The Economic Impact of Real-Time Payments

A Cebr report for ACI Worldwide

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About

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Executive Summary

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What are real-time payments?

Payment systems enable the smooth connection of funds between buyers and sellers.

Real-time payments have the potential to revolutionise the way that funds are circulated across the economy by delivering payments near instantaneously, subsequently promoting economic growth and productivity improvements which are prerequisites to elevating living standards.

How do they create economic advantages?

Key areas that instant payments can stimulate economic gains are:

- Improving the efficiency and reducing the costs of the payment infrastructure and wider financial system;
- Unlocking working capital and reducing 'float' times; and
- Supporting the formalisation of economic activity that traditionally occurs beyond the jurisdiction of formal institutional frameworks, through reducing cash usage.

Methodological Framework

The overall analysis covers thirty countries over three stages:

- A bottom-up estimation of the net efficiency savings in 2021 from the adoption of real-time payments system for businesses and consumers;
- The estimation of the macroeconomic impacts in 2021 as a result of the agent-level efficiency savings; and
- A forecast of the benefits to 2026 for businesses and consumers, and at the aggregate macroeconomic level.

Outputs of the study

The final output of the bottom-up model for businesses and consumers is the net efficiency savings from the adoption of real-time payments in each country. We present this as a dollar figure.

The final output of the macroeconomic impact framework is the total economic impact in each country that is supported by real-time payments. We present this as a dollar figure, as a percentage share of GDP, and as an equivalent jobs figure.

Policy Recommendations

By allowing for the transfer of money between parties within seconds rather than days, real-time payments improve overall market efficiencies in the economy. In terms of the opportunities for real-time payments, there is huge potential to accelerate financial inclusion, they are important in providing flexibility within the digitally-led gig economy, and can directly alleviate cash flow and liquidity issues as highlighted by the COVID-19 pandemic.

However, barriers to immediate adoption range from ensuring that fraud prevention and security systems are in place and at an adequate standard, to addressing consumer resistance or 'inertia' towards innovation and change as the technology is rolled out.

A successful real-time ecosystem will work alongside country-specific characteristics, rather than apply a one-size-fits-all mentality. Our recommendations for key areas to target are governed by the general infrastructure capacity of each country.

Overall, our view of the future of real-time is of prudent enthusiasm; recognising that there is immense potential, but the most astute path to increasing real-time coverage is by confronting the risks, and to take each use-case as unique by assessing the key characteristics of each economy.

$78.4 billion

scale of GDP supported in 2021 by real-time payments across the 30 countries observed.

Based on 2021 real-time payment utilisation, this represented 3.6% of the maximum attainable macroeconomic benefit.

Top 5 Real-Time Markets

India, Brazil, China, Thailand, South Korea

Business and consumer level benefits:

2021	2026
$37.0 billion	$164.6 billion

Formal GDP Supported by Real-Time:

2021	2026
$54.6 billion	$131.1 billion
equivalent to 0.23% of the combined GDP of the 5 countries, or the equivalent output of 4,170,395 workers across the five countries	equivalent to 0.43% of the combined GDP of the 5 countries, or the equivalent output of 9,043,577 workers across the five countries

Leading 5 Developed Markets

USA, Canada, UK, France, Germany

Business and consumer level benefits:

2021	2026
$2.1 billion	$5.5 billion

Formal GDP Supported by Real-Time:

2021	2026
$7.3 billion	$14.0 billion
equivalent to 0.02% of the combined GDP of the 5 countries, or the equivalent output of 70,464 workers across the five countries	equivalent to 0.04% of the combined GDP of the 5 countries, or the equivalent output of 118,989 workers across the five countries

Selected Highlights 2021

- Most annual real-time transactions: **India** – 48.6 billion
- Largest real-time share by volume: **Bahrain** – 34.2%
- Largest realised total agent-level benefit: **China** – $15.4 billion
- Largest realised total macroeconomic benefit: **China** – $18.7 billion
- Largest realised share of max. agent-level benefit: **South Korea** – 33.3%
- Largest realised share of max. macroeconomic benefit: **Bahrain** – 16.3%

$173.0 billion

scale of GDP supported in 2026 by real-time payments across the 30 countries observed.

Based on 2026 real-time payment forecasts, this represents 7.1% of the maximum attainable macroeconomic benefit.

Glossary

- Payment System Cost
  - In this study, the payment system costs take into account not only the direct costs of making payments (e.g. bank account fees or ATM withdrawal charges), but also the wider indirect or social costs (e.g. shoe-leather costs or central banks costs in producing and processing banknotes).
- Payment Float
  - The inefficiencies that result from money being locked in the financial system as payments between two parties wait to be fully processed.
- Cost of Failed Transactions
  - The wider costs associated with failed transactions. A failed transaction incurs a cost due to three main channels: The cost of fees that individuals and organisations incur from a payment failing; the labour costs per organisation for repairing a failed payment; and the costs that are associated with lost business through consumer attrition or churn.
- Total Agent-Level Impacts
  - The sum of the efficiency savings for businesses and consumers. This comprises of the country-specific gains across the three channels: the payment system, the payment float, and failed transactions.
- Informal Economy
  - As per the IMF, the informal economy represents the "illegal activities and unreported income from the production of legal goods and services, either from monetary or barter transactions, that would be taxable were they reported to the tax authorities." It should be noted that throughout this report, we use the terms 'informal economy' and 'shadow economy' interchangeably.
- Macroeconomic Impact
  - The aggregate macroeconomic impact is defined as the magnitude of economic output in each country that is supported by real-time payments. We present this as a dollar figure, as a percentage share of GDP, and as an equivalent jobs figure.
- Equivalent Jobs Supported
  - The final metric of the macroeconomic impact is an equivalent jobs figure. This represents the number of employees required to produce the equivalent level of economic output that is supported by real-time payments in each country, given country-specific average productivity rates.
- Realised Benefits
  - The estimates for the economic impacts of real-time payments in 2021 and 2026, per real-time's current and forecasted share of the payment mix in the respective years.
- Maximum Additional Benefits
  - The maximum additional benefits are the estimates for the economic impacts of real-time payments in 2021 and 2026, based upon a hypothetical counterfactual scenario of 100% real-time payment utilisation across the payment mix in each country.

Introduction

The economic role and value of payments systems

- Payment systems enable the smooth connection of funds between buyers and sellers. They deliver the liquidity required for economic activities to take place and hence are critically important to the functioning of the increasingly interconnected global economy. An efficient payment system can play a central role in promoting economic growth and delivering long-term productivity improvements which are prerequisites to elevating living standards.
- Payment systems are often regarded as one of the most important social infrastructures. [1] In this report we assess a range of the benefits of real-time that manifest for both businesses and consumers, as well as at the aggregate macroeconomic level.
- Real-time payments have the potential to revolutionise the way that funds are circulated across the economy by delivering payments near instantaneously. This process allows all parties act with greater confidence following each transaction, since payments are synchronous between payer and beneficiary and are either irrevocably made or rejected.
- The key areas that instant payments can stimulate economic gains are through improving the efficiency and reducing the costs of the payment infrastructure and wider financial system; through unlocking working capital and reducing 'float' times; and through formalising swathes of economic activity that traditionally occurs beyond the jurisdiction of formal institutional frameworks.
- In this report, we estimate the economic impact of this technology and conclude that today there are significant benefits for both businesses and consumers, and at the economy-wide level as a result of real-time payments.
- Our research adds to the literature by estimating the economic impact of real-time payments in 30 country-specific scenarios. Impacts are quantified under two distinct lenses. Firstly, we estimate the realised benefits in each country based on current real-time adoption rates. Secondly, we hypothesise the scale of the additional untapped benefits that would be attainable if all payments took place instantaneously.
- Our analysis is conducted for each country in 2021 and 2026 (where data is available). There is no one-size-fits-all approach and by taking into account the unique structural characteristics of each country within the sample, the results reflect the heterogenous nature of how real-time payments ultimately manifest into economic impacts.
- At the outset, it is important to stress that measuring the economic impact of real-time payments is a broad and challenging exercise. While we have identified and modelled some of the key channels by which real-time payments support economic impacts on a best effort basis, we suspect that a non-zero share of the total benefits available will manifest through additional pathways not specifically analysed in this report.
- Within this report, we are estimating results from a purely economic perspective. The cost or efficiency savings that we estimate suggest that there are some unequivocal net benefits for an economy that can be achieved through utilising real-time payments. While as a part of this exercise, we model the theoretical impacts of all payments being real-time, we do not suggest that there is no longer place for non-instant electronic payments or paper-based payments going forward.
- In specific circumstances, there will likely always remain advantages of different payment systems. Equally, an immediate radical shift in the payment mix to this extreme scenario would likely bring significant disruptive transition costs not modelled in this report. Over time, we anticipate country-specific dynamics and relative advantages and disadvantages of different payment types, will shape the optimal payment mix.

[1] Nakajima, M. (2012). "The Evolution of Payment Systems."

Real-time payments and disruptive technology

- The rise of real-time payments presents itself as this generation's leap forwards for payment systems. The key advancement of this technology is that payment systems providers can offer instantaneous transfers of funds at any time for all payment categories from P2P to B2B.
- Before presenting our country-specific results in detail, it is important to consider how real-time payments might challenge the payment systems status quo, and whether one can learn from lessons of the past. In essence, real-time payments represent a classic example of disruptive technology. This is a technology that affects the normal operation of a market or sector, displacing older established products. In this case, over time real-time payments have the potential to displace significant activity otherwise occurring through paper-based. instruments, or slower electronic transactions.
- Similarly, the last half century, a major step change in the context of increased automation and the financial system was the introduction of the ATM, or automatic teller machine. As these were established, there was a concern that bank teller jobs would be replaced.
- This is a frequent concern with disruptive technology, and indeed one that has been discussed significantly in the context of real-time payments and the consideration of their economic impacts, as a part of this project. One might think that new technology will always replace and substitute the traditional service provider, in this case human jobs.
- However a key factor that is often overlooked is the complementarity between incumbent processes and the new technology. For example, when new technology allows for labour to be more productive in the same job by having some of the more repetitive tasks automated, they can focus on the more skilled, value-adding aspects of that job.
- Supporting this, data from the USA shows that following the introduction and rapid expansion of ATM machines in the mid-1990s, bank teller jobs in fact increased. Since 2000, this growth has slightly outstripped that of the wider labour force. [1]
- The ATM reduced the average number of tellers required to operate a bank branch, making each branch cheaper to operate overall. This meant that the demand for branch offices increased, resulting in the derived demand for bank tellers to increase as a result. This derived demand increased to such an extent following the labour-saving introduction of the ATM that job losses were offset, and a greater number of jobs overall were created.
- This is a more general pattern with similar cases occurring in the legal sector following the introduction of electronic discovery software for doing discovery of documents in lawsuits. Here, the number of paralegals increased rather than decreased.
- In the context of real-time payments, if certain tasks within the overall payment provision service can be automated through instant payments, this will leave greater resources available to be deployed where non-instant payments add the most value.
- An example of this might be for fraud prevention. As their name suggests, instant payments must be cleared within seconds, and hence fraud checks must be streamlined to accommodate this. A potential consequence of this is an increase in the number of fraudulent transactions that do not get flagged. However, real-time payments could lead to an overall reduction in fraud incidence even if intrinsically, the real-time infrastructure is less effective at catching fraudulent transactions compared to non-instant, electronic alternatives. This result can manifest if greater automation frees up resources from other areas of the wider payment system to work on the prevention of fraud. Ultimately fraud incidence drops, resulting in an unequivocal net societal benefit.
- Alternatively, labour can be redeployed in a different sector based upon the most efficient use. Adam Smith's classical economic theory of the 'invisible hand' suggests that these resources will naturally be reallocated to the industry in which they can be most efficient. On a net economy-wide basis, this complimentary process can augment demand for skilled labour, elevate productivity, increase earnings, and ultimately raise living standards.

[1] AEI. (2016). "What the story of ATMs and bank tellers reveals about the 'rise of the robots' and jobs."

Policy Recommendations

Opportunities presented by real-time payments

- In terms of the potential opportunities for real-time payments, over the last two years the importance and need of liquidity for business and consumers has been highlighted. The COVID-19 pandemic has presented an opportunity to accelerate the adoption of real-time payments due to the increased demand for cash flow. One consequence of the pandemic was restricted liquidity for businesses and individuals [1]. While clearly there were unique external factors causing businesses challenges, exogenous to the efficiency of the payment mix, real-time instruments can more generally play a part in alleviating such issues, through providing more efficient payments for businesses. Payment mix data does suggest a faster adoption of the technology since the start of the pandemic.
- By allowing for the transfer of money between parties (e.g. between consumers and businesses) within seconds rather than days, real-time payments improve overall market efficiencies in the economy. This is done not only by reducing payment float times, but also by reducing uncertainty and information asymmetries regarding payment failures. This latter effect is especially prominent in the increasingly digitally-led gig economy.
- The gig economy refers to labour markets that are characterised by informal contracting, often on temporary bases. Examples of the jobs that comprise the "just-in-time workforce" include ride-hailing services (such as Uber or Bolt), food delivery services, or even house-sitters and dog-walkers. Real-time payments are important in the gig economy because workers are paid quickly, allowing them to better plan their finances. There are also benefits for gig-employers. Instant payments allow businesses to be more flexible and reduces the need for overly burdensome cashflow management.
- Finally, real-time payments have huge potential to accelerate financial inclusion. Instant payments technology is not reserved exclusively for countries that are already well served by banks. If introduced effectively and appropriate steps are taken, real-time payments can be a key contributing factor to improving the rates of financial inclusion through the shift away from a status quo, with large shares of the of the population solely relying on cash-dominated payment mixes.
- The results of our analysis have highlighted certain country characteristics that present significant areas of opportunity for real-time to support beneficial economic outcomes.
- For example, in countries with a large informal economy as a percentage of formal output, real-time could support in formalising this activity, through reducing cash usage. This has various economic advantages, notably in growing the size of the formal economy and increasing the resulting tax base.
- Across this study, countries such as Brazil, Nigeria, Pakistan, Philippines, and Thailand all had informal economies that were more than 30% (up to 47% in Nigeria) of formal GDP in 2021. In these cases, the additional potential macroeconomic benefits are significant relative to the realised benefits, due to the large impact that real-time payments can have on reducing the size of the informal economy.
- Other characteristics that present significant areas of opportunity for real-time are when high returns to capital (proxied by real interest rates) combine with long clearing times for traditional payment instruments (a combination present in particular, in South Africa and Brazil). When working capital is locked in the financial system for a long period of time, this presents a drag on economic activity. Real-time instruments allow money to flow through the payment system more efficiently, and hence countries with such characteristics have the potential to gain significantly by increasing their real-time payment usage.
- These characteristics apply beyond the thirty countries that are assessed in this report. Hence, this study provides policymakers with evidence for the potential mechanisms and magnitudes of how real-time payments are likely to impact their respective economies.

[1] European Central Bank. (2020). "COVID-19 and the liquidity crisis of non-banks: lessons for the future."

Current barriers to growth

- In this section of the report, we move away from quantitative analysis and assess real-time payments through a qualitative lens. We discuss considerations from an economic perspective regarding the efficient and effective introduction (or further development) of real-time payment systems.
- This discussion covers key market opportunities, potential barriers to growth, prerequisites for successful real-time integration, and what prudent enthusiasm towards the ever-growing role of real-time instruments in the modern payment mix might look like.
- The literature reveals important factors to consider that can support the increase of real-time payments adoption and subsequently lead to greater economic gains being realised from the technology.
- Firstly, a competitive landscape is a key driving force behind technological revolutions, including in payments system. [1] Priming this landscape involves actions across the banking and financial industries, by both non-traditional payment system providers (PSPs) and traditional PSPs alike. Individual stakeholders cannot drive progress in isolation. The presence of suitable digital infrastructure serves as the foundation on which the development and expansion of real-time payments depends. A user-friendly infrastructure with clear and easy to digest benefits for consumers is vital for the adoption of the technology on the demand-side of the market, however, role of authorities can also define success in achievement of higher adoption of real-time payments. [1, 2]
- Central banks play an important role in accelerating the development of real time payments, and although authorities may have some ability to affect the demand for instant payments, many of these actions are related to the supply side of the market. In many cases, these efforts serve to encourage the implementation of fast payments through open systems when coordination problems among PSPs might otherwise complicate or prevent their implementation.
- Successful growth of real-time payments will require all parties to move in the same direction towards the same goal; that is, efficiency savings and productivity gains across the payment mix that ultimately contribute to wider economic benefits.
- One barrier to immediate adoption is ensuring that fraud prevention and security systems are in place and at an adequate standard. This is no simple fix and requires significant back-end resourcing to ensure that real-time infrastructures are fit for purpose, particularly in countries with less technologically advanced economies with less advanced incumbent payment systems where the infrastructure must be built from a less developed baseline. Of course, in most economies, in 2022 real-time payments are not a completely new phenomenon and lessons can be learnt from the past by using best practices developed by other countries as a guide. However, this does not imply that there are no new unforeseen challenges that will need to be addressed.
- Another barrier to increased real-time adoption could be due to the resistance of consumers or businesses to change, even when the presented change is beneficial. Consumer resistance or 'inertia' to innovation or change is a common phenomenon observed across the field of economics. [3, 4] This can be driven by multiple factors including uncertainty, convenience, habituated decision-making, or loss aversion. Such a phenomenon reinforces the importance of a user-friendly infrastructure with easily digestible benefits for take-up as there will likely be some natural resistance to move away from the status quo for consumers.

[1] Bank for International Settlements. (2016). "Fast payments – Enhancing the speed and availability of retail payments."
[2] Faster Payments Task Force. (2016). "Faster Payments Effectiveness Criteria."
[3] Samuelson, W., and Zeckhauser, R. (1988). "Status Quo Bias in Decision Making."
[4] Ram, S., and Sheth, J. (1989). "Consumer Resistance to Innovations: The Marketing Problem and its Solutions."

Final recommendations and conclusions

- We conclude this section by looking towards the future development of real-time payment systems. Our view is of prudent enthusiasm; recognising that clearly there is immense potential, as seen by the fact that for most countries, the unrecognised percentage of potential economic benefits far outweighs the recognised share.
- However, the most astute path to taking advantage of the untapped benefits is confronting the risks that are presented by this technological revolution. Across the world there are a wide range of country-specific requirements for businesses and consumers that mean the most prudent approach to increasing global real-time coverage is to take each use-case as unique, and assess the key individual characteristics of an economy and consumer demand.
- The benefits of real-time can be maximised by structuring regulatory frameworks that are not only fit-for-purpose today, but also have the flexibility and adaptability to react to developments in the future that may jeopardise the quality of service of the technology. An example of this might be for a domestic real-time system to adapt to cross-border transactions as the demand for this service grows in the future.
- Furthermore, the economic impact can be maximised by improving the wider enabling infrastructure of real-time. Examples of this include breaking down the barriers to entry with better consumer UI and UX. Intuitive user touch points make it easy for new entrants to access and use the technology with no or minimal required knowledge, increasing adoption rates. Other examples of this enabling infrastructure are improving general levels of financial inclusion, reducing the underbanked share of the population, ensuring strong mobile network coverage to support the impact of real-time payments through mobile banking services.
- Finally, an understanding of the need for cooperation between all stakeholders, but simultaneously the need for specialisation by distinct parties across the integrated payments system supply chain. There is a role for all payment types in the future, however efficiency is optimised by each being used in their respective areas of comparative advantage.
- A successful real-time ecosystem will work alongside the country-specific characteristics, rather than apply a one-size-fits-all mentality. Our recommendations for key areas to target are as follows:
- **States with low infrastructure capacities:**
  - Actions to intensify development of enabling infrastructure; and
  - Increased banked population with policies on financial inclusion.
- **States with medium infrastructure capacity:**
  - Employing strategies to combat consumer resistance or inertia towards new technology; and
  - Exploring and formulating cross-solution rules and standards and prioritising changes in the regulatory framework. [1]
- **States with high infrastructure capacity:**
  - Supporting the development of infrastructure needed to achieve interoperability across solutions [1]; and
  - Ensuring the sustainability and evolution of faster payments through advocacy and education on the faster payments system, investing in research and development on cross-border real-time payments and other emerging technologies, and supporting the development of fraud detection, reporting, and information-sharing methods. [1]

[1] Faster Payments Task Force. (2016). "Faster Payments Effectiveness Criteria."

Scope and methodology

Scope and modelling framework

- The study is designed with an objective to estimate the economic impact of adopting real-time payment systems, assessing thirty countries across six global regions.
- To perform the economic impact assessment of real-time payments, a comprehensive methodology is designed with a bottom-up approach. In that, the assessment first identifies and estimates the various channels of costs savings from introducing real-time payments in the current payment environment of each economy. Secondly, it quantifies the impact of the total savings across the whole economy in terms of support to national output, and finally extrapolates the benefits by five years into the future to showcase the increased stream of benefits in 2026.
- The study covers analysis on thirty countries representing the six major global regions. There are eight countries from Europe, five countries spanning the Americas, two from the African continent, and ten countries across the broad Asia-Pacific region. With the exception of Russia, the analysis has full coverage of the G20 member nations.
- The three stages of the overall analysis include –
    i. A bottom-up estimation of the net efficiency savings in 2021 from the adoption of real-time payments system for businesses and consumers;
    ii. The estimation of the macroeconomic impacts as a result of the agent-level efficiency savings; and
    iii. A forecast of the benefits to 2026 for businesses and consumers, and at the aggregate macroeconomic level.
- For the model estimating the economic impacts of real-time payments in 2021 and 2026, we use transaction volume and transaction value data for each component of the payment mix. Underpinning the study, we leverage data provided to us from Global Data on payment volumes and values for each country, disaggregated at the payment instrument level. [1]
- In terms of the payment mix for each country, the analysis going forward assesses three distinct payment instruments: real-time payments, traditional electronic (non-instant) payments, and paper-based payments.
- To estimate the counterfactual scenario of 0% instant payments, in all channels of this model we estimate a 'new' payment mix that is based on the distribution of electronic (non-instant) payments versus paper-based payments. This allows us to produce an estimate for how the transactions that are currently undertaken through real-time instruments would likely have been made in the absence of this technology. Here, we distribute the volume of real-time transactions proportionate to the current non-instant electronic versus paper payment mix, while applying the average real-time transaction value to those transactions which ensures that the overall, newly estimated payment system with zero instant payments has the same number of transactions and the same total transaction value.
- To estimate the potential maximum *additional* benefit that real-time payments present, we construct a counterfactual framework within each country that estimates the efficiency savings and wider benefits associated with hypothetical 100% real-time utilisation.
- It must be stressed that full real-time adoption is not a realistic or likely scenario for any country in the near term future, even for those with the most advanced payment systems. In general, while we are seeing a shift away from paper-based instruments, based on the information regarding the payment landscape today, full real-time adoption is not realistic for the timeframe assessed within this study. Results should be considered indicative of the potential scale of benefits, rather than any form of prediction or forecast.
- The framework for estimating the total cost savings (or benefits) for firms and consumers comprises of three channels:
    - Channel 1: the adoption of real-time payments technology will lead to a change (typically a reduction) in the unit costs per transaction.
    - Channel 2: the adoption will suffice in reducing the 'payment float' – in other words, the reducing the funds locked in the payment system after a payment is issued but before it is settled.
    - Channel 3: the reduction in the rate of failed transactions as a direct result of real-time payment usage.
- **The rest of this section elaborates on the methodology for the reader including the technical details for the components of the three stages of the overall analysis, (i), (ii), and (iii).**

[1] Note: The one exception to this is that GlobalData did not have an estimate for the 2021 payment mix of Vietnam. As a result, the payment mix was estimated by Cebr using transaction data from the State Bank of Vietnam. In addition, there was no capacity to forecast the payment mix of Vietnam robustly to 2026, hence the analysis extends to 2021 only.

(i) Channel 1 – Net impact on total transaction costs across the payment system

- All payments involve a transfer of wealth between payers and payees. For transactions occurring through the financial system, the processing of these payments does not come without a cost. Examples of these costs include physical infrastructure costs such as buildings, bank branches, and ATM networks; resources used across the tracking, clearing, settlement, and correcting processes; hardware and software for the computer systems used to support the payment infrastructure; and labour costs needed to support the payment infrastructure such as bank tellers or cash-in-transit services.
- Such costs occur on either a marginal basis or on a fixed basis. Typically, paper-based payments have a higher unit cost per transaction (particularly with larger transaction values) because there are more manual inputs that are required to complete each transaction relative to electronic payments that typically have a more automated process with low variable costs. [1]
- The data points used for this channel are predominantly via the academic literature. To estimate the unit costs per transaction, we use a best-fit relationship between transaction volumes per capita and unit costs per transaction that was produced by Deloitte. [1] This model is based on a review of the literature looking back to 1993, assessing volumes per capita and unit payment system cost estimates in order to produce a sample of data points. From this, a best-fit relationship is estimated for each payment instrument.
- Therefore, by applying the payment volume data provided by GlobalData, and cross-referencing this with population estimates for each country, we are able to estimate transaction volumes per capita for each country to provide a bespoke estimate for the unit cost of each transaction for each instrument in the payment mix. This unit cost is applied to the respective volume of transactions via each instrument to find an estimate for the total cost of transactions across the payment system in each country.
- It is crucial to note that this methodology captures not only the direct costs of making a transaction, but also the indirect or social costs. These indirect costs are the net sum of all resource costs borne by the payment system e.g., beyond the direct cost of processing payments at a bank, further costs that must be considered are the opportunity costs of the time that it takes an individual to physically obtain cash or the time taken to perform credit transfers and direct debits, central banks costs in producing and processing banknotes, and retail bank costs of cash deposits and disbursements. [2] In summary, it is important that a holistic approach is taken here regarding the productivity boost that real-time payments can induce through costs per transaction, over and above the fees or charges levied onto customers.
- At present, there is a dearth of evidence on the unit cost per transaction for instant payments. There is some ambiguity as to whether real-time payments always result in lower unit costs than non-instant electronic payments. This is because there are certain elements that lower costs (such as more efficient processing and improved data) while others raise unit costs (such as the requirement to run the service 24/7/365). [1]
- As a result, the ultimate cost differential between instant and non-instant electronic payments is uncertain and hence, the most pragmatic assumption to make here is that the unit costs here are equivalent. **The impact of real-time payments through net costs of the payment system, is therefore primarily determined by the fact that real-time payments displace and reduce the volume of transactions that would have otherwise occurred via paper-based instruments.**

[1] Deloitte. (2019). "Economic impact of real-time payments."
[2] Krüger, M. and Seitz, F. (2014). "Costs and benefits of cash and cashless payment instruments."

(i) Channel 2 – Reduction in the opportunity cost associated with the payment float

- The payment system float is the term used for inefficiencies in the payment system that result from time spent waiting for payments to be fully processed. Generally, payment systems involve two main processes: clearing and settlement. Clearing is the stage in the process relating to the transfer of instructions for each individual payment, while settlement is the actual transfer of the funds between the payor and the payee.
- With real-time payments, these processes are synchronised and are actioned simultaneously such that within seconds, a payment is either irrevocably made or it is rejected. However, with non-instant payments (electronic or otherwise), there is a delay between funds being debited from the payer and subsequently credited to the payee while the back-end clearing and settlement processes take place. This delay – the payment float – causes money to be locked in the financial system, beyond the scope of the real economy, placing a limiting factor on economic activity. Therefore, real-time payments can reduce the amount of time that money is locked in the financial system, thereby generating benefits through increased economic activity by businesses as well as consumers.
- We estimate the positive impact that real-time payments can have across the economy by calculating the reduction in the total opportunity cost that is associated with the length of time that money is locked in the financial system due to non-instant payments.
- The concept of opportunity cost is commonly used in microeconomic theory to place a value on what you give up when you make any decision. For example, a commuter might buy a $5 coffee every day on her way to work. However, every day she is explicitly or implicitly giving up the opportunity to spend that $5 in a different way. An explicit alternative might be to spend $5 on a sandwich rather than a drink, while an implicit alternative might be to save the money instead, putting aside $1,300 per year to go on a holiday or to spend on a new TV. This is an illustrative example of the fact that all decisions, whether they involve money or not, have costs in the short-run and long run that are associated with alternative options.
- In the context of real-time payments, when a transaction takes place via a non-instant payment method, the opportunity cost is the economic activity that could have been generated by that money if it was not locked in the financial system.
- The loss associated with each individual transaction are small as non-instant payment clear after a small number of working days, on average. However, when these modest costs are aggregated up to an economy wide level, the annual opportunity costs have the potential to become substantial.
- Real-time payments will reduce the amount of money that is kept out of the real economy, unlocking greater working capital, and thereby generating lower total opportunity costs associated with the overall payment system.
- To estimate the return on this capital, in line with traditional economics and accounting methods, we estimate the time value of money on each working day. This involves calculating the future value of each transaction by discounting its present value with the prevailing interest rate in each country, over the period of time that the money is stuck in the financial system (known as the float time or clearing time). The difference between the future and present values is the opportunity cost. This is calculated per working day and subsequently scaled up to produce an annual cost.
- The data points used for this channel are annual interest rates and average clearing time data associated with each payment method. Data for interest rates was sourced from central banks, while the latter was sourced either directly from the central bank or from commercial banks for some countries in which data gaps persisted. We use the real interest rate in each country to estimate the real return on the locked capital. In the context of 2021, there have been high levels of inflation observed as countries recover from the effects of Covid-19, driven by factors such as rising fuel prices and global supply chain shortages. This results in the real interest rate for many countries turning negative, potentially penalising savers and stimulating expenditure. In this model, if the real interest rate is negative, we apply an assumption for the discount factor used to proxy the return on capital. In these cases, we apply a 1.0% real return on capital.

(i) Channel 3 – Reduction in the wider costs associated with failed transactions

- The systems underpinning real-time payments have the capacity to reduce the number of failed transactions – theoretically to zero – and hence reduce the associated costs with such failed transactions.
- Payments can fail for reasons such as due to errors in payment detail inputs, data entry issues due to human error, or poor reference data and validation tools. A failed transaction incurs a cost due to three main channels:
    - The cost of fees that individuals and organisations incur from a payment failing;
    - The labour costs per organisation for repairing a failed payment; and
    - The costs that are associated with lost business through consumer attrition or churn.
- We assume that instant payments have a potential for a 0% failure rate. The rationale for this is that real-time payments require a central infrastructure with details of both the payor and the payee's banks. Mistakes can be anticipated before payments occur through technologies such as Confirmation of Payee [1], verifying to the payor that they have, for example, entered the payee details accurately before funds are transferred. This can remove the potential for human error and has the *potential* to reduce all payment failures within the banking system to zero.
- The availability of relevant data regarding bilateral (or otherwise) payment system failure rates is limited. The data points used for this channel are leveraged from a review of the quantitative literature on the topic, providing estimates for the cost of failed payments estimates. All transactions, regardless of instrument, have the capacity to fail with varying probabilities. Accurately and robustly estimating the likelihoods and values of these potential outcomes is highly problematic. So based on the available data, for each region we estimate an average expected cost per transaction that implicitly bakes in the probability that the payment will fail and the associated cost of that payment failing. We can do this by triangulating the known data points that we have from GlobalData and LexisNexis, ultimately producing an expected cost of failure per transaction.
- LexisNexis estimated that the total cost of failed payments globally in 2020 was $118.5 billion, a figure that encapsulated bank fees, labour costs, and crucially the costs of lost business outlined above. [2] We are leveraging their estimates of this total cost, disaggregated on a continental level. This is an important step to make because the relative importance of each factor making up total costs is heterogeneous between regions. For example, while bank fees are relatively similar globally, in the Middle East and Africa (MEA), fees account for 75% of the region's cost compared to only 58% in Europe. The driving factor behind this is that average salaries, and hence labour costs, are greater in Europe by comparison. This results in 34% of Europe's total cost being via labour costs compared to only 17% in MEA. [3] This data is outlined in the table on the following page.
- The current impact of real-time payments is estimated as the difference between the current cost and the cost if real-time payments had the same assumed failure rate as non-instant payment instruments.
- Regarding the potential, but currently untapped cost savings that could be achieved if all transactions were undertaken through real-time instruments, we assume that this could theoretically fall to zero with sufficiently advanced and well implemented payment system frameworks. Therefore, this figure is equal to the current estimated cost of failed payments in each country.

