-69-951177-0

www.paysys.de/en



Management summary

Now that the investigation phase is over, the digital euro (D€) is in its preparation phase. While this phase is not yet completed and the ECB is open to extending it or introducing a second preparation phase, the official Eurosystem publications to date and the EU Commission's regulatory proposal (D€-R) already indicate a number of general design tendencies.

Many questions remain unanswered at this stage, and the relevant Eurosystem documents and the EU Commission's regulatory proposal contradict each other on certain points. Some issues still remain, especially with regard to the compensation model, liability issues, the offline D€, holding limits and the design of the D€ card. The focus on smartphones as payment device should also be viewed critically.

There is no convincing use case for consumers¹. Although no direct fees will be charged to the D€ account (which is positive for consumers overall), if PSP costs for D€ basic services used by natural persons are not fully covered by inter-PSP revenues or income from special services for D€ accounts, it is likely that this shortfall will be factored in when defining the fees for current accounts (or other banking services).

Whilst users of the online D€ will need D€ accounts, these will not replace current accounts. Having an additional account leads to more complexity as it establishes an additional transaction level between the current account and the D€ account.

For the D€ to be implemented successfully, it will need to be convenient and easy to use. This includes updates, easy transferability of account data to a new smartphone, or the option of using the D€ for Google Pay, Apple Pay or bank-specific wallet payments.

Executing D€ payments does not require D€ to be held in the D€ accounts, as payers can fund their account at the time of payment ("reverse waterfall"). Since the rules stipulate that D€ balances flow into current accounts if merchants receive payments ("waterfall"), it is likely that any D€ balances held by consumers will serve primarily as store of value. However, in view of the planned holding limit, these holding balances will be relatively small.

Consumers already have numerous payment options to choose from, especially in e-commerce, i.e. a new product such as the D€ will have to offer significant added value to gain a foothold in the market. However, as things currently stand, the D€ does not appear to offer this significant recognisable added value as a means of payment.

Using the D€ in e-commerce may entail increased risks for consumers. Unlike payment schemes with a chargeback option, D€ transactions constitute a final and irrevocable payment – unless the rules are amended.

Overall, it is not clear what advantages the D€ offers over existing payment schemes in e-commerce in terms of convenience, risk and reach.

The same applies to physical POS, where consumers already have a wide range of payment options at their disposal.

¹ For the sake of simplicity, this management summary is based on the simplified D€ standard case where the payer is a consumer, the payee is a merchant and the IPF is paid to the consumer's PSP by the merchant's PSP.

Online D€ payments do not seem to offer any additional benefits when compared with existing payment options.

Offline D€ payments offer more privacy than current electronic payment schemes, however less privacy than cash. Some people may prefer to make cashless payments while still benefiting from a certain level of privacy protection. The offline D€ would offer added value for these customers.

Even though the D€ can offer added value to P2P payments, some countries already have very successful mobile payment schemes in place. Since it is unlikely that two mobile payment schemes could coexist, the D€ would have to replace these schemes.

The Eurosystem's focus on an app-based payment instrument on smartphones (or other wearables) may cause the D€ to fail. At present, mobile payments account for less than ten per cent of payments in face-to-face business, and it remains unclear whether smartphones will establish themselves as the dominant payment device in the foreseeable future.

Most merchants will be forced to accept the D€, both in e-commerce and at the physical POS – in other words, they will be legally obliged to ensure D€ acceptance by a certain date.

The part of the D€ system provided by the private sector (PSPs) is to be financed by (capped) merchant service charges. These merchant service charges comprise an inter-PSP fee, mainly for the consumers' payment service providers. Merchants will also have to bear implementation costs, which could be challenging for smaller merchants in particular.

It remains to be seen whether the D€ will reduce payment transaction-related costs for merchants. Even though the D€ is intended as a low-cost alternative for the market, it cannot be assumed that the most favourable alternative for merchants will prevail on a two-sided market.

As such, merchants will probably (have to) add the D€ to their list of accepted payment schemes, whereas the other side of the market – i.e. customers and their PSPs – will determine its use.

The consumers' PSPs (or at least the account-keeping financial institutions) will have to offer the D€ as an option. They will also have an interest in offering payment schemes that provide the greatest profit, or at least cover their own costs. As a result, the D€ might replace the payment schemes that are most favourable for retailers; it is also possible that PSPs will be reticent about offering the D€, meaning that little interest is generated among customers. Such an outcome would be detrimental to retailers and ultimately also to consumers.

The cost of fraud will be particularly important when it comes to using the D€ on the internet. If the liability rules are not improved, there may be unpleasant surprises regarding fraud costs, resulting in higher total costs, which will ultimately be passed on to consumers in the form of price increases.

At present, it is entirely unclear what the D€ implications will be for non-financial companies that are not classified as merchants. Definitions and terms contradict each other on the whole.

SEPA Inst will probably replace SCT as normal use case. In other words, the D€ would have to offer further advantages, alongside an immediate value date, in order to be of interest for non-financial companies not classified as merchants.

It is doubtful whether the D€ will be needed to develop new business models (such as machine-to-machine payments). Standardised interfaces are the key factor in this respect. Clearing and settlement do not necessarily require a D€ and could use existing SEPA payment products or tokenised commercial bank money instead.

It is difficult to establish a new payment solution via an open competitive process in a currency area that already has a wide range of payment methods – particularly if there are no obvious "gaps" in the mix of payment instruments. As no such gaps are discernible, the D€ has no unique selling point.

Setting up a subsidised state-backed/public payment system with mandatory acceptance and additional price regulation at several supporting levels will lead to imbalances and potential competitive distortions, the effects of which can only be foreseen to a limited extent. Efficient European payment systems used at national or even cross-border European level may be ousted by the "artificial" new state-backed/public competitor. There is a very real risk that a complex system that offers hardly any added value will weaken competitiveness on the European payment market without significantly influencing the position of international systems.

1 Introduction

On 1 November 2023, the ECB initiated the two-year preparation phase for the digital euro (hereinafter abbreviated as D€). The ECB Governing Council will probably decide to introduce the D€ at the end of this phase. Consumers are not expected to be able to use the new means of payment until 2027/2028 at the earliest.

The digital euro is designed as an additional account-based payment system that consumers in particular can use for cashless payments in the euro area – in addition to existing payment systems offered by private-sector payment service providers (PSPs) such as credit institutions, payment institutions and e-money institutions. The main focus to date is on consumer payments vis-à-vis retailers (including remote payments), public-sector entities, and other private individuals (C2C). As such, the D€ is more of a rival product to existing cashless payment methods and less of an innovative replacement for the traditional central bank product "cash", the use of which is currently declining.

Potential issuer ECB mainly cites monetary policy and geopolitical reasons for introducing the D€. These include the anchoring effect of central bank money for privately issued commercial bank money, declining central bank money in form of cash, European independence and sovereignty in retail payment transactions, and the threat to public money from private cryptocurrencies.

Pursuant to Article 14 of the European Commission's Proposal for a Regulation on the Establishment of the Digital Euro (28 June 2023), German cooperative banks will also be required to act as D€ distributors vis-à-vis retail customers. On the acquiring side, the VR Payment company will have to expand its services to include acceptance and processing of D€ payments for corporate clients.

The Association of German Cooperative Banks (Bundesverband der Deutschen Volksbanken und Raiffeisenbanken e.V., hereinafter abbreviated as "BVR") sees the D€ payment system as having been designed without taking real-life challenges into account. It also asks whether, and in which areas, it would be capable of generating actual added value for bank clients (retail customers and corporate clients, including merchants) if it were imposed on the market. This study has been commissioned to examine this question.

Numerous publications have been written on the digital euro. When taking stock of the status quo, this study refers only to primary sources, i.e. publications made by the ECB or the Eurosystem and their representatives (including presentations) and by the "*co-legislators*" (European Commission, European Council and European Parliament). The study's primary focus is on the effects of the European Commission's Proposal for a Regulation "*on the establishment of the digital euro*", as published on 28 June 2023 (hereinafter abbreviated as D€-R).

Generally speaking, primary sources are referred to (and cited from) in their original language to avoid issues resulting from any translation errors.

This study works under the assumption of the "normal use case", i.e. that intermediaries (PSPs) on the payer and payee side as well as users all reside in the euro area and therefore that D€ payment

transactions will also take place in the euro area.² The ECB also aims to start with this "normal use case" (ECB, 2023d, 16).

2 New types of digital central bank money

Central bank digital currencies (CBDC) are the most recent form of "public money" and have been the subject of intensive research for some time. Figure 1 categorises and classifies public and private money, using the euro as an example. The Eurosystem mainly addresses this question in order to move with the (digitalised) times by offering a digital form of central bank money, to minimise dependence on foreign payment service providers and, in turn, to achieve monetary sovereignty (ECB, 2023a). According to a survey of 86 central banks conducted by the Bank for International Settlements in 2022, over 90% of the central banks interviewed are considering issuing a CBDC (Kosse & Mattei, 2023). The process began with the e-krona project in 2017 following the unusual decline of cash in circulation in Sweden. It was then accelerated by the Facebook (Meta) initiative in 2019 on the planned (albeit not realised) introduction of Libra (Diem).³ While the former has been put on hold due to "insufficient social need" (Sveriges Riksbank, 2023), the latter was taken over by Silvergate Bank in 2022 (Diem Association, 2022).

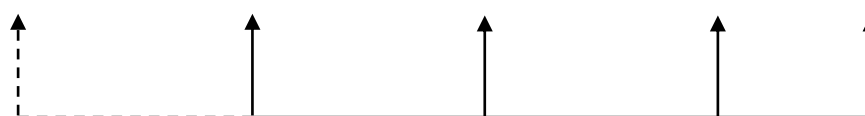
Only four retail CBDCs have gone live so far: the first was the Bahamian Sand Dollar in October 2020 and the most recent was Jamaica's Jam-Dex in July 2022.⁴ All projects were rather insignificant and experienced a number of initial difficulties. For example, the Sand Dollar in the Bahamas is less relevant than coins in circulation, accounting for just under 2% of cash in circulation at the end of 2023 (Digital Euro Association, 2023). CBDC use in Jamaica corresponds to 0.1% of cash in circulation (Muir, 2023).

² Special use cases include, for example, D€ use by natural or legal persons residing in EU member states outside the euro area, visitors from third countries, etc. Several articles in the EU Commission's Regulation Proposal (D€-R) refer to such use cases (e.g. Art. 13, 18, 19, 20). See CPMI (2021) and FSB (2020) for general information on a cross-border (or more specific: cross-currency payments) system and to ECB (2023i) for information specifically relating to the D€.

³ In 1993, the Bank of Finland launched the Avant smart card, an electronic form of cash. Although the system was discontinued at the beginning of the 2000s, it can be considered the world's first CBDC (Grym, 2020).

⁴ The other two were D€Cash in the Eastern Caribbean in February 2021 and eNaira in Nigeria in September 2021.

Category of money	Public-issued money						Private-issued money		
Type of money	Central bank money				Government money		Commercial bank money	E-money	
Kind of money	Transferable accounts with the central bank banks	Central Bank Digital Currency		Banknotes		Coins		Transferable accounts with commercial banks	E-money
Issuer	Eurosystem	Eurosystem		Eurosystem		Euro area governments		Commercial banks of the euro area	E-money institutions of the euro area
Money holders	Commercial banks	Nonbanks	Commercial banks	Nonbanks	commercial banks	Nonbanks	Commercial banks	Nonbanks	Nonbanks



Non-bank liquidity = money stock

Figure 1: Private and public money

Source: Rösl & Seitz (2023, 2).

Note: Commercial banks (credit institutions) are automatically authorised to issue e-money with their banking licence.

While the ECB and the Eurosystem are very open to the idea of the D€ project in their official statements, other central banks – including the Federal Reserve System, the Bank of England, and the Swiss National Bank (Bank of England and HM Treasury, 2023; Swiss National Bank, 2023a) – are rather sceptical, especially with regard to a retail CBDC. Fed Governor Bowman (2023) even went as far as to say that CBDCs are about solving problems that have yet to be found.

3 General structural components

3.1 Overview

The ECB launched the "preparation phase" (following the "investigation phase") in November 2023 (cf. ECB, 2023a). Even though the Eurosystem has not yet made any final decisions and the legislative procedure at European level has not yet been completed (e.g. regarding the role of the D€ as legal tender), the official Eurosystem publications to date and the EU Commission's regulatory proposal (D€-R), along with consultations, already indicate a number of general design tendencies.⁵ The main features of these design tendencies will be listed in this paper, allowing us to discuss specific items, including inconsistencies between ECB and Commission positions, at a later point. The D€ is part of the Eurosystem's Retail Payments Strategy (ECB, 2023b) and is *not* intended to replace but rather to complement cash.

The intention is for the D€ to:

⁵ The ECB has always emphasised that the final decision about issuing a D€ will only be made once the legislative process, which was initiated by the EU Commission in June 2023, has been completed.

- be another legal tender alongside cash (D€-R, Chapter III; ECB, 2023a, chapter 1);
- be account- or token-based, not blockchain-based;⁶
- be designed as a retail CBDC, i.e. available to everyone (private individuals and companies), and not as a wholesale CBDC for interbank payments (ECB, 2023a, chapter 1; D€-R, recital 4);
- be made accessible via intermediaries (payment service providers, "PSPs") and via a D€ app provided by the Eurosystem (ECB, 2023a, chapter 3);
- be available only as means of payment, not (or only to a limited extent) as a store of value (ECB, 2023a, chapter 1; D€-R, Art. 16);
- be capable of being used in particular for point-of-sale (POS) and person-to-person (P2P) payments (ECB, 2023a, chapters 1, 2);
- be capable of being used both online and offline (e.g. via smartphones) (ECB, 2023a, chapters 2, 3);
- be used throughout the euro area (ECB, 2023a, chapter 1);
- have a holding limit for end users (amounts discussed range between €3,000 and €4,000) (ECB, 2023a, chapter 4; Panetta 2022a);⁷
- not bear interest (either in a positive or negative territory; this is in contrast to the original intention (ECB, 2020, 13)) and as such means that the D€ will not be available as a potential monetary policy instrument either (D€-R, Art. 16 (8));
- ensure a high level of data protection and privacy, noting that guidelines on combating terrorist financing and on anti-money laundering measures require certain data to be provided (verification by PSPs, not by the Eurosystem; cf. ECB, 2023a, chapters 2, 3, 6);
- be subject to mandatory acceptance by legal persons (excluding small businesses that do not accept electronic payments) (ECB, 2023a, chapter 2); unilateral exclusion of D€ payments by the payee is not allowed (D€-R, Art. 10);
- be free of charge for consumers, financed via (capped) merchant service charges and inter-PSP fees ("compensation model", cf. ECB, 2023c);
- adopt the characteristics of cash (as far as possible) in its offline form (ECB, 2023a, chapter 1);⁸
- not be programmable money (D€-R, Art. 24 (2));
- be inclusive and easy to use (ECB, 2023a, chapter 5);
- enable instant payments (ECB, 2023a, chapter 1; D€-R, Art. 30 (1)).

As such, the ECB aims to make the digital euro attractive – but not too attractive – for users in order to maintain financial stability (by avoiding withdrawal of customer deposits in crisis situations, bank runs, etc.). The ECB also wishes to guarantee interoperability, both with private digital solutions and with CBDCs in other currency areas. Another function of the D€ is to ensure independence from foreign

⁶ Please refer to BIS (2021), Box 1, for differentiation issues between account- and token-based systems.

⁷ While the Bank of England expects limits to be between £10,000 and £20,000 (Bank of England and HM Treasury, 2023, 80), the German Banking Industry Committee (2024) assumes a figure in the low hundreds. The Sand Dollar in the Bahamas was introduced with a limit of B\$5,000 (approx. €4,500), which was later increased to B\$8,000.

⁸ Please refer to Krüger & Seitz (2017, chapter 3) for the specific characteristics of cash. ECB and EU Commission documents refer repeatedly to the D€ as a public good like cash (as far as possible), without specifically explaining what this means and implies. Please refer to Labat et al. (2024) and the PaySys Report (2023a, 3) for more information on the "public goods issue" in this context.

payment service providers (card companies in particular) and to create a payment infrastructure for Europe.

First of all, however, it should be noted that the D€ is not a *perfect* substitute for cash. This is because it is designed to serve only as means of payment, has an upper holding limit, cannot be completely anonymous and will be more complicated to use and less inclusive than cash.

Nevertheless, as previously mentioned, the EU Commission (in its D€-R) and the ECB intend for the D€ to have legal tender status alongside cash. This will apply to both the offline and online model (Art. 8 of the D€-R). The nature of legal tenders has not been harmonised throughout the EU and there are more or less different national regulations in place in various countries.⁹ While new provisions attempt to apply the rules consistently to D€ and cash,¹⁰ it remains unclear exactly what consistency means in this context. The nature of "legal tender" will obviously be weaker for cash than for D€. For example, ex-ante cash acceptance may be excluded for certain transactions, or upper cash limits may be decided (under national responsibility and if in the public interest, cf. EU Commission, 2023d, recital 4). By contrast, the D€ will be subject to general mandatory acceptance (D€-R, Art. 7) and no transaction limits. Exceptions are only envisaged for small retailers who do not accept comparable digital means of payment (D€-R, Art. 9). It will also be permitted to refuse D€ payments where this is on reasonable grounds and in good faith, where the payment is a P2P transaction, or where the refusal is not based on a unilateral determination by the payee (where unilateral means that the arrangement is drafted in advance, i.e. the payer is unable to influence its substance).

As such, mandatory acceptance of banknotes (the only unrestricted legal tender so far) may also be restricted in Germany because of the principle of contractual freedom which stipulates that parties to a contract are free to define its contents when *concluding* said contract. This means that contracting parties can agree on, or exclude, a specific type of fulfilment at any time, i.e. contractual provisions can stipulate how to fulfil contractual obligations. Contractual freedom is a valuable asset, and it is doubtful whether contractual freedom for D€ will be handled similarly as for physical central bank money. Art. 10 of the D€-R only states that unilateral exclusion of payments is prohibited; bilateral exclusion is not mentioned and therefore not prohibited. Does that mean that restaurants could put up a notice at the entrance to their business informing customers that they do not accept D€ payments?

The ECB assumes that the nature of D€ as legal tender, as embedded in the D€-R, implies mandatory acceptance both for the online and the offline form of the digital euro: "*The legal tender status entails the requirement to accept the digital euro both online and offline, since this is necessary to enable the take-up of both models of the digital euro.*" (ECB, 2023d, 7) Then again, the ECB states elsewhere that offline acceptance is not a given *per se*, "*depending on whether the POS terminal is equipped with offline settlement capabilities (i.e. a secure element)*" (ECB, 2023a, 16). Regulatory clarification on this issue would be advisable.

⁹ In accordance with The National Forum on the Payment System (2015, 6 et seq.), the following currently applies at EU level: "*Case law on this point is scarce, and ultimately it falls to the European Court of Justice to interpret the provision that cash is 'legal tender'.*"

¹⁰ The EU Commission has also drafted a corresponding legislative proposal for cash (EU Commission, 2023d).

The entire D€ project is designed as a step-by-step plan. The first version would facilitate P2P and online payments, followed by payments at retail checkouts and payment transactions with public institutions (Balz, 2023a).

3.2 Application and user groups

3.2.1 The ECB's perspective

The D€ currently being planned by the ECB is a central bank digital currency (CBDC) and payment system for "retail payments" and not for payments between banks, financial intermediaries, payment service providers or similar institutions (also known as "wholesale payments"). The concept of "retail payments" is delineated differently. In a narrower sense, it only includes payments to and from natural persons. The ECB uses a broader concept: *"Retail payments are typically payments between consumers, businesses and public authorities. They can be everyday consumer transactions, but also include, for example, salary and tax payments made by businesses."*¹¹ According to the ECB, the current concept stipulates that the D€ *"could be used for all digital payments throughout the euro area"* (ECB, 2023g, chapter 1), with the understanding that this statement only applies to "retail payments".

In the D€ Glossary (ECB, 2023e, 1), the ECB lists "individual user", "business user" and "government or other public authorities" as potential users of the retail D€ ("rCBDC").¹² The "business user" group is defined broadly and comprises *"groups that may overlap, such as professionals, merchants, small and medium-sized enterprises and the self-employed."* (ECB 2023a, 11). A "merchant" is a subgroup of the "business user": *"a business user providing products or services to individual users in exchange for payments in digital euro"* (ECB 2023e, 10). According to the definition in the ECB glossary (ECB 2023e, 3), a *"business user"* can be either a natural or a legal person. The ECB appears to believe that the classification should be based on the holding limit of the respective accounts, however, a criterion is lacking.¹³ However, the ECB glossary does not include a definition of the *"business user"* as an economic entity. The holding limit for accounts of a *"business user"* is generally zero (multiple accounts are allowed). Fundings or defundings (only *"refunds"* are mentioned here) are settled directly and without delay by the two waterfall procedures via the user's non-D€ payment account at a commercial bank¹⁴. The zero holding limit account also applies to the group comprising government or other public authorities (ECB 2023a, 13).

Consequently, not all natural persons are by definition *"individual users"* (or *"individuals"*) – this only refers to natural persons who are authorised to hold D€ accounts in a particular role. It remains unclear which criteria must be met for a natural person to fulfil the role of a *"business user"*. In any case, according to the ECB methodology, this user is a *"merchant"* and therefore a *"business user"* if they offer goods or services to *"individual users"* in exchange for D€. The same natural person can be registered as a "merchant" and as an "individual user" with a PSP, but with two different D€ account types (credit and zero limit account) (ECB 2023a, p. 19).

