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Structural Conflicts in Central Banking: Regulator or Operator of a Payment System?

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Introduction

America has the world's largest economy, yet its payment system is increasingly outdated and slow compared to other major economies. Federal Reserve (Fed) Chairman Jay Powell acknowledged in his July 31, 2019 press conference: "the United States is far behind other countries in terms of having real-time payments available to the general public" as the Fed was in the midst of a multi-decade process of trying to catch up to the rest of the world. The Fed finally launched its updated payment system, FedNow, in late July 2023, with little fanfare and fewer than 1 percent of banks signed up to use it. Why has America lagged?

This paper analyzes four countries' payment systems and the role the central bank played in each. Three of the countries, China, Brazil, and the United Kingdom, adopted real-time payment systems, while the United States did not. The central hypothesis of the paper is that structural conflicts of interest in the Federal Reserve's mandates, coupled with a lack of prioritization of the importance of faster payments is the most likely explanation for America's failure. If accurate, then a failure to align these incentives will continue to plague America and the simple creation of FedNow will prove ineffective at modernizing the payment system.

The Fed's conflict of interest stems from its dual role as the regulator of payment systems while simultaneously expecting it to operate its own large payment system. This dual responsibility creates an inherent tension in which the central bank will not establish regulations for the payment system that its own operational arm cannot comply with. Even when Congress gave the Fed the regulatory responsibility to ensure a modern payment system, the Fed prioritized its role as operator. The Fed foreclosed itself from requiring faster payments and allowing the private sector to solve the problem. Even when the private sector built such a system, the Fed not only failed to act through regulation, it responded by announcing a decision to build its own real-time payment system. The launch of FedNow provides another test of this hypothesis as to whether the Fed will use its regulatory authority only after it has created an operational system that can comport with new rules.

The result of America's delay in expediting its payment system is difficult to measure in the macro-context. However, the distributional consequences are clear. Lower income Americans suffer greatly from the existing payment system and stand the most to gain from faster payments. The faster payment lever was one of the few levers available to the Federal Reserve to reduce income inequality, yet it was never pulled. As a result lower income Americans lost potentially hundreds of billions of dollars over more than a decade in overdraft and late fees, interest costs, payday loans, and check cashing fees. In fact, many of the high cost financial services that flourish in the United States but are largely absent elsewhere are made more profitable by slow payments.

The paper is organized as follows: It begins with a brief foundational section defining payment systems and the central bank's role. The paper then turns to several international examples where real-time payments have been established and examines how that happened and what role their central banks played. The paper concludes with an analysis of why other nations have

been able to make this leap while America has not and what role the Federal Reserve's structural conflict as operator and regulator has played.

What are Payment Systems:

A payment is an exchange of value, usually money, between two or more parties. A payment comprises two distinct pieces: the transmission of funds and the corresponding information. The transmission of funds is the actual movement of money between parties. The information necessary to complete this includes who is paying whom, how much, when, and through which accounts or intermediaries. The flow of information is separable from the flow of funds, an important foundational concept in understanding payment systems. Some payment systems are informational (SWIFT), whereas others combine information and flows of funds (ACH).

Payment systems generally experience network economic effects whereby each additional member of a given payment systems adds positive marginal value to existing members. This increases economic value to size, benefiting scale and universal acceptance. Payments have agglomerative economic externalities, in which the addition of a new payment system provides positive value to direct competitors.

For decades payment systems used batch procession. In this system, payments are held and credited and debited in groups (batches), rather than individually when they occur. A batch system is analogous to a washing machine in which all the clothes go in together, regardless of when they were soiled, and come out clean at the same time. The person doing the laundry then decides when to fold and return the clean clothes, much like the bank has some discretion on which order to post the various debits and credits that come through the payment cycle. Changing the order of such posting, such as posting debits before credits or reordering payment flows to process the largest first can alter consumer balances, create uncertainty as to the amount of funds available in their account, and cause consumers to overdraft.

Realtime payments in contrast run individually and can be processed immediately. There is no need to collect payments and pause processing in between batches. Real time gross settlement (RTGS) systems (referred to as real time payments in this paper) are a more modern technology that has grown sharply in the past two decades.

The Role of the Central Bank

In almost every country, the central bank plays a major role in payment systems. Central bank roles vary but are generally within three categories: operator, facilitator or catalyst, and regulator. The facilitator or catalyst role is important as the central bank has unique ability to promote or require payment services operated by either itself or the private sector. A core tension exists between regulating the entire payment system and operating a system within that regulatory structure. The central bank's roles as regulator, supervisor of banks and systemically important financial institutions can add another layer to this tension. This is particularly important in the United States as the Federal Reserve regulates all bank holding companies, state member banks, and all non-bank systemically important financial institutions

(SIFIs), which since that authority was granted in the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank) have been predominantly payments organizations. Many, but not all, central banks globally have some of these roles as well.

Before diving into the country case studies, a table setter in central bank theory is helpful. Central banks are generally given significant autonomy from the executive branches. Independence is grounded on the idea that monetary policy requires different temporal trade-offs for optimal economic performance than election cycles. However, central bank independence is not confined just to the conduct of monetary policy. Central banks enjoy varying degrees of independence in how they regulate and operate payment systems.

In considering the best way to structure the delegation of power to an independent central bank, Paul Tucker, the former British central banker, lists several principles of which the first few are informative in this discussion: “the core Design Precepts are well-specified goals, responsibilities, and powers, coming from the legislature; clear mandatory procedures for decision making; the articulation of operating principles for how discretion will be exercised” (Tucker 2018, 556). It is important to contextualize the payment analysis on these metrics. The paper will show that despite Congress articulating clear goals, responsibilities and powers, the Federal Reserve has maintained and exercised its discretion in payment operations in manners at odds with these authorities.

The rationales given for the central bank to operate a payment system are multiple but can be broken down in to two main themes: economic and systemic. The economic argument is that payment systems have a series of market failures, including monopoly components, network effects, coordination difficulties, and asymmetric information, that lead it to be best thought of as a public good. Public goods can be under-provisioned by the market and require government action. The central bank should provide this role as it has comparative advantages in providing and moving money between banks. The second argument is that the central bank needs to ensure the functionality and operations of payment systems due to their systemic importance to the economy. The premise is that private actors cannot be trusted to internalize the importance of operation for the entire economy, requiring a public payment system option. Analyzing these arguments, the Congressional Research Service concludes, “From a societal perspective, it is unclear whether it is optimal to have a single provider or multiple providers in the case of a natural monopoly, particularly when one of those competitors is governmental. Multiple providers could spur competition that might drive down user costs, but more resources are likely to be spent on duplicative infrastructure.” (Cooper et al. 2019)

Payment systems can impact both total economic activity and its distribution. More efficient and effective payment systems link buyers and sellers of goods and services in ways that move money cheaper, faster, and more accurately. Electronic payments are a necessity for e-commerce. The story of eBay is as much if not more the story of PayPal. The App economy does not take cash. Monopolistic tendencies inherent in payment networks allow for economic rent extraction and in the extreme reverse cross-subsidies. America’s credit card reward system moves billions from merchants and lower income consumers to the wealthy.

