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Costs and Benefits of Building Faster Payment Systems: The U.K. Experience and Implications for the United States

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Abstract:

A number of countries have implemented faster payment services that allow consumers and businesses to rapidly transfer money between bank accounts. These services compete with slower, existing payment services. In 2008, the United Kingdom implemented its Faster Payments Service (FPS) at a cost of less than £200 million (.014 percent of U.K. GDP, or $307 million) spread over seven years, plus investment costs borne by each participating bank to connect to the FPS. This paper examines the economic cost-benefit analysis underlying the U.K. FPS investment decision and describes the subsequent diffusion and use of FPS through 2013. The paper also assesses the effects that FPS likely had on the rest of the U.K. payment system and highlights key unanswered questions for future research. Based on this U.K. experience, the paper describes implications for the U.S. payment system, which the Federal Reserve has proposed to make faster in recent policy announcements.

Keywords: fast payments systems, cost-benefit analysis, account-to-account (A2A) transfers, person-to-person (P2P) payments

JEL codes: G210

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1. Introduction

A number of countries have implemented faster payment services that allow consumers and businesses to rapidly transfer money between bank accounts, in transactions known as "account-to-account (A2A)" payments.[1] These services can be provided by banks or nonbanks (with cooperation from banks) that are connected to a new central infrastructure[2] that supports faster authorization, clearing, and settlement (ACS) than existing payment services, along with faster confirmation to the payer and payee of each money transfer.

In 2008, the United Kingdom adopted and implemented a new Faster Payment Service (FPS) rather than investing in improvements to speed up its existing payment system.[3] According to VocaLink (2009), a key motivation for the U.K. decision was a request by the Office of Fair Trading (OFT) to remove the float from standing orders (regular recurring payments for a set amount) in the U.K. banking industry. It is not known whether British banks or nonbank payment service providers would have taken this step eventually without the directive of government authorities.

This paper examines the economic cost-benefit analysis underlying the U.K. FPS investment decision.[4] We report *quantitative* estimates of the monetary costs associated with the FPS but only *qualitative* descriptions of potential benefits to all parties involved: consumers, merchants, financial institutions, other businesses, and government. This analysis provides a framework that may help the payments industry and payments policymakers to assess the viability, costs and benefits, and social welfare of adopting faster payment services.

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[1] These countries include Singapore, Mexico, India, South Africa, and Switzerland, as well as the United Kingdom. A detailed description of the last four systems is given in Summers and Wells (2011) and Jacob and Wells (2011). Faster payments systems vary in their functionality and use. Lodge (2014) identifies more than 35 faster payments systems around the world. Clear2Pay (2014) cites about a dozen systems.

[2] "Infrastructure" refers to the servers, software, and communication networks that connect participating financial institutions and transmit payment messages from the sending account to the receiving account and back.

[3] For detailed evaluations of the British FPS, see Milne and Tang (2005) and Summers and Wells (2011).

[4] A similar study was done by the Reserve Bank of Australia; see RBA (2012, p. 1), which states: "*While not wishing to dictate how the strategic objectives are met, the paper also outlines the Board's thinking on a possible approach to architecture for providing real-time payments*."

The costs to U.K. banks of building, installing, and maintaining the British FPS was relatively modest. According to sources at VocaLink, which operates the infrastructure of the U.K. FPS, it cost less than £200 million ($307 million), or .014 percent of U.K. GDP, to install and operate the FPS for the initial contract period of seven years (2008–2015), plus *estimated* investment costs of up to £50 million ($77 million) for each participating bank to connect to the FPS.[5] Thus, the estimated maximum total cost of FPS was less than .06 percent of U.K. GDP in 2008. For payment system participants, introduction of the new FPS also may have led to revenue transfers to the FPS or losses associated with substitution from existing payment methods, but the U.K. data suggest that revenue effects from substitution have been relatively small thus far. Direct revenue from the use of FPS during the initial period was zero, because users do not pay for each transaction. Costs and revenues beyond 2015 are not known at this time.

Identifying potential benefits from faster payments is more challenging, and currently it is impossible to produce complete, accurate, and precise quantitative estimates.[6] Instead, this paper uses new survey data (Faster Payments 2013) on the use of FPS by U.K. participants to describe its diffusion through the end of 2013. Then it surmises what types of benefits may ensue to whom when A2A payments are made faster from authorization to settlement or when confirmation of payment is communicated faster.[7]

A new payment technology like FPS may yield additional benefits beyond speeding up individual payments. While these benefits are even harder to assess and measure, they may be more important than speed per se. The following apocryphal quotation, attributed to auto maker Henry Ford, illustrates the difficulty in assessing benefits of products and services before consumers can actually experience them: "*If I had asked people what they wanted, they would have*

[5] All values in British pounds are converted to U.S. dollars using the OECD's estimates of the PPP dollar-pound exchange rate (see http://stats.oecd.org/Index.aspx?DataSetCode=SNA_Table4).