[1] Open Banking. (2022). "Confirmation of Payee."
[2] LexisNexis. 2021. "True cost of failed payments."
[3] For completeness, the shares of labour costs out of the total regional cost for the Americas and APAC were 27% and 29%, respectively.

(i) Channel 3 cont. – Reduction in the wider costs associated with failed transactions

- The LexisNexis report estimates global costs of failed payments via three channels: labour costs, customer attrition, and fees.
- Labour costs relate to the human resources that are employed for the purposes of fixing failed payments that could otherwise be deployed in an alternative industry, generating more value adding products and services.
- Consumer attrition refers to the lost revenue to businesses due to customers that experience a failed payment and subsequently choose not to make a purchase. This lost expenditure represents a decline in overall consumption as a direct result of payment failures. The cost associated with attrition contributes to a wider macroeconomic impact if the consumption is absolutely lost due to a failed transaction. However, attrition for a specific business may not necessarily have a negative impact on total consumer spending, because the loss of consumption of a good/service due to a failed transaction may simply be substituted to an alternative merchant.
- Fees are penalty payments that are payable by customers as well as payment providers as a result of failed transactions, partially reflecting the costs associated with the inefficiencies created by payment failures.
- In the following data tables, we present results for the efficiency savings that are generated by real-time payments through reduced failed transactions with all three components included as we understand that instant payments can prompt a reduction in the gross costs of payment failures, leading to efficiency savings for firms and consumers. However, when translating these costs to a wider macroeconomic benefit for each country, the most appropriate methodology does not incorporate the sum at face value, in particular the fees and customer attrition components.

Costs of failed payments by region and cost component, $ million and %

Region	Labour Costs		Customer Attrition		Fees		Total	
	Cost	% of Region	Cost	% of Region	Cost	% of Region	Cost	% of Region
Asia-Pacific	$12,673	29%	$3,933	9%	$27,094	62%	$43,700	100%
Europe	$12,954	34%	$3,048	8%	$22,098	58%	$38,100	100%
Americas	$9,099	27%	$3,370	10%	$21,231	63%	$33,700	100%
MEA	$510	17%	$240	8%	$2,250	75%	$3,000	100%
Total	$35,236	30%	$10,591	9%	$72,673	61%	$118,500	100%

Source: LexisNexis

(ii) Constructing the Macroeconomic Impact Framework for Real-Time Payments

- Once the net efficiency savings for firms and consumers are estimated, based on both 2021 real-time adoption rates and 100% instant payment adoption, we can integrate these results into the macroeconomic impact framework to estimate the country-wide benefits of real-time payments.
- **The final output of the macroeconomic impact framework is the total economic impact in each country that is supported by real-time payments. We present this as a dollar figure, as a percentage share of GDP, and as an equivalent jobs figure [1].**
- Translating agent-level benefits to aggregate economy impacts requires prudent handling because some components of the agent-level model should not be incorporated at face value. Critically, we only include efficiency savings that generate *additional* final economic output. Key instances where benefits from the founding model are omitted from the macroeconomic impact framework are net payment system costs and portions of the failed payments channel.
- Firstly, differences in net payment system costs are excluded because although the overall cost associated with the effective functioning of the payment system is less, the counterfactual payment system is still responsible for generating significant value-adding economic activity.
- Real-time transactions unequivocally improve the efficiency of certain aspects of the holistic payments infrastructure. However, where there is ambiguity, is the reallocation of these resources (labour, capital, time) and how these will ultimately convert into an overall net increase of final economic output in each country. This is because we do not have evidence to suggest whether the redeployment of those resources will be more or less productive (compared to their current allocation) once they are reallocated elsewhere in the economy.
- There is definitely a positive impact; a more efficient payments system frees up resources to partake in other value-adding activity. However, the magnitude of this impact is challenging to identify with a high degree of certainty. Therefore, these impacts feature as sizeable efficiency savings for firms and consumers alike, but are not included in the macroeconomic impact framework.
- With regards to certain aspects of the failed payments channel, again not all will stimulate net gains to the final output of each economy. For instance, it is ambiguous as to whether or not a reduction in fees (i.e. penalty payments that are payable by customers and payment providers as a result of failed transactions) will manifest into economy-wide gains.
- On one hand, a reduction in fees payable by consumers leads to greater disposable income for consumption elsewhere in the economy, on value-adding goods and services. However, where fees contribute to overall revenues of payment providers, this implies that fees could paradoxically be considered a revenue-generating component of business activity. The loss of these fees could be considered a loss to financial sector output, even if strictly this is an inefficient use of resources, which could instead be reallocated to other productive means.
- Finally, we do not include the customer attrition component of the total failed transaction costs in the macroeconomic impact framework due to an ambiguity of its aggregate macroeconomic impact.
- Customer attrition refers to the loss of consumers for a business. One of the causes of this is due to a failed payment. If a transaction fails at a particular vendor, this poor experience may cause a consumer to either switch to a separate seller, or leave the market entirely. The figure in this report represents substitution of consumer spending between suppliers, rather than ultimately lost consumption. As a result, at the aggregate economy level, there is not necessarily a decrease in net spending by consumers. Hence, a reduction of failed payments may not contribute to greater final output through reducing customer attrition. Instead, the positive impact of reduced failed payments manifests as an efficiency saving for businesses that are no longer required to recapture lost consumers as a result of failed transactions.
- **To summarise, the channels of the agent-level model that are included in the macroeconomic impact framework are the payment float impacts, the labour costs share of the failed payments impact, and finally the impact that real-time payments have in formalising segments of the shadow economy.** This final mechanism is explained in full on the following slide.

[1] Note: This should be interpreted as the equivalent number of workers (at the mean productivity rate) that are required to produce a level of national output equal to the annual economic impact associated with real-time payments.

(ii) Increased formal economic activity due to a reduction in the shadow economy

- Currently, there is lack of comprehensive and credible data on whether instant payments reduce all types of fraudulent activity. However, there is some indication that these payment types have a positive effect on reducing illicit activity in the economy because they have the potential to replace cash-based transactions. Within the analysis, we consider this by looking at an often unreported segment of the economy, known as the 'shadow economy', within which transactions are typically cash dominant.
- Cash payments serve as an instantaneous transfer of wealth between two parties. Electronic but non-instantaneous payments have a lag between the exchange of funds among the payer and the payee, whereas real-time payments can be considered as a substitute payment method due to the instantaneous transfer of money.
- The International Monetary Fund defines the 'shadow economy' to represent "illegal activities and unreported income from the production of legal goods and services, either from monetary or barter transactions, that would be taxable were they reported to the tax authorities." [1] It should be noted that throughout this report, we use the terms 'informal economy' and 'shadow economy' interchangeably. Research shows that a reduction in the cash share of the economy leads to reduction in the shadow economy. [2] We use the academic evidence as a basis to build a model estimating the costs savings from this channel.
- The study by Schneider establishes that a one percent decrease in the cash share in the total payment mix in the economy leads to a 0.075% decrease in the shadow economy. [2] Using this relationship, we estimate the current impact that real-time payments have on the informal economy due to their contribution towards reducing cash usage. We subsequently re-evaluate the size of the shadow economy and find a new estimate for the additional economic activity that may have been occurring illicitly were it not for real-time payments. The difference between these two estimates serves as the share of each country's GDP that real-time payments are responsible for formalising. Note that we refer to this as 'formalising', as we are considering activity which otherwise still would occur, but in the informal sector, as opposed to in reported economic statistics.
- Regarding a payment mix with 100% real-time payments, it follows that there would be no cash payments. Schneider also finds that if cash instruments drop out of the payment mix entirely, then the shadow economy will fall by 20.1%. Therefore, following the same rationale, we can find a new implied size of the informal economy and estimate the additional economic activity that could be formalised through complete adoption of real-time payments in 2021.
- This channel is directly incorporated into the analysis as part of the macroeconomic impact framework because it is an aspect of real-time payments that formalises additional value-adding activity and thus directly contributes to formal aggregate economic output.
- To estimate the size of the informal economy in each country, we use timeseries data from the Centre for Applied Macroeconomic Analysis [3] which includes measures of informality over the period 1990-2018 from which we are able to forecast to 2021 and 2026.
- Finally, as an additional step in the analysis, we further estimate the value of exchequer revenues that real-time payments are responsible for formalising. This is done for the estimates of both current real-time adoption and complete real-time adoption in the payment mix. This is estimated by applying World Bank, IMF, and OECD estimates tax revenue to GDP ratios to each country. From this, we can produce an estimate for the addition to exchequer revenues that is associated with the formalisation of a portion of the shadow economy.
- Gross domestic product and tax revenue data is critical for estimating the impact of real-time payments in formalising informal economic activity. For this we use Cebr's in-house estimates of GDP by country in 2021 taken from our World Economic League Table (WELT) report for 2022 [4] which is underpinned by the IMF's World Economic Outlook database, as well as estimates published by the national statistics offices of each country published by the World Bank.

[1] IMF. (2002). "Hiding in the shadows. The growth of the underground economy."
[2] Schneider, F. (2017). "Restricting or Abolishing Cash: An Effective Instrument for Fighting the Shadow Economy, Crime and Terrorism?"
[3] Elgin, C., Kose, M., Ohnsorge, F., and Yu, S. (2021). "Understanding informality."
[4] Cebr. (2022). "World Economic League Table 2022." 13th ed.

(iii) Forecast of impacts to 2026 for the wider economy as well as for businesses and consumers

- The final component of the analysis involves forecasting the economic impacts with a five year time horizon to 2026.
- Regarding the framework for the bottom-up model of benefits for firms and consumers plus the macroeconomic benefits that are stimulated by the use of real-time payments, the mechanism for 2026 is symmetric to the modelling framework for 2021, as described in the previous slides in this section.
- There are, however, a few key differences with regards to the datapoints that underpin the 2026 forecast.
- Critically, the payment mix for each country is re-estimated, driving a significant proportion of the results. This data is based on forecasted adoption rates of real-time payments, plus changes in the proportions of electronic (non-instant) transactions and paper-based transactions making up the remainder of the overall payment mix within each country. All payment mix estimates – for both 2021 and 2026 – are provided by GlobalData. [1]
- In terms of the **agent-level model**, in the first channel (net impact on total transaction costs across the payment system) we apply the same structural equations to new transaction volume and population data. Therefore, the unit costs per transaction for each payment type do change nominally, but in real terms they are held constant between 2021 and 2026.
- This also applies in the third channel (reduction in the costs associated with failed transactions) as, on a per transaction basis, in real terms each transaction has the same expected cost of failure. Overall, we predict that the total global cost of failed transactions to increase in 2026 compared to 2021, but this is driven by the overall increase in the total number of transactions.
- Stepping back to the second channel (reduction in the opportunity cost associated with the payment float), real interest rates are held constant between 2021 and 2026. We do so because forecasting interest rates is notoriously inaccurate. Interest rates are a monetary policy tool which today are typically used to control inflation. How each country's economy evolves in the next five year will affect how interest rates change.
- We assume a 'no change' scenario in which interest rates are held constant across the two time periods to produce business and consumer impacts that are attributable to the forecasted developments to each country's payment mix, particularly the predicted growth in real-time transactions.
- As a result of these, the agent-level impacts are predominantly driven by the evolution of the payment mix in each country.
- For the **macroeconomic impact framework**, there are some key data points that differ between 2021 and 2026. One change is to the forecasted size of the shadow economy. We use timeseries data dating back to 1990 from the Centre for Applied Macroeconomic Analysis to approximate the 2026 estimates of informal output as a share of GDP in each country whilst maintaining directional trends over time. Furthermore, real GDP is forecasted to 2026 based on Cebr's World Economic League Table (WELT) report which affects the results in two ways.
- Firstly, this is used to estimate the impact of real-time payments through increased formal economic activity due to a reduction in the shadow economy. The forecasted real GDP estimates are combined with the forecasted shadow economy sizes in each country as primary data inputs in this channel.
- Secondly, when estimating the relative size of the macroeconomic impact in each country (which drives the calculation for the equivalent support of employment), real GDP must be adjusted appropriately to reflect total national output in 2026.

[1] Note: All payment mix estimates are provided by GlobalData with the exception of two cases in 2021 – Indonesia and Vietnam. Indonesia's payment mix in 2021 was interpolated between data points for 2020 and 2026 that were both provided by GlobalData, while Vietnam's payment mix was estimated by Cebr based on transaction data from the State Bank of Vietnam, with its analysis only extending to 2021.

Country Profiles

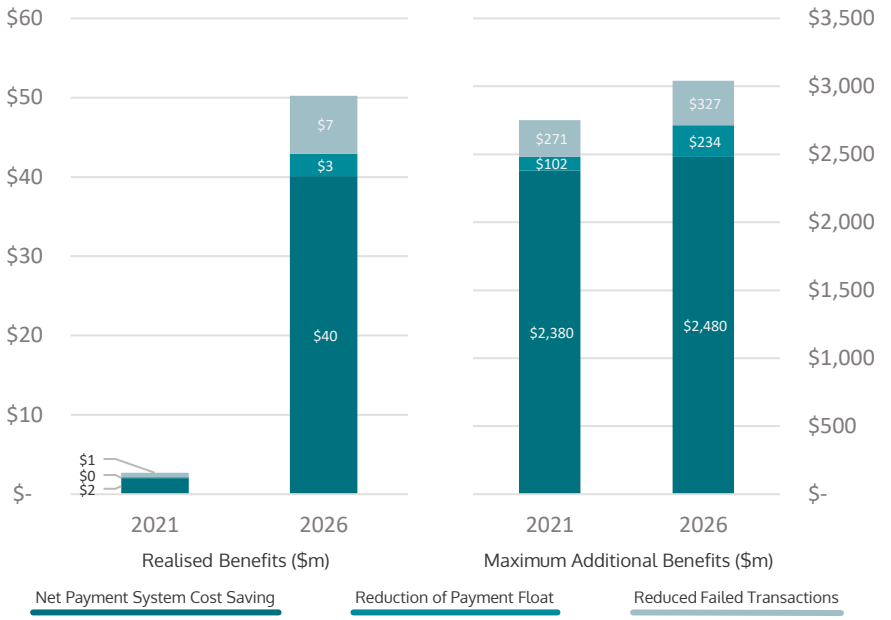
Economic Impacts of Real-Time Payments

2022

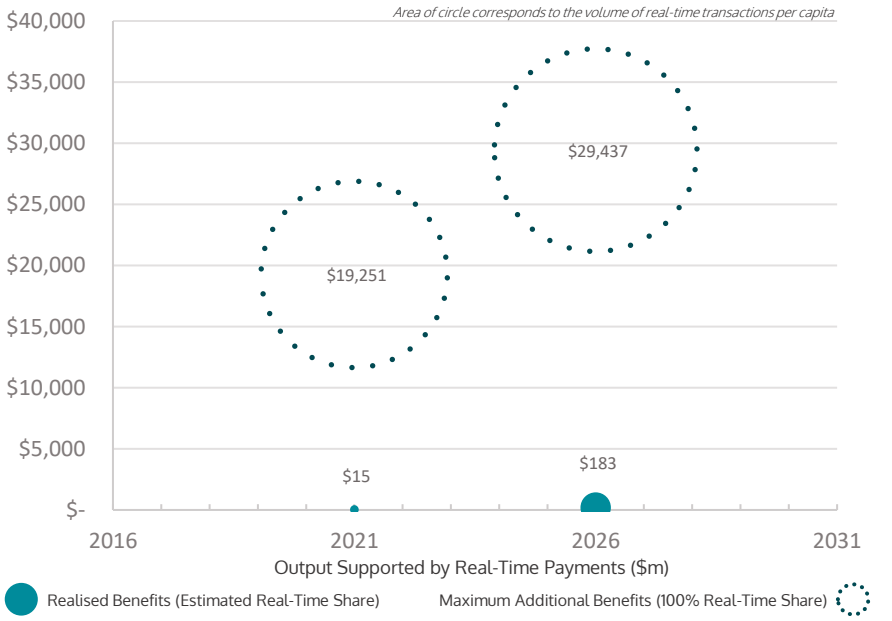
Argentina

- Argentina is the second largest economy in South America. It is an upper-middle-income country, and ranked as the 31st largest global economy in 2021 (Cebr World Economic League Table, 2022).
- In 2021, total efficiency savings for businesses and consumers, through the use of real-time payments, generated benefits worth $2.7 million. This was led by the reduction in the payments system cost, accounting for 73% of this total. On a per transaction basis, real-time payments in Argentina in 2021 had an 11% lower average payment cost, compared to non-instant payments. Under current adoption rates of real-time payments, this represented a cost saving of $2.0 million.
- This relatively low benefit compared to other economies of a similar size is driven by the fact that as of 2021 the country has a predominantly paper-based payment mix (67.7% of all transactions). Real-time payments accounted for only 0.2% of all transactions.
- At the macroeconomic level, these benefits amounted to $15.3 million in 2021 (<0.01% of formal GDP), with the increase driven by real-time payments formalising $15.0 million of shadow economy activity through reduced cash usage.
- It is estimated that the share of real-time transactions will increase by more than ten-fold by 2026, to 2.2%. At the business and consumer level, net efficiency savings increase to $50 million. Ultimately, the forecasted macroeconomic impact of real-time is estimated to be $183 million of economic output (0.03% of formal Argentinian GDP) in 2026, equivalent to that produced by 4,969 workers, annually.
- The untapped benefits of adopting 100% real-time payments were estimated to yield potential additional savings of $2,752 million for businesses and consumers in 2021, while the theoretical maximum level of additional economic output that real-time payments could have facilitated stood at $19,251 million (4.1% of GDP) in the same year. Combining those additional benefits with the current benefits, 100% real-time payments utilisation could have brought a total benefit of $2,755 million to consumers and benefits, and supported a total of $19,267 million in Argentinian GDP.
- By 2026 the maximum additional benefits for businesses and consumers will rise to $3,040 million, annually. This contributes to the theoretical maximum level of additional economic output that real-time payments could facilitate rising to $29,437 million, or 4.0% of formal GDP.
- Between 2021 and 2026 we estimate that for Argentina, based on respective real-time adoption rates in each year, the realised share of the maximum attainable macroeconomic benefits rises from 0.1% to 0.6%.

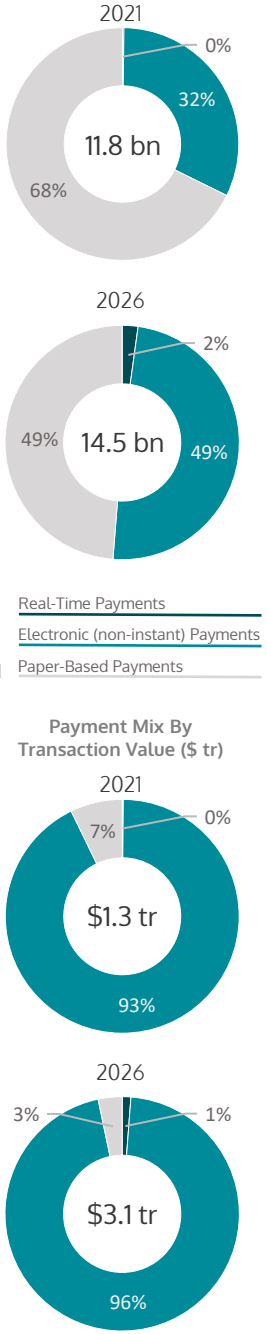
Net Efficiency Savings for Businesses and Consumers



Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)

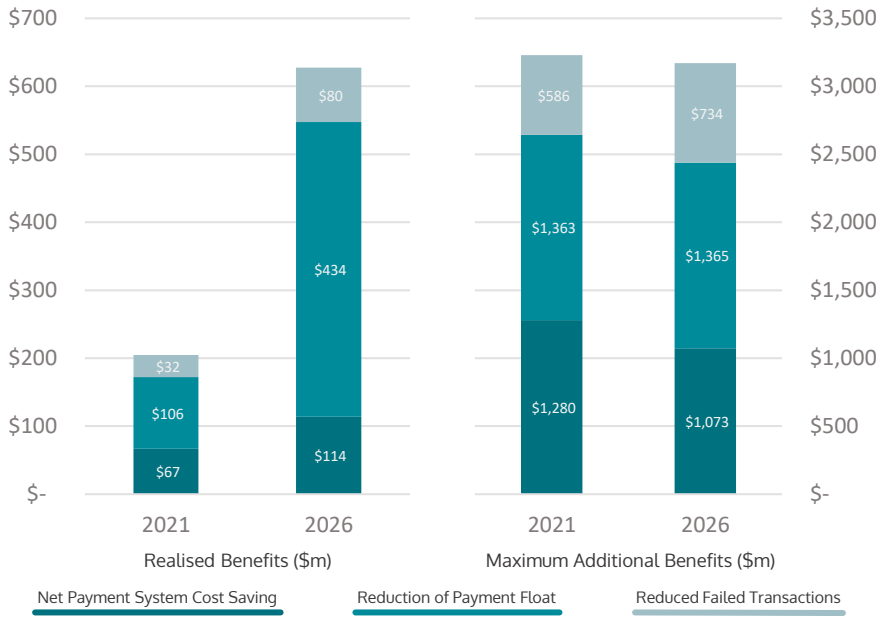


Payment Mix By Transaction Value ($ tr)

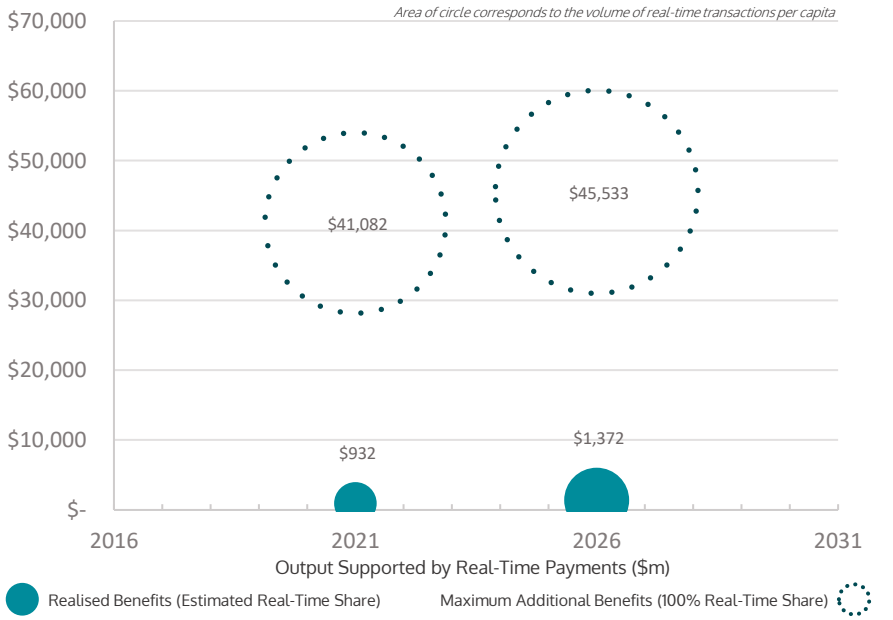
Australia

- As of 2021, Australia is estimated to have ranked as the 13th largest global economy and is classified as a high-income country (Cebr World Economic League Table, 2022).
- The 2021 share of real-time payments (5.2% of all transactions) led to a total estimated efficiency saving of $205 million for businesses and consumers, driven principally by reduction in the payment float. Based on these real-time adoption rates in Australia, instant payments unlock a total transaction value of $2,933 million per day, through a reduced float time. This working capital facilitates an estimated $106 million of business output in the same year.
- With regards to the realised aggregate economic benefits in 2021, real-time transactions support economic output equivalent to 0.06% of GDP ($932 million), or the output of 7,512 workers, annually.
- Forecasts to 2026 estimate that real-time payments will represent 9.9% of the payment mix following a CAGR of real-time transactions of 19.9% over the five-year period. In the same year, total estimated efficiency saving for businesses and consumers reach $628 million. This subsequently contributes to the realised macroeconomic benefits of real-time payments increasing to $1,372 million (0.07% of formal GDP).
- If all transactions were real-time in 2021, we estimate that the theoretical maximum cost saving for businesses and consumers could increase by an additional $3,230 million, to a total of $3,434 million. This maximum potential increase decreases slightly to $3,171 million in 2026, as real-time adoption increases, and a greater share of that theoretical benefit is already realised.
- Similarly, between 2021 and 2026 we estimate that for Australia, the realised share of the maximum potential macroeconomic benefits of real-time payments rises from 2.2% to 2.9%.
- This represents a maximum of $41,082 million and $45,533 million of additional economic output in 2021 and 2026, respectively. These latter figures are equivalent to a 2.5% and 2.4% addition to formal GDP in Australia under full real-time adoption.

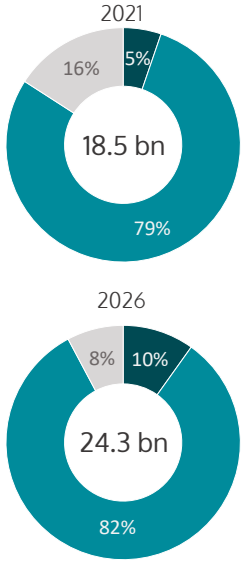
Net Efficiency Savings for Businesses and Consumers



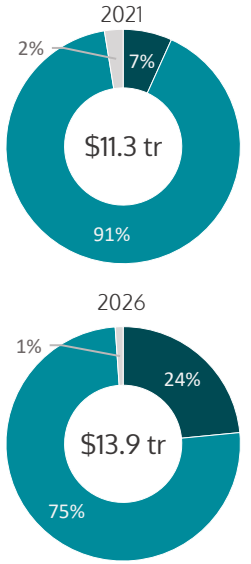
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



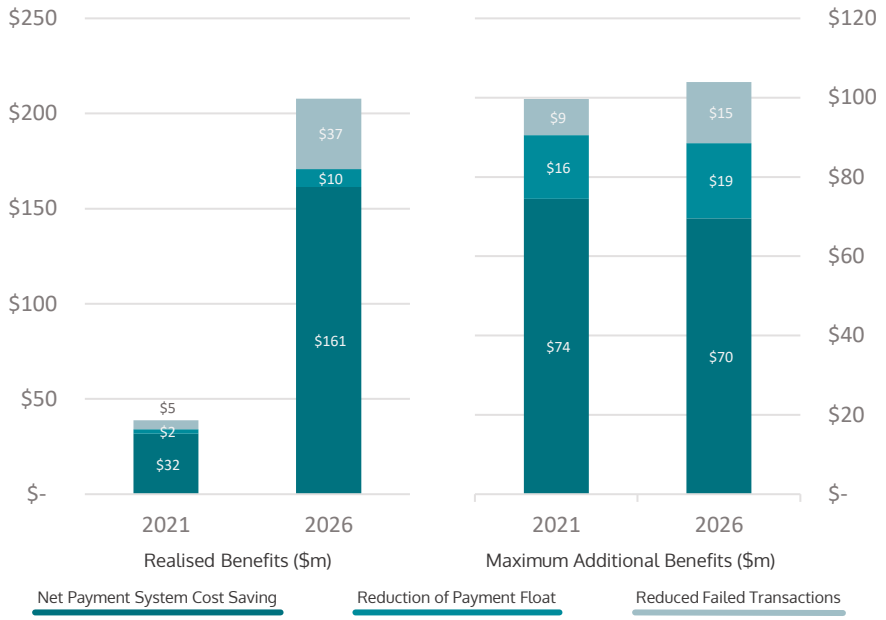
Payment Mix By Transaction Value ($ tr)



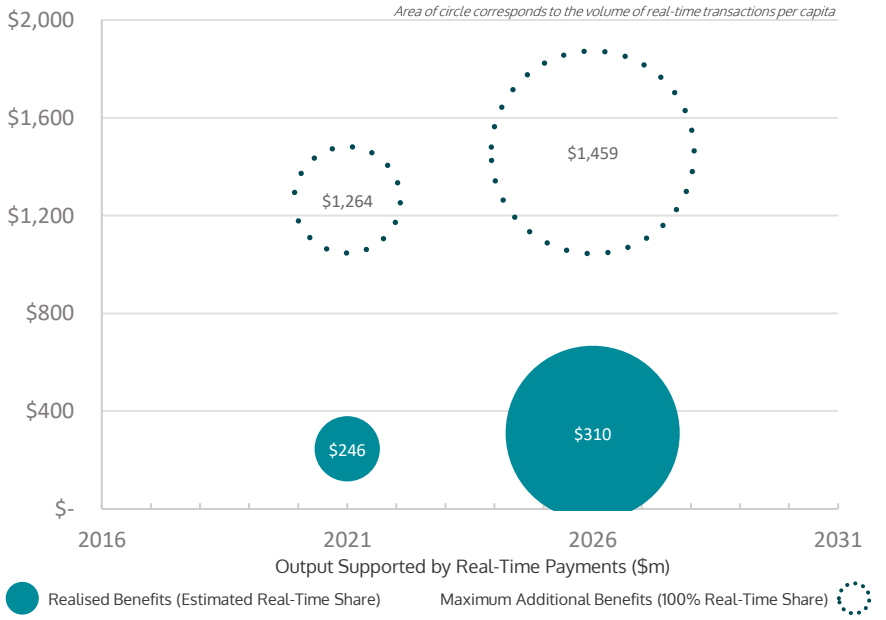
Bahrain

- Situated in the Persian Gulf, The Kingdom of Bahrain is a high-income island nation and ranked as the 93rd largest global economy in 2021 (Cebr World Economic League Table, 2022).
- Bahrain demonstrates a unique payments system network where the volume of real-time payments accounts for the largest share (34.2%) of transactions by volume, followed by paper-based payments (33.8%) and non-instant electronic payments (32.0%) in 2021.
- This means that compared to other countries, a relatively significant share of the maximum benefits are already realised. The adoption of real-time payments yields Bahraini businesses and consumers benefits of $39 million in 2021, predominantly driven by net payment system cost savings. On a per transaction basis, real-time payments in Bahrain had a 32.9% lower average payment cost, compared to non-instant payments. Based on 2021 adoption rates, this represents a cost saving of $43.1 million for consumers and businesses across the country.
- At the macroeconomic level, these benefits amounted to $246 million of economic output in 2021. This is equivalent to the output of 6,250 workers, annually and represents a 0.63% share of formal GDP.
- The strong forecasted real-time uptake results in realised business and consumer level benefits reaching $208 million in 2026. This subsequently stimulates $310 million in economy-wide benefits (0.68% of formal GDP); equivalent to the output of 7,732 workers, annually.
- High real-time volumes in Bahrain result in the already realised share of the maximum attainable economic benefits from instant payments being relatively large, compared to other countries. In 2021, we estimate that Bahrain captured 16.3% of the maximum attainable macroeconomic benefits of real-time payments, the largest share in our sample in that year. By 2026, this share is forecasted to rise further to 17.5%.
- In monetary terms, the theoretical maximum further level of economic output that real-time payments could facilitate was $1,264 million in 2021 and $1,459 million in 2026; equivalent to a 3.1% addition to formal GDP in Bahrain as a result of full real-time adoption in both years.
- Broken down, if all transactions took place through the real-time payments system in Bahrain, the maximum additional benefit to businesses and consumers was an estimated $100 million in 2021, rising to $104 million by 2026. Combining these with the current and forecasted benefits of existing real-time utilisation rates, consumers and businesses could benefit by a total of $138 million and $312 million in 2021 and 2026 respectively.