¹¹ <https://www.ecb.europa.eu/paym/integration/retail/html/index.en.html>

¹² It remains unclear whether this list should be considered exhaustive, as the glossary cites these participant groups as examples. No other participant categories are mentioned in the glossary.

¹³ There may be a kind of circularity here: *"business users"* have a holding limit of zero. And: the holding limit of zero applies for *"business users"*.

¹⁴ The ECB assumes that the *"non-digital euro payment account"* is a *"commercial bank account"*. According to the D€-R, these payment accounts may also be offered by other PSPs, such as payment institutions and e-money institutions.

It is not clear whether the ECB actually intends to make a distinction between the terms "*business user*" and "*merchant*" or whether it regards them as synonyms.¹⁵ "At least by definition, there is a user group that acts as a "*business user*" (zero holding limit account) but is not a "*merchant*". This case might apply to users in the B2B business. However, according to the ECB, it is not yet possible – or intended – for "*business users*" who are not "*merchants*" to open a D€ account and participate in the D€ payment transaction system.¹⁶ There is no indication of whether (and, if so, how) these potential D€ participants can open a D€ account with an intermediary if they do not fulfil the requirements as a "*merchant*". On the other hand, opening accounts (including multiple accounts) for the government or other public authorities is expressly provided for (ECB 2023e, 8).

Many statements and regulations give the impression that they were made mostly with two "standard cases" in mind: P2P and P2M (payments to merchants).

3.2.2 The EU Commission's perspective

According to recital 4 of the D€-R, the D€ should facilitate a variety of "*retail payments*": P2P, P2B, P2G, B2P, B2B, B2G, G2P, G2B and G2G (P = person, B = business, G = government). This means that the Commission assumes the typically broad definition of "*retail payment*" with regard to the D€. ¹⁷ Furthermore, the proposal explicitly mentions innovative and future payment methods that are rarely used at this early stage and are likely to be found in the B2B segment:

"In addition, the digital euro should also be able to fulfil future payments needs, and in particular machine to machine payment in the context of Industry 4.0 and payments in the decentralised internet (web3)." (recital 4, D€-R).

The D€-R uses different roles or recipients in relation to D€ users:

- payer and payee;
- natural and legal person, can act as either payer or payee;
- "*merchant*".

The term "*merchant*" is not defined in the D€-R. However, the specific merchant role is only relevant in the context of the "*merchant service charge*" (cf. in particular Art. 15 and 37). The "Compensation model" chapter further examines the question of who qualifies as a "*merchant*" and must therefore be considered subject to charges.

¹⁵ In the description of the onboarding process for the "business user", the ECB assumes, for example, that the user is acting as a merchant. Cf. ECB (2023a, 20). Additionally, "*businesses*" outside the euro area should contract an acquirer as a payment service provider to accept the D€. Cf. ECB (2023a, 11). This requirement would be incomprehensible for non-merchants.

¹⁶ "*An end user would be onboarded either as an individual or as a merchant*" (ECB 2023a, 19). It is possible that the ECB equates "*merchant*" with "*legal person*" in this context as well.

¹⁷ In the Payment Services Regulation, PSR (EU Commission, 2023b), the Commission also adopts a broad definition of "*retail*" when supplementing the definition of "*funds*" (Art. 3 (30)) with "*central bank money issued for retail use*", as the PSR also encompasses B2B payments in relation to "*funds*." Please also refer to recital 28 of the PSR. For the definition of "*retail payment*", please refer to World Bank (2012, 91).

Regarding user groups ("*digital euro user*") and therefore also use cases (such as B2B), the D€-R also includes specific rules only for *natural* persons, such as:

- the obligation of credit institutions to provide existing customers with the "*basic digital euro payment services*" listed in Annex II (Art. 14 (1));
- the exemption from charges for the aforementioned basic services (Art. 17 (1));
- the access to the D€ account, even without a "*non-digital euro account*" (Art. 14 (2));
- the exemption from mandatory acceptance, but only if the natural person is "*acting in the course of a purely personal or household activity*" (Art. 9 (c)).

In the list of basic services for *natural* persons, the D€-R in Annex II (except "*conditional payments*") specifies the following payment applications:

- person-to-person payments,
- point-of-interaction (POI) payments (merchant-related): physical POS and e-commerce,
- government-to-person and person-to-government payments.

This list pertains solely to the mandated charge exemption for a variety of incoming and outgoing payments for natural persons but does not intend to limit the application of the D€ to these segments.

It is therefore to be assumed that the D€-R should apply to all retail transaction types mentioned in recital 4 (including B2B). However, it should be emphasised once again that P2P and P2M appear to be seen as standard cases.

3.3 The role of payment service providers for users

3.3.1 D€ payment services

Art. 13 (6) of the D€-R expressly stipulates that users (natural and legal persons) may not have a direct contractual relationship with the ECB or other Eurosystem central banks. Instead, the D€-R (recital 26) sets forth that payment services for users should be provided by payment service providers that have been approved and authorised pursuant to PSD2 (credit institutions, payment institutions and electronic money institutions) and – where applicable – by designated institutions (e.g. "*post office giro institutions*") and public-sector entities.¹⁸ (Participating payment service providers are abbreviated as PSPs hereinafter.) D€ payment services are listed in Annex I of the D€-R; they include account management, account dispositions and provision of payment instruments. Annex II lists the payment services that fall under the sub-category "basic payment services", i.e. services that should be free of charge for natural persons in accordance with Art. 17 (1) of the D€-R.¹⁹

Pursuant to Art. 13 (7) of the D€-R, users may have several D€ accounts with the same PSP or at different institutions. The ECB, on the other hand, is in favour of limiting the number of D€ accounts – at least for natural persons – to only one account, citing technical complexities associated with monitoring individual holding limits (ECB, 2023d, sections 9.2 and 9.3; ECB, 2023a, 20).

Although the D€ balance for offline payments is referred to as D€ account pursuant to Art. 2 (5) of the D€-R, it can be assumed that Art. 13 (7) refers to online accounts held with a PSP. Section 3.5 contains a discussion as to whether one individual can have several offline accounts.

Pursuant to the D€-R, the main task of participating PSPs (also referred to as "*intermediaries*") is "*to distribute the D€*" or "*provide*" or "*distribute D€ payment services*" to D€ users (which include both natural and legal persons). Distribution generally includes the provision of D€ payment accounts and related payment services pursuant to Annex I of the D€-R. Pursuant to Annex I, distributor (a term not used as such in the D€-R) tasks also include payment services for the receipt of D€ on a D€ account and therefore also payment services for D€ accounts held by merchants or other legal persons acting as payees. In other words, distribution expressly covers both parties involved in a payment (payer and payee) and both user groups (natural and legal persons).²⁰ The D€-R assumes that the merchant's PSP offers basic D€ payment services – such as account keeping, the option of receiving D€ payments, and defunding²¹ to the merchant bank's conventional current account (non-digital euro payment account) – at least when acting as a distributor.

¹⁸ All PSPs defined as such in the PSD2 are generally authorised to provide D€ payment services (cf. Art. 13 (1)). Recital 26 suggests that only "*account servicing payment service providers*" (ASPSPs) are allowed to perform this task.

¹⁹ Where PSPs offer basic services at a flat fee within a current account package that is not free of charge, the fee charged by PSPs may not be higher than that charged for the current account package excluding D€ services (cf. recital 40 of the D€-R).

²⁰ In its opinion on the D€-R, the ECB works under the same assumption (cf. ECB, 2023d, section 9.1).

²¹ Should customers receive repayments, funding may take place given that the ECB stipulates that the holding limit on merchant accounts will generally be zero.

This situation contradicts the notion of a 4-party system similar to that in the card business as the basis for the compensation model in which the ECB refers to the merchant's PSP as "*acquiring PSP*" and to the consumer's ("*private individual*") PSP as "*distributing PSP*" (cf. e.g. ECB, 2023a, 31). Please refer to the "Compensation model" section for a more detailed discussion of this contradiction in the role model.

This means that the D€ system can be seen as a 7-party system (cf. the following figure) with the following participants: payers and payees and their PSPs who can keep the current account as well as the D€ account, and the ECB.

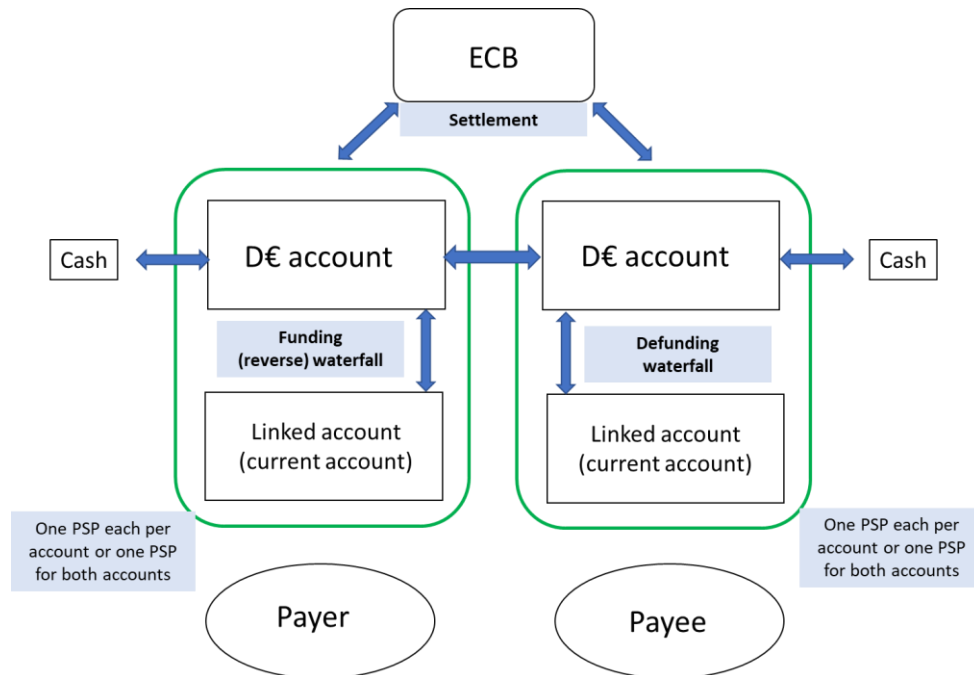


Figure 2: The 7-party system

3.3.2 PSPs – rights and obligations

Art. 13 and 14 of the D€-R set forth PSP rights and obligations regarding D€ payment services and required connectivity between conventional payment accounts and D€ accounts (cf. overview in figure 3):

- Pursuant to Art. 13 (1), all PSPs approved as such within the meaning of the PSD2 may provide D€ distribution services to users.
- Art. 13 (2) and Art. 13 (3) are directed at the ASPSP sub-group (within the meaning of the PSD2²²) whose task it is to establish the connectivity of the payment accounts (non-D€) that they keep for manual and automatic (de)funding. ASPSPs that offer cash services are also required to enable this service for D€ account holders. This raises the question (to be discussed below) as to whether this cash service has to be offered to non-customers as well.

²² The PSD2 does not mention ASPSPs as a sub-group. This group is first mentioned in the EBA's Regulatory Technical Standards (RTS) regarding the obligations on the accessibility of the respective payment accounts in open banking.

- Pursuant to Art. 14 (1), only credit institutions are required to provide existing customers who are natural persons with the free basic services pursuant to Annex II of the D€-R. This mandatory provision of services also extends to potential retail customers who are entitled to a conventional basic payment account pursuant to the Payment Accounts Directive (EU) 2014/92 vis-à-vis credit institutions (Art. 14 (2)).
- In addition, member states will require certain public-sector entities or "*postal offices giro institutions*" (with a PSP authorisation) to provide basic services (Art. 14 (3)).

The **ECB** is in favour of requiring not only credit institutions but also other PSPs "*that offer retail payment instruments*" (ECB, 2023d, section 9.6) to provide basic payment services to natural persons.²³ It justifies this by using the "level playing field" argument and citing the disadvantage for customers who hold an account with this PSP group (currently payment and e-money institutions) and may be forced to enter into an additional contractual relationship with a credit institution for the D€ account. This corresponds to a *de facto* extension of the PSP group to all PSPs that offer their customers IBAN accounts (cf. ECB, 2023d, section 9.6). In its specific proposed amendment to Art. 14 (1), the ECB names "*payment service providers that provide services as referred to the points (1), (2) or (3) of Annex I*" of the PSD2 as subject to this obligation (ECB, 2023d, amendment 18). The European Parliament's ECON Committee is also in favour of extending the group of parties to whom this obligation applies (ECON, 2024, amendment 63).

However, the reference to the payment services to be provided (cash withdrawals and cash deposits, execution of credit transfers, direct debits, and card payments) is problematic because PSPs that do not offer IBAN accounts provide these payment services in a different context (e.g. card-acquiring business). The proposed amendment would force these PSPs to offer D€ accounts to natural persons. Referring to the ASPSPs would be more expedient.

²³ However, referring to Art. 13 (1)(a) of the D€-R, both the EU Commission and the ECB point out that this obligation should apply only to natural persons residing in the euro area.

Payment services	D€ basic payment services		Additional D€ payment services	(De)funding via non-D€
	For natural persons	For legal persons		
PSPs				For natural and legal persons
Credit institutions - account - cash	Mandatory*	Optional	Optional	Mandatory Mandatory
Other PSPs - account - cash	Optional	Optional	Optional	Mandatory Mandatory
Designated PSPs (e.g. public-sector entities)	Mandatory**	Optional	Optional	Mandatory Mandatory

* For existing and non-existing customers entitled to a basic payment account pursuant to the Payment Accounts Directive (EU) 2014/92.²⁴

** For natural persons without a conventional payment account (non-D€).

Figure 3: PSP rights and obligations pursuant to Art. 13 and 14 of the D€-R

3.3.3 Non-digital euro payment accounts

3.3.3.1 (De)funding

The D€ payment services mentioned in the annexes refer not only to the D€ account (online payments)²⁵ held in the central system, but also to (de)funding processes via "*non-digital euro payment accounts*" (e.g. current accounts held at a credit institution) or via cash. (De)funding via accounts can be carried out manually by the D€ account holder or automatically without being initiated directly by the account holder – for example when the waterfall mechanism (including "*reverse waterfall*") is launched upon reaching the mandatory holding limits. Art. 13 (4) and Art. 22 (4) stipulate that D€ accounts may only be linked to one non-digital euro payment account when carrying out automatic (de)funding.²⁶ Digital euro users are allowed to hold their non-digital euro payment accounts and their D€ account with different PSPs. It is unclear whether the non-digital euro payment account and the D€ account must have the same holder.²⁷

²⁴ The obligation with reference to the Payment Accounts Directive applies only to natural persons that are classified as "consumers" within the meaning of Art. 2 (1) of the Directive.

²⁵ Offline payments via the decentralised account are effected without involving a PSP. Payment services are limited to making the instrument available and to funding and defunding.

²⁶ Cf. ECB, 2023a, 21.

²⁷ When the automatic (de)funding process is carried out, Art. 13 (4) assumes, at least for the non-digital euro payment account, that both account holders are identical: "*Digital euro users shall be allowed to have that designated non-digital euro payment account with a different payment service provider than the one where a given digital euro payment account is held.*"

In this case, automatic (de)funding can only work if both of the end customer's participating PSPs establish the necessary technical and organisational conditions. All PSPs offering (non-D€) payment accounts are required to open these non-digital euro payment accounts pursuant to Art. 13 (2) and (3) of the D€-R. In a reverse waterfall event (i.e. when the euro holdings in a D€ account are not sufficient to make a payment), funding should take place in real time to enable "*a smooth payment experience*" (recital 36 D€-R) for the payer.

It is unclear how a real-time transaction between the non-digital euro payment account and the D€ account is to take place in such a funding case. Default risks may occur for the PSP keeping the D€ account, or the transaction could take a relatively long time. Art. 13 (2) states that PSPs keeping non-digital euro payment accounts shall enable D€ users to fund their payment accounts or cash "*manually*" or "*automatically*". It can be assumed that this is an error and that the PSP with which the non-digital euro payment account is held must ensure that both funding variants are possible. Art. 13 (4a), which is probably directed at the PSP keeping the D€ account²⁸, stipulates that PSPs shall enable *automatic* defunding for online transactions (upon approval by the customer), but there is no such provision for funding (Art. 13 (4b)). It is very likely that this is also an error.

3.3.3.2 Exemption from fees

It stands to reason that (de)funding processes always require two payment accounts: the D€ account and the non-digital euro payment account. The exemption from fees applicable to natural persons concerns the D€ account and associated payment services. In other words, the PSP with which users hold their D€ account is not allowed to charge fees for any manual or automatic (de)funding.²⁹

It is doubtful whether the mandated exemption from fees also covers fees for withdrawals from and deposits to the non-digital euro payment account. Exemption from fees for natural persons is governed by Art. 17 (1) of the D€-R. PSPs that provide "*digital euro payment services*" as stipulated in Annex I pursuant to Art. 13 (1a-c) are subject to this obligation. At least in cases where users hold their non-digital euro payment account with another PSP that does not provide D€ services, no obligation can be derived for this second PSP from Art. 17 (1).

The legal construction is probably decisive for (de)funding processes via cash services provided by a second PSP. If the PSP paying out cash acts on behalf of the PSP with which the natural person holds the D€ account, the PSP keeping the account cannot invoice the costs (interchange fee and own costs) to the D€ account holder by charging a fee. Exemption from fees cannot be derived from Art. 17 (1) of

²⁸ Art. 13 (2), (3) and (4) govern the (de)funding rules. It can be assumed that Art. 13 (2) and (3) are aimed at PSPs that keep the non-digital euro payment account and/or offer cash services. As the obligations refer to D€ accounts (e.g. PSPs "*shall link each digital euro payment account to a single non-digital euro payment account*"), Art. 13 (4) is probably directed at the PSPs keeping the D€ accounts. It is unclear why Art. 13 (4) mentions only PSPs providing "*account servicing payment services*", i.e. ASPSPs, since Art. 13 (1) states that all PSPs can provide D€ payment services. Art. 13 (2) also clearly refers to ASPSPs as being subject to this obligation. The word "*account*" that is missing in the first sentence is most likely an oversight. PSPs providing only cash payment services are seldom ASPSPs.

²⁹ The ECB assumes, in its opinion, that the exemption from fees for automatic (de)funding is not regulated. ECB (2023a, 19): "*The draft legislation does not currently list automated funding (...) among the basic services which would be free for basic use. On the other hand, it does include free funding and defunding with cash.*" However, Annex II (f) and Art. 17 (6) refer to Art. 13 (4) which provides information on the automatic (de)funding.

the D€-R if the second PSP provides the cash service to the account holder immediately.³⁰ The ECB assumes that only the PSP with which the user holds the D€ account is required to provide any cash services as free D€ basic services.³¹

No requirement for transactions in the non-digital euro payment account to be exempt from fees can be derived from the D€-R.³²

It is doubtful whether this result from the D€-R is in line with what the regulators intended. If a natural person uses their D€ account by setting a zero limit without credit (as is commonly done with PayPal e-money accounts), each D€ transaction will result in two transactions and therefore incur an item-per-item charge if the non-digital euro payment account is not priced via a flat fee (e.g. on a monthly basis). (Please refer to the "Compensation model" section.) Waiving the item-per-item charge of the non-digital euro payment account might even encourage a zero-limit behaviour among payers.

Due to a voluntary or enforced zero holding limit for natural and legal persons (merchants, businesses, etc.), each D€ transaction – whether C2B, B2B or other – results in at least four bookings if the legal person acting as payee does not make use of acquiring services (collecting). On the payer's side (natural person), the chain of payments triggered by a D€ transaction could even be prolonged by another booking.³³

It is fair to ask whether the principle of automatic (de)funding does not in fact reverse the efficiency gains that the ECB hopes to realise by introducing the D€ given that accounting transactions are potentially doubled.

3.3.3.3 D€ accounts without a non-digital euro payment account

The D€-R realistically assumes that the end customer's online D€ account will generally be linked to an existing non-digital euro payment account to enable automatic (de)funding on the PSP's initiative (upon prior approval by the account holder³⁴) when opening the account (Art. 13 (4)). Natural persons who use a D€ account pursuant to Art. 14 (2) or (3) with a credit institution or designated PSP ("post office" case) without having a conventional payment account are an exception and cannot make use of automatic (de)funding. (De)funding D€ accounts can only be carried out manually in cash or, if

³⁰ By the same token, the exemption from charges cannot cover cash services provided by non-PSPs (independent ATM operators and merchants) either.

³¹ In its opinion on the D€-R, the ECB also proposes that "*funding/defunding from/into cash*" is only a free basic service "*when the payment service provider provides cash services*" (ECB, 2023d, amendment 34). This proposed amendment to Annex II refers to the PSP with which a natural person holds a D€ account.

³² Even assuming that Art. 13 (4) is (also) directed at the PSP keeping the non-digital euro payment account, the free basic service with reference to Art. 13 (4) pursuant to Annex II (f) refers to "*digital euro payment transactions*". (De)funding transactions are not D€ transactions but rather a prerequisite or a consequence (depending on the D€ holding) of a D€ payment transaction pursuant to Art. 2 (14) and (15).

