

UK account-to-account payment infrastructure

Case for change and economic implications



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A reformed account-to-account (A2A) payments infrastructure model will facilitate innovation and generate economic growth in the UK

Why reform is needed to the UK A2A payment infrastructure

- The UK's retail payments ecosystem, including Faster Payment System (FPS), BACS, and cheques, is crucial for the economy.
- Policymakers stress the need for the payments system to better adapt to modern digital demands, ensure open access and drive innovation and competition.
- Despite its maturity, the UK's A2A payment system offers limited user choice and needs modernisation.
- Modernising the A2A infrastructure will support new services, including Open Banking and drive economic growth, as highlighted by the Bank of England, the Garner Review Report and the National Payments Vision (NPV).

What is the proposed reform

- The core infrastructure layer will provide essential clearing, settlement, and liquidity management for A2A retail payments.
- Regulatory oversight, if required, will ensure fair access, competition, and resilience.
- An exchange layer will drive interoperability with other payment and non-payment systems, including digital assets, cross-border payments and digital identity.
- Bank of England's RTGS system (Layer 0) will ensure settlement finality, while Layers 2 and 3 will offer additional functionalities and value-added services.
- Modular architecture will allow for flexible, secure, and innovative service development, fostering greater choice and competition.

Direct benefits (Business cost savings and fraud reduction)

1
Reduction in fraud

2
Reduction in cross-border fees

3
Improved cross-border liquidity

4
B2B reduced invoice processing cost

5
Reduction in B2B fees

6
Improved B2B liquidity

Economic impact



- Direct impacts enhance productivity and generate efficiency savings.
- Savings can be reinvested into capital and labour.
- This leads to increased levels of economic activity.
- The projected increase of £9.0 billion in GDP is expected to materialise in the short to medium term, typically spanning two to five years.
- The direct impact refers to the immediate effects of an economic activity or policy on a specific sector or group.
- The GDP impact represents the economy-wide effects of the initial direct impact.

¹ This estimate reflects the economy-wide effects of payment infrastructure improvements and is based on a bottom-up quantification of fraud reduction, cross-border payment cost savings and improved business-to-business transactions efficiency. It is the estimated increase in annual GDP compared to a counterfactual without the reform.



A new A2A payments infrastructure will also support broader socio-economic impacts like regional growth and financial inclusion

Benefit drivers/themes:

1	Enhanced innovation and competition:	2	Improved access:	3	Consumer choice:
	The core infrastructure layer fosters innovation and competition by encouraging firms to develop and offer a variety of products and services on top of the core infrastructure.		The model provides centralised, efficient capabilities for the processing of payments and establishes a common foundation for firms to access the infrastructure.		Greater innovation and competition would lead to more products and services being developed, providing better and more varied choice for consumers.

Quantified benefit examples:

Fraud reduction: <ul style="list-style-type: none">The new A2A infrastructure could reduce Authorised Push Payment (APP) and Unauthorised Push Payment (UPP) fraud.By integrating advanced security features and analytics, the core layer would be effective at detecting fraud.	Retail payments: <ul style="list-style-type: none">Delivering against the NPP's retail payment initiative by enabling merchants to leverage both card and A2A payments, expanding payment choices for merchants whilst meeting the diverse needs of their customers.
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Cross-border payments: <ul style="list-style-type: none">The new A2A infrastructure is expected to streamline cross-border transactions, reducing fees and enabling faster settlements.This could reduce trade costs and improve efficiency for businesses.	Regional growth: <ul style="list-style-type: none">Represents a transformative opportunity to catalyse regional growth in fintech clusters beyond London, helping to incentivise innovation and financial inclusivity across the country.
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Business payment efficiencies: <ul style="list-style-type: none">Reduce business-to-business transaction costs.Improve business liquidity through accelerated payment processing.	Financial inclusion: <ul style="list-style-type: none">Offers greater flexibility and control over financial obligations, thereby helping consumers better manage their finances and access tools to support their unique needs.
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Summary: Reforming retail account-to-account payments to boost economic activity in the UK

EY teams have been commissioned by Mastercard to conduct a study to evaluate the benefits and economic impacts of a proposed new account-to-account (A2A) payments infrastructure in the UK. The EY teams' role was to act as a professional third-party advisor to help Mastercard identify, assess, and quantify the expected benefits and broader economic impacts of the proposed reform.

Introduction and context

Account-to-account (A2A) payments are electronic money transfers directly between bank accounts. They support a variety of peer-to-peer, online purchase, bill payment and salary payment use cases. Resilience and stability in an innovative and competitive environment are cornerstones of the UK's retail A2A payments ecosystem. This is in line with the National Payments Vision (NPV) published by HM Treasury, which outlines three key pillars designed to guide future activity – innovation, competition, and security.² The UK pioneered real-time payments globally with the launch of Faster Payments in 2008 but has not kept pace with the speed of international innovation since. As a result, A2A in the UK does not fully support the current needs of consumers, businesses, and society at large. To meet current demand and be future proof, the A2A payments ecosystem needs a new approach to delivering strategic change which, together with a reimagining of the current regulatory framework and industry governance, will deliver a payments landscape with competition and innovation at its heart, enabling the UK to become a market leader once again.

The foundation for this new approach should be greater *competition in the market* for payments and that the most beneficial way to deliver this is an end-user-focused core infrastructure to support the rails that process retail A2A payments. Payments are so fundamental to the UK economy that this infrastructure needs to be developed in a way that supports economic growth productively and sustainably. This aligns with the government's stated mission to grow the economy. If the design is right, then it will establish a secure,

reliable foundation that will provide a feature-rich, resilient core infrastructure platform on which participants can develop new products and services.

Mastercard envisages a model where the core A2A infrastructure is funded and maintained by a private provider and delivered directly to the participants in the system. This model could be supported by a regulatory oversight regime that defines and monitors the competitive conditions for access, but only if conditions deem it necessary. According to the NPV, this regulatory framework must be clear, predictable and proportionate. Such a framework would allow for greater and more varied competition and innovation without risking the resilience of the system.

Case for change

The UK's retail payments ecosystem consists of the Faster Payments System (FPS), the Bankers' Automated Clearing Services (Bacs), and cheques. Playing a crucial role in driving the economy, a payments ecosystem must be able to adapt to the evolving needs of end users and a modern digital landscape. Recognising the importance of this infrastructure, the Bank of England has stressed that the UK's retail payments ecosystem must remain fit for purpose and resilient to ensure safe innovation can take place in support of monetary and financial stability.³

The UK's payment ecosystem is mature and resilient but, in some circumstances, offers limited choice for users, especially regarding alternate payment methods, compared to other similar economies. There is clear room for improvement to

² National Payments Vision, HM Treasury, October 2024

³ [The Bank of England's approach to innovation in money and payments](#) | Bank of England



reach the level of innovation that characterises a leading payments market. This includes refining payment initiation mechanisms and enhancing fraud prevention services.

Improved interoperability would pave the way for digital assets such as tokenised deposits and Central Bank Digital Currencies (CBDCs), and seamless cross-border payments. Additionally, a modernised A2A infrastructure will accelerate the adoption of adjacent services such as Open Banking and fraud analytics, all of which can further boost economic growth.

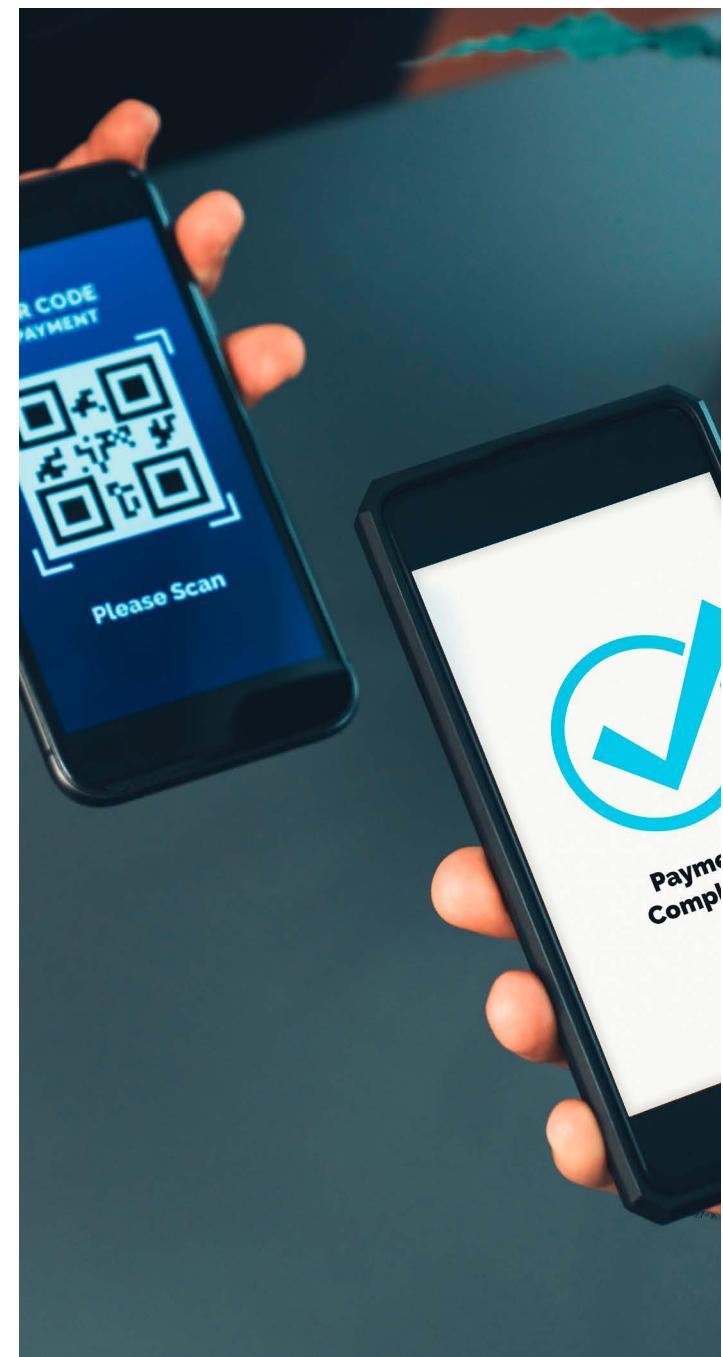
The Bank of England⁴, the Garner Review Report⁵ and the NPV⁶ have articulated that the need for change is driven by the objective of addressing current system inefficiencies and taking advantage of new opportunities for growth.

They recognise the critical role that payment infrastructure plays in boosting economic growth. By modernising the payments ecosystem, the UK can unlock the significant economic benefits experienced by some other countries that have upgraded their retail payments infrastructures. These improvements not only address current inefficiencies but also pave the way for future innovations and economic expansion, thereby supporting broader economic growth.

Global examples of modernised payment systems

According to the Bank of England's discussion paper on the approach to innovation in money and payments, *"Internationally, innovations in retail payments mean that, in countries like Sweden, Brazil and India, interbank payment systems are used alongside cards to make retail payments in ways that do not currently happen in the UK."*⁷

Modern payment solutions such as Brazil's Pix, India's Unified Payments Interface (UPI), and Sweden's Swish have revolutionised their respective countries' financial landscapes. Pix, launched in November 2020, aimed to reduce cash reliance, enhance financial inclusion, and invigorate competition in Brazil's banking sector. It achieved rapid



⁴ The Bank of England's approach to innovation in money and payments | Bank of England

⁵ Future of Payments Review, Joe Garner, 2023.

⁶ National_Payments_Vision.pdf

⁷ The Bank of England's approach to innovation in money and payments | Bank of England



adoption,⁸ used by about 75% of the population and 15 million companies by March 2024.⁹ Notably, this included 71.5 million individuals who had not made electronic credit transfers before its inception.¹⁰

India's UPI transformed a fragmented payment ecosystem to a unified platform that by August 2023 had processed over 14 billion transactions worth about £190 billion, a stark growth compared to the pre-UPI era.¹¹

Sweden's Swish, introduced in 2012, became a widely used real-time mobile payment app, with 8 million users as of 2023, representing a significant portion of the population of 10.6 million, contributing to an estimated 0.5% Gross Domestic Product (GDP) growth and a 10% increase in the velocity of money.¹²

The progress made in Brazil, India and Sweden exemplifies the potential for digital payment solutions to enhance the payment ecosystem in different ways. According to the Garner Review Report, "A healthy economy relies on a thriving payments ecosystem. Payments facilitate trade, commerce and every aspect of the economy."¹³

Recent efforts to modernise the UK's retail A2A payment infrastructure have stalled

The New Payments Architecture (NPA), conceived in 2017 by the Payment Strategy Forum (PSF) established by the Payment Systems Regulator (PSR), was the UK's plan to revamp its core A2A payments infrastructure. However, progress was slow, with seven years passing since its inception without any commercial rollout. Concerns were also raised by industry about potential competitive risks and the complexity of the NPA, which may hinder innovation.¹⁴

In November 2024, Ministers laid out the NPV.¹⁵ The NPV considered current efforts underway with the NPA and concluded that a 'more agile and flexible approach' was required. As a response to the NPV, Pay.UK cancelled the procurement for the NPA.¹⁶

The government's NPV also sets out the need to build for tomorrow, highlighting the importance of considering a range of innovations, whilst also ensuring continued high standards of consumer protection, security and resiliency.¹⁷ It is becoming increasingly clear that any new retail A2A payments infrastructure must be able to adapt to meet the present and future demands of the payment ecosystem.

Our approach

To evaluate the benefits of a new A2A payments ecosystem, it was essential to understand how its characteristics would interact with the economy. This understanding was important for identifying a specific delivery model. Various options were considered and assessed against a comprehensive set of appraisal criteria. This approach facilitated the selection of the highest-ranking option, which is believed to have the greatest potential to deliver the associated economic benefits.

Alternative courses of action

A wide range of potential alternatives to the UK's current system have been considered for the purpose of this evaluation, ranging from incremental updates to complete overhauls. This includes an 'Enhanced Status Quo', which suggests minor improvements to the existing FPS. In contrast, the NPA proposed a transformation akin to Australia's New Payments Platform. Other options include the 'combined core and overlay infrastructure with potential for economic regulation' and the 'core infrastructure with potential for

8 <https://www.elibrary.imf.org/view/journals/002/2023/289/article-A004-en.xml>

9 <https://www.europeanpaymentscouncil.eu/news-insights/insight/PIX-latest-updates-brazils-leading-instant-payment-scheme>

10 <https://www.elibrary.imf.org/view/journals/002/2023/289/article-A004-en.xml>

11 <https://www.npci.org.in/what-we-do/upi/product-statistics>

12 [Future_of_Payments_Review_report.pdf \(publishing.service.gov.uk\)](https://www.gov.uk/government/publications/future-of-payments-review-report)

13 Future of Payments Review, Joe Garner, 2023

14 [Competition and innovation in the UK's NPA call for input \(psr.org.uk\)](https://www.gov.uk/government/publications/competition-and-innovation-in-the-uks-npa-call-for-input)

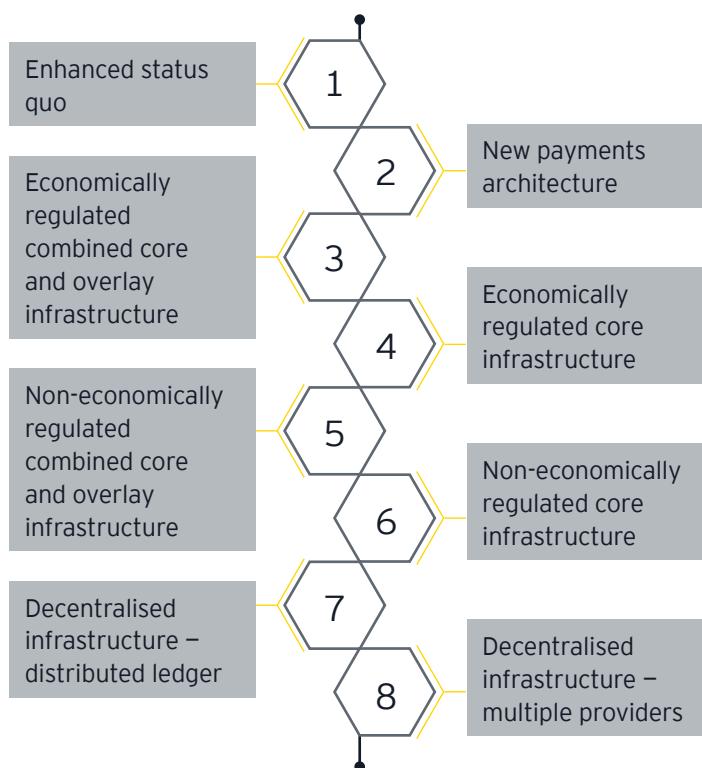
15 National Payments Vision, HM Treasury, October 2024

16 [Pay.UK response to National Payments Vision](https://www.gov.uk/government/publications/pay-uk-response-to-national-payments-vision)

17 National Payments Vision, HM Treasury, October 2024



economic regulation', both of which have the potential to introduce an element of regulation or transparency requirements for pricing. Lastly, the 'decentralised infrastructure' option considers the use of distributed ledger technology or multiple competing providers to foster a competitive environment.



