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STANDARDISING QR CODE PAYMENTS IN EUROPE

Potential benefits for merchants, consumers, and
the real economy

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JANUARY 2022

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EXECUTIVE SUMMARY

A common, open European standard for QR code payments can deliver substantial economic benefits

QR codes can be a powerful tool for the ongoing digital transformation of the European payments landscape. They have the potential to accelerate the adoption and use of mobile payments as they represent a versatile touchpoint between merchants and consumers, as well as enable innovative ‘new retail’ and mobile lifestyle use cases seamlessly connecting in store and online experiences. They also represent an opportunity for financial institutions to expand customer value by facilitating QR code payments directly from their mobile banking apps, with integrated transaction authentication and value-added services. This report explores the economic benefits of standardising QR code payments in Europe.

A single, open European standard for QR code payments can deliver substantial economic benefits to merchants, consumers, and the society as a whole.

This is because:

- **QR code payments are quick, secure, and convenient:** QR code payments work by scanning a two-dimensional Quick Response code with a mobile app or existing

POS equipment. Scanning a QR code quickly, securely, and conveniently initiates a payment and transfer of information between payer and payee. Account-to-account (instant) payments, (dematerialised) card payments, and e-money payments can all be initiated by scanning a QR code, regardless of payment service provider or mobile operating system.

- **QR code technology** has been successfully adopted for payments in multiple countries, but in Europe its **scalability is jeopardised by a fragmented landscape:** Within the Single Euro Payments Area, there are several payment services that use QR codes, but they have not gained the same popularity as QR code payment services in many parts of Asia and Latin America. This is partly because the QR codes used by payment service providers in Europe are not interoperable: a merchant wishing to accept QR code payments needs to implement different QR codes for each separate provider. This constitutes a significant barrier to entry and expansion, leaving the market faltering.

- **A common, open standard has the potential to:**
 - Significantly reduce **merchants' cost** of accepting QR code payments as they only need to invest in a single mechanism for accepting QR code payments;
 - Allow QR code payment providers to **enter the market** without having to create their own QR code format; and
 - **Encourage adoption and use by customers**, as their chosen QR code payment service would work everywhere where QR code payments are accepted.

The economic benefits from a common, open European standard for QR code payments have the potential to reduce the investment needed to accept QR code payments and the cost of accepting and making payments overall. **Merchants would face lower costs, and consumers would face lower prices.** At the lower end, with a European QR code standard in place, we estimate the total annual cost savings to be up to €3bn for merchants and €2bn for consumers. If the take-up levels reached the higher end of market observers' estimates, these savings could be as high as €7bn and €5bn for merchants and consumers respectively.

The main sources of these benefits are:

- Introduction of instant payments into bricks-and-mortar retail, for which QR code payments are an ideal supportive mechanism; and
- Bolstering of competition between different payment services, resulting in downward pressure on merchants' payment acceptance cost and stronger incentives for payment services innovation.

QR code payments are accessible to everyone with a smartphone, which are now ubiquitous in Europe. This means QR code payments can help support financial inclusion for both consumers and merchants by providing easier access to modern electronic payments.

STANDARDISED QR CODE PAYMENTS CAN SUPPORT WIDER USAGE OF INSTANT PAYMENTS

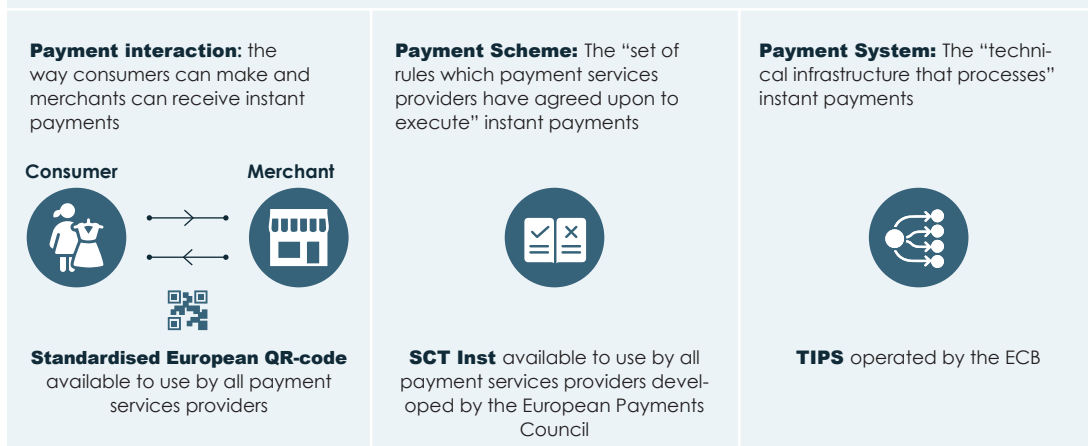
Standardised QR code payments can bring instant payments to retail. Instant payments are fast and secure, and hold promise for cost savings through increased competition. But these benefits can only be realised if consumers and businesses use them at scale. QR code payments can offer a convenient and open method for payers to make, and payees to receive, instant payments in both physical and online retail environments, inclusive of all payment service providers on all types of mobile operating systems. This is because a typical QR code payment app can be linked directly to the payer's bank account, enabling the initiation of instant payments in a retail environment.

QR code powered instant payments can reduce costs for merchants: with an instant payment, merchants receive funds almost instantly. This eliminates the float costs associated with delayed payment processing, potentially saving merchants nearly €2bn annually. In competitive retail markets these cost savings are largely passed on to consumers in lower prices, higher quality, wider range and/or better service.

In addition, a European QR code standard would provide the 'missing link' to address fragmentation and enable pan-European reach and interoperability of instant payments. A standard would support instant payments by complementing the Eurosystem's TIPS (TARGET Instant Payment Settlement) payment system and the European Payments Council's SCT Inst (SEPA Instant Credit Transfer) payment scheme. The former is the "behind-the-scenes" process that enables the transfer of funds from one payment service provider to another, while the latter is the payment scheme that allows account-to-account transfers with the funds made available on the payee's account in less than 10 seconds.

FIGURE 1

Layers of standardisation for QR code enabled instant payments



Source: Copenhagen Economics based on the European Payments Council

A QR code standard can offer a convenient, open and attractive consumer-facing solution that would allow European QR code payment service providers to compete for the ‘last-mile delivery’ of instant payments, regardless of mobile operating system.

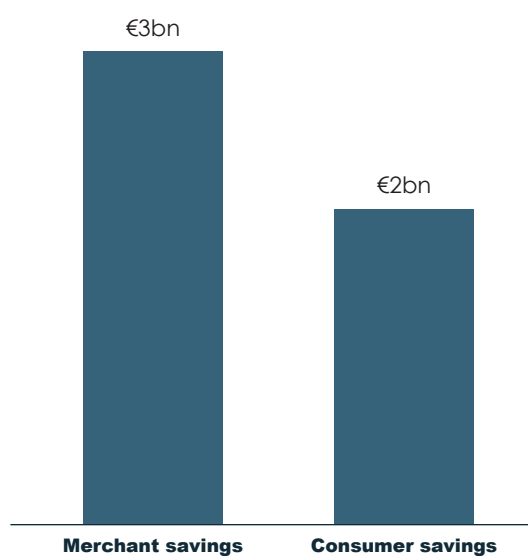
Merchants’ cost savings are passed on to consumers. Retail markets in Europe are competitive. This means that merchant cost savings are largely passed on to consumers in the form of lower prices, higher quality, wider range and better service. We estimate that the total annual cost savings passed on to consumers directly in lower prices amount to €2bn-€5bn annually.

A QR CODE STANDARD CAN INCREASE COMPETITION BETWEEN PAYMENT SERVICES, DELIVERING BENEFITS TO MERCHANTS AND CONSUMERS

Standardised QR code payments can reduce merchants’ payment acceptance costs. QR code payments are, on average, less costly than current retail payment solutions based on payment cards. QR code payments can offer a more efficient way to execute payments, through lower payment fees. On average, the cost of accepting a QR code payment can be up to a quarter less than the cost accepting a cash or card transaction.

The total savings across Europe will depend on the uptake of QR code payments: we estimate total annual merchant cost savings in the range of €3bn to €7bn in the medium term, depending on how widely QR code payments are used.

FIGURE 2
Potential savings for merchants and consumers from wider adoption of QR code payments – low uptake scenario



SECURE, QUICK AND CONVENIENT QR CODE PAYMENTS HAVE LOW FRAUD LEVELS

An expansion of QR code payments backed by a European standard can reduce payment fraud. QR code technology, like other forms of mobile payments, supports strong security.