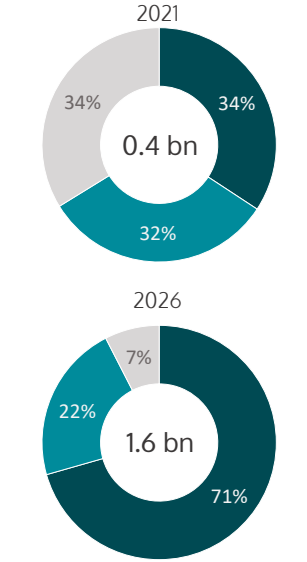
Net Efficiency Savings for Businesses and Consumers



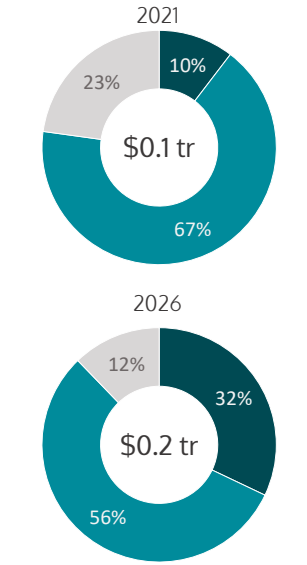
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



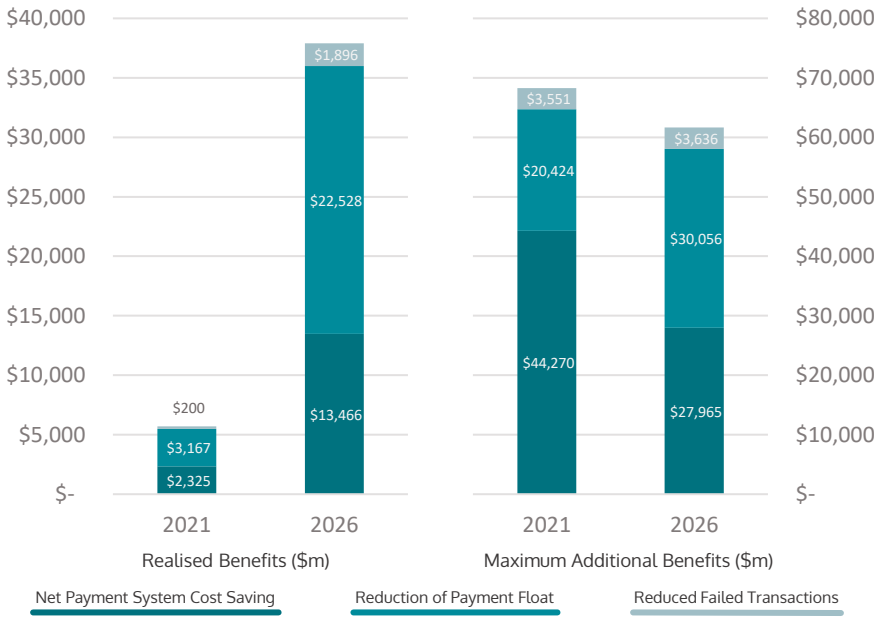
Payment Mix By Transaction Value ($ tr)



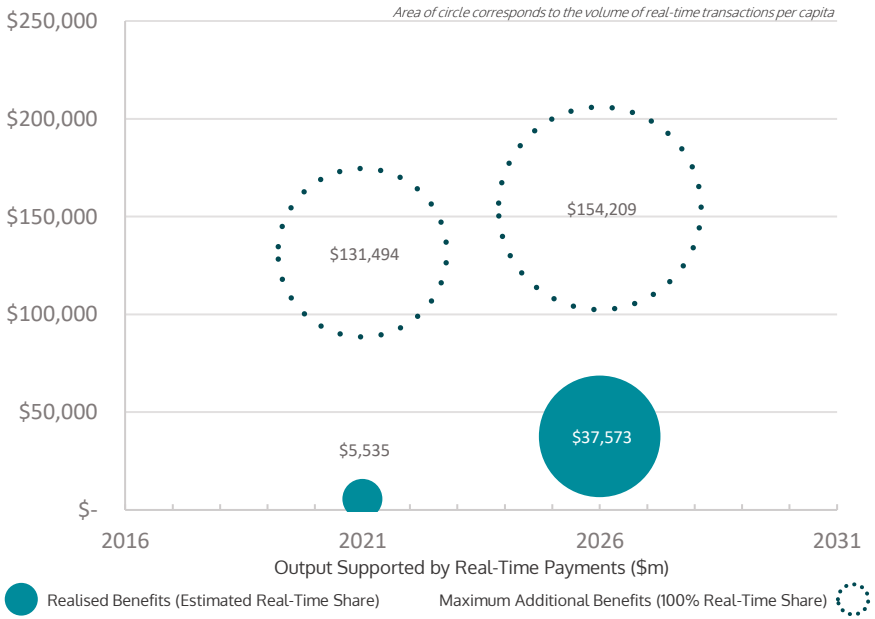
Brazil

- Brazil ranked as the 11th largest global economy in 2021 – the largest South American economy – and is an upper-middle income country (Cebr World Economic League Table, 2022).
- Real-time payments generated business and consumer level benefits of $5,692 million in 2021, the third largest in our sample. The largest contribution to this total was from the reduction in payment float costs. Based on current real-time adoption rates in Brazil, instant payments unlocked a total transaction value of $8,391 million per day in 2021 through a reduced float time. This working capital facilitated an estimated $3,167 million of business output in the same year.
- At the macroeconomic level, the realised benefits in 2021 were estimated at $5,535 million, equivalent to 0.34% of formal GDP or the output of 287,209 jobs.
- However, these economic impacts are expected to rise drastically by 2026 as real-time's share of the payment mix in Brazil rises to 34.3% from 5.2% in 2021. This expansion is mirrored by a significant spurt in realised benefits. The benefits at the business and consumer level rise to $37,890 million, while macroeconomic efficiency gains total $37,573 million in 2026. This is a figure equivalent to 2.08% of formal GDP or the output of 1.9 million workers and in absolute terms is an impact more than seven times larger compared to 2021.
- With full real-time adoption, there are significant additional macroeconomic benefits that could be unlocked in Brazil. Total business and consumer level benefits could increase by a further $68,245 million; a significant increase above the realised benefits due to the payment mix in 2021 being characterised by a dominant share of paper-based payments (65.2%). Full real-time adoption could contribute to an additional 7.4% of formal GDP ($131,494 million of national output) if all transactions were processed instantaneously, supporting the equivalent output of 6,296,546 additional jobs.
- In 2021, the realised share of the maximum attainable macroeconomic benefits from real-time payments was 4.0%. As real-time's share of the payment mix in Brazil is forecast to significantly rise by 2026, so does its realised share of the maximum potential macroeconomic benefits, with this metric reaching 19.6% in the same year.
- Regarding the scale of the maximum additional benefits in 2026 for Brazil, business and consumer level benefits could increase further by$61,657 million, reaching a total of $99,547 million. An additional economic benefit of $154,209 million could be attained; a 7.7% addition to formal GDP.

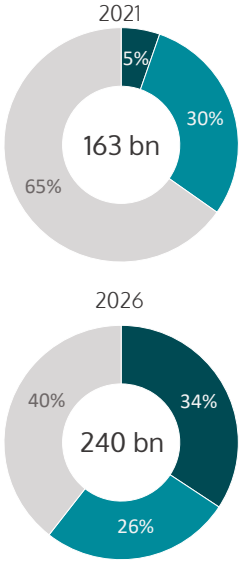
Net Efficiency Savings for Businesses and Consumers



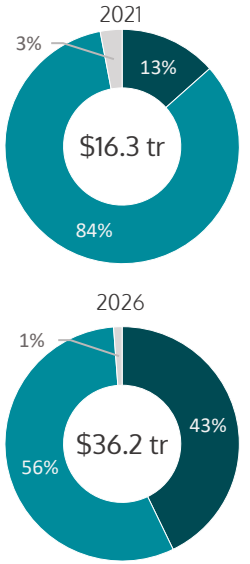
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



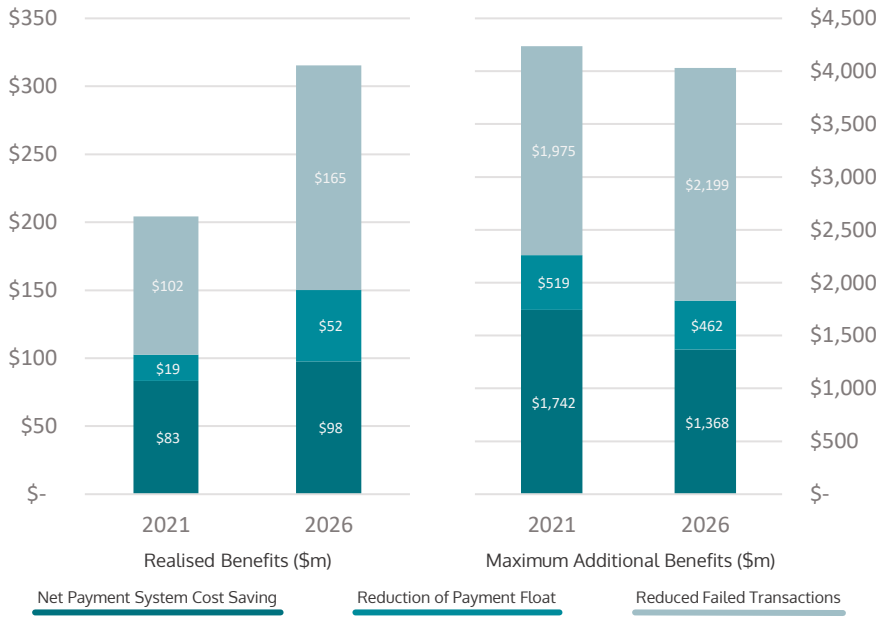
Payment Mix By Transaction Value ($ tr)



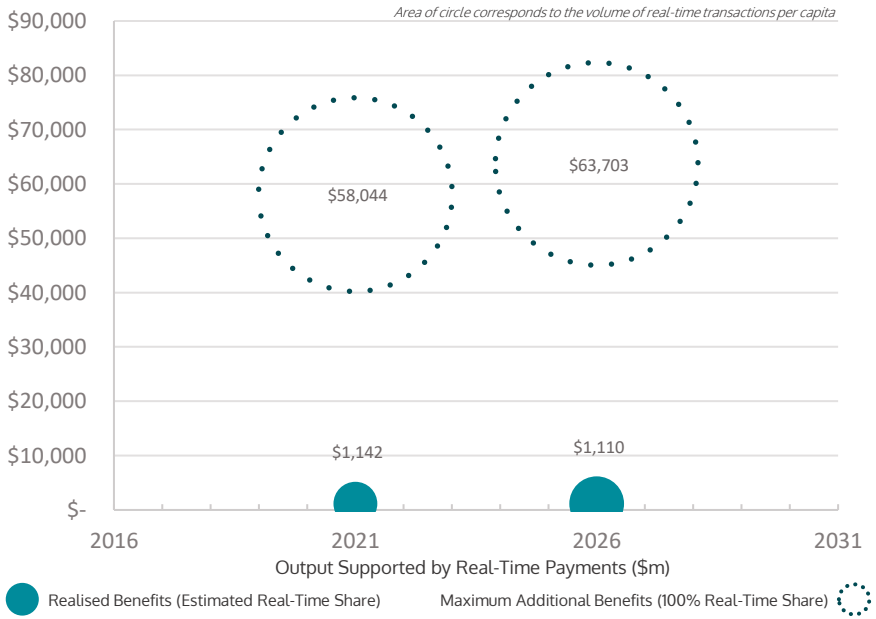
Canada

- Canada is a high-income country ranked as the 9th largest global economy in 2021 (Cebr World Economic League Table, 2022).
- Supported by a relatively typical real-time payment mix share for an advanced economy (4.9% of all transactions), in 2021, the net benefits of real-time payments for businesses and consumers hit $204 million. The largest component of this was net savings through the reduction of failed transactions. Failed transactions generated an associated annual cost of $118.5 billion, borne by financial institutions, consumers, and other businesses across the globe. In Canada specifically, we estimate the total cost of failed transactions to be $1,975 million per year. However, by reducing the probability that a transaction fails, real-time payments saved these stakeholders from an additional $102 million of payment failure costs in 2021.
- Based on forecasted adoption rates to 2026, real-time payments are anticipated to account for 7.0% of the payment mix. The resulting net benefits of real-time payments for businesses and consumers are expected to increase moderately to $315 million by the same year.
- At the macroeconomic level, the real-time payments system was estimated to support economy-wide benefits worth $1,142 million in 2021; equivalent to 0.06% of GDP or the output of 10,966 workers. This is forecasted to drop marginally to $1,110 million (0.05% of GDP) by 2026.
- The cause of this slight decline is because of the reduced impact that real-time payments are expected to have in the formalisation of shadow economy activity. Cash usage is expected to be low in 2026 across Canada, with electronic (non-instant) payments accounting for almost 83% of all transactions. Therefore, the degree to which real-time payments are displacing paper-based instruments is limited compared to 2021. As a result, there is a fall in the absolute value of informal activity that real-time payments are credited for formalising.
- If the payment infrastructure was fully instantaneous, theoretical additional business and consumer level benefits are predicted to amount to $4,236 million in 2021, dropping to $4,029 million in 2026. This decline in the potential additional benefit is driven by a greater share of the maximum theoretical benefit already being forecast to be realised by 2026, as the real-time payments share increases. Summing up the realised and potential benefits, the overall values add up to $4,441 million in 2021 and $4,345 million on 2026.
- The maximum additional macroeconomic benefits for Canada are $58,044 million in 2021 (a formal GDP addition of 2.8%) and $63,703 million in 2026 (a formal GDP addition of 2.7%).
- Between 2021 and 2026 we estimate that for Canada, the realised share of the maximum attainable macroeconomic benefits of real-time payments falls from 1.9% to 1.7%.

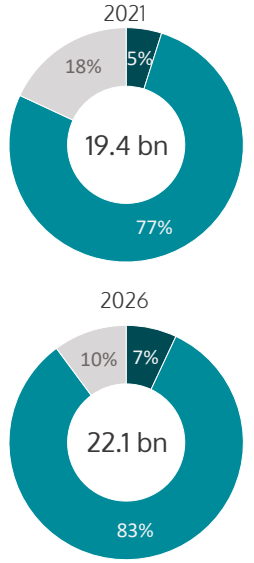
Net Efficiency Savings for Businesses and Consumers



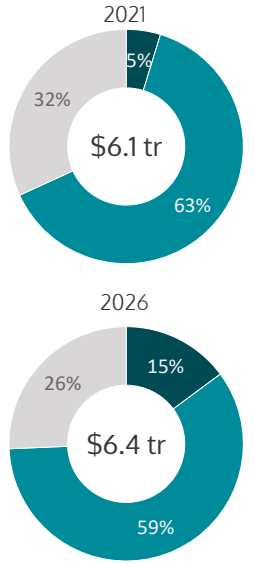
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



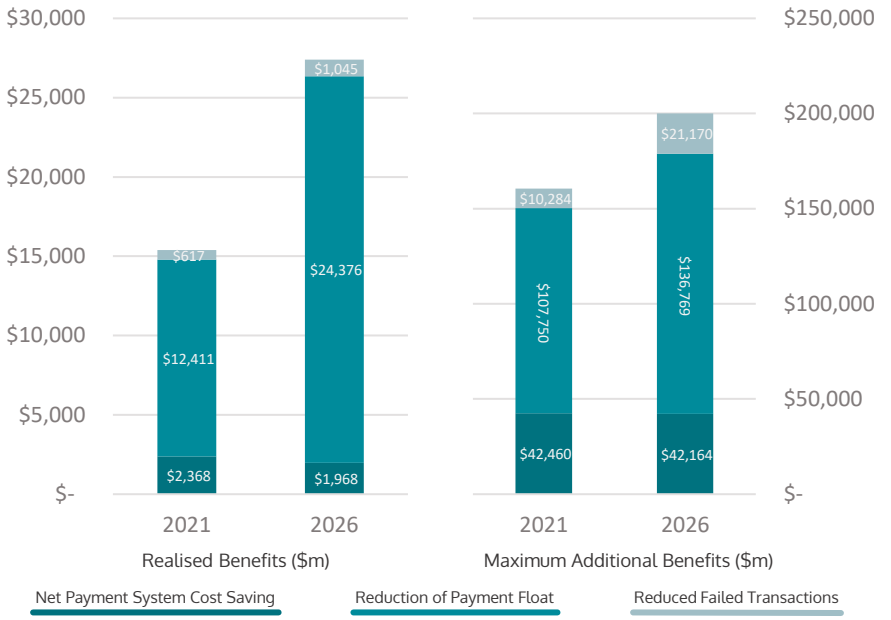
Payment Mix By Transaction Value ($ tr)



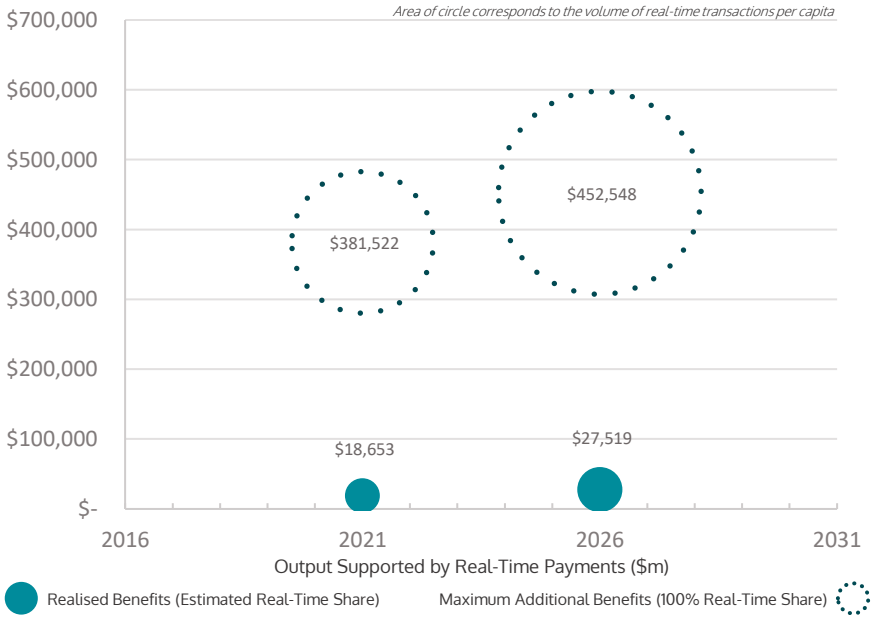
China

- China is classified as an upper-middle-income country that ranked as the 2nd largest global economy in 2021 (Cebr World Economic League Table, 2022).
- In 2021, net benefits for businesses and consumers of real-time payments hit $15,397 million, supported by real-time accounting for 5.7% of all transactions. The largest component of this was net savings through a reduction in the payment float, subsequently unlocking working capital for businesses. Based on current real-time adoption levels in China, instant payments unlocked a total transaction value of $170,800 million per day in 2021 through a reduced float time. This working capital facilitated an estimated $12,411 million of business output in the same year.
- The macroeconomic benefits in 2021 of current real-time adoption rates were estimated to be $18,653 million of formal economic output. This is equivalent to 0.11% of Chinese GDP, or the output of 853,695 workers, annually.
- By 2026, business and consumer level benefits rise to $27,389 million (again with the reduction in the size of the payment float accounting for the largest contribution to this), despite the 2026 real-time share of all transactions dropping to 4.7% in relative terms. Based on 2026 adoption estimates, the forecasted macroeconomic benefits in 2026 are estimated to be $27,519 million of economic output (0.13% of forecasted formal GDP).
- When it comes to the untapped benefits of real-time through a theoretical 100% real-time adoption, in 2021 there was an additional $160,495 million of efficiency savings which Chinese businesses and consumers could have enjoyed. This figure is forecasted to increase to a maximum of further $200,103 million of additional agent-level gains in 2026. Summing these further gains with those already realised due to current levels of real-time adoption, the maximum theoretical consumer and business level gains stand at $175,892 million and $227,492 in 2021 and 2026 respectively.
- Furthermore, we estimate that there was $381,522 million in additional economic output that China could have unlocked in 2021 if all payments were real-time, which would have supported an additional 2.2% of formal GDP (equivalent to the output of an additional 17 million workers). In 2026, the maximum additional macroeconomic benefit is forecasted to also increase to $452,548 million (an additional 2.0% of formal GDP).
- Between 2021 and 2026 we estimate that for China, the realised share of the maximum attainable macroeconomic benefits of real-time payments rises from 4.7% to 5.7%.

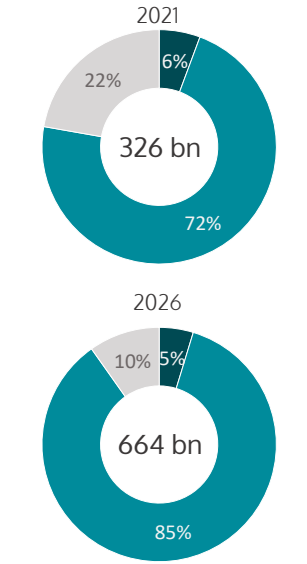
Net Efficiency Savings for Businesses and Consumers



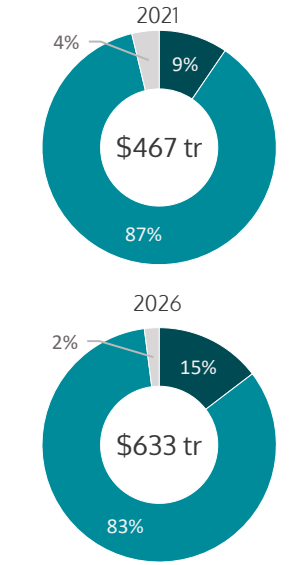
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



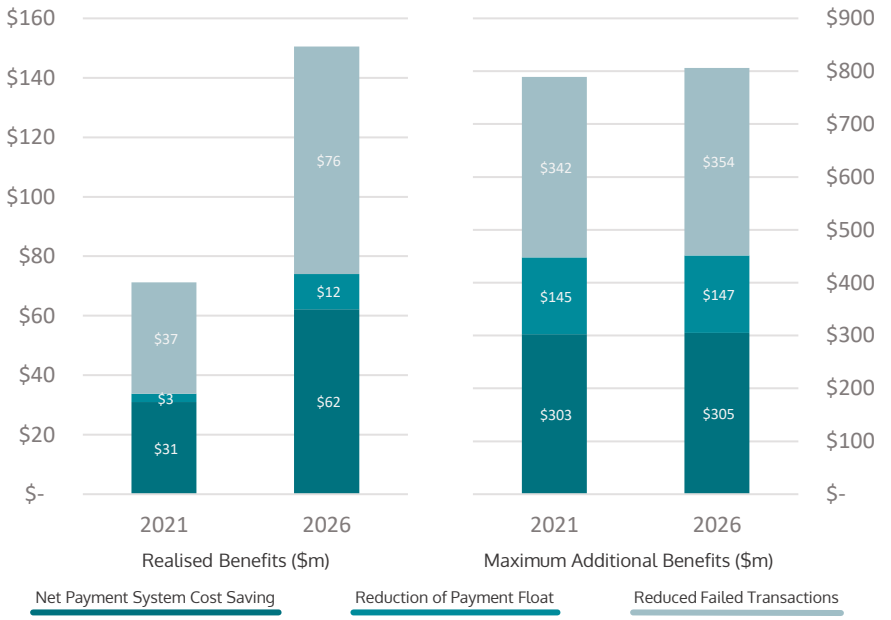
Payment Mix By Transaction Value ($ tr)



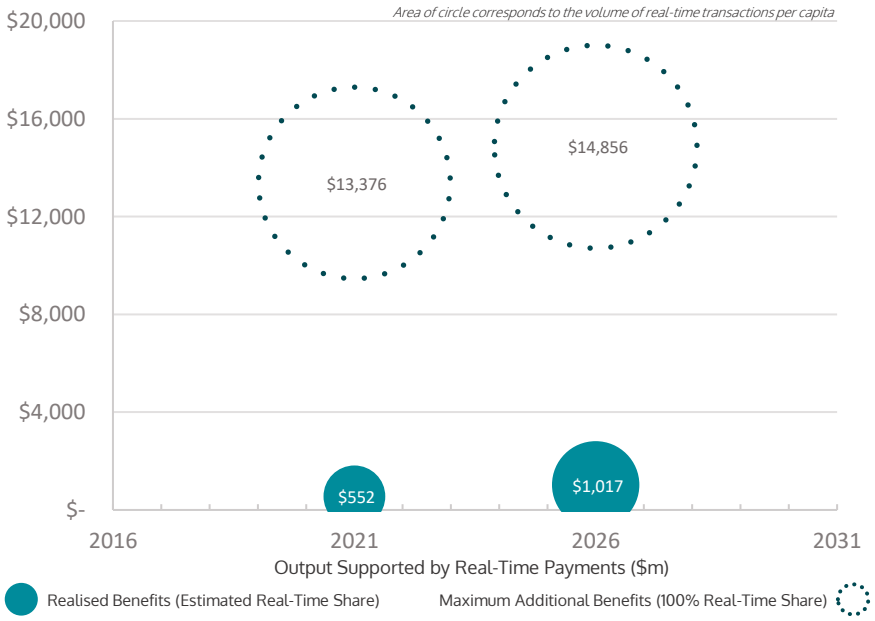
Denmark

- Denmark ranked as the 35th largest global economy in 2021 and is classified as a high-income country (Cebr World Economic League Table, 2022).
- The current share of real-time payments (9.9% of all transactions in Denmark) led to an estimated efficiency saving of $71 million for businesses and consumers, driven principally by a reduction in the costs associated with failed transactions. Failed transactions generated an associated cost of $118.5 billion annually, borne by financial institutions, consumers, and other businesses across the globe. In Denmark specifically, we estimate the total cost of failed transactions to be $342 million per year. However, real-time payments saved these stakeholders from an additional $37 million of payment failure costs in 2021. With regards to the realised aggregate economic benefits in 2021, real-time transactions contributed to 0.14% of GDP ($552 million), or the output of 4,013 workers, annually.
- Forecasts to 2026 estimate that the efficiency saving for businesses and consumers grow to $151 million. This is in line with the forecast CAGR of real-time transactions of 15.3% over the five-year period, by 2026 real-time payments are estimated to represent 17.8% of the payment mix. These impacts contribute to the realised macroeconomic benefits of real-time almost doubling to $1,017 million (0.23% of formal GDP).
- If all transactions took place through the real-time payment infrastructure in Denmark, in addition to the current benefits, the maximum additional benefit for businesses and consumers was an estimated $789 million in 2021, contributing to a maximum of $13,376 million in additional output (equivalent to an additional 3.3% of formal GDP), in the same year. Summing the current and potential further benefits associated with full real-time utilisation, consumer and business benefits could have totalled $861 million, while a total of $13,928 million in Danish GDP could have been facilitated.
- Looking forwards to 2026, maximum additional business and consumer level benefits will increase by 2% to $806 million, while the maximum additional macroeconomic benefit will rise to $14,856 million of economic activity; again, a 3.3% addition to formal GDP in 2026.
- Between 2021 and 2026 we estimate that for Denmark, the realised share of the maximum attainable macroeconomic benefits of real-time payments rises from 4.0% to 6.4%.