For most of the twentieth century ACH systems were the workhorse of the payments infrastructure, supplementing and perhaps replacing paper check clearinghouses. Central banks were active ACH operators. Globally, 34 central banks operate ACH systems (accounting for around 40 percent of ACH systems), while more operate other forms of clearinghouses to handle payments such as check.

The future is real-time digital payments. This is where some central banks took the lead while others lagged. The BIS identifies twenty-seven different real-time payment systems operators globally. They term a payment fast or instant “when the transmission of the message and the availability of funds to the payee occur in real time or near real time on as near to a 24 hour and seven-day (24/7) basis as possible” (CPMI 2021). These payment systems are networks connecting payors and payees across different platforms.

The platforms may or may not be entirely inclusive; for example, the lone real time payment system identified in the United States, the RTP network operated by The Clearing House, connects over 60 percent of the bank accounts in America but operates with only 285 banks and credit union participants in the network and is discussed in greater detail in the United States section. As of writing in June 2023, RTP is the only real-time digital payment system operating across banks, although the Federal Reserve’s FedNow system will launch shortly. Why America’s central bank lagged, while others led, and what role the private sector played is the subject of the rest of this paper.

Four Nation’s Payment Experience In-Depth

This paper goes into detail in four countries: the United States, the United Kingdom, China, and Brazil. Exploring these countries experiences in payments provides insight and data into why some countries moved to real-time payments while the U.S. largely did not. These countries were not chosen randomly. They are a mix of developed and developing. Three are among the largest countries in the world in terms of population and size, while the fourth is one of the oldest economic powerhouses and home to a global financial center. Each has a different mix of responsibilities and roles for their central bank.

China¹

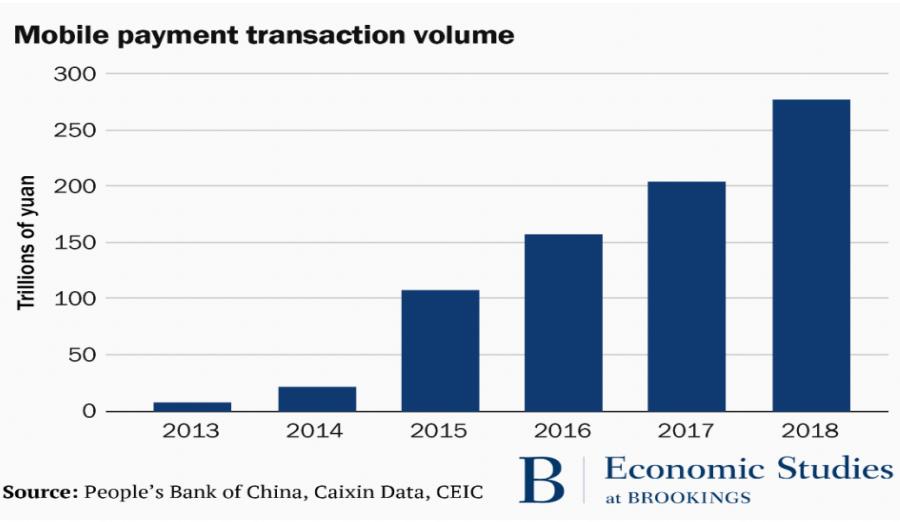
China is the story of a central bank taking a back seat in both regulation and operation of the payment system. The result was the second largest economy in the world leapfrogging the rest of the world’s plastic card system into its own, highly effective, efficient, and inclusive payment miracle. It is ironic that China, a communist nation with an authoritarian regime and greater government role in society than any other nation analyzed, would allow their payment system to advance in an unplanned and at first unregulated direction. China’s experience is evidence

¹ Much of this section builds on prior work by the author (Klein 2019) https://www.brookings.edu/wp-content/uploads/2019/06/ES_20190620_Klein_ChinaPayments.pdf and Martin Chorzempa’s book The Cashless Revolution (Chorzempa 2022).

supporting the argument that the less central banks operate payment systems or that banks profit from them, the faster payment systems can evolve.

China developed one of the world's most cutting-edge payment systems rapidly during the mid-2010s. Today, the vast majority of retail Chinese payments move in realtime between accounts using QR codes and smart phones. Digital wallets operated by AliPay and WeChat, two of China's largest tech firms, combined, account for 90 percent of retail payments. China's payment system satisfies the objectives of speed, universality, inclusion, and low cost. Payments settle almost immediately, everywhere, always. Payments are often costless for users and merchants alike. Small fees sometimes exist (on the order of 10 basis points) when funds are moved between digital wallets and bank accounts, but generally, merchants and consumers pay far less for the Chinese payment system than America's.

Immediately prior to the current system, China's payment system was largely cash-based. China had the world's largest card-based system with 7.6 billion cards, with over 90 percent of those being debit cards, however, despite widespread account holdings and card distribution, few transactions settled over this system. Chinese merchants largely refused to adopt this system which was based on fees paid for by merchants. Even though these fees were initially capped at 200 basis points (lower than the average paid over Visa or MasterCard in the US), Chinese merchants did not go along. The card-based system, largely operated by Union Pay and Chinese banks, did not gain traction, while Visa, MasterCard, and American Express were largely banned by the Chinese government. In 2018, only 34 million transactions occurred over traditional point of sale card-based systems in China while mobile payments largely over the non-bank AliPay and WeChat Pay totaled over \$41 trillion.



Why did China leapfrog the western payment system and move from cash straight to QR codes and smart phones? How did this leap occur and what role did the Chinese central bank play? The answer starts with appreciating that the People's Bank of China (PBOC) played an important role in this digital revolution, but not the one that a traditional central bank might have been expected to play. The PBOC is legally situated like the Federal Reserve with legal

mandates to operate and regulate the payment system. Article 4 of the PBOC (2003) authorizing statute specifically charges it with “maintaining the normal operation of the payment, clearing and settlement systems;” while Article 27 states that “The People’s Bank of China shall, in conjunction with the banking regulatory authority under the State Council, formulate rules for payments and settlements.” PBOC was doing both as a regulator of the Union Pay and interbank system and an operator. However, the PBOC then allowed innovation in payments to occur outside of its own jurisdiction!