To evaluate the alternatives, we developed an appraisal framework to consider a broad range of criteria. The process began with the identification of viable alternatives which were assessed against the 12 criteria shown below:

Appraisal criteria

End-user Innovation	Regulatory and political feasibility
B2B Competition	Deliverability
Fraud prevention	Cost of implementation
Financial inclusion	User experience and accessibility
International compatibility	Resilience and reliability
Interoperability	Scalability and flexibility

Proposed layered infrastructure

Through the evaluation process, guided by the principles of HM Treasury's Green Book, the core infrastructure, supporting a series of other layers, emerged as the highest-ranked option. Primarily, this was because it would be designed with a high degree of deliverability, support innovation, adopt international messaging standards, and enable interoperability with new emerging technologies. In this assessment, the layered model should stimulate competition in the market by lowering the barriers to entry and allowing firms, in particular financial technology firms, to build applications in some or all of the layers.

How the approach would benefit the UK

The layered architectural model as proposed, would open-up competitive access to A2A payment services. It would do this by providing centralised low-cost foundational capabilities for the processing of payments. The core infrastructure would provide the common foundation for firms, who are then able to access a variety of layered additional services depending on their needs.

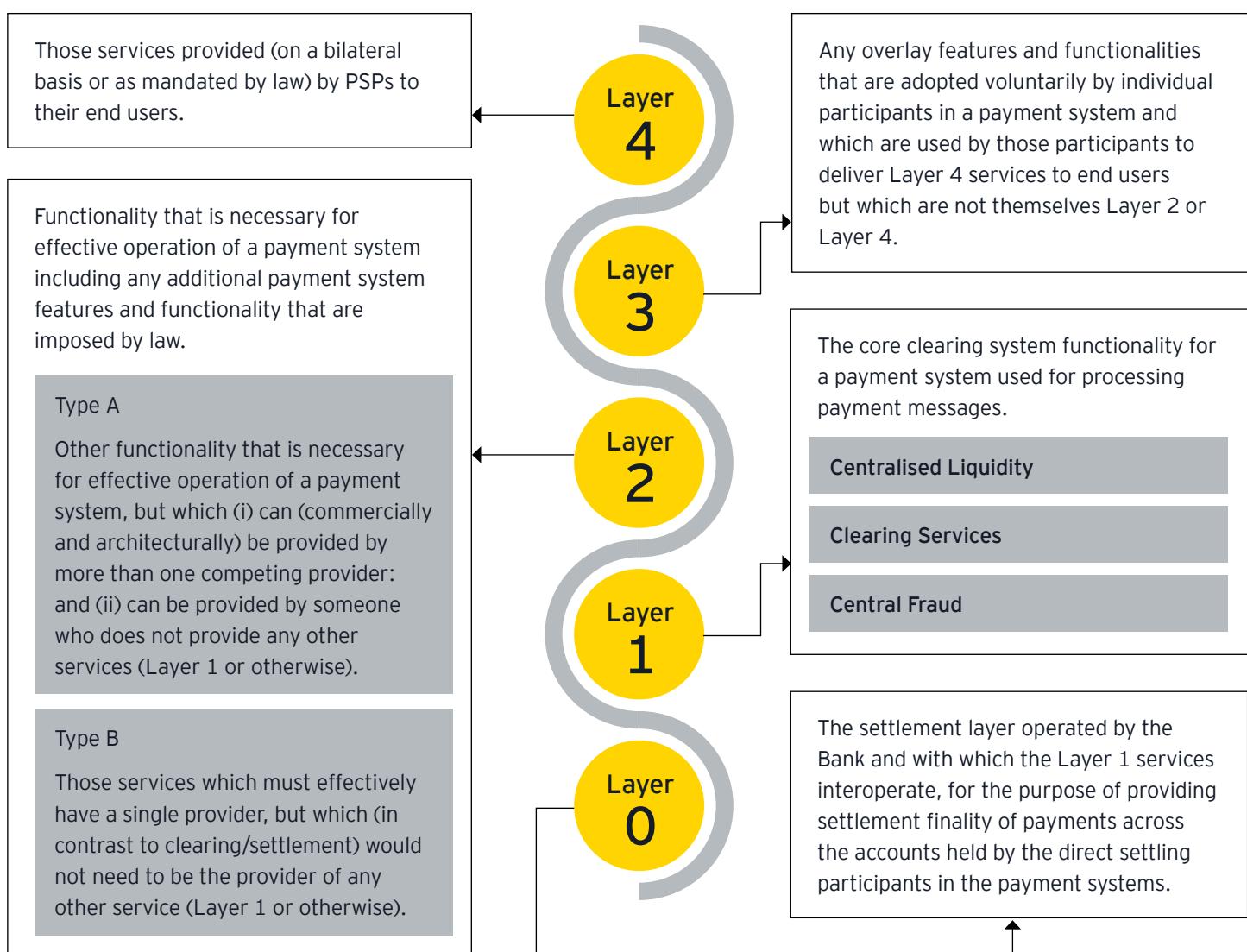
Mastercard proposes a five-layered model as shown in Figure 1. The layers sitting above the core provide the functionality required for a fully functioning payments system. Many of these functions will be provided competitively by multiple suppliers. The design allows for both legally mandated requirements and voluntary overlay offerings.



The core underpins the other layers, maintaining resilience and creating the conditions for greater innovation at the higher layers without the risk of jeopardising the stability of the core infrastructure. This would lead to an environment in which more products and services are developed to provide greater choice for consumers. The core layer would streamline strategic change and open up the market for messaging and exchange services which can drive more access, interoperability and innovation.

The layered model could support economic growth by enhancing the ease of payments for consumers and businesses, increasing cross-border payments, improving interoperability with emerging technologies through ISO 20022 standardisation, and simplifying international transactions. An appropriate level of supervisory oversight alongside a framework for monitoring and managing risks can contribute to resilience and stability whilst ensuring fair and reasonable access to the core infrastructure.

Figure 1: Layered infrastructure





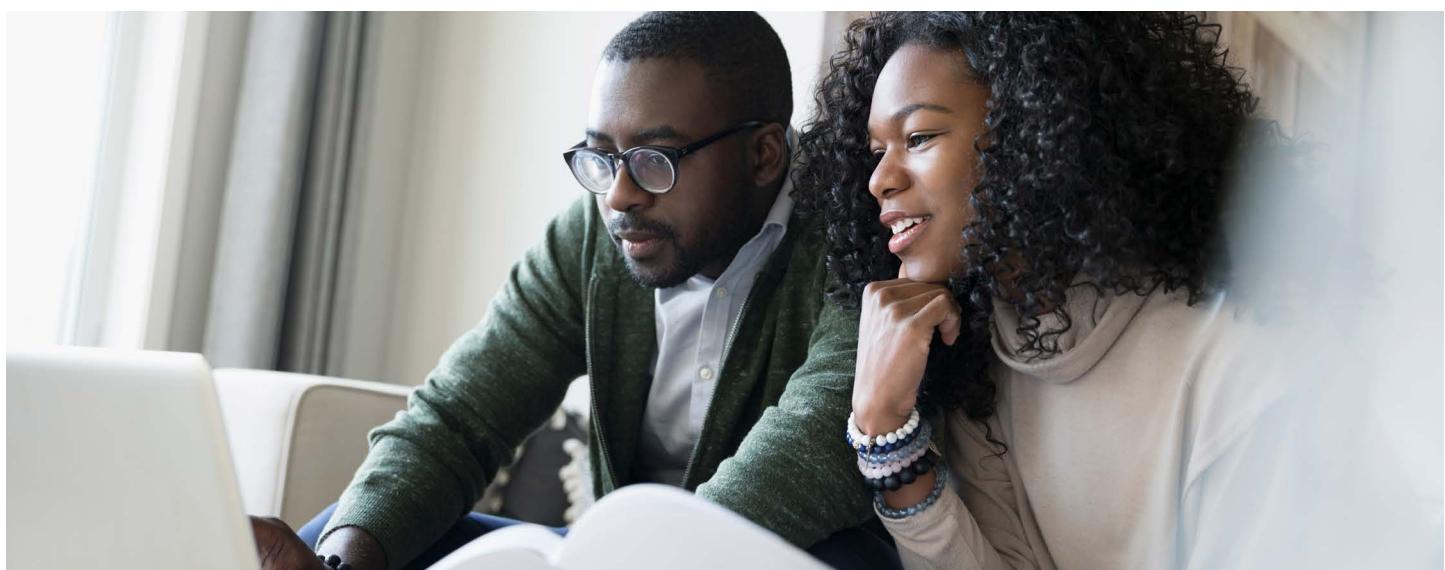
Economic impact of modernising the UK retail payments infrastructure

The economic impact of modernising the UK's retail payments infrastructure has been estimated using two distinct methodologies: a "top-down" econometric analysis and a "bottom-up" theory of change approach. These methodologies represent different ways of estimating impacts and cannot be aggregated, as each provides a unique perspective on the potential benefits. This dual approach was employed to validate the robustness of the findings and to ensure a comprehensive assessment of the potential economic benefits from the infrastructure enhancements. By leveraging both methodologies, we aim to capture a more reliable estimate of the impacts, considering both macroeconomic trends and specific, quantifiable benefits.

The first approach, a top-down analysis, uses a regression model to link payment system sophistication with transaction volumes. It quantifies economic impacts by examining the relationship between the sophistication of payment systems and the volume and value of economic transactions in a panel of 25 countries, estimating a 0.8% increase in transactions and a £10 billion boost to the economy.

Secondly, the bottom-up approach sought to determine the broader economy-wide effects on the UK economy using a Computable General Equilibrium (CGE) model, specifically the Global Trade Analysis Project (GTAP). This model simulates the potential ripple effects of payment infrastructure improvements throughout the UK economy, capturing changes in output, employment, and income across sectors. The CGE model projects substantial economic benefits, forecasting an increase in economic output of £9 billion. This growth is anticipated not only in sectors directly linked to payment processing but also across the broader economy, positively affecting employment and household income.

The bottom-up approach quantifies benefit channels such as fraud reduction, cross-border payment cost savings, and improved business liquidity, which is estimated to generate significant first order impacts. This estimate excludes additional potential benefits that are challenging to quantify or have uncertain direct attribution. Therefore, the first order impacts (see following section on channels of impact) should be viewed as a cautious estimate of the potential scale of benefits that the infrastructure can deliver. This is particularly relevant given that the UK has fallen behind international peers, indicating that there is room for innovation in payments infrastructure to drive economic growth.





£4.9bn
direct impact

- Direct impacts enhance productivity and generate efficiency savings.
- Savings can be reinvested into capital and labour.
- This leads to increased output.

£9.0bn
GDP impact

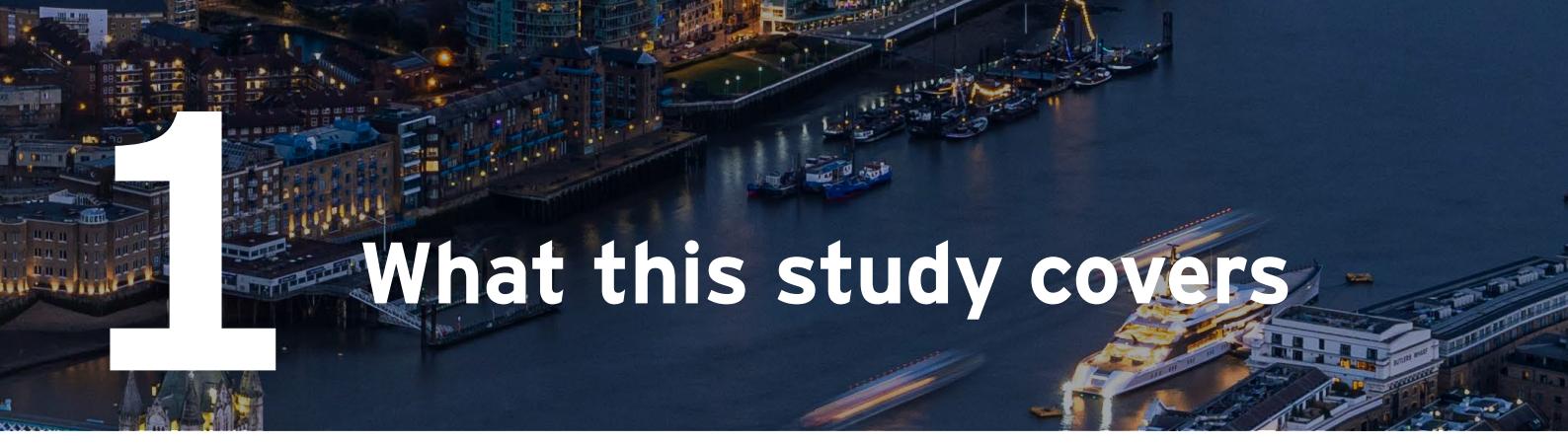
Channels of impact

- **Cross-border payments:** The implementation of the new infrastructure is expected to streamline cross-border transactions, reducing fees and enabling faster settlements. The impact on cross-border payments is estimated to reduce trade costs and improve efficiency for businesses, with a value of £880 million.
- **Fraud reduction:** The new infrastructure's role in reducing fraud, such as Authorised Push Payment (APP) and Unauthorised Push Payment (UPP) fraud, by integrating advanced security features and analytics, is quantified with potential annual savings of £240 million.
- **Business-to-Business (B2B) transactions:** Automating the reconciliation of invoices with payments is expected to yield substantial efficiency gains and cost savings estimated at £3.5 billion.
- **Increased liquidity for businesses:** Accelerating Bacs transactions to match FPS processing times could result in significant annual savings due to a reduced working capital requirement, with an impact estimated at £200 million. However, it is important to clarify that Bacs operates on a batch processing system, which serves a distinct purpose, such as handling high volumes of scheduled payments like payroll and direct debits. Transitioning all transactions to real-time processing may not be necessary or practical, as the batch processing system is designed to efficiently manage these specific types of transactions.

Additionally, the proposed new payment infrastructure offers significant qualitative benefits that extend beyond the economic benefits that have been quantified. Some of these benefits were challenging to quantify and hence were not included in the economic estimates. These include improvements in user experience, enhanced security, and the potential for innovation, which collectively contribute to a more efficient and adaptable financial ecosystem. The evolving nature of technology and regulatory environments underscores the importance of these unquantified benefits.

Furthermore, the next generation A2A infrastructure could benefit UK merchants by supporting alternative payment options, enabling merchants to integrate different payment systems and thereby offer increased choice for their customers. The core infrastructure layer also promises to drive regional fintech growth and financial inclusivity across the UK, supporting businesses, especially those in underserved areas, through efficient and low-cost payment processing.

In conclusion, our analysis suggests that whether estimated on a top-down or bottom-up basis, we should expect the proposed reforms to result in a £9-10 bn increase in economic output per annum in the years following its implementation.



What this study covers

EY has been commissioned by Mastercard to carry out a study to evaluate the benefits of a proposed new account-to-account (A2A) payments infrastructure in the UK. The study aims to incorporate international perspectives by examining examples from several countries that have experienced updates to their A2A payment infrastructures. These are used to consider advancements in the UK's A2A payment systems and assess their impact on the country's payment environment and the resulting economic impact.