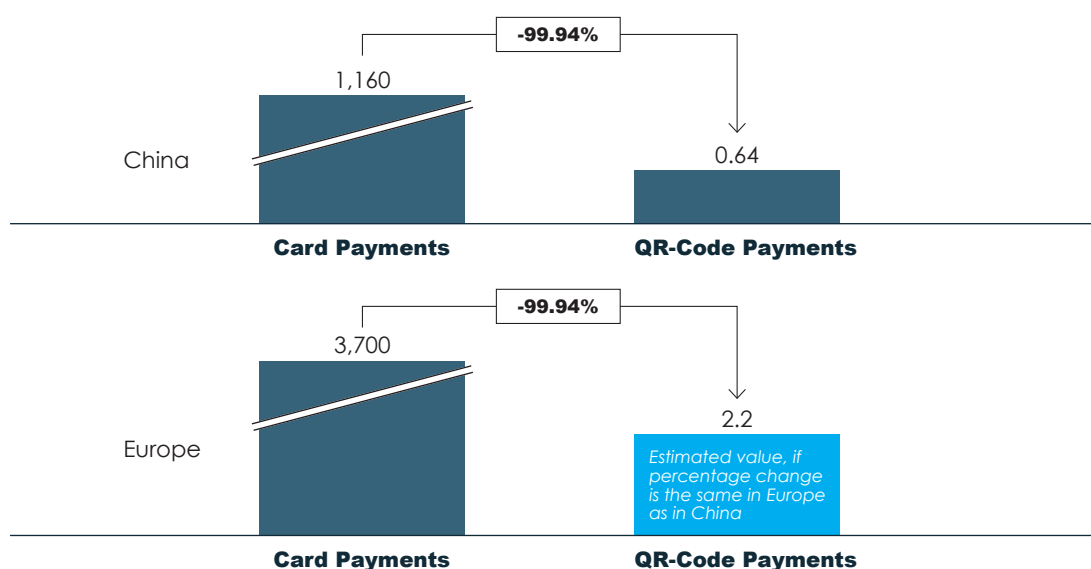
An increased uptake of QR code payments in Europe would provide high security standards combined with a convenient user experience both in store and online, especially when it comes to strong customer authentication requirements. This would reduce the scope for payment fraud overall. Introducing a European standard would ensure that these benefits can be realised by supporting the adoption of QR code technology. It would also allow for the inclusion of European data protection, security, and cyber resilience

standards in the QR code standard and interoperability design. This is aligned with the European Commission’s objectives on payment cyber resilience.

International experience suggests that fraud costs can decrease by hundreds of millions of Euros. In large international markets with extensive usage of QR code payments, such as China, the fraud levels associated with QR code payments are much lower than, among other methods, for card payments. In Europe, losses in card payment fraud amount to €1.8bn annually, or €3,700 for each €10m spent on payment cards. QR code payments are particularly well-defended against “present fraud”, i.e., fraud where the payer and merchant are in the same place. This type of fraud accounts for about a fifth of the total fraud, meaning that QR code fraud, conservatively estimated, could be around €500 lower for every €10m spent.

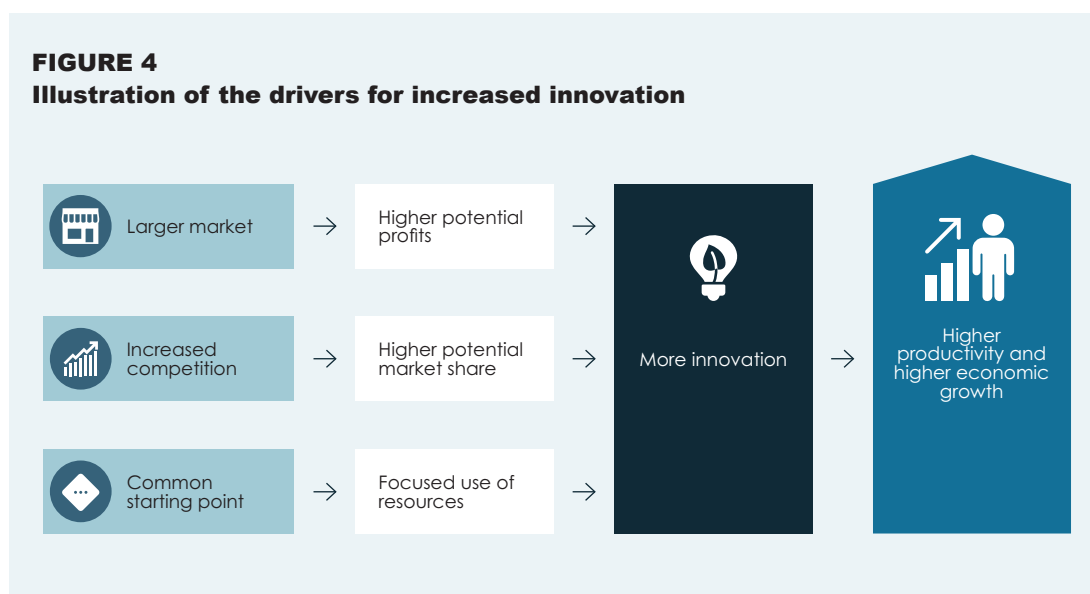
FIGURE 3
Fraudulent activity for payments by cards and QR codes

Fraud induced loss in EUR for every EUR 10 million worth of payments



Source: ECB (2021)- Sixth report on card fraud / Alipay (2019) / Sohu (2019).

FIGURE 4
Illustration of the drivers for increased innovation



A QR CODE STANDARD CAN FOSTER INNOVATION

Increasing the addressable market through standardisation increases incentives to innovate. The primary effect of a European QR code payment standard is an increased addressable market for QR code payment service providers. This increased market size means that a successful innovation effort can be rolled out to a larger market, thereby increasing the potential returns on innovation.

Innovation in QR code payments is likely to spark a competitive response. Improvements in the security, resilience, and efficiency of QR code payments are likely to encourage innovation in competing payment services, making the European payment market work better for merchants and consumers alike.

Specifically, we would expect the increase in innovation arise for three interrelated reasons:

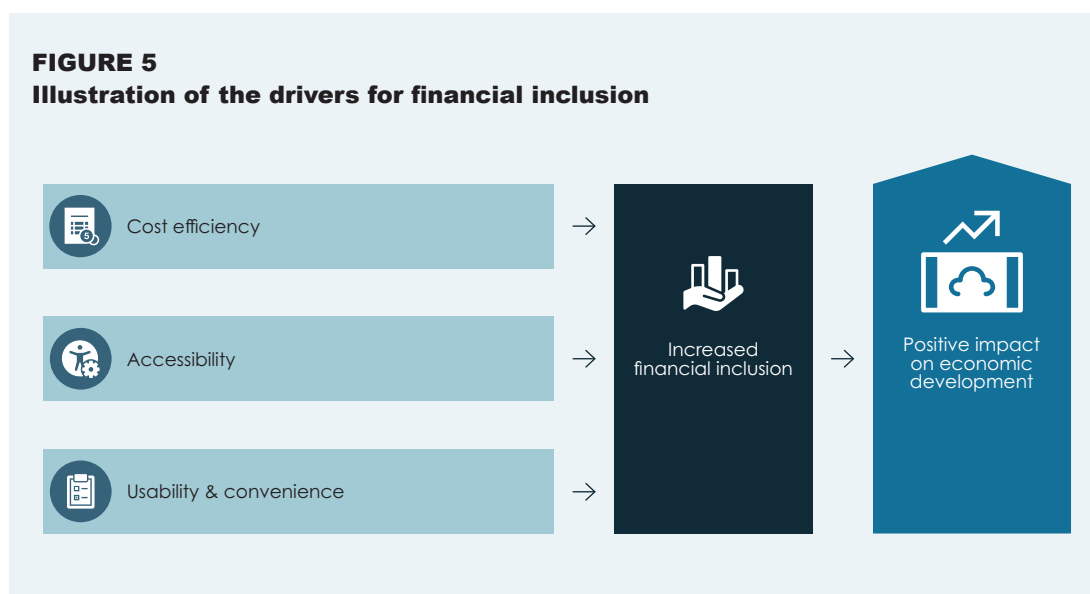
- **Larger market:** Standardisation of QR codes establishes a larger market for QR code payment service providers. Access to a larger market is a driver for innovation as potential profits from innovation are larger.

- **Increased competition:** A larger market also increases competitive pressure among payment service providers in general.
- **Common starting point:** Standardisation can establish a common starting point for innovation by actors in the QR code payments market, enabling resources to be focused on new innovation instead and preventing “reinventing-the-wheel” effects.