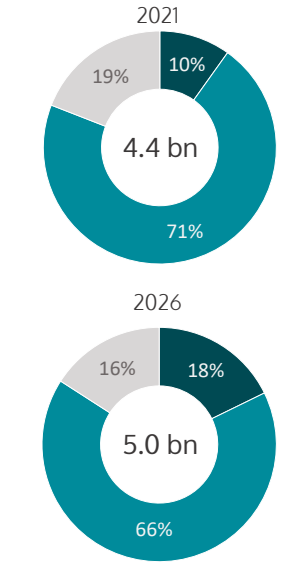
Net Efficiency Savings for Businesses and Consumers



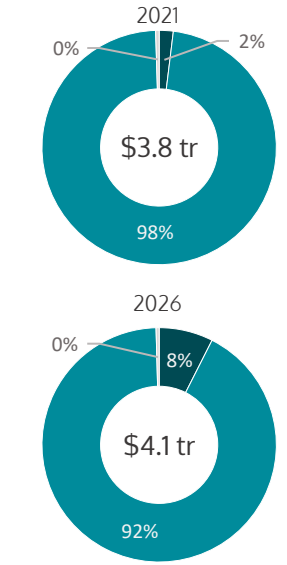
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



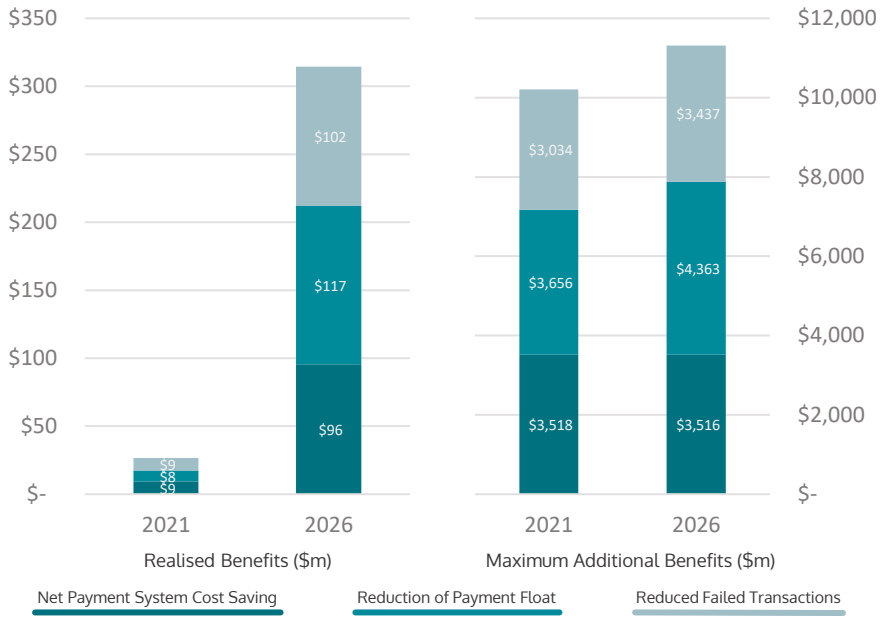
Payment Mix By Transaction Value ($ tr)



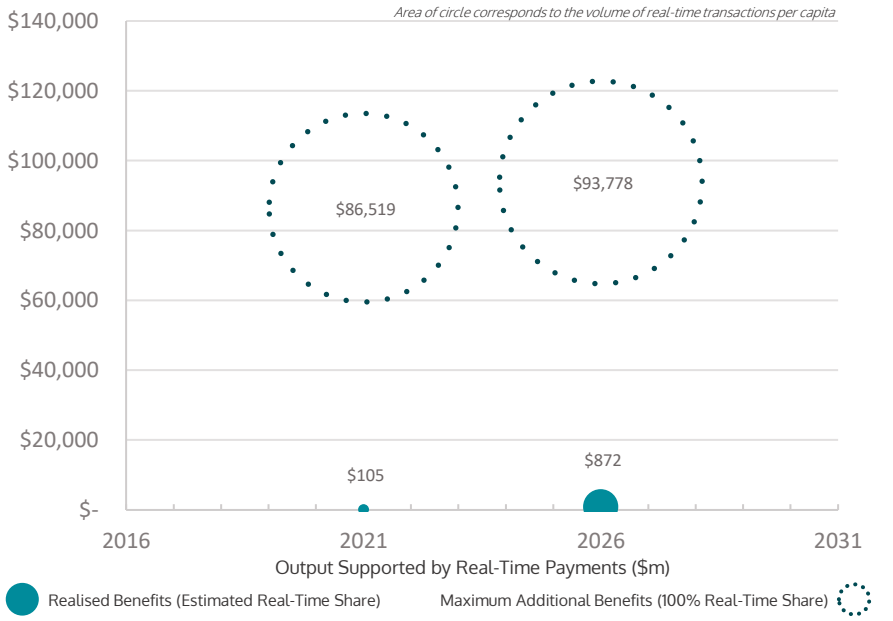
France

- France is classified as a high-income country and ranked as the 6th largest global economy in 2021 (Cebr World Economic League Table, 2022).
- However, considering that France is one of the largest economies in the world, real-time payment usage remains low as of 2021, accounting for just 0.3% of total transaction volumes. As a result, the current overall economic impact is relatively limited, while the untapped potential is significant.
- In 2021, net benefits for businesses and consumers reached $27 million (less than 8% than that of the Netherlands), supporting $105 million of the total national output (<0.01% of formal GDP).
- The primary factor generating these benefits was the ability for real-time payments to formalise activity in the shadow economy by reducing cash usage. Given the scale of the French economy, the country's 14% shadow economy share represented an estimated $407 million of informal output in 2021. Despite the relatively small transaction share of real-time payments in France, they have the ability to formalise a relatively large level of informal economic activity ($94 million, annually).
- Looking forward to 2026, approximately 2.9% of the payment mix is anticipated to be real-time. While still modest, this increases the anticipated economic benefits for businesses and consumers more than ten-fold to $315 million. The economy-wide impact also rises significantly to $872 million, representing a 0.03% share of forecasted formal French GDP, or the equivalent output supported by 7,725 additional jobs in 2026.
- The untapped benefits of adopting 100% real-time payments were estimated to yield maximum additional savings of $10,209 million for businesses and consumers in 2021, meaning a total of $10,236 million including the existing savings from current real-time usage. The theoretical maximum level of further economic output that real-time payments could have facilitated stood at $86,519 million (2.9% of GDP) in the same year, resulting in $86,624 million overall.
- However, by 2026 the maximum additional benefits for businesses and consumers will rise to $11,316 million annually, or $11,630 million including benefits which are forecasted to be realised per France's estimated payments mix in the same year. This contributes to the theoretical maximum level of additional economic output that real-time payments could facilitate rising to $93,778 million, or 2.8% of formal GDP, which would bring up the total benefits to $94,650 million.
- Between 2021 and 2026 we estimate that for France, the realised share of the maximum attainable macroeconomic benefits of real-time payments rises from 0.1% to 0.9%.

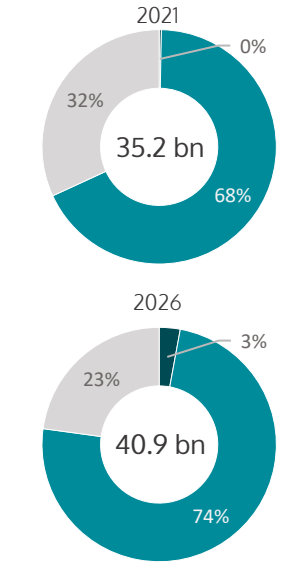
Net Efficiency Savings for Businesses and Consumers



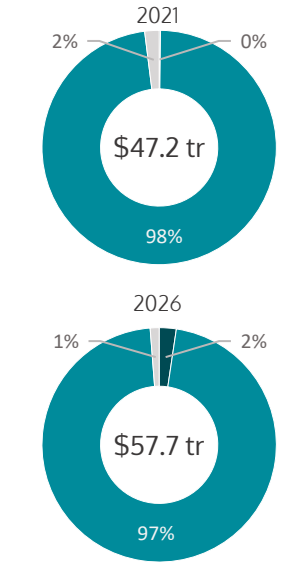
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



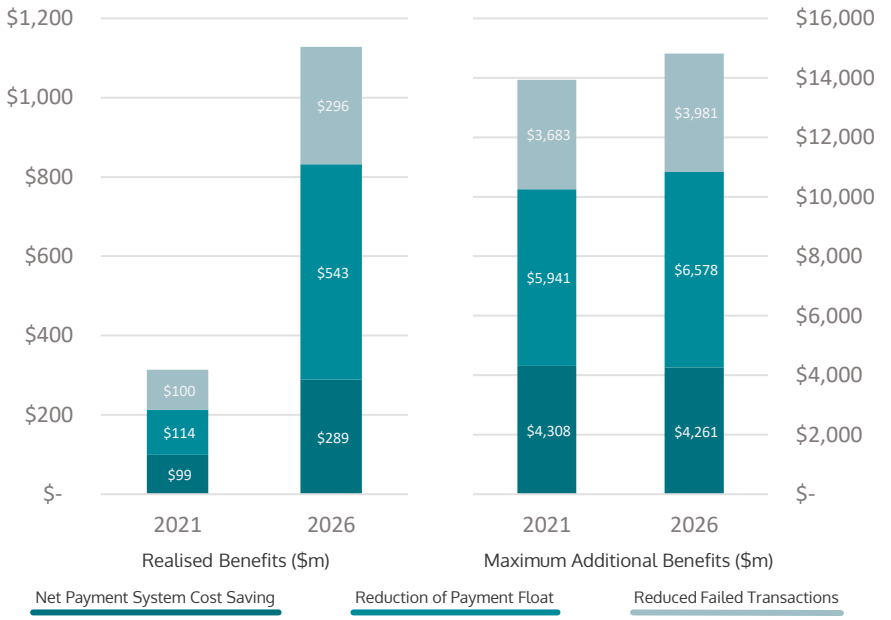
Payment Mix By Transaction Value ($ tr)



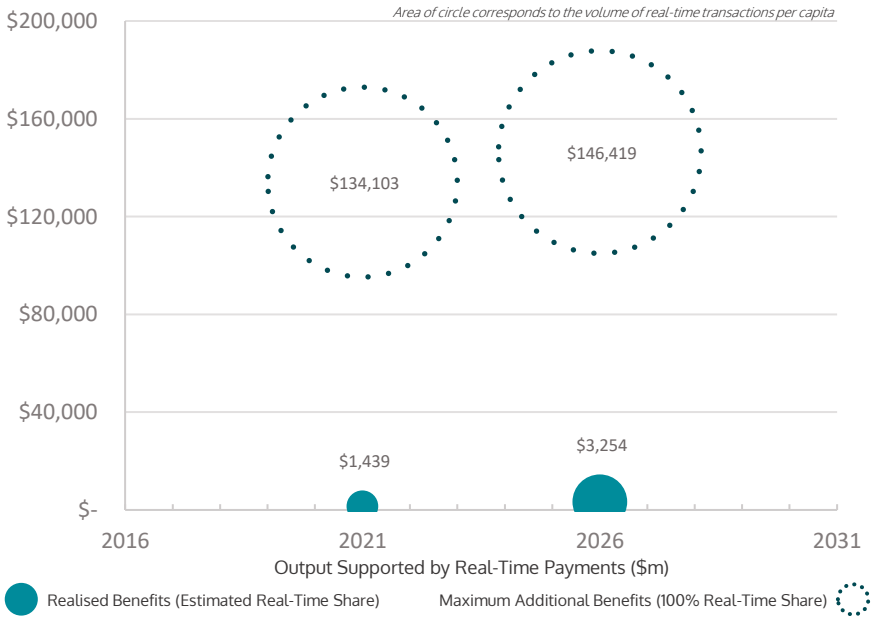
Germany

- Germany – a founding member of the European Union as well as its largest economy – is a high-income country and ranked as the 4th largest global economy in 2021 (Cebr World Economic League Table, 2022).
- With its current share of real-time adoption, German businesses and consumers gain estimated net efficiency saving of $313 million in 2021, which is predominantly driven by a reduction in the payment float. Instant payments unlocked a total transaction value of $4,823 million per day in 2021 through a reduced float time in Germany. This working capital facilitated an estimated $114 million of firm output in the same year.
- As of 2021, the macroeconomic benefits of using real-time payments was an estimated $1,439 million (0.03% of formal GDP); equivalent to the output of 14,525 workers.
- In 2021, the share of real-time payments was recorded at 2.7%, but this is estimated to more than double to 6.9% by 2026. This robust growth in real-time uptake will result in business and consumer level benefits reaching $1,128 million in 2026. This is forecasted to support 0.07% of formal GDP in 2026, or $3,254 million of output; equivalent to the output of 31,074 workers.
- Regarding the untapped benefits of real-time through a theoretical 100% real-time adoption, in 2021 there was an additional unrealised $13,932 million of efficiency savings which German businesses and consumers could have enjoyed. This figure is forecasted to increase further to a maximum of $14,819 million of additional agent-level gains in 2026. Combining these with the current benefits of existing real-time utilisation rates, consumers and businesses could be worth £14,245 million and £15,947 million in 2021 and 2026 respectively.
- Furthermore, we estimate that there was an additional $134,103 million of economic output that Germany could have unlocked in 2021 through full real-time utilisation, which would have supported an additional 3.1% of formal GDP (equivalent to the output of an additional 1.3 million workers). In 2026, the maximum further macroeconomic benefit is forecasted to also increase to $146,419 million (an additional 3.0% of formal GDP).
- Between 2021 and 2026 we estimate that for Germany, the realised share of the maximum attainable macroeconomic benefits of real-time payments rises from 1.1% to 2.2%.

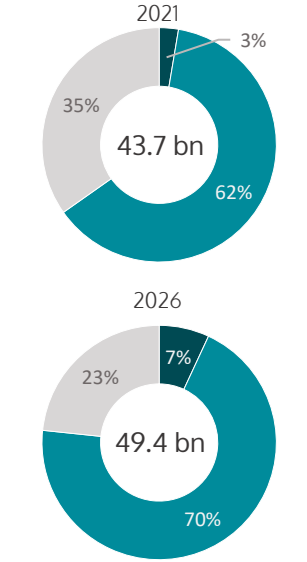
Net Efficiency Savings for Businesses and Consumers



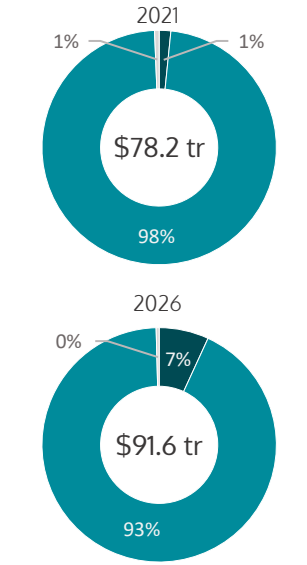
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



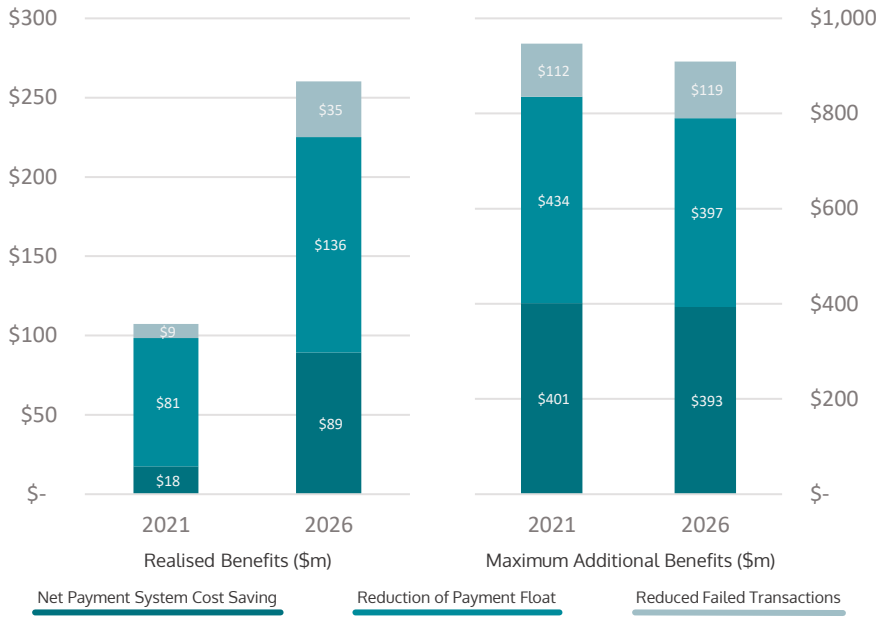
Payment Mix By Transaction Value ($ tr)



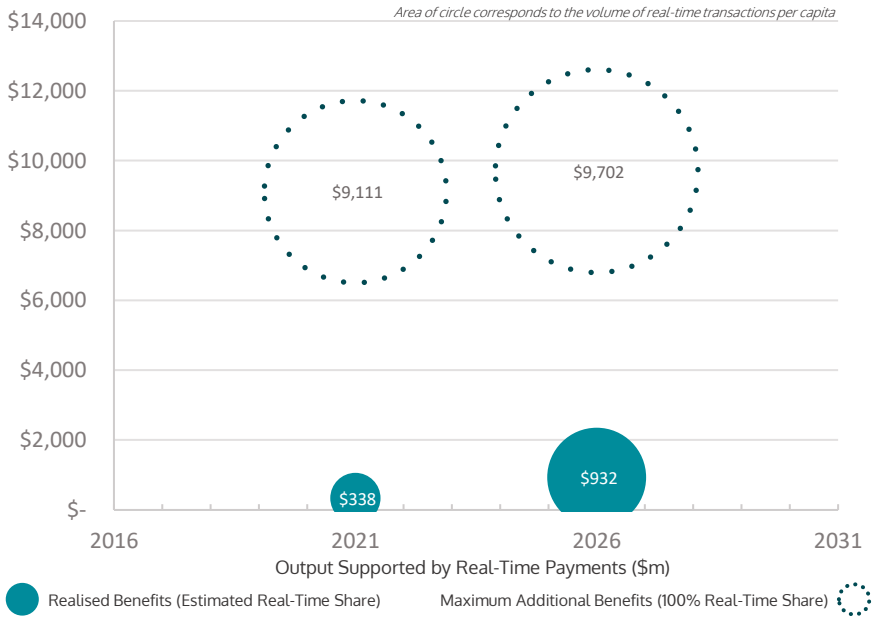
Hong Kong (SAR China)

- Hong Kong had a GDP per capita of $62,839* in 2020, making it one of the richest countries in the world, ranking as the 40th largest global economy in 2021 (Cebr World Economic League Table, 2022). *PPP adjusted.
- With its current share of adoption, Hongkonger businesses and consumers gained estimated net efficiency saving of $107 million; predominantly driven by a reduction in the payment float. Instant payments unlocked a total transaction value of $1,123 million per day in 2021 through a reduced float time in Hong Kong. This working capital facilitated an estimated $81 million of firm output in the same year.
- The share of real-time payments was recorded at 7.3% in 2021, which is estimated to almost triple to 22.8% by 2026. The strong predicted real-time uptake will result in business and consumer level benefits reaching $260 million in 2026.
- The macroeconomic benefits of using real-time payments were an estimated $338 million of economic output (0.09% of formal GDP) in 2021; equivalent to the output of 3,355 workers. In relative terms, this impact is in line with the benefits associated with real-time across China in 2021 (0.11% of Chinese GDP).
- As the share of real-time across the payment mix grows, this is forecasted to support 0.22% of formal GDP in 2026. The scale of this impact is substantial and is equivalent to $932 million of output, annually. Now, in relative terms, this impact significantly outpaces the forecasted benefits associated with real-time across China in 2026 (0.13% of Chinese GDP).
- If all transactions took place through the real-time payments system in Hong Kong, the potential additional benefit to businesses and consumers was an estimated $947 million in 2021. Combining these additional benefits with the realised benefits, 100% real-time payment utilisation could have induced a total benefit of £1,054 million. By 2026, the maximum additional benefits for businesses and consumers are expected to drop to $909 million out of a total benefit of £1,170 million. This is as a result of real-time adoption increasing significantly in the years to 2026, hence a greater share of the theoretical benefit will be realised.
- Equivalently, between 2021 and 2026 we estimate that for Hong Kong, the realised share of the maximum attainable macroeconomic benefits of real-time payments rises from 3.6% to 8.8%.
- Under full real-time adoption, an additional $9,111 million of economic output is forecasted to be supported by real-time, equivalent to an additional 2.4% of GDP in 2021. This could further rise to $9,702 by 2026 (an additional 2.2% of GDP).

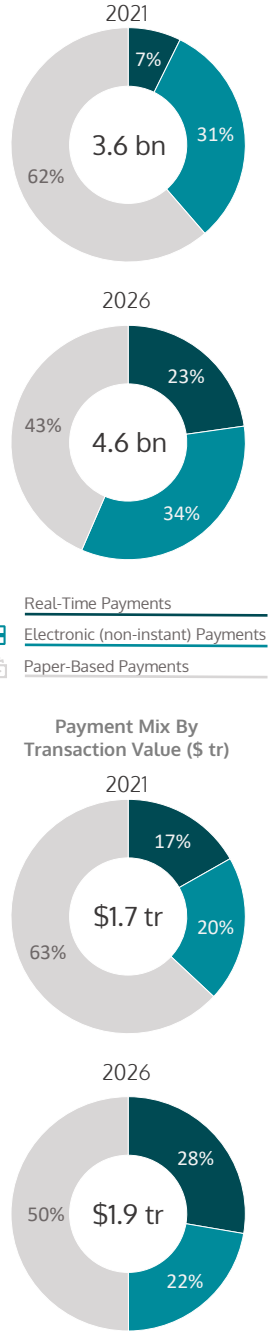
Net Efficiency Savings for Businesses and Consumers



Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)

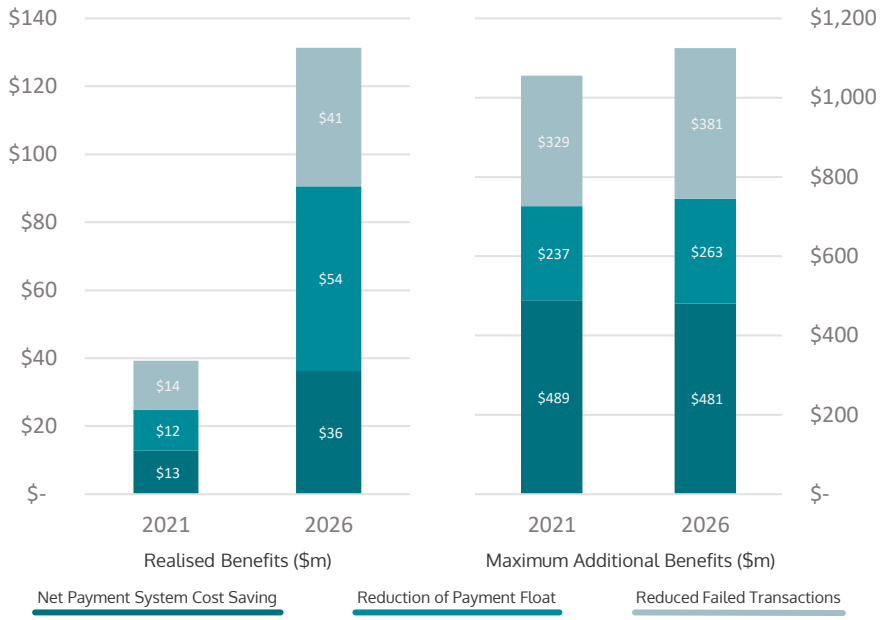


Payment Mix By Transaction Value ($ tr)

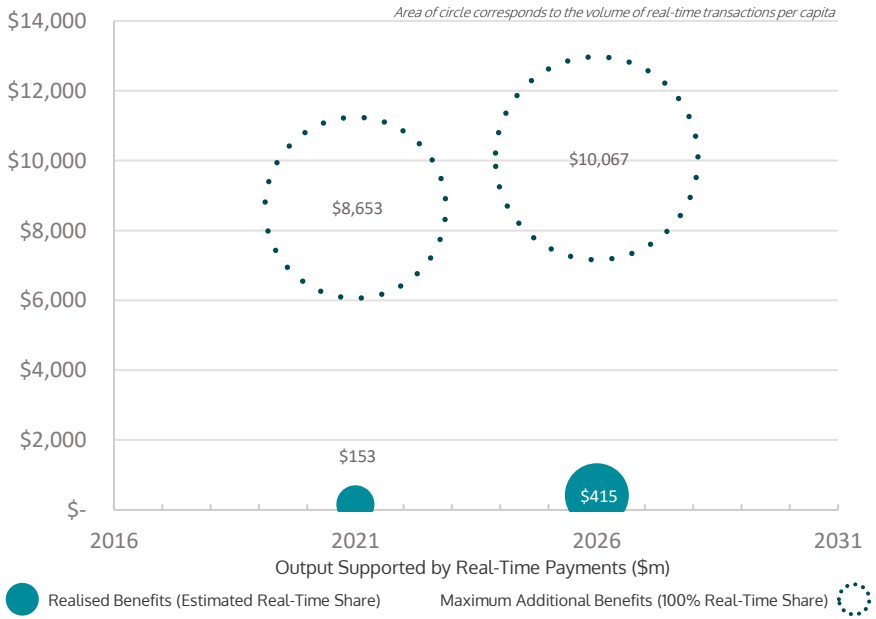
Hungary

- Hungary, a high-income country, ranked as the 56th largest global economy in 2021 (Cebr World Economic League Table, 2022).
- With its current share of real-time adoption, Hungarian businesses and consumers gained estimated net efficiency saving of $39 million in 2021, which is predominantly driven by a reduction in the costs associated with failed transactions. In Hungary, we estimate the total cost of failed transactions to be $329 million in 2021. However, through reducing the probability of failure, real-time payments saved these stakeholders from an additional $14.4 million of payment failure costs.
- In 2021, economy-wide efficiency gains are estimated to facilitate $153 million of economic output (0.08% of formal Hungarian GDP). The country has a relatively young real-time infrastructure with the first scheme launching in 2020. 4.2% of all transactions are real-time accounting for 3.8% of total transaction value in 2021.
- By 2026, the share of real-time payments is estimated to increase by more than double to 9.7%. This robust real-time uptake will result in business and consumer level benefits reaching $131 million in 2026. This is forecasted to support 0.19% of formal GDP in 2026. Compared to other European countries in relative terms, the scale of this impact is above average and is equivalent to $415 million of output, annually.
- When it comes to the untapped benefits of real-time through a theoretical 100% real-time adoption rate, in 2021 there was a total benefit of $1,094 million of efficiency savings for Hungarian businesses and consumers to enjoy. Of this total, Hungarian businesses and consumers realised 3.6%, leaving an additional $1,055 million of additional benefits left untapped.
- By 2026, out of the total benefits of $1,256 million, Hungarian businesses and consumers enjoy 10.5%, suggesting that there is an additional $1,125 million for these stakeholders to take advantage of by increasing real-time payment utilisation.
- The maximum additional macroeconomic benefits for Hungary are $8,653 million in 2021 (a formal GDP addition of 4.6%) and $10,067 million in 2026 (a formal GDP addition of 4.4%).
- Between 2021 and 2026 we estimate that for Hungary, the realised share of the total attainable macroeconomic benefits of real-time payments rises from 1.7% to 4.0%.

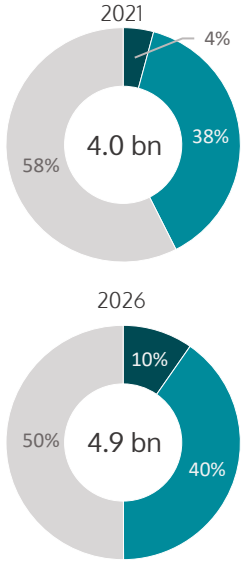
Net Efficiency Savings for Businesses and Consumers



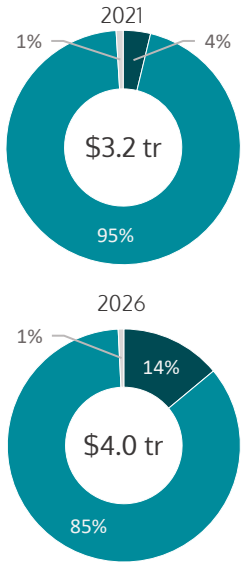
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



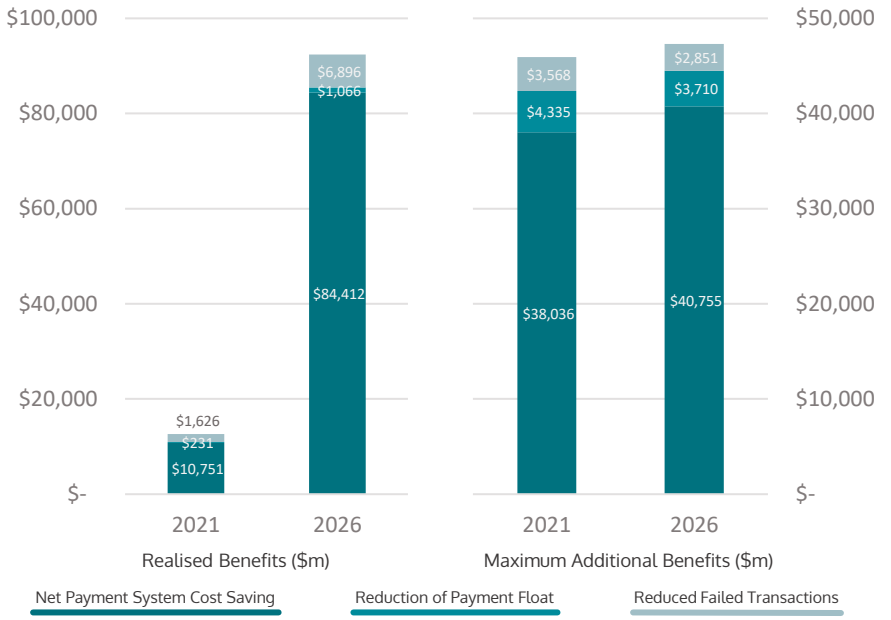
Payment Mix By Transaction Value ($ tr)



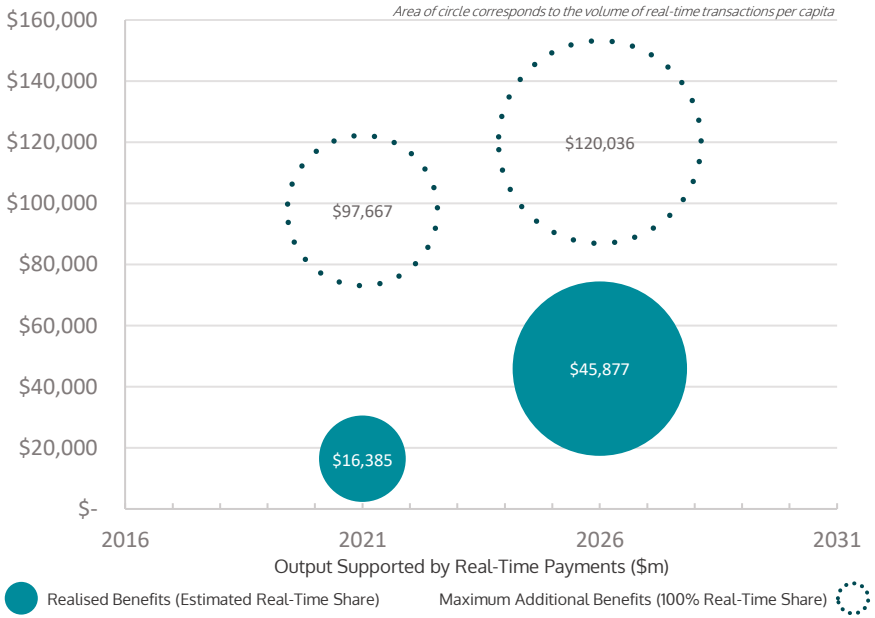
India

- India, the second-most populous country in the world, is classified as a lower middle-income country and in 2021 ranked as the 7th largest global economy (Cebr World Economic League Table, 2022).
- In 2021, India recorded the largest absolute number of real-time transactions in the world at over 48 billion, representing 31.3% of all transactions in the country. Indian businesses and consumers benefited an estimated $12,607 million from the adoption of real-time payments in 2021, which is predominantly driven by net savings in the payments system costs. On a per transaction basis, real-time payments in India had a 22.2% lower average payment cost in 2021, compared to non-instant payments.
- Total business and consumer level benefits contributed to an economy-wide impact of $16,385 million of economic output in 2021 that was supported by real-time payments (0.56% of formal GDP); equivalent to the output of approximately 2.5 million workers.
- The share of all transactions occurring via real-time instruments is expected to increase significantly to 70.7% by 2026. The strong predicted real-time uptake results in realised business and consumer level benefits reaching $92,374 million in 2026. This is forecasted to support 1.12% of formal GDP (an impact of $45,877 million) in 2026. The scale of this impact is extensive and is equivalent to the output of 5.3 million workers, annually.
- If all transactions took place through the real-time payments system in India, the maximum additional benefit to businesses and consumers was an estimated $45,938 million in 2021, rising to $47,317 million by 2026. Combining these with the current and forecasted benefits of existing real-time utilisation rates, consumers and businesses could benefit by a total of $58,545 million and $139,691 million in 2021 and 2026, respectively.
- High real-time volumes in India result in the already realised share of the total attainable economic benefits from instant payments being relatively large, compared to other countries. In 2021, we estimate that India captured 14.4% of the maximum attainable macroeconomic benefits of real-time payments. By 2026, this is forecasted to rise to 27.8%, the largest share in our sample in that year.
- In monetary terms, the theoretical maximum further level of economic output that real-time payments could facilitate was $97,667 million in 2021 and $120,036 million in 2026; equivalent to a 3.2% and a 2.8% addition to formal GDP in India under full real-time adoption, respectively.