The study outlines:

- The case for change, i.e., why the status quo requires addressing.
- An evaluation of alternative courses of action, following HM Treasury's Green Book guidance.
- An economic analysis¹⁸ to assess the potential economic impact of these proposals.

The economic analysis includes a quantitative assessment of the economic impact that the new A2A payment solution is anticipated to have. In doing so, this evaluation will focus on a carefully selected series of impact factors as outlined in a "Theory of Change"¹⁹ framework, which was developed as part of this study.

Drawing on historical transaction records from the Bank for International Settlements (BIS) for 25 countries, the analysis includes data for countries with financial systems comparable to the UK's or with a history of implementing similar payment innovations. The estimation of the economic benefits is based on the level of improvement in payment systems compared to an alternative scenario without these changes.

The rest of this report is structured as follows:

- Section two outlines the justification for proposing and implementing changes,²⁰ including the current efforts to resolve challenges.
- Section three outlines and evaluates alternative courses of action to address challenges.
- Section four describes the proposed new core infrastructure layer and its principles.
- Section five provides the analysis results and quantifies the macroeconomic impact of updating the UK payments system.
- Section six explores the channels of impact, providing a comprehensive view of the potential impact of the infrastructure upgrade, including the qualitative benefits.

18 A more comprehensive economic analysis will be undertaken in the next phase of the study.

19 A theory of change is a structured outline that describes the sequence of actions and outcomes required to achieve a specific change.

20 The data sources and methodology used in the quantitative analysis are discussed in Appendix A.

2

Case for change

The UK's A2A payment infrastructure faces a pivotal moment, with the Bank of England, the Garner Review and the NPV articulating the need for change, driven by an objective to take advantage of new opportunities and to enable the UK to stay at the forefront of innovation in payments.

2.1. Overview of A2A real-time payments in the UK

The UK's A2A payments infrastructure currently processes 11 billion transactions each year,²¹ a figure that has been steadily rising due to the increasing adoption of digital and mobile banking solutions. A2A payments, which enable the direct transfer of funds between bank accounts, bypassing intermediaries, are gaining traction. Launched in 2008, the Faster Payment System (FPS) has become an integral component of the UK's instant A2A payment infrastructure. The primary objective of FPS was to revolutionise payment processing times, cutting them down from days to seconds, thereby enabling swifter transactions for both individuals and businesses.²²

Despite the significant advancements FPS has brought to payment processing speeds in the UK, it is not without its challenges, particularly in promoting innovation for end-users and competition in the business-to-business (B2B) sector. Direct participation in FPS is limited to less than three percent of Financial Conduct Authority (FCA) regulated entities,²³ with many payment service providers relying on indirect access.

There have been initiatives within A2A payments designed to benefit customers. Open Banking was first introduced to the UK as a digitally enabled A2A payment mechanism, with HMRC tax payments being one of the notable use cases.

Innovation and uptake of Open Banking, however, has been limited. Innovation at Point of Sale is also a notable gap and certain limitations, such as where a payment needs to be reversed, along with the lack of a commercial and consumer protection model, have yet to be adequately addressed.

2.2. UK's position relative to other economies

The independent Future of Payments Review (Garner Review) pointed out a concerning trend: the UK is starting to fall behind other advanced economies in terms of upgrading its electronic payments infrastructure.²⁴ In 2022, the UK was ranked 9th in the volume of real-time payment transactions per person per month, but it is expected to slip in the global rankings by 2027.²⁵

When compared with other countries such as India, Brazil and Netherlands, the UK's A2A payment infrastructure is lagging behind in adapting to fast-paced technological changes and evolving customer demands. While other countries have been proactive in embracing new payment technologies, the UK's slower approach may hinder its ability to maintain a competitive position which could be seen as a contributing factor to the UK's current low growth economy. This delay has an impact not only on the effectiveness and adaptability of transactions within the country but also has broader implications for the UK's reputation as a hub for financial innovation and investment.

21 Annual-Summary-2023.pdf (wearepay.uk)

22 What is the Faster Payments Service (FPS)? (moderntreasury.com)

23 Resources (fca.org.uk)

24 Future_of_Payments_Review_report.pdf (publishing.service.gov.uk)

25 CMR-4200 US LETTER full report Final Linked (dymit0g8an2f3.cloudfront.net)



2.3. Global examples: modernised payment systems

There are several examples which demonstrate the transformative impact of modern payment solutions such as Brazil's Pix, India's Unified Payments Interface (UPI) and Sweden's Swish system.

Pix, launched in November 2020, aimed to reduce the reliance on cash, increase financial inclusion and strengthen competition within Brazil's concentrated banking sector. Before Pix, the payment landscape had limited integration between banks, with slow and costly transactions that often created barriers for both consumers and businesses. Since Pix's implementation, Brazil has had the fastest adoption rate in terms of transactions per capita gained,²⁶ with Pix being used by approximately 75% of the population and 15 million companies as of March 2024.²⁷ Pix has also significantly contributed to financial inclusion. By December 2022, it facilitated transactions for 71.5 million individuals who had not made any electronic credit transfers in the year before its launch.²⁸

Prior to UPI, India's digital payments landscape was fragmented, with low transaction volumes due to a lack of interoperability and user-friendly interfaces. Post-UPI, the landscape has changed dramatically: UPI facilitated over 14 billion transactions worth approximately £190 billion in August 2023, a contrast to the pre-UPI era where digital transactions were a fraction of this volume.²⁹

Swish was launched in 2012, when Sweden's payment systems relied heavily on traditional methods and mobile payments were not widely adopted. Swish quickly gained popularity as a real-time mobile payment app, allowing individuals and

businesses to transfer money instantly through mobile phones using just a phone number. In 2023, Swish had 8 million users from a total population of 10.6 million. In addition, 70% of merchants stated that Swish was positive for their business and estimated to have increased GDP growth by 0.5% and velocity of money by 10%.³⁰

By contrast, the UK's retail payments landscape, despite its pioneering origins, now trails in several areas:

Continuous innovation: The rigidity of the current ecosystem, fragmentation of payment systems, lack of interoperability, congested regulatory landscape and inflexible governance arrangements stifles innovation, curtailing the UK's ability to maintain a competitive edge. According to the Bank of England's Discussion Paper, "The UK's financial market infrastructure must remain at the forefront of developments in finance, which will help to support innovation and growth."

Fraud vulnerabilities: Authorised Push Payment (APP) fraud is an increasing problem, whilst this type of fraud does not start in the payment system, the payment system could help play a major role in identifying fraud and reducing losses. The UK recorded 2.97 million cases of confirmed fraud in 2023, equivalent to £1.17 billion.³¹

Financial exclusion: According to a survey commissioned by the Financial Conduct Authority (FCA), 1.1 million UK adults remain unbanked,³² and many more face barriers to accessing digital payment solutions, underscoring the urgent need for more inclusive payment systems.

26 <https://www.elibrary.imf.org/view/journals/002/2023/289/article-A004-en.xml>

27 <https://www.europeanpaymentscouncil.eu/news-insights/insight/PIX-latest-updates-brazils-leading-instant-payment-scheme>

28 <https://www.elibrary.imf.org/view/journals/002/2023/289/article-A004-en.xml>

29 <https://www.npci.org.in/what-we-do/upi/product-statistics>

30 [Future_of_Payments_Review_report.pdf](https://www.gov.uk/government/publications/future-of-payments-review-report) (publishing.service.gov.uk)

31 https://www.ukfinance.org.uk/system/files/2024-05/Annual%20Fraud%20Report%202024_0.pdf

32 [Financial Lives 2022: Key findings from the FCA's Financial Lives May 2022 survey](https://www.fca.org.uk/publications/research/220509-financial-lives-2022-report)



2.4. Insights from UK payments infrastructure review

The Garner Review³³ envisions a system for the UK that is *resilient, reliable, scalable, adaptable, secure, trusted, fast and convenient for trade to thrive at every level of the economy*. It describes the opportunity for the UK to improve its alignment and prioritisation to free up space for innovation, removing some of the complexity in the payments landscape. The Review provides several recommendations, focusing on consumer experience, Open Banking and regulatory oversight, delivering better consumer outcomes such as increased financial inclusion, which would enable the UK to create a world leading payment environment for the future.

The Bank of England's research supports the development of payment systems that are instantaneous, secure, and available to everyone. The Bank of England's recent Discussion Paper³⁴ highlights the advantages that could arise from innovative advancements, such as the compatibility with tokenised assets and Central Bank Digital Currencies (CBDCs), as well as the potential improvements for consumers and businesses that emerging technologies may bring. Nonetheless, the paper emphasises the importance of developing a UK retail payments landscape that allows for innovation to occur safely, underpinning monetary and financial stability. The ultimate aim is to maintain and enhance trust and confidence in the currency system.³⁵

2.5. Limitations of the current efforts to modernise the UK payment infrastructure

The New Payments Architecture (NPA), conceived by the Payment Strategy Forum (PSF) and established by the Payment Systems Regulator (PSR), was the UK's ambitious plan to overhaul its core account-to-account (A2A) payments infrastructure. The primary goal was to create a more flexible, secure, and efficient system. This initiative, regarded as the most significant update in a generation, aimed to replace existing systems like Bacs and Faster Payments System (FPS) with a unified platform designed to foster innovation and competition.

However, progress was slow, with seven years passing since its inception without any commercial rollout. Industry stakeholders raised concerns about potential competitive risks and the complexity of the NPA, which could stifle innovation.

In response to the Garner Review Report, ministers laid out the UK's New Payments Vision. Notably, this new vision states: "The government has considered carefully the role of the New Payments Architecture programme and concluded that a more agile and flexible approach to delivering the UK's infrastructure needs is required to ensure the UK is primed to seize the opportunities of next-generation technologies." As a result, Pay.UK cancelled the procurement for the NPA.³⁶

This new direction underscores the need for a more adaptable and responsive retail payments infrastructure including Faster Payments and Bacs that can better meet the evolving demands of consumers and businesses, ensuring the UK remains at the forefront of financial innovation.

33 Future_of_Payments_Review_report.pdf (publishing.service.gov.uk)

34 <https://www.bankofengland.co.uk/paper/2024/dp/the-boes-approach-to-innovation-in-money-and-payments>

35 <https://www.bankofengland.co.uk/-/media/boe/files/paper/2024/the-boes-approach-to-innovation-in-money-and-payments.pdf>

36 Pay.UK response to National Payments Vision

3

Evaluation of alternative courses of action

We conducted a review of international A2A payment infrastructure to create a comprehensive list of potential alternative courses of action. This was complemented by discussions with Mastercard, and a review of literature, including the Garner Review, ACI Prime Time, Pragner's Payment Practice Paper, and several papers by the Bank for International Settlements (BIS).

3.1. Qualitative appraisal framework

An appraisal framework was developed to evaluate the alternatives by considering a diverse range of criteria (see Appendix B for further explanation of the qualitative appraisal framework). The process began with the identification of viable alternatives, which were then scrutinised in a workshop, where stakeholders collaboratively assessed them against a selected set of criteria shown below:

Appraisal criteria

1. End-user Innovation
2. B2B Competition
3. Fraud prevention
4. Financial inclusion
5. International compatibility
6. Interoperability
7. Regulatory and political feasibility
8. Deliverability
9. Cost of implementation
10. User experience and accessibility
11. Resilience and reliability
12. Scalability and flexibility

Each option was analysed and assigned a score for each criterion, indicating how well it aligns with the desired outcomes. The scoring system was based on a consistent scale, which allowed for clear comparison across different criteria and options.

The assessment resulted in a profile for each option, highlighting its performance across all criteria. The framework allowed the ranking of options but also provided transparency and accountability in the decision-making process.

3.2. Alternatives evaluated

Our review has identified a range of alternatives. These options are outlined below, and examples from around the world have been used to illustrate how they work in practice.

3.2.1. Enhanced status quo

This option involves the continuation of the existing FPS infrastructure, focusing on essential maintenance and minor updates. This would aim to extend the life and efficiency of the current system. There is an ongoing programme of activity to deliver certain upgrades to the existing FPS platform, but there is a need over and above ongoing efforts in order to address current and future technological and market change e.g. ISO20022 interoperability, CBDCs. Canada's ongoing enhancements to the Interac e-Transfer system exemplify this approach, emphasising increased capacity, speed, and user experience to enhance payment efficiency and economic growth.³⁷



3.2.2. New Payments Architecture

The NPA entailed a comprehensive redesign of the UK's payment infrastructure as proposed by the PSF. The NPA proposed replacing existing systems like FPS and Bacs with a new infrastructure designed to support a wide range of payment types and services. Similar initiatives include Australia's New Payments Platform (NPP),³⁸ which facilitates real-time, data-rich payments, and India's UPI,³⁹ which has significantly contributed to financial inclusion through instant bank-to-bank transfers.

3.2.3. Core Infrastructure with potential for economic regulation

This model proposes the development of a new core Account-to-Account (A2A) infrastructure that would act as a central switch, with the flexibility to be economically regulated if required. The infrastructure would be designed to meet current and future market needs, with capabilities updated accordingly.

In an economically regulated scenario, a framework would be in place to oversee and guide the overall operation and service delivery requirements. This is exemplified by Brazil's Pix system, which operates as an overlay on existing banking and payment systems. Developed by the Central Bank of Brazil, Pix aims to boost interoperability and competition among financial institutions, enabling real-time transactions across banks.

In a non-economically regulated scenario, the infrastructure would operate under market dynamics, allowing for a more flexible and potentially competitive environment. This model assumes that the core infrastructure would be complemented by innovative, value-added services developed by third-party providers, thus enhancing the overall functionality and user experience of the payment systems.

3.2.4. Combined core and overlay infrastructure with potential for economic regulation

This model proposes the development of a new central infrastructure that includes both core and overlay services, with the flexibility to be economically regulated if required. The infrastructure would not only perform basic switching functions but also offer additional services such as advanced fraud detection, richer data analytics, and support for complex payment types.

In an economically regulated scenario, a framework would be in place to oversee and guide the overall operation and service delivery requirements, ensuring it serves the public interest. This would ensure that the infrastructure operates in a manner that promotes fairness, transparency, and accessibility for all users.

In a non-economically regulated scenario, the infrastructure would operate under market dynamics, allowing for a more flexible and potentially competitive environment. This approach leverages market forces to drive innovation and efficiency, while still providing the comprehensive services required by modern payment systems.

3.2.5. Decentralised infrastructure

The decentralised infrastructure option was refined into two distinct models:

- **Distributed ledger infrastructure:** This model uses distributed ledger technology to create decentralised payment systems that are transparent, immutable, and secure. El Salvador's national blockchain initiative, which includes the adoption of Bitcoin as legal tender, is an example of this approach.
- **Multiple providers infrastructure:** This model fosters a competitive environment with multiple interconnected payment systems operated by independent service providers, prioritising interoperability, competition, and innovation. It allows users to select providers based on their specific preferences and requirements.