QR CODE PAYMENTS ALLOW MORE CONSUMERS AND MERCHANTS TO BENEFIT FROM MODERN ELECTRONIC PAYMENTS

QR code payments are an inclusive way of accepting electronic payments for merchants. The only requirement for accepting QR code payments is access to a suitable mobile device and a service agreement with a QR code payment service provider or a merchant acquirer. This can be a much cheaper way of accepting electronic payments than dedicated card payment terminals with high upfront costs or mobile card acceptance tools with high ongoing costs.

FIGURE 5
Illustration of the drivers for financial inclusion



QR code payments can support financial inclusion for consumers. Increasing the use of QR code payments can increase financial inclusion for the unbanked and under-banked thanks to low transaction costs and the prevalence of smart phones.

There are three main drivers for increased financial inclusion:

- **Cost efficiency:** The cost-efficiency of QR code payments makes it cheaper to use them.
- **Accessibility:** Around 80% of the unbanked and under-banked in Europe have mobile devices that can be used for QR code payments.
- **Usability:** QR code payments are simple, quick and have few technical requirements and are thus an attractive complement to cash and card payments.

These benefits could incentivise the unbanked and under-banked to engage in electronic transactions, especially in an ever more digitalised world. The resulting higher financial inclusion can be expected to reduce inequality and poverty and have positive effects on economic growth.



CHAPTER 1

BACKGROUND AND CONTEXT: QR CODE PAYMENTS AND THE EUROPEAN PAYMENTS LANDSCAPE

QR code payments are a form of electronic payment, where the payer and payee exchange the necessary information about the payment using a two-dimensional barcode known as Quick Response code. As of now, QR code payments are particularly popular in the Far East, China, and Latin America. QR code payments are expected to gain popularity in the rest of the world to exceed 2.2bn global users by 2025.¹

In this section, we first describe how QR code payments work, and then outline the current commercial and policy context for payment services in Europe. We end this section by discussing the role an open European standard for QR code payments can play.

FIGURE 6

A Quick Response code is a two-dimensional barcode



1.1

QR CODE PAYMENT SERVICES COMPLEMENT EXISTING PAYMENT INSTRUMENTS

QR codes can be used to convey payment information in many different types of payment situations. The most common application for QR code payments are point-of-sale payments, where the payer is in the same place as the payment recipient (the payee). For **point-of-sale payments**, the QR code is presented either by the payer or the payee:

- In the **consumer-presented mode** a dynamic QR code (i.e. generated for each transaction) is shown on the payer's mobile device and is scanned by the merchant to initiate a payment. Existing checkout scanning equipment can be used for this purpose. The consumer-presented mode is well suited for use in supermarkets, chain stores, or department stores as it allows for a faster payment experience and can also work in scenarios where network connection is weak.
- In the **merchant-presented mode** the QR code is shown by the merchant and scanned by the payer with their mobile device. In this mode, QR codes can be either dynamic, i.e. generated separately for each transaction, or static, i.e. the same QR code is used for each transaction. Dynamic QR codes are displayed on merchant POS terminals. They are mostly used by larger retailers and in self-service pay-

¹Juniper Research (2021)

ment scenarios. Static QR codes, on the other hand, do not require merchants to obtain any equipment to collect payments. They are most commonly used by smaller retailers, restaurants, and taxis.

At a technical level, QR code payment services are overlay services on existing payment instruments. The payer's app is linked to a funding source, and when the payer makes a QR code payment the funds are taken from that funding source and transferred to the payee's account with the QR code payment service provider. There are three commonly available funding sources:

- **Bank accounts** – the payer's app can be linked to the payer's bank account. The QR code payment service provider can then use either a direct debit or, increasingly, an application programming interface to access the funds on the payer's account. The payments themselves can be either instant payments or regular account-to-account transactions.
- **Payment cards** – the payer's app holds the details of the payer's payment card, and the QR code payment service provider uses these card details to access the funds required to make payments.
- **E-money** – the payer deposits funds to their account with the QR code payment service provider either at stores, by card or by bank transfer.

On the merchant side, there are multiple ways to receive the funds relating to QR code payments, all of which are ultimately based on existing payment systems. These include:

- **A standalone QR code payment acceptance service**, whereby the payee signs up with a QR code payment service provider. The payments they receive are routed to their account with the QR code payment service provider. The funds can then be withdrawn from the account with the service provider to the payee's bank account.

- **An integrated payment acceptance service**, whereby the payee sources payment acceptance services from one or more payment acceptance service providers. These services are typically used by larger merchants, and they can cover multiple payment mechanisms. Ultimately, the payment acceptance service provider will make the funds available to the payee in the same way as for all other payment services.

1.2 A SUCCESSFUL QR CODE PAYMENT SERVICE NEEDS PAYERS AND PAYEES

QR code payment services, in common with other payment services, bring together two types of users into the payment platform: payers who make the payments and payees, who receive the payments. The more widely a payment service is accepted by the payees, the more attractive it is for the payers. Similarly, the more widely a payment service is used by payers, the more attractive it becomes for the payees.

This general feature of payment services means that a new and expanding payment service faces a chicken-and-egg problem: it is difficult to attract payers if the service is not widely accepted, and it is difficult to attract payees if there are limited numbers of potential payers.

This hindrance means that incumbent payment services who have historically been able to overcome the challenges associated with growing the acceptance network and user population can be protected from competition by more efficient alternatives. This, in turn, means that the benefits from more efficient payment services can be slower to materialise in an economy.²

This problem is particularly acute in smaller markets, where the investment that is required to grow the payment service may not be justified by the potential returns from such investments.

²Bourreau & Valletti (2015 Competition and Interoperability) in *Mobile Money Platform Markets: What Works and What Doesn't?*, p. 16

1.3 THE CURRENT PAYMENTS MARKET IN EUROPE IS FRAGMENTED

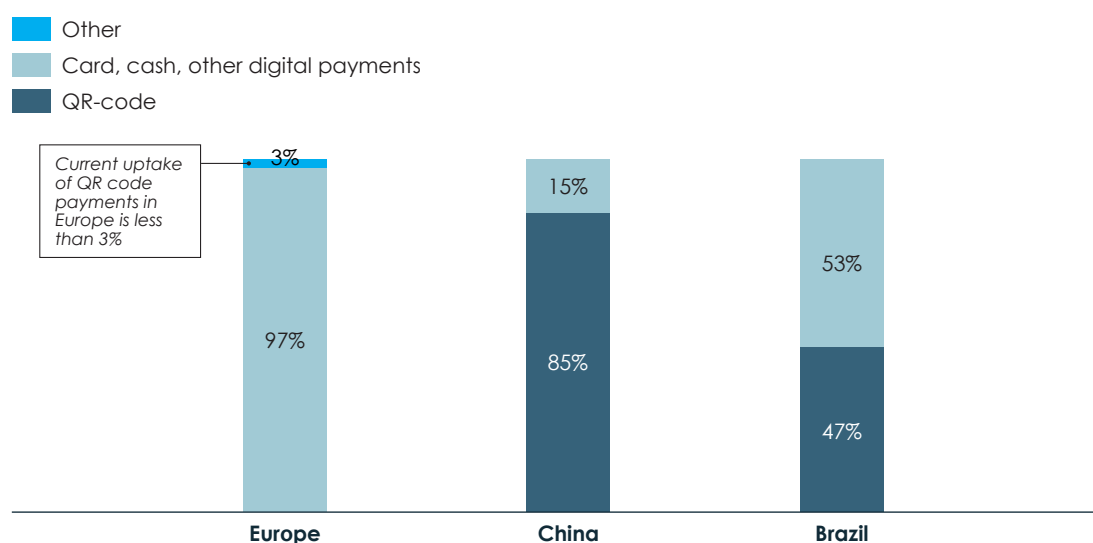
The European payments market is characterised by multiple – often purely domestic – actors leading to a fragmented market. For example, out of 41 mobile payment solutions offered to customers, 25 are only available in one country. Even where a mobile payment service operates in more than one country, they are typically limited to a small number of countries. No pan-European mobile payment solution or service currently exist outside the use of an international payment card in a mobile wallet.³

In recent years digitalisation has increased while cash usage has decreased⁴ changing the underlying structures and attracting new payment services providers. However, these new payment services providers face the chicken-and-egg problem described in Section 1.2 above. Additionally, European consumers are very well served by

multiple payment solutions that are generally fast, cheap, secure and convenient to use. This means the bar is high for any new entrant to do better than existing solutions on all these fronts. This is exacerbated by fragmentation as any compelling, innovative solution will find it hard to reach a sustainable scale.^{5,6}

These effects are demonstrated by the evolution of QR code payment services in China. As the Chinese economy grew rapidly, demand for efficient and convenient payment services grew at the same time. However, owing to the nature of the Chinese economy prior to the late 2000s, payment cards were not widely used in the country. Owing to the convenience of QR code payments, they are used by 85% of all consumers in China, whereas only 3% of consumers use QR code payments in Europe as shown in Figure 8 below. The figure also shows the substantial share of QR code payment users in Brazil, where the barriers to QR code payment services expansion were partly addressed by an open standard for QR code payments.