[6] Stavins (1997) describes a similar challenge in examining the costs and benefits of switching from paper check presentment to electronic check presentment with truncation.

[7] The value of speed may be different for recurring bill payments than for payments made at the point of sale (POS). A full analysis of this differential is beyond the scope of this paper and little research is available for bill payments. For more detailed research on POS speed, see Klee (2008), Borzekowski and Kiser (2008), Schuh and Stavins (forthcoming), and Polasik et al. (2013).

said faster horses." Nevertheless, faster A2A payments could provide the following benefits: (1) facilitate business-to-business (B2B) payments, which are still accomplished largely by paper check; (2) facilitate mobile payments, a rapidly developing payments application; (3) improve payment security[8]; (4) be available at all times (24/7/365), unlike clearing houses run by the Bank of England or the Federal Reserve; (5) facilitate person-to-person (P2P) payments, which are typically handled by cash and check in the United States; and (6) facilitate faster international payments using standards such as ISO 20022.

Although we cannot provide monetary estimates of the benefits of the U.K. FPS, the total costs of the new system relative to the U.K. population (63 million in 2012) suggests that the value of benefits per individual per year need not be large to give FPS a positive net present value. Because the U.K. payment system prior to the FPS bears striking similarity to the current U.S. payment system, the U.K. experience has implications for the U.S. payments industry and policymakers who are now contemplating the adoption of a similar faster payment system for the United States.[9] Briefly, we compare and contrast the costs and benefits of the U.K. FPS with those that might prevail in an analogous U.S. system. We also discuss some unanswered questions about the options to invest in new technology to speed up and expand A2A payments in the United States and suggest future research.

The rest of the paper is organized as follows: Section 2 defines concepts. Section 3 provides an overview of the U.K. payments system. Section 4 describes the uses and potential benefits of FPS in the United Kingdom. Section 5 explains costs of the U.K. FPS. Section 6 draws implications of the U.K. FPS for the United States and discusses the outlook for faster U.S. payments.

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[8] A detailed discussion of security is outside the scope of this paper.

[9] Although potential benefits for the United States were identified long ago (BOG 2002), options for fast, inexpensive A2A payments and transfers still are largely lacking in the current U.S. payments landscape (Shy 2012). In 2012, the Federal Reserve announced an updated strategic plan that emphasized a preference for faster U.S. A2A payments. More recently, the Fed set forth a "*vision to improve the speed and efficiency of the U.S. payment system from end to end*" (BOG 2013, p. 2).

2. Concepts and Definitions

2.1 Payment System

According to the Bank for International Settlements (BIS 2003), a payment system consists of a set of instruments, banking procedures, and, typically, interbank funds transfer systems that ensure the circulation of money. Summers (2012) uses a much broader definition, where a payment system is an infrastructure (consisting of institutions, instruments, rules, procedures, standards, and technical means) established to effect the transfer of monetary value between parties who are discharging mutual obligations.

Each payment activity is divided into steps. Different payment instruments may use different steps to accomplish money transfers originated by a payer and received by a payee. Moreover, even if two payment instruments use similar steps, they may vary significantly with respect to the time it takes to accomplish each step. The definition of steps also depends on the role played by the entity participating in the payment activity.

2.2 Authorization, Clearing, Settlement, and Notification

Electronic transactions are generally divided into three major steps: authorization, clearing, and settlement. Table 1 presents a possible timeline for an FPS transaction and compares it with a typical debit card transaction.

Step	Faster Payments Service (U.K.)	Debit Card (single message)
1	Request: Payer submits payee's bank account details and amount.	Authorization (approved/declined): Card swiped at POS, typed online, or provided over the phone. Issuing bank may put a $1 to full amount hold on payee's account. Clearing: Data exchanged provide the verification for the dollars debited from issuing banks and credited to acquiring banks.
2	Clearing or rejection: Funds withheld from payer's account and credited to payee's account.	Settlement: Aggregated netted funds transfers among banks. Transfers include interchange fees from the acquirer to the issuer.
3	(Possible time gap until settlement.)	(Possible time gap until settlement ends. Few hours or longer.)
4	Settlement: Funds transfers among banks (three times daily during business days).	Within 24 hours, funds released by acquirer or card processor are credited to the payee's account.

Source: VocaLink (2009) and Herbst-Murphy (2013), mostly pp. 12–14.

Table 1: Possible timelines of U.K. FPS and debit card transactions.