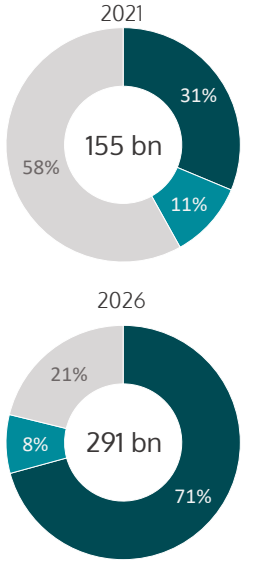
Net Efficiency Savings for Businesses and Consumers



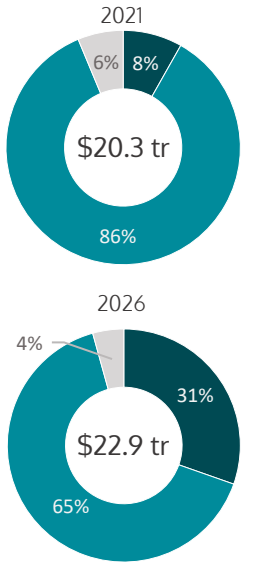
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



Payment Mix By Transaction Value ($ tr)

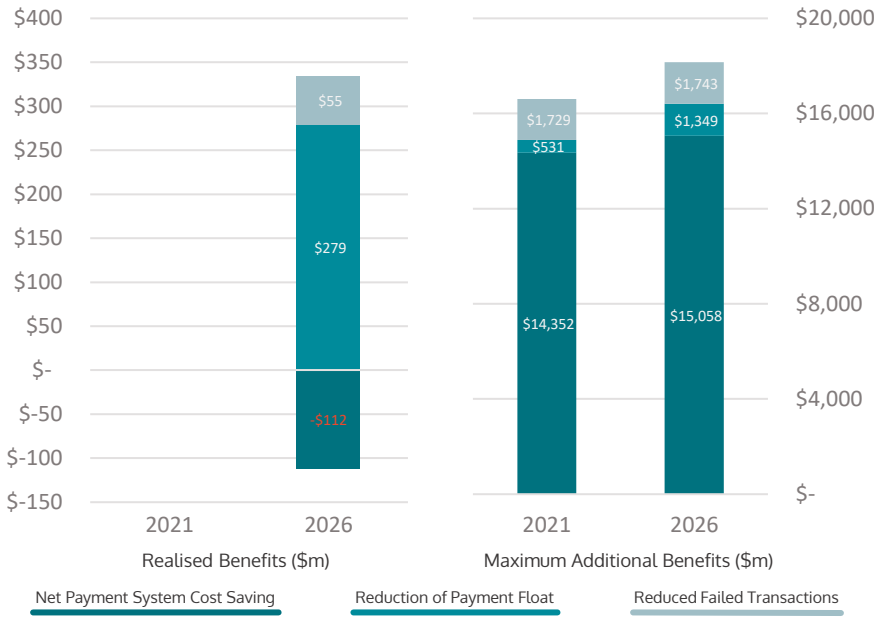


Indonesia

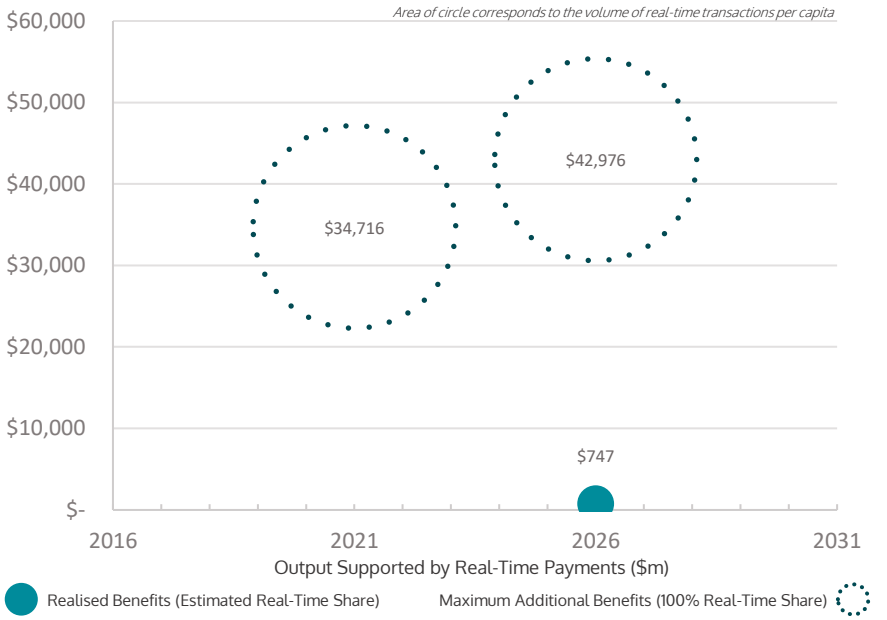
- Indonesia ranked as the 16th largest global economy in 2021 and is classified as a lower middle-income country (Cebr World Economic League Table, 2022).
- With regards to real-time payments, Indonesia's BI-FAST system initially launched late in December 2021, with its full launch in 2022. As a result, there is no economic impact of real-time payments in 2021. However, the hypothetical maximum attainable benefit to Indonesian businesses and consumers from full adoption of real-time payments was estimated at $16,612 million for 2021, while hypothetical macroeconomic gains stood at an additional $34,716 million of economic output (2.9% of GDP) in the same year.
- By 2026, the forecasted share of the payment mix that real-time payments account for is 3.1%, while the majority of transactions are predicted to remain as paper-based instruments (81.1%). Based upon this forecast, businesses and consumers stand to gain a net value of $222 million in 2026. The realised macroeconomic benefits of real-time are anticipated to reach $747 million in 2026, equivalent to the output of 70,412 workers or 0.05% of formal GDP.
- As real-time instruments are introduced into the payment mix, there is an expected net cost increase for the payment system in 2026 of $112 million due to the introduction of real-time. As the new technology is brought in, the high costs per transaction relative to paper-based alternatives mean that real-time payments will not yet create net efficiency gains. However, once real-time instruments mature and become more established in the payment mix, the number of real-time transactions per capita will rise and Indonesia will start to benefit from net cost savings across the payment system.
- By 2026 the maximum additional benefits for businesses and consumers will rise to $18,150 million, annually. This suggests that 1.2% of the total benefit pool of $18,371 million for businesses and consumers will be realised.
- Regarding the theoretical maximum level of additional economic output that real-time payments could facilitate, by 2026 we predict that this addition will rise to $42,976 million from $34,716 million in 2021, representing a 2.7% addition to formal GDP.
- Between 2021 and 2026 we estimate that for Indonesia, the realised share of the total attainable macroeconomic benefits of real-time payments rises from 0% to 1.7%.

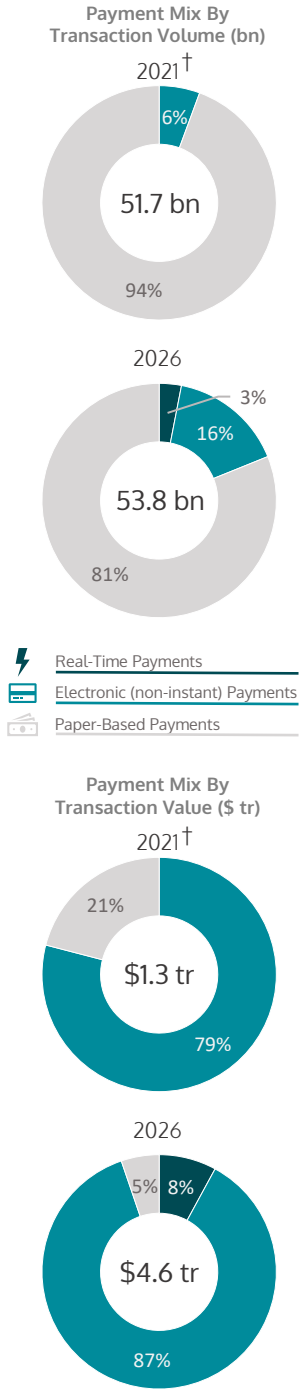
† Payment mix data for Indonesia was not available for 2021. As a result, Cebr analysis based upon GlobalData estimates for the payment mix in Indonesia in 2020 and 2026 were used to interpolate the payment mix estimate for 2021.

Net Efficiency Savings for Businesses and Consumers



Aggregate Macroeconomic Impact

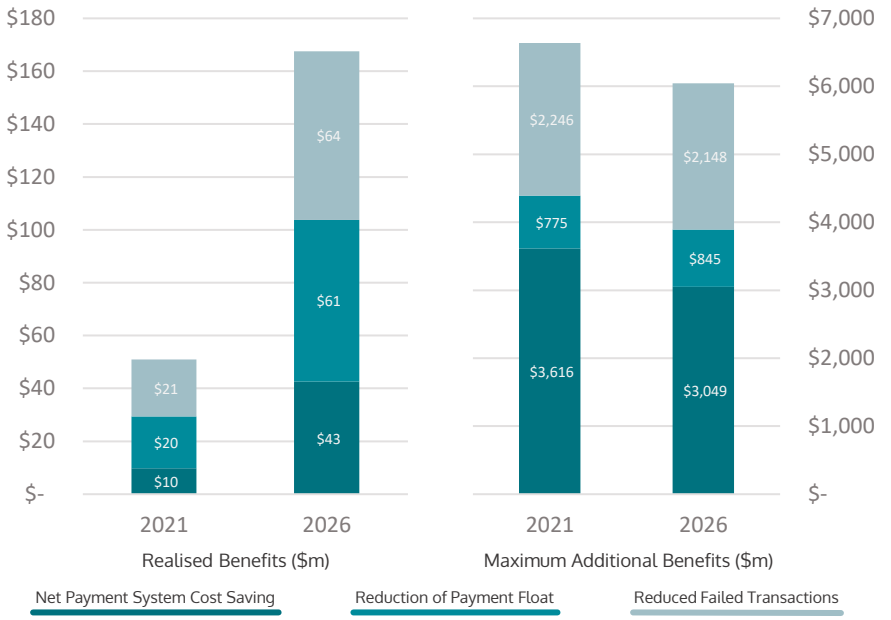




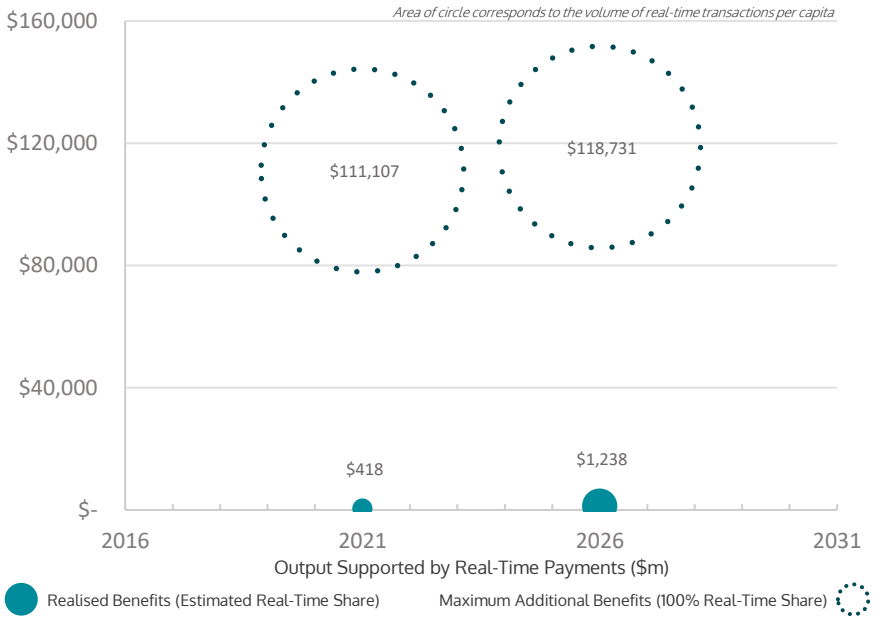
Italy

- In 2021, the Southern European country Italy ranked as the world's 8th largest economy (Cebr World Economic League Table, 2022).
- In contrast to its European peers, Italy has a primarily paper-based payment mix. Almost three quarters of all transactions in the economy are paper based, leaving real-time payments with a marginal share of 0.9%, as of 2021. Italian businesses and consumer therefore enjoyed relatively modest benefits from real-time payments, totalling only $51 million in efficiency savings.
- This benefit contributes to the real-time payments system facilitating $418 million in macroeconomic gains in 2021 (0.02% of formal GDP); equivalent to the output of 4,535 workers. This macroeconomic impact is predominantly driven by the formalisation of shadow economy activity. Cebr estimates that, in Italy, real-time payments were responsible for the formalisation of $359 million of economic activity that would have otherwise occurred outside of the formal institutional and bureaucratic frameworks.
- By 2026, the share of real-time payments is forecasted to increase to 2.9%, with paper-based transactions remaining dominant. The benefits at the business and consumer level are forecasted to increase to $168 million, while the macroeconomic benefits of these real-time adoption rates are estimated to rise to $1,238 million of formal economic output; equivalent to that of 12,694 workers, or 0.05% of formal GDP in 2026.
- In addition to the realised benefits, the untapped benefits of adopting 100% real-time payments were estimated to yield additional savings of $6,637 million for businesses and consumers in 2021. In the same year, the theoretical maximum level of additional economic output that real-time payments could facilitate stood at $111,107 million (a 5.0% addition to GDP).
- However, by 2026 the maximum additional benefits for businesses and consumers is expected to fall to $6,042 million, annually. This maximum potential increase decreases as real-time adoption increases and a greater share of the total theoretical benefit is already realised.
- Overall, the total benefit for businesses and consumers falls from $6,688 million in 2021 to $6,210 million in 2026 (a 7% fall) amidst a general decline in the total transaction volume of Italy, which is forecasted to fall by 2.5%.
- This contributes to the theoretical maximum level of additional economic output that real-time payments could facilitate rising to $118,731 million, or 4.9% of formal GDP.
- In terms of the absolute support of formal economic output, between 2021 and 2026 we estimate that the realised share that Italy captures of total attainable economic benefits of real-time payments rises from 0.4% to 1.0%.

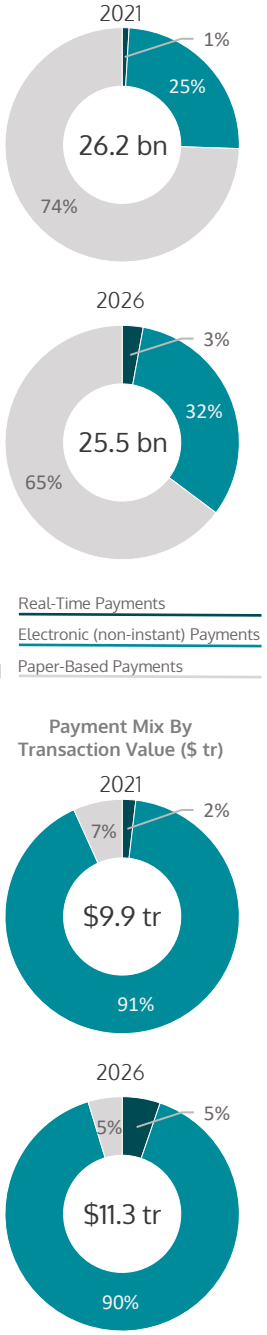
Net Efficiency Savings for Businesses and Consumers



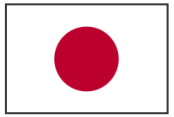
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



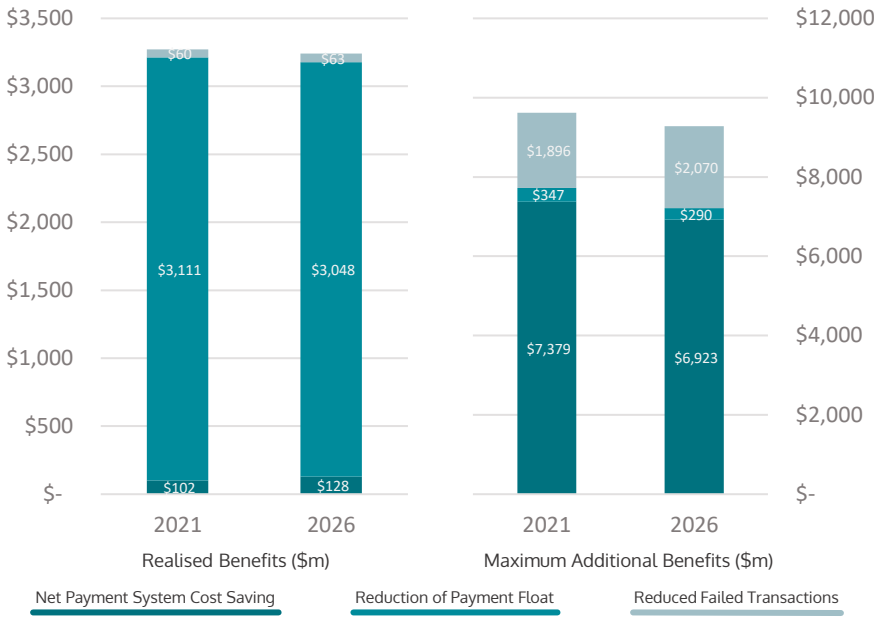
Payment Mix By Transaction Value ($ tr)



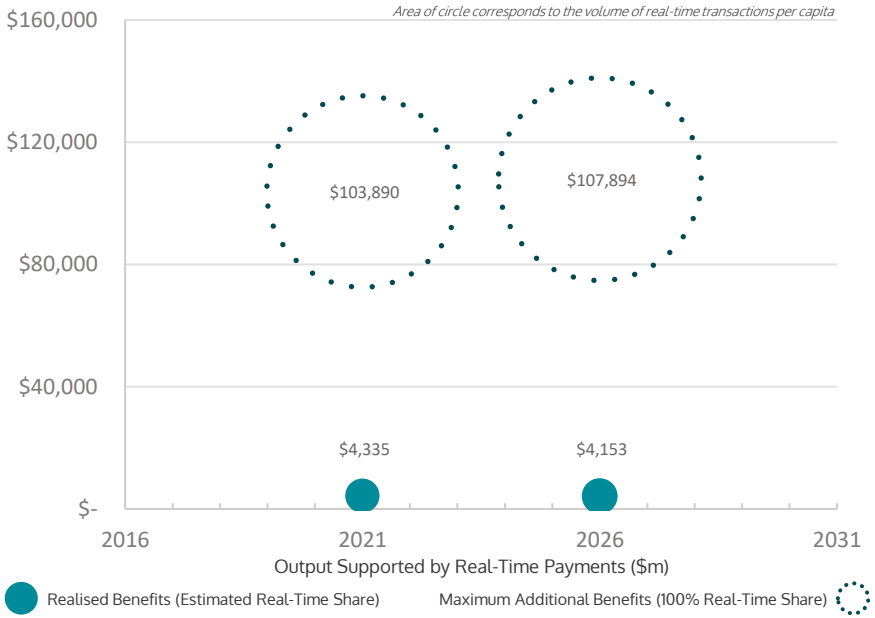
Japan

- Japan is a high-income economy in East Asia, and the world's 3rd largest in 2021 (Cebr World Economic League Table, 2022).
- Japan is one of the few advanced economies that remains predominantly cash-based (68.9% of all transactions) in the modern day, with just 3.0% of all transactions in 2021 made through real-time instruments. However, despite its low share of instant payments, Japan still stands to benefit very highly from the technology.
- The total benefit to businesses and consumers was estimated to be $3,272 million in 2021, the fourth largest across Cebr's sample. This result is a function of the payment float mechanism: Japan has a payment mix with a high paper-based share combined with high-value real-time transactions meaning that instant payments unlock a total transaction value of $108,588 million per day in 2021 through a reduced float time. This working capital facilitates an estimated $3,111 million of business output in the same year.
- In 2021, Japan realised total macroeconomic benefits worth $4,335 million (0.09% of GDP), equivalent to the output of 56,538 workers.
- The share of real-time payments is forecasted to remain at 3% to 2026. As a result, the economic impacts at both the business and consumer level and the economy-wide level are predicted to also remain broadly constant in real terms. In 2026, the benefit for businesses and consumers is forecasted to be $3,240 million, supporting $4,153 million of the total national output (0.08% of formal GDP); equivalent to the output of 52,195 workers.
- If all transactions took place through the real-time payments system in Japan, in addition to the realised benefits, the maximum additional benefit for businesses and consumers was an estimated $9,622 million in 2021, which would decrease to $9,283 million by 2026. This additional benefit decreases because of the realised share of the total attainable benefits increasing by 0.5 percentage points to 25.9% in 2026.
- Under full real-time adoption, an additional $103,890 million of output is forecasted to be supported by real-time, equivalent to the addition of 2.0% of GDP in 2021. This could further rise to $107,894 by 2026 (a 1.9% addition to formal GDP).
- Between 2021 and 2026 we estimate that for Japan, the realised share of the maximum attainable macroeconomic benefits of real-time payments drops from 4.0% to 3.7%.

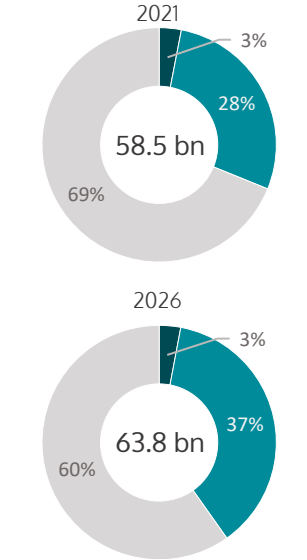
Net Efficiency Savings for Businesses and Consumers



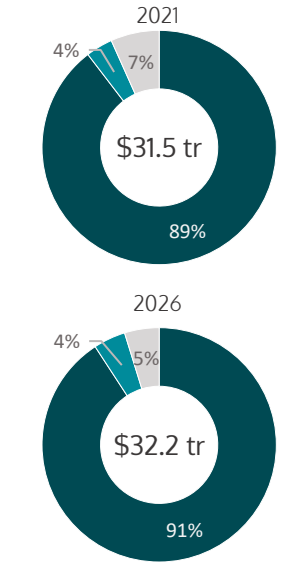
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



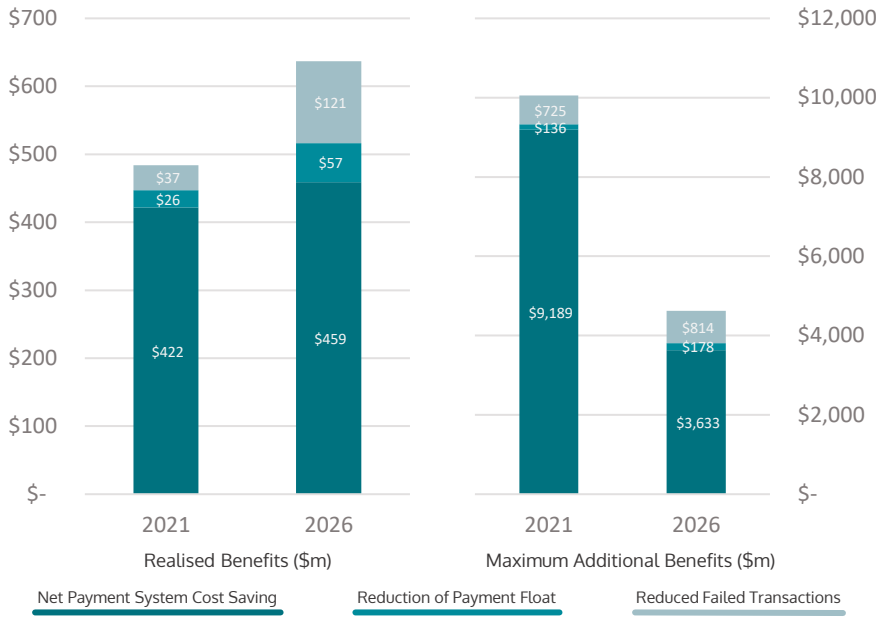
Payment Mix By Transaction Value ($ tr)



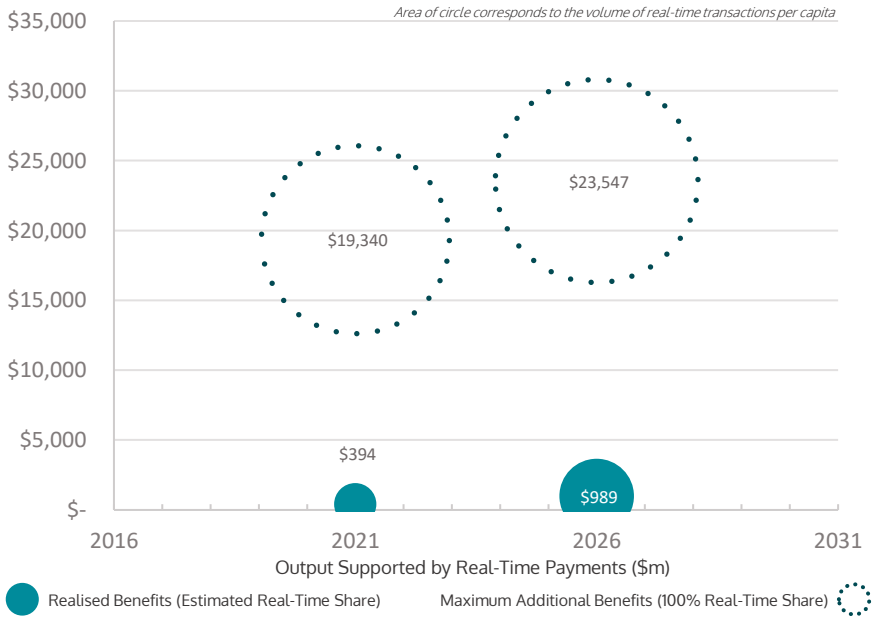
Malaysia

- Malaysia is an upper middle-income country, at roughly the same level of prosperity as Greece or Turkey. In absolute terms, Malaysia ranked as the 39th largest global economy in 2021 (Cebr World Economic League Table, 2022).
- In recent years, adoption of real-time instruments in Malaysia has been rapid in terms of transaction volumes, rising from a 0.3% share in 2020 to 4.8% in 2021, with forecasts suggesting the share will climb further to 12.9% in 2026.
- Led by the reduction in net payments system costs, total efficiency savings for businesses and consumers, through the use of real-time payments, generated benefits worth $484 million in 2021. On a per transaction basis, real-time payments in Malaysia had a 41% lower average payment cost, compared to non-instant payments. This represents a cost saving of $422 million.
- At the macroeconomic level, economy-wide efficiency gains are estimated to facilitate $394 million of economic output (0.11% of formal GDP). This is equivalent to the output supported by 16,505 jobs.
- Looking forwards to 2026, net efficiency savings for businesses and consumers are estimated to increase to $637 million. While the forecasted macroeconomic impact of real-time is estimated to be $989 million of economic output (0.20% of formal Malaysian GDP) in 2026, equivalent to the output of 34,071 workers, annually.
- Between 2021 and 2026, the annual untapped benefits for businesses and consumers associated with complete real-time adoption are expected to fall from $10,050 million to $4,626 million. This is caused by a reduction of the total additional benefits through net payment system costs from complete real-time adoption. By 2026, the costly paper-based instruments are expected to drop to 51% of the payment mix, from 77% in 2021. As a result, the potential for real-time transactions to displace paper-based instruments under a hypothetical 100% instant payment scenario is relatively limited.
- At the macroeconomic level, the theoretical maximum level of additional economic output that real-time payments could facilitate was $19,340 million in 2021 and $23,547 million in 2026; equivalent to a 1.0% and a 1.1% addition to formal GDP in Malaysia under full real-time adoption, respectively.
- Between 2021 and 2026 we estimate that for Malaysia, the realised share of the maximum attainable macroeconomic benefits of real-time payments doubles from 2.0% to 4.0%.