³³ Example: The D€ account is offered by the PSP "PayPal". The PayPal e-money account is the non-digital euro payment account that is "funded" against a current account held with a third-party bank (direct debit or debit card). With certain neo-banks, card transactions that fund the non-digital euro payment account can in turn be funded by another card issued by a different PSP.

³⁴ The LIBE Committee is in favour of changing the text from "*prior approval*" by the customer (natural person) to "*permission*" (cf. LIBE, 2024, amendment 40). From the customer's perspective, this change in wording does not seem to make any great difference.

permitted, via an account held by an account holder other than the holder of the D€ account. Nevertheless, Art. 14 (3b) and (4) stipulate that the PSPs in question must offer at least one non-digital euro payment account to allow the natural person to make use of all basic services pursuant to Annex II if they wish to.

Depending on the holding limit, current D€ account balance and transaction amount, a non-digital euro payment account that does not exist or is not used could not only limit the account holder's ability to execute payments, but – in the case of incoming payments – might also place constraints on the payer, since the transaction to the D€ account initiated by said payer is re-transferred because the holding limit is exceeded. This allows the payer to draw conclusions about the non-existence of a non-digital euro payment account, which in turn could lead to data privacy issues, as the constellation of a D€ account without a non-digital euro payment account is provided especially for certain groups of people who are vulnerable to digital financial exclusion pursuant to Art. 14 (3b).

As per Art. 22 (2) and (4) of the D€-R, users (natural and legal persons) are expressly not required by law to open or use non-digital euro payment accounts for online payments:

"(2) In their relationships with their payment services providers for the provision of digital euro payment services, digital euro users shall not be required to have or open non-digital euro payment accounts or accept other non-digital euro products."

"(4) Each digital euro payment account may be linked to one or more non-digital euro payment accounts that shall be designated by the digital euro user."

(Word underlined by the author)

The zero holding limit constitutes a structural obligation, at least for legal persons (e.g. merchants), to use non-digital euro payment accounts because legal persons cannot *de facto* accept a D€ payment without using an acquirer (collection services). This contradiction can be resolved if Art. 22 (2) in conjunction with recital 40³⁵ refers only to opening a non-digital euro payment account with the respective distributor – and not to the non-digital euro payment account with another PSP.³⁶ With regard to Art. 22 (4), the contradiction remains an issue due to the structural obligation for a non-digital euro payment account.

Art. 22 (4) of the D€-R stipulates that "**each** digital euro payment account may be linked to one or more non-digital euro payment accounts" if the account holder wishes to do so. In accordance with the legal definition of "digital euro payment accounts" (Art. 2 (5) of the D€-R), both the account for online payments and the holdings held decentralised as a bearer instrument (offline account) constitute separate D€ accounts. As such, it should generally be possible to link the offline account directly to a non-digital euro payment account for manual (de)funding³⁷. This in turn means that users should be

³⁵ Recital 40 also repeats the statement: "*Digital euro users should not be required to have or open a non-digital euro payment account or to accept other non-digital euro products.*" It could be concluded from the context that the D€-R refers to distributors that provide D€ services to natural persons here.

³⁶ The ECB (2023a, 12) interprets this rule as referring to the PSP with which the D€ account is held. The LIBE Committee advocates for Art. 22 (2) to refer only to D€ services provided to natural persons by designated institutions ("post office" option) (LIBE, 2024, amendment 56).

³⁷ This excludes the automatic waterfall functionality because offline accounts are generally "*prefunded*".

able to fund (and vice versa: defund) the offline account – which is generally "prefunded" (cf. ECB, 2023a, 13 et seq.) – via the online D€ account, via a non-digital euro payment account or via a cash deposit (e.g. via ATM or counter). The ECB explicitly provides for all three methods (ECB, 2022b, 9), stating that offline devices require an online connection for this process, "either directly or via a banking terminal" (ECB, 2023a, 15). It remains unclear why this online connection is required for cash deposits or withdrawals.

Pursuant to Art. 37 (4d) of the D€-R, participating PSPs are required to register the account numbers when (de)funding an offline account. It is unclear whether this provision only applies if (non-digital euro payment) accounts are involved, or if (de)funding in exchange for cash is generally not provided for. In recital 75 of the D€-R, the EU Commission assumes with regard to Art. 37 that offline accounts are (only?) funded and defunded via online accounts, stating that "only personal data related to depositing or withdrawing digital euros from digital euro payment accounts to load them onto the local storage devices, or from the local storage devices into the digital euro payment accounts" should be processed.

In this context, the question arises as to whether users can use the D€ exclusively via an offline account without having an online account. If offline accounts are seen as independent D€ accounts rather than as sub-accounts to online accounts (as per Art. 2 (5)), end customers should be able to hold the two accounts (online and offline account) via different PSPs.

Both accounts should have a specific identifier. It is doubtful whether the offline account (like the online account) will be allocated a specific DEAN (digital euro account number). The descriptions of the onboarding process currently mention only one single DEAN for the (online) D€ account (ECB, 2023a, 20; ECB, 2024a, 6 et seq.). It is likely that the "identifier of the local storage device" required as per Art. 37 (4b), which stores the offline holdings, will fulfil the function of an account number, which would mean that DEANs would only be allocated to online accounts.³⁸

3.4 Form factor

The ECB defines the form factor as the interaction between the "device" (e.g. smartphone), the interface (e.g. app) and the data transmission technology (e.g. NFC and QR code) for initiating a D€ transaction from the perspective of a natural person (cf. ECB, 2023e, 7). The following section focuses on the device used and the respective interface.

D€ payment transactions (online and offline) can be initiated from different physical devices: computer (PC), smartphone, (smart) card and wearable³⁹. The ECB assumes a "mobile device" in the form of a smartphone as the standard case. The "local storage device" for offline payments would be a physical component within the aforementioned physical devices. Online D€ transactions can be initiated via an online interface (e.g. in online banking by accessing a website via PC or smartphone) or an app and/or wallet (usually via smartphone) or another payment instrument (card).

³⁸ Art. 34 (1c) of the D€-R and Annex III (2iii) and (3ii) state that the DEAN and identifier of the offline device are recorded.

³⁹To simplify matters, "wearables" and "tablets" will not be explicitly mentioned here as additional "mobile devices" alongside smartphones.

The terms "payment instrument", "app" (or "payment application") and "wallet" are often used interchangeably (not only in relation to the D€ ecosystem) with no clear definition or distinction, which makes it difficult to interpret and analyse the respective source material in which they are used. The terms are interpreted on a case-by-case basis in the following sections. The terms "app" (or "payment app") and wallet⁴⁰ are also used only in relation to smartphones (and possibly web-based interfaces), but not in relation to cards.⁴¹

The ECB (ECB, 2023a, 24) currently lists the following options for initiating a D€ payment transaction:

- ECB app (also called digital euro app), developed and offered by the Eurosystem
- PSP app ("*proprietary app*")
- online interface of the PSP (website)
- payment card

3.4.1 Front-end services (FES)

3.4.1.1 Freedom of choice

The Explanatory Memorandum on the D€R states that both the ECB and PSPs "*may provide*" front-end services (p. 15). The end customer should have the freedom to choose between the available FES (p. 15). The term "FES" is broadly defined in Art. 2 (20)⁴² of the D€-R and refers to the interfaces between PSP and users for the provision of D€ services, such as the PSP's online interface. With regard to the smartphone as a standard instrument, the FES refer primarily to the ECB app and the PSP's proprietary app (PSP app), which can be made available to users (especially natural persons). The PSP app and the online interface are to be created on the basis of an SDK ("*software development kit*") provided by the ECB. The ECB app is designed to initiate both online and offline transactions.

The users' freedom of choice between the two apps is regulated in Art. 28 (1) of the D€-R. Art. 28 (1) does not imply that both apps must also be actually offered by the respective PSPs, as is often assumed

⁴⁰ The ECB defines the D€ wallet as "*a service that enables digital euro users to initiate digital euro transactions by storing secure information related to the digital euro holdings of a digital euro user, which are either with the Eurosystem or local in an offline digital euro device*" (ECB, 2023e, 6). The definition does not distinguish it from the D€ app. The ECON Committee (2024) even suggests replacing the term "*digital euro payment account*" with "*digital euro wallet*", albeit without providing a justification or suggesting a legal definition for the term "wallet". This leads to opaque statements, such as "Digital Euro wallets are a category of payment accounts" (amendment 9).

⁴¹The term "*payment application*" is already defined in European regulation through its use in the Interchange Fee Regulation (Regulation (EU) 2015/751) with a legal definition in Article 2 (21) in the context of a card category.

⁴² "*[...] all components necessary to provide services to digital euro users that interact via defined interfaces with back-end solutions and other front-end services*".

by the DK⁴³ and others.⁴⁴ According to Art. 28 (1), PSPs are needed so that users can choose to access their D€ account through either app, even if the PSP provides its own app ("*choice of using*"). Despite presumptions to the contrary, sentence 2 of Art. 28 (1) states that there is no obligation to distribute both apps, as the PSP explicitly has the option to refrain from offering an app. This option is specifically intended for smaller PSPs that may decide not to offer an app of their own due to the development costs involved (ECB, 2024b, 3). The PSP should only ensure that the end customer can use the ECB app in either case, i.e. whether offering a PSP app or not. Art. 28 (1) of the D€-R states that users (natural and legal persons) should generally have this freedom of choice. By contrast, the ECB refers only to "*individuals*" (ECB, 2024b, 3).

In the case of the ECB app, the PSP that provides the user with the D€ account should ensure that the account can be used and accessed. However, the ECB will provide the app expressly without having a contractual relationship with the end customer (cf. recital 62). If the PSP does not offer the ECB app to its customers but merely enables them to use it, it is not clear who the issuer of this payment instrument is within the meaning of PSD2. The D€-R does not specify with whom the user enters into a contractual agreement for using the ECB app in this case. According to the ECB (2023a, 21), the natural person's⁴⁵ PSP would be responsible for distributing and "*maintaining*" the respective payment instrument

If the "*local storage device*" is on the same device (smartphone), it should also be possible to control the offline function through the app (ECB, 2024b, 3).

3.4.1.2 The "app" payment instrument as a minimum requirement

Annex II of the D€-R also confirms the aforementioned interpretation regarding the requirement under Art. 28 (1) for the natural person's PSP to offer only one app for basic services "*provision of at least one electronic payment instrument*" (Annex II (g)). It can be assumed that both app variants are to be classified as payment instruments under the PSD2⁴⁶.

⁴³ Cf. German Banking Industry Committee (2024, 3). EPI also derives from Art. 28 (1) an obligation for PSPs to offer the ECB app (cf. EPI, 2024, 4).

⁴⁴There are a number of arguments against the interpretation of Art. 28 (1) of the D€-R as requiring PSPs to provide both apps to the end customer. In different parts of the D€-R (e.g. in recital 61 with reference to Art. 28), it is mentioned that the ECB app is not only developed but also "*provided by*" the ECB. According to the ECB (2024b, 3), the distribution channels for the ECB app include, for example, the "*Android and iOS platforms*". Recital 61 describes the scenario where a PSP offers both apps as an option rather than as standard: "*Where digital euro users can choose between different front-end services...*"

⁴⁵The ECB (2023a, 21) uses the term "*consumer*" instead in this context.

⁴⁶ A payment instrument is "*a personalised device(s) and/or set of procedures agreed between the payment service user and the payment service provider and used in order to initiate a payment order*" (Art. 4 (14) of the PSD2). This legal definition is not precise and clear. It is to be assumed that a "*set of procedures agreed between the payment service user and the payment service provider*" must always be in place, regardless of the existence of a "device". A "*personalised device*" can only be considered a payment instrument if the physical device is directly technically linked to the "*set of procedures*" and provided by the issuer with the application, as in the case of a physical payment card. Otherwise, smartphones, PCs and even cars would be payment instruments that could be issued only by approved PSPs. This lack of clarity in the legal definition is unfortunately not resolved in the Commission's proposal for PSD3/PSR.

According to Annex II (e) and (g), this app-based payment instrument should, as part of the basic services, enable the following primary use cases for the natural person: P2P, P2B (physical and e-commerce), G2P and P2G. Only an app can be used for all use cases.

A payment instrument in the form of an **interface** (online access to the D€ account) with the capacity to make a D€ transfer would not be sufficient because there is no option for face-to-face payments in the case of P2B transactions.⁴⁷ As well as this, providing a **payment card** would not cover all use cases – in the scenario of face-to-face payments, for instance, this requirement could only be met on the payer's side if the payee had a smartphone or another card reader in the P2P case.

Annex II (g) calls for the provision of a "*payment instrument for the execution*" of D€ transactions in the aforementioned segments. This requirement corresponds to the immanent basic function and the legal definition of a payment instrument "*to initiate a payment order*" (Art. 4 (14) of the PSD2). According to Annex II (e), however, the payment instrument should also enable "*the reception of digital euro payment transactions*". The natural person should be able to receive payments through the payment instrument as well. This means that crediting the D€ account of the natural person following a payment transaction initiated by the payer is not sufficient. Here, it is possible that not only the payment instrument of the payer but also that of the payee would be involved. In addition to the P2P case, Annex II (e) explicitly mentions the G2P case, in which the natural person acts solely as the payee of payments made by public-sector entities. It should be possible to receive incoming payments through the payer's payment instrument. Having an app as a payment instrument fulfils this dual function.

Taking into account the payment instruments under consideration, Annex II therefore requires an app to be provided for incoming and outgoing D€ payments as a minimum requirement for basic services. At the very least, the ECB app would be the "*front-end solution for all prioritised use cases of the digital euro*" (ECB, 2023a, 29). The Austrian National Bank currently expects that every bank will provide smartphone access (Niederländer, 2024, 16).

The required dual function excludes the physical card from fulfilling the minimum requirement of "*at least one electronic payment instrument*" in accordance with Annex II (g), because the natural person can only initiate payments with it, but – at least with the equipment commonly used today – cannot receive payments in accordance with Annex II (e) for technical reasons.

Annex II refers to the initiation and receipt of D€ transactions. It is not clear here whether the mandatory payment instrument is supposed to facilitate both online and offline transactions. At the same time, according to recital 34, the end customer needs to have the option of executing a D€ transaction either online or offline. This implies that the natural person with the mandatory instrument can implement both options if they so wish.

⁴⁷ A transaction using online access to the D€ account (interface) without an app would be technically possible, for example by using a QR code, but it would be impractical in a face-to-face transaction at the POS. This scenario is currently not provided for. Cf. EZB (2022d, 19).

Both apps (ECB app and PSP app) can be integrated into a wallet⁴⁸ provided by the PSP or a third party. According to Art. 25 of the D€, the apps must be capable of being integrated into the planned "European Digital Identity Wallet" (EUDIW) or at least designed to be compatible with the EUDIW application.⁴⁹ The EUDIW is used in this case to authorise the D€ payment via Strong Customer Authentication (SCA). Other commonly used instruments in digital payment transactions (proprietary methods of PSPs or those of a third party as "*delegated or decoupled SCA*") can also be used for the purposes of authentication (cf. ECB, 2023a, 24).

According to recital 58, the EUDIW should also facilitate offline transactions: "*Further, to facilitate offline proximity payments in digital euro, it should be possible to use the European Digital Identity Wallets for the storage of digital euros in the payment device.*" It remains unclear whether the EUDIW is intended solely as a storage location for the offline D€, or if the authentication function of the EUDIW is also intended for funding, accessing the storage or facilitating offline payments. Opinion is also divided as to whether the eIDAS Regulation 2.0 adopted in 2024 (EU, 2024) includes a mandatory acceptance requirement for the application of SCA in payment transactions (cf. PaySys Report, 2023c). The need to authenticate offline transactions is discussed in the "Offline Application" section.

3.4.1.3 Payment card as an optional additional instrument

As previously demonstrated, an app combined with a mobile device is the only currently known payment instrument that meets **all** the requirements listed in Annex II regarding the payment instrument that must be provided by the obligated PSPs (currently only credit institutions) as part of the basic services for natural persons. In the definition of a "*mobile device*" (Art. 2 (31)), which allows both online and offline D€ transactions, the card is not mentioned as an example, unlike "*smart phones, tablets, smart watches, and wearables of all kinds*". This means that a payment card would be an optional additional instrument, which – in contrast to an app on a smartphone – can only cover certain use cases for the D€. ⁵⁰ Here, the payment card might only be provided if requested by the end customer (ECB, 2023a, 20). An additional card might incur fees, as the respective PSP would – according to Annex II of the D€-R – only be required to provide one payment instrument as part of the free basic services package.⁵¹

Elsewhere, the ECB mentions the payment card as an additional form factor (together with the app) for "*vulnerable groups*" (ECB, 2023a, 7; cf. also ECB, 2023j, 9). "*A digital euro payment card would be available for those who are vulnerable to digital financial exclusion and prefer a physical card to an app, while the option of funding and defunding via cash would also allow a simple top-up of a digital euro device without using a smartphone.*" (ECB, 2023a, 34). The card would serve as an instrument "*to foster financial inclusion*" (ECB, 2023h, 8). According to the ECB, the PSPs designated under Art. 14 (3)

⁴⁸ A wallet can serve as a "*pass-through wallet*", containing multiple digitalised payment instruments such as virtual payment cards. Unlike a "*staged wallet*", the wallet itself, as a container, is not a payment instrument. Cf. recital 24 of the Commission's proposal for PSR. Without further explanation, the term "wallet" in this analysis is understood to mean a container ("*pass-through wallet*").

⁴⁹ According to recital 57, this compatibility is only required for the FES developed by the ECB.

⁵⁰ The "QR code" form factor would not be feasible with a card either, cf. ECB (2023a, 16).

⁵¹The ECB (2023j, 6) mentions the provision of an "*extra payment card*" or other "*additional payment instruments*" as an additional source of revenue for PSPs serving natural persons.

of the D€-R ("post office" case), which are required to offer basic services to unbanked persons, should be obliged to issue such a card (ECB, 2023j, 9 and ECB 2023g, 1).

The D€ card would then be an auxiliary payment instrument for including marginal groups. In this case, there is a risk that the use of a payment card could have a stigmatising effect.⁵² It is noteworthy that the development of a D€ card system – unlike the app, SDK and offline solution – has not yet been tendered by the ECB. It is likely that a physical card will be introduced at a later stage.⁵³

The fundamental question is whether the "*mobile device*" form factor of a smartphone in conjunction with an app as a payment instrument is future-viable and suitable as the central and primary payment medium of the D€ system for the population at large. The ECB implicitly assumes that the smartphone will be accepted and used as a payment medium by the vast majority of consumers for D€ payments at the time of introduction. However, there is a lack of solid evidence to justify this assumption. The form factor app + smartphone could become a factor contributing to the potential failure of the D€.

3.5 Offline use

3.5.1 Introduction

The intended offline use is both a core element and innovative feature of the planned D€, for several reasons: (1) The offline version of the D€ is designed as a bearer instrument and, as such, is very similar to the concept of digital cash, fulfilling one of the key reasons for introducing the D€ (as an additional digital solution alongside cash). (2) The offline concept creates a payment method that offers a high degree of anonymity when compared with online payments. (3) The offline version is robust because payments can be effected even without a network connection. (4) The EU is hoping that the offline version will improve financial inclusion (cf. ECB, 2022a, 8).

In contrast to conventional payment instruments based on privately issued commercial bank money (including e-money), the D€ offline version – as a bearer instrument – is a systemic and functional additional instrument and technical innovation. Due to lack of demand and utilisation, comparable payment instruments – "electronic purses" (in Germany: the "GeldKarte" payment card) – have all but disappeared from the EU market.

3.5.2 Definition

Based on the definitions set out in the ECB glossary (ECB, 2023e, 10) and Art. 2 (15) of the D€-R, the offline version is characterised by the D€ payment being effected between the payer's and the payee's "*devices*", without "*settlement*" taking place between the D€ accounts held in the digital euro settlement infrastructure. As opposed to online payments⁵⁴, offline payments can be settled immediately; an internet connection to the "*digital euro settlement infrastructure*" pursuant to

⁵² The current discussion regarding the "payment card" for refugees shows that even using the same payment instrument in the form of a payment card with an international brand (Mastercard or Visa) is seen as being potentially stigmatising.

⁵³ Cf. Balz (2023b)

⁵⁴ *Online payment*: "A payment in which settlement requires that at least the payer or the payee is connected to a network" (ECB, 2023e, 11).

Art. 2 (14) is not required and the infrastructure is not part of the settlement process. "*Final settlement*" of offline D€ payments pursuant to Art. 30 (3) of the D€-R occurs when the D€ is transferred from device to device (similar to what happens with cash payments) and when the D€ holding balances have been definitively updated in the payer's and the payee's local storage devices. Recipients can use the D€ for further payments immediately upon receipt, or can withdraw the euro from circulation as the owner of the bearer instrument (e.g. by destroying the device).

The key difference between online and offline D€ payments is the settlement level (as defined above), which is either centralised or decentralised. Offline payments can – but do not necessarily have to – occur via transmission technologies such as NFC or Bluetooth, which require the two devices to be in close physical proximity to one other (face-to-face transactions). From a technical perspective, decentralised settlement between the two devices could also take place via the internet. "Offline" therefore refers to the missing connection to the digital euro settlement infrastructure to authorise and settle the payment. As such, the requirement for offline payments to take place only when the two devices are in close physical proximity to one other is – as opposed to the "*offline payment*" definition in the ECB glossary⁵⁵ – not a consequence of the decentralised settlement method⁵⁶ but only a regulatory requirement. In view of this, including the requirement "*made in physical proximity*" in the definition (as is currently the case in the D€-R (Art. 2 (15)) seems questionable from a methodological perspective.