Two important points need to be made regarding Table 1: First, the term "clearing" is used differently in discussions concerning the British FPS and debit card transactions. In the U.K. FPS process, "clearing" occurs when end users are debited and credited. In debit card transactions, clearing refers to the exchange of data between the card issuer and the card acquirer. Second, in the U.K. FPS process, the payer and the payee are debited and credited before banks settle their funds transfers. This need not be the case for debit cards.

Three key terms characterize electronic funds transfers.[10]

Authorization. *"Giving power or permission to (someone or something)."* At the point of sale (POS), authorization begins when the payer swipes a card. For electronic A2A transfers, a payer (fund sender) may use online, ATM, phone, or a mobile device to fill out a form instructing a financial institution to transfer funds. The payer generally has to click (or press) on a "confirm" button, thereby having a second chance to cancel the authorization. Authorization for online

[10] The definitions of clearing and settlement are taken from BIS (2003). BIS (2003) does not define authorization; therefore, the reader is referred to http://www.merriam-webster.com/dictionary/authorize. In the context of debit card transactions, Herbst-Murphy (2013, p. 1) refers to authorization as the creation of electronic records in the merchant's transaction system and at the cardholder's bank.

debit card transactions is similar; however, at the POS, authorization begins when a card is swiped.

Clearing. *"[T]he process of transmitting, reconciling and, in some cases, confirming payment orders or security transfer instructions prior to settlement, possibly including the netting of instructions and the establishment of final positions for settlement. Sometimes the term is used (imprecisely) to include settlement."*

Settlement. *"An act that discharges obligations in respect of funds or securities transfers between two or more parties."* Also, *"the completion of a transaction, wherein the seller transfers securities or financial instruments to the buyer and the buyer transfers money to the seller. A settlement may be final or provisional."*

The Faster Payment Service (U.K.) column in Table 1 separates the settlement (final) stage from other stages because, in most cases, the sender and receiver of funds are not concerned with (and may not even be aware of) when banks settle their own accounts, unless the receiving bank conditions crediting the payee on final settlement between the sending and the receiving banks. As discussed below, the U.K. FPS separates the settlement stage from clearing, so in that system the payer's account is debited and the payee's account is credited within seconds, although banks settle only three times daily.

2.3 "Faster" Payments

There is no uniform definition of a "fast payment service." The Board of Governors of the Federal Reserve System (BOG 2013) addresses the "need-for-speed" issue by proposing a "*vision to improve the speed and efficiency of the U.S. payment system from end to end*" (p. 2) with "*a real-time validation process assuring the payee that the payer's account exists and (that) it has enough funds or available credit to cover the payment; timely notification to the payer and payee that the payment has been made; and near-real-time posting/availability of funds to both the payer's and payee's accounts*" (p. 3). Thus, the Fed's consultation paper does not provide a precise definition of "fast." Instead, it uses the phrase "near-real-time." The use of the term "real time" is not fully informative because actual real-time functionality of such a system is not feasible and different people define "real

time" differently. In contrast, NACHA GPF (2013, p.14) defines a "fast" A2A payment as "*an interbank account-to-account payment that is posted and confirmed to the originating bank within one minute*." Note also that currently PIN debit networks in the United States can place a hold on the amount in the payer's account within a few minutes. In what follows, this paper describes some actual timeframes for payments made via the U.K. FPS.

One reason that no uniform definition of "fast" exists in this context is that the speed of each electronic payment can be measured with respect to at least four steps of the payment process: authorization, clearing, settlement, and notification(s). The first three steps occur in sequence (see rows 1 and 2 of Table 1), whereas notification(s) can be sent to the transacting parties at any stage (or stages) within this sequence.

No funds transfer can be initiated without an authorization, so the first stage is required. However, clearing may be an independent step (as depicted), or it may be combined with (or occur very close in time to) either the authorization stage or the settlement stage. Thus, the following four parameters may be included in the definition of "fast":

1. The ability to process (or at least originate and clear) transactions 24/7/365.
2. The length of time between origination and confirmation of clearing.
3. The length of time between origination and confirmation of settlement.
4. The practice of handling transactions in a nonbatched manner, meaning that each transaction is individually processed through the network (different from the way processing occurs in the existing FedACH in the United States and Bacs in the United Kingdom; see Benson 2009).[11]

Note that the above four parameters are not mutually exclusive as shown by the fact that the FPS in the United Kingdom and Singapore seem to satisfy most or all of these criteria.

[11] In a batch payment system, the originating bank bundles several payment requests into a single file that is submitted to the central clearing organization. This explains why faster payment systems may require a technology change.