The PBOC fostered payment system innovation around and outside of the banking system, actively promoting such a change. As PBOC Governor Zhou stated in 2013: “If businesses that did not have a financial license use new Internet technology to do business that required a financial license, we need to think of ways to research these new business models to give them some type of license and a certain amount of space” (Chorzempa 2022). In fact, giving these businesses space was exactly the approach the PBOC took, allowing AliPay and WeChat Pay to take off, exploding in popularity and essentially leapfrogging the traditional banking payment system. As Chorzempa (2022) concludes in his definitive account of how China’s payment system arose, “reformist bureaucrats like Zhou Xiaochuan [who served as Governor of the PBOC from 2002 to 2018] invited big tech into finance to compete with state-owned banks and force them to shape up”. He goes on to argue that Chinese policymakers “recognized that private companies and consumers needed finance not provided by the state sector, so they turned a blind eye to informal finance” such as the new payment systems. More than a blind eye, leading Chinese officials gave affirmations for financial technology firms to challenge bank monopolies as Premier Wen Jiabao, then China’s top-ranking economic official said in 2012: “Frankly, our banks make profits far too easily. Why? Because a small number of major banks occupy a monopoly position... That’s why right now, as we’re dealing with the issue of getting private capital into the finance sector, essentially, that means we have to break up their monopoly.”

Chinese banks may have had some monopolistic advantages but within payments this monopoly was not generating substantial profit. As noted earlier, Chinese merchants and consumers had refused to adopt the bank-based payment system, relying primarily on cash. This resulted in different profit sources for Chinese banks as compared to American. For example, in 2017, JP Morgan Chase netted \$4.4 billion in card transaction fees, roughly 18 percent of the bank’s profit, China’s ICBC generated only about six percent of its total profit from card based payments. That fee calculation is only from cards (debit and credit); if one adds in other revenue generated in part due to the slow speed of the American payment system, such as overdraft, those figures are even higher.

China’s central bank allowed for payment modernization to occur despite having both operational and regulatory responsibilities. The key distinction is that this payments evolution occurred not just outside the central bank but outside the entire banking system. This was a conscious decision to inject innovation and competition from technology firms into the payment system. In doing so, the PBOC segregated payments from other elements of banking.

For example, the PBOC stopped Ant and Tencent (parent companies of AliPay and WeChat Pay) from issuing virtual credit cards and engaging in consumer credit through their payment arms.

That the PBOC was willing, and even encouraging, in allowing competition between banks and non-banks in the payment system highlights the potential for central banks to promote innovation in payments even when they have regulatory and operational authority and responsibility. In the Chinese context this was part of a broader set of policies to inject tech innovation into finance, going around the banks. The PBOC was willing to essentially seed payments to the tech sector, a concept that is unlikely in other developed countries where the central bank actively promotes and protects the financial interests of the banks it regulates. One factor that could have made this decision easier for the PBOC was the smaller share of payments as a function of revenue and profitability for Chinese banks. Another factor was that China's existing banking payment system was slow to adopt new technology and innovate as compared to the tech sector. Fundamentally, businesses and consumers were simply not willing to adapt to the magnetic card-based system popular in America and most of the developed world. The banks had not presented an alternative system, and reform-minded Chinese government officials, surprisingly led by central bankers, were willing to allow Chinese tech firms to take over.

The Chinese experience makes clear that the tension between operating and regulating a payment system is not enough to preclude a nation from adopting real-time payments. But in China's case the central bank allowed payments to migrate away from the banking sector entirely, a radical change that occurred in a country where banks were not previously making large profits off of payments. That this happened in China, which has a stronger degree of central government planning and control than democratic capitalistic countries, is even greater evidence of the power of choices and decision-making by central bank and other leaders, as opposed to structural forces.

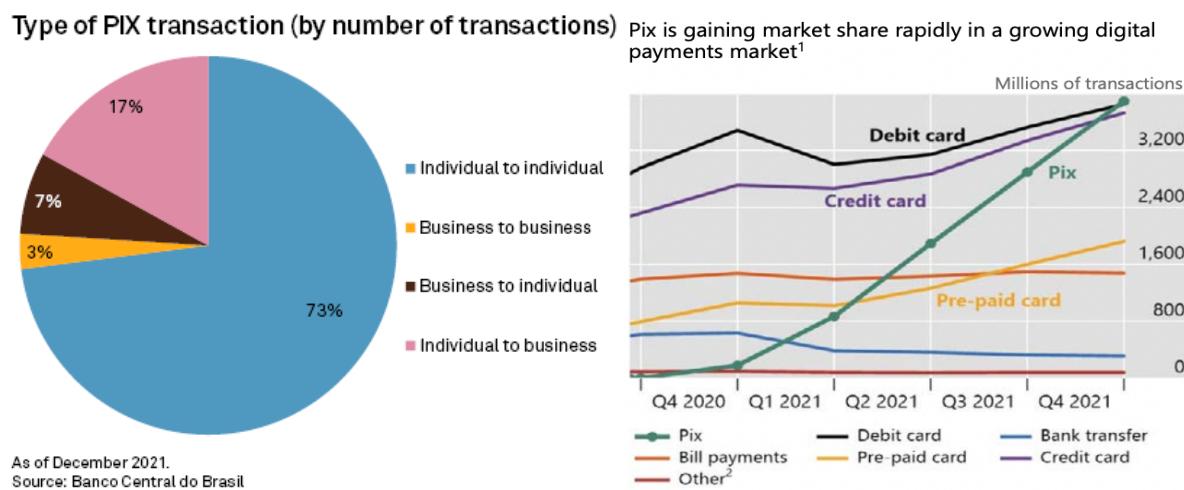
A coda to the Chinese story of payment evolution. The Chinese government is possibly bringing payment systems back into the banking system through piloting a central bank digital currency (CBDC). China's CBDC system builds off of the existing AliPay and WeChat Pay rails with a goal of interoperability between CBDC, Ali/WePay payment systems, and corresponding digital wallets. As Chaangchun Mu, Director General of the PBOC's Digital Currency Institute stated at a recent presentation before the IMF, China's CBDC has a goal to improve the efficiency of the central bank system while providing a backup for the existing retail payment system. Thus, while the PBOC allowed the payment system to involve outside of the banking system, it may be reestablishing central bank control and possibly bringing the core system back into operational compliance with the central bank's own system.

Brazil

Brazil has instituted one of the most advanced and successful real time payment systems in the world, Pix. Introduced in November 2020, Pix has already grown to have adoption by two-thirds of Brazil's adult population (114 million users). Pix is free to use and can be used through a

variety of information, including email addresses, phone numbers, and QR codes. The system processes over half a million transactions per minute with most transactions occurring peer-to-peer, and while less than 3 percent of transactions are business to business, B2B transactions account for almost a third of the dollar volume on Pix, highlighting success in penetrating that market.

The picture below (Duarte et al. 2022) captures Pix's spectacular rise within the Brazilian payment system, which is widely acknowledged to be a tremendous success across the major metrics of adoption, inclusion, speed, and cost.