3.5.3 Bearer instrument

The D€-R uses the term "*local storage device*" to denote the equipment on which "*the records of the digital euro holdings*" (Art. 30 (3)) are stored. Both payers and payees must have this equipment to initiate offline transactions (cf. Art. 2 (15) D€-R). The D€ may be stored either locally in a decentralised account (holding balances) or as digital "*units of value*". The D€-R is technology-neutral in terms of both offline holdings and holding balances held within the digital euro settlement infrastructure ("*holding balances or units of value*"⁵⁷). According to the D€-R (Art. 2 (5)), offline holdings are also "*digital euro payment accounts*" for regulatory purposes.

Any D€ transferred in offline transactions can be used immediately by payees in subsequent offline transactions (ECB, 2023a, 30), thereby establishing the "transferability" of the offline D€ for natural persons. Merchants should also be able to immediately reuse offline D€ (e.g. for refunds) and maintain a given account balance (ECB, 2023a, 24). The device used for offline payments should go online regularly for security reasons ("*verification of security*"; ECB, 2023a, 14) and to monitor holding limits. It is not clear how this requirement can be met if the device is only used for offline transactions.

According to the ECB's position and the current tender, the offline device constitutes a bearer instrument: "*hardware bearer payment instrument*" (ECB, 2024c, 1). The D€ units or holding balances

⁵⁵ *Offline payment*: "A payment in which authorisation and settlement takes place between payer's and payee's devices, without the need for any connection to the internet or other computer network and **therefore** only in physical proximity." (ECB, 2023e, 10) (Word highlighted by the author)

⁵⁶ A "*peer-to-peer validation*" is also technically possible for online transactions (cf. ECB, 2022b, 6).

⁵⁷Cf. recitals 23, 64 and 65.

are merely stored on the hardware component serving as the "*local storage device*".⁵⁸ This can only be used for payments after first being funded (from a D€ account, non-digital euro payment account or cash), which should be done manually and always online ("*prefunding*") (ECB, 2023a, 15). This online requirement for (de)funding transactions is justified by the need to authenticate each respective transaction (ECB, 2022b, 9). The question remains as to whether this online connectivity is actually necessary from a systems perspective if cash is used to effect funding at an ATM or counter.

Loss or theft of this device results in the loss of the digital offline euro for its former owner, just as is the case with cash or the phased out e-purse (like "GeldKarte") (cf. ECB, 2023a, 32). Loss could also be caused by technical problems.

A bearer instrument is characterised by the fact that it is generally transferable between individuals by means of physical transfer. No information about the owner should be associated with the instrument because each transfer results in a new ownership relationship. The holder of the device or storage location is determined by the owner physically holding the units of value stored there (cf. Deutsche Bundesbank, 2021, 4). By its nature, the D€ bearer instrument refers to both the storage device and the units of value stored there. The D€ concept provides for the D€ to be transferred from one local storage device to another for offline payments, thereby allowing for decentralised changes of ownership.

However, the local storage device is personalised and attributed to an end customer by registering the "*identifier of the local storage device*". An anonymous transfer of a local storage device holding D€ between individuals (e.g. like a gift card) is therefore not envisaged and would contradict the privacy concept put forward by the ECB and the Commission, according to which every D€ user must be identified, as a general rule, even when offline. Transferring a local storage device anonymously would also prevent individual offline holding limits from being fully monitored.

Because the local storage device is by its nature a bearer instrument, the personalised local storage device is essentially transferable. The question is whether an unintentional transfer of a local storage device holding D€ would only represent a loss for the former holder and whether it could be used by the new holder for subsequent payments. It has not been established whether payers must authenticate themselves not only by physically holding the local storage device, but also as the legal owner of the local storage device (e.g. with PIN, fingerprint) and, if so, whether this would only be required when a certain payment amount is exceeded.

The question also remains as to how individual offline limits should be updated or restored if the device is lost or stolen. Depending on required administrative procedures and any verification of the loss or event of theft, the offline limit could easily be circumvented by "losing" a device multiple times.⁵⁹

⁵⁸ The ECB calls this hardware component an "*offline wallet*" (ECB, 2023a, 30). This is another example of the imprecise use of the term "*wallet*".

⁵⁹ Further monitoring measures could reduce the risk of limits being circumvented in this way (e.g. blocking funding by the person to whom the device is attributed).

Possible storage locations include not only smartphones, but also chip cards in conjunction with corresponding "secure elements" on hardware for authenticating users, holdings and transactions (ECB, 2022b, 7).

3.5.4 Bearer instruments as an (additional) payment instrument?

The "*local storage device*" (as per the D€-R) or "*offline digital euro device*" (ECB, 2023e, 10) is a combination of hardware and software that is installed on a carrier (e.g. smartphone or card). After funding, the D€ is stored on the carrier, which is referred to as a "*payment device*" in the D€-R (see e.g. recitals 58 and 65). In accordance with Art. 37 (3) D€-R, the D€ is stored on the payment instrument itself. For smartphones, however, it is not the carrier itself but rather the relevant app that is a payment instrument within the meaning of the PSD2. While it can be assumed that the app is used to initiate offline transactions, the app does not constitute the "*local storage device*". Contrary to Art. 37 (3), the storage location is therefore not the payment instrument.

The ECB, on the other hand, refers to the bearer instrument as a "*hardware bearer payment instrument*" (ECB, 2024c, 1). This term contradicts the definition of a payment instrument set out in the PSD2 (Art. 4 (14)), according to which a payment instrument is "*used in order to initiate a payment order*". While Art. 4 (13) of the PSD2 stipulates that a "*payment order*" requires the involvement of an authorised PSP, an offline payment is defined precisely by the absence of a PSP in the execution and "*final settlement*" of the payment. The bearer instrument is therefore not a payment instrument within the meaning of the PSD2.

The offline model is not mentioned anywhere in the list of basic services for natural persons set out in Annex II of the D€-R. However, according to the ECB (2023h, 2), basic services should also include offline payments. The question remains as to whether the PSPs in question have discharged their obligation by providing a payment instrument for online payments. If necessary, the "*local storage device*" could be provided as an additional service for a fee.

3.5.5 No "full anonymity"

Regardless of whether the D€ is offline or online, every D€ user should be identified upon onboarding (opening a D€ account). Here, the ECB (voluntarily) subjects itself to the existing European AML/CFT regulations for traditional payment accounts (cf. ECB, 2022a, 7). With regard to "*customer due diligence*", the D€-R adopts this harmonisation (see Art. 5 (5) and recitals 78 and 79). However, under certain low-risk conditions, a "*simplified due diligence*" based on future regulatory technical standards (RTS) set down by the new European supervisory authority AMLA would be possible (cf. recital 79). Nevertheless, the ECB and the Commission believe that "*full anonymity*" by waiving the need for identification is not possible.⁶⁰ This also applies for the offline version in low-risk or low-value segments.

The ECB mentions two reasons for excluding fully anonymous use by waiving the need to identify users.⁶¹

⁶⁰ Cf. ECB (2022a, 7) and Explanatory Memorandum on the D€-R, p. 4.

⁶¹ See details in the PaySys Report (2023b, 5 et seq.).

- This does not comply with existing AML/CFT regulations
- It is not possible to monitor compliance with the individual total holding limit for natural persons.

According to the ECB, every digital payment requires the payment partners to be identified: "*Users of any digital payment services currently need to identify themselves to their PSP before they can start making use of such services*" (ECB, 2023a, 37).

However, the current EU Anti-Money Laundering Directive (Directive EU 2015/849) still provides for an exemption from identification for e-money in case of low-risk/low-value products in accordance with Article 12, provided that certain holding limits are not exceeded (€150 for face-to-face transactions and €50 for remote payments). This exemption for e-money is maintained with minor changes in Art. 19 (7) of the new European Anti-Money Laundering Regulation (AMLR).⁶² If the AML/CFT regulations applicable to privately issued money are to be extended to the D€, this exemption could also apply to the offline variant. One legitimate reason for equal treatment is that the offline variant is, in practice, very similar to the existing e-money option as a payment product (and is also "*prepaid*" due to the prefunding requirement).

With regard to the second argument put forward by the ECB (monitoring of the total holding limit per person), the question arises as to whether continuous limit monitoring is actually "*essential*" for achieving the objective of "*financial stability*" (ECB, 2022a, 7). The number of – in this case anonymous – offline instruments per person can also be limited by other measures, such as a pledged deposit solution or issuing a single "*local storage device*" per person per PSP.⁶³ Moreover, the D€ concept is primarily based on storage on a smartphone. If the holding limit per device (e.g. €150) is enforced using technology, exceeding the limit would require the use of several smartphones per person.

Instead, the end customer's privacy should be protected in the D€-R in accordance with Art. 37 by not collecting transaction data for offline transactions. With this concept, only the personal funding (or defunding) amounts are recorded. The question is whether this information adds value with regard to avoiding AML/CFT, as the amounts are limited. The alternative to this concept would be to record and monitor the transaction data rather than identifying the user – this approach would certainly be more useful for preventing AML/CFT.

In all likelihood, this alternative concept would not only be more attractive for many users from a privacy perspective, but would also enable the inter-PSP fee to be applied for these offline transactions with a view to compensating the "*distributing PSPs*". By not monitoring the limits of the offline holdings, monitoring could be restricted to the online holdings, which would in turn reduce complexity significantly.

3.5.6 Limitation

⁶² The condition for the exemption is a uniform transaction limit of €150 for face-to-face and remote payments, but this can only be applied to non-reloadable e-money products.

⁶³ Cf. Godschalk (2024).

In addition to the total D€ (offline and online) holding limit per person (according to Art. 16 (1) of the D€-R), which is defined by the ECB, the Commission⁶⁴ is authorised, in accordance with Art. 37 (5) of the D€-R, to set additional limits (transaction and holding limits) for the offline holding stored in the "local storage device". This offline limit should be included as a subset of the total holding limit set by the ECB (ECB, 2023a, 14). The offline limits refer to a maximum "*transaction limit*" or to a "*holding limit*" as the maximum amount that can be stored locally and then spent. The rule does not preclude the Commission from also setting a holding limit in a given period (e.g. x euros per calendar month), even though setting such a limit would be challenging from a technical perspective.⁶⁵ The ECB's design requirements provide for a time limit (ECB, 2023f, 48). According to Art. 37 (6) of the D€-R, the offline limits should be based on the risks for money laundering and terrorist financing.

With regard to a possible transaction limit, it can be assumed that the "*low-value*" criterion should be applied, although the D€-R does not make any reference to this. The application of the level of privacy for "*low-value offline proximity payments*" is only mentioned in the Explanatory Memorandum in the context of the proposal.⁶⁶ The ECB provides for the offline function only for "low-value" payments but does not specify any criteria for delimitation (cf. ECB, 2023a, 38). In its first progress report, the ECB also mentioned "*low-risk*" as a further criterion (ECB, 2022a, 7).

At present, we can only speculate about the limits that will be set by the Commission for offline mode. For an anonymous e-money product (without KYC), Article 19 of the new EU Anti-Money Laundering Regulation (EU 2024/1624) imposes a storage and transaction limit of €150 for non-reloadable products. In contrast to the restricted use of the offline version of the D€ for face-to-face transactions, anonymous e-money products can also be used for remote payments, for which a transaction limit of €150 also applies. With regard to the possibility of adopting these limits for offline D€ payments, the amounts are considered very restrictive (Deutsche Bundesbank, 2021a, 7).

One indication of "*low value*" can be found in the PSD2, which states that a payment service provider is exempt from having to provide information for "*low-value payment instruments*" in accordance with Art. 42 if the payment amount does not exceed the €30 limit or if a holding or storage limit of €150 applies to the payment instrument. In the ECB-commissioned Kantar study, a customer survey assumes a value of €150 in a "use case" for the offline variant of a D€ wallet for "*lower value*" in-person payments (Kantar, 2022, 42). Burkhard Balz, member of the Executive Board of the Deutsche Bundesbank, is in favour of having a €150 as de minimis limit (Balz, 2024).

As a bearer instrument, the "*local storage device*" is not subject to direct limit monitoring by the PSP or the ECB. Accordingly, it can be assumed that holding and transaction limits are implemented by technical means in the device. The limits should apply "per device" (ECB, 2023a, 14). The fact that the offline holding limit is a subset of the individual total holding limit suggests that each end customer can only use one "*local storage device*".⁶⁷ Were this not the case, it would not only be necessary to monitor the holding balances of several D€ accounts but also of several offline holdings, which the

⁶⁴ In January 2023, the ECB still assumed that the Eurosystem would establish this offline limit (ECB, 2023f, 48).

⁶⁵ Cf. ECB, 2021, 7

⁶⁶ Cf. ECB (2023a), Explanatory Memorandum, 8.

⁶⁷ The ECB (2023f, 47) assumes one offline wallet per citizen.

monitoring entity might only be able to view in the regular online connection required for security reasons (see ECB, 2023a, 14).

Due to the decentralised offline holding balances, it is not generally possible to adhere strictly to the total holding limit per person (as the sum of the online and offline holding). As offline holdings are not subject to constant monitoring by the supervisory authority, it makes sense to establish separate limits for both holding balances, as has also been proposed by the LIBE Committee (LIBE, 2024, amendment 8).

At the same time, low offline limits curtail the further benefits of the offline variant as regards the intended fallback solution (e.g. power failure, no internet access, etc.).

3.5.7 Time of introduction

In the Commission's opinion, both online and offline variants should be made available at the same time from the date at which the D€ is introduced, in accordance with Art. 23 (2) of the D€-R. In its statement, the ECB criticised this statutory requirement because of "*the higher level of uncertainty that the offline digital euro involves*" (ECB 2023d, 18). The central bank prefers to include an exemption in recital 34 and a corresponding amendment to Art. 23, which would allow the offline option to be introduced at a later date under certain conditions. In its first progress report, the ECB already emphasises the challenges associated with developing the offline model, such as "*dependence on technological innovation, regulatory changes and security risk tolerance*" (ECB, 2022a, 6). According to the ECB, the requirement to implement offline payment must not jeopardise the introduction of the D€ in its online form.⁶⁸

3.5.8 Acceptance

The offline variant can be used for face-to-face payments in C2B, C2G and C2C (P2P) scenarios. In all cases, the respective storage ("*secure element*") for the transmission and/or settlement must be available and set up in the "*devices*" of the payer and the payee. The "card" form factor is not feasible, or at least in the P2P case where chip cards have been commonly used in payment transactions to date – this is because there is no keyboard for entering the amount and authorising the payment.

Art. 23 (3) of the D€-R requires that, in face-to-face transactions, the payer and payee be informed about the type of payment (offline or online) before initiation. The obligation to provide the information according to Art. 23 (3) of the D€-R could be fulfilled by a display on the terminal's screen. It can be assumed that offline payments occur primarily in the interest of the payer due to the increased privacy level, and that the choice at the POS – between the offline and the online variant – is therefore made on a case-by-case basis (if necessary by selecting the physical payment instrument) or by a systemic presetting in the payer's payment application. The payee would have to accept the payer's choice if they were obliged to accept offline payments. Even if there is a difference in the merchant fees between the online and offline variants (due to the lack of an IPF), a conflict of interest

⁶⁸ In the "Bargeld der Zukunft (Cash of the Future)" study commissioned by Deutsche Bundesbank, one scenario ("The hyperdigital payment world") assumes that the offline variant will be introduced at a later date (cf. VDI/VDE/IT/Sinus, 2024, 104 et seqq.).

could arise between the payer and the merchant. It has not yet been possible to obtain any concrete information on the selection process or about how potential conflicts of interest between the two parties would be resolved.

In this context, one noteworthy amendment proposed by the LIBE Committee to Art. 23 (3) of the D€-R (LIBE, 2024, amendment 57) suggests that an agreement should be reached between the payer and the payee on whether the payment should be made offline or online, rather than simply requiring information to be provided. A prerequisite for such an agreement would be that – despite the general obligation to accept the D€ – the payee would not be obliged to accept *both* options.

The obligation to accept the D€ as "*legal tender*" under Art. 7 (2) of the D€ does not differentiate between online and offline payments. According to Art. 8, both cases are explicitly considered "*legal tender*", with only the territorial scope differing due to the different nature of transmission.⁶⁹ The question arises as to whether mandatory acceptance of the D€ would already be fulfilled by accepting *one* of the two variants or, at minimum, just the online variant. With internet access, the online version could be used for all use cases, while the offline version is an additional payment option only for face-to-face transactions.

In all likelihood,⁷⁰ the user would always have the option of paying online with their payment instrument in the face-to-face segment if the offline option is not accepted. A guaranteed online version would be sufficient at least for those who are obliged to accept the D€ but do not operate in the face-to-face business.

If mandatory acceptance could be met by ensuring either of the two versions, it is likely that the obliged parties in stationary business will generally ensure online acceptance. Unlike the payer, the payee does not appear to have a greater need for privacy than what is afforded by online payments. Assuming that the merchant service charge is the same for both options⁷¹, a merchant would offer the additional offline payment mainly due to customer demand and for risk considerations (power failure, disaster). Depending on the additional costs for equipping the POS terminal for offline payment, some merchants may limit their acceptance of the D€ to the online variant.

⁶⁹ Art. 8 of the D€-R stipulates that the status as legal tender for offline payments depends on the location of the face-to-face payment (euro area); for online payments, this depends on the location of the payment recipient in the euro area.

⁷⁰ It is not yet clear whether the concept also provides for payment instruments that only work offline (e.g. a prepaid card as a bearer instrument).

⁷¹ This assumption is necessary because the technical possibility of collecting the inter-PSP fee for offline transactions is questionable due to the privacy concept and transferability. See section 3.7.3.

3.6 Non-financial companies

Neither the ECB's publications nor the EU Commission's regulation proposal contain many statements about non-financial companies other than retailers ("merchants"). This is consistent with the Eurosystem's proposal that "euro area residents, merchants and governments" should use the D€ in its initial phase (ECB, 2023h, 4). For example, the onboarding discussion only mentions "end users" such as "individuals" and "merchants" (cf. ECB, 2023a, 19).

Elsewhere, however, the ECB (2023a, 11) says that "businesses established in the euro area would be able to accept payments in digital euro. The category of business users is broad and includes groups that may overlap, such as professionals, merchants, small and medium-sized enterprises and the self-employed." In other words, SMEs and the self-employed are also expected to accept D€ payments. Large companies and multinational corporations are not mentioned and it is possible that these will not be covered unless there are sufficient grounds for doing so. Panetta (2022b) notes:

"The intermediaries that would distribute the digital euro have in-depth knowledge and unique insights into what users need. They are thus best placed to be the direct counterparts for the individuals, merchants and businesses that would use the digital euro."

Recital 4 of the D€-R lists the possible retail payment use cases, referring to payments between three types of market players (or within these distinct groups): individuals ("persons"), businesses and governments. The D€ should also be able to meet future requirements for payment transactions, e.g. machine-to-machine payments or payments on the decentralised internet (cf. PPI, 2020). However, the use of the D€ for payments between financial intermediaries, payment service providers and other market participants is explicitly excluded.

In accordance with Art. 7 of the D€-R, the D€ – like cash – is to be a legal tender, i.e. it must always be accepted (at full face value). This also means that payees are not permitted either to refuse D€ that is tendered to comply with a payment obligation or to impose "surcharges"⁷² – irrespective of whether payees accept payments in euro cash or not. Art. 9 of the D€-R sets out exceptions to this rule, namely:

- "where the payee is an enterprise which employs fewer than 10 persons or whose annual turnover or annual balance sheet total does not exceed EUR 2 million", unless it accepts comparable (private) digital means of payment (e.g. debit or credit cards);
- where the principle of proportionality is breached (the burden of proof lies with the payee);
- "where, prior to the payment, the payee has agreed with the payer on a different means of payment", provided that payments in D€ are not unilaterally excluded, as prohibited in Art. 10 of the D€-R.

While the exact holding limit for D€ end users has not been determined yet, it will definitely be set: Panetta (2022a) suggests €3,000 to €4,000. The holding limit for all other users, especially businesses, has already been set at zero (ECB, 2023a, chapter 3), meaning that any D€ payments to businesses will be immediately transferred to the linked account. Accordingly, automatic funding and defunding, including waterfall and reverse waterfall functionalities, will be mandatory for corporate users – at least for holdings in the online D€ account. Offline D€ holdings require a special provision (ECB, 2023a,

⁷² However, it would appear that discounts are permitted.

23). The ECB states that "*owing to the inherent design features of the offline digital euro, business users would hold offline digital euro in their acceptance devices until the devices have connectivity to defund them.*" The offline model will not work unless these kinds of holding balances are allowed. The ECB goes on to say that "*no decision has yet been made on the amount of funds that business users would be able to hold in their offline devices or number of consecutive offline transactions they could accept.*" A "*limited amount*" of offline D€ could even be allowed to be retained permanently to "*enable refunds and pay-outs*" at any time. This is also necessary in order for the offline D€ to be used effectively as a fallback solution.