FIGURE 7
Uptake of payment services in Europe, China, and Brazil
Proportion of adults using the service



Note: Data is for Europe 2019, China 2020, Brazil 2021

Source: ECB (2020) / China Daily (2020) / Central Bank of Brazil (2021)

³Burelli, Jacob, Grahl (2021). Will there be an epi-driven industry consolidation for mobile payment solutions in Europe?

⁴ThePaypers (2021), Key Players in the European Payments Landscape

⁵Rosenbaum et al., (2017), Faster Payments: Market Structure and Policy Considerations, p. 20-40.

⁶Hartmann, Gijssels, Plooi, Vandeweyer (2019), Are Instant payments becoming the new normal? A comparative study, p.13-14 and 25-31

⁶Burelli, Jacob, Grahl (2021). Will there be an epi-driven industry consolidation for mobile payment solutions in Europe?

1.4

QR CODE PAYMENT INTEROPERABILITY CAN BE ACHIEVED THROUGH STANDARDISATION

One significant way to reduce the barriers to entry and expansion in the payment services market is to strive for interoperability between competing payment services providers. This increases the acceptance network for the payers and the number of potential users for payees. As such, potential gains from entry for the payment services providers are increased, which in turn will strengthen competition between competing payment services. This, ultimately, benefits merchants with lower payment acceptance costs and consumers with a greater choice of secure and convenient payment solutions.⁷ We expand on this in Section 2.2.

There are effectively two ways to achieve interoperability between payment services. First, individual payment service providers can reach a bilateral agreement on the terms under which they allow interoperability of their respective services. In a fragmented market with many service providers, reaching a reasonable coverage with such bilateral agreements is unlikely to be feasible. This is because the number of bilateral agreements needed grows exponentially with the number of players. A comprehensive set of bilateral agreements with two providers consists of only one agreement, between three providers three agreements are required, and between five operators ten agreements are required.

This complexity is compounded by fragmentation along national lines in the European payments landscape: even if interoperability was feasible through bilateral agreements within a single country, the coordination challenge quickly becomes insurmountable in a cross-border context. This means that investment into building a payment service would have to be replicated separately in each country.

The alternative to a series of bilateral agreements is a multilateral interoperability arrangement, which would set a standard all participants can use. In the context of QR code payments, the standard would specify a common QR code format and the technical details needed to enable interoperability between any participating QR code payment service providers. Users from Provider A could make payments on the acceptance network of Provider B, and vice versa, without any change needed for consumers or merchants on either side.

An open pan-European standard would be the most effective way to achieve interoperability for three main reasons⁸:

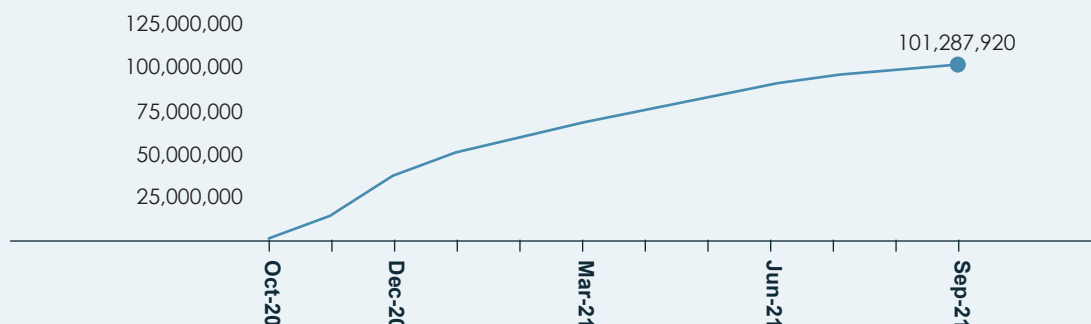
- a. Technical requirements:** Standardised technology will require merchants to only update their point-of-sale systems for one QR code technology thereby minimising costs of transitioning to QR code payments. And as the technology is used at larger scale, it is reasonable to expect that the investment costs required to integrate QR code payments into existing point of sale systems will be significantly reduced.
- b. Reduced duplication in investment:** QR code payment service providers will not have to invest in creating their own QR code technology but can benefit from already developed and implementation-ready technology at a fraction of the cost of building a completely new system.
- c. Reduced barriers to entry and expansion:** A common standard will help create a larger base of payers and acceptance networks for QR code payment service provider, allowing them to compete on a pan-European basis. The increase in competition has multiple positive effects such as increase in innovation and decrease in transaction costs.

⁷ Cook, Lennox, Sbeih (2021) *Building Faster Better*, p. 6

⁸ Naden (2016), *Mobile payments to take off with new series of standards*

FIGURE 8
Uptake of QR payment system PIX in Brazil

Number of users



An open standard for QR code payments will also increase uptake of the technology, which can deliver substantial benefits to both consumers and merchants as set out in the next sections of this report.

It is reasonable to expect that a common, open, and pan-European standard for QR code pay-

ments will significantly reduce the cost of entry and expansion in the European payment services market. The rapid growth of QR code payment users in Brazil, shown in Figure 9, is likely to be in large part due to the standard based PIX payment technology. Within a year of the launch, nearly 50% of consumers in Brazil used PIX-based payment services.

CHAPTER 2

WIDER ADOPTION OF QR CODE PAYMENTS CAN IMPROVE AN ECONOMY'S EFFICIENCY

This section sets out the main economic benefits from increased use of QR code payments within an economy. In particular, we explore the potential role of QR code payments in:

- offering a convenient and open front-end for instant payments in physical and digital stores;
- strengthening competition between payment services;
- improving the security of payments through fraud reduction;
- supporting innovation; and
- improving financial inclusion.

2.1 QR CODE PAYMENTS CAN BRING INSTANT PAYMENTS TO RETAIL

European consumers are well served by multiple payment solutions and services that are generally fast, cheap, secure and convenient to use. This means the bar is high for new payment service providers to do better than existing solutions on all these fronts – and this is exacerbated by fragmentation as any compelling, innovative solution will find it hard to scale.

Instant payments are fast and secure, and hold promise for cost savings through increased competition. But these benefits can only be realised if consumers and businesses use them at scale. QR code payments can offer a convenient and open method for payers to make and payees to receive

instant payments in both physical and online retail environments, inclusive of all payment service providers on all types of mobile operating systems. This is because a typical QR code payment app can be linked directly to the payer's bank account, enabling the initiation of instant payments in a retail environment.

In practical terms, this would mean that QR codes are scanned at the point of sale or at the online checkout. After the customer approves the payment on their app, the funds are transferred from the payer's bank account to the merchant (almost) instantly. This near real-time settlement of transactions is not only convenient for both the payer and payee, but also cheaper than alternative payment mechanisms such as cash, payment cards and cheques.