38 Payments & Infrastructure | RBA

39 <https://www.npci.org.in/what-we-do/upi/product-overview>



3.3. Highest ranked alternative

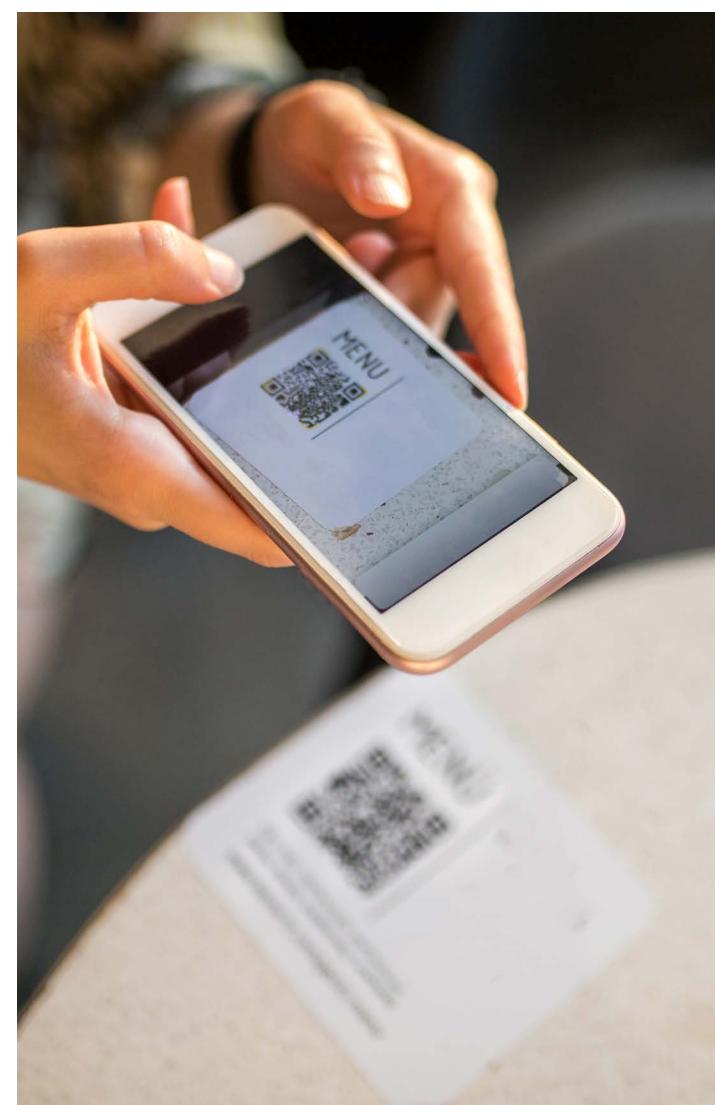
Each option was evaluated and scored against the criteria listed above. The core infrastructure with potential for economic regulation emerged as the highest ranked alternative (see Appendix C for further rationale). It is conceived to act as a foundational platform, enabling third-party providers to build and deploy innovative financial solutions for the benefit of end users in order to encourage technological advancements, innovation and stimulate competition. The open marketplace enabled by this core layer envisages multiple actors creating competition (including price competition) and thereby delivering value to end consumers and businesses. Additionally, the inherent adaptability and scalability of the core layer should ensure it can meet changing market needs, whether that is handling more transactions or incorporating new technologies like digital currencies and open banking systems.

Compared to the status quo, the core layer infrastructure would be a leap forward, offering a more robust framework for security and financial inclusion.

The core layer model envisages treating the core payment clearing infrastructure as an open-access layer, coupled with a simplified regulatory regime in line with the National Payments Vision,⁴⁰ which advocates a regulatory framework which is clear, predictable and proportionate. This would foster innovation and competition at the overlay services and application layers with the expectation that new end-user innovation would provide access to a wider group of consumers and businesses, potentially resulting in increased levels of financial and digital inclusion.

It avoids the pitfalls of over-complexity and inflated costs that could arise with the combined core and overlay infrastructure alternative. When set against the backdrop of the two decentralised options, the core layer's regulated environment provides a greater level of oversight and consistency, providing a balance between the benefits of innovation and the need for stability.

The core infrastructure, when combined with accompanying structural reforms, would not just be an upgrade – it would be a reimagining of the UK A2A payment systems, with the potential to drive transformative change that has been seen in other countries. It could be a key enabler of future financial services, ready to meet the demands of the UK economy.



4

Description and principles of the core infrastructure layer

Transitioning from the status quo, in the form of a core layer approach or an alternative, could provide a foundation to catalyse innovation, bolster security and enhance inclusivity. Such a shift could help to future-proof the UK's payment systems, ensuring its resilience and relevance in the years ahead.

Mastercard's proposition presents an opportunity to bring A2A infrastructure to the forefront of discussion amongst policy makers, regulators and stakeholders. Through open access this core layer architecture, when combined with accompanying structural reforms, is designed to provide Critical National Infrastructure grade resilience, security and availability whilst also creating an environment which enables growth through driving competition in the service and application layers. Fraud detection services are also supported, which could be provided either centrally through the core layer, or as services provided in other layers of the infrastructure.

4.1. The core infrastructure layer

The core layer (or 'Layer 1' in Figure 1) is designed to provide the core clearing system functionality for an A2A retail payment platform used for processing payment messages. This includes centralised liquidity management, settlement, clearing and ancillary services. This core layer architecture would adhere to the payment scheme's rules and access controls.

This layer, if subjected to an appropriate level of regulatory oversight could address competition related concerns as they arise, ensuring fair and reasonable access to the infrastructure whilst providing a robust level of resilience and stability. In turn, this would enable a large number of players to compete in a 'safe space' for the development of additional innovative features on top of the core system.

In order to drive current and future technology and innovations, the core will be supported by an exchange layer that would drive interoperability with other payment architectures including digital assets and cross-border payments.

4.2. The core infrastructure layer and the payments ecosystem

Beneath the "core layer" lies the Bank of England's Real-Time Gross Settlement (RTGS) system, designated as 'Layer 0'. The core layer services are designed to interoperate with Layer 0 to ensure the settlement finality of payments through the accounts of direct settling participants within the payment systems.

Positioned above the core layer are additional functional strata that represent an Open Access Payment Exchange. This layer will act as an orchestration layer, providing a unified entry point, improving ease of connection to value-added services from both Mastercard and third-party providers. This layer will drive interoperability with other payment rails and services e.g. digital assets, cross border payments. 'Layer 2' encompasses the essential functionalities necessary for operating a payment system, as well as the functionality and controls mandated by legislation. A service such as Confirmation of Payee is an example of a typical of Layer 2 offering.

'Layer 3' includes a suite of optional, value-added services that participants may choose to adopt, enabling them to offer more sophisticated services to their end-users. For instance, services like Request to Pay would fall under Layer 3, allowing participants to provide unique functionalities to those they are integrated with.

This approach provides participants the benefit of a single point of integration, access to real-time and batch core payment infrastructure provided in Layer 1, as well as overlay and value-add services provided in Layers 2 and 3. Modular and flexible architecture allows participants to 'plug and play', in Layers 2 and 3, creating an Open Access Payment Exchange

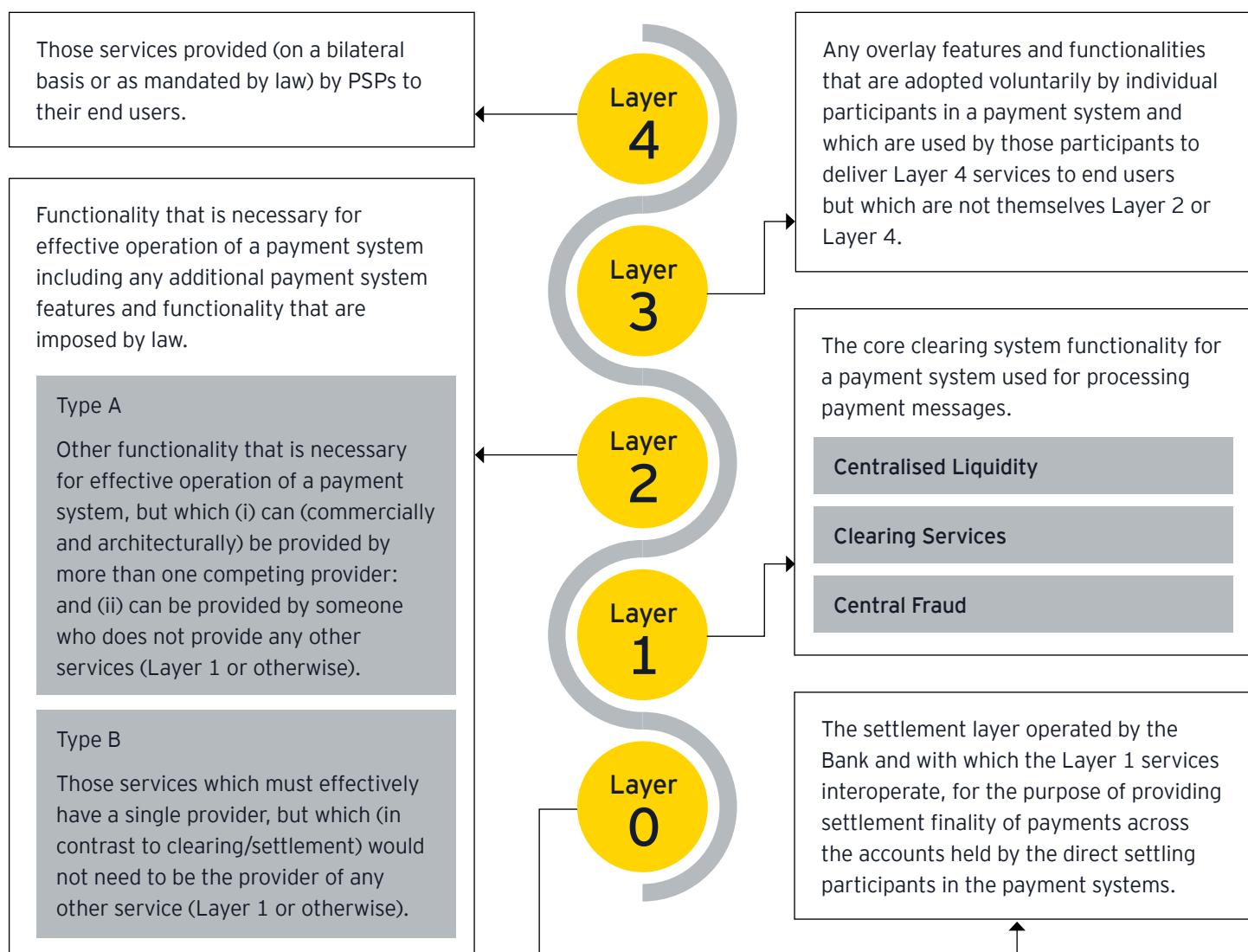


to act as a marketplace for additional services which can enhance security, safety, and enable new use cases. Through lowering barriers to participation this approach provides a more open ecosystem to encourage greater innovation and competition, driving a greater choice of services.

Modular architecture would enable faster, more compartmentalised service development, with minimal risk

to the core real-time and batch payment infrastructure. This ensures the delivery of reliable core functionalities, fostering an environment where innovative and diverse services can be introduced to the market without compromising on essential resilience or fraud protection measures.

Figure 1: Layered infrastructure



5

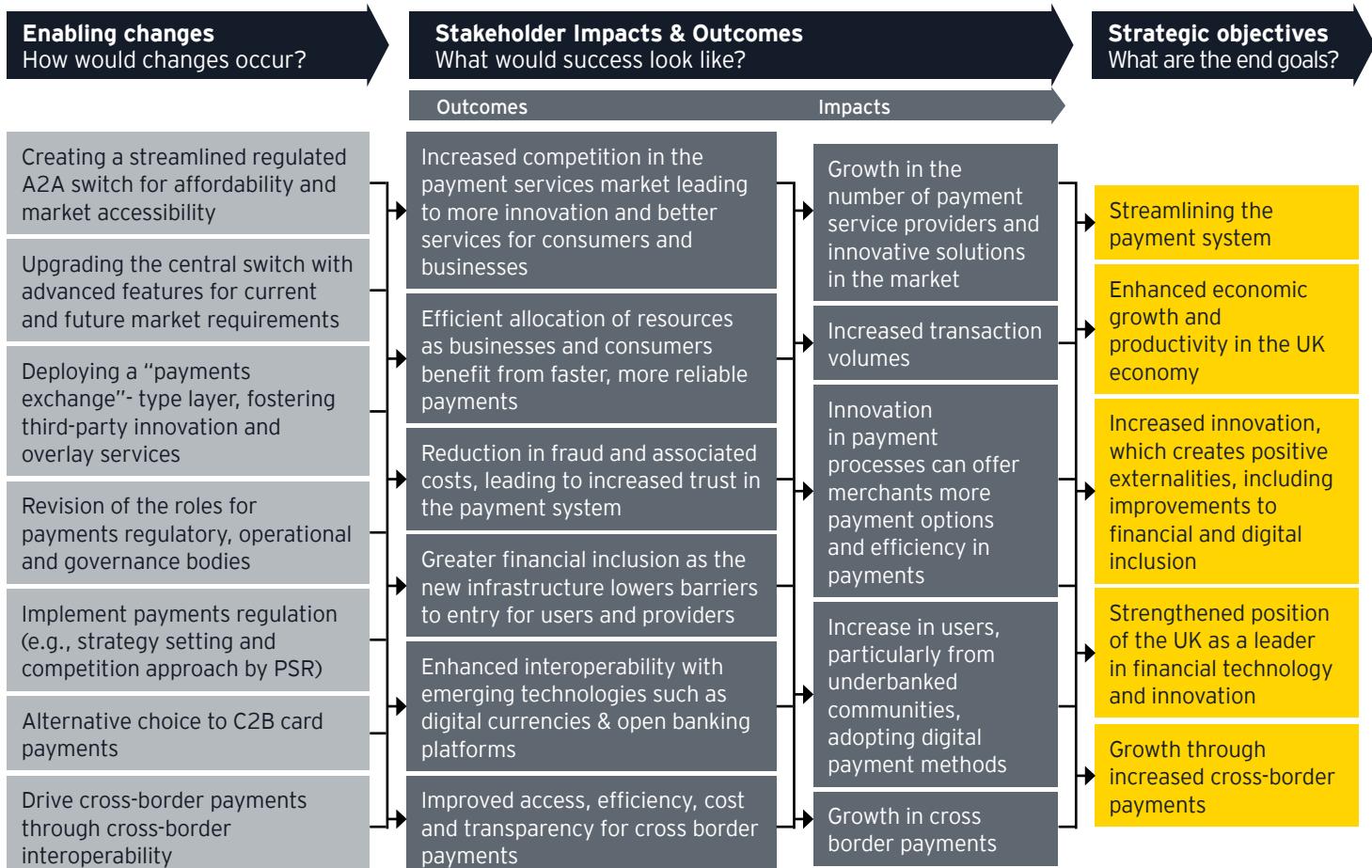
Enhancing the UK's payment infrastructure: Benefits and economic impact

A core infrastructure layer that supports the development of innovative, value-added services developed by third-party providers, represents a transformative step in payment processing within the UK's financial landscape, seeking to establish a balance between simplicity and fostering competition that does not presently exist. It also aims to provide a cost-effective approach, that drives modular deployment to enable faster speed to market in comparison to the previous approach to upgrading FPS. This section will highlight the benefits of such an infrastructure, including its role in promoting financial inclusion, spurring innovation, and contributing to a more efficient and inclusive economy.

5.1. The Theory of Change (ToC)

A theory of change is a structured outline that describes the sequence of actions and outcomes required to achieve a specific change. It is a critical tool for understanding how desired changes can be realised within a particular context, in this case reforming the UK retail payments infrastructure.

Figure 2: Extract of the Theory of Change





The core infrastructure layer approach, combined with structural reforms, aims to drive economic growth and financial inclusion by providing easier access to payment systems for all segments of society.

This infrastructure is expected to spur innovation through third-party services, increasing competition and efficiency in the payment services market, allowing businesses to allocate resources more efficiently. More payment services in the market will enhance choice, competition, and quality, particularly in fraud protection and interoperable systems. These advancements will lead to increased transactions from businesses and consumers, enhancing the UK's ability to trade internationally. The payment and banking market could become more accessible to the unbanked or underbanked, positioning the UK as a global leader in financial technology and innovation.

By fostering innovation and competition, the UK could boost economic activity and maintain its competitive edge in the evolving digital economy. This theory of change outlines expected outcomes and impacts, showing how improvements in payment infrastructure and processes could yield tangible economic and societal benefits.

5.2. Economic impact analysis

The economic impact of enhancing the UK's payment infrastructure is analysed through two methodologies: a detailed top-down econometric analysis and an in-depth bottom-up theory of change approach.

Carrying out the top-down and bottom-up estimates provides a comprehensive assessment of the potential economic benefits of upgrading the UK's payment infrastructure. The top-down analysis offers a macroeconomic perspective, accounting for the UK's advanced payment systems and potential for incremental growth, while the bottom-up approach details specific benefits for businesses and consumers.

Utilising both methodologies serves to validate and strengthen the credibility of the findings. It demonstrates that the positive economic impact is not contingent on the choice of analytical approach but is evident across different methodologies. This

approach enhances confidence in the results, suggesting that the projected economic uplift is an outcome of the infrastructure enhancements rather than a result of methodological bias.