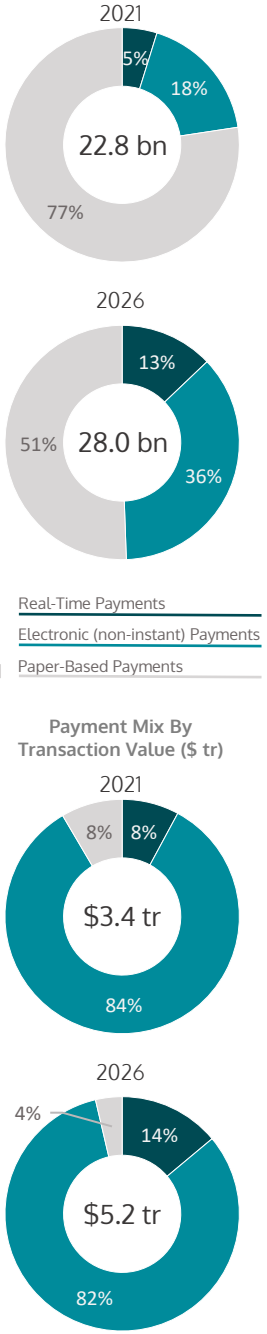
Net Efficiency Savings for Businesses and Consumers



Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)

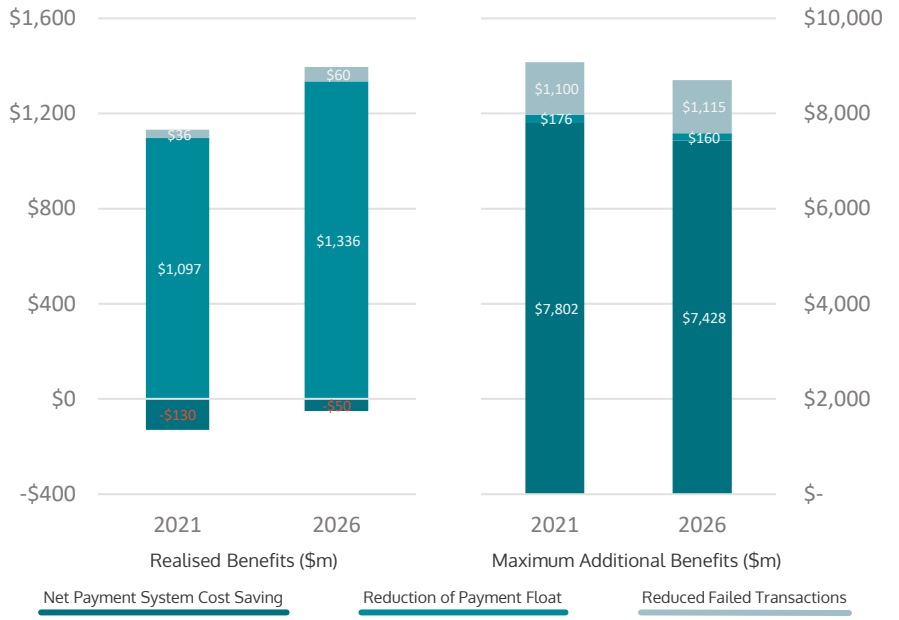


Payment Mix By Transaction Value ($ tr)

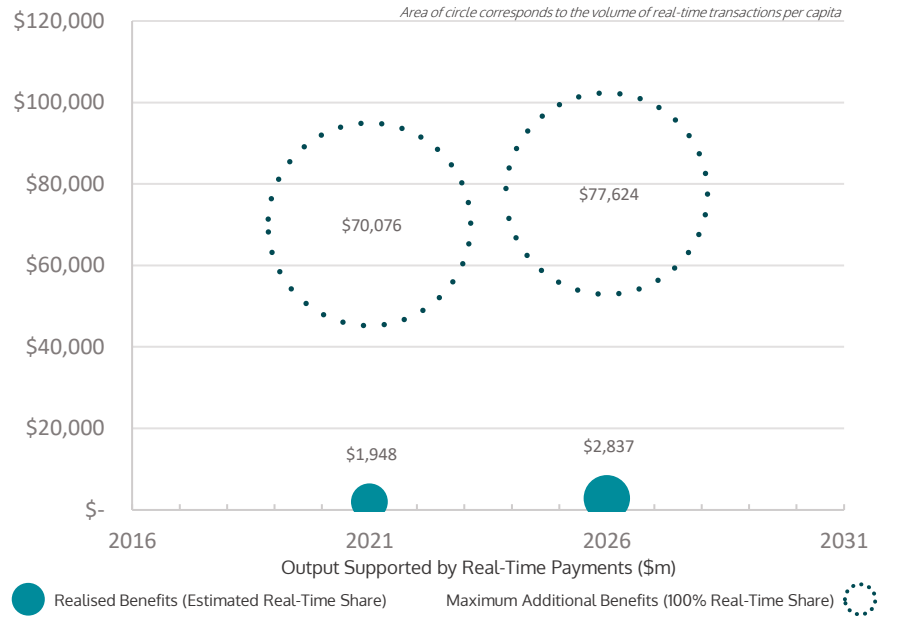
Mexico

- Mexico is Latin America's second-largest economy behind Brazil. At the aggregate level, in 2021 it ranked as the 15th largest global economy (Cebr World Economic League Table, 2022).
- While 3.1% of payments were real-time in 2021 – a volume share that was greater than in Germany or the USA – 85.8% of transactions took place via paper-based instruments that year.
- In 2021, net benefits of real-time payments for businesses and consumers hit $1,003 million, rising to $1,345 million in 2026. The high paper-based volume means that significant agent-level benefits are generated through the impact of real-time in reducing the payment float since paper-based instruments typically have the longest clearing times.
- In 2021 and 2026 respectively, 109% and 99% of the attained net benefits for businesses and consumers are derived by reducing the payment float. These results are so high (even exceeding 100% in 2021) also because of the high paper-based transaction volume which leads to real-time increasing payment system costs.
- The negative impact of real-time for businesses and consumers through greater payment system costs is due to the current very high share of paper-based payments. This generates significant enough economies of scale that ultimately leads to lower estimated unit costs per transaction for paper-based instruments than electronic alternatives in Mexico. However, net cost savings will turn positive and grow over time once the technology matures and real-time transaction volumes increase. However, we estimate that based on forecasted adoption rates, this will occur sometime beyond 2026.
- The business and consumer level benefits contribute to wider annual macroeconomic gains of $1,948 million (0.15% of formal GDP) and $2,837 million (0.19% of formal GDP) in 2021 and 2026, respectively. In terms of the number equivalent workers supported in 2021 and 2026, this impact is equal to the output supported by 83,161 and 114,096 jobs, respectively.
- The untapped benefits of adopting 100% real-time payments are estimated to yield maximum additional savings of $9,078 million for businesses and consumers in 2021, while the theoretical maximum level of additional economic output that real-time payments could facilitate stands at $70,076 million (5.2% of GDP) in the same year. This means that including the already realised benefits associated with current levels of real-time payments, total benefits would have been $10,080 million and $72,025 million, respectively.
- By 2026, as the real-time share is forecast to increase slightly, the theoretical unrealised benefit for businesses and consumers is forecast to reduce slightly to $8,703 million annually. The theoretical maximum level of additional economic output that real-time payments could facilitate rises to $77,624 million, or an additional 5.0% of formal GDP, which results in an overall benefit of $80,461 million. This is primarily driven by a significant modelled reduction in the size of the shadow economy, caused by reduced cash usage.
- In terms of the absolute support of formal economic output, between 2021 and 2026 we estimate that the realised share that Mexico captures of the total potential economic benefits of real-time payments rises from 2.7% to 3.5%.

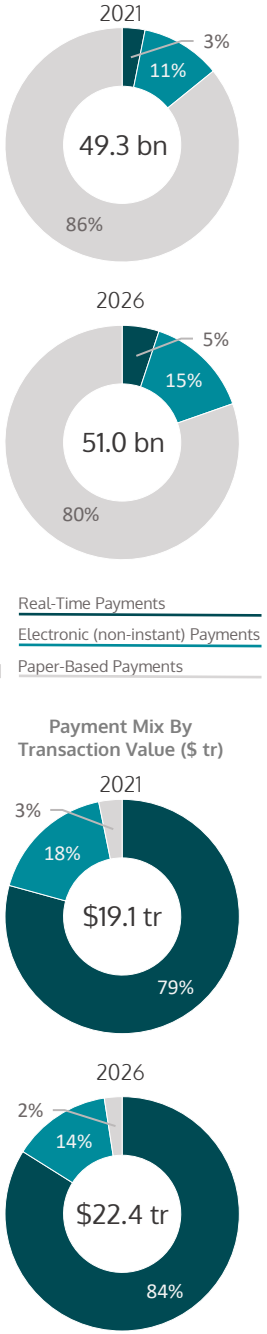
Net Efficiency Savings for Businesses and Consumers



Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



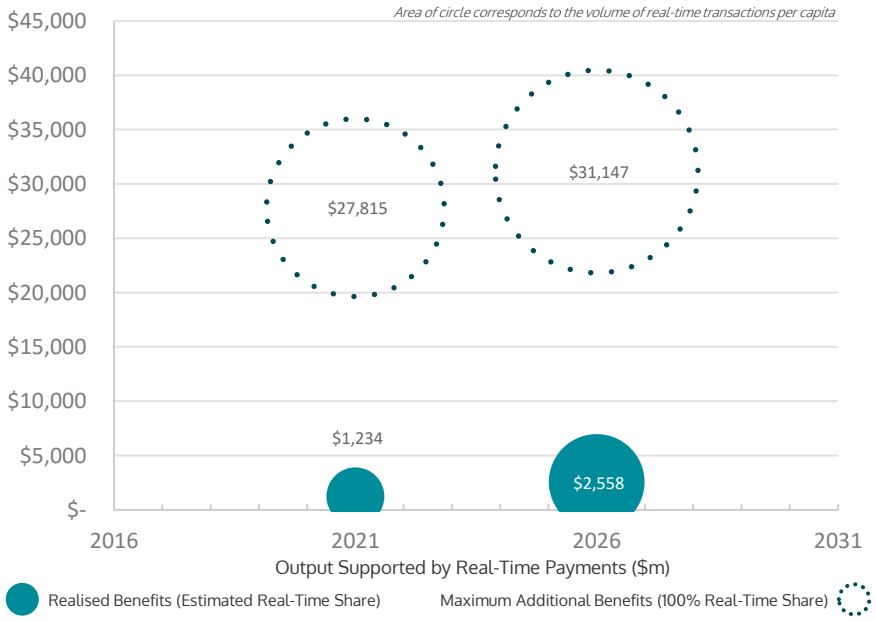
Payment Mix By Transaction Value ($ tr)

Netherlands

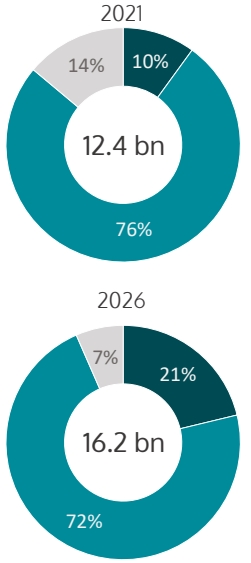
- Netherlands is a high-income country located on the North-western coast of continental Europe. As of 2021, it ranked as the 18th largest global economy (Cebr World Economic League Table, 2022).
- 10.0% of all transactions in the country were real-time in 2021, a figure in line with the UK but outpacing Eurozone counterparts France and Germany.
- As a result of its strong real-time adoption, businesses and consumers in the Netherlands benefitted from efficiency savings of $338 million in 2021, with real-time payments ultimately supporting 0.12% of the formal economy ($1,234 million) in the same year; equivalent to the output supported by 11,412 jobs.
- By 2026, the share of transactions by volume is forecasted to grow to 21.2% – at a CAGR of 22.6% – driving the impact of real-time payments for businesses and consumers to reach $1,587 million. This result is underpinned by the significant benefits generated by the reduction in the size of the payment float, which is estimated to unlock a total transaction value of $2,933 million per day in 2026 through a reduced float time. This working capital facilitates an estimated $1,122 million of business output in 2026.
- At the macroeconomic level, economy-wide efficiency gains are estimated to facilitate $2,558 million of economic output (0.23% of formal GDP) in 2026; equivalent to the output supported by 21,835 jobs.
- If all transactions were real-time in 2021, we estimate that the theoretical maximum further cost saving for businesses and consumers would equal $3,888 million, rising to $4,488 million in 2026. Combined with the realised benefits, the overall potential benefits stand at $4,226 million in 2021 and $6,075 million in 2026.
- Under complete real-time adoption, these agent level impacts are estimated to contribute to a maximum of $27,815 million and $31,147 million of additional economic output in 2021 and 2026, respectively, or $29,049 million and $33,704 million in total. Both of these former sets of figures are equivalent to a 2.7% addition to formal GDP in the Netherlands under full real-time adoption.
- Between 2021 and 2026 we estimate that for the Netherlands, the realised share of the maximum attainable macroeconomic benefits of real-time payments rises from 4.2% to 7.6%.

Net Efficiency Savings for Businesses and Consumers

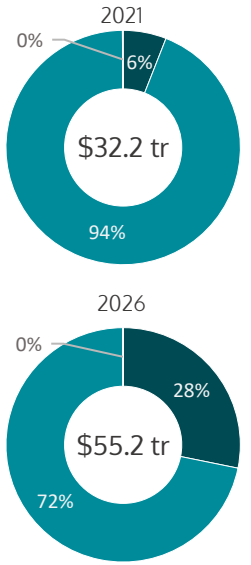
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



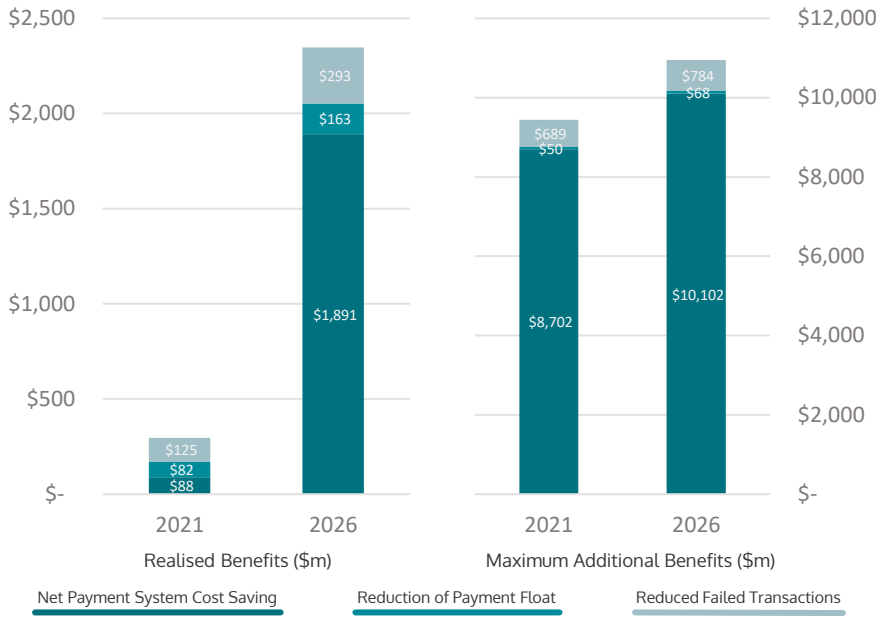
Payment Mix By Transaction Value ($ tr)



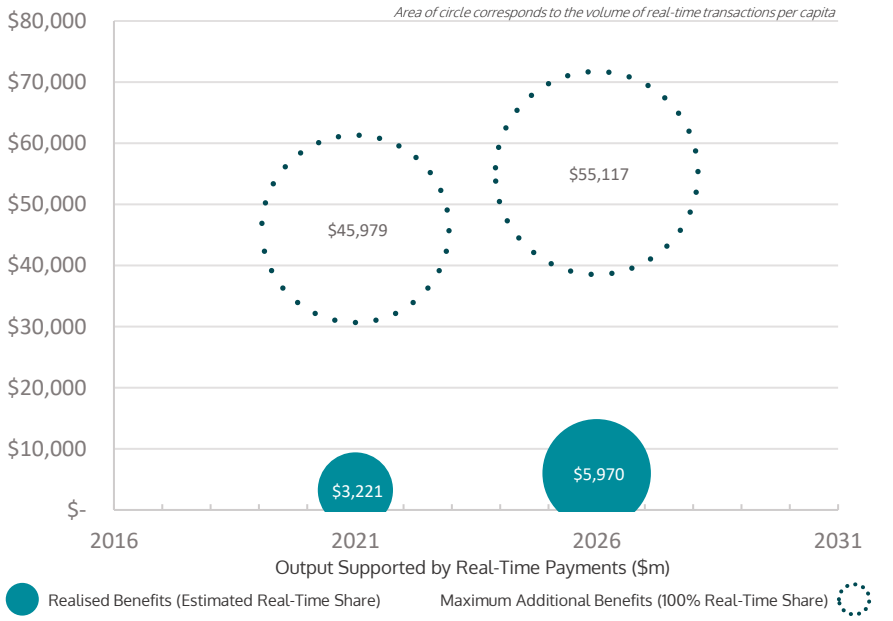
Nigeria

- Nigeria is an emerging market in West Africa. It is the world's 29th largest economy and the largest in Africa (Cebr World Economic League Table, 2022).
- Due to its mature real-time market but paper-dominated payment mix, Nigeria has both healthy existing benefits as well as significant potential to grow even further. In 2021, the use of real-time payments benefitted businesses and consumers $296 million in efficiency savings. These gains contributed to real-time payments supporting 0.67% of Nigerian GDP ($3,221 million of final output) in the same year.
- Of the overall realised macroeconomic gains of real-time payments, the largest contributing factor in 2021 (and 2026) was the benefit of real-time payments through shadow economy formalisation. In Nigeria, the size of the informal economy was estimated to be 47% of formal GDP in 2021, equivalent to approximately $228 billion of informal economic output. In the absence of real-time payments, Nigeria's informal economy would have been 1.4% larger. Hence, instant payments were responsible for formalising $3,103 million of economic output in that year.
- Business and consumer benefits are expected to reach $2,347 million by 2026, driven by paper-based payments being displaced by real-time instruments (which are forecasted to grow to 27.2% of the payment mix). The economy wide impacts are also expected to grow, with 1.01% of Nigerian GDP supported by real-time in 2026, equivalent to $5,970 million of economic output, or that supported by 668,734 workers.
- If all transactions took place through the real-time payments system in Nigeria, the additional further benefit to businesses and consumers would be an estimated $9,442 million in 2021, which would increase to $10,954 million by 2026. Combining those additional benefits with the realised benefits, 100% real-time payments utilisation could have brought a total benefit of $9,738 million to consumers in 2021, and could bring $10,954 million in 2026.
- Under full real-time adoption, an additional $45,979 million of output is forecasted to be supported by real-time, equivalent to an additional 8.7% of GDP in 2021. This could further rise to $55,117 million by 2026 (an additional 8.5% of GDP).
- Between 2021 and 2026 we estimate that for Nigeria, the realised share of the maximum attainable macroeconomic benefits of real-time payments drops from 6.5% to 9.8%.

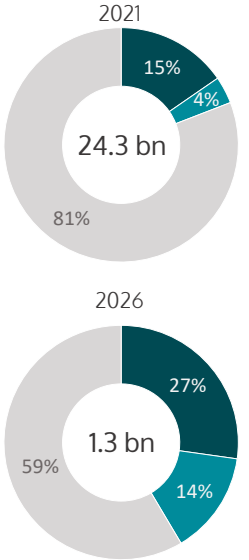
Net Efficiency Savings for Businesses and Consumers



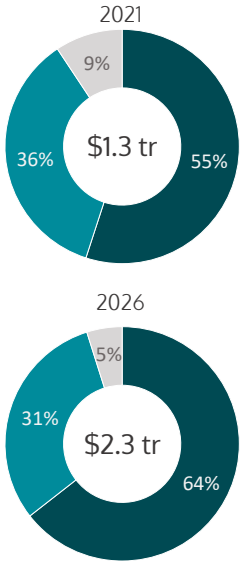
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



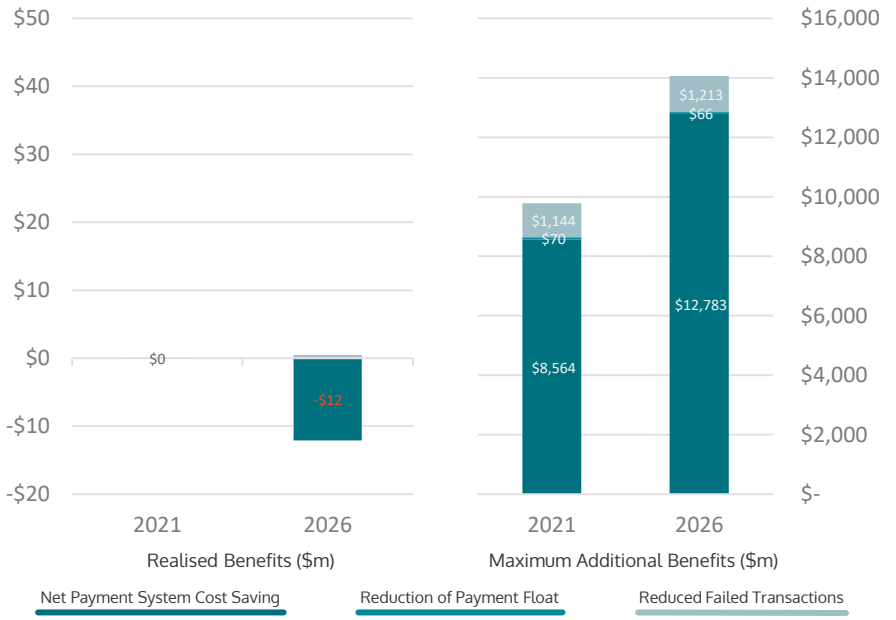
Payment Mix By Transaction Value ($ tr)



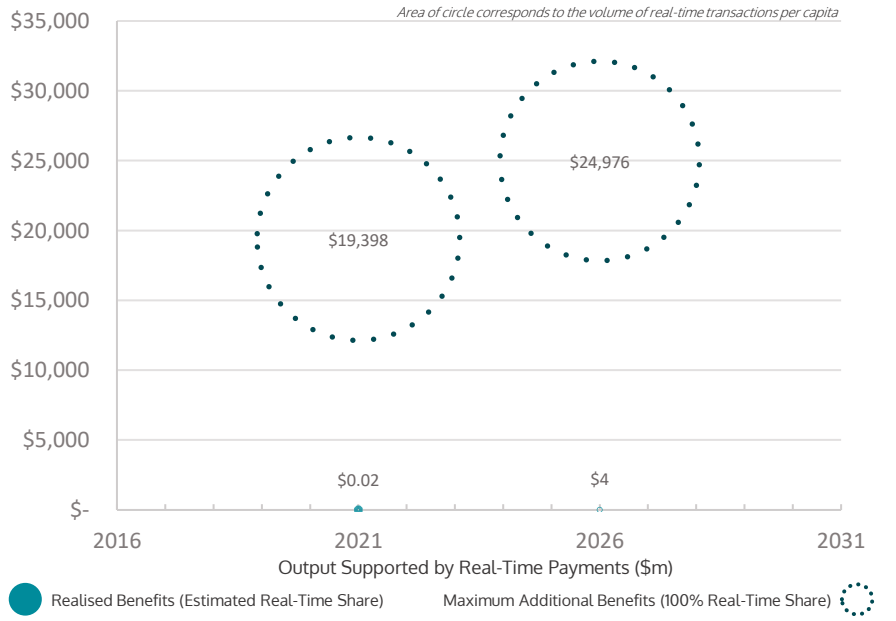
Pakistan

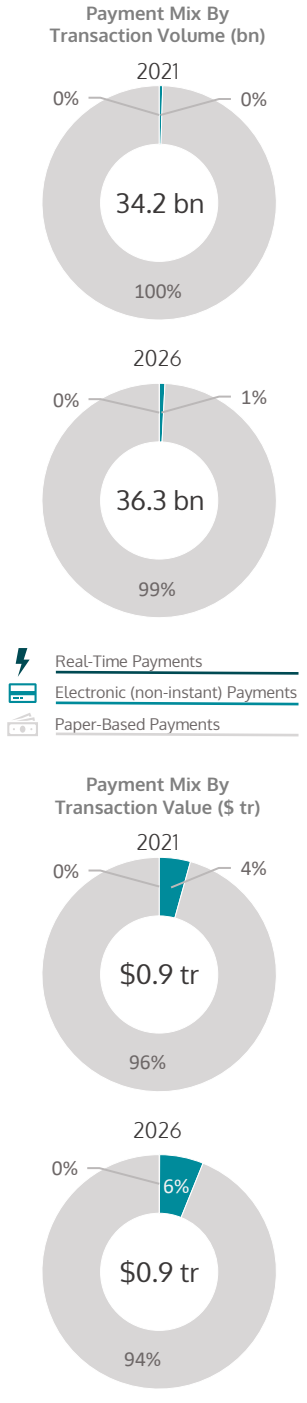
- Classified as a lower middle-income country, in 2021 Pakistan ranked as the 46th largest global economy (Cebr World Economic League Table, 2022).
- The low level of real-time take up (0.0003% of all transactions were real-time in 2021) led to negligible realised benefits in 2021. By 2026, the number of transactions by volume is forecasted to reach approximately 13 million, however this is only estimated to account for a 0.04% share.
- Based on this, the high initial costs and low real-time take up means the costs per real-time transaction are yet to drop below the dominant paper-based transactions (99.2% share). For businesses and consumers, the higher real-time cost per transaction led to a small negative impact of -$0.10 million in 2021.
- As the share of real-time grows over time, Pakistan will start to unlock significant (but as yet untapped) benefits, as the cost per transaction of real-time payments falls. However this is not forecast to happen by 2026, based on estimated adoption rates. As the real-time market share increases but before economies of scale are realised, the increased volume of real-time transactions drives an increasing negative impact, as the per transaction payments systems cost of real-time payments is still higher than the alternative. This negative business and consumer impact is forecast to reach -$12 million by 2026.
- However at the macroeconomic level, we additionally consider the positive impact that real-time payments has in formalising informal economy transactions, through reducing cash usage. This formalisation of previously informal sector activity represents an addition to formal GDP. Given the low level of real-time usage in 2021, this impact is relatively minor, but it did act to stimulate a slight net positive support to Pakistani GDP ($0.024 million).
- By 2026, the economic output support by real-time payments is forecast to increase significantly, to $4 million; equivalent to the output supported by 717 jobs.
- If the payment infrastructure was solely real-time, theoretical further business and consumer level benefits are predicted to equal $9,778 million in 2021, rising to $10,745 million in 2026.
- The maximum additional macroeconomic benefits for Pakistan are $19,398 million in 2021 (a formal GDP addition of 6.2%) and $24,976 million in 2026 (a formal GDP addition of 6.1%). As the realised effects are currently very small, this is very similar to the modelled combined realised and untapped benefits.
- Between 2021 and 2026 we estimate that for Pakistan, the realised share of the maximum attainable macroeconomic benefits of real-time payments rises from 0.0001% to 0.014%.

Net Efficiency Savings for Businesses and Consumers



Aggregate Macroeconomic Impact

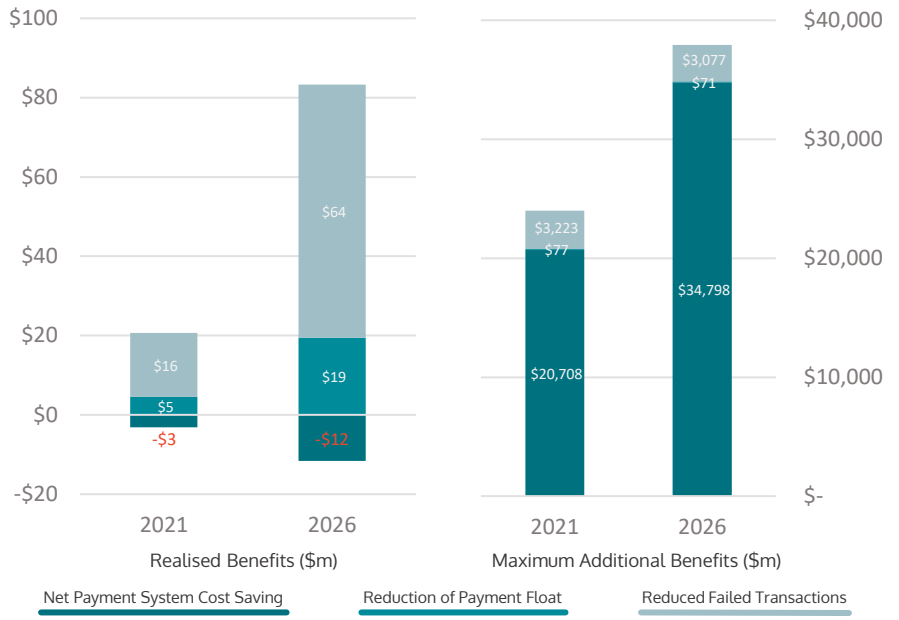




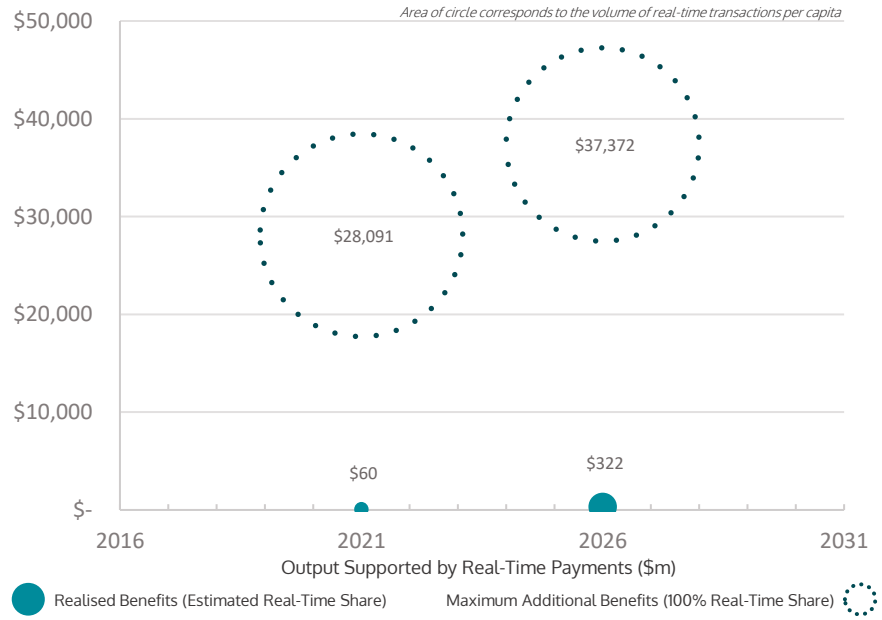
Philippines

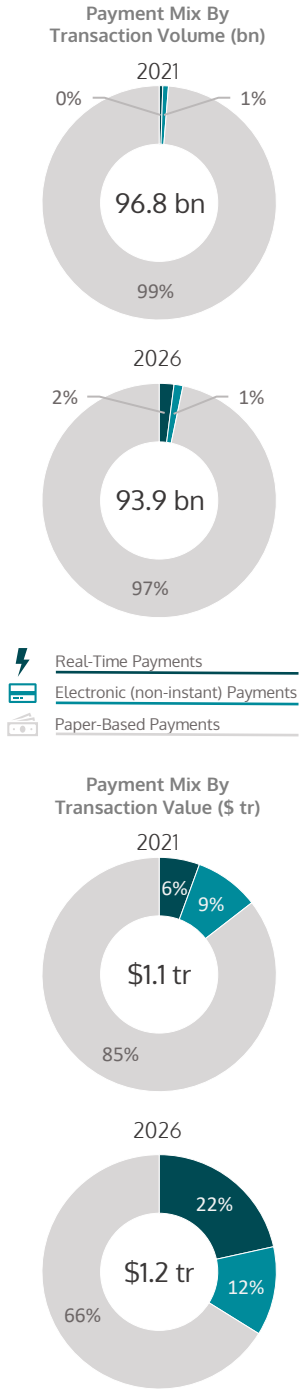
- As of 2021, the Philippines is classified as a lower-middle-income country, ranking as the 37th largest global economy (Cebr World Economic League Table, 2022).
- The 2021 payment mix of the Philippines was heavily dominated by cash, with 98.7% of all transactions in the country made via paper-based payment methods. Real-time is expected to grow to 2.0% in 2026, however its current share of transaction volumes is very small (0.5%).
- As a result, the realised impacts are relatively low in comparison to the other countries, although the unrealised potential benefits are significant. 2021 business and consumer level benefits reached $17 million, with economy-wide efficiency gains estimated to facilitate $60 million of economic output (0.02% of formal GDP) in the same year.
- Within this however, in 2021, there was a small negative net cost of $3.2 million through higher transaction costs of real-time, due to the fact that real-time payments are estimated to not yet be as efficient as the currently preferred paper-based payment methods. The high initial costs and low take up means that costs per transaction are yet to drop below paper-based transactions.
- As instant payments grow, the country will begin to enjoy economies of scale and see a sizeable reduction in net payment system costs. By 2026, we estimate that realised benefits for businesses and consumers will total $2,209 million, almost exclusively driven by net payment system cost savings. On a per transaction basis, real-time payments in the Philippines will have a 51.9% lower average payment cost, compared to non-instant payments.
- By 2026, the forecasted economy-wide impact of real-time is estimated to reach $322 million of economic output (0.06% of formal GDP), equivalent to that supported by 28,838 jobs. Therefore, if the Philippines can successfully integrate real-time transactions into its payment mix, it will be able to enjoy significant economic benefits in the future.
- The untapped benefits of adopting 100% real-time payments are estimated to yield maximum potential further savings of $24,008 million for businesses and consumers in 2021, while the theoretical maximum level of additional economic output that real-time payments could facilitate stands at $28,091 million (6.8% addition to formal GDP) in the same year. Combining those additional benefits with the current benefits, 100% real-time payments utilisation could have brought a total benefit of $23,025 million to consumers and benefits, and supported a total of $28,151 million in GDP.
- By 2026 the maximum further benefits for businesses and consumers will rise to $37,946 million annually; totalling $38,018 million with currently modelled realised benefits included.
- This contributes to the theoretical maximum level of additional economic output that real-time payments could facilitate falling to $37,372 million, or 6.5% of formal GDP.
- In terms of the absolute support of formal economic output, between 2021 and 2026 we estimate that the realised share that the Philippines captures of total attainable economic benefits of real-time payments rises from 0.2% to 0.9%.