Additionally, from the merchant's perspective, instant payments offer certainty of payment combined with fluid customer interaction facilitated by QR codes, and improved cash flow management⁹. This is why many retailers are exploring ways of accepting a greater share of payments with instant payment mechanisms.¹⁰

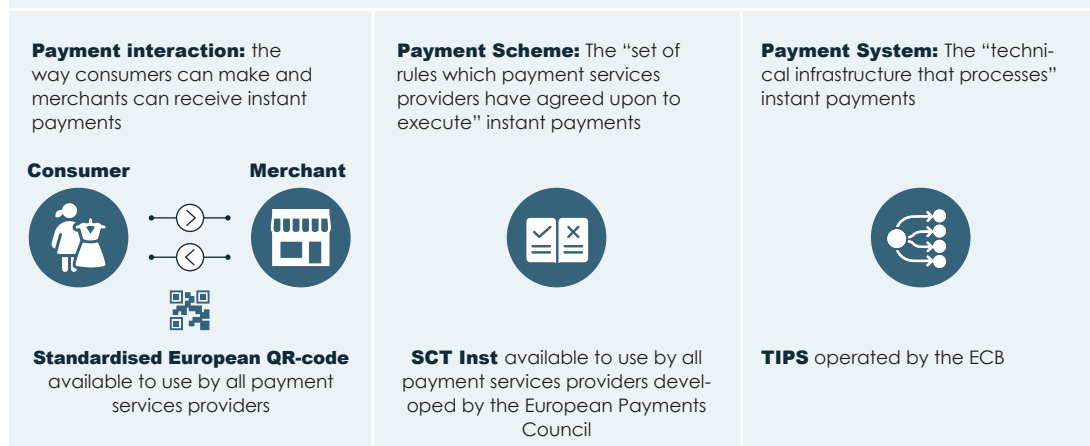
An open European standard for QR code payments would provide the 'missing link' to address fragmentation and enable pan-European reach and interoperability of instant payments. A standard would support instant payments by complementing the Eurosystem's TIPS (TARGET Instant Payment Settlement) payment system and the European Payments Council's SCT Inst (SEPA Instant Credit Transfer) payment scheme. The former is the "behind-the-scenes" process that enables the transfer of funds from one payment

⁹ European Commission (2021), Instant Payments: Current and foreseeable benefits

¹⁰ Payments Europe (2020), Understanding instant payments

FIGURE 9

Layers of standardisation for QR code enabled instant payments



Source: Copenhagen Economics based on the European Payments Council

service provider to another, while the latter is the payment scheme that allows account-to-account transfers with the funds made available on the account in less than ten seconds.

A standard can offer a convenient, open and attractive consumer-facing solution that would allow European QR code payment service providers to compete for the 'last-mile delivery' of instant payments, regardless of mobile operating system.

An open, pan-European standard for QR code payments would therefore support the entry and expansion of QR code payment service providers underpinned by instant payments, which would help deliver the broader benefits from a more extensive use of instant payments.

In broader terms, policy makers, including the European Commission, are supportive of increased use of instant payments in the economy¹¹. This is because:

- **Fewer inefficiencies in the payment system lowers the float costs:** payment float is inefficiency due to delayed payment processing. These delays limit short term economic activity as the funds are locked in the financial system during the process. Removing the delay could boost short term spending and aggregate

economic activity resulting in estimated annual benefits of up to €1.8bn.

- **Reducing cash transactions induces a reduction in tax evasion:**¹² reducing cash transactions reduces the size of the shadow economy which currently amounts to 7-12% of the total economic activity in developed countries.¹³ A reduction in cash usage also contributes to reducing fraud and financial crime. Instant payments can be a suitable substitute for cash, as it meets the same needs especially as compatible mobile devices are ubiquitous. The reduction of VAT evasion alone could result in an estimated economic gain of up to €1.6bn on a yearly basis.
- **Replacing cheque usage will reduce transaction costs and provide savings for consumers:** cheques are still widely used across the EU due to their ability to give a sense of payment guarantee for their recipients. They are however by far the most expensive payment instrument as well as being time costly for all parties involved due to reconciliation, management, delays, and non-payment. Instant payments provide another way of ensuring certainty of payment at a lower fee and less time used. The annual economy-wide cost savings from eliminating cheque usage in the EU are estimated to be around €3bn.

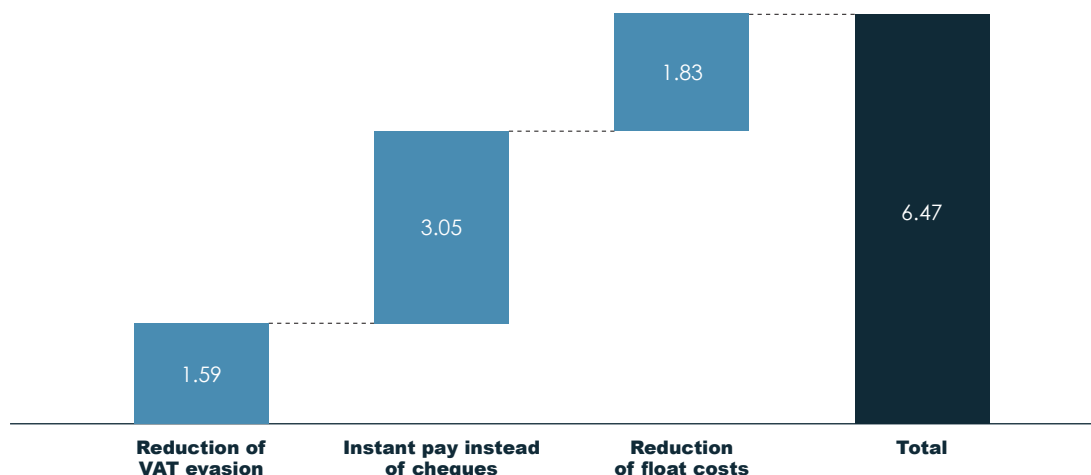
¹¹ Payments Europe (2020). *Understanding instant payments*

¹² Deloitte (2019), *Economic impact of real time payments*, p. 42

¹³ Deloitte (2019), *Economic impact of real time payments*, p. 42

FIGURE 10
Efficiency gains in EU27 from transitioning to instant payments

EUR billions



Note: Based on high level of uptake scenario. Defined as 50% above the econometrically predicted take-up profile in the source study

Source: Deloitte, "UK economic impact of real time payments report for Vocalink", p. 42

Other, non-quantified, benefits of instant payments include a higher velocity of money (more dynamic economy), higher convenience for consumers, safer pay-on-delivery transactions, immediate fund transfer, opportunity to secure higher value purchases, prevention of theft/human error, prevention of lost sales due to long queues and no cash/card at hand, lower costs linked to handling and depositing cash, minimisation of cash flow latency, touchless payments, instant rebates/refunds, improved supply chain times and reduction of environmental impact for invoices/receipts/cards¹⁴.

2.2

STRENGTHENING COMPETITION BETWEEN PAYMENT SERVICE PROVIDERS CREATES BENEFITS FOR CONSUMERS AND MERCHANTS

Perhaps the most significant potential benefit from a stronger QR code payment ecosystem underpinned by a standard is the increased choice of payment solutions and payment service providers for both consumers and merchants across Europe. This increased choice means that incumbent pay-

ment service providers need to compete harder for consumers' and merchants' business, incentivising them to improve the pricing and quality of their services. Similarly, entrants into the payment services market need to offer consumers and merchants a compelling proposition, such that they can win business from incumbents.

This section explores the mechanisms and magnitude of potential benefits from QR code standardisation: lower merchant fees introduced through new ways of making and receiving payments in section 2.2.1 and savings passed on to consumers in section 2.2.2.

2.2.1 Lower fees through new ways of making and receiving payments

QR code payments are less costly than current payment mechanisms, which in Europe are mainly based around domestic and international payment card schemes. QR code payments can offer a more efficient way to execute payments, through lower payment fees.¹⁵

The reduction in the overall payment fees through the use of QR code payments arises from the

¹⁴ European Commission (2021), Instant payments: Current and foreseeable benefits

underlying payment instrument: account-to-account payments, including instant payments, are typically a much cheaper way of making payments than card or cash payments. So, the higher the proportion of account-to-account (instant) payments, the lower the overall cost of making and receiving payments.

The positive effects of a wider use of QR code payments are demonstrated by the evolution of payment acceptance costs in China, where QR code payments have become particularly popular

since the introduction of the first QR code payment solutions in the 2010s.

Box 1 below describes the evolution of debit card and e-money payments' costs and quality across providers between 2011 and 2019. In this period, the cost of accepting debit card payments fell by more than two-thirds, while processing times halved. At the same time, the cost of accepting e-money payments via QR codes fell to effectively zero from 60bps at the start of the period.

BOX 1
Case study: Alipay in China

In 2011, Alipay in China became one of the first movers to introduce QR code technology for mobile payments. By 2019, the wider use of QR codes had generated significant cost savings for merchants.

Characteristics of QR code payments (Alipay) and debit card or NFC payments (other providers) in China:

2011	Debit card payment or NFC via POS terminal	E-money payment via QR code
Collateral	2000-3000 CNY	Zero
Transaction fee	1.00-3.00 %	0.60 %
Time	T+1	T+0
2019	Debit card payment or NFC via POS terminal	E-money payment via QR code
Collateral	300-700 CNY	Zero
Transaction fee	0.38-0.50 %	0 %
Time	T+0	T+0

Source: People's Bank of China; Lian et al., 2017; Luohan Academy

¹⁵ Liu (2019), The future of payments is inclusive and invisible

In Europe, standardised QR code payments have the potential to reduce merchants’ payment acceptance costs by up to a quarter.