Together, they present a holistic view of the potential uplift from enhancing the UK's real-time payments infrastructure. This analysis, supported by both quantitative data and qualitative insights, underscores the transformative potential of the infrastructure upgrade.

5.3. Top-down approach

5.3.1. Methodology

The top-down econometric analysis employs a regression model to explore the relationship between the sophistication of payment systems and the volume of cashless transactions. This model is particularly relevant for the UK, which, despite having a fairly developed payment system with high card penetration and contactless payment adoption, is now beginning to lag behind other developed countries in terms of core A2A payment infrastructure and choice. Recognising that the UK's payment system is due for a refresh to align with the latest technological and innovative advancements, the model incorporates specific assumptions to reflect the UK's relative level of sophistication.

The regression analysis produced coefficient estimates that serve as a proxy for understanding the link between real-time payments infrastructure sophistication and economic transactions. The model indicates that for every one-point increase in the sophistication score, there is an associated four additional transactions per capita per year across the panel of countries. When applied to the UK, which is currently evaluated as having a moderately advanced level of payment system sophistication, it is estimated that enhancing the payment infrastructure to a more streamlined model, and thus improving the sophistication score by an estimated one point, could result in a 0.8% increase in transaction volumes. Please refer to Appendix A for further explanation of the methodology.



5.3.2. Results of top-down analysis

The modernisation of real-time payment systems is a key driver for increasing both the volume and value of cashless transactions. Sophisticated payment infrastructures can unlock more spending and economic activity by providing convenience and fostering trust among consumers. The analysis suggests that as payment systems become more advanced, with features like faster settlement speeds and enhanced interoperability, people are likely to engage in more cashless transactions.

The sophistication of a country's payment infrastructure is a critical factor in its economic performance. Typically, countries with advanced payment systems have limited room for growth in this area, as they are already operating at or near peak efficiency.

However, the UK presents a unique case where, despite being a major global economy, it has lagged behind its peers in payment system modernisation. This has inadvertently created headroom for growth, offering the UK a rare opportunity to advance its current position and potentially realise sizeable economic benefits.

We created a "sophistication index" to compare the different levels of sophistication of payment infrastructure across 25 global economies including the UK. This index ranges from basic or non-existent electronic payments to fully integrated and highly sophisticated systems characterised by high levels of real-time payments with fraud detection, QR-enabled payments, and request-to-pay functionality.

Our analysis suggests that a one-point increase in the sophistication score of the UK's payment systems could lead to a 0.8% increase in the volume of transactions and translate to around a £10 billion boost in economic activity annually. This is not a mere redistribution of existing transactions from cash to digital but represents net new economic activity.

The convenience, safety and increased functionality of a modernised payment system is expected to be the driver which encourages more frequent transactions – increasing transaction volumes and value thus directly stimulating economic growth.

5.4. Bottom-up approach

5.4.1. Methodology

The bottom-up theory of change approach identifies and quantifies the direct benefits of upgrading the UK's payment infrastructure through various impact channels. This method involves:

- 1. Identification of impact channels:** Key areas of impact are identified, including fraud reduction, cross-border payment cost savings, improved business liquidity, and efficiency gains in business-to-business (B2B) transactions.
- 2. Assessment of current challenges:** We then assess the magnitude of existing challenges that need addressing, such as the level of fraud, the magnitude of payment fees for cross-border transactions, and processing times.
- 3. Estimation of addressable improvements:** Using analysis derived from secondary research, we estimate the extent to which these challenges can be mitigated through infrastructure enhancements. This involves applying potential improvements to the identified challenges.
- 4. Quantification of benefits:** The potential economic benefits from addressing these challenges are quantified for each impact channel.
- 5. Aggregation of benefits:** The quantified benefits from each impact channel are aggregated to provide a conservative estimate of the total economic gains from the infrastructure upgrade. This excludes additional potential benefits that are challenging to quantify or have uncertain direct attribution.

This bottom-up approach provides a granular and detailed assessment of the direct economic benefits of enhancing the UK's payment infrastructure.



5.4.2. Results of bottom-up analysis

It is important to recognise that this estimate is not comprehensive as it is limited to these channels.

- **Cross-border payments:** The impact on cross-border payments is estimated to reduce trade costs and improve efficiency for businesses, with a value of £880 million.
- **Fraud reduction:** The new infrastructure's role in reducing fraud, such as APP and UPP fraud, by integrating advanced security features and analytics, is quantified with potential annual savings of £240 million.
- **Business-to-Business (B2B) transactions:** Automating the reconciliation of invoices with payments is expected to yield substantial efficiency gains and cost savings estimated at £3.5 billion.
- **Increased liquidity for businesses:** Accelerating Bacs transactions to match FPS processing times could result in significant annual savings, with an impact estimated at £200 million.

Further detail on these channels of impact is included in Chapter 6.

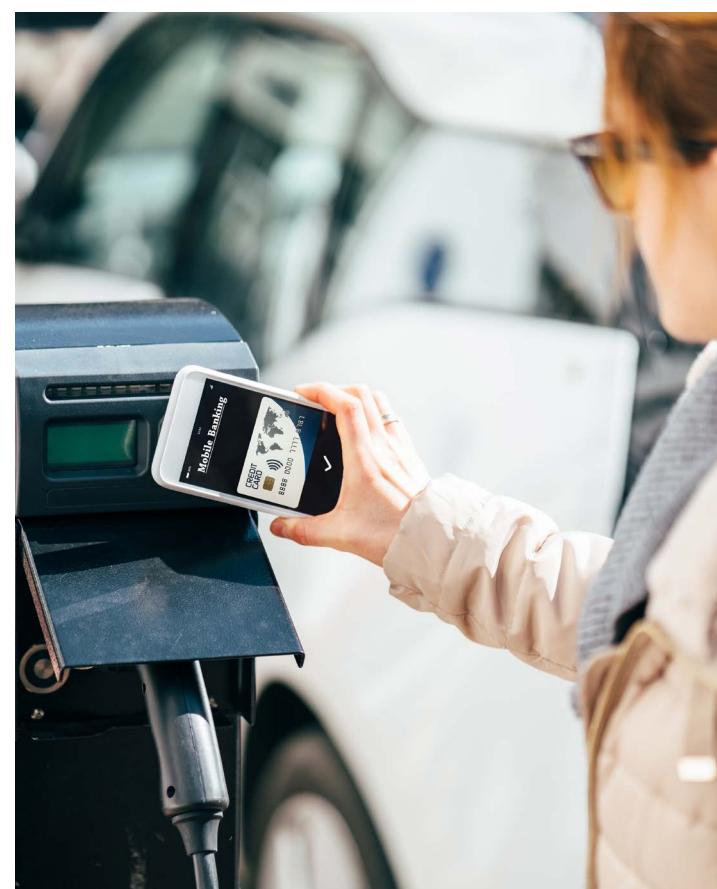
There are potential additional channels that have not been quantified – these are better described qualitatively because of the estimation challenges and where a direct attribution of value remains uncertain.

5.4.3. Results of broader economy wide analysis

Further analysis of the estimates derived from the bottom-up approach was conducted to determine the broader economy-wide effect on the UK economy using a Computable General Equilibrium (CGE) model, specifically the Global Trade Analysis Project (GTAP). This model simulates the potential ripple effects of payment infrastructure improvements on the UK economy, capturing changes in output, employment, and income across sectors.

The CGE model forecasts substantial economic benefits, projecting an increase in annual economic activity of £9.0 billion in Gross Domestic Product (GDP) terms. This growth is anticipated not only in sectors directly related to payment processing but also across the broader economy, positively affecting employment and household income.

The projected increase of £9.0 billion in GDP is expected to materialise over a period typically spanning two to five years. This means that once the new payment infrastructure has been established and adopted, the UK economy's annual GDP would be £9.0 billion higher than it would have been if the reform had not happened.



6

Enhancing the UK's payment infrastructure: Exploring the channels of impact

6.1. Introduction

Building on the benefits discussed in Chapter 5, this chapter further examines the specific channels through which the new core infrastructure layer can enhance the UK's payment systems. It explores both quantifiable and unquantifiable benefits, providing a comprehensive view of the transformative potential of this infrastructure upgrade. The focus will be on cross-border payments, fraud reduction, business-to-business (B2B) efficiencies, liquidity improvements, and the broader economic impacts, including regional growth and financial inclusion.

6.2. Complexity of cross-border payments

Cross-border payments are inherently more complex than domestic transactions due to multiple intermediaries, different time zones, and varying regulatory regimes. Unlike domestic systems, cross-border payments often rely on the correspondent banking network, adding regulatory and data requirements.

This analysis focuses on retail cross-border payments involving businesses, public sector entities, and individuals, whilst excluding remittances. These transactions are typically characterised by low-values but high-volume, unlike wholesale transactions between financial institutions, which involve large-values.⁴¹

6.2.1. Key challenges

The Bank of England highlights several frictions that make cross-border payments lag behind domestic ones in terms of

cost, speed, access, and transparency:⁴²

- Fragmented and truncated data formats.
- Complex processing of compliance checks.
- Limited operating hours.
- Legacy technology platforms.
- High funding costs.
- Long transaction chains.
- Weak competition.

The new A2A infrastructure aims to address these barriers by improving data, streamlining compliance, reducing intermediaries, and fostering new business models and technologies by leveraging ISO 20022 and other standards to drive interoperability between other domestic payment platforms.

6.2.2. Current state of cross-border payments

According to the Financial Stability Board (FSB) in 2023, the global average cost of sending retail cross-border payments is 1.5% of the transaction value for B2B. While 42% of cross-border payments reach recipients within an hour and 76% within a business day, 24% take longer.⁴³ Some transactions can take several days and cost up to 10 times more than domestic payments.⁴⁴

In 2023, the UK exported £865 billion and imported £898 billion worth of goods and services.⁴⁵ Of these amounts, 68% of exports and 66% of imports involved trading partners that have adopted ISO20022.⁴⁶ At least 41% of the value of cross-border transactions is settled through CHAPS and is excluded from the calculation of the potential benefit.⁴⁷ The remaining

41 Financial Stability Board, 2020, Enhancing Cross-Border Payments.

42 <https://www.bankofengland.co.uk/payment-and-settlement/cross-border-payments>

43 Financial Stability Board, 2023, G20 Roadmap for Enhancing Cross-border Payments: consolidated progress report for 2023.

44 <https://www.bankofengland.co.uk/payment-and-settlement/cross-border-payments>

45 <https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/datasets/uktotaltradeallcountriesseasonallyadjusted>

46 ACI, EY analysis.

47 <https://bankunderground.co.uk/2024/09/26/payments-without-borders-using-iso-20022-to-identify-cross-border-payments-in-chaps/>



59% of cross-border trade with countries that have adopted ISO20022 represents £345 billion in exports and £349 billion in imports, which stand to benefit from the new core infrastructure layer.

6.2.3. Potential for enhancement of cross-border payments using core infrastructure

The new A2A infrastructure can reduce costs, improve access, and speed up cross-border payments by enabling access to bilaterally settled domestic platforms, reducing the need for correspondent banking:

- **Cost reduction:** The FSB aims to reduce the average cost of cross-border transactions from 1.5% to 1.0% by 2027.⁴⁸ Since the core infrastructure layer addresses only some of the challenges associated with cross-border payments, this study conservatively applies half of the potential gain, equating to a 0.25% reduction in transaction costs. Given that both exporters and importers incur cross-border transaction costs, the model assumes an equal split of the gain, resulting in a 0.125% improvement for both exports and imports.
- **Speed improvement:** Faster payments reduce trapped liquidity, thereby enhancing working capital. The FSB aims for 75% of cross-border payments to be processed within an hour and all payments to be completed within a business day.⁴⁹ This study assumes a one-day improvement for the 24% of payments that currently take more than one business day, with a 6% cost of debt.

6.3. Strengthening the UK's defences against APP and UPP fraud

The UK's financial ecosystem has been increasingly burdened by the rise of Authorised Push Payment (APP) fraud, where individuals or businesses are tricked into sending money

to accounts controlled by criminals. Unauthorised Push Payment (UPP) fraud, involving transactions made without the account holder's consent, compounds the issue. Reported losses in 2023 due to authorised and unauthorised fraud (remote banking only) was £460 million and £152 million, respectively.⁵⁰ This not only undermines individual and business financial security but also acts as a drag on economic growth, eroding consumer confidence and diverting funds from productive use.

6.3.1. The core infrastructure as a catalyst for fraud reduction

The proposed core payment infrastructure can play a pivotal role in curbing fraud. By enabling advanced security features such as real-time transaction monitoring, enhanced identity verification, fraud analytics and artificial intelligence (AI), the proposed infrastructure can target the vulnerabilities that fraudsters exploit. This can reduce the incidence of both APP and UPP fraud.

For example, by addressing cyber-crime and fraud, the new core infrastructure can save substantial amounts of money that would otherwise be lost to fraudulent activities. This not only protects individual and business finances but also supports economic stability and growth.

Overlay services, operating in conjunction with the core infrastructure, can complement the defences against fraud. These services can include innovative technologies like digital identity, behavioural analytics, and AI-powered fraud detection systems. These services ensure that the UK's payment infrastructure remains at the forefront of fraud prevention. Building a resilient and safe future payments architecture is crucial to ensuring the security and integrity of financial transactions.

⁴⁸ Financial Stability Board, 2021, Targets for Addressing the Four Challenges of Cross-Border Payments.

⁴⁹ Ibid.

⁵⁰ Annual Fraud Report 2024_0.pdf (ukfinance.org.uk)



6.3.2. Quantitative estimates of potential for fraud reduction

To estimate the potential impact of the core payment infrastructure on mitigating APP fraud, we have used a coefficient based on an extensive analysis of historical transaction data. This analysis, conducted by Pay.UK and its partners, scrutinised billions of transactions over a significant period, successfully pinpointing instances of fraud. The reported success rate – 40% – can be deemed to represent the effectiveness of AI in identifying and preventing fraudulent activity.

The success of the tool in detecting fraud across such a large volume of historical transactions serves as a benchmark for what could be achieved with the new core infrastructure and its accompanying overlay services. By applying this 40% coefficient to the current scale of APP and UPP fraud in the UK, a similar rate of reduction in fraud incidence can be estimated once the core infrastructure is operational.

This benchmark suggests that the implementation of the core payment infrastructure, with its accompanying fraud prevention features and overlay services, has the potential to reduce APP and UPP fraud by at least 40%. Beyond the deployment of AI, the expectation is that there will be additional fraud prevention features that will further address fraud, hence this magnitude of fraud reduction is seen as a conservative minimum.

Applying this 40% reduction to the reported losses in 2023 due to APP and UPP fraud (remote banking), which were £460 million and £152 million respectively, we can estimate potential savings of £184 million in APP fraud and £61 million in UPP fraud remote annually. These substantial savings would not only recover significant financial losses but also reinforce the UK's reputation as a leader in secure financial transactions. By ensuring a resilient and safe payments architecture, we can build a more secure financial future that supports economic growth and consumer confidence.

51 Bacs Payment System statistics – Pay.UK

52 UK Finance Payment Markets Report 2023 Summary.pdf

53 newseventsinsights.wearepay.uk/media/u1rjdbtd/economics-of-request-for-payment.pdf

54 Sources: AP Automation Survey, Institute of Financial Operations, 2015 and The True Cost of Invoicing and Payments, 2002

6.4. Business-to-Business (B2B) efficiencies

6.4.1. E-invoicing for businesses

The introduction of a new core infrastructure layer presents a significant opportunity to enhance the capabilities of remittance messaging, thereby facilitating the expansion of e-invoicing. The current system's (ISO 8583) limitation on the number of characters in a payment message necessitates that detailed remittance information be conveyed separately, often through post or email. This disjointed process often requires manual intervention for the reconciliation of payments, incurring substantial costs for businesses.

E-invoicing stands as a transformative solution, enabling businesses to automate the reconciliation of invoices with payments. This automation can lead to considerable efficiency gains, particularly when considering the vast volume of electronic B2B payments processed annually. These payments, totalling approximately 1.8 billion transactions in 2023,^{51,52} represent a significant portion of invoices that could benefit from automated reconciliation solutions.

While small and microbusinesses are currently excluded from this benefit due to the assumption that their operations lack the scale to justify investment in such solutions, it is important to note that these businesses account for a third of the UK's annual business turnover. There is potential for future inclusion as the technology becomes more accessible and cost-effective.