2.4 Gross versus Net Settlement

Table 1 separates the settlement (final) stage from all other stages because implementing faster payment services, as done in the United Kingdom, need not rely on instantaneous settlements (which are transfers of funds between two banks via a central bank or a similar clearing house).[12] This implies that the receiving bank may have to extend credit to the payee until settlement is completed. However, a delay in settlement allows banks to aggregate several transactions into a single settlement, and this aggregation may facilitate "netting," which reduces the amount transferred if banks transact in both directions.

The following terminology (taken from BIS 2003) classifies real-time settlement systems into two types:

Gross settlement: "*a transfer system in which the settlement of funds or securities transfer instructions occurs individually (on an instruction-by-instruction basis).*"

Net settlement: *"the settlement of a number of obligations or transfers between or among counterparties on a net basis."* Netting is defined as *"an agreed offsetting of positions or obligations by trading partners or participants. The netting reduces a large number of individual positions or obligations to a smaller number of obligations or positions."* The smaller number of transactions reduces banks' settlement cost.

Gross settlements mean one-by-one transfers of funds, which may complicate or overload the network—particularly if the faster payment service results in a high volume of low-value transactions. This suggests one possible explanation of why the FPS process in the United Kingdom separated the settlement stage from other stages, perhaps to allow banks to gain economies of scale by netting out bi-directional transactions and also to avoid using CHAPS (the Clearing House Automated Payment System, Britain's real-time gross settlement system).

[12] In the United States, these bank-to-bank transfers are referred to as wholesale payments.

Instead, the FPS relies on the Bank of England to handle settlement. Thus, the FPS is a new system only for authorization and clearing. Relying on an existing settlement system reduced the construction cost of the FPS and suggests another explanation for why the FPS uses net settlement rather than gross. Note that a delay in settlement creates a tradeoff between the cost of more frequent settlement and the credit risk associated with immediate transfer to the payee.

3. The U.K. Payment System

This section describes the payment system in the United Kingdom before and after the introduction of the FPS. As the reader will learn, the U.K. payment system before the FPS was very similar to the current U.S. payment system, and therefore the rapid implementation and near-universal accessibility of the FPS in the U.K. market may have implications for the U.S. payment market.

3.1 The U.K. Payment System Before the FPS

Prior to the establishment of the FPS in 2008, the payments landscape in the United Kingdom was similar to that in the United States. Cash was popular for small transactions, whereas debit cards and credit cards were common for larger-value retail transactions. Checks were also reasonably common and were used for similar purposes as in the United States. U.K. banks relied on two networks: CHAPS (a real-time gross settlement [RTGS] high-value network similar to Fedwire in the United States) and Bacs (formerly known as Bankers' Automated Clearing Services, similar to the automated clearing house (ACH) networks of the Fed and The Clearing House [EPN] in the United States), in addition to checks and an ATM network.

Milne and Tang (2005, p. 6) describe Bacs as a provider of three types of payment transactions: bulk (salaries and pension payments, which require submission at least two days in advance of the payment date), direct debit (which are scheduled 14 days in advance), and standing orders (A2A transfers, which require at least two days' notice). Milne and Tang (2005, p. 10) report that *immediate* person-to-person transfers were most often made using cash or bank drafts. Table 2 roughly compares the payment systems in the United Kingdom and the United

States. The similarities of the two countries' payment systems suggest that the experience of the United Kingdom with respect to faster payments may be instructive for the United States.

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.

Table 2: Description of payment systems in the United Kingdom and the United States.

3.2 Speed of Payment Networks in the United Kingdom

Following is a description of payment methods in the United Kingdom and an evaluation of the speed at which users can transfer payments.

Cash: If speed is measured by the time it takes for money to change hands, then cash is a fast payment mechanism. However, the existence of counterfeit notes and the risk of theft make cash a poor choice for large-value transactions. Moreover, if speed is measured as the time it takes to transfer money from one account to another, cash is a slow payment instrument. Two trips to the ATM (or some combination of ATM, bank teller, check cashing store, cash-back at retail, etc.) are required.

Debit: When a consumer initiates a transaction with a debit card, the consumer's bank is immediately informed and typically places a hold on the consumer's account. However, the transfer of funds does not take place until the next clearing of transactions, typically overnight, but sometimes an additional day later. Since banks do not deposit money in the merchant's account until after banks settle their accounts, the merchant often has to wait a day or two

before receiving the funds. According to Herbst-Murphy (2013, Figure 1), consumers and merchants are debited and credited, respectively, typically within two days of the transaction.[13] This discussion highlights a fundamental difference between card transactions and the operation of the FPS system in the United Kingdom. For card transactions, banks first transfer the money from the issuing bank to the acquiring bank, and only then are funds debited from the sender's account and credited to the receiver's account. In contrast, the U.K. FPS system first debits and credits the payer and payee's accounts, respectively, before the participating banks settle their own accounts with the central bank.