Cost savings arising from a greater use of QR code payments depend on the payment instrument underlying the QR transaction. Figure 11 below shows the typical cost of accepting each payment instrument for a merchant based on publicly available data: on average, accepting a card payment will cost a merchant around €0.68 per €100 spent at the merchant, whereas an account-to-account payment and e-money payment costs around €0.44 per €100 spent.

On average, the cost of accepting a QR code payment can be up to a quarter less than the cost of accepting a cash or card transaction. Total savings will depend on the uptake of QR code payments, with potential cost savings to merchants in the range of €3bn - €7bn annually across Europe. In a high take-up scenario with a QR code standard in place, we estimate the total cost savings for merchants to be up to €7bn annually (see detailed calculations in the following section). The greater the level of competition across payment services

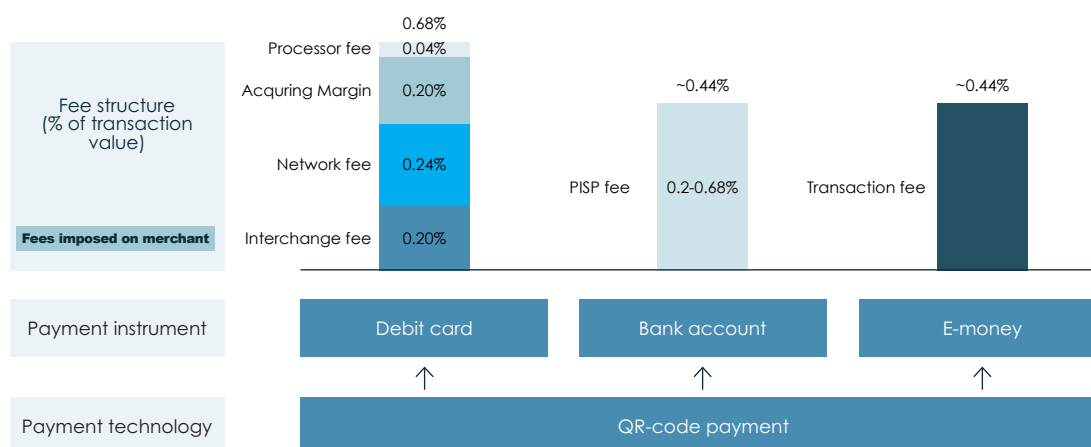
at the merchant end, the lower the fees overall for merchants.

We note that a widespread adoption of QR code payments in retail will require merchant investment into updating their point-of-sale systems and payment terminals. An open, European QR code standard can make these necessary investments to unlock the benefits of QR code payments more attractive to merchants, as it removes duplication in investment, and improves the payback for the investments through higher usage.

2.2.2 Savings passed on to consumers increase consumer welfare

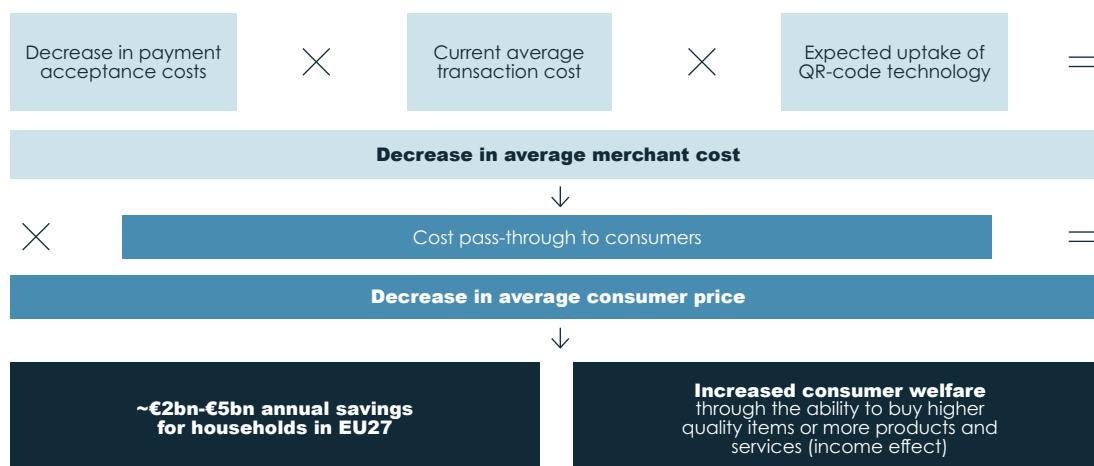
Merchants cost savings are passed on to consumers. Retail markets in Europe are competitive. This means that merchant cost savings are largely passed on to consumers in the form of lower prices, higher quality, wider range and better service. Depending on the take-up of QR code payments, we estimate the total cost savings passed on to consumers directly in lower prices in

FIGURE 11
Fee structure of QR code payments



Note: Assuming the average value of the PISP fee range is the total cost for QR payments via transaction accounts, and that this fee is identical to that of E-money
 Source: European Commission (2020), Study of the application of the Interchange Fee Regulation & Accenture (2016), Seizing the Opportunities Unlocked by the EU’s Revised Payment Services Directive, p. 8

FIGURE 12
Quantification and methodology of calculation cost savings



Note: ~€2-5 bn saved for households in EU27 is estimated by CE using three scenarios for the expected uptake (20%,40%,60%), fee sizes from Figure 11, a cost pass-through of 72%, and final consumption expenditure of households in EU27 of € 7,343bn in 2019

Source: EuroStat: [Link](#) / European Commission prepared by EY and CE: [Link](#) / Figure 11

the range of €2bn - €5bn annually across Europe. We estimate these savings by first estimating the potential savings in payment acceptance costs for merchants, and then estimate the share of these savings that would be passed on to consumers in lower retail prices.

Our approach to quantifying these benefits is summarised in Figure 12 above.

Merchants

In the medium term, we estimate an overall decrease in merchants' payment acceptance costs of around 7% to 21%, depending on the extent to which consumers use QR code payment services. We derive this estimate as follows:

1. Cost of accepting QR code payments is lower per transaction on average: We assume the per transaction cost of accepting QR code payments is 24% lower than the cost of accepting payment card or cash payments in Europe. We base this assumption on the data set out in Figure 11 above, which shows the cost of accepting payments by payment instrument.

We then assume that all three underlying payment instruments are used in equal volumes for QR code payments. In other words, we assume that the cost of accepting QR-code payments converges to the cost of accepting the underlying payment instrument. We note that, to the extent payment cards' share of the underlying payment instrument is greater than a third, this saving would be lower. The opposite is true if payment cards' share of the underlying payment instrument is lower than a third.

2. Expected uptake of QR code technology (short to medium term): we use three different scenarios for the expected uptake in Europe, 20%, 40%, and 60%. The highest case scenario is based on industry observers' estimates that suggest that a potential uptake for QR code payments in Europe is at around that level.¹⁶

Consumers

We estimate the reduction in merchants' payment acceptance costs to be largely passed through to consumers, resulting to ca. €2bn-€5bn savings

¹⁶ Hanrahan (2021). QR codes could become a mainstream payment method in 2021

TABLE 1
Estimates of merchant and consumer savings in different scenarios

SCENARIO	QR CODE PAYMENT UPTAKE LEVEL	ESTIMATED MERCHANT SAVINGS	ESTIMATED CONSUMER SAVINGS
Low uptake	20%	€3bn	€2bn
Medium uptake	40%	€5bn	€3bn
High uptake	60%	€7bn	€5bn

to retail customers. We base this estimate on the total long-run cost pass-through of cost decreases of up to 72% in the EU¹⁷. This means that the potential total merchant cost savings of €3bn-€7bn translate to potential total consumer savings of €2bn-€5bn across Europe.

2.3

QR CODE TECHNOLOGY CAN REDUCE PAYMENT FRAUD

QR code technology, like other forms of mobile payments, supports strong security. A larger uptake of QR code payments in Europe would provide high security standards combined with a convenient user experience both in store and on-line, especially when it comes to strong customer authentication requirements.

This would reduce the scope for payment fraud overall.

Introducing a European standard, by supporting the adoption of QR code technology, would ensure that these benefits can be realised. It would also allow for the inclusion of European data protection, security, and cyber resilience standards in the QR code standard and interoperability design. This is aligned with the European Commission's objectives on payment cyber resilience¹⁸.