Brazil's movement to Pix began in 2013 with passage of legislation empowering the Central Bank of Brazil (BCB) to regulate retail payments according to the principles of efficiency, security, interoperability and financial inclusion. The law explicitly requires the BCB to operate an inclusive payment system while regulating all payment systems.

To implement the law, the BCB published a comprehensive payment system report in 2013 highlighting the need to create a realtime payment system, but calling on the payments industry to create it. Despite the call to action, little change appeared over the next several years. Undeterred, the BCB kept moving forward collaborating with the private sector, ultimately producing a roadmap, The Brazilian Payments System, issued by the BCB in December 2018. This document spelled out an agreement in which the BCB would lead the development of an instant payment system. While the system would have an advisory group comprised of users of the payment system, the BCB maintained control and decision-making authority.

Pix was developed and launched by the fall of 2020. BCB used its regulatory authority to mandate participation by banks and any payment institutions with 500,000 transaction accounts. This caused pressure on smaller banks and non-bank payment service providers who were not obligated to participate, and many quickly followed. While Brazil has a relatively high

share of unbanked (30%) citizens, the Pix system does require a bank account at this time, however BCB is encouraging banks, financial technology companies, and other digital wallet providers to help bridge this gap.

Pix's impact on bank revenue is unclear. Pix resulted in an immediate decrease in transaction fees as Pix is free for consumers and banks previously charged consumers for transactions. However, Pix has improved backroom efficiency for banks reducing costs for handling cash. Most importantly, it has helped drive greater interest in the banking system, which may increase longer run profits from greater participation and more money remaining in the banking system. Central bank head Neto argued that Pix is not costing Brazilian banks revenue. This position was supported by a senior Brazilian banker who said the increased number of checking accounts opened "completely offset" revenue losses from fewer transaction fees.

Pix lowers transaction costs for businesses. A report by BCB economists found that Pix was the cheapest form of payment for merchants, costing merchants an average of 0.22% per transaction compared to 1% with debit cards and 2.2% with credit cards (Duarte et al. 2022). One small business owner in Brazil told Bloomberg that, before Pix, she had to operate multiple different bank accounts in different banks so that her customers wouldn't have to pay a fee to transfer money to her if her bank account was at a different bank than the customer's. She said this fee could be 30% of the total cost to her customers, now she just has one bank account and customers pay no fee. One final benefit was the greater time flexibility, as previously payments only processed during banker hours and now, they are anytime.

The BIS highlights the dual control by the central bank as operator and regulator as one of the positive reasons Pix was able to launch and gain adoption so quickly: "The BCB plays two roles in Pix: it operates the system and it sets the overall rulebook. As a system operator, the BCB fully developed the infrastructure and operates the platform as a public good. As rulebook owner, the BCB sets the rules and technical specifications (eg APIs) in line with its legal mandate for retail payments" (Duarte et al. 2022). The BIS report goes to highlight the benefit of the dual role as regulator and operator: "By directly operating such a system, the central bank can define and enforce rules that govern the platform, including on costs, use of data and other technical standards. Not least, the central bank can build on its foundational role at the centre of the monetary system to make its settlement accounts available to support the finality of payments" (Duarte et al. 2022).

Brazil is an example where the tension between operator and regulator of the payment system was resolved through both aggressive regulation and operation. First the BCB gave the private sector the opportunity to innovate in payments. When the private sector failed, the central bank took charge. PIX was created. But the BCB did not stop there. It then required adoption. Aggressive regulation coupled with central bank led innovation worked in Brazil.

United Kingdom²

The UK developed and implemented its faster payment system in under two years between 2007 and 2008. This system is now known as Pay.UK, and by 2020, it processed 9.5 billion transactions. It is not an instant payment system, but rather processes retail and small dollar transactions quickly, generally within an hour. The UK is working on a next iteration to move to an instant payment system, but for practical purposes, the UK moved from batch-based slow payments to faster payments by 2008, when the first iPhone was introduced.

Analysis from the Boston Fed found that the UK was able to implement this faster payment system at a “relatively modest” cost and while they did not quantify the benefits they concluded that “the value of benefits per individual per year need not be large to give FPS [faster payments system] a positive net present value” (Greene et al. 2014, 4). This highlights the importance of timing: early movement to a faster payment system produces greater benefits, delay imposes costs. The analysis also considered the cost to UK banks from reduced float although it pointed out that the current “near-zero short term interest environment, it is hard to make an argument that gains and losses from float are substantial to payers and payees.”

The drive to faster payments in the UK during this time was Her Majesties Treasury and the Office of Fair Trading. The Bank of England supported these actions with then Deputy Governor Paul Tucker assisting in the process at a senior level. Within a few years of operation of the new system concerns that benefits were not being passed on to consumers remained. In 2012, new regulation required faster funds availability. Prior to this regulatory push new technology allowed faster funds availability, but financial institutions were still holding people’s money.

Analyzing why the UK was able to create a near real time payment system but not have those benefits fully passed on to consumers, the lack of regulatory authority of the Payments Council as a regulator was highlighted. From the Treasury report: “First, the Payments Council has not been able to adequately perform its advisory and strategy-setting function in a way that is reflective of the needs of all stakeholders, including end-users. This stems from the strong position of the UK’s largest banks, which are the joint owners of the major payment scheme companies and the dominant force in Payments Council decision-making. This has led to decisions being taken by the Payments Council that do not take fully into account the needs of stakeholders beyond the large incumbents. Projects that would be to the wider benefit of society but not in the narrow interests of the banks have been blocked, and progress has been made at the pace of the slowest.”

The UK’s solution was to create a new payment systems regulator (PSR) with full regulatory authority. The PSR was created under the Financial Services Act of 2013 as “an independent economic regulator, we have our own statutory objectives and management structure and

² This section includes references from the original UK sources including “New Payments Architecture Programme, Opening up UK Payments.” 2013, “Background to the PSR” and authors’ conversations with former BOE Paul Tucker.

board and we are directly accountable to parliament" ("PSR Governance" n.d.). The PSR board is appointed by the FCA with approval of HM Treasury.

Making the PSR independent and singly focused on payments aligns its mission with its responsibility and eliminates other potential conflicts. Furthermore, giving the FCA authority to appoint the PSR board prioritizes consumer end-user experience as opposed to those of payment system operators and financial institutions. The FCA is a consumer-focused regulatory agency, more akin to America's CFPB, while prudential bank regulation (safety and soundness) is handled by the Prudential Regulatory Authority. The two regulators memorialize this distinction: "The mandates of the FCA and the PRA are very different. At the highest level, they are, respectively, the integrity of the provision of financial services to users, and the safety and soundness of banking and insurance including contributing to protection for policyholders, with each also having a role in supporting the Financial Policy Committee. The two authorities have separate and independent mandates, which are set out in statute, reflecting the UK's 'Twin Peaks' micro regulatory system" ("Memorandum of Understanding" n.d.).