The intention is for the D€ to foster (payment transaction) innovations, which in turn will open up new business potential for companies. As such, Balz (2023a) and the ECB (2023h) mention the possibility of conditional payments, e.g. for M2M payments or in the Internet of Things based on Smart Contracts. PSPs are to be given the option of offering additional (optional or value-added) D€ services that could then be remunerated (ECB, 2023h). The Eurosystem's idea is for the D€ to be a driving factor in establishing new digital and pan-European ecosystems, as well as new products and lucrative business activities in various industries and markets. This is to be done on the one hand by following a standardised set of rules (the "*digital euro scheme rulebook*"), and on the other by the Eurosystem providing additional settlement functionalities in the back-end infrastructure of the digital euro. This concerns in particular the "*reservation of funds*" required for providing certain payment services securely to end users.

As business users are not permitted to hold D€, it is not certain whether the D€ would even be suitable for many M2M and IoT applications. After all, many potential use cases – especially in the B2B segment (e.g. fuel and toll payments by lorries) – require a prepaid instrument.⁷³ For the D€ to be usable in this segment, the holding limit of zero that applies to legal persons would have to be removed, at least for these applications. In addition, the PSD2 legal framework would have to be adjusted for M2M payments (cf. PPI, 2020).

⁷³ Most current private-sector approaches are based on distributed ledger technology.

3.7 Compensation model

3.7.1 Basics of the compensation model

The ECB has broadly outlined a compensation model on several occasions, as in the following example (ECB, 2023a, 31):

"1. Free basic use by private individuals:

2. PSPs would be able to charge merchants for their services, Co-legislators could decide to implement safeguards to prevent potential abuse and ensure that merchant service charges are reasonable.

3. Distributing PSPs should receive compensation from acquiring PSPs in the form of an inter-PSP fee.

4. PSPs would bear their own costs related to the distribution of the digital euro services they provide, but they would not be charged by the Eurosystem for its costs related to scheme management and settlement processing."

These general requirements are specified in many publications and especially in the D€-R. In addition, principles for setting upper price limits for the Merchant Service Charge (MSC) and the Inter-PSP Fee (IPF) are also provided for.

However, it should be noted that the rules proposed for the compensation model raise quite a few questions themselves.

3.7.1.1 Methodological issues

There are a number of ambiguities and contradictions in the compensation model as described by the regulators (ECB, EU Commission). It can be assumed that the regulators have adopted the methods and regulatory system associated with the traditional four-party payment card scheme (IFR, 2015) as a blueprint for the D€ model.⁷⁴ At several points, terms and in some cases even legal definitions of the four party payment card scheme regulation concerning the compensation model are directly adopted without modification, such as "issuer", "acquirer", "interchange fee" (inter-PSP fee), "merchant" and "MSC". Many of the contradictions discussed in this analysis of the D€-R emerge when the traditional card model is transferred to the new D€ ecosystem. When attempting to interpret the regulators' intentions (especially those of the Commission in the D€-R), two approaches can be considered:

- **Card approach:** The compensation model is intended to be interpreted primarily along the lines of the conventional four-party payment card scheme. The results must be applied to the D€ ecosystem and aligned with the regulators' objectives. This exegetical approach means that the D€-R must be revised to form a consistent overall text.
- **Holistic approach:** While regulators do adopt approaches from the traditional card business, these are used as modules for building a new, internally consistent model. This approach assumes that the compensation model is logically aligned with the new D€ ecosystem. It

⁷⁴ This is particularly true for the ECB, cf. e.g. ECB (2023a), chapter 3.3 or Cipollone (2024), slide 13, which explicitly refers to a "*four-party model*". The EU Commission also uses terms from the world of card payments such as "merchant service charge" or "inter-PSP fee"(analogous to the "interchange fee"), cf. EU Commission (2023a), Art. 15.

involves moving away from the traditional card-based perspective and interpreting the model in the context of the entire D€-R.

With the **card approach**, the acquirer is the PSP of the payee (= merchant). This PSP charges the payee an MSC (IPF + acquirer margin). The payer's PSP receives the IPF to compensate for the costs of the basic services of the D€ account provided to the payer (natural person) free of charge.

Under the **holistic approach**, the PSP of the payee (including merchants) is – like the payer's PSP – a distributor that is also required to provide services free of charge to the payee (who in some cases may be a merchant). It is doubtful whether the PSP, who manages D€ accounts for merchants and offers them D€ payment services, is to be seen as an acquirer in the sense of the traditional 4-party card system.

The wording of the D€-R suggests that both approaches could – probably unintentionally – take effect. The subsequent analysis of the compensation model follows the card approach taken by the ECB in many of its publications. In an appendix ("holistic approach"), at the end of this section, an alternative interpretation is discussed ("holistic approach").

3.7.1.2 No clear requirements for applying the inter-PSP fee (IPF)

The ECB's compensation model stipulates: *"Distributing PSPs should receive compensation from acquiring PSPs."* Although an IPF is proposed for this purpose, the D€-R does not define it. This is surprising, since the direction and the addressee of such a fee are basically not given, even though in most payment systems the acquirer pays the issuer for each payment transaction. Art. 17 of the D€-R is also phrased neutrally with regard to the direction of the payment obligation.

However, recital 45 states:

"As payment services providers distributing the digital euro would not be in a position to charge fees to natural persons for basic digital euro payment services, an inter-PSP fee may be needed to provide compensation to those payment service providers for the distribution costs."

This means that the IPF is to be paid by the payee's PSP to the payer's PSP. This also complies with the definition of the IPF in the ECB glossary (ECB, 2023e, 9):

"A fee paid for each transaction directly or indirectly (i.e. through a third party) by the payment service provider (PSP) involved in acquiring digital euro to the payment service provider (PSP) involved in distributing digital euro. The net compensation or other agreed compensation is part of the inter-PSP fee."

This definition is used to interpret the D€-R and means that any IPF is paid by the payee's PSP to the payer's PSP.

In conjunction with recital 45, these statements allow for two more conclusions:

- The function of the IPF is to compensate for costs on the distributing side of the market (and is therefore not a "balancing fee", as discussed as a further option in the theoretical literature on two-sided markets).
- Compensation (i.e. an IPF) is required when no fee can or may be charged on the distributing side of the market – i.e. if a "natural person" is making the payment.

This suggests the IPF is only due if the recipient is a merchant. However, the problem with this interpretation is that user groups are not properly defined (cf. section 3.2), which is why it remains unclear what exactly a "merchant" is.

This in turn raises a further question: what happens if the payer is not a "merchant" but still a legal person (e.g. travel expenses incurred by a company's employees).⁷⁵ In this case, the PSP does not offer a "free service". According to the logic of the compensation model, no IPF is incurred if the payer's PSP is in a position to charge a fee. This is the case when the payer is not a natural person.

In the event of a "legal person to natural person" payment, the natural person's PSP would also not generate fee income from which the IPF could be paid. This would be another argument against an

⁷⁵ Although one might wonder whether this case was even envisaged by the co-legislators.

IPF. It can therefore be assumed that no IPF is incurred in these two cases. However, the regulation proposal does not contain clear requirements.

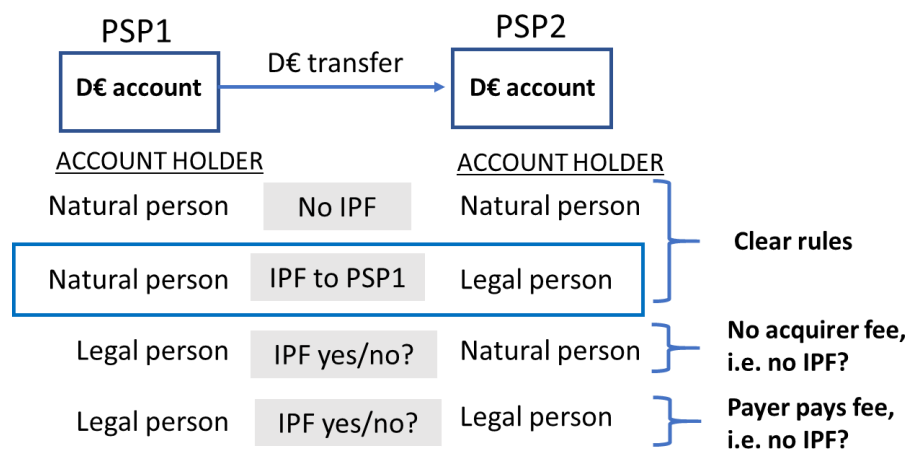


Figure 4: Different D€ transactions

In summary, it can be said that an IPF is probably only permitted if a payment is made by a "natural person" to a "merchant" who is a "legal person". Nonetheless, there are considerable ambiguities surrounding this:

- Does this really include all natural persons or just those "acting in the course of a purely personal or household activity"?⁷⁶
- Are all legal persons also to be considered "merchants", which means that their PSPs have to pay an IPF for receiving payments by natural persons?
- Is there a separate acquiring function? (Please also refer to section 3.7.6)

Only the following points seem clear:

- With the IPF, the basic direction of the payment is from the payee to the payer.
- Not all transactions are subject to an IPF.
- The IPF is intended as a compensation for the PSP of a natural person, which does not pay a fee for basic services.
- The IPF is only due if the payee's PSP is also authorised to charge an MSC (MSC minus IPF is the net compensation of the merchant's PSP).

In conclusion, we can see that the role model for D€ payments is unclear and urgently needs to be improved. This makes it difficult to interpret the intended compensation model.

3.7.2 Regulation of fees

⁷⁶ This differentiation can be found in Art. 9 (c) of the D€-R, which stipulates exceptions from mandatory acceptance for D€ payments.

3.7.2.1 Regulation of fees: General requirements

The D€-R provides for the implementation of ceilings for the MSC and the IPF.⁷⁷

Art. 17(2):

"Any merchant service charge or inter-PSP fee shall not exceed the lowest of the following two amounts:

- (a) the relevant costs incurred by payment services providers for the provision of digital euro payments, including a reasonable margin of profit;*
- (b) fees or charges requested for comparable digital means of payment."*

Art. 2(25):

"'comparable digital means of payment' means digital means of payment, including debit card payment and instant payment at the point of interaction but excluding credit transfer and direct debit that are not initiated at the point of interaction".

It is still unclear whether credit cards should also be included in the "comparable digital means of payment". While the EU Parliament (2024, amendment 43) is in favour of including them, the ECB (2023d, 4.1 and amendment 13) opposes it.

The wording in Art. 17 (2) "*merchant service charge or inter-PSP fee*" is unfortunate. If taken literally, this regulation makes no sense, since the IPF is part of the MSC. If the same ceiling is stipulated for both variables, the net income of the merchant PSP would be zero. Accordingly, it seems to make sense to interpret the wording "*the relevant costs incurred*" as follows:

- relevant for the IPF: costs of the payer's PSP
- relevant for the merchant PSP's margin (= MSC minus IPF): costs of the merchant's PSP

In this context, there is another unresolved issue regarding the IPF. The IPF is designed to enable PSPs to cover (at least partially) the costs they incur by providing free payment services to natural persons.⁷⁸ When a natural person makes a payment to a merchant, the payer's PSP receives an IPF. By contrast, neither PSP receives anything for a P2P payment.

This raises the question of which costs the IPF is supposed to cover:

- a) all costs related to payment transactions of the natural person (incl. P2P) or
- b) only the costs for payments to a merchant.

Case a) would mean that merchants would ultimately bear the complete costs, including the costs for P2P payments (provided that the fee ceiling is sufficiently high). Case b) would mean that not all costs for providing basic D€ services would be covered for the PSPs. This results in a considerable lack of clarity for PSPs and merchants alike.

⁷⁷ However, the EU Parliament proposes to delete this provision and replace it with the wording "... shall be set by market participants" (European Parliament, 2024, amendment 72)

⁷⁸ It is often noted that consumer PSPs have other opportunities to generate additional income from the D€ through "additional services".

It is also rather impractical that the D€-R does not distinguish between the IPF and the MSC when calculating the limits. As a consequence, it is not taken into account that the IPF, like an interchange fee, is not a competitive price. If a maximum value is set for the IPF, eligible market participants will typically choose this maximum value. There is no incentive to settle for a lower IPF. Accordingly, this is not about setting a ceiling for the IPF but rather about establishing a "fixed price".

This is not the case with the fee for the merchant PSP included in the MSC, which is a competitive price. If the maximum value is relatively high, PSPs with merchant customers have an incentive to attract customers through lower fees. This means that setting a maximum value for the MSC may well lead to lower MSCs in the market, with market differences reflecting the different costs. For example, the costs of merchant PSPs in e-commerce are fundamentally different from those in face-to-face business. A "maximum price" is thus more necessary for the IPF than for the MSC.

The D€-R does not specify who should set the maximum prices. However, in its opinion on the D€-R, the ECB takes the view that the European Commission should determine this in coordination with the ECB (ECB, 2023d, amendment 21).

3.7.2.2 Determining the costs within the meaning of Art. 17 (2a) of the D€-R

Art. 17 (5a) and (5b) define which part of the market should serve as a benchmark. However, they do not provide any further information on what "relevant costs" are.

Art. 17 (5a) stipulates the basis of the IPF and MSC:

"based on the relevant costs incurred for providing digital euro payment services by the most cost-efficient payment service providers representing collectively one fourth of digital euro distributed across the euro area in a given year".

Art. 17 (5b) refers to the determination of the margin of profit:

"calculated on the basis of the margin of profit of the payment service providers charging the lowest margin of profit representing collectively one fourth of the digital euro distributed in the euro area."

The main problem with this approach is that the cost (and profit mark-up) can only be determined once the D€ has been introduced. During the launch phase, for instance, there is no alternative but to make use of the second approach according to Art. 17 (2b) ("*comparable digital means of payment*").

Even after the D€ has been launched, using this approach would entail serious problems, as the requirements of the D€-R raise many questions. In particular, it is largely unclear what is meant by the "relevant costs" of the PSPs involved, as referred to in Art. 17 (2a). All that is stipulated is that the "relevant costs" may also contain a "reasonable margin of profit". Article 17 (6) further specifies that the "costs associated with funding and defunding" are included here as well.

There is no further information on which costs can be considered relevant. It can be safely assumed that at least the running costs are relevant. But does this also apply to the presumably significant one-time costs? The D€-R only mentions "distribution costs" (recital 45). By contrast, the EU Parliament wishes to include the "implementation costs" as well (European Parliament, 2024, amendment 20). In

a footnote to the fourth progress report (ECB, 2023j, 5), the ECB announced that "*only operational costs have been considered for compensation. Initial investment costs will be considered separately.*" It therefore remains unclear at this stage whether implementation costs will be included and, if so, to what extent.

The same question arises for the costs of adapting POS terminals to process D€ payments. These one-time costs are estimated by the Commission – based on ECB analyses in the Impact Assessment Report (EU Commission, 2023c, 133) – as being between €0.5 billion and €1 billion. It is also doubtful whether this includes the extra costs for an additional device in the terminal for storing the offline D€. Depending on the business model, the terminal adaptation costs are incurred by either the merchant or the acquirer if the terminal is rented.

Terminals are necessary when merchants sell items at the POS. In this scenario, an MSC is permissible. Since there are pricing models in which terminal costs are covered by transaction fees, the terminal costs (or the additional costs caused by the D€) should be included in the relevant costs. Costs related to fraud and fraud prevention are also crucial. Please refer to section 3.7.4 for more information on this.

3.7.2.3 Determining the fees for alternative payment schemes

Art. 17 (2b) of the D€-R refers to the fees for comparable payment schemes as the basis for setting maximum limits for the MSC or IPF. However, there is one problem with this approach that regulators seem to have overlooked: the "comparability" of a system is not merely about whether payments are "comparable" in terms of processing and use cases – the rules for fees and liability must be comparable as well. However, there are significant differences between the D€ and the aforementioned "comparable systems". Under Art. 2 (25) of the D€-R, "comparable systems" include debit card payments and instant payments (possibly also credit cards, cf. section 3.7.2.1).

Taking card payments as an example, the following differences to the D€ exist:

- cardholder fees are possible;
- there are chargeback rights (still undecided for the D€);
- the interchange limit is not based on issuer costs.

The existing Interchange Fee Regulation for card payments does not take into account issuer costs. The maximum permissible interchange fee is derived based on the costs incurred by the merchants (cost of cash and card). The limits were established rather arbitrarily (e.g. assuming an acquirer margin that is too low, cf. PaySys Report, 2014). Finally, it should be noted that the Interchange Fee Regulation determines a maximum value for the *average* interchange fee. This means that higher values are permitted in individual segments. However, the D€-R provides for a fixed maximum rate.

Taking instant payments as an example, the following differences to the D€ exist:

- account and per-item fees are generally possible;
- there is no inter-PSP fee;
- there are no chargeback rights – this is still a possibility for the D€.

This means that the values cannot simply be taken from "comparable" systems. Rather, the differences between the compensation models and liability rules must be factored in.

There are a number of schemes relating to payments from consumers to merchants. Whether these can be viewed as "comparable" is a question that leads to the next point that the D€-R fails to address: Are "*comparable digital means of payment*" just schemes that are available throughout the euro area or are national schemes included as well? In the euro area, only Maestro/Debit Mastercard and V Pay/Visa Debit are widely available. This would suggest an interchange fee of 0.2%.⁷⁹ Is the comparison limited to these or can it also include schemes such as Bizum, which is only used in Spain?

3.7.2.4 Funding and defunding

Art. 17 (1) stipulates that natural persons will not have to pay a fee for basic services. In addition, Art. 17 (6) states that merchants will not have to pay a separate fee for funding or defunding transactions in addition to the MSC for a D€ transaction. However, the costs of (de)funding can be taken into account in the MSC in accordance with Art. 17 (6) in conjunction with 17 (2a).

Here, too, there is a certain lack of clarity. If a customer has a D€ account with PSP1 and a current account with PSP2, then Art 17 implies that PSP1 may not charge a fee for funding/defunding. However, the normal conditions for a current account would apply at PSP2. These regularly provide for a transaction fee for business clients (and occasionally for private customers as well). This means that (de)funding can certainly incur costs, which is particularly important for business clients, as:

- they almost always pay per-item fees for account movements on the non-D€ payment account;
- every D€ transaction immediately leads to a (de)funding.

⁷⁹ This value was also recently mentioned by Burkhard Balz (member of the Executive Board of the Deutsche Bundesbank), cf. Balz (2024).

3.7.2.5 Further processing models on the side of the merchant PSP

The ECB also seems to be open to a model in which the merchant PSP acts as a concentrator, where D€ payments are received and then forwarded to the merchants.

"For merchants/businesses, defunding from a digital euro account to a commercial bank account would be done on a transactional basis. However, on top of the standard functionality, PSPs could offer business users other digital euro payment schedules (e.g. daily) and make one aggregated digital euro pay-out instead of multiple digital euro pay-outs per transaction. This would require an acquirer to collect and aggregate transactions on behalf of the merchant and make combined payments to a commercial bank account (on a daily or other basis)" (ECB, 2023a, 23).

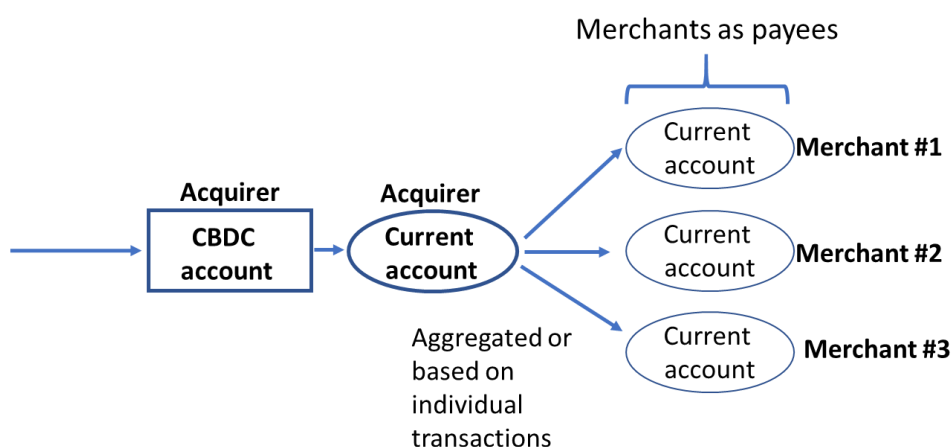


Figure 5: Relationship between acquirer and merchant

This would not change the basic compensation model (MSC is collected, interchange fee is paid). However, by aggregating payments, the acquirer could reduce the number of payments made to customers' accounts and, in turn, the number of their per-item charges.

The ECB even goes one step further and also mentions the integration of D€ acceptance together with the acceptance of other instruments (e.g. payment cards):

"For business users, it is assumed that acquirers would be able to provide digital euro reconciliation reporting, by integrating digital euro payments into existing solutions used for other retail payment schemes." (ECB, 2023a, 22).

Nonetheless, it is not quite clear whether this refers exclusively to reporting or also to integrated payments. If this is about integrating payments, then the question arises – especially for business transactions with smaller customers – whether blending (i.e. having a uniform fee for different types of payments) would also be permissible for the MSC.

3.7.2.6 Permissibility of fees not based on transactions

Account management fees (€ per account per period) for "merchants" appear to be a viable option. In addition to the MSC, only other transaction-based fees are excluded.

Art. 17(6):

"The merchant service charge shall be the only charge per transaction that payment service providers may apply to merchants. Payment service providers shall not charge merchants for the funding and defunding of the digital euro, including digital euro payment transactions referred to in Article 13(4)."