In technical terms, dynamic QR code payments, where QR codes used to convey payment information are generated dynamically for each trans-

action, benefit from a high level of data security, thanks to:

- Secure transmission of transaction data such as account number, pin etc. using encryption^{19,20}
- The use of timestamps, which prevents QR codes from being copied or abused; and
- Protection of sensitive payments data by tokenisation.²¹

QR code payment service providers, as is the norm in the industry, apply fraud detection systems. Automated systems employ machine learning techniques to analyse transactions and transaction patterns to detect fraud attempts, adjust risk profiles, and intervene in case of fraud suspicion.²²

QR code payments, like other forms of mobile payments, are in addition well-defended against 'present fraud' e.g., cash withdrawals and counterfeit/stolen cards.²³

Reducing the scope for payment fraud overall would lower the cost of fraudulent activity to both society and individuals. As fraud levels reduce, the cost of crime imposed on individuals is lowered.

At a societal level this improves welfare through a more efficient allocation of resources. In addition, there are direct cost savings at the societal level arising from reduced expenses in areas such as crime control and crime prevention.²⁴

¹⁷ European Commission (2020). Study of the application of the Interchange Fee Regulation, p. 171

¹⁸ Commission proposal COM (2020) 595 final, p. 12

¹⁹ Baidog and Yukun (2019), Research on Quickpass Payment Terminal Application System; Surekha et al. (2015), E-Payment Transactions Using Encrypted QR Codes

²⁰ Surekha et al. (2015) - E-Payment Transactions Using Encrypted QR Codes

²¹ CGAP (2019), Acceptance Technologies for Merchant Payments

²² Helpnetsecurity (2020) - Alipay enhances its AI-powered risk engine to protect businesses amid accelerating digitization

²³ ECB (2021), Sixth report on card fraud

²⁴ Chalfin (2019) – Economic costs of crime (p. 2-3)

In practice, as shown in Figure 13, fraud rates for card payments can be substantially higher than fraud rates for QR code payments. It is estimated that the annual cost of payment fraud in Europe amounts to around €1.8bn. Even if the difference in fraud rates in Europe is likely to be lower than in other geographies with large scale use of QR code payments such as China, due to a different payment landscape, the decrease in money lost to fraudulent activity could still be significant. The evidence on payment fraud from China suggests that fraud losses for card payments amount to around €1200 per €10m of card payments, whereas the fraud losses for QR code payments have only been less than €1 per €10m of expenditure.

Fraud losses for card payments in Europe are just over twice as high as those in China. This means that the scope for reducing these losses is likely to be higher too. If higher take-up of QR code payments only reduced “present fraud” that accounts

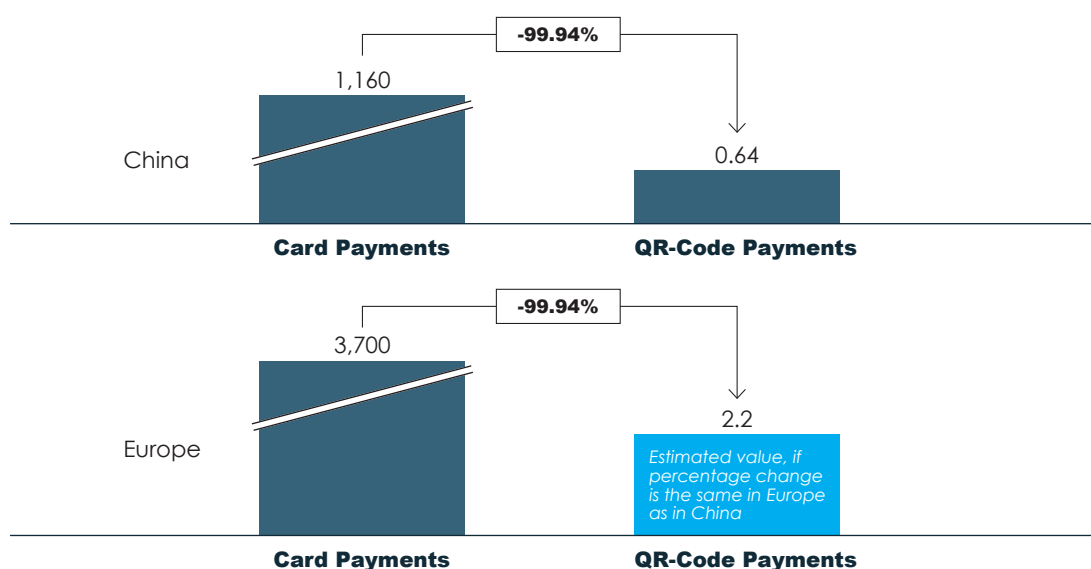
for around 15% of card fraud losses in Europe, the total potential savings from reduced fraud would still account for over €500 per €10m.

2.4 A STANDARD FOR QR CODE PAYMENTS CAN FOSTER INNOVATION IN RELATED PRODUCTS

The primary effect of a European QR code payment standard is an increased addressable market for QR code payment service providers. This increased market size means that a successful innovation effort can be rolled out to a larger pool of merchants and consumers, thereby increasing the potential returns on innovation.

This is expected to lead to an increase in innovation, which would in turn contribute to further

FIGURE 13
Fraudulent activity for payments by cards and QR codes
 Fraud induced loss in EUR for every EUR 10 million worth of payments



Source: ECB (2021)- Sixth report on card fraud / Alipay (2019) / Sohu (2019).

improvements in the security, resilience, and efficiency of QR code payments. These developments would also encourage innovation in competing payment services, making the European payments market work better for merchants and consumers alike.

Specifically, we would expect the increase in innovation to arise for three inter-related reasons:

- **Larger market:** Standardisation of QR codes establishes a larger market for QR code payment service providers. A standard can consolidate the market for QR code payment solutions which increases the size pool of potential clients for service providers. Access to a larger market is a driver for innovation as potential profits from innovation are larger²⁵.
- **Increased competition:** A larger market also increases competitive pressure among payment service providers in general. The increased competition incentivises innovation as providers need to develop increasingly better services to compete for their customers' business. This holds for both new market entrants and incumbents. Competition lowers the barriers of entry, making network effects more achievable for newcomers, as well as pushing incumbents to reinvent and innovate to keep market share^{26,27}. Both are driven by the opportunity to "escape" competition and attempt to win higher potential market share.
- **Common starting point:** Standardisation can establish a common starting point for innovation by actors in the QR code payments market enabling resources to be focused on new innovation instead and preventing "reinventing-the-wheel"-effects²⁹ as well as allowing exploitation of economies of scale²⁹. Creating a common ground could spur collaboration beneficial for all parties. Further, innovations by one actor can be advanced by others, reducing the cost of innovation for all of the competing providers.

As with all innovation, the benefits of innovation in payment services are not necessarily limited to payment services alone. There can be significant spill-over effects from other parts of the economy, much like the use of QR codes in exchange of payment information is a spill-over from the earlier uses of QR code technology.

We note that while standardisation has many positive effects on innovation, in certain cases standards can also curtail innovation within the standard itself. This is because a fixed standard can make it difficult for companies to monetise investments in developing new innovations in the standard.³⁰ Similarly, a standard can risk locking in older technologies that become inferior over time, and in some instances allow the standard setter to exercise monopoly power.

For these reasons, it is critical that any standard is designed in such a way that it ensures (backward) compatibility between older and newer technology and innovation within the standard itself.

This would typically call for periodic updates to the standard, with a view of maintaining sufficient level of backward compatibility. Typically, an open standard that can be freely used by all market participants is much less susceptible to the potential negative effects from standardisation than proprietary standards.

2.5 WIDER USE OF QR CODE PAYMENTS CAN SUPPORT FINANCIAL INCLUSION

Widening the use of QR code payments can increase financial inclusion for the unbanked and under-banked due to low transaction costs and the prevalence of smart phones.

Insufficient access to financial services currently remains a problem worldwide. Within the EU, differences in financial inclusion between Member States persist³¹. Choice of payment instrument

²⁵ EBRD (2014) – Drivers of Innovation, p. 49

²⁶ OECD (2014), Factsheet on how competition policy affects macro-economic outcomes, p.14 and EBRD (2014), Drivers of Innovation, p.60

²⁷ Knut (2013), The Impact of Standardization and Standards on Innovation, p. 8

²⁸ ISO (2014) – Standardisation and innovation, p. 2

²⁹ Knut (2013), The Impact of Standardization and Standards on Innovation, p. 9

³⁰ Knut (2013), The Impact of Standardization and Standards on Innovation, p. 10

³¹ Korynski et al. (2016), Measuring Financial Inclusion in the EU: Financial Inclusion Score Approach

and technology can play a central role in overcoming such barriers and in fostering financial inclusion³².