Credit: The credit card market works similarly to the way the debit card market works because Europe uses a dual message system for both credit and debit transactions.[14] However, consumers' billing is delayed to a predetermined date, or even later if the consumer chooses to borrow by taking advantage of his or her preauthorized revolving credit. A credit card transaction is revocable. Credit card payments are authorized immediately at the POS and the card issuer is committed to pay at this time.

Paper check: Within two days of the day the payee deposits the check into a bank account, the bank must start paying interest on the deposited amount; however, funds may not be available for four days. This is known as the 2-4-6 rule (after six days the deposit cannot be reversed without consent); see BIS (2012).

Bacs: The Bacs system is an electronic system that operates between banks. Consumers do not have direct access to the Bacs system. It is typically used for direct deposit of salary (Bacs direct credits), for paying recurring bills such as utilities (Bacs direct debits), and for business-to-

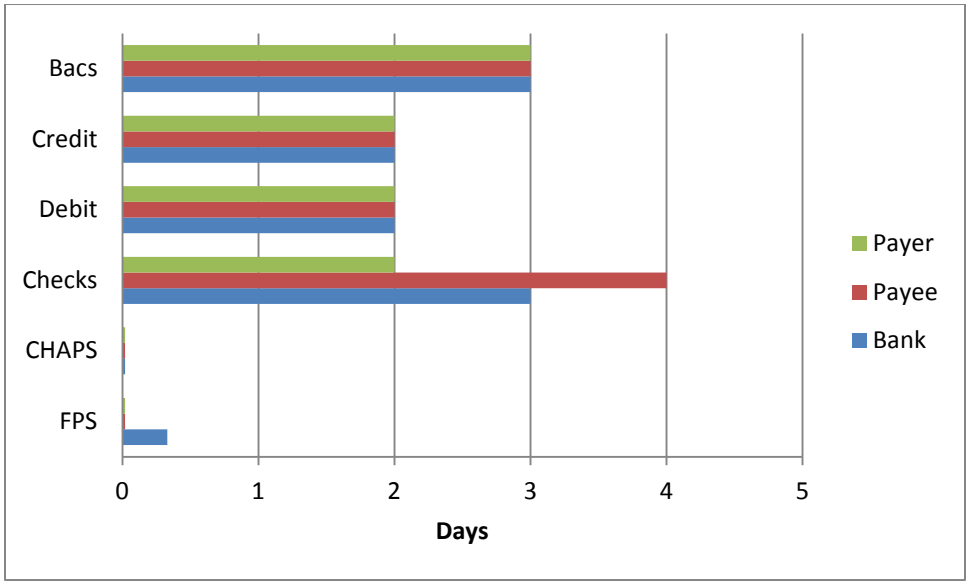
[13] The United Kingdom's Payments Council's Q&A Web page states the following: "*A debit card transaction will usually be debited from your account on the following working day. However, if the amount of the transaction is above the floor limit of that retailer, the card issuer will earmark the funds on your account at the time the transaction is made. The time it takes for the money to reach the retailer is dependent upon the terms of the contract with their merchant acquirer (bank).*" See http://www.paymentscouncil.org.uk/resources_and_publications/faqs/debit_cards/.

[14] Herbst-Murphy (2013) discusses dual and single message systems for debit and credit cards. A dual message system is slower because it was designed for signature credit cards, whereas a single message system relies on a PIN at either a POS or an ATM. Roughly speaking, a single message system combines into a single stage the authorization and the writing of files on the sending and receiving banks. Herbst-Murphy (2013, Figure 1) refers to the stage when accounts are debited and credited as "settlement," whereas in the FPS terminology used in this paper, this stage is referred to as "clearing."

business payments. Before the FPS was implemented, Bacs also was used for payments made via online banking. The Bacs network operates as a batch system. Payments submitted to Bacs are subject to a three-day clearing and processing cycle. The deadline for receiving payment instructions from users is 22:30 on Day 1 of the cycle. Data submitted throughout the day are validated and sorted by bank by the central infrastructure in preparation for onward transmission. The destination bank may be either a receiving bank or a paying bank, depending on whether the transaction is a direct debit or a direct credit. Processing of input transactions should be completed by 06:00 on Day 2 (BIS 2012, p. 455). On Day 3, transfers are debited/credited to the respective payer/payee accounts, usually at the beginning of the operating day. The interbank obligations that arise in Bacs are settled at the Bank of England on a multilateral net basis on Day 3 of the clearing cycle; see BIS (2012).

CHAPS: CHAPS is a real-time payment system, envisioned for high-value transfers between banks. End users are charged fees. Transfers executed in CHAPS are irrevocable.