Net Efficiency Savings for Businesses and Consumers



Aggregate Macroeconomic Impact

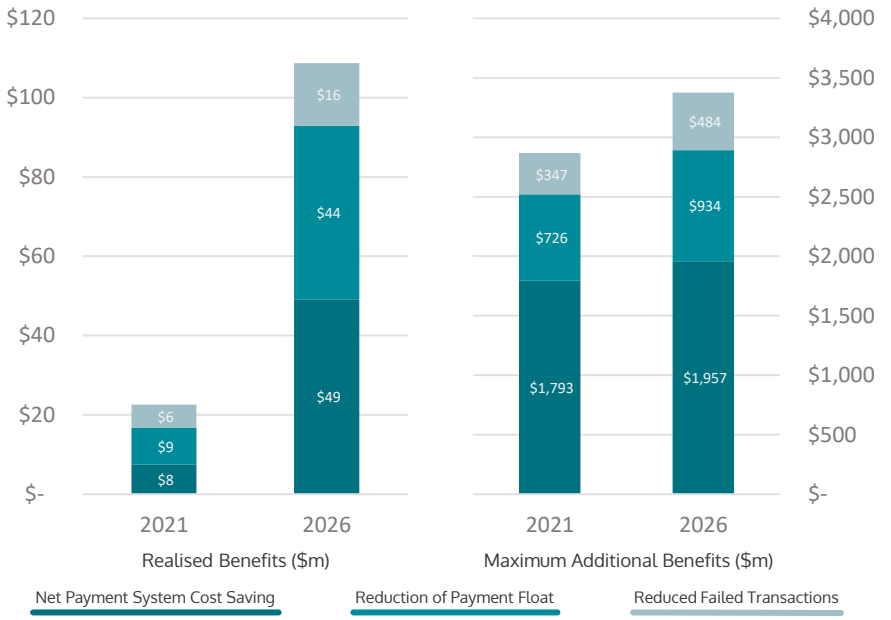




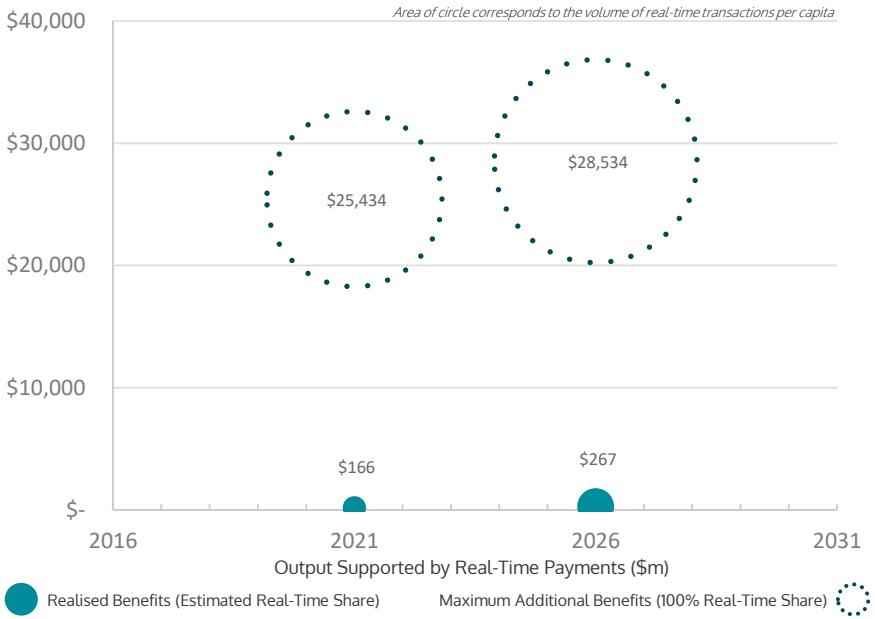
Saudi Arabia

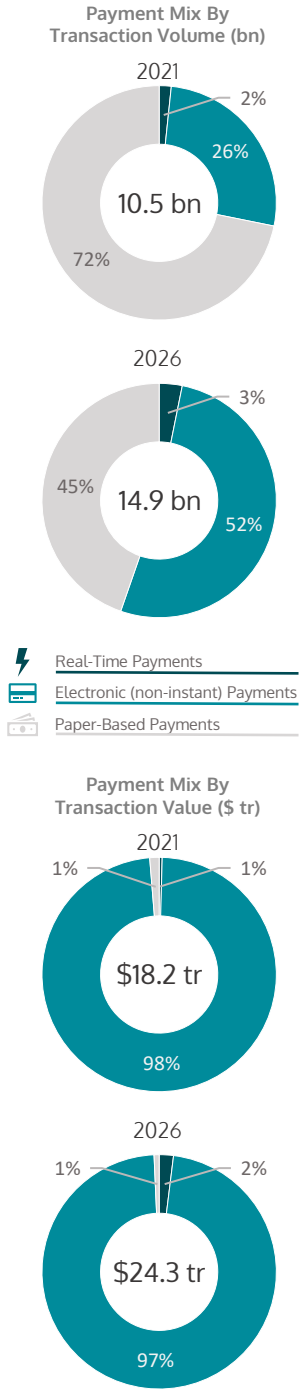
- The Saudi Arabian economy is the second largest in the Middle East and is classed as high-income. At the aggregate level, the Saudi Arabian economy is the world's 19th largest (Cebr World Economic League Table, 2022).
- In 2021, net benefits for businesses and consumers of real-time payments hit $23 million. The largest component of this was net savings through the reduction in the payment float. Based on current real-time adoption rates, instant payments unlocked a total transaction value of $290 million per day in 2021 through a reduced float time in Saudi Arabia. This working capital facilitated an estimated $9.3 million of business output in the same year.
- Almost 72% of all transactions in 2021 were paper-based across Saudi Arabia, with only 1.7% as real-time payments. Even by 2026, this real-time share is only anticipated to grow to 3.2%, despite a strong CAGR of 22.1%. This relatively small share of transactions does however support a significant increase in the business and consumer level benefits forecasted. By 2026, we estimate this will increase to $108.7 million.
- The macroeconomic benefits of real-time in 2021 were estimated to be $166 million of economic output in Saudi Arabia, rising to $267 million by 2026. These represent 0.02% and 0.03% of current and forecasted Saudi Arabian GDP respectively, supporting the equivalent of 2,939 and 4,728 jobs.
- If all transactions took place through the real-time payment infrastructure in Saudi Arabia, the maximum additional benefit for businesses and consumers was an estimated $2,866 million in 2021, contributing to a maximum of $25,434 million in additional output (equivalent to an additional 2.9% of formal GDP) in the same year. These would result in total benefits of $2,889 million and $25,599 million, respectively, combining these additional benefits with those already estimated to be realised, per current and forecasted levels of real-time adoption.
- Looking forwards to 2026, maximum additional business and consumer level benefits will increase by 18% to $3,375 million, while the maximum additional macroeconomic benefit will rise to $28,534 million of economic activity; a 2.8% addition to formal GDP in 2026. The overall values including realised and these additional figures are $3,483 million and $28,801 million, respectively.
- Between 2021 and 2026 we estimate that for Saudi Arabia, the realised share of the maximum attainable macroeconomic benefits of real-time payments rises from 0.6% to 0.9%.

Net Efficiency Savings for Businesses and Consumers



Aggregate Macroeconomic Impact

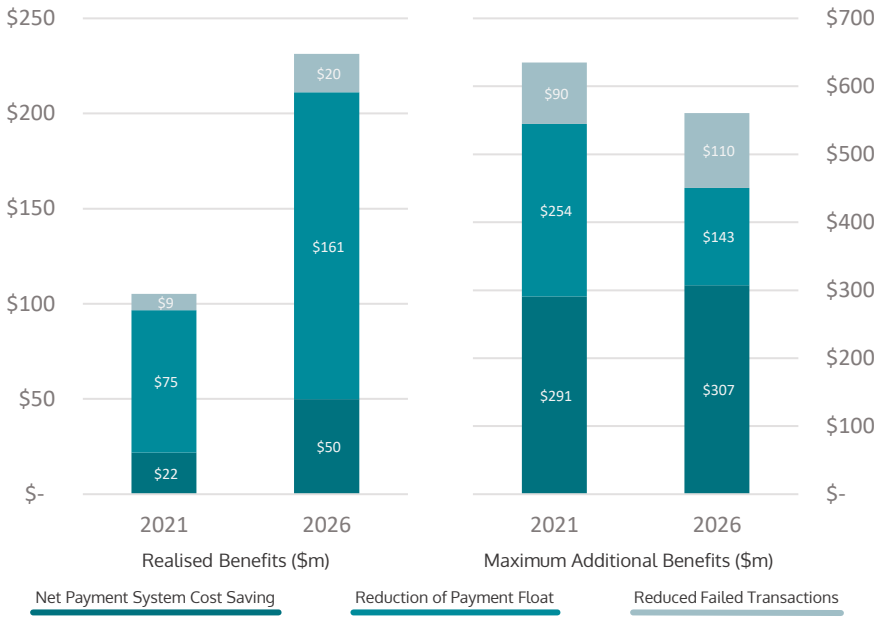




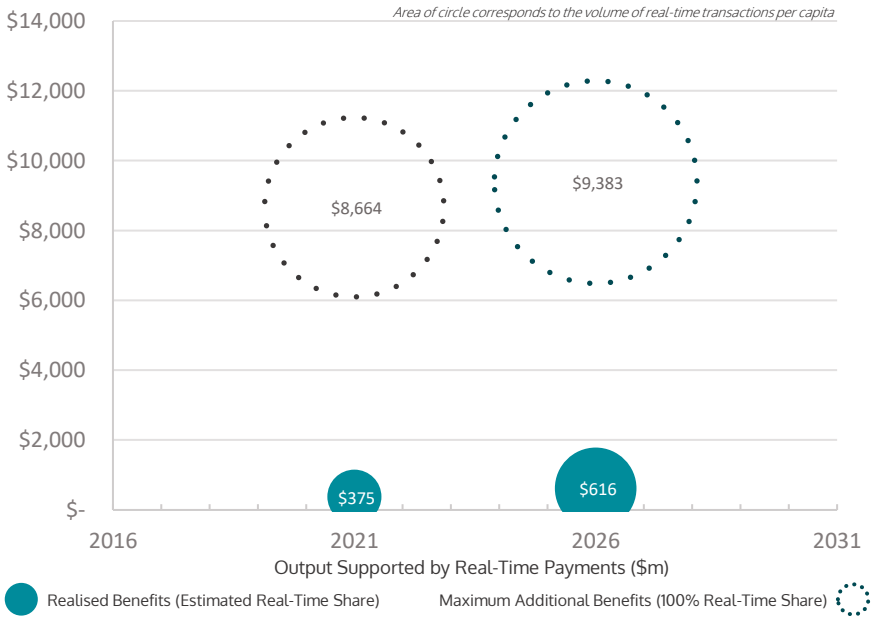
Singapore

- Featuring amongst the world's most competitive economies, Singapore is one of the four Asian Tiger economies and has seen consistently high levels of economic growth over the last four decades. It is a high-income country and ranked as the 38th largest global economy in 2021 (Cebr World Economic League Table, 2022).
- Of the $105.3 million in business and consumer level benefits in 2021, real-time payments generated the largest agent-level economic impact through a reduction in the payment float, which unlocks working capital for businesses. Based on current real-time adoption rates in Singapore, instant payments unlocked a total transaction value of $866.9 million per day in 2021 through a reduced float time. This working capital subsequently facilitated an estimated $74.9 million of business output in the same year.
- In 2021, economy-wide efficiency gains were estimated to facilitate $375 million of economic output (0.10% of formal Singaporean GDP). The country has a reasonably well-established real-time infrastructure with the first of two schemes launching in 2014. 8.7% of all transactions are real-time, accounting for 23.3% of total transaction value in 2021.
- Based on current real-time adoption forecasts, which see real-time payments account for 15.5% of all transactions in 2026, total annual realised business and consumer benefits are estimated to more than double, to $231 million. Economy-wide output supported by real-time payments is estimated to rise to $616 million in 2026 (0.14% of forecasted Singaporean GDP). This is equivalent to the output supported by 5,122 jobs.
- If all transactions were real-time in 2021, we estimate that the theoretical maximum cost saving for businesses and consumers would reach $740 million; an additional $635 million on top of the $105 million already realised. The equivalent maximum potential benefit in 2026 is $792 million.
- These agent level impacts could contribute to a further $8,664 million and $9,383 million of additional economic output in 2021 and 2026, respectively under full real-time adoption. These latter figures are equivalent to 2.2% and 2.1% additions to formal GDP in Singapore respectively in each year.
- Between 2021 and 2026 we estimate that for Singapore, the realised share of the maximum attainable macroeconomic benefits of real-time payments rises from 4.1% to 6.2%.

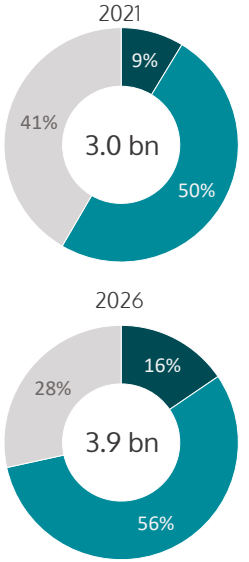
Net Efficiency Savings for Businesses and Consumers



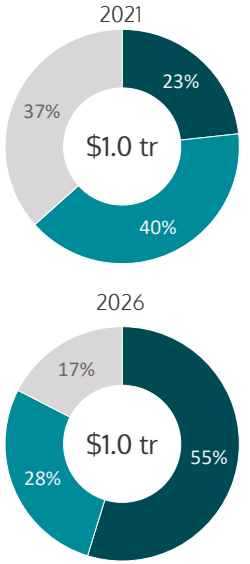
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



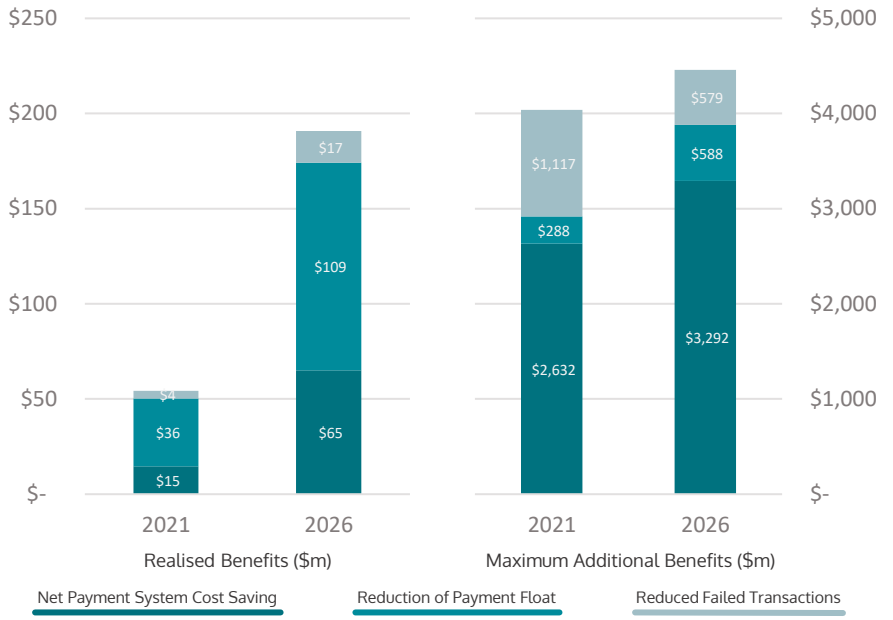
Payment Mix By Transaction Value ($ tr)



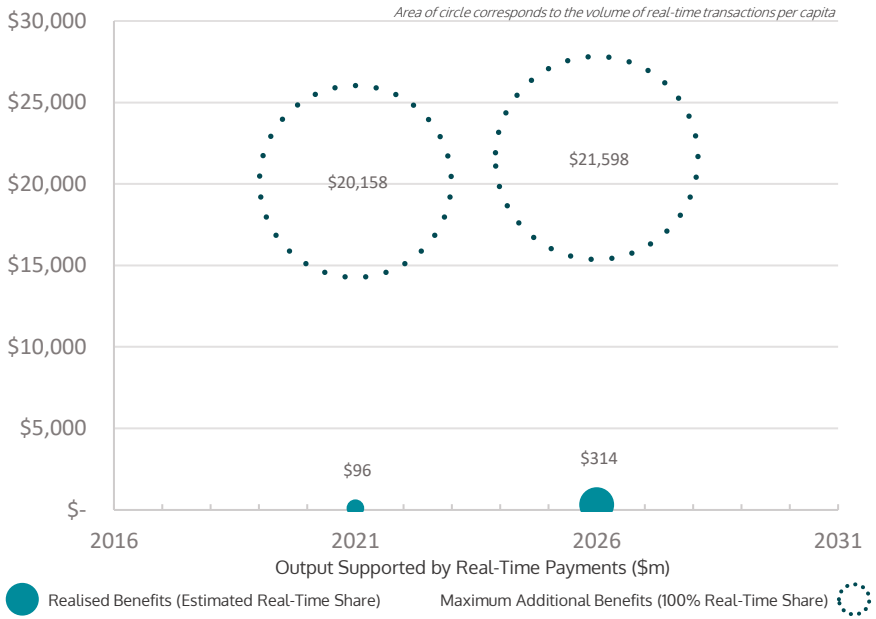
South Africa

- South Africa is the second largest economy in Africa after Nigeria and generally considered to be the most industrialised country on the continent. Classified as an upper-middle-income country, in 2021 South Africa ranked as the 33rd largest economy in the world (Cebr World Economic League Table, 2022).
- Current business and consumer level benefits are relatively low, at $54 million in 2021. South Africa's first real-time payments infrastructure, Real-Time Clearing (RTC) was launched in 2006, however adoption rates have been low. 15 years later and the real-time share of overall transaction volumes stands at only 0.8%. At the economy level, in 2021 real-time payments stimulated $96 million in economic output, equivalent to 0.02% of GDP.
- Today, cash dominates the payment mix (59.6%) and is still expected to be king in South Africa by 2026, although, the share of paper-based instruments out of total transaction volumes is anticipated to drop to 52.2% in 5 years' time as real-time volumes grow to a share of 2.8%.
- Driven by this growth in real-time transactions over the intermediary period, by 2026 the business and consumer level benefits are forecast to grow to $191 million. This growth will increase the economy-wide benefits to $314 million (0.07% of GDP) which is equivalent to the economic output generated by 11,399 jobs.
- If all transactions were real-time in 2021, we estimate that the theoretical maximum cost saving for businesses and consumers would reach $4,229 million, rising to $4,650 million by 2026. These represent additions of $4,175 million and $4,460 million on the already realised (and forecasted to be realised) benefits as of 2021 and 2026, based on current (and projected) levels of real-time payments utilisation.
- These agent level impacts would translate to a theoretical additional $20,158 million and $21,598 million of additional economic output in 2021 and 2026, respectively. These latter figures are equivalent to a 4.6% and 4.5% addition to formal GDP in South Africa under full real-time adoption.
- In terms of the absolute support of formal economic output, between 2021 and 2026 we estimate that the realised share that South Africa captures of total potential economic benefits of real-time payments rises from 0.5% to 1.4%.

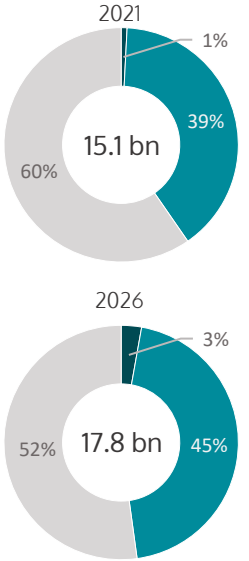
Net Efficiency Savings for Businesses and Consumers



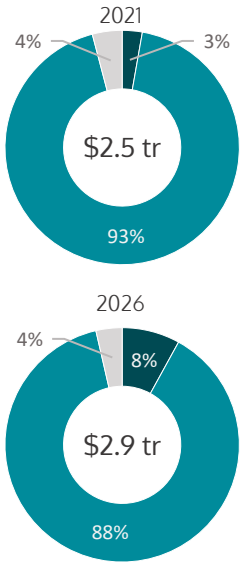
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



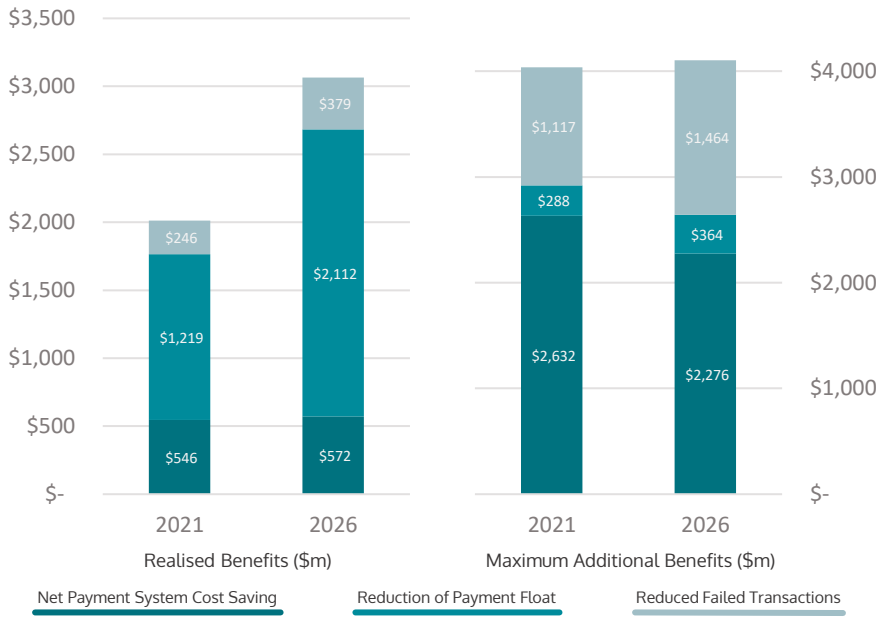
Payment Mix By Transaction Value ($ tr)



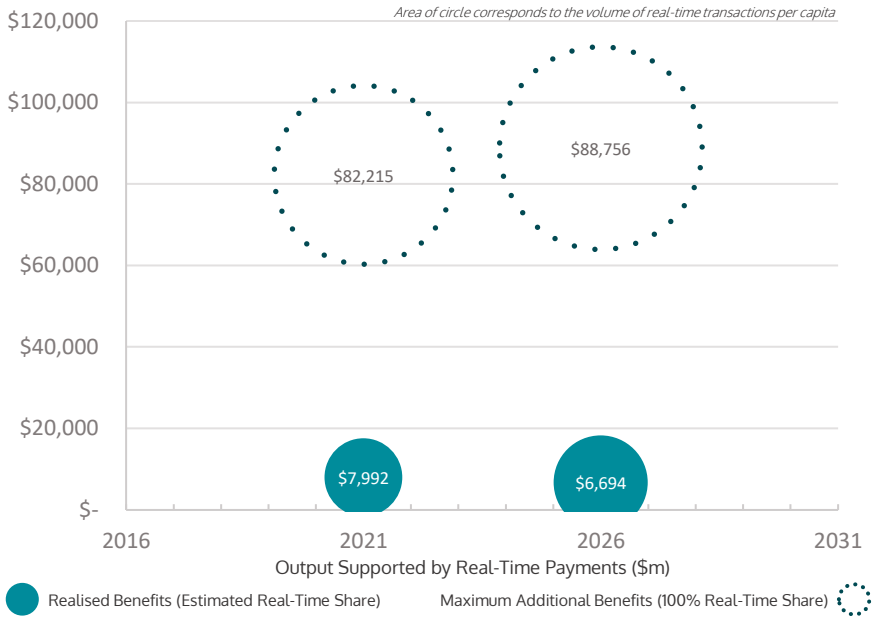
South Korea

- The Republic of Korea is a high-income economy in East Asia. Alongside Singapore, Taiwan, and Hong Kong, Korea is one of the four Asian Tiger economies, characterised by significant economic growth between the 1960s and 1990s. Today, it ranks as the 10th largest global economy (Cebr World Economic League Table, 2022).
- In 2021, net benefits for businesses and consumers of real-time payments hit $2,011 million. The largest component of this was net savings through a reduction in the payment float, subsequently unlocking working capital for businesses. Based on real-time adoption levels in South Korea as of 2021, instant payments unlock a total transaction value of $104,092 million per day, through a reduced float time. This working capital facilitated an estimated $1,219 million of business output in the same year.
- The macroeconomic benefits in 2021 under current real-time adoption rates were estimated to be $7,992 million of economic output, or 0.44% of formal GDP. This is equivalent to the output supported by 120,199 workers in the same year. This economic impact is the third largest across our sample in absolute terms, behind only China and India.
- The large benefits in 2021 may be a result of the fact that real-time payments in the South Korea date back to the late 1980s, as one of the oldest infrastructures in the world. Real-time payments in 2021 are typically high-value, accounting for 80.9% of total spend from just 18.0% of total transaction volume.
- Based on 2026 real-time adoption estimates, business and consumer level benefits are forecasted to rise to $3,063 million. But, by 2026 it is estimated that 0.32% of economic output ($6,694 million) will be underpinned by efficiency savings as a result of real-time payments, equivalent to the productive capacity of 90,088 workers.
- If the payment infrastructure was fully instantaneous, the maximum additional benefit to businesses and consumers was an estimated $4,036 million in 2021, rising to $4,104 million by 2026. Combining these with the realised benefits of existing real-time utilisation rates in 2021 and 2026, consumers and businesses could benefit by a total of $6,048 million and $7,168 million, respectively.
- The maximum additional macroeconomic benefits for South Korea are $82,215 million in 2021 (an addition to formal GDP of 4.3%) and $88,756 million in 2026 (an addition to formal GDP of 4.1%).
- Between 2021 and 2026 we estimate that for South Korea, the realised share of the maximum attainable macroeconomic benefits of real-time payments falls from 8.9% to 7.0%.

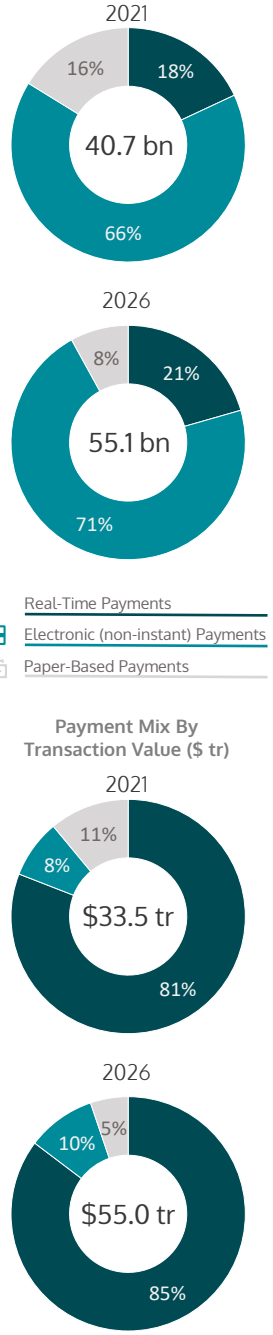
Net Efficiency Savings for Businesses and Consumers



Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)

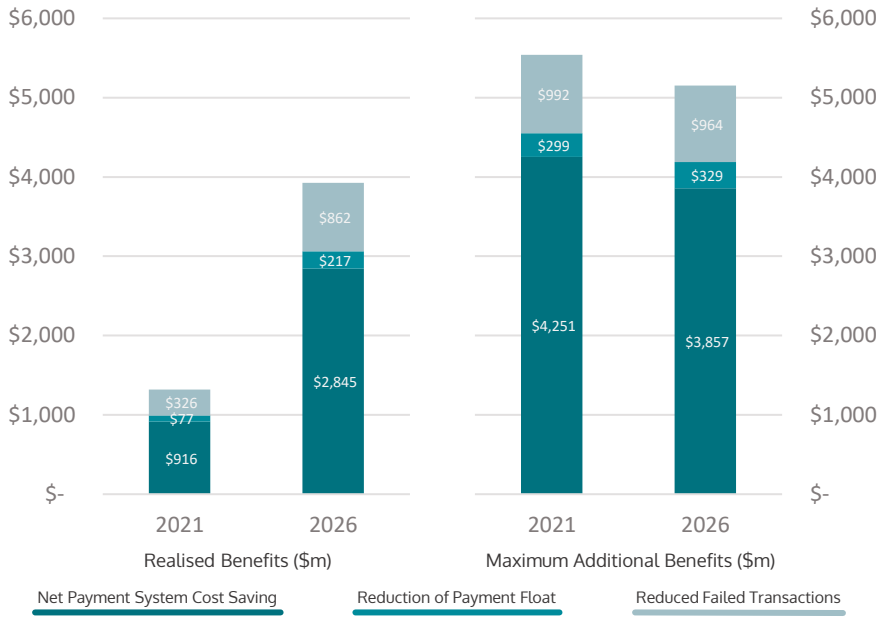


Payment Mix By Transaction Value ($ tr)

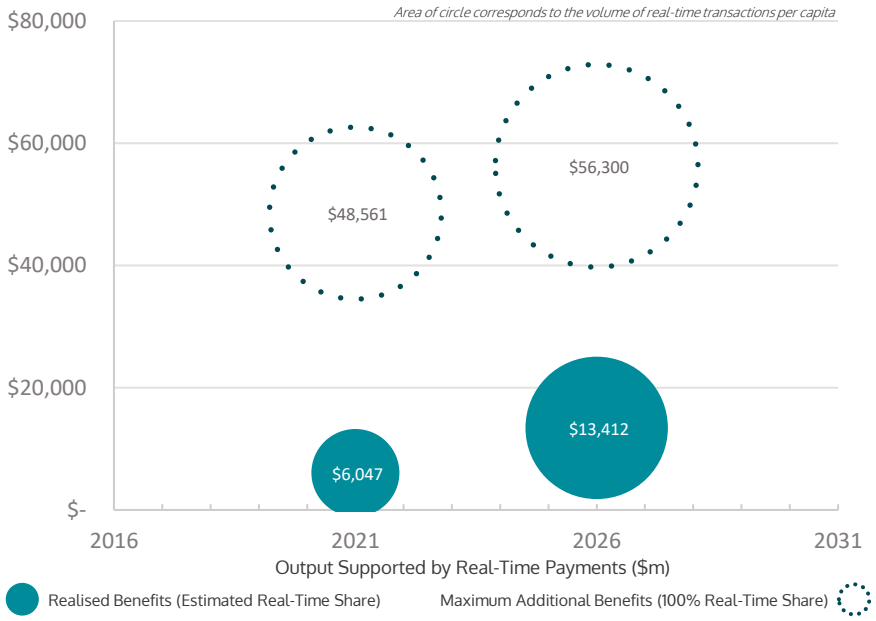
Thailand

- As of 2021, Thailand is classified as an upper middle-income country, having seen strong growth rates over the last few decades. Indeed, its economic growth has pulled millions out of poverty, resulting in the nation being lauded as a development success story, featuring as the 26th largest global economy in 2021 (Cebr World Economic League Table, 2022).
- In volume terms, 24.7% of transactions were executed through its real-time infrastructure in 2021, the third largest share in the 30-country sample of Cebr's economic impact assessment behind Bahrain and India. In 2021, the total economy-wide impact generated by real-time payments stood at $6,047 million, or the equivalent output of 430,960 workers. This is equivalent to 1.12% of formal GDP. This macroeconomic benefit is supported by 2021 business and consumer level benefits to the sum of $1,319 million.
- The macroeconomic benefit of real-time payments is predominantly driven by the formalisation of informal economy activity. Not tackling this could pose a plethora of challenges for the nation and could undermine further progress on economic development. Through their displacement of paper-based transactions, real-time payments have the potential to directly address this issue and contribute to long-term economic growth in Thailand.
- Based on forecasted real-time adoption volumes, Cebr estimates that by 2026, Thailand's informal economy will be 4.5% smaller than in the absence of real-time payments. This equates to the formalisation of $12,952 million of output that would have otherwise occurred outside of the formal institutional and bureaucratic frameworks. Ultimately, the forecasted macroeconomic benefits in 2026 are estimated to be $13,412 million of formal economic output (2.08% of GDP) due to real-time payments; equivalent to GDP supported by 789,359 workers. In 2026, total business and consumer benefits are estimated to be worth $3,925 million.
- If the payment infrastructure was fully instantaneous, theoretical additional business and consumer level benefits are predicted to amount to $5,541 million in 2021, falling to $5,150 million in 2026. This would bring the estimated total benefits for 2021 and 2026 respectively, to $6,860 million and $9,075 million.
- The maximum additional macroeconomic benefits for Thailand are $48,561 million in 2021 (a formal GDP contribution of 8.2%) and $56,300 million in 2026 (a formal GDP contribution of 7.9%).
- Between 2021 and 2026 we estimate that for Thailand, the realised share of the maximum attainable macroeconomic benefits of real-time payments rises from 11.1% to 19.2%.