There are three main drivers for increased financial inclusion:³³

c. Cost efficiency: The cost-efficiency of QR code payments makes it cheaper to use them. Barriers to financial inclusion are, among other things, costs related to financial transactions, current accounts, and transportation costs³⁴. Additionally, no cards must be shipped, which can both be difficult and costly³⁵.

d. Accessibility: Better accessibility lowers the barriers for consumers to engage in QR code payments. Around 80% of the unbanked and under-banked already possess mobile phones in Europe and have as such already the means to carry out financial transactions electronically using QR code technology³⁶.

e. Usability: Usability and convenience increase the incentives of consumers to shift from cash to electronic payments. QR code payments are simple, instantaneous, have few technical requirements and are thus an attractive complement to cash and card payments.

These benefits could incentivise the unbanked and under-banked part of the population to engage in electronic transactions, especially in an ever more digitalised world. The resulting higher financial inclusion has been found to reduce inequality and poverty and to have positive effects on economic growth³⁷.

We also note that QR code payments offer a low cost, yet secure way for merchants to accept modern electronic payments. The only requirement for accepting QR code payments is access to a suitable mobile device and a service agreement with a QR code payment service provider or a merchant acquirer. This can be a much cheaper way of accepting electronic payments than dedicated card payment terminals with high upfront costs or mobile card acceptance tools with high ongoing costs.

³² BIS (2020) – *Payment aspects of financial inclusion in the fintech era*, p. 2

³³ Chiampo et al. (2018), *QR codes and financial inclusion: reasons for optimism*

³⁴ CPMI & World Bank (2016), *Payment aspects of financial inclusion*, p. 8

³⁵ Chiampo et al. (2018), *QR codes and financial inclusion: reasons for optimism*

³⁶ World Bank (2019), *Financial Inclusion: Europe and Central Asia Economics Update*, p. 41

³⁷ Khera et al. (2021), *Is digital financial inclusion unlocking growth?*, p. 9

CHAPTER 3

SUMMARY AND CONCLUSIONS

An open and common European standard for QR code payments is an efficient way to support greater take-up of QR code payments in Europe. These payments, which are currently provided by a number of payment service companies across Europe, have the potential to make the European payment landscape less fragmented and more efficient.

In particular, QR code payments can provide the missing link for instant payments in a bricks-and-mortar retail environment by complementing the existing SCT Inst scheme and TIPS system. QR code payments offer a convenient, open and secure way for merchants to accept and consumers to make instant payments within this infrastructure, inclusive of all payment service providers on all types of mobile operating systems.

As a result, the greater uptake of QR code payments facilitated by a common and open European standard for QR code payments is expected to lead to even stronger competition between payment services in Europe. This competition between payment services would further drive down the cost of accepting payments for merchants and improve the quality of payment services for merchants and consumers alike. **Ultimately, these benefits will flow to all merchants and consumers in Europe, and therefore to the European economy as a whole.**

A higher uptake of QR code payments in Europe would provide high security standards combined with a convenient user experience both in store and online, especially when it comes to strong customer authentication requirements. This would reduce the scope for payment fraud overall. Another significant benefit of an open and common European QR code standard would be the increase in the addressable market for QR code

payment providers. This would strengthen the incentives for innovation, and thereby increase innovation in QR code payments as well as in alternative payment services that compete with QR code payments.

QR code payments can also support financial inclusion by making it easier for both merchants and consumers to use modern electronic payments.

While this report focuses on Europe, the benefits of standardisation in terms of reducing fragmentation, increasing competition, and encouraging innovation could be magnified were regional QR code standards designed to be interoperable with one another on a global basis.

At a global level, international standardisation and interoperability efforts would streamline cross-border payments, increasing the size of the addressable market even more and thereby also the potential gains from innovation. Following this rationale, several countries in South East Asia have recently announced the launch of cross-border payment links leveraging interoperable QR codes and real-time payment systems between their countries.³⁸

³⁸ <https://kr-asia.com/indonesia-and-thailand-launch-cross-border-qr-payment-link>

REFERENCES

- Accenture (2016), “Seizing the Opportunities Unlocked by the EU’s Revised Payment Services Directive”
- Baidog, Hu, Zhou, Yukun (2019), “Research on Quickpass Payment Terminal Application System”
- Surekha, Anbalagan, Rubesh, Anand et al., (2015), “E-Payment Transactions Using Encrypted QR Codes”
- Bank of Negara Malaysia & Bank of Thailand (2021), “Singapore and Thailand Launch World’s First Linkage of Real-time Payment Systems”
- BIS (2018), “Cross border retail payments”
- BIS (2020), “Payment aspects of financial inclusion in the fintech era”
- Borauzima, Luc, Dominique, Niyondiko, et al., (2021), “Does cross-border banking enhance competition and cost efficiency? Evidence from Africa”
- Bourreau, Marc, Tommaso, Valletti (2015), “What Works and What Doesn’t?”
- Burelli, Jacob, Leni, Grahl (2021), “Will there be an epi-driven industry consolidation for mobile payment solutions in Europe?”
- CGAP (2019), “Acceptance Technologies for Merchant Payments”
- Chalfin, Aaron (2019), “Economic costs of crime”
- Chiampo (2018), “QR codes and financial inclusion: reasons for optimism”
- Commission proposal COM (2020), 595 final
- Congressional Research Service (2020), “International Trade and E-commerce”
- Cook, Lennox, Souraya, Sbeih (2021), “Building Faster Better”
- Copenhagen Economics (2021), “The economic impact of the forthcoming Equiano subsea cable in Portugal”
- CPMI & World Bank (2016), “Payment aspects of financial inclusion”
- Deloitte (2019), “Economic impact of real time payments”
- Desmet, Klaus, Stephen, Parente (2010), “Bigger is better: market size, demand elasticity, and innovation”
- ECB (2021), “Sixth report on card fraud”
- EBRD (2014), “Drivers of Innovation”
- EPRS (2020), “The added value of international trade and impact of trade barriers”
- European Commission (2021), “Instant Payments: Current and foreseeable benefits”
- European Commission (2020), “Study of the application of the Interchange Fee Regulation”
- EuroStat (2021), “Final consumption expenditure of households by consumption purpose”
- Hanrahan (2021), “QR codes could become a mainstream payment method in 2021”
- Hartmann, Gijssels, Plooij, Vandeweyer (2019), “Are Instant payments becoming the new normal? A comparative study”
- Helpnetsecurity (2020), “Alipay enhances its AI-powered risk engine to protect businesses amid accelerating digitization”
- Hummels, David, Lugovskyy, Volodymyr (2005), “Trade in Ideal Varieties: Theory and Evidence”
- International Trade Administration (2017): “Barriers to Cross-Border Trade”
- ISO (2014), “Standardisation and innovation”
- JRC (2015), “Consumer perceptions of (cross-border) eCommerce in the EU Single Market”
- Juniper Research (2021)
- Khera, Purva, Stephanie, Ng, et al., (2021), “Is digital financial inclusion unlocking growth?”
- Blind, Knut (2013), “The Impact of Standardization and Standards on Innovation”
- Korynski, Piotr, Justyna, Pytkowska (2016), “Measuring Financial Inclusion in the EU: Financial Inclusion Score Approach”

- Lee, Jeongsik, Kim, Byung-Cheol (2013), “The Relationship between Innovation and Market Share: Evidence from the Global LCD Industry.”
- Liu, Louis (2019), “The future of payments is inclusive and invisible”
- Maina, Grace (2021), “Impact of E-KYC and financial inclusion on cross-border payments”
- Naden, Clare (2016), “Mobile payments to take off with new series of standards”
- Nepal Rastra Bank (2020), “NepaQR Standardization Framework and Guidelines”
- OECD (2014), “Factsheet on how competition policy affects macro-economic outcome”
- EBRD (2014), “Drivers of Innovation”
- Payments Europe (2020), “Understanding instant payments”
- Rosenbaum, Aaron, Garth, Baughman et al., (2017), “Faster Payments: Market Structure and Policy Considerations”
- Hummels, David, Lugovskyy, Volodymyr (2005), “Trade in Ideal Varieties: Theory and Evidence”
- Surekha et al. (2015), “E-Payment Transactions Using Encrypted QR Codes”
- ThePaypers (2021), “Key Players in the European Payments Landscape”
- Viacconnects (2021), “MasterCard Alternative: Why you should accept QR code mobile payments”
- Wells Fargo (2021), “Payment Network Pass-Through Fee Schedule”
- World Bank (2019), “Europe and Central Asia Update: Financial Inclusion”