For businesses, the manual reconciliation of invoices is estimated to cost £4 per unit.⁵³ With the adoption of automated reconciliation solutions, facilitated by the new core infrastructure's enhanced messaging capabilities, we anticipate a cost reduction of approximately 40%. This figure is derived from an average of estimates found in relevant literature.⁵⁴



As a result of these advancements, businesses can save circa £2.8 billion in invoice reconciliation costs per annum.⁵⁵ The new core infrastructure layer not only promises to streamline payment processes but also to unlock significant economic value by reducing the administrative burden associated with payment reconciliation. This is just one example of the broader financial efficiencies and innovations that the new system aims to deliver, reinforcing the UK's position as a leader in financial technology and paving the way for a more integrated and automated future in business transactions.

6.4.2. Reduction in business transaction costs

While there is often no financial transaction cost when consumers spend money through FPS, there is a cost for businesses. The costs quoted by banks for same day business to business FPS transactions are in the region of £2-3 per transaction. It is recognised that this is not a perfect estimate of the cost to banks of processing the transactions, due to the often significant cross-subsidisation between products. However, imposing a cost on transactions has a direct impact on economic activity.

Implementations of equivalent proposals to the core infrastructure layer in other countries, e.g. Pix, UPS, iDEAL, etc., come with differing fee structures, but it is often significantly cheaper to make individual transactions between businesses. The comparison is not like-for-like for a number of reasons, including the state backed nature of some of these schemes, and potential alternative charging or cost recovery arrangements.

The experience of cost reductions in other markets, despite not being directly comparable, provides evidence that suggests the introduction of the core infrastructure layer could reduce the overall cost associated with making these A2A transactions. Even if banks do not directly pass on these savings, the potential for competition at other layers enabled by the core infrastructure would create incentives for price competition in this market.

⁵⁵ 1.8b transactions saving 40% of the £4/invoice cost

⁵⁶ Cost of capital and UK business investment: Measurement challenges and research opportunities – slides by Catherine L. Mann

⁵⁷ Payment timescales | Payments & transfers | Lloyds Bank

⁵⁸ Cost of capital and UK business investment: Measurement challenges and research opportunities – slides by Catherine L. Mann

⁵⁹ FSB | Time is Money

The scale of any reduction in cost, and how this is passed through to businesses is highly uncertain. Therefore, for the purpose of illustrating the potential scale of the direct impact, a 20% reduction in cost per transaction has been assumed, although this assumption does not have evidence-based empirical support and involves a degree of uncertainty. On the basis of 1.5 billion FPS transactions, at c.£2.5 per transaction, and 300 million Bacs transactions assuming the same average cost, the direct impact of a 20% reduction in cost would be approximately £0.9 billion. To provide transparency and a more comprehensive view, we also considered a sensitivity analysis with a 10% reduction (equivalent to a £0.4 billion impact), which would proportionally adjust the impact accordingly. This approach helps illustrate the potential range of outcomes while acknowledging the variability and uncertainty in the underlying assumptions.

6.4.3. Improving liquidity for businesses

The proposed introduction of the core layer infrastructure and its additional layers will be a significant step forward for businesses. This change is particularly important for businesses that often deal with a 6%⁵⁶ cost on their debt, making the speed at which payments are processed a key financial factor.

Currently, there is a notable difference in how quickly payments are processed through FPS and Bacs. FPS transactions are completed almost instantaneously or within a few hours,⁵⁷ but Bacs can take up to three days.⁵⁸ This delay means that businesses have their money tied up, which can lead them to take out short-term loans to keep cash flowing.⁵⁹

Accelerating Bacs transactions to match FPS processing times could result in significant annual savings, with an initial first-order impact estimated at £200 million. However, it is important to clarify that Bacs operates on a batch processing system, which serves a distinct purpose, such as handling



high volumes of scheduled payments like payroll and direct debits. Transitioning all transactions to real-time processing may not be necessary or practical, as the batch processing system is designed to efficiently manage these specific types of transactions.

This means that businesses will have faster access to their money, reducing the need to borrow and allowing for more efficient cash flow management. The benefits of this change are clear: businesses will be able to manage their funds better, make quicker investment decisions, and spend less time on cash flow administration.

In terms of numbers, making the £400 billion^{60,61} business to business Bacs transactions instant will save businesses Bacs cost equivalent to paying interest on this amount. With an annual interest rate of 6%, businesses could save around £200 million each year.

In summary, the new core infrastructure layer will offer both qualitative and quantitative benefits to UK businesses. It will make financial operations more straightforward and reduce the costs associated with liquidity, leading to a stronger, more agile, and competitive business environment.

6.5. Unquantified benefits: Beyond the numbers

While the quantitative analysis provides the tangible benefits associated with the proposed new payment infrastructure, it is equally important to consider the qualitative benefits that are not easily measured. These unquantified benefits can have significant long-term impacts on the efficiency, security, and overall functionality of the economy.

Certain benefits are described qualitatively due to the complexity of measurement and the indirect effects they produce. Improvements in user experience or the potential for innovation are challenging to quantify due to their complex nature. Additionally, many benefits have indirect effects that

positively impact the economy and financial systems, such as increased competition, which is often better captured qualitatively. Furthermore, the evolving nature of technology and regulatory environments introduces uncertainties that complicate precise quantification, making qualitative descriptions more flexible and adaptive.

In this section, we will explore the qualitative benefits of the new payment infrastructure, highlighting how these advantages can contribute to a more efficient, secure, and innovative payment ecosystem.

6.6. Consumer-to-Business (C2B): Expanding payment choices for merchants

UK merchants encounter distinct expenses when handling different payment methods. For example, card transactions come with associated fees, including interchange charges, usually a percentage of the transaction value, along with processing fees. In contrast, cash payments, though exempt from these specific transaction fees, incur operational costs for handling, security measures, and loss prevention. These varied costs impact merchants' financial strategies and their choice of preferred payment methods.

Merchants have access to a variety of payment methods, each with its own set of benefits and considerations. Card payments offer merchants the advantage of widespread consumer adoption and acceptance, robust security features, comprehensive consumer redress mechanisms and the ability to facilitate credit transactions, which can boost consumer spending and, consequently, merchant sales.

The payments industry in other parts of the world (for example in Brazil, India, Sweden) is experiencing innovation in retail payments across A2A payments rails, which are gaining traction. A2A payments have the potential to offer choice for consumers and merchants as an alternative for certain types of transactions.

⁶⁰ Bacs Payment System statistics – Pay.UK

⁶¹ [payuk.co.uk/Annual-Summary-2023.pdf](https://www.payuk.co.uk/Annual-Summary-2023.pdf)



Merchants can benefit from a multi-faceted approach to payment acceptance, leveraging the strengths of both card and A2A payments to meet the diverse needs of their customers. For example, card payments might be preferred for their credit offerings and consumer protections, while A2A payments could be used for specific scenarios where direct bank transfers are more efficient.

6.6.1. Potential for efficiencies

A2A's role is complementary to cards and other more established forms of payments. Cards will continue to play a vital role in the financial transactions landscape.

While A2A payments may present an opportunity for efficiencies the overall value proposition of card payments will remain compelling, particularly when considering the services and benefits they provide to merchants and consumers.

For instance, in Europe, the adoption of instant payments facilitated by the SEPA Instant Credit Transfer scheme may be cheaper than other payment instruments but is not a like for like comparison.⁶² SEPA Inst scheme can be particularly advantageous for high-volume, low-margin businesses where even marginal savings on transaction fees can significantly impact the bottom line.

Similarly, in India, UPI has revolutionised the payment landscape by offering a low-cost, efficient A2A and P2P payment solution that has been widely adopted by merchants of all sizes. The growth of UPI transactions has demonstrated the potential for efficiencies,⁶³ especially for small and medium-sized enterprises.

By having a choice of payment options, merchants can adopt solutions which best meet their (and their customers) needs. They can maintain the consumer trust and security associated with card payments, while also capitalising on the potential for efficiencies of A2A payments for suitable transaction types. This aligns with the National Payments Vision, which

highlights the significant potential and innovation that can be harnessed from A2A payments, as demonstrated by countries like Sweden and Brazil. For customers, this could mean paying for goods or services in a shop or online via mobile phone numbers or QR codes. For merchants, the benefits include potential efficiencies driven by a wider variety of payment options.

A direct comparison of A2A and card payments is difficult because of the uncertainty as to the level of enhanced features that may come to be included as standard in future A2A schemes (e.g. fraud protection and consumer redress), as well as the time taken for these developments to come to realisation. Additionally, both card and A2A payments will co-exist, giving consumers the ability to choose the payment method that suits them. Given this complexity we have not estimated the potential cost reductions for UK merchants.

6.7. Regional growth: Catalysing fintech innovation across the UK

Although London maintains its status as a premier global financial hub, regional growth in the fintech industry can contribute to UK growth. Across the nation, from Cardiff to Leeds and Manchester to Edinburgh, various clusters and cities present prospects for entrepreneurs to establish and expand fintech services. Analysis undertaken for the Kalifa Review⁶⁴ identified 25 clusters of fintechs across the UK. Each at different stages of growth and development, with different focus areas and specialisms.

The proposed core infrastructure layer for the UK's payment systems represents a transformative opportunity to catalyse regional growth beyond the financial hub of London. By establishing an accessible platform for A2A retail payment processing, this infrastructure can serve as a springboard for innovation and financial inclusivity across the country.

⁶² Brochure on Instant Payments (europa.eu)

⁶³ India's Unified Payment Interface's impact on the financial landscape | World Economic Forum (weforum.org)

⁶⁴ Kalifa Review of UK fintech



6.7.1. Supporting regional fintech growth with the UK's core payment infrastructure

The UK's proposed core payment infrastructure can revolutionise the financial landscape, offering a significant boost to regional fintech growth beyond the traditional stronghold of London. An accessible A2A retail payment platform is expected to be a catalyst for innovation, enhanced security, and greater financial inclusivity throughout the nation.

6.7.2. Current landscape of regional fintechs

Fintech is vital to the UK economy creating jobs and contributing to GDP. It supports the ongoing success and improvement of the UK's Financial Services industries, and in the world of open finance impacts many other adjacent sectors. With over 1,400⁶⁵ fintech firms currently operating across the UK's regions, these entities represent approximately 33%⁶⁶ of the nation's total fintech sector. While London continues to lead with 66%⁶⁷ of UK fintechs headquartered there, cities like Manchester, Edinburgh, Bristol, and Leeds are emerging as hubs of financial innovation. The UK attracts more fintech investment than the rest of Europe combined and is second only to the United States, according to Innovate Finance.⁶⁸

6.7.3. Growth potential with core infrastructure

The core infrastructure layer promises to democratise financial technology, providing regional fintechs with the tools to develop and scale. According to the Kalifa Review, by 2030, fintech's direct Gross Value Add (GVA) contribution to the UK economy is predicted to reach £13.7 billion with job creation contributing to 70% of this value.⁶⁹

Currently, regional fintechs contribute to the UK economy, this could grow with the opening of new market opportunities afforded by the core infrastructure. By facilitating a

competitive environment free from the current system's barriers, the core layer could see regional fintech revenues potentially doubling, driving both local and national economic growth.

6.7.4. Supporting business needs

The core infrastructure's potential can extend to aiding businesses in areas with a higher concentration of financially underserved populations. By enabling efficient and low-cost payment processing, the core layer can help these businesses offer more affordable services to their customers. Businesses serving financially underserved populations stand to gain from the core infrastructure's efficient and cost-effective payment processing capabilities. The introduction of flexible payment options and enhanced fraud detection services is expected to foster increased financial participation and literacy among traditionally cash-reliant demographics. This shift could lead to an increase in digital transaction volume in these areas, contributing to a more inclusive financial ecosystem.

6.8. Financial inclusion: Enhancing access and innovation for underserved populations

According to the BIS, financial inclusion starts with payments. Payments serve as a gateway to other financial services, such as savings, credit and insurance.⁷⁰ International research has shown that there is a positive correlation between fintech services and increased levels of financial inclusion, especially in relation to lower socioeconomic groups.^{71,72} The proposed core infrastructure layer and its overlay services has the potential to support financial inclusion. FCA's data indicates that 23% of UK adults (12.1 million people) had issues accessing a financial product or service in the two years to May 2022,⁷³ highlighting the need for enhanced financial inclusion.

⁶⁵ openbanking.org-How open banking is driving regional growth and prosperity across the UK

⁶⁶ Kalifa Review of UK fintech

⁶⁷ Kalifa Review of UK fintech

⁶⁸ Fintech Investment Landscape 2023 – Innovate Finance – The Voice of Global fintech

⁶⁹ Kalifa Review of UK fintech

⁷⁰ Payment aspects of financial inclusion in the fintech era



The core infrastructure layer would drive innovation by introducing an "exchange-type" layer that serves as a foundation for new services to be built on top of the core system. This architecture would unlock a wide range of possibilities, allowing for faster, more efficient, and adaptable payment solutions. The simplification of the payment systems facilitates innovation in areas like real-time payments, cross-border transactions, and digital currencies. Promoting the growth of A2A payments and the enablement of greater innovation is likely to accelerate the take up of other services designed to benefit consumers, such as those associated with Open Banking and Open Finance. The proposed "exchange-type" layer is poised to address this gap by facilitating the development of new services that cater to a broader segment of the population.

The core infrastructure layer would also promote competition in the economy by lowering barriers to entry and allowing businesses to build additional services on top of the core system. This opens the financial ecosystem to smaller firms and fintechs, enabling them to enter markets that may otherwise be challenging to access.

The core infrastructure layer would not only pave the way for a more innovative and competitive financial landscape but also has the potential to significantly enhance services for financially underserved population. By enabling features such as Request to Pay, the system could offer greater flexibility and control over financial obligations. These can help consumers better manage their finances, receive timely financial guidance, and access a suite of tools designed to support their unique needs, contributing to a more inclusive financial environment.

6.9. Conclusion

There is a clear need for a step change in the UK's approach to A2A payments if we are to avoid falling further behind international comparators. The sooner this change is initiated, the sooner the potential benefits can be realised.

The implementation of a new core infrastructure layer in the UK's payment processing landscape has the ability to accelerate financial inclusion, support small business growth activity and enable economic growth. By simplifying access to the payments ecosystem, this innovative approach could increase competition in the service and application layers, where a variety of providers vie for business, offering more choice and alternatives, particularly for merchants.

The theory of change underscores the potential for this infrastructure, as part of a broader model that includes service and application layers, to streamline payment processes, enhance economic growth, and boost productivity across the UK economy.

The potential increase in transaction volumes, shown in the quantitative analysis, suggests a correlation between the sophistication of payment systems and economic activity.

Furthermore, the core infrastructure layer is expected to allow for greater participation by SMEs and fintech companies, thereby strengthening the UK's position as a leader in financial technology and innovation. The increased adoption of A2A payments, the potential for enhanced cross-border payment efficiency and the enablement of initiatives such as Open Banking, are additional benefits that promise to stimulate economic activity and create a more inclusive financial environment.

71 6 Tok, Yoke Wang; Heng, Dyna. fintech: Financial Inclusion or Exclusion? IMF Working Paper no. WP/2022/080

72 [Financial_Inclusion_Report__002_.pdf](#)

73 [Exploring financial exclusion](#)

Appendix A – Modelling methodology

Econometric estimation of the impact of payment sophistication on transaction volume

The econometric analysis is based on a panel data set for 25 countries, using annual data from 2012 to 2022. This dataset, comprising over 10,000 data points, combines payment data sourced from BIS with economic data from Oxford Economics. Since the economic effects might vary by the level of economic development, there is an argument that the results based on international data may sometimes not be adequate for a specific country. We reduce such a risk by re-performing an international analysis for a limited set of countries that are at a similar level of economic development as the UK to ensure the results do not change significantly.