One of the UK's core principles in faster payments was economic efficiency and competition. Three of Pay.UK's six guiding principles for creating a new payments architecture are: enhancing consumer choice, lowering barriers to entry for consumers, and ensuring users benefit from enhanced efficiencies.³ These principles are similar to the goals Congress articulated for the Federal Reserve. However, these goals are enumerated directly by the operating arm of the payment system, not part of a myriad of goals prescribed generally to the central bank.

The Bank of England has migrated into payments operation system since the UK's movement. The CHAPS system, which handles wholesale payments and foreign exchange was transferred to the BOE in 2017. Prior to 2017 CHAPS was run by the Chaps Clearing company, so that during the time period in question BOE was not in charge of CHAPS (King 2017). CHAPS is an RTGS system integrated into the BOE's existing RTGS system. The other half of that system was Bacs which is today run by Pay.Uk. A comparison of the UK and US payment structure as it looked in 2014 is helpful:

³ "New Payments Architecture Programme." 2022. Pay.UK. September 13, 2022. <https://www.wearepay.uk/programmes/new-payments-architecture-programme/>.

Type	U.K. Payment System	U.S. Payment System
RTGS (large value)	CHAPS	Fedwire/CHIPS
Batch (slow, any value)	Bacs	FedACH and EPN
Ubiquitous Faster Payment Service	FPS	Not provided by banks
Paper checks	To be phased out	Declining fast
Credit, debit, and prepaid cards	Mostly Chip & PIN	PIN and signature networks and closed loop
Bank account (mainly for bills)	Giro	Bank account number (via ACH)
ATM	Single network	Multiple networks
Coins and notes	British pound	U.S. dollar

Source: Authors' analysis.

The United Kingdom implemented faster payments quickly and cheaply during the great financial crisis. The UK has benefited from this system for almost 15 years and is still improving it moving from faster to real time. The BOE played a supportive but not definitive role in these moves. Her Majesty's Treasury, the FCA, and private sector all played critical roles. Private banks and private payment companies succeeded in solving the problem. The BOE eventually ended up operating a wholesale payment system, showing that private retail payment systems can exist with central bank operated wholesale systems.

The UK is an example of how a country was able to innovate and improve its payment system without the conflict of the central bank facing objectives of maintaining its operational and regulatory role. In the UK the Treasury and FCA were able to prioritize consumers and end users, not financial institutions. Banks did not seem to fight this, perhaps as they were dealing with the financial crisis, but also perhaps because slow payments were not driving revenue. Float was not a major source of profit nor overdraft fees.

United States

The Federal Reserve operates as both the regulator of all payment systems and as an operator of several of the largest payment systems. The Fed's main retail payment system is FedACH while the other large payment system in operation is run by The Clearing House, an organization owned by the largest commercial banks in the nation. These two large retail payment systems have been called a duopoly given their high shares of payment process.

Early in the Fed's history there were major battles regarding the Fed's role in payments with the fight reaching the Supreme Court and prompting Congress to change the recently enacted Federal Reserve Act. The Fed ultimately won substantial autonomy in payments. A few key laws prescribe the Fed's role. The Depository Institutions Deregulation and Monetary Control Act of 1980 required the Fed to price payment services that, over the long run, cover "all direct and indirect costs actually incurred in providing the Federal Reserve services priced" ("Federal Reserve's Key Policies" 2008). Prior to this law, the Fed offered free payments services to its members. The Monetary Control Act required the Federal Reserve to return all savings from

increased revenue and reduced budgetary needs of Regional Banks to the United States Treasury. This set up a structural conflict, whereby to the extent the Federal Reserve realizes savings in its payment operations, it is structured by law to return those savings, thereby shrinking its own budget. However, since the Federal Reserve Board sets the budget for the Regional Banks, there are no mechanisms for Congress to enforce this requirement.⁴

The Expedited Funds Availability Act of 1987 was enacted to force the payment system to move faster. The Act gives the Fed “plenary power over the check collection system and invites the Fed to use this power in a variety of ways” including to require banks to make funds available to consumers more quickly (Rubin 1989). Specifically, Section 4002(d) states:

“Notwithstanding any other provision of law, the Board, jointly with the Director of the Bureau of Consumer Financial Protection, shall, by regulation, reduce the time periods established under subsections (b), (c), and (e) to as short a time as possible and equal to the period of time achievable under the improved check clearing system for a receiving depository institution to reasonably expect to learn of the nonpayment of most items for each category of checks.”⁵

Note the requirement is obligatory (shall), not discretionary (may) creating an obligation for the Fed to reduce wait times/expedited funds to consumers as fast as the improved payment system will allow. Conti-Brown and Wishnick (2020, 57) argue that EFAA only applies to transactions that involve checks and ATMs. They contemplate its use for wire transfers but dismiss that authority because “the Act is directed by and large, at the banks, not the Fed” and that if the Fed were to require faster clearing of other payments that would be subject to legal challenge. They conclude that “This is ironic: the Act is the most explicit congressional attempt in history to force banks to facilitate faster payments.”

Accepting their argument for the moment, that EFAA only applies to checks at ATM deposits, why has the Fed not required near immediate funds availability as current technology allows? While checks have declined in usage, there were still 11.2 billion checks written in 2021 with a total value of \$27.23 trillion, comprising 21 percent of noncash payments by value (“Federal Reserve Payments Study (FRPS)” 2022).

The last major legislative overhaul of payment operations was the Check-21 Act, legislation I was deeply engaged in drafting as professional staff on the Senate Banking, Housing and Urban Affairs Committee.⁶ This legislation was proposed by the Federal Reserve to Congress to allow

⁴ Federal Reserve remittances to the Treasury general fund are complicated, particularly as the Fed's balance sheet ballooned since the 2008 financial crisis. The fundamental mechanisms, accounting, and magnitude of the transfer merit its own analysis. What is important in this paper's context is the Congressional requirement for the Fed to separately recover its costs for payment services. Congress did not want the Fed cross-subsidizing its payment operations and undercutting private competition. However, the ability to monitor this is lacking, perhaps impossible.

⁵ This is the current reading of the statute, which was slightly amended in the Dodd-Frank Act to include the CFPB Director's assent, a further nod by Congress as to the importance of this authority to assist consumers.
<https://uscode.house.gov/view.xhtml?path=/prelim@title12/chapter41&edition=prelim>

⁶ The next few paragraphs rely on the legislative history of the bill, Eubanks Walter, “Electronic Banking: The Check Truncation Issue.” (CRS, 2003), Federal Reserve reports after the law was enacted, and the author's role as a lead Congressional staffer for the Banking, Housing, and Urban Affairs Committee under then Ranking Member Sarbanes (D-MD).

check processing to become digitized. The impetus for this legislative proposal was the terrorist attacks of September 11, 2001, which resulted in a one-week grounding of air travel.