Figure 1 displays rough estimates of the duration of funds transfer from start to end for each payment network from the viewpoints of the sender (payer), receiver (payee), and the participating banks.

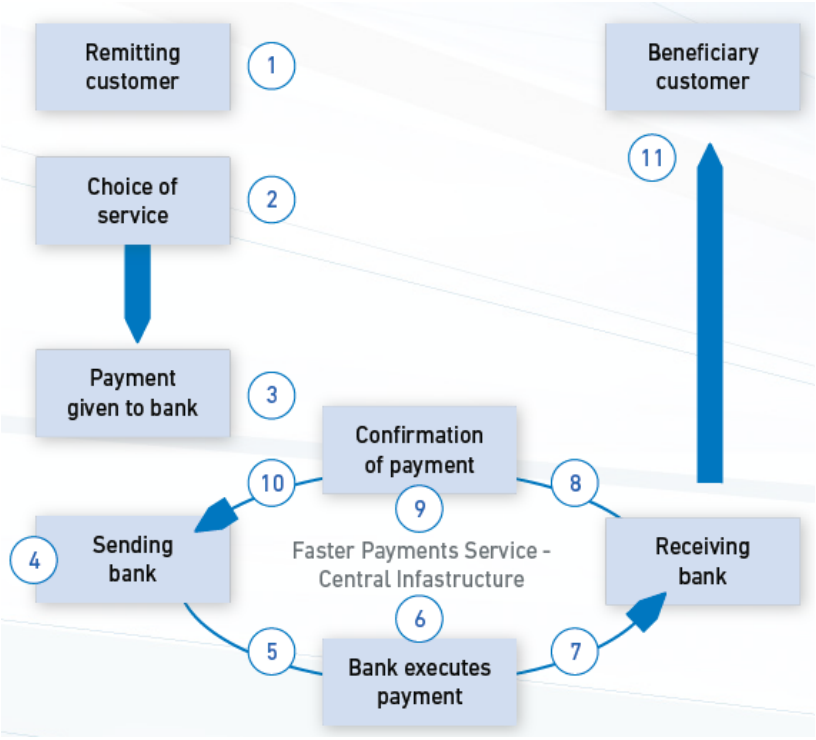


Source: Authors' estimates.

Figure 1: Duration from start to finish from the consumer and bank perspectives.

As Figure 1 shows, CHAPS and the FPS transfer funds within seconds from the perspectives of both the payer and the payee. However, from the banks' perspective the FPS settles only three times during each business day. Figure 1 also shows the maximum time for payments made via Bacs, payment cards, and checks; however, it is possible that transactions may appear to be faster from the payer's perspective and even from the payee's.

3.3 The U.K. Faster Payments Service



Source: http://www.fasterpayments.org.uk/about-us/how-faster-payments-works

Figure 2: How the U.K. FPS works.

Figure 2 illustrates the structure of the FPS process in the United Kingdom. The sequence of 11 steps illustrated in Figure 2 occurs in few seconds as follows: (1) A bank customer (payer) decides to send money to a customer of another bank. (2) The payer chooses a mechanism to instruct the bank (mobile phone, online, landline phone, or an ATM). (3) The payer provides the payee's sort (routing) code and bank account number. (4) The sending bank performs security and sufficient funding checks of the payer's account. (5) The sending bank submits the transaction to the FPS. From that stage, the transaction cannot be canceled. (6) The FPS checks that all the relevant information is included and submits the payment instruction to the receiving bank. (7) The receiving bank sends a message back to the FPS that it has accepted or rejected the payment after confirming that the payee's account is valid. (8) The FPS credits the receiving bank (if accepted) and sends a message to the sending bank confirming that the transaction was successful (or rejected). (8) The sending bank marks the transaction as complete.

(10) The sending bank notifies the payer that the transaction has been completed (or rejected).
(11) The receiving bank credits the payee's account for the amount sent.

3.3.1 Current System

In terms of speed (see the discussion in Section 2), the U.K. FPS operates 24/7/365, and clearing and confirmations of individually processed transactions usually occur within a second or two. Settlements are made three times daily; see VocaLink (2009).[15] It is up to the receiving bank to decide to make the funds available immediately to the payee or to delay receipt. In practice, most banks make the funds available immediately. Payments can be originated via the Internet, ATM, over the phone, or via mobile.

Unlike the slower, batch-based networks, the FPS is limited to credit (push) irrevocable transactions.[16] As noted in the response to the consultation paper by the Federal Reserve Banks, some observers believe push payments provide better security because the payer does not have to reveal any account information that enables debiting of the payer's account by the payee. The irrevocable nature of the payment, however, makes correcting errors more difficult than with some other payment methods. While there are mechanisms in place in the United Kingdom to reverse mistaken or fraudulent transactions, faster payments could be difficult to contest.[17] If a payer provides the wrong sort code or account number when making a payment, the bank must make a reasonable effort to recover the money, but the bank is not liable for losses.