3.7.3 The offline compensation model

Offline payments generate additional problems in the application of the compensation model. The D€-R sets relatively restrictive requirements for this payment option with regard to the data that may be stored. This poses a major problem when it comes to determining and allocating the IPF.

The data storage requirements that are relevant for the offline digital euro can be found in Art. 34 and 37 of the D€-R which specify that only (de)funding data may be stored. However, it is not possible to implement a compensation model with different IPF options (for payments with and without IPF) based on this underlying data alone.

Provided that the only two options available for offline payments are "natural person to natural person" (without IPF) and "natural person to merchant" (with IPF), the merchant PSP's payment obligation could be derived from the defunding volume – albeit only for an IPF in the form of "% of turnover". For an IPF in the form of "cent per transaction" (or a mixed tariff), the number of transactions would also have to be stored. This would essentially make it possible to determine the IPF obligations of the merchant PSPs. The corresponding amounts could be paid into a pool from which the eligible distributors would then be paid.

However, the value of the funding cannot be used in similar fashion on the payer side to calculate the distributors' IPF claims. This is because funding does not mean that the amounts have already been used in payments, so the balance change would have to be considered for each online update of the offline wallet. Even the balance change provides no basis for entitlements to IPF, as the balance is also influenced by payments received and payments to other natural persons. Only the payments to merchants are relevant for the IPF. This means that at least data on the offline payments to merchants (value and, if applicable, quantity) would have to be stored.

Another practical problem is that it will be virtually impossible to match the timing of the payment obligations and payment claims. Merchants are likely to be eager to carry out the defunding process relatively quickly. This may also be made mandatory, as business users are not actually supposed to hold any D€ balances. Defunding at the end of each day could therefore also be conceivable.

However, it is different for natural persons. There may be people here who are online relatively often, while others are only (very) seldom online. This means that the determination of entitlements to IPF lags structurally behind the determination of the payment obligation. The two

amounts (payment obligation and payment claim) in particular will generally differ. Without having more precise transaction data, the IPF can only be allocated according to rules of thumb.

Accordingly, for any collection of an MSC and IPF, the methods constructed for offline payments must differ from those for online payments. It can be assumed that the regulators do not intend to waive these fees.

It is also unclear for these payments whether fee differentiation is possible for online payments and what can serve as a "comparable digital payment instrument" in this case. Traditional e-purses (such as the "GeldKarte" payment card in Germany) are the most similar. However, these have largely died out on the European market. But if, contrary to expectations, no transaction fees will be incurred for payments made with the offline D€, the offline D€ would be an interesting alternative for commerce, even if the offline option were to involve higher implementation costs.

3.7.4 The particular importance of fraud costs

Fraud is an important factor in the context of payment transactions. Significant losses can occur, especially in e-commerce payment transactions. However, it is very difficult to estimate the cost of fraud before the D€ is launched – especially as the burden of loss and the costs of preventing fraud (e.g. installing the corresponding systems) and fraud processing (including complaints management) have to be taken into consideration. These "fraud costs in the wider sense" should therefore be included when determining the maximum limits for the MSC and IPF. When looking at "comparable systems", it must also be considered how the applicable liability rules there allocate these costs.

When determining fraud costs, it is important on the one hand to know the total fraud losses incurred on the D€. On the other hand, it is important – when allocating the costs to the PSPs – to know how the liability issue is regulated. The extent to which the payer PSPs, the payees' PSPs, the ECB, the payers and the payees (merchants) are liable has yet to be clarified.

Rules on liability for fraud losses can generally be determined in the specific regulation of the D€ (D€-R), in the general rules regarding payment transactions (draft PSR) or in the ECB's scheme rules (currently being drawn up). The D€-R does not include anything about liability. The digital euro scheme rulebook is still in its very early stages and does not contain any detailed liability rules (as yet).

Liability issues are currently regulated in the PSD2. However, this should be replaced by the PSR, which significantly extended the payer's rights and the liability of the PSP. The extended liability of payer PSPs contained in the draft PSR may well lead to a substantial increase in fraud costs for this group. The liability of the payee's PSPs is not dealt with in the current draft.

For a start, the draft PSR stipulates that the term "*funds*" also includes digital central bank money (Art. 3 (30) in conjunction with recital 28). This means that, once they have been adopted, the PSR rules will also be binding for the D€. There are also a series of new rules for the liability of PSPs.

Art. 50 of the PSR states that, in the case of credit transfers, it must be checked that the name of a payee matches the "unique identifier" specified by the payer. If the payer is not informed of an existing

deviation, it should not incur any losses as per Art. 57 of the PSR (which in this case are incurred by the payer's PSP). It is not clear here if this should also apply for D€ payments. The ECB generally anticipates two models for D€ payments: payer-initiated payments and payee-initiated payments (ECB, 2024, pp.18–20). Perhaps, the liability rules for credit transfers (as per Art. 57) will also be applied for payer-initiated D€ payments, which also follow the logic of a push payment. If this is to be the case, the following problems would arise:

- a. How can the rules be applied to transactions conducted by merchants (POS or e-commerce)? The payment data here is generally transferred from the merchant to the payer's app. In this case, the payee's PSP would actually have to be liable for the consistency of the data.
- b. Offline transactions cannot be assessed through the payer's PSP.

If this rule were to actually apply only to credit transfers but not to D€ payments, certain fraud tactics (based on social engineering) could move from (instant) credit transfers to D€ payments.

Art. 56 of the PSR states that the payer's PSP is not liable for unauthorised payments. The EBA has laid down details about Strong Customer Authentication (SCA) and exemptions (EU Commission, 2017). The rules for SCA are of particular importance for payments with the D€ because two PSPs can be involved here, both on the payer and on the payee side. This is particularly relevant for payments that result in a "*reverse waterfall*" transaction.

If a payer wants to make a D€ payment but does not have sufficient funds in the D€ account, the D€ account should be automatically funded ("*reverse waterfall*"). If the two accounts in question are kept by different PSPs, the situation arises whereby the PSP managing the non-D€ account has to rely on the proper performance of SCA. In the event of a claim, it should be ensured here that liability is assumed by the PSP that has conducted the SCA in this case. If not, the PSP keeping the underlying current account could be held liable for losses for which other PSPs are responsible.

Payment initiation service providers (PIS) can also be involved with D€ payments. If a PIS is involved, the account-keeping PSP is initially liable but can request a refund from the PIS (Art. 56 (5) of the PSR). Furthermore, in the case of an unauthorised transaction, the payer may potentially be entitled to additional compensation (Art. 56 (6) of the PSR). If the lack of strong customer authentication is due to errors made by technical service providers or "*payment system operators*", then they will be liable (Art. 58 of the PSR).

The payer's PSP is also liable for identity theft, at least if the payer reports the incident immediately and has not acted fraudulently or with gross negligence (Art. 59 of the PSR). The burden of proof for fraudulent action or gross negligence lies with the payer's PSP. As per Art. 60 of the PSR, the payer may be obliged, under certain circumstances, to bear [up to] €50 of the loss.

The provisions of Art. 62 and 63 are relevant for payee-initiated D€ transactions. As per Art. 62 (1) paragraph 4, the payer has an unconditional right to a refund from their PSP for payments that were initiated by the payee. Pursuant to Art. 63 (1), the payer may request the refund within "a period of 8 weeks from the date on which the funds were debited." Art. 62 (3) stipulates that this payer's right to a refund may be excluded in a framework contract between the payer and the PSP. However, this

exclusion may only apply to transactions where the payer has authorised payment directly with the PSP. Exclusion would not be possible if the authorisation was outsourced to a third party, e.g. Apple.

Overall, the rules on liability mainly obligate the payer PSPs. The payees' PSPs are not mentioned. Liability issues between the PSPs are not addressed.

Recital 96 states:

"Questions relating to liabilities form an essential part of those contracts. To ensure mutual confidence among payment service providers and intermediaries taking part in a payment transaction, legal certainty is necessary to the effect that a non-responsible payment service provider is compensated for losses incurred or sums paid pursuant to the rules on liability. Further rights and details of content of recourse and how to handle claims towards the payment service provider or intermediary attributable to a defective payment transaction should be subject to agreement."

Realistically, in a system with hundreds of PSPs, agreement can only mean that liability issues must be regulated in the scheme rules. All connected PSPs are contractually obliged to comply with these rules.

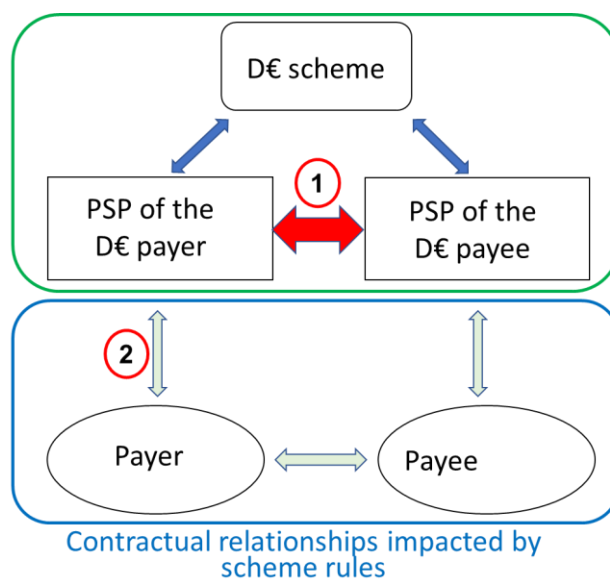
The ECB is currently working out the scheme rules for the D€ (ECB, 2024). These do not yet include any liability rules, such as chargeback rights for the payer's PSPs. In other documents, however, the ECB mentions an entire series of reasons that could lead to a payment being challenged by the payer (ECB, 2023a, 26–27).

"Technical disputes (meaning disputes which occur due to technical errors, causing for instance the transaction amount to differ, duplication of transactions, or improper authorisation/pre-validation). Fraud disputes (meaning disputes based on potential fraud cases, such as identity theft, merchant identity fraud, interception of payment information, counterfeit goods, questionable merchant activity)."

It remains to be seen how liability will be regulated in the D€ scheme rulebook. The ECB (2023a, 24) states that:

"Refunds should take place within a reasonable timeline and in line with other digital payment methods accepted by the merchant. The scheme rulebook will further clarify refund rules and timelines."

Nonetheless, liability is not primarily about refunds. Allocating the liability for losses is more important. Chargeback rights have to be defined for this. The scheme rules necessarily require a level that regulates the relationships between the payer's PSP and the payee's PSP (see fig. 6). In this context, it would also be worth considering whether the acquiring function needs to be defined.



- ① Currently missing ② Extensive provisions included in the PSR

Figure 6: Liability – major gaps in the set of rules

As regards the allocation of liability, the only thing that is clear at present is that the ECB/Eurosystem does not want to take on any liability itself:

"The Eurosystem shall not take on liabilities of other stakeholders. Hence, either the PSP, the merchant or, in some cases, the consumer would be liable." (ECB, 2023a, 27).

However, the European Council takes a different view (Council of the European Union, 2024, recital 12):

"Member States agree with the principle that the digital euro user shall seek compensation from its payment service provider, regardless of the liability allocation, and that in case the fault resides in the Eurosystem, a right of recourse for the payment service provider shall exist."

In addition to liabilities issues, the options for preventing risk are important. On the one hand, this necessitates the exchange of information between the participating PSPs and the ECB. Art. 32 of the D€-R provides for the ECB to set up a corresponding information system that should serve to detect and prevent fraudulent transactions. On the other hand, the rights of the PSPs in suspect cases must be clarified. It is particularly important here that, in the event of suspect cases, the payer's PSP is able to delay transactions (to carry out a more detailed check) or even to reject them entirely. The payee's PSP should also have the option of delaying or blocking refunds of payments received. It should also be possible to block accounts that were used repeatedly for fraudulent transactions. The PSR should be adjusted accordingly, as fraud cannot be effectively prevented otherwise.

Considerations concerning risk prevention can also be included in the onboarding requirements. "Customer" (end user) onboarding is described in very general terms in the digital euro scheme rulebook (ECB, 2024a, 5–7). Separate onboarding may be developed for business clients. ECB (2024a, 7) states:

"In the context [of] business end users, the onboarding process described above will be adjusted as required and will be developed in detail in the digital euro rulebook."

It is not clear what form these adjustments will take. However, considerations about fraud prevention may potentially be included at this point. Another important question is whether it is generally permissible for a PSP to refuse the provision of a D€ account for reasons of fraud prevention.

The question of liability would also need to be clarified with regard to the EU Digital Identity Wallet (EUDIW). If users are granted the statutory right to use the EUDIW for authentication purposes (Art. 25 of the D€-R), this raises the issue as to who is liable in the event of a malfunction.

The current proposed set of rules on "liability" largely comprises consumer protection rules. However, efficient fraud avoidance requires all participants to have an interest in contributing to the security of the system. The rules of the system must provide clear incentives for this. In particular, liability for fraud losses must be allocated in a sensible manner. The existing rules are still a long way off this. If significant improvements are not made here, there are concerns that the fraud losses on D€ will be relatively high because neither the payers nor the payee's PSPs are currently expected to assume liability (to any significant degree).

3.7.5 The compensation model: urgent need for revision

The current rules of the compensation model raise numerous questions and cannot be implemented with legal certainty in their current form. On the one hand, this is because the co-regulators do not have a consistent understanding of the fundamental architecture of the D€ payment system. This is particularly relevant for the role of the PSPs. Do we essentially have a uniform group of "*distributing PSPs*" or is a distinction made between the PSPs of payers and PSPs of payees (acquirers) – as in the card world?

The draft D€-R that was presented by the Commission provides for rules that include a limit on fees (MSC and IPF). These rules raise a large number of unresolved issues. In addition, the question of "liability for fraud losses" is not properly regulated. This gap needs to be closed, especially in the scheme rules.

Some of these problems might become irrelevant if the EU Parliament pushes through its proposal that the fees should be set by the market participants (European Parliament, 2024, amendment 72). In a strict sense, however, this can only refer to the acquirer margin. It would therefore still need to be clarified whether an IPF is necessary and who determines it. With card payments, the scheme determines the IPFs (interchange fees) where legally stipulated ceilings are in place. Questions regarding liability between the participating PSPs would also have to be clarified at the scheme level.

3.7.6 Appendix: holistic approach

The previous analysis of the compensation model based on the card approach of a conventional 4-party system leads to a series of unresolved issues and a number of contradictions. Alternatively, the compensation model will be considered below as a component of the D€-R, which can only be interpreted in the context of the entire D€-R. This approach assumes an adequate level of consistency within the document.

The role of the acquirer, which is always specified in the traditional four-party card system, is at the forefront of this approach. The D€-R contains virtually nothing about the role of the acquirer or about acquiring services. With regard to the D€ payment services to be provided by "*distributing PSPs*" to payers and payees or natural and legal persons, there does not seem to be a specific acquirer role.

The D€-R only refers once to the acquirer (recital 45), again, only in relation to the compensation model:⁸⁰

"The inter-PSP fee should provide sufficient compensation for the distribution costs of both the distributing and acquiring payment service providers, including a reasonable margin of profit."

This sentence contradicts the overall context of the D€-R, whereby "*distributing PSPs*" are not only – as in the recital quoted above – positioned on the side of the payer in the form of a natural person.

The D€-R probably assumes that a PSP will always provide the merchant with distribution services and, if applicable, with acquiring services.⁸¹ It does not ask which specific acquiring services that are not covered by the distribution services are still systemically required in the D€ ecosystem or must be viewed as value-added services. In the context of the D€, the ECB sees an additional role for the acquirer as provider of collection services: "*This would require an acquirer to collect and aggregate transactions on behalf of the merchant and make combined payments to a commercial bank account (on a daily or other basis)*" (ECB 2023a, 23). Accordingly, not every distributing PSP of the merchant or the payee would also be an acquirer by definition. The "*acquiring services*" would be an additional payment service that could be offered by the payee's distributing PSP in addition to all the D€ account services (or from a third party?).⁸²

⁸⁰ In the D€-R intro, in section 3 (Results of ex-post evaluations, stakeholder consultations and impact assessments, p. 9), the Commission refers to the two different groups: "*distribution and acquiring PSPs*".

⁸¹ In the impact assessment analysis, the Commission assumes that these services will be provided by the acquirers currently operating in the card business (EU Commission, 2023c, 53).

⁸² The acquiring legal definition as per Art. 4 (44) of the PSD2 also offers further reference points: "*acquiring of payment transactions means a payment service provided by a payment service provider contracting with a payee to accept and process payment transactions, which results in a transfer of funds to the payee.*" It can be concluded from this definition that the disbursement to the payee is as a result of the acquiring services ("*accept and process*"). In other words, the acquiring is more than the "*execution of a payment transaction*" stated under (3) as an additional payment service in Annex 1. In this context, the Commission's reference that "*one may also need to consider the provision of acquiring services to merchants, which is a specific service and is expected to be offered by only a subset of PSPs*" (EU Commission, 2023c, 53) is notable. Were this not the case, every account-keeping institution would offer acquiring services to a payee (also in the retail customer business). In the conventional card business, the payment guarantee to the merchant is the acquirer's core service, requiring a

This interpretation raises the question as to whether the merchant (or other payee) has to levy a merchant service charge pursuant to the D€-R even if no acquirer or acquiring payment services of the distributor PSP are involved. The definition of the MSC pursuant to Art 2 (24), which was adopted analogously from the Interchange Fee Regulation (IFR 2015)⁸³ for card-based transactions, is as follows:

"a fee paid by the payee to a payment service provider when acquiring a digital euro transaction".

Although the definition⁸⁴ avoids the term acquirer – unlike the definition in the IFR – it refers to the acquiring service. It remains to be seen if the account-keeping services of the payee's PSP already meet the requirements of *"acquiring a digital euro transaction"*. If they do, PSPs would also offer acquiring services to natural persons that receive D€ payments, as part of the basic services. In this case, an MSC would also come under the ban on fees.

Art. 17 (6) of the D€-R is another interpretation challenge. Sentences 2 and 3 read as follows:

"Payment service providers shall not charge merchants for funding and defunding of the digital euro, including digital euro payment transactions referred to in Art. 13(4). Payment service providers shall include costs associated with funding and defunding in the relevant costs referred to in paragraph 2(a)."

In view of the planned zero holding limit for merchants, the merchant can at most hold a short-term D€ position in its D€ account. The merchant PSP (distributor) may not pass on the costs for these defunding transactions that are required regularly to the merchant in the form of fees. The same requirement applies to funding transactions for any complaints (refunds). These costs should be an additional element of the "relevant" costs of the distributing PSP, which may be taken into account when calculating the IPF/MSL limit.⁸⁵

Pursuant to Art. 17 (6) sentence 3 and recital 45, the IPF should also compensate for these free distribution costs of merchant PSPs in addition to the free-of-charge basic services provided to natural persons. The IPF serves as compensation for all free distribution services.

This approach would contradict the card approach, whereby the issuer (payer's PSP) would receive the interchange fee from the acquirer (merchant's PSP). The question of systematic implementation also arises. If necessary, one could replace this requirement by introducing a gross and net IFS, where the difference remains with the merchant's PSP to cover its (de)funding costs.

legal permit. This is largely dispensed with for real-time D€ payments. This raises the basic question as to whether the card system-related term "acquirer" would still be suitable and transferable to an account-to-account payment system such as the D€ system.

⁸³ In the IFR (2015), the definition as per Art. 2 (12) is as follows: *"a fee paid by the payee to the acquirer in relation to card-based payment transactions"*.

⁸⁴ It is worth noting that the "merchant" included in the term MSC is not specified further in the definition but is generally afforded the same status as a payee.

⁸⁵ Art. 17 (6) of the D€-R refers to the merchant's D€ account-keeping PSP. As in the case of the private person's D€ account-keeping PSP (see details in section 3.3.3.2), it can be assumed that the demand for a fee waiver for (de)funding transactions relates only to the D€ account and not to the non-digital euro payment account. It is doubtful whether this conclusion arising from the text of the D€-R is in line with what the Commission intended. If the demand for a fee waiver is also extended to the respective non-digital euro payment account during the legalisation process, the D€-R would also imply regulation of the pricing of current accounts.

In international card business practice, the term MSC usually refers to the merchant service charge levied by acquirers. Adopting the term in the context of the D€-R suggests an identical concept. However, the question arises in this context whether the MSC should be interpreted within the meaning of the card approach and therefore as a merchant service charge for all the usual acquiring services (including terminal costs in face-to-face business). The first sentence of Art. 17 (6) of the D€-R is as follows:

"The merchant service charge shall be the only charge per transaction that payment service providers may apply to merchants."

It is possible that the MSC may only be charged for each transaction, where the emphasis is on "*charge per transaction*" and a flat fee is not permitted. The reason for this requirement would be to monitor the limit.

Alternatively, an interpretation with an emphasis on "*only*" could be possible, where additional fees for other D€ transaction-related services are not included, like the defunding transaction mentioned in sentence 2 of the same Article, which is triggered directly by the D€ transaction. This means that the MSC could relate only to the PSP's transaction-related distribution services. The merchant's distributor could potentially provide additional acquirer services (collecting, terminal provision, etc.) for a fee. This interpretation of the MSC would at least be methodologically consistent with the method for calculating the MSC limit, where only the costs of the distributing PSPs are relevant "*for the provision of digital euro payments*" (Art. 17 (2a) or "*for providing digital euro payment services*" (Art. 17 (5a)). The MSC would therefore be charged independent of any acquirer services of the merchant PSP.