Uncertainty about future terrorist attacks, the dependency on air travel, and the broad electronic revolution that made electronic processing of checks achievable motivated the Fed to take the rare step of proposing legislation to Congress.

The law allowed banks to digitize checks and send digital files for processing. This new technology increases the speed of check processing, but existing law split the time between check processing and funds availability to consumers as discussed earlier. There was substantial debate in the legislative drafting process regarding whether to change the timing of funds availability. The original Fed proposal, as passed by the House, did nothing while the Senate version contained requirements for studies by both the Fed and the Comptroller General. Efforts in the Senate to include language requiring the Fed to make funds available faster were opposed by the Federal Reserve who argued that existing legal authority both provided such discretion and compelled it, given EFAA's 'shall' requirement. In the end, the Senate's proposed study, slightly modified, became law. Funds were not required to move faster.

The Federal Reserve's study submitted in April 2007, found some improvement in check processing time but that, "this improvement, however, has not been sufficient to warrant changes in the maximum permissible hold periods mandated by the EFAA and Regulation CC"(FRB 2003). The Fed did not change availability times for consumers under EFAA and still has not, despite widespread adoption of electronic check clearing.

The Federal Reserve estimated total systemic savings from Check-21 at \$1.16 billion in the year 2010. The Fed estimated these savings were split almost evenly between the banking system and the Federal Reserve system. This would mean savings of just under \$600 million to the Fed. Under the Monetary Control Act, these savings are required to be passed back to Treasury. The Fed acknowledged these savings in their 2010 annual report, but still the Federal Reserve's Regional Bank budget in 2010 did not decline but rose by 2.5% (\$78.8 million). Under the Monetary Control Act, this means the Fed budget would otherwise have increased by over \$650 million, around 20 percent of its 2010 budget, had Check-21 not passed.

The Federal Reserve spent most of the past twenty years studying and debating whether it should launch a real-time payment network. In 2015 the Fed created the Faster Payments Task Force with a stated vision to realize a faster, inclusive payment system by 2020. The Faster Payments Task Force had a Kafkaesque 321 members. In 2018, the Federal Reserve issued a request for public comments on whether the Fed should develop its own real-time payment system. One year later in August, 2019 the Fed announced it would create such a system, eventually called FedNow. FedNow is expected to launch in July 2023, nearly four years after the Fed's decision to build it.

Why it took the Fed four years to build something that other central banks around the world built in around two or less is unclear. The Fed has said America is more challenging because it has over 9,000 banks and credit unions. However, that explanation does not conform with

experiences globally, particularly when one considers that FedNow is for banks and credit unions, compared with the millions of merchants who quickly adopted China or Brazil's payment systems. The Bank of England implemented its real-time payment system during the 2007/2008 financial crisis, demonstrating that a committed central bank can act quickly on payment system modernization even during periods of financial distress.

The Clearing House had already launched a real-time payment system (RTP) in 2017, before the Fed's request for comments as to whether it should build its own system. Over its first five years it has grown to include over 120 banks and credit unions that reach 62 percent of bank accounts. However, despite this large potential customer base, RTP handled only 45 million transactions valued at under \$20 billion in the entire third quarter of 2022. By contrast Fed ACH averaged just over 74 million transactions worth \$155 billion, per day in 2022. Some argued that the Fed's consideration of building its own system and subsequent decision to do so had a chilling effect on adoption of RTP.

Analysis: Taxonomy of Findings Across Countries

China, Brazil and the UK all adopted real-time payments but through very different methods. In the UK the Treasury department led the push with the central bank in agreement. The UK established a separate payment regulator through legislation and then that regulator worked with its banking system to develop and implement the system expeditiously. The Bank of England was a part of this process but did not see its regulatory or operational turf threatened. China allowed the private, non-bank FinTech sector to develop a new payment system, largely bypassing the existing banking system. Ironically, China, the most authoritative nation in this sample, was also the one most willing to allow the least regulated entities to innovate and lead in payments. Brazil attempted to allow the private sector to take the lead. However, when the private sector failed, the Brazilian government acted forcefully. Its central bank leaned heavily on mandates and transitioned the payment system expeditiously and successfully.

This chart summarizes some of the key findings across countries and the heterogeneity of results is striking. There is no one single answer:

Country	Enacted RTP	Central Bank Operator/Regulator Conflict	Legislative Requirement for Faster Payments	Central Bank Created RTP	Private sector RTP
US	No	Yes	Yes (but not recent)	Coming	Yes
UK	Yes	No	Yes	Not	Yes
Brazil	Yes	Yes	Yes	Yes	No
China	Yes	Yes	No	No	Yes

One thing all three of these countries have in common was that the banking system was not particularly dependent on payments for revenue, or to the extent it was, faster payments did not threaten that revenue stream.

Expanding the sample beyond the four in depth countries, the table below lists the various real time payment systems in operation as of 2020 across the globe. Countries in orange have payment systems not operated by the central bank, while those in green are. 18 of the 23 real time payment systems in operation are not run by the central bank. Of the five that are, only Mexico began in operation before 2018. Until that moment 15 of the 16 in operation were not operated by the central bank, including the RTP network in the United States.

Jurisdiction (abbrv)	System name	Operator	Year of introduction	Is the Operator the Central Bank?
Japan (JP)	Zengin	Zengin-Net	1973	N
Korea (KR)	EBS	KFTC	2001	N
South Africa (ZA)	RTC	BankServAfrica	2006	N
KR	CD/ATM	KFTC	2007	N
United Kingdom (UK)	FPS	Pay.UK	2008	N
China (CN)	IBPS	China NCC	2010	N
India (IN)	IMPS	NPCI	2010	N
Argentina (AR)	IT	RedLink SA & Prisma SA	2011	N
Sweden (SE)	BiR	Bankgirot	2012	N
Singapore (SG)	FAST	BCS	2014	N
Mexico (MX)	SPEI	Banxico	2015	Y
Spain (EA (ES))	SNCE	Iberpay	2016	N
Euro Area (EA)	RT1	EBA Clearing	2017	N
Switzerland (CH)	Twint	Twint Ltd	2017	N
United States (US)	RTP	TCH	2017	N
Australia (AU)	NPP	NPPA	2018	N
Euro Area (EA)	TIPS	Eurosystem	2018	Y
France (EA (FR))	SEPA EU	STET	2018	N
Hong Kong (HK)	FPS	HKICL	2018	Y
Belgium (EA (BE))	CEC.IP	CEC	2019	N
Netherlands (EA (NL))	eW IP CSM	eW	2019	N
Russia (RU)	FPS	CBR	2019	Y
Brazil (BR)	Pix/SPI	BCB	2020	Y

This is evidence for the argument that central banks are laggards in adopting real-time payments that they operate. This is consistent with the general theory that government run enterprises tend to be smaller ‘c’ conservative when it comes to adopting new technology. They are more cautious and innovate less. The pick-up in central bank operated real-time payment systems in more recent years can be interpreted to show that central banks are willing to operate this technology now that it has been broadly proven.