Sophistication framework

To measure the sophistication of payment systems in different countries, we developed a table of key metrics, such as the messaging scheme used, fraud protection rate, number of authorisation methods, areas of acceptance (banks,

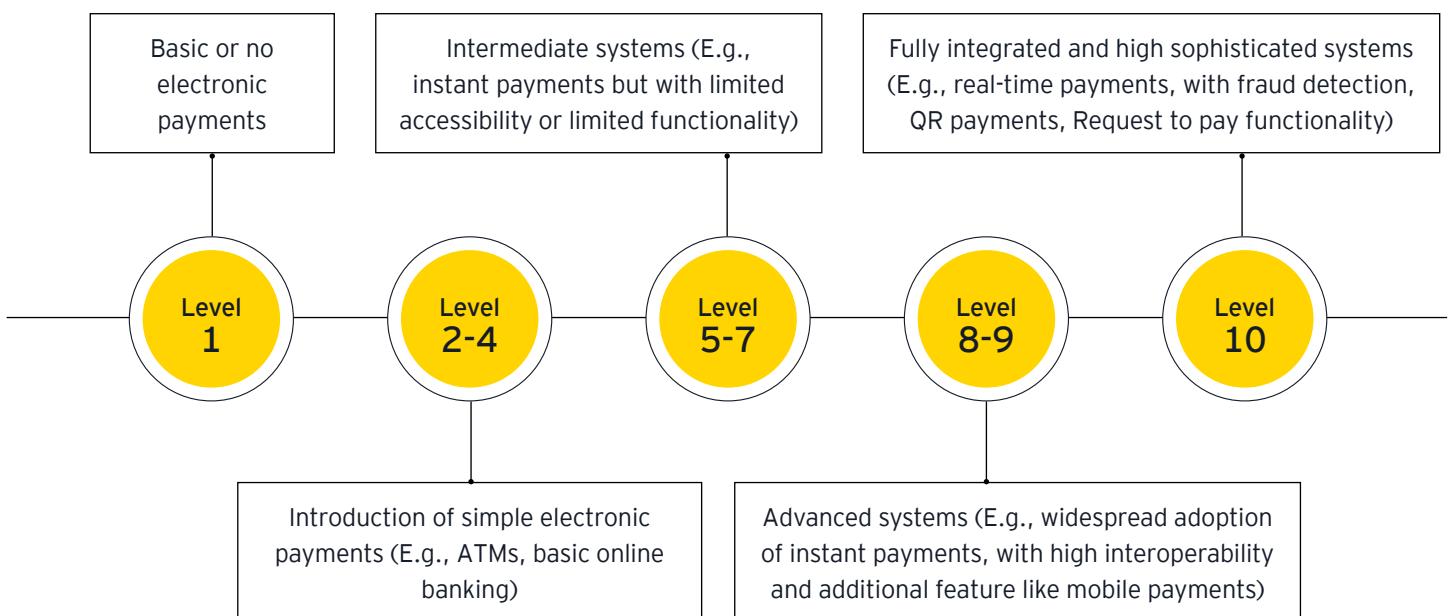
merchants, P2P, bills), transaction speed, and availability of cross-border payments. For each metric, we assigned a rating of high, medium, or low based on the system's performance. These qualitative assessments were then translated into a numerical scale ranging from 1 to 10, allowing us to quantify and compare the overall sophistication of payment systems across countries.

In order to evaluate the economic impacts of modernising the UK's payment landscape, a "sophistication metric," a 1 to 10 scale that quantifies a country's payment infrastructure development and functionality, was developed.

This metric incorporates indicators such as authorisation methods, acceptance areas, settlement speed, and cross-border payment options, with each assessed as high, medium, or low.

Secondary research was conducted and discussions with Mastercard stakeholders were held to score these metrics. This methodology was applied across 25 countries to evaluate real-time payment innovations and their correlation with increases in transaction volume and value.

Figure 3: Sophistication scale describing the different levels of payment infrastructure





Next, in order to estimate the impact of payment sophistication on transaction volume, an econometric technique known as a fixed-effect model is used as this approach accounts for each country's unique characteristics, ensuring that variations in the relationship between sophistication and transaction volume is not solely attributed to external factors but also reflects inherent local dynamics. The model also controls for confounding factors, such as structural (e.g., No. of ATMs, No. of POS), technological (e.g. No. of mobile phones) and economic conditions (e.g., GDP per capita, unemployment rate).

A simplified version of the panel model used is outlined below, explaining log transaction volume per capita in country i in year t with payment sophistication, controlling for several additional economic factors.

$$\text{Transaction volume}_{i,t} = \beta \text{Sophistication metric}_{i,t} + \gamma X_{i,t} + \mu_i + \varepsilon_{i,t} \quad (1)$$

In this model, the dependent variable (transaction volume $_{i,t}$) stands for the transaction volume per capita.

Sophistication (Sophistication metric) $_{i,t}$ is the key independent, or explanatory variable.

The rest of the equation (X) $_{i,t}$ is a joint term describing any other explanatory variables included in the econometric models, which are referred to as control variables. Those variables describe the macroeconomic factors explaining GDP growth, as well as the structural and technological factors that change over time.

Finally, $\varepsilon_{i,t}$ is the idiosyncratic shock affecting transaction volume in a particular country i in period t .

Translating econometric results into the impact on the UK economy

The econometric result is the coefficient that describes the impact of a payment sophistication on transaction volume, which has the following interpretation: an increase in payment sophistication by one point increases the volume of transactions by 0.8%, with all other factors unchanged.

The additional derived impacts are calculated as follows:

Impact of “core layer” on sophistication metric

In this report, the objective of the econometric analysis is to quantitatively evaluate the potential economic impact of implementing a “core layer” in the UK payments infrastructure. Specifically, it is essential to understand how this implementation could influence the UK’s payment systems sophistication metric. Introducing a core layer is assumed to raise this score by 1 point.

Volume of transactions

To translate the coefficient into its impact on cashless payments, we first needed to identify which payment instruments would be affected by the introduction of the core layer—specifically, which payments would represent net additional volumes rather than substitutes. We hypothesised that large-value and regular payments, such as those processed through CHAPS and Direct Debit, would remain unaffected. Instead, retail payments (e.g., cards and e-money transactions) and potentially B2B payments are more likely to experience a net impact. Therefore, to estimate the incremental net effect of the core layer in the UK, we used the average volumes of card, e-money payments, and credit transfers (excluding CHAPS) as a basis for our calculations. This approach isolates the segments of the payment systems that are most susceptible to the benefits of the core layer while minimising the substitution effect from other established payment methods.

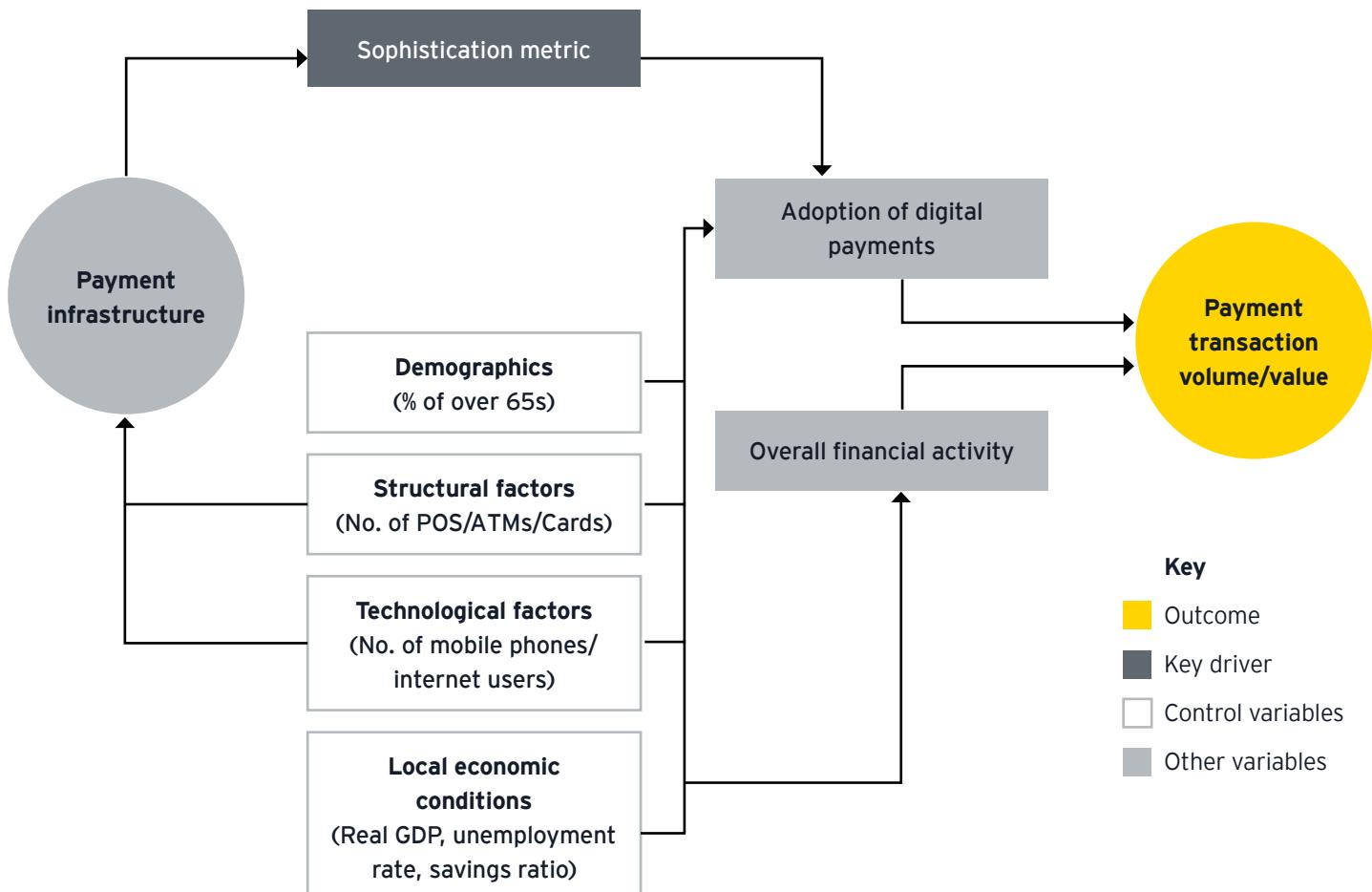


Value of transactions

To translate this impact into a monetary value, we conducted a similar analysis by calculating the average value per transaction for a subset of card, e-money transactions and credit transfers (excluding CHAPS). This allowed us to estimate the effect of the core layer on the economy by applying the incremental volume increase to the corresponding average transaction values. We note that not

all of the new transactions are expected to be additional economic activity, as some will be existing activity but now conducted through multiple smaller transactions. We have assumed that only 25% of the increase in volume will translate into additional value. By focusing on these payment types and adjusting for additionality, we were able to quantify the financial impact that the core layer would have on cashless payments in the UK.

Figure 5: Flowchart of variables used in econometric modelling





GDP impact

To estimate the Gross Value Added (GVA) equivalent of cashless transactions in the UK, we applied the national GVA-to-output ratio of 51.8%. This ratio reflects how much economic value is generated for each unit of transaction value. By using this figure, we can quantify the contribution of increased cashless transaction value to the overall economy, providing an estimate of the economic impact of cashless payment growth.

Limitations of the analysis

Enhancements to the real-time payments' infrastructure and the provision of greater convenience are crucial assumptions underpinning the estimated increase in transaction volumes. Without these improvements, if the system becomes less attractive to businesses and consumers, the probability of achieving the projected economic benefits is significantly reduced.

The extent of these estimates is contingent on the level of sophistication achieved by the new core layer infrastructure. If the level of sophistication realised by its deployment is less than what this analysis assumed, the estimates of benefits may be considered optimistic. Conversely, if the level of sophistication realised as a result of its implementation surpasses assumptions, the estimates provided in this study may be considered conservative.

While the analysis links estimated economic benefits to the core infrastructure layer as part of a broader model, it is worth noting that similar advantages could be achieved by an alternative infrastructure that equally facilitates competition and innovation through comparable features.

That said, the features of Mastercard's preferred core infrastructure layer, as part of a broader model, can play a crucial role in realising these advantages. Alternative approaches would need to match its level of sophistication and user-centric convenience to achieve similar economic outcomes.



Appendix B – Qualitative appraisal methodology

The qualitative appraisal conducted followed a structured approach to evaluating multiple options or courses of action using a qualitative appraisal framework. This framework was designed to systematically assess the strengths and weaknesses of each option against a set of predefined criteria.

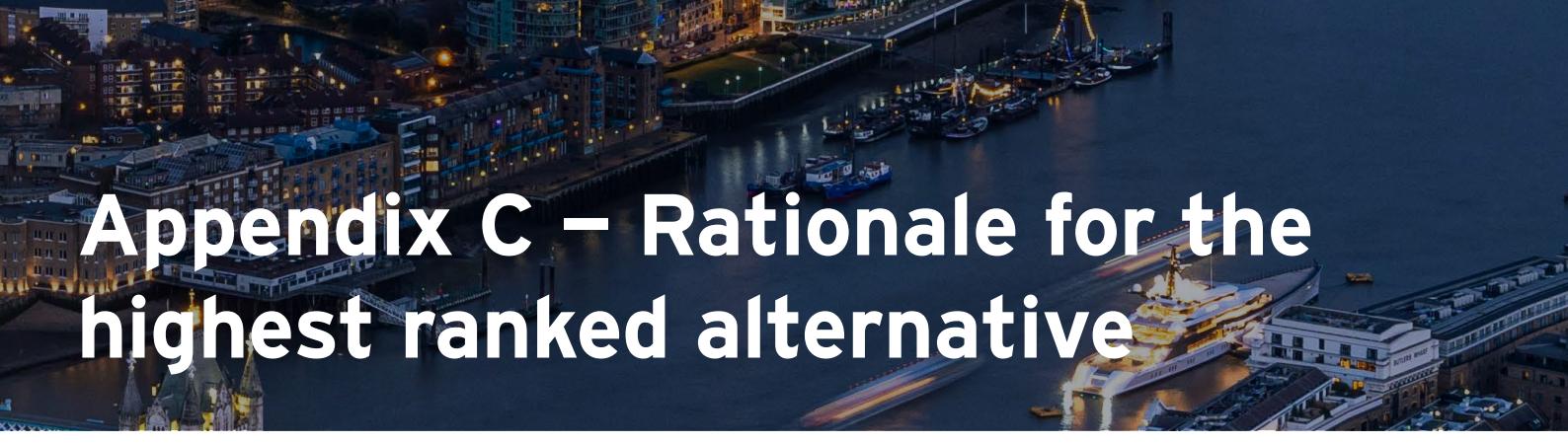
Process

- **Identification of alternatives:** The first step was to identify the different options or courses of action.
- **Workshop with stakeholders:** A collaborative workshop was conducted where stakeholders evaluated the alternatives.
- **Assessment against criteria:** During the workshop, each alternative was scrutinised against a set of selected criteria.
- **Scoring:** Each option was scored based on how well it meets each criterion. The scoring was conducted using a consistent scale to allow for fair comparison.
- **Ranking:** The framework facilitated the ranking of options based on their profiles and supported transparent and accountable decision-making.

Assessment criteria

- **End-user innovation:** Evaluates how the option encourages or supports innovation by the end-users.
- **B2B competition:** Assesses the impact of the option on competition between businesses.

- **Fraud prevention:** Looks at the effectiveness of the option in preventing fraudulent activities.
- **Financial inclusion:** Considers how the option helps to include more people in the financial system, especially those who are currently underserved.
- **International compatibility:** Assesses the option's compatibility with international standards or systems.
- **Interoperability:** Examines how well the option works with other systems and technologies.
- **Regulatory and political feasibility:** Evaluates the likelihood of the option being accepted by regulators and fitting within the current political climate.
- **Deliverability:** Assesses the practicality of implementing the option and whether it can be delivered effectively.
- **Cost of implementation:** Considers the financial costs associated with implementing the option.
- **User experience and accessibility:** Considers how the option affects the overall user experience and its accessibility to various users.
- **Resilience and reliability:** Evaluates the option's ability to withstand challenges and its reliability over time.
- **Scalability and flexibility:** Assesses whether the option can be scaled up or down and its flexibility to adapt to changing conditions.