According to the card approach, equating the limits for the MSC and the IPF as required in the D€-R is contradictory, as the MSC includes the IPF plus the compensation for the merchant's (acquirer) services. The contradiction would be resolved if the MSC were only viewed as compensation for the merchant PSP's distribution services. The logic behind putting the MSC and IPF on an equal footing is derived from the requirement that this fee (IPF/MSC) should only cover the distribution costs (including profit margin) of the participating PSPs. The costs of the natural person's free D€-account will be covered by the IPF, and those of the merchant PSP by the MSC. Without taking the (de)funding costs into consideration, it can be assumed that there will be no material differences between two PSP groups. This means that the limit will be calculated using the same method (PSP costs for the distribution of the D€). According to this logic, the IPF represents a fee for merchants, which will be collected *in addition* to the MSC and is not – as is customary in the card world – included in the MSC.

This results in the following fee components from the merchant's perspective:

IPF	Regulated limit (same method as MSC)	Compensation for free basic services of the respective PSP for natural persons and the costs for the merchant PSP's (de)funding.
MSC	Regulated limit (same method as IPF)	Compensation for the merchant PSP's distribution services (without (de)funding)

Acquirer fee	No regulation	"Real" acquirer services of the merchant PSP (e.g. collecting)
Terminal fee	No regulation	Only relevant in face-to-face business
Other fees	No regulation	Special services in connection with the D€ (e.g. conditional payments)

Figure 7: Merchant service charges (holistic approach)

The legal definition of the MSC must therefore be changed in the D€-R, as there is no similarity with the MSC as used in the card approach. To avoid any misinterpretations, this interpretation should avoid using the term "merchant service charge" (MSC) that is well-established in the payment world.

However, this interpretation (additive consideration of IPS and MSC) contradicts Art. 17 (2) which states that either the IPS or the MSC may not exceed the limits (costs of the PSP or merchant service charges for comparable payment methods).

Conclusion: As methods for interpreting the compensation model pursuant to the D€-R, both the card and the holistic approach lead to ambiguities and contradictions.

3.8 Remuneration and interest

There is nothing to prevent CBDCs having (variable) interest rates – this is a view that was also taken by the ECB (2020, 13) in its first report on the D€: "... *The digital euro should be remunerated at interest rate(s) that the central bank can modify over time.*" This was in line with the goal of using the D€ interest rate as a new monetary policy instrument. However, in the interests of promoting financial stability and avoiding problems in the banking sector, a tiered approach to interest rates was initially taken as the starting point (e.g. Nagel, 2022). This course has since been abandoned by both the ECB and the EU Commission's Draft Regulation.

In its report on the investigation phase and outlook on the next phase, the ECB (2023a, 33) confirmed: "*Holdings of digital euro would not be remunerated, thereby conveying a strong public signal that it is intended as a complement to cash. At this stage the Eurosystem does not intend to develop any functionality to remunerate digital euro holdings.*" Similarly, Bindseil et al. (2024) stated: "*Moreover, digital euro holdings would not accrue interest.*" And in an ECB blog post dated 19 February 2024, Cipollone et al. stated that "... *the combination of the reverse waterfall, a holding limit and no remuneration would strongly reduce incentives to keep large amounts of money in a digital euro wallet. Users would rely on digital euro as a means of payment rather than use it for investment ...*". The ECB has emphasised that the D€ should be used as a means of payment and not as a store of value.⁸⁶

The EU Commission expressed its support of this approach in the D€-R, Art. 16 (8): "*Within the framework of this Regulation, the digital euro shall not bear interest*". However, the wording of the ban on interest "*within the framework of this Regulation*" leaves open the possibility of alternative arrangements "*outside*" of the legislative proposal. Similarly, the ECB's choice of wording "*At this stage ...*" (2023a, 33) is not entirely clear. The German Banking Industry Committee (2024) has called for a binding regulation and a standardised approach. What is clear, however, is that the ban on interest means that the interest-bearing products provided by banks and savings banks would not face any competition from an artificially generated public digital money.

The absence of interest is in keeping with the non-remuneration of cash as another form of central bank money for everyone. However, the emphasis on its use as a means of payment would only imply a low interest rate, in keeping with common market practices, and not necessarily zero interest (some current accounts offer interest rates on a par with overnight deposits, i.e. positive but low-yield).

Nonetheless, the ECB (2023d, 13) did state the following in response to the EU Commission's Draft Regulation: "*Given its mandate to maintain price stability and the concomitant basic task of defining and implementing the monetary policy of the euro area, the ECB cannot exclude future scenarios where remuneration of the digital euro might be warranted. Also, to further its monetary policy mandate, the ECB must remain in control of the remuneration of all liabilities on its balance sheet.*" As such, it would seem that the ECB is leaving a back door open to the possibility of introducing (positive or negative) interest. From its own perspective, it is conceivable that there would be a place for a sharply negative rate in the event of a severe economic downturn, something that has frequently been discussed in the

⁸⁶ It should be noted that the D€ as a means of payment must not be confused with the D€ as a payment scheme (German Banking Industry Committee, 2024).

wake of the last two severe crises (the 2008-2009 financial markets and economic crisis and the 2020 Corona pandemic).

3.9 Overview of current regulations: Derived (un)certainities and contradictions

1. Clear/certain
– Retail CBDC across the entire euro area
– Account-based model
– Online and offline versions
– Holding limit, only an offline transaction limit potentially
– Free basic services for users; financing through MSC and IPF (subject to upper limit)
– Not programmable
– Complement to rather than a substitute for cash
– D€ as instant payments
– Not fully anonymous
– (Initially) no interest, no surcharges
– Interoperability
– Mandatory acceptance by legal persons (with exceptions for small retailers)
– Legal tender
2. Unclear/uncertain
Roles:
– Merchant terminology in a price-regulated public system: distinction between a merchant and a business user; treatment of non-financial firms that are not merchants.
– Criteria for the role of a natural person as a business user. What constitutes a "natural person" who does not have to pay fees?
– Provision of D€ payment services for all ASPSPs or only for certain credit institutions?
Compensation model
– What are the relevant costs in determining the MSC and IPF? What about the rollout costs and upgrade costs for terminals? What are "comparable digital means of payment" (type, jurisdiction, comparability)?
– Who will bear the costs of P2P payments: merchant, PSP or the public sector?
– What do the free basic services for users include? Automatic (de)funding? If so, what about the account movements on the non-digital euro payment account (mainly per-item charges common for business clients)? What about switching a D€ account to a different PSP? Or costs for conflict resolution processes?
– Does the IPF cover the costs of providing the D€ account via PSPs?
– Key role of the acquirer in the system; acquiring services that are not covered by distribution services?
– IPF if the payer is a legal person or if a payment is made by a legal person to a natural person.
– Who is responsible in the event of fraud: merchant, PSP, payer or ECB (Eurosysteem)? Do PSR regulations for transfers also apply to the D€?
– Offline D€, data protection and IPF
Limits
– Holding limit amount
– Transaction and possible holding limit for offline D€
– Is (de)funding automatic even if the D€ transaction exceeds the holding limit?
– Can users set limits? Can PSPs limit reverse waterfalls?
Offline version
Is there mandatory acceptance (required acceptance) for the online and offline versions or just online?

Storage of offline D€: in a decentralised account (holding balance) or digital units of value?
Is the offline D€ bearer instrument a payment instrument within the meaning of the PSD2?
Other
How should funding work in real time between a non-digital euro payment account and a D€ account (reverse waterfall)?
What does the term "public good" mean as used by the ECB (Eurosystem) and the D€-R?
3. Contradictions
D€-R: Distributing PSP provides services for payers and payees; ECB: Distinction between acquiring PSP (payee) and distributing PSP (payer)
Introduction of the online and offline version: simultaneously according to the D€-R or online-first (ECB)
D€-R: multiple D€ accounts with different PSPs possible; ECB: only one account for monitoring and holding limit reasons
Definition of offline payments in D€
D€-R: natural and legal persons can choose their app (ECB app, PSP app); ECB: only "individuals" can choose
Same limits for IPF and MSC

4 Implications for consumers, merchants and non-financial corporations

What implications does the analysis of the status quo hold for consumers (who are ultimately the decisive user group), retailers and other non-financial companies? As central bank money in digital form, the purpose of D€ is to supplement cash rather than replace it. The selected structural features (cf. section 3.1) are designed to make it attractive for users. However, in the interests of financial stability, care should be taken not to make it too attractive an option (to avoid customer deposits being withdrawn in crisis situations, bank runs, etc.). What does this mean in terms of potential user benefits ("use case"/"business case")?

4.1 Consumers

There are a number of different potential consumer use cases for the D€:

- for making payments to merchants (P2B), either at the physical POS or in e-commerce;
- for P2P;
- for making payments to other companies and government agencies;
- for receiving payments;
- for cashless small payments through the offline function which offer greater privacy compared with conventional cashless payment instruments;
- as a store of value.

On a generally positive note for consumers, no direct fees will be charged to the D€ account. Basic services should be free of charge for natural persons, with no account or transaction fees for D€ accounts. Accordingly, account-keeping institutions will only generate fee income via IPF; the exact specifications of the fee model are still unclear.

Even though a D€ account will not have to be linked to a current account, it is safe to assume that this will be the standard case. However, if costs for D€ accounts are not fully covered by IPF income, it is likely that any shortfall will be factored in when setting fees for current accounts. Higher current account fees might also become necessary because account-keeping PSPs (banks) stand to lose seigniorage income if customers hold funds in D€ accounts instead of current accounts. However, this effect is limited due to the planned maximum holding amounts per D€ account.

Account models with per-item charges also exist for private customers: where funding/defunding transactions result in credits to (or debits from) a current account, account fees would be incurred in the same way as for business clients. However, given that not every D€ transaction for private customers automatically involves (de)funding, D€ transactions for private customers can be expected to incur lower fees on average.

Costs are not only incurred in the form of fees – opportunity costs (time and effort) must also be considered. Specifically, the application must be installed or initiated and the connection to the current account established. Having an additional account leads to more complexity, as it establishes an additional transaction level between the current account and the D€ account. However, (de)funding may be automated in a second step – at least in the online version – thereby containing the cost and effort involved. Important factors over time will also include the frequency of required updates, how easy it is to switch to a new smartphone and how D€ can be used with Google Pay or Apple Pay.

It is reasonable to assume that most D€ users will utilise the reverse waterfall (cf. section 3.3.3.1). If the D€ is used for payments only, the procedure should be similar to a PayPal credit balance, meaning that automatic funding applies (reverse waterfall) when D€ payments are initiated. For D€ accounts that serve as transaction accounts, the D€ balance would therefore generally be zero. This means that consumer liquidity would continue to be concentrated in users' current accounts, which will remain the central account for private households for the foreseeable future.⁸⁷ Especially for customers with limited financial resources, it is important to reduce the risk of current account overdrafts (or of payments being rejected, e.g. direct debits) by minimising the D€ balance.

As a result, *transaction* balances are likely to be low, with *D€ holdings* presumably serving first and foremost as a store of value. However, in view of the planned holding limit (cf. section 3.5), these holdings are likely to remain relatively small.

It is also conceivable that private users will do without a current account altogether, making their D€ account their payment hub in order to save fees. Whether this is a realistic scenario depends on the extent to which a D€ account can sufficiently replicate the wide range of functions offered by a current account. This would not be the case if a relatively low holding limit were to apply.

D€ as a means of payment in e-commerce

Numerous payment models are already in place for e-commerce, such as:

- cash on delivery;
- advance payment by bank transfer, instant bank transfer, "direct transfer" (Klarna, Giroipay, etc. – plus procedures abroad such as iDEAL in the Netherlands);
- purchase on account, with payment after delivery, by (instant) bank transfer;
- payment by direct debit (with or without PSP guarantee);
- PayPal (with different funding options);
- credit and debit cards.

Three key factors determine whether the D€ is preferred to these procedures: convenience, risk and reach (fees are not relevant as consumers do not usually pay fees for any option).

As regards convenience, procedures that a consumer already uses (and is already used to) have an implied advantage. Essentially, any new product must offer significant added value for it to be used as well. There are also frequent exceptions to SCA requirements for existing customer-merchant relationships, making payment processing more convenient from the customer's point of view. Payment methods incurring very low costs, such as direct debit or bank transfer, can already be used in these business relationships.

From a risk perspective, there are procedures (e.g. credit card, direct debit) that provide payers with protection against merchant misconduct (fraud, bankruptcy) through the chargeback function. This includes refund rights for payers or minimum screening of merchants plus exclusion of "problem merchants". Unlike payment schemes with a chargeback option, D€ transactions constitute a final and irrevocable payment – unless the rules are amended.

⁸⁷ This will continue to be the case as long as wage payments are primarily made by bank transfer to current accounts.

As many merchants will be required by law to accept it, the D€ will have an advantage as regards reach as it will be generally accepted. However, most merchants already offer a number of payment options (such as PayPal or VISA/MasterCard credit/debit cards).

In total, there are no clear advantages for the D€ vis-à-vis existing, widely accepted cashless payment methods in terms of convenience, risk or reach. The convenience aspect depends to a great extent on the specific design. In any case, any new method always involves additional effort for users. This applies in particular to a public app or a “public product” in an existing app. Without a doubt, the problems associated with the launch of the Corona app are still far from forgotten. For transactions where the retailer is a risk factor, there are other methods that offer a much better alternative.

D€ as a means of payment at the physical POS

Likewise, consumers already have a wide range of payment options at their disposal at physical POS, in particular:

- cash,
- debit or credit cards,
- mobile payments based on stored card data.

All of these payment methods are generally free of charge for customers – or at least do not involve transaction-related fees and work very well from a payer’s perspective (e.g. Kantar Public, 2022; Sveriges Riksbank, 2023; Swiss National Bank, 2023b). Online D€ payments do not seem to offer any additional benefits when compared with these existing payment options. Offline D€ payments offer more privacy than cashless payment methods, but less privacy than cash.

Some people may prefer to make cashless payments while still benefiting from a certain level of privacy protection. The offline D€ would offer added value for these customers. The offline D€ might be an interesting alternative to cash in countries where cash acceptance has declined considerably. For people who do not carry cash, this form of D€ could serve as a fall-back solution in the event that the merchant’s communications infrastructure is not working.

D€ as a means of payment for P2P transactions

A number of options currently exist for P2P payments:

- cash,
- bank transfer (SCT),
- real-time transfer (SCT Inst),
- PayPal (or comparable e-money products),
- special P2P apps in individual countries.

As cash is not suitable for P2P distance payments and bank transfers are slow, there is potential for the D€ to offer added value here. Although real-time transfers are fast, they are not particularly convenient for P2P payments. In addition, they will remain more expensive than conventional transfers until the costs are aligned at the end of 2025. As such, the D€ could offer benefits in this respect. However, there are already applications based on real-time transfers that are very popular and more

will follow (as described below) – for instance, PayPal is widely used and also relatively easy to use for P2P payments. It remains to be seen whether the D€ can gain a foothold here.

Moreover, domestic banks in various countries have developed their own mobile payment methods that are suitable for P2P payments. For example, Bizum in Spain, MobilePay in Finland and Tikkie in the Netherlands are widely used, while Twint is very successful in Switzerland and Swish in Sweden.⁸⁸ Swish recently switched to TIPS for back-end processing. However, these systems lack cross-border reach. The European Payment Initiative (EPI) is currently developing a system for the euro area that is due to go live in mid-2024.

The D€ card

A D€ card is to be introduced as an alternative for the target group of unbanked, vulnerable groups and consumers who do not wish to use their smartphone as a payment medium. At present, these groups of people mainly use cash or debit cards. As long as cash is still widely accepted, their demand for D€ will presumably remain extremely low. On the other hand, there are people for whom data protection is a high priority. For them, cash is likely to remain their first preference as long as access and acceptance are guaranteed.

This means that the only potential users left would be those who would like to use the D€ as a means of payment at the POS, but are reluctant to use their mobile phone for this purpose. According to Statista, smartphone users accounted for around 81.1% of the German population in 2022.⁸⁹ However, the use of smartphones as a cashless payment medium is still at a relatively low level compared with physical cards.

No clear figures are available for Germany. According to EHI, “only” 7.5% (2022: 5.4%) of cashless retail POS transactions were made via smartphone (card-based or using other means) in 2023.⁹⁰ The most recent payment behaviour study by Deutsche Bundesbank (2024) for 2023 found that mobile payment methods accounted for a total share of 6% (5%) in terms of the number of transactions (turnover).⁹¹ Across the euro area, the figures for 2022 were around 4% (ECB, 2022c). According to Statista (2024), 19% of POS payments in Germany in 2023 were processed via mobile devices. A VISA survey showed that 23% of all payments at the checkout were made using smartphones or wearables in 2023.⁹² While the range of values is very wide indeed, the only thing that seems certain is that most people do not use mobile phones as a payment medium.

As recent years have shown, many people continue to prefer plastic cards to mobile phones as a means of payment. According to the regional transport association of the Rhein-Main area (“RMV”), around 50% of ticket holders who purchased their nationwide regional pass (“Deutschlandticket” or “D-Ticket”) via the RMV prefer the non-digital card version even though the digital smartphone version is much

⁸⁸ Both countries are not part of the euro area.

⁸⁹ Cf. <https://de.statista.com/statistik/daten/studie/585883/umfrage/anteil-der-smartphone-nutzer-in-deutschland/> (in German only)

⁹⁰ Cf. Rüter (2024), p. 63

⁹¹ This is an increase by 4 (3) percentage points from 2021, respectively.

⁹² Cf. Visa Payment Monitor (2023)

easier and faster to purchase.⁹³ Assuming that “D-Ticket” holders are a representative proportion of the population, the percentage of smartphone owners is far higher. Obviously, a significant part of this group do not wish to use the D-Ticket via their smartphone. Furthermore, on analysing the ECB’s Consumer Expectations Survey, Meyer & Teppa (2024) find that most people prefer to use just one digital payment method even if several are available. Another important factor is force of habit, which makes it extremely difficult for new solutions to gain acceptance unless they offer substantial added value.

The ECB and the European Commission seem to consider smartphone-based D€ use to be standard. However, many people currently prefer a plastic card for payments, as well as for other use cases. This means that the D€ would require a successful card-based model in order to ensure widespread use.

Weak use case for consumers

All in all, the D€ use case appears to be greatly lacking from a consumer perspective. For argument’s sake, imagine a country with a highly developed payment system and a variety of possible payment methods (cash, debit and credit cards, mobile payment methods, national payment apps and a successful EPI): why would high numbers of users be interested in installing yet another payment solution (developed by the public sector for public money) or obtaining yet another payment card if everything is already working to their satisfaction? In this context, Sveriges Riksbank (2023) stated that:

“Whether or not to introduce an e-krona in Sweden is ultimately a political decision. An inquiry into the role of the state in the payment market, presented in March 2023, assesses that there is currently insufficient social need for the Riksbank to issue an e-krona.”

While the offline version appears quite attractive at first glance, potential users who set great store by data protection, privacy and anonymity are likely to continue using cash. According to the points discussed above, other users – who are less concerned about protecting their privacy – have little incentive to use the D€, whether online or offline. The only core group of users left would be those who want to use a cashless payment method while retaining a certain degree of privacy protection.

4.2 Merchants

Most merchants will be forced to accept the D€, both in e-commerce and at the physical POS – with the D€ system to be financed via merchant service charges (“MSCs”, which will be capped by regulation).

Assuming that the online D€ is accepted, this offers the alternatives of payment being made to a D€ account of the merchant – or the acquirer. In both cases, the merchant is likely to incur an MSC.⁹⁴ The second option may be better for SMEs, as they would otherwise have to pay a (relatively high) per-

⁹³ Cf. RMV (2024) – IT association Bitkom reports similar figures, cf. Bitkom (2023).

⁹⁴ However, based on a holistic interpretation of the compensation model, MSCs will only be levied if the transaction involves a merchant’s PSP that is responsible for acquiring a D€ transaction (cf. Art. 2 (24) of the D€ Regulation). It is unclear whether the merchant’s PSP which only maintains the D€ account is already to be considered an acquirer.

item fee to their bank for each transaction with subsequent defunding. As acquirers would presumably be able to offer better conditions, it might make more sense to accumulate D€ transactions with the acquirer and disburse them periodically (e.g. on a daily basis). In fact, some large merchants may prefer the first option. Based primarily on the number of merchants (as opposed to their turnover), the second variant is likely to dominate.

E-commerce

In e-commerce, mandatory acceptance can be fulfilled in various ways.

A merchant may offer "advance payment using D€" as a payment option, which raises the question as to whether there are cheaper alternatives (e.g. a simple bank transfer). The answer essentially depends on what is considered a "comparable payment instrument" in accordance with the D€ Directive. After all, the D€ must be subject to the same fees as all "comparable" schemes.

D€ payment can also be integrated with other payment alternatives in the e-shop: while large merchants ("key accounts") may be able to do this themselves, SMEs will need to have this done by their acquirer.

If D€ payments are first paid into an acquirer account and then disbursed periodically, there will be no difference for merchants in payment processing compared with the other methods. It is quite conceivable that merchants will receive a single transfer to their account containing the total receipts from all schemes.

Small merchants often prefer a simple fee model that does not differentiate between the various payment instruments ("blending"). However, it is unclear whether acquirers will be allowed to include D€ payments for this purpose.