Central banks may be slow to develop their own operational real-time payment system, but this did not stop many countries from creating and rolling them out. In these countries, such as China and the UK, the central bank was willing to allow the private sector to operationalize a new payment system. In China’s case, the central bank allowed the payment system to move out of the banking system, although that is an aberration compared to most of the developed world.⁷ In the UK example, the central bank ended up as a supervisor of Pay.uk but not the primary regulator, which is the Payments System Regulator.

⁷ Kenya is not listed among the BIS data base in having realtime payments although the mPesa system does move mobile money across accounts instantly and has become the dominant payment system in the nation. However, similar to China the Kenyan central bank did not act to stop the migration of the payment system outside of the banking system. For more see:

Analysis: Why Not America

Why does the United States payment system lag? The UK transitioned largely during the 2007-2008 financial crisis. If the UK can accomplish this during financial turmoil, America could have done it well before 2023. There are multiple potential reasons: structural conflict within the Fed; prioritization of objectives; impact on bank profitability; role of the private sector in payments; or idiosyncratic reasons.

This paper argues that the Fed's prioritization of operating a payment system compared with its central bank counterparts who are more content to regulate is a major reason. When the central bank writes regulations for payment systems, its own system must comply. Thus, the central bank has a structural conflict between its regulatory and operational function. This conflict can be settled in one of two ways: altering operations to comply with regulation or refusing to write regulations that their system cannot comply with.

As a matter of fact, a batch-operated payment system cannot comply with a requirement for immediate payment. This is a fundamental incompatibility with the technology and processing. Thus, the Federal Reserve's ACH system could not comply with a requirement for immediate funds availability. Even though the law required the Fed to update its payment regulation to the speed available by technology, the Fed knew that doing so would jeopardize its ACH system's volume. This is one explanation for why the Fed did not follow through with its legal requirement.

However, this does not explain two different questions: why didn't the Fed just regulate and let the private sector solve; why didn't the Fed just build FedNow earlier when the UK did. Tackling the first question, private real-time payment systems can still face problems complying with regulatory requirements if they, in turn, must rely on non-real time wholesale payment systems. For example, the RTP system strongly supported expanding hours of operation to the Fed's wholesale payment system (Fedwire) to avoid concerns about liquidity gaps during periods when Fedwire was closed (weekends and holidays) while RTP was open.

The Federal Reserve has by and large not made even those incremental changes to improve the payment system, and in the process help RTP. Despite bipartisan calls for such improvements the Fed prioritized building FedNow over improving the existing system. Ironically, the Fed's failure to extend operating hours almost exacerbated the recent banking crisis as some settlements during the failure of Signature Bank were not able to be met during normal Fedwire business hours. Thus, these longer hours of payment operations could have been justified on a grounds of financial stability, another goal of the Fed.

<https://www.worldbank.org/en/news/feature/2018/10/03/what-kenya-s-mobile-money-success-could-mean-for-the-arab-world>
(Soyres et al. 2018)

Had the Fed made a series of regulatory choices to prioritize faster retail payment systems such as RTP it would have exposed problems in its antiquated wholesale payment systems. Perhaps those could have been solved quicker than the time it took to build FedNow. Speed was not the Fed's priority, stability of the payment system was given priority. Stability helps ensure the central bank is not perceived as creating problems or failing. If the cost of that inaction is born by those with the least, that does not directly reflect on the central bank. Put another way, a payment system problem impacting retail sales over a weekend that can be traced to an outage of Fed operated system (whether retail or wholesale) is far more damaging for the central bank's reputation than the tens of billions spent annually by lower income consumers on overdrafts, check cashing fees, and payday loans, only some of which is attributable to the slow payment system

Turning to the second question, why did the Fed just not build FedNow earlier, the international comparisons shed light. Brazil challenged the private sector to build a system, just as the Fed did in the early 2010s. Unlike in Brazil, America's largest banks did build a privately owned real-time payment system operated the RTP system launched in 2017. Yet, despite RTP's launch, the Federal Reserve committed to building its own network (FedNow) which will compete with RTP and is likely to not be interoperable. RTP has a several year heads start on FedNow and can reach almost two thirds of American's bank accounts. Yet RTP usage remains tiny less than 1 percent of payments in 2022.

The Fed has lowered expectations for FedNow adoption, as Federal Reserve Vice Chairman for Supervision Michael Barr told Congress in November 2022, “[I]t will take time to build the number of institutions that are well positioned to offer the kinds of services that FedNow will then allow them to do. Ramp up time is going to take a while.”

Brazil was able to move from commitment to build to operationalization to mass adoption in under two years. An even shorter time frame was achieved in the UK which introduced their payment system when the first iPhone was introduced but FedNow just barely beat the iPhone 15 to market. Given the availability of technology is at least equal if not greater in the United States, how could it possibly be that American banks are unable to adapt while Brazilian and British banks were able to almost immediately? Why did it take the Fed twice as long as Brazil and the UK? Why is America so slow?

There are several possible reasons. First, the fundamental desire of the central bank to speed payments. If this were a core objective, the Fed already would have done so through its existing regulatory authority under EFAA. As discussed earlier, the Fed has longstanding legal authority to require faster funds availability for checks (and perhaps more) through the EFAA but has not done so. The earlier explanation was that doing so would harm the Fed's ACH, which is structurally unable to process payments faster, thus forcing banks to either switch to the RTP system or take on the risk of funds not transferring and not being able to be taken back. However, once FedNow exists, this rationale goes away. Whether the Fed then uses its EFAA authority will serve as a test case for this theory.

Another explanation is that the Fed is protecting banks' profits through other fees that slow payments provide. These include interest on the float, the time between settlement between banks, and crediting to consumers. With interest levels at historic lows the past several decades, consumers may have been less interest sensitive, even though float differentials may have remained (or even widened with the Fed now paying banks interest on excess reserves). Float is global and thus would not explain why the US behaves differently, unless the Fed is prioritizing bank earnings from float more than other central banks, which seems unlikely.

Overdraft fees, however, are relatively uniquely American. Other countries lacked the explosion in overdraft fees that were widespread in America. Overdraft fees accrue directly to banks and have become a multi-billion source of profit. Estimates as high as \$35 billion annually for the industry writ large, with certain large banks routinely pocketing \$1 billion or more in overdraft revenue. Because overdrafts are paid only by those who run out of money (definitionally an overdraft can only occur when a consumer's account goes negative) they are borne disproportionately by people living on the edge. Research from the CFPB has shown that eight percent of customers account for 80 percent of overdrafts with 1 in 12 Americans categorized as heavy overdrafters who accumulate 10 or more overdrafts a year costing them \$350 or more in associated fees (CFPB 2021). For an individual earning \$35,000 a year (roughly the 38% percentile of earnings), that translates into one percent of total income in overdraft fees.