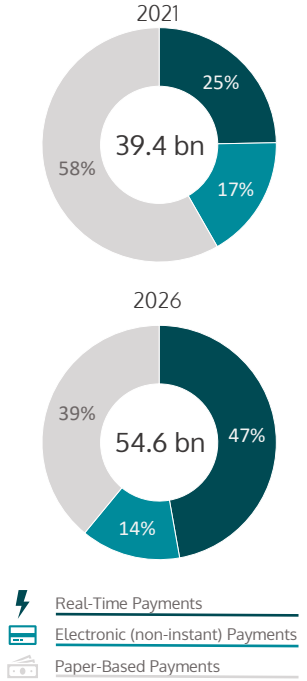
Net Efficiency Savings for Businesses and Consumers



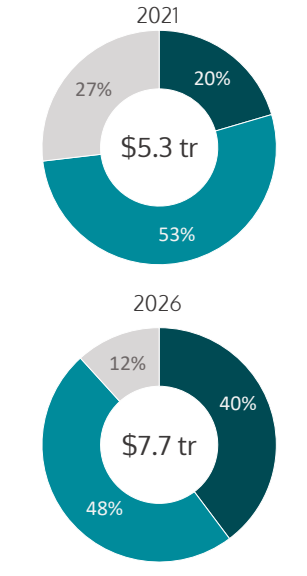
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



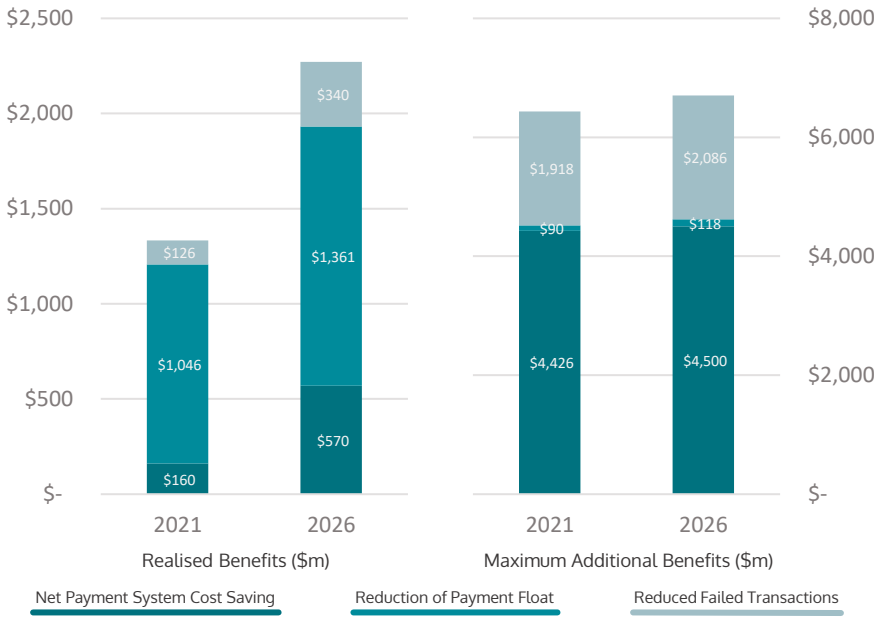
Payment Mix By Transaction Value ($ tr)



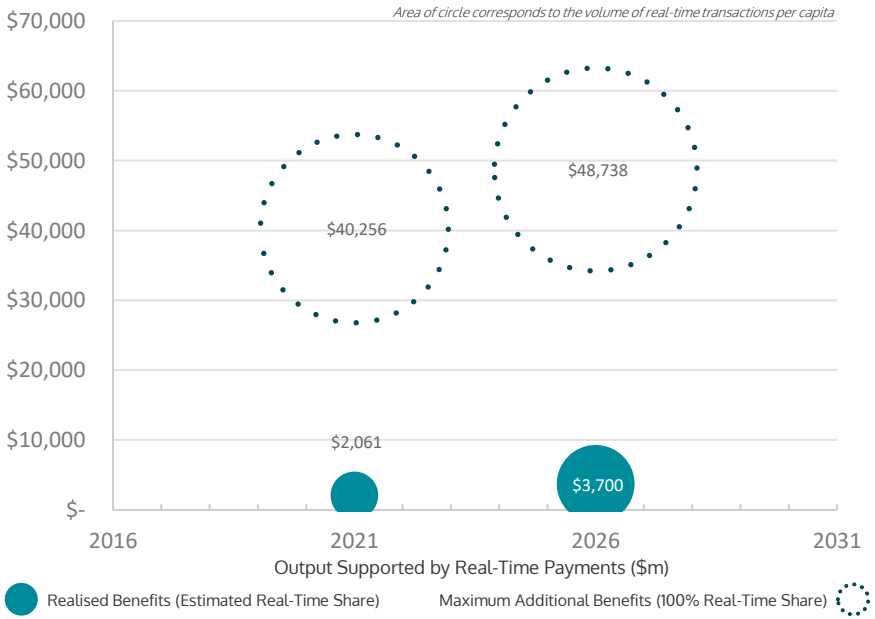
Turkey

- Turkey is classified as an upper-middle-income country, and ranked as the 21st largest economy in 2021 (Cebr World Economic League Table, 2022).
- As the majority of transactions by value take place as real-time (91.6% of the total value of all transactions in the country), the economic impacts already manifesting, are sizeable. Business and consumer benefits totalled approximately $1,333 million annually in 2021. The largest component of this ($1,046, or 78.5% of the total) was due to net savings from the reduction in the size of the payment float.
- At the macroeconomic level, the benefits as of 2021 amount to $2,061 million (0.26% of Turkish GDP). The most significant contribution is again the additional economic activity supported through a reduction in the size of the payment float, allowing this unlocked capital to support higher levels of economic output.
- By 2026, it is estimated that the share of transactions by value will remain at the same level while the share of transactions by volume will grow to 14.0% at a strong CAGR of 21.9%. This results in the businesses and consumer level benefits swelling to $2,271 million. The specific benefit associated with the reduction in the size of the payment float, is estimated to increase to $1,361 million.
- This increase in the business and consumer levels benefits are also estimated to be associated with an increase in the contribution of real-time payments to Turkish GDP. By 2026, this is estimated to increase to £3,700 million. This is equivalent to 0.36% of formal Turkish GDP, or the output supported by 111,870 jobs.
- The untapped benefits of adopting 100% real-time payments are estimated to yield maximum additional savings of $6,435 million for businesses and consumers in 2021, while the theoretical maximum level of additional economic output that real-time payments could facilitate stands at $40,256 million (4.8% of GDP) in the same year. Including the already realised benefits based on existing levels of real-time payments utilisation, the maximum theoretical agent-level benefits were $7,767 million, while the potential economic output supported could have been $42,317 million.
- By 2026 the maximum additional benefits for businesses and consumers will rise to $6,705 million, annually. This contributes to the theoretical maximum level of additional economic output that real-time payments could facilitate increasing to $48,738 million, or 4.5% of formal GDP.
- In terms of the absolute support of formal economic output, between 2021 and 2026 we estimate that the realised share that Turkey captures of total potential economic benefits of real-time payments rises from 4.9% to 7.1%.

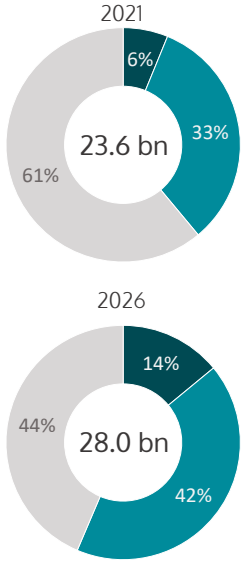
Net Efficiency Savings for Businesses and Consumers



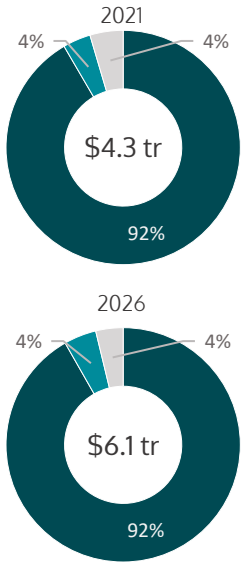
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



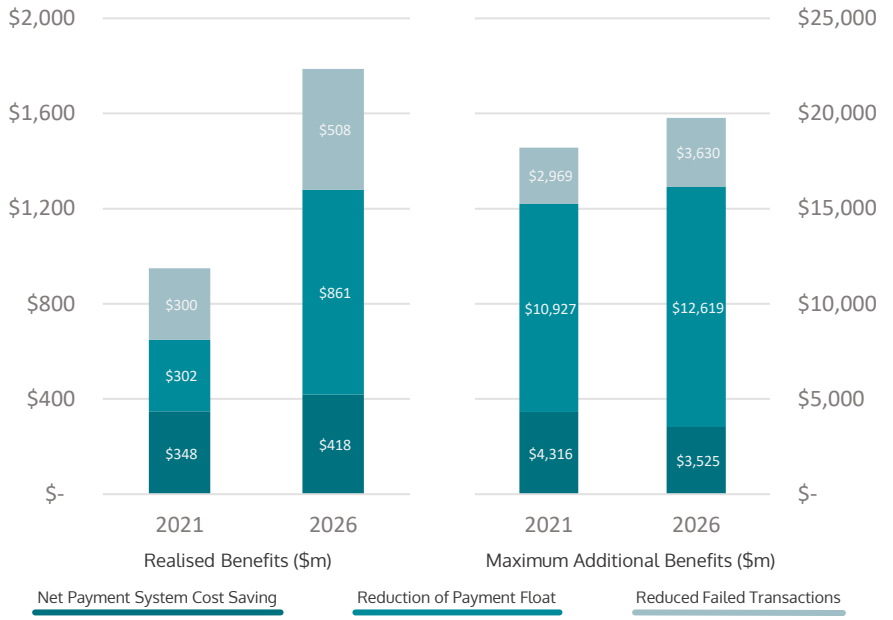
Payment Mix By Transaction Value ($ tr)



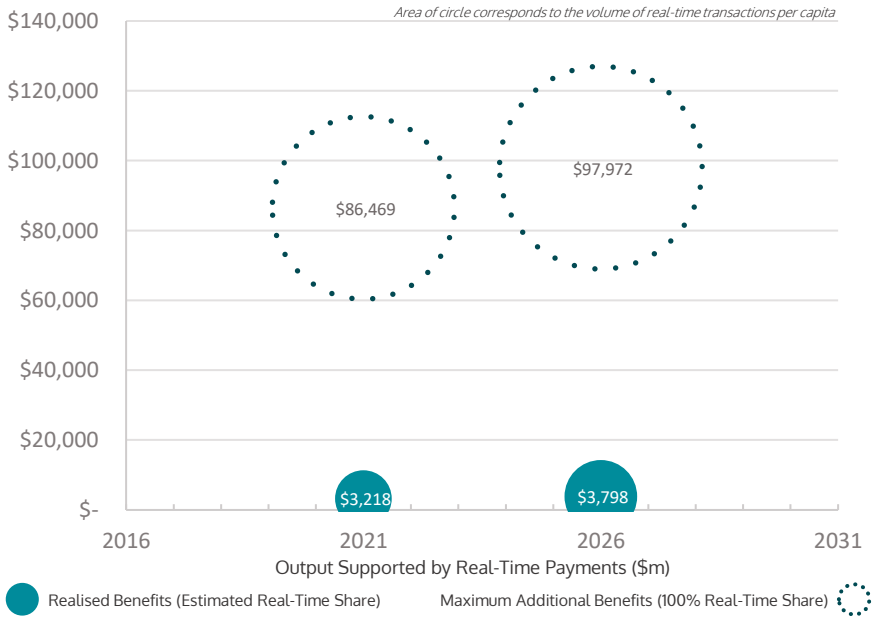
United Kingdom

- The United Kingdom is an advanced economy in North-Western Europe. As of 2021, the UK is the world's fifth-largest economy (Cebr World Economic League Table, 2022).
- Supported by a relatively strong real-time payment mix share (9.2% of all transactions), in 2021, net benefits for businesses and consumers of real-time payments hit $950 million. The largest component of this was net savings through the transaction costs within the payment system. On a per transaction basis, real-time payments in the UK currently have a 14.1% lower average payment cost, compared to the weighted average mix of all non-instant payments. Under current adoption rates of real-time payments, this represents a cost saving of $347.5 million for consumers and businesses across the country in 2021.
- The macroeconomic benefits in 2021 of real-time adoption was estimated to be $3,218 million of additional economic output. This is equivalent to 0.10% of total UK GDP, or the output of 34,732 jobs.
- By 2026, the business and consumer level benefits rise to $1,787 million, with the main driving force of this stemming from the reduction in the size of the payment float. Based on 2026 real-time adoption estimates (growth to 12.6% of all payments), instant payments unlock a total transaction value of $40,828 million per day, with this working capital facilitating an estimated $861 million of business output in the same year. Ultimately, the forecasted macroeconomic benefits in 2026 are estimated to be $3,798 million of additional economic output (0.11% of formal UK GDP).
- If all transactions took place through the real-time payment infrastructure in the UK, the maximum theoretical benefit for businesses and consumers was an estimated $19,163 million in 2021, with $18,213 additional to the already realised $950 million. These additional theoretical benefits could have contributed to a maximum of $86,469 million in additional output (equivalent to an additional 2.7% of formal GDP) in the same year.
- Looking forwards to 2026, maximum additional business and consumer level benefits will increase by 9% to $19,773 million, while the maximum additional macroeconomic benefit will rise to $97,972 million of economic activity; a 2.7% addition to formal GDP in 2026.
- Between 2021 and 2026 we estimate that for the UK, the realised share of the maximum attainable macroeconomic benefits of real-time payments rises from 3.6% to 3.7%.

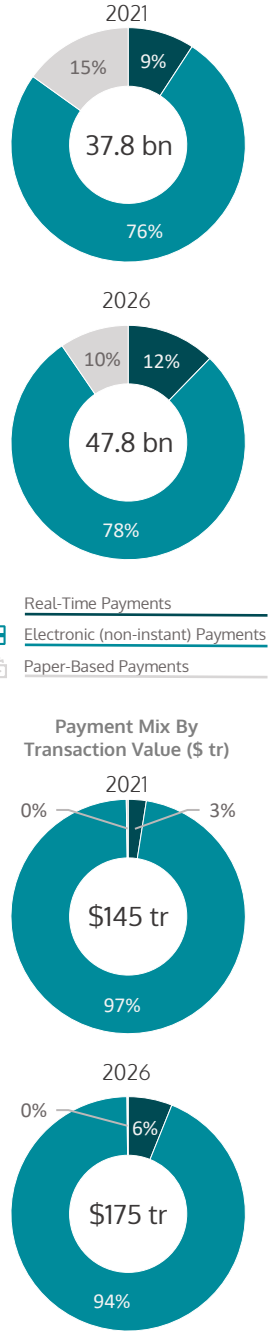
Net Efficiency Savings for Businesses and Consumers



Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)

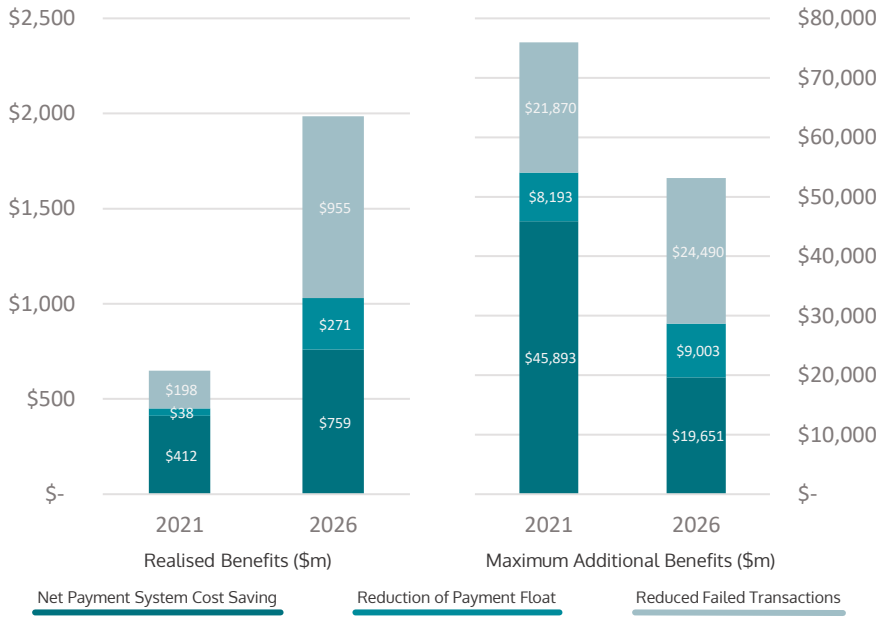


Payment Mix By Transaction Value ($ tr)

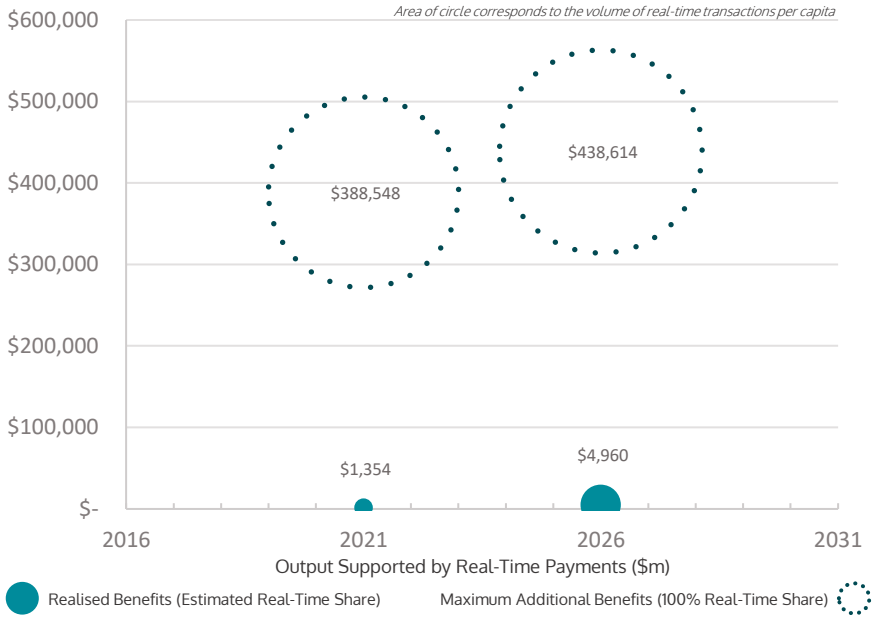
United States of America

- The United States of America is one of the world's wealthiest countries per person, ranking as the world's largest economy in 2021 (Cebr World Economic League Table, 2022). In 2021, the United States accounted for 16% of global GDP after adjusting for purchasing power parity.
- However, considering the US is the largest economy in the world, real-time payment usage remains nascent in 2021, accounting for less than 1% of total transaction volumes. As a result, the current overall economic impact is limited, while the untapped potential is significant.
- In 2021, net benefits for businesses and consumers reached $648 million (less than 5% than that of China), supporting $1,354 million of total national output (0.01% of formal US GDP). The primary factor generating these benefits was the ability for real-time payments to formalise activity in the informal economy by reducing cash usage. Given the scale of the US economy, the country's 8% informal economy share represents an estimated $1.86 billion in informal output. Despite the relatively small transaction share of real-time payments in the US, they have the ability to formalise a relatively large level of informal economic activity.
- Looking forward to 2026, approximately 3.8% of the payment mix is anticipated to be real-time, tripling the anticipated economic benefits for businesses and consumers to $1,985 million. The economy-wide impact also rises significantly to $4,960 million, representing a 0.02% share of forecasted formal output or the equivalent of 31,542 additional jobs.
- If all transactions were real-time in 2021, we estimate that the theoretical maximum further cost saving for businesses and consumers if all payments were real-time would reach an additional $75,955 million, reducing to $53,144 million by 2026. This decline in the 'untapped' benefit, is driven by a greater share of the potential maximum benefits ($76,604 million and $55,129 million in 2021 and 2026 respectively) already being recognised, as the real-time payments share is forecast to increase from 2021 to 2026.
- These agent level impacts are forecasted to contribute to a maximum of $388,548 million and $438,614 million of additional economic output in 2021 and 2026, respectively. These figures are equivalent to a 1.7% addition to formal GDP in the USA under full real-time adoption, in both years.
- In terms of the absolute support of formal economic output, between 2021 and 2026 we estimate that the realised share that the USA captures of total attainable economic benefits of real-time payments rises from 0.3% to 1.1%.

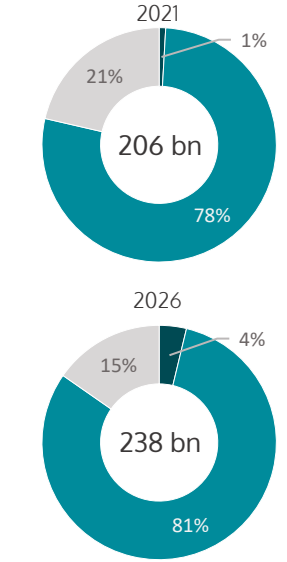
Net Efficiency Savings for Businesses and Consumers



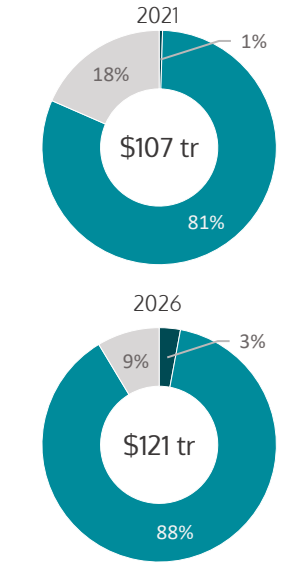
Aggregate Macroeconomic Impact



Payment Mix By Transaction Volume (bn)



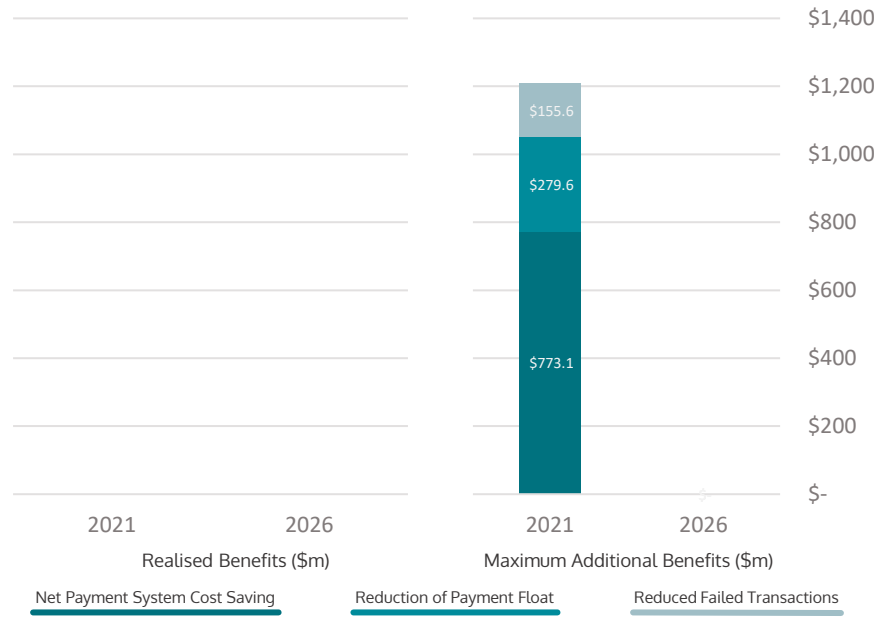
Payment Mix By Transaction Value ($ tr)



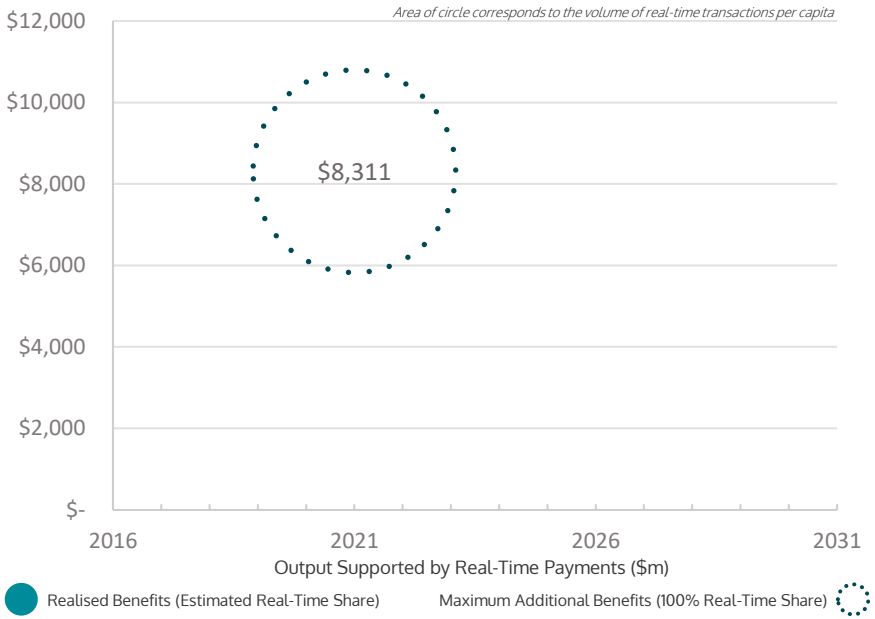
Vietnam

- As of 2021, Vietnam had the 41st largest economy in the world with an estimated PPP adjusted GDP per capita of $11,608 (Cebr World Economic League Table, 2022). Vietnam's economic growth story has been nothing short of a miracle, with the Đổi Mới reform period in the mid-1980's, coupled with favourable global trends, enabling the nation to achieve rapid economic growth and propelling the country from a poor country to a lower middle-class country.
- At present, Vietnam does currently have a central real-time payments infrastructure that was launched by NAPAS, the National Payment Corporation of Vietnam, in 2020. This system provides a 24/7, near real-time interbank funds transfer service across Vietnam.
- However, data availability on the usage of this is very limited, and we are only able to estimate the payment mix for 2021, while solely disaggregating between paper-based payments and electronic payments (including those which are real-time). As real-time payments were unable to be stripped out, the economic impacts are exclusively presented for the maximum attainable benefits in 2021.
- The country has a population fast approaching 100 million and over 4.6 billion transactions in 2021 (78.9% of which are already electronic). Consequently, the potential unrealised benefits are the key areas for Vietnamese policymakers to look to take advantage of by increasing real-time take up rates.
- We estimate that there is a theoretical maximum of $1,208 million in business and consumer level benefits that Vietnam can unlock in 2021, supporting 2.2% of formal GDP ($8,311 of economic output, which is equivalent to the support of 1.2 million jobs).
- This is predominantly driven by the potential of real-time payments to reduce the size of the informal economy and formalise significant portions of economic activity. In Vietnam, we estimate that $7,988 million of currently informal output could be shifted to the licit economy under 100% real-time payment usage.
- We do not have forecasts for the payment mix in Vietnam in 2026; therefore we are unable to present these forward-looking economic impacts, as with other countries within the scope of work.
- However as seen by the potential impacts of full real-time utilisation in 2021, there is significant potential for the benefits of real-time payments to facilitate further economic prosperity in Vietnam.

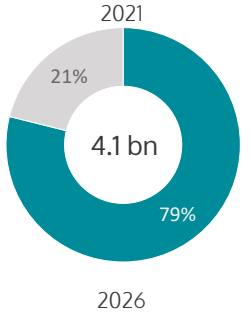
Net Efficiency Savings for Businesses and Consumers

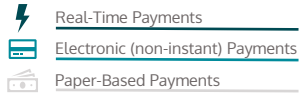


Aggregate Macroeconomic Impact

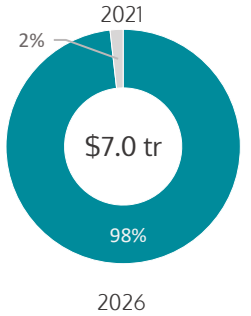


Payment Mix By Transaction Volume (bn)





Payment Mix By Transaction Value ($ tr)



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London, April 2022