Online D€ at the physical POS

Merchant terminals will first have to be adapted to be able to integrate online D€ payments. The costs associated with this depend primarily on the extent to which existing standards can be used as a basis. There may be one-off costs for merchants' own terminals or higher rental prices.

All in all, benefits and disadvantages for merchants are difficult to determine based on the limited information currently available. Key factors in this context are:

- size and composition of fees,
- liquidity,
- functional features,
- settlement speed,
- reliability (including fraud cases and fraud costs),
- customers' assessment.

If merchants have certain preferences, it would be important to know to what extent they are actually able to influence or determine the choice of payment method. Although from a legal perspective, this should be the customer's decision, it often ends up being taken by the merchant.

Offline D€ at the physical POS

Terminals will also have to be adapted for the offline variant and offline acceptance is likely to require additional design and implementation work. On the other hand, payment transactions will probably be somewhat more favourable for merchants, since no "waterfall" is triggered after each transaction. This might make the offline D€ an attractive alternative for merchants. However, customer behaviour and the two-sided nature of the markets are both important factors in this context: it will be difficult to realise the benefits in the absence of broad customer acceptance.

The offline D€ could also be an attractive fall-back solution in the event of communication disruptions with the acquirer. At the same time, this requires that customers have sufficient offline credit balances and that significant amounts can actually be accumulated in the *local storage device*. This is still being discussed. Other regulatory framework conditions also need to be clarified: what are the specific offline limits for the *local storage device*? And will there be limits regarding the number of devices per merchant?⁹⁵

Overall, it is conceivable that the offline D€ will prove to be a low-cost payment option at the POS, providing merchants with an opportunity to reduce the costs of payments. However, this will require customer cooperation – customers must implement the "Offline D€" payment function, accept it and maintain sufficient credit. This means that the offline variant in particular depends mainly upon its popularity among customers.

Will the D€ lead to more favourable terms for merchants?

The D€ is designed as a particularly favourable payment option for merchants. However, fees for basic services are largely incurred by merchants since private individuals are exempt from fees. In the case of payments from private individuals to merchants, a part of the merchant fee is transferred to the payer's service provider in the form of an inter-PSP fee. The level of fees to be paid by merchants cannot be estimated at present because there are too many questions regarding the proposed methodology for determining maximum amounts (cf. section 3.7.2).

With this particular means of payment, it is not up to merchants to decide whether or not to accept the D€ – they will be obliged to do so. This in turn means that D€ acceptance must be established by a certain date. As merchants will incur implementation costs of their own, it can be expected that small merchants in particular will be faced with significant cost increases.

Nonetheless, regulators assume that the D€ will be favourable for merchants, noting in particular that the ECB will not be levying any scheme fees. From the regulators' perspective, this will eliminate considerable costs.

But even if the D€ should prove to be relatively favourable for merchants, there are two aspects to consider:

⁹⁵ It is quite conceivable that regulators will seek to impose a limit to prevent companies with a large number of devices from circumventing the zero holding limit. On the other hand, large merchants will certainly want to have one device per checkout or, if this can be centralised within a shop, at least one device per shop.

- If a uniform upper limit for merchant and inter-PSP fees is established for the entire euro area, this may indeed exceed fee levels for national payment schemes (national debit card systems, for example).
- In a two-sided market, the payment method with the lowest costs will not necessarily prevail.⁹⁶

The fact is that merchants will have no option but to accept the D€. It is also a fact that merchants frequently accept a variety of payment methods (a practice called "multihoming"). As such, merchants will probably simply add the D€ to their list of accepted payment schemes, whereas the other side of the market – i.e. customers and private individuals' PSPs – will determine its use.

PSPs of private individuals must offer basic services for the D€ free of charge. They will also have an interest in offering payment schemes that provide the greatest benefit. As a result, the D€ might in fact displace those schemes that are most favourable for merchants.

As a rule, customers do not pay any transaction fees, regardless of the payment scheme used. This means that small details regarding convenience or additional applications often determine the customer's choice. Especially in this context, national and international card payment schemes and wallet providers (Apple/Google) are likely to be closer to the customer than the ECB is.

4.3 Non-financial enterprises (except merchants)

At present, it is entirely unclear what the D€ implications will be for non-financial enterprises (NFEs) that are not classified as merchants. There are two reasons for this:

- The D€ is initially intended for the general public, merchants and public-sector entities.
- There is already a range of European payment applications for NFEs: SEPA Credit Transfer (SCT), SEPA Direct Debit (SDD) and SEPA Instant Payments (SEPA Inst).

SCT and SDD are widely used and can be regarded as standard payment applications for payments where timing is not a critical factor (i.e. where funds do not have to be transferred in a matter of minutes). SEPA Inst has been available as an option for time-critical payments for some time now. Switching to D€ payments would necessitate cost advantages or improved functionality.

When the European Commission's Instant Payment Regulation (EU Commission, 2024) is implemented, fees for SCT and SEPA Inst will be harmonised. In this case, SEPA Inst is likely to replace SCT as the normal case. In other words, the D€ would have to offer further advantages, alongside an immediate value date, in order to be of interest for NFEs.

Fees are an important factor. With SEPA Inst, the payer's PSP and the recipient's PSP pay 0.1 euro cent each. Customers will ultimately have to bear these fees. One positive aspect of the D€ is that the ECB does not intend to charge participating PSPs any fees for D€ transactions. a factor that is in favour of the D€. However, as the scheme fees (settlement costs) only make up a small part of overall processing costs (IT costs, liquidity costs, etc.), savings from centralised ECB settlement are quite limited. As well as this, D€ transactions are far more complex, as they would require a reverse waterfall as well as a

⁹⁶ It is often assumed that the exact opposite is the case and that those schemes that are particularly expensive will prevail – a phenomenon also known as "Gresham's law of payments" (cf. Macfarlane, 2005).

waterfall transaction for NFEs. This raises doubts as to whether a D€ transaction will in fact be cheaper to process than SEPA Inst. Consequently, for many regular standard transactions, it seems unlikely that the D€ will replace credit transfers or instant transfers.

However, one of the aims of the D€ is also to provide a platform for developing new services such as conditional payments (Cipollone, 2024), machine-to-machine payments or payments that can be used on the decentralised internet. PSPs should also be generally permitted to charge fees for applications like these outside the scope of "basic digital euro payment services". In some cases, this might give rise to new business models and areas of application.

However, the question is to what extent innovations depend on the existence of a D€. Standardised interfaces are key. Clearing and settlement do not necessarily require a D€; SEPA Inst could also be used for this purpose, as demonstrated by examples such as Swish. It is also questionable whether the legal framework for the D€ is compatible with the concept of promoting payment innovations. For instance, having zero holding limits for legal entities means that the D€ cannot be used for M2M transactions.

It is virtually impossible to predict whether – and to what extent – the D€ will in fact give rise to innovations. As pointed out above, there is reason for scepticism. However, it is relatively clear that very few repercussions for the NFEs are to be expected following the initial introduction of the D€.

4.4 Conclusion: doubts about the use case

It is difficult to establish a new payment solution in a currency area that already has a wide range of payment methods – particularly if there are no obvious gaps in the mix of payment systems. Without such gaps, the D€ has no unique selling point. While the D€ is certainly of interest to many users for storing value, this benefit is restricted by holding limits.

Clearly, costs are the main focus for merchants. While these might prove interesting for the offline D€, widespread use at the POS calls for widespread interest on the part of customers as well. Use of the online D€ will depend on the level of IPF, which is difficult to forecast ex-ante. The D€ is officially expected to be a cost-effective payment alternative.

However, the cost of fraud will be particularly important when it comes to using the D€ on the internet. If the liability rules are not improved, there may be unpleasant surprises regarding fraud costs, regardless of who will initially bear these costs from a legal perspective. Ultimately, it is users who will have to bear these costs – meaning that they will also be reflected in the fees for merchants and consumers.

The D€ will be of little interest to non-financial enterprises that are not merchants. While the potential for digital applications is being emphasised, the legal framework needs to be re-examined in this context as well. At present, this tends to hinder such innovations.⁹⁷ The same applies to the schedule

⁹⁷ Supplementing the legal framework might improve conditions for innovation, but would probably also make the D€ product even more complex.

for introducing the D€. By the time the D€ is introduced, other solutions will probably have become established.

Generally speaking, the ability to use the D€ throughout the euro area is an advantage, if only compared with national schemes. However, international schemes are already widely used – at the POS, online and worldwide. The D€ will not achieve this reach in the foreseeable future. But if European governance and independence from the powerful international players are deemed important factors, then the D€ has an advantage. However, the benefit of cross-border acceptance throughout the euro area is not necessarily linked to the D€ but is simply based on standardisation driven by legislation. This could also be achieved using SEPA Inst.

In summary, the D€ is likely to be complex and expensive, without guaranteeing any added value. Efficient national payment transaction systems are likely to lose out. However, it is by no means certain that international payment systems will in fact be weakened by a new public competitor.

Bibliography

- Balz, B. (2023a), Der digitale Euro – Gestaltung der Zukunft [The digital euro – shaping the future], speech held at Hannover stock exchange's "Jahresschlussbörse 2023" event, 29 December 2023.
- Balz, B. (2023b), Der digitale Euro – Pläne und Perspektiven für Europa [The digital euro – plans and perspectives for Europe], speech held at the online discussion round of "Europa-Union Deutschland e.V.", 10 October 2023.
- Balz, B. (2024), Der digitale Euro ist für Europa eine kritische Infrastruktur [The digital euro is critical infrastructure for Europe], Handelsblatt interview, 28 February 2024. (<https://www.handelsblatt.com/finanzen/maerkte/devisen-rohstoffe/bundesbank-interview-der-digitale-euro-ist-fuer-europa-eine-kritische-infrastruktur/100016677.html>)
- Bank of England and HM Treasury (2023): The Digital Pound: A new form of money for households and businesses?, consultation paper, February 2023.
- Bank for International Settlements (2021): Central Bank Digital Currencies: System design and interoperability, report no 2 in a series of collaborations from a group of central banks, September 2021.
- Bindseil, U.; Cipollone, P.; Schaaf, J. (2024), The Digital Euro After the Investigation Phase: Demystifying fears about bank disintermediation, VoxEU, 19 February 2024.
- Bitkom (2023), Ein Monat Deutschlandticket: Hälfte der Fahrgäste bevorzugt Nutzung per App [One month after launch of the German "Deutschlandticket" monthly ticket: 50% of passengers prefer using the app], press release, 1 June 2023.
- Bowman, M. W. (2023), Responsible Innovation in Money and Payments, speech at the Roundtable on Central Bank Digital Currency, Harvard Law School Program on International Financial Systems, Washington, D.C., 17 October 2023. (<https://www.federalreserve.gov/newsevents/speech/bowman20231017a.htm>)
- German Federal Cartel Office (2022), 2022 Review of the Second Payment Services Directive (PSD2), contribution by the Bundeskartellamt on Surcharging, 2 August 2022.
- Cipollone, P. (2024), DIGITAL EURO – The future of money, meeting with the Italian Banking Association, 17 April 2024.
- Cipollone, P.; Bindseil, U.; Schaaf, J. (2024), Digital Euro: Debunking banks' fears about losing deposits, The ECB Blog, 19 February 2024.
- Committee on Payments and Market Infrastructures (2021), Central Bank Digital Currencies for Cross-border Payments, report to the G20, July 2021.
- Deutsche Bundesbank (2021), Eurosystem Experimentation Regarding a Digital Euro – Research workstream on hardware bearer instrument, 9 August 2021.
- Deutsche Bundesbank (2024), Zahlungsverhalten in Deutschland 2023 [Payment behaviour in Germany], July 2024.
- German Banking Industry Committee (2024), Comment on the German Parliament's plenary sitting of 19 February 2024 on the European Commission's legislative proposal on the digital euro of 28 June 2023.
- Diem Association (2022), Statement by DIEM CEO Stuart Levey on the Sale of the DIEM Group's Assets to Silvergate, 31 January 2022.
- Digital Euro Association (2023), Lessons from the first implemented CBDC: The Sand dollar, Digital Euro Association Blog, 23 June 2023. (<https://blog.digital-euro-association.de/lessons-from-the-sand-dollar>)

- ECON (2024), Draft Report of the Committee on Economic and Monetary Affairs (ECON), 2023/0211(COD), 9 February 2024
- EPI (2024), European Payments Initiative statement on the digital euro.
- EU (2024), Regulation (EU) 2024/1183 of the European Parliament and of the Council of 11 April 2024 amending Regulation (EU) No 910/2014 as regards establishing the European Digital Identity Framework, 30 April 2024.
- EU Commission (2017), Commission Delegated Regulation (EU) 2018/389 of 27 November 2017 supplementing Directive (EU) 2015/2366 of the European Parliament and of the Council with regard to regulatory technical standards for strong customer authentication and common and secure open standards of communication, 13 March 2018.
- EU Commission (2023a), Proposal for a Regulation of the European Parliament and of the Council on the Establishment of the Digital Euro, COM(2023) 369 final, 28 June 2023 (abbreviation used in the study: D€-R).
- EU Commission (2023b), Proposal for a Regulation of the European Parliament and of the Council on Payment Services in the Internal Market and Amending Regulation (EU) No 1093/2010, COM(2023) 367 final, 23 June 2023 (abbreviation used in the study: PSR).
- EU Commission (2023c), Impact Assessment Report, SWD(2023) 233 final, Brussels, 28 June 2023.
- EU Commission (2023d), Proposal for a Regulation of the European Parliament and the Council on Legal Tender of Euro Banknotes and Coins, COM(2023) 364 final, 28 June 2023.
- EU Commission (2024), Regulation (EU) 2024/886 of the European Parliament and of the Council of 13 March 2024 amending Regulations (EU) No 260/2012 and (EU) 2021/1230 and Directives 98/26/EC and (EU) 2015/2366 as regards instant credit transfers in euro, 19 March 2024.
- European Central Bank (2020), Report on a Digital Euro, October 2020.
- European Central Bank (2021), Digital Euro Experimentation Scope and Key Learnings.
- European Central Bank (2022a), Progress on the Investigation Phase of a Digital Euro, 29 September 2022.
- European Central Bank (2022b), Progress on the Investigation Phase of a Digital Euro – second report, 21 December 2022.
- European Central Bank (2022c), Study on the Payment Attitudes of Consumers in the Euro Area (SPACE), December 2022.
- European Central Bank (2022d), Annex 1 – Front-end Prototype Providers Technical Onboarding Package, 7 December 2022.
- European Central Bank (2023a), A Stocktake on the Digital Euro – Summary report on the investigation phase and outlook on the next phase, 18 October 2023.
- European Central Bank (2023b), The Eurosystem's Retail Payments Strategy – Priorities for 2024 and beyond, November 2023.
- European Central Bank (2023c), Compensation Model for the Digital Euro, 22 February 2023.
- European Central Bank (2023d), Opinion of the European Central Bank of 31 October 2023 on the digital euro (CON/2023/34).
- European Central Bank (2023e), Digital Euro Glossary, as at: 7 November 2023.
- European Central Bank (2023f), Annex 1: Functional and non-functional requirements linked to the market research for a potential digital euro implementation, 13 January 2023.

- European Central Bank (2023g), Eurosystem Proceeds to Next Phase of Digital Euro Project, press release, 18 October 2023.
- European Central Bank (2023h), Progress on the Investigation Phase of a Digital Euro – third report, 24 April 2023.
- European Central Bank (2023i), International Aspects of CBDCs: update on digital euro, Eurogroup presentation, 15 May 2023.
- European Central Bank (2023j), Progress on the Investigation Phase of a Digital Euro – fourth report, 13 July 2023.
- European Central Bank (2024a), Update on the Work of the Digital Euro Scheme's Rulebook Development Group, 3 January 2024.
- European Central Bank (2024b), Calls for Applications for Digital Euro component Providers, App and SDK, 3 January 2024.
- European Central Bank (2024c), Calls for Applications for Digital Euro component Providers, Offline Solution, 3 January 2024.
- European Parliament (2024), Draft Report on the Proposal for a Regulation of the European Parliament and of the Council on the Establishment of the Digital Euro, 2023/0212(COD), 9 February 2024.
- Financial Stability Board (2020), Enhancing Cross-border Payments: Stage 3 roadmap, 13 October 2020.
- Godschalk, H. (2024), Digital Euro – No Full Anonymity. Why Not?, *PayTechLaw*, contribution to the hearing in the Finance Committee of the German Bundestag on the digital euro on 19 February 2024, 15 February 2024. (<https://paytechlaw.com/en/digital-euro-no-full-anonymity/>)
- Grym, A. (2020), Lessons Learned from the World's First CBDC, *Bank of Finland Economics Review*, No. 8/2020.
- Initiative Deutsche Zahlungssysteme e.V. (2022), Vertrauen in Bewährtes bestimmt Bezahlmittel der Zukunft [Consumers' trust in the tried and tested defines future payment methods], representative survey conducted by the Institut für Demoskopie Allensbach (IfD Allensbach) on behalf of the Initiative Deutsche Zahlungssysteme e.V., August 2022.
- Kantar Public (2022), Study on New Digital Payment Methods, Report dated March 2022.
- Kosse, A.; Mattei, I. (2023), Making Headway – Results of the 2022 BIS survey on central bank digital currencies and crypto, *BIS Papers No 136*, July 2023.
- Krueger, M.; Seitz, F. (2017), *The Benefits of Cash (Module 2)*, Fritz Knapp Verlag, Frankfurt/Main.
- Labat, H.; Seitz, F.; Lepecq, G. (2024), Cash is More than a Public Good, *Cash Essentials*, White Paper, February 2024.
- LIBE (2024), Opinion of the Committee on Civil Liberties, Justice and Home Affairs (LIBE), 2023/0212(COD), 20 February 2024.
- Macfarlane, I.J. (2005), Gresham's law of payments, address to the Australasian Institute of Banking and Finance Industry Forum, Sydney, 23 March 2005, *Reserve Bank of Australia Bulletin*, April 2005, pp. 8–13.
- Meyer, J.; Teppa, F. (2024), Consumers' Payment Preferences and Banking Digitalisation in the Euro Area, *ECB Working Paper Series No. 2915*.
- Muir, M. (2023), Jamaica, we have a CBDC, *Financial Times*, 20 July 2023.
- Nagel, J. (2022), Digitaler Euro – Chancen und Risiken [The digital euro – risks and opportunities], *CFS-IMFS Special Lecture*, Goethe University Frankfurt, 11 July 2022.

- National Forum on the Payment System (2015), Vision on the Role of Cash in Point-of-Sale Payments, report of the Payments Forum task force on the future of cash, 17 November 2015.
- Niederländer, P. (2024), Der digitale Euro bezweckt nicht, andere Zahlungsformen zu verdrängen [The digital euro is not aiming to replace other payment methods], interview with Ewald Judt, cards Karten cartes, issue 1/2024, pp. 14–17.
- Panetta, F. (2022a), The Digital Euro and the Evolution of the Financial System, introductory statement by Fabio Panetta, Member of the Executive Board of the ECB, at the Committee on Economic and Monetary Affairs of the European Parliament, Brussels, 15 June 2022.
- Panetta, F. (2022b), Building on our Strengths: The role of the public and private sectors in the digital euro ecosystem, introductory statement by Fabio Panetta, Member of the Executive Board of the ECB, at the Committee on Economic and Monetary Affairs of the European Parliament, Brussels, 29 September 2022.
- PaySys Report (2014), Results of the Payment Cost Study of the EU Commission, February issue (formerly: "PaySys SEPA newsletter").
- PaySys Report (2023a), The Compensation Model of the Digital Euro: Mission Impossible, issue 4, December 2023.
- PaySys Report (2023b), Digital euro: The concept and implications for privacy, issue 1, February 2023.
- PaySys Report (2023c), SCA for Payments via EU Digital Identity Wallet: End of the Puzzle?, issue 5, December 2023.
- PPI (2020), Internet of Payments, May 2020.
- Rösl, G.; Seitz, F. (2023), Uncertainty, Politics, and Crises: The case for cash, Institute for Monetary and Financial Stability (IMFS) Working Paper Series, No. 186, June 2023.
- Rüter, H. (2024), EHI: Payment-Entwicklungen aus Sicht der Handelsforschung [EHI: Payment developments from a trade research perspective], 17 April 2024.
- RMV (2024), Deutschland-Ticket bringt Fahrgäste zurück [German "Deutschlandticket" monthly ticket brings back passengers], press release, 7 February 2024.
- Swiss National Bank (2023a), SNB launches pilot project with central bank digital currency for financial institutions, press release, 2 November 2023.
- Swiss National Bank (2023b), Payment Methods Survey of Private Individuals in Switzerland 2022.
- Statista (2024), Beliebteste Bezahlweisen an Verkaufsstellen in Deutschland im Jahr 2023 [The most popular payment methods at German POS in 2023], 14 February 2024.
- Sveriges Riksbank (2023), E-krona. (<https://www.riksbank.se/en-gb/payments--cash/e-krona/>)
- Visa Payment Monitor (2023), Das Smartphone bestimmt zunehmend den Umgang mit Geld [Smartphones increasingly determining how we handle money], 13 November 2023.
- VDI/VDE/IT/Sinus (2024), Bargeld der Zukunft [Cash of the Future].
- World Bank (2012), Developing a Comprehensive National Retail Payments Strategy, October 2012.