In addition to overdraft fees, slow payments help drive late fees (including on credit cards and loans, but also on other payments), reliance on high cost short dollar lending such as payday loans, usage of expensive alternative settlement such as check cashers, and other expenses. There are more check cashers in America than McDonalds, a point of comparison unique to America (even though we have successfully exported McDonalds to become a global phenomenon). Seven out of ten customers at check cashers have bank accounts, leading to the conclusion that they are at the check casher for faster access to funds.

The Federal Reserve acknowledges this direct linkage writing that: "Consumers can benefit from the flexibility that faster payments offer, such as the ability to complete last-minute or emergency payments. With this capability, consumers can avoid late fees, the risk of account overdrafts, and damage to their credit scores. Additionally, gig-economy workers, like rideshare drivers, may be able to get paid immediately for work they perform that day. Having immediate access to funds means, among other things, a person is less likely to have to rely on short-term and often costly financing like payday loans" ("How Can Faster Payments Benefit Me?" n.d)

Many of these benefits that consumers enjoy from faster payments will come at the expense of bank profits. Experience during the 2007-9 recession indicated that bank overdraft fees went up as consumer distress increased, thus providing banks with a source of profit from payment/fees during periods when their loan portfolio was suffering. This touches the tension between the Federal Reserve as bank regulator wanting to ensure their banks remain safe and sound, a different tension than of that proposed between payment system regulator and operator. This tension would impact the Federal Reserve differently than the Bank of England,

who, at the time in 2007, was not in charge of regulating banks, under the ‘twin peaks’ model that included the Financial Regulatory Authority (FRA).

Is the Federal Reserve’s concern with protecting bank’s revenue from payments a major cause for the delay in adopting faster payments? The data above shows evidence in this direction, although it is more correlation than causation. Overdraft revenue is somewhat uniquely American, providing evidence as to why America is different than the rest of the world. The Bank of England was not a bank regulator when it moved forward with faster payments. Chinese banks had relatively little revenue from payment operations due to low adoption of electronic bank payments when China allowed their payment system to be modernized. Brazil also had smaller payment revenue and a sizeable unbanked population such that a better payment system could be net profitable (or at least not detract from profits).

This example highlights the Fed’s failure to use its supervisory authority to promote faster payments. As Conti-Brown and Wishnick (2020, 48) argued, correctly, that the Fed could push “supervised entities toward faster payments could fit well within several of these supervisory categories, including management, liquidity, susceptibility to market risk, and especially whether each firms’ management is staying current with advances in information technology.”

Perhaps the Fed will use this supervisory authority to push the industry toward faster payment adoption. Brazil’s central bank did this through a mandate of adoption. The Fed could do so through a similar mandate of faster funds availability, giving banks the choice between FedNow, RTP, or using slower funds delivery while offering faster funds availability, giving consumers the benefits while the bank takes the settlement risk. This would be in-line with Conti-Brown and Wishnick’s (2020, 39) finding that, “the Fed has both the ability and the incentive to affirmatively promote FedNow among the long tail of depository institutions.”

However, the evidence at the moment does not indicate the Fed is going to proceed with either a mandate for adoption of real-time payments (whether through FedNow or RTP) or exercising their regulatory authority for faster funds availability. As Vice Chair Barr testified, expectations are slow for FedNow’s initial rollout. RTP’s volume has been slow as banks have not chosen to move funds through it. This is happening, despite the fact that RTP is owned by the nation’s 48 largest banks, and they could choose to move more volume through it. The experience of Brazil shows that mandates work. The experience of the US shows that absent mandates, substantial revenue generated by slow payments, and the availability of an RTP alternative does not generate widespread adoption. Many RTP member banks are still offering consumers surcharges to use the system (often 1 percent of the deposit).

Conti-Brown and Wishnick (2020, 39) argue that “the Fed shores up its political support” by offering a real-time payment system that is not owned by the to the smaller banks that make up the majority of Federal Reserve member banks. This is correct and something that smaller banks have deemed important. However, there is another question of how the Fed shores up its political support among the member banks, which is how aggressively it pushes for adoption of these payment systems.

Conclusion

Over the past fifteen years, most of the rest of the G10 nations adopted real time payment systems, as did many major developing economies including China, Brazil, and India. These changes began by being led by private payment operators with the leadership or support of the central bank. More recently, central banks themselves have begun to operationalize real time payment systems.

America was late to adopt. The private sector built a real-time payment system, but the Federal Reserve never used its regulatory authority to incentivize adoption of this system. After the private sector system was in operation, but had not gained much usage, the Fed committed to building its own system, FedNow. Whereas other countries routinely built and operationalized such a system within a two-year time frame, the Fed initially forecast five years, later stating that it would be only four and eventually launching it in about 4.5 years with a small number of banks to start.

The Federal Reserve is structurally conflicted, serving multiple roles as regulator of payments, operator of a payment system, and regulator of banks. Faster payments, particularly from the private sector, threaten the Fed's role as operator of a payment system that would lose market share. Faster payments threaten bank profitability, particularly as overdraft became a major source of revenue especially for a handful of small banks. Faster payments would help achieve the Fed's stated goals of greater economic prosperity, reducing inequality, and enhancing efficiency.

Other countries who managed to have faster payments have different structures for their central bank. In the United Kingdom, the central bank was not initially the payments regulator, nor operator, nor a bank regulator. The twin peaks model of UK regulation in place at the time may have helped the Bank of England focus on the priorities of economic growth and efficiency in helping lead the push for private sector payment innovation. In China, PBOC leadership was willing to let non-banks innovate and take over the payment system. This was part of a broader governmental desire to increase innovation coupled with relatively low reliance on the payment system to generate bank revenue to begin with. Finally, in Brazil, the central bank was the leader in adopting a transformative new payment system. The desire to increase banking access, coupled with enhancing economic growth trumped concerns about reducing bank profits from payments. In addition, over five years, the private sector had not stepped up and built such a system, so the central bank decided to act and act quickly.

These examples illustrate how central bank mandates, responsibilities, and leadership decisions impact policy choices. Citizens and businesses in the UK, China, and Brazil enjoy benefits of faster payments. These benefits accrue disproportionately to lower income households and small businesses. Americans suffer from slow payments and high costs. How much of this is due to poor choices versus structural conflicts is debatable. This paper presents evidence that structural conflicts from multiple mandates and goals at the Fed have helped produce this

undesirable outcome. Congress provided clear goals and tools for the Fed to act, yet it chose not to use those tools and did not achieve those goals. The Fed's independence has largely shielded it from the consequences of that decision.

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