Currently, 49 million account holders in the United Kingdom (compared to an adult population of 52 million) have access to the FPS. Initially, each transfer was limited to £10,000 ($15,365). By now, some banks have raised the limit beyond £10,000 for individual customers to

[15] Because settlements occur only three times per day, banks in the United Kingdom have signed a loss-sharing agreement in case one of the banks fails before funds are settled.
[16] The newly constructed faster payments system in Singapore (called Fast, for Fast And Secure Transfers) is able to handle debit requests www.clear2pay.com/sites/default/files/brochures/Clear2Pay-G3-Domestic-Payments.pdf.
[17] "Bank digit mistakes costly" BBC One (June 19, 2013)
http://www.bbc.co.uk/programmes/articles/2vLsDqDfHFdW7pmfjkSrDqZ/bank-digit-mistakes-costly
accessed 8/13/2014.

£100,000 ($153,647) for business customers.[18] FPS values accounted for 1.0 percent of total clearing values in 2013 (PC 2014a). This share by value is low due in part to the size of other types of transactions. For example, the average CHAPS transaction was £2.11 million ($3.00 million) in 2012, while the average FPS transaction was £761 ($1,082), as discussed below and shown in Figure 9.

3.3.2 Future Enhancements

So far, the introduction of the FPS in the United Kingdom has had little or no effect on transactions made at the POS. For purposes of this discussion, POS refers to payments that must be made prior to the delivery of goods. This could change in the future. An FPS system announced for this year would, when implemented, enable users to pay directly from their bank accounts by scanning a barcode or tapping an NFC reader with their mobile phones.[19] To date, costs to merchants for such a service are unknown.

One improvement to the FPS that has already been implemented in 2014 is the introduction of mobile FPS, whereby users who register their accounts can make payments using their mobile phone numbers without having to reveal their bank account details.[20] This service aims to make it easier for individuals to pay one another. It is possible that some small merchants would be able to receive immediate payments using this mobile service, but further enhancements are needed to make mobile FPS available at the point of sale in most retail stores.

A second enhancement already on the way is adherence to international standards, which eventually would permit faster payments between countries. The U.K. FPS and Singapore's Fast are compatible with ISO 20022.[21] The purpose of this standard is to unify payment messages across all electronic payment systems in Europe and all other participating countries.[22]

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[18] See http://www.paymentscouncil.org.uk/resources_and_publications/faster_payments_value_limits/.

[19] "VocaLink announces new mobile payment system 'Zapp'" http://www.information-age.com/technology/mobile-and-networking/123457153/vocalink-announces-new-mobile-payment-system--zapp-.

[20] The service is called Paym; see http://www.paym.co.uk. Like FPS, Paym is offered by the participating banks, which guarantee that 90 percent of bank customers will have immediate access to this service.

[21] See, http://www.vocalink.com/payments-services/immediate-payments-gather-pace-globally.aspx.

[22] See, http://www.europeanpaymentscouncil.eu/index.cfm/sepa-credit-transfer/iso-20022-message-standards.