Appendix C – Rationale for the highest ranked alternative

- **Innovation:** The assumption of third-party value-added services being developed on top of the core infrastructure layer means that innovation is not stifled; rather, it is channelled through a competitive ecosystem of service providers.
- **Competition:** Competition can still flourish in the form of service differentiation, customer experience, and technological advancements provided by third parties, even in a regulated environment.
- **Fraud prevention:** There are requirements for a minimum base line level of fraud prevention on the core layer infrastructure, which are going to ensure the implementation of additional measures compared to the status quo.
- **Financial inclusion:** The assumption of third-party value-added services being developed on top of the core infrastructure layer will enable the building of additional services to serve underbanked or unbanked populations.
- **International compatibility:** A core infrastructure layer is likely to adopt ISO 20022 and will provide the right platform for international compatibility given players can develop additional features to support multiple currencies and process multi-currency transactions.
- **Interoperability:** The opportunity to enable seamless compatibility with emerging technologies, such as digital currencies and open banking exists with the core layer infrastructure but is highly dependent on incentives for players to take ownership and to develop the technology.
- **Regulatory and political feasibility:** A regulated infrastructure has the ability to provide market stability, enhance transparency and encourage competition. Competition at higher layers of the infrastructure is likely to ensure affordability and accessibility.
- **Deliverability:** A core infrastructure layer means that there are fewer components or services at the core, compared to a thick layer infrastructure. This allows for a simpler and more focused approach to delivery, reducing the complexity of the implementation.
- **Cost of implementation:** Similarly, the approach to implementing a core infrastructure layer is more streamlined, compared to a thick layer infrastructure, and includes a lower number of core features, resulting in a lower cost.
- **User experience and accessibility:** Given the possibility of including additional features on the core layer platform, some payment providers are likely to focus on providing better ease of use and accessibility of the payment systems, ensuring a more seamless and user-friendly experience for consumers.
- **Resilience and reliability:** A core infrastructure layer for payments allows for the efficient deployment of new features that specifically enhance the system's resilience and reliability. By maintaining a streamlined architecture focused on core functionalities, the core layer approach facilitates faster and more targeted updates.
- **Scalability and flexibility:** The core layer's flexibility gives the capability to scale efficiently and to support growing transaction volumes, ensuring adaptability to future payment needs and trends. It enables the system to evolve and accommodate emerging demands in the retail payments landscape.

Appendix D – Impact on transactions from modernising payments systems

Empirical research on payment system sophistication's impact on transaction volumes

There have been several examples of modernisation of payment systems across the world over the last 15 years that have contributed to economic activity. Academic research has been conducted to establish the extent to which the modernisation or innovation has led to an increase in transactions, versus just a change in the form of payment used.

While some countries have improved the infrastructure for A2A payments, others have focused on different technologies, in

particular cards, with contactless and mobile wallets providing more convenient ways to pay. Research from the US market has shown that improvements to payment methods, particularly contactless, lead to consumers conducting more transactions and on average spending higher amounts per visit.⁷⁴ This is hypothesised to be a result of lower non-monetary transaction costs leading to greater spend at the margin.

These findings have been replicated in other countries, including in Europe, with research finding that merchants accepting contactless payments increased the number of card payments by 17%, and the value of card payments by 15%.⁷⁵

Name of study	Country / Year of study	Description of study	Key findings
The impact of Contactless Payments on Spending (Tobias Trütsch)	US (2010)	This paper estimates the effect of contactless payment on the spending ratio for different transaction types at the point-of-sale.	The introduction of contactless credit and debit cards leads to an increase in spending at the point-of-sale (POS). Specifically, contactless credit card transactions increase the spending ratio by approximately 8% , and debit card transactions by around 10% . Contactless debit card holders do not appear to adopt contactless payments to reduce cash transactions, suggesting a complementary relationship between cash and debit cards.
Card-sales response to merchant contactless payment acceptance (David Bounie, Youssouf Camara)	France (2018)	This paper investigates how merchants' acceptance of contactless card technology affects card sales.	Accepting contactless payments in 2018 increases the card-sales amount by 15.3% on average (and by 17.1% the card-sales count) compared to merchants who do not accept contactless payments. Accepting contactless payments contributes to increasing total card-sales value and volume, both by attracting more consumers and by displacing non card payments.
Mobile Wallet and Entrepreneurial Growth (Sumit Agarwal et al.)	Singapore (2019)	This paper studies the effect of a mobile wallet payment technology introduction in 2017 on business growth in Singapore.	Mobile wallet usage doubled after the new technology introduction, and the improved payment efficiency generated a significant spillover effect. During the period of study, the aggregate level of ATM withdrawal remained constant, while small merchants experienced a monthly increase in debit and credit card sales amount (count) of 3.5% (3.4%) compared to large merchants.

74 Trütsch (2014) The Impact of Contactless Payment on Spending, International Journal of Economic Sciences <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=8cafe10155754be1638a240151d4c9a4655cfe44>

75 Bounie, Camara (2020) Card-sales response to merchant contactless payment acceptance, Journal of Banking & Finance <https://www.sciencedirect.com/science/article/abs/pii/S0378426620302004>



Outcomes observed in select other countries

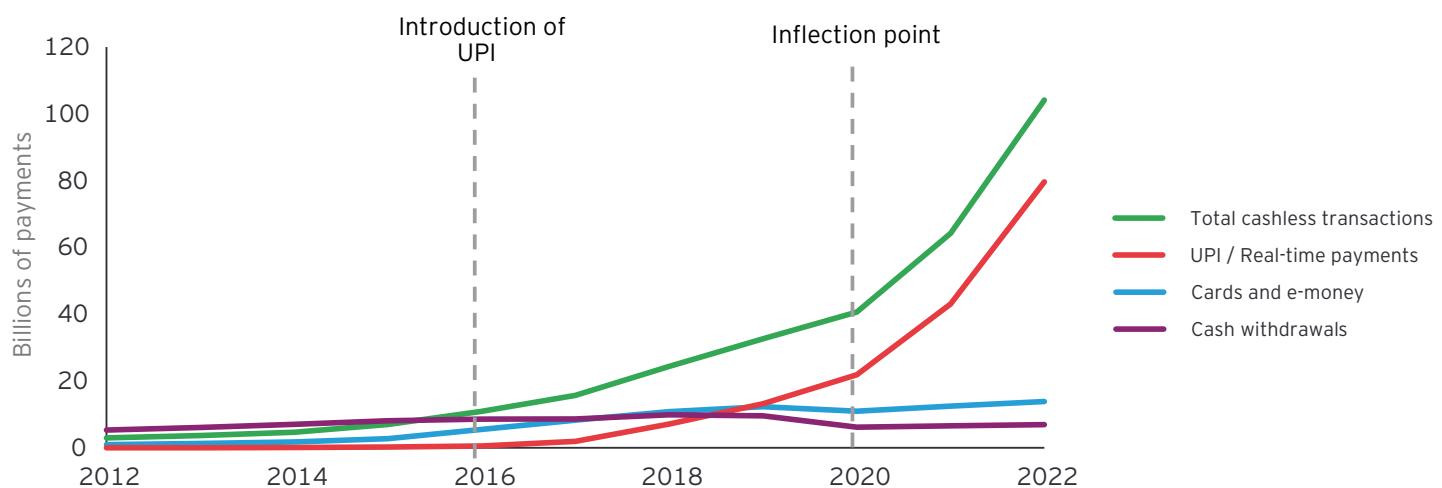
Countries with less developed payments landscape have often seen significantly greater impacts on activity, as the relative improvement in sophistication or convenience is greater. However, innovations and improvements to payment systems are recognised in countries like the UK as being important for economic development.

The Australian government payment system plan from 2023 states that the critical role of payments in facilitating economic interactions can help drive economic growth and attract foreign investment. They focus on the number of payments carried out in the country, meaning that even small inefficiencies in the system can have significant implications.⁷⁶ Even in a country where cards are the default form of payment for many individuals, account to account payment through the NPP is becoming more widely used, with over 30% of people

having used it as a payment method in 2022.⁷⁷ While the NPP rollout did lead to declines in some groups of alternative payments, card transactions continued to increase,⁷⁸ which suggests that some of the transactions were additional.

For UPI, in the years following its introduction, overlay services were developed to enable account to account payment, and the use of QR-code payments using this technology has become embedded in the country. The volume of cashless payments has increased by 46% per year since its introduction, whereas cash withdrawals remained stable, except for a small decline in 2019, resulting in a 42% net increase in overall transactions from 2012-2022. The overall value of cashless payments has also increased, but by a much smaller amount, suggesting the majority of the new cashless transactions are for low value high volume use-cases.

Figure 6: India Payment volumes by payment method (billions, 2012-2022)⁷⁹



76 A Strategic Plan for Australia's Payments System (treasury.gov.au)

77 The Evolution of Consumer Payments in Australia: Results from the 2022 Consumer Payments Survey (rba.gov.au)

78 Two Years of Fast Payments in Australia (rba.gov.au)

79 https://data.bis.org/topics/CPMI_CT/tables-and-dashboards/BIS,CPMI_CT8C,1.0



Impacts of past upgrades to the UK real-time payments infrastructure

Comparing the payment infrastructures of distinct economies at different stages of development presents challenges. We have sought broader instances of modernisation within the UK's payment systems to identify any recurring trends that could be applicable to our analysis. Major advancements in the UK's payment sector have shown the capacity to significantly affect both transaction volumes and consumer habits. By examining these developments, we can gain valuable insights into how modernising the UK's payment infrastructure might impact transaction volumes.

Faster Payments System

The introduction of the FPS in the UK marked a pivotal shift towards real-time payment processing. This innovation enabled immediate bank-to-bank transfers, enhancing convenience for both consumers and businesses. As a result, FPS has been linked to an increase in overall payment transactions, as the immediacy and ease of use encouraged more frequent and diverse types of payments, contributing to economic activity. This was described in the research from the

Federal Reserve Bank of Boston in the US, which reviewed the costs and benefits of building the faster payment system in the UK and showed how it provided a new option for A2A payment that was quicker and lower cost than the previously available alternatives.⁸⁰

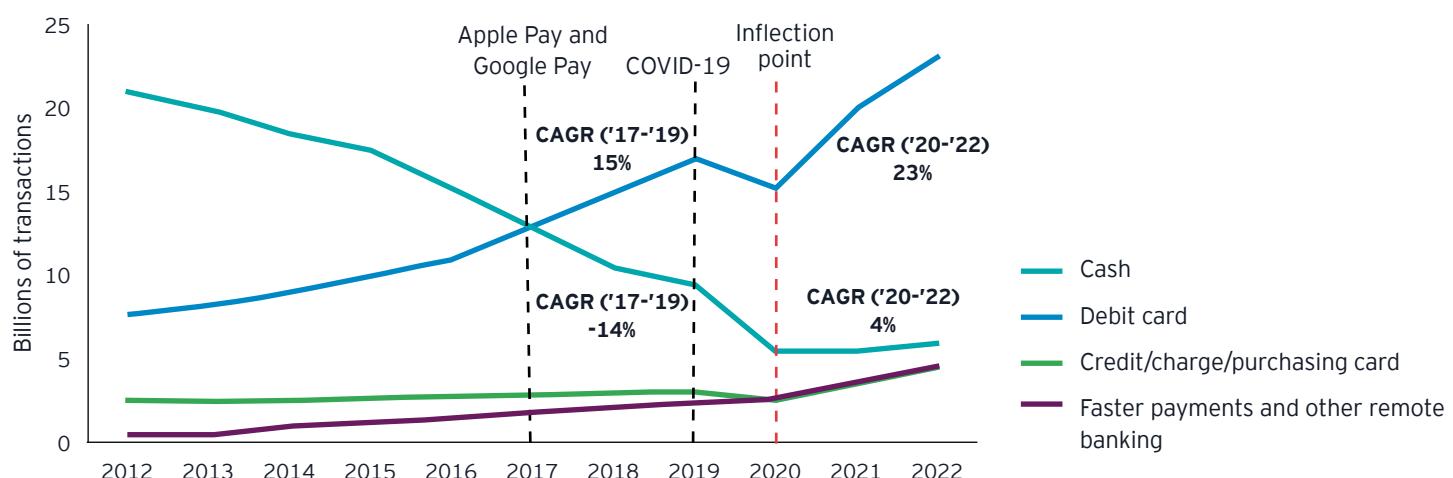
The Reserve Bank of Boston paper looked at the impact on other forms of payment and found that in the years following the adoption of faster payments, none of the other main A2A payment methods exhibited major change in the value of payments, suggesting that much of this value was additional. The volume of transactions for cheques did decline, but this was a continuation of the existing trend.

Contactless payments

The push for core payment infrastructure modernisation can draw inspiration from the contactless payment revolution, which, while not directly equivalent, illustrates the principle that streamlined payment methods can boost transaction volumes by simplifying and enhancing the consumer experience.

The widespread adoption of contactless payment technology has had a transformative impact. By simplifying the

Figure 7: UK Payment volumes by payment method (billions, 2012-2022)



⁸⁰ Costs and Benefits of Building Faster Payment Systems: The U.K. Experience and Implications for the United States – Federal Reserve Bank of Boston (bostonfed.org)



transaction process, contactless payments have reduced friction at the point of sale, leading to quicker service and increased throughput for merchants. Studies have shown that the convenience of 'tap and go' has not only boosted transaction volumes but also encouraged consumer spending.⁸¹

The adoption of contactless payments began to increase in 2015, leading to a notable increase in debit card transactions and a decline of cash usage. As Apple Pay and Google Pay gained traction in 2017, this trend accelerated with debit card transactions growing at a 15% Cumulative Annual Growth Rate (CAGR) from 2017 to 2019 – outpacing the 14% CAGR decline in cash transactions over the same period.

UK Finance data estimates that there were 18.3 billion contactless payments in 2023, an increase of 7% from the 17 billion in 2022.⁸² Between 2020 and 2022, debit card transaction volume increased by 23% CAGR. However, the data suggests that since 2020 there has been no corresponding reduction in the volume of cash payments, indicating an overall increase in the UK transaction volumes as cash remains a vital payment method for certain demographics.

This example of contactless payments, though not a like-for-like comparison, underscores the broader principle that modern, efficient payment systems are key to enhancing transaction volumes, a concept that is central to the argument for upgrading core payment infrastructure.

Strong Customer Authentication (SCA)

Although SCA is not equivalent to the modernisation of payment infrastructure, it illustrates a key principle: the level of convenience in payment processes influences consumer spending behaviour. The "inconvenience" introduced by SCA, while aimed at enhancing security, inadvertently led to an increase in abandoned transactions, highlighting how ease of use is pivotal in encouraging or discouraging transaction volumes.

The UK implemented the EU Payments Services Directive (PSD2) in 2018, which requires customer-initiated payment transactions to be subjected to SCA. Its implementation has produced varied outcomes. These protocols are designed to increase security and mitigate fraudulent activities. However, they also have the potential to complicate the checkout process by introducing extra steps for consumers to complete.

There is growing evidence to suggest that heightened security measures, while well-intentioned, may inadvertently lead to higher instances of shopping cart abandonment. Consumers encountering these additional layers of authentication might experience frustration, especially when the process disrupts a smooth shopping experience.

For consumers, the new SCA regulations have resulted in an additional hurdle in the payment journey when using debit or credit cards. For instance, merchants are losing more than 20% of transactions on average every time that SCA is applied.⁸³ According to the Baymard Institute, 26% of consumers cited checkout processes being too long as a key reason for cart abandonment.⁸⁴

UK SCA Success rate

Average SCA success rate	Abandonment rate	Fail due to incorrect details	Technical issue
79%	8%	11%	2%

The SCA experience, while distinct from the core infrastructure modernisation, emphasises the principle that the consumer's convenience and ease of use is important. Enhancing user experience could drive spending, whereas complexity and inconvenience can impede it, thereby directly impacting transaction volumes. This insight is crucial when considering the modernisation of payment systems and their potential to shape consumer behaviour and economic activity.

⁸¹ The Rise of Contactless Payments and its Impact on Consumer Behavior (financemagnates.com)

⁸² One third of UK adults now use mobile contactless payments | Insights | UK Finance

⁸³ <https://www.paymentcardsandmobile.com/psd2-in-the-uk-the-impact-on-fraud-and-revenues-to-date/>

⁸⁴ 49 Cart Abandonment Rate Statistics 2024 – Cart & Checkout – Baymard Institute

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