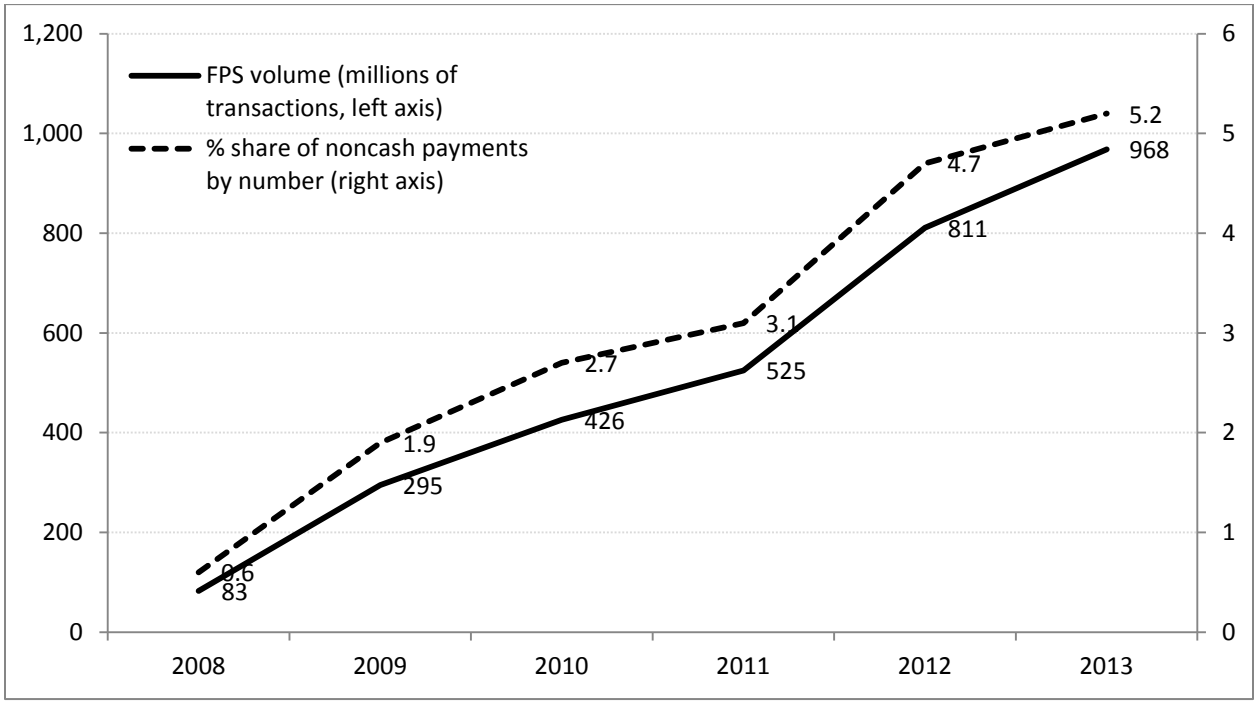
Concerns have been raised that payment systems in the United States are incompatible with ISO 20022.[23]

4. Uses and Potential Benefits of Faster Payments in the United Kingdom

Using limited data available, this section describes how businesses and consumers in the United Kingdom are using the FPS. Data are limited, but there are a few interesting findings. In 2013, 968 million payments initiated by consumers, businesses, or government were processed via FPS. This represents 13.3 percent of inter-branch and interbank clearing volumes by number, a 19 percent increase over 2012. As mentioned above, FPS transactions by value (£771 billion) accounted for 1.0 percent of total clearing values in 2013 (PC 2014a).

Overall in the United Kingdom in 2013, consumers, businesses, and government made 18.5 billion noncash payments, so payments via the FPS represented about 5.2 percent of all noncash payments by number (up from 4.7 percent in 2012). Including cash payments, faster payments were about 2.6 percent of all payments by number (PC 2014b, Table 27.1).

Figure 3 displays the volume of FPS transactions since 2008, when the FPS became operative.



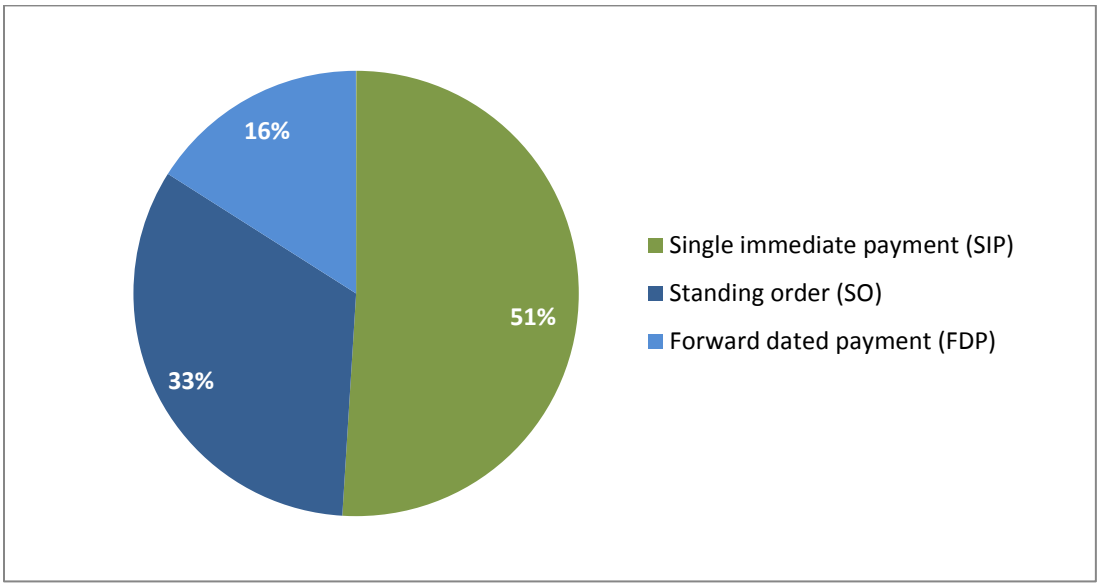
[23] See, https://payments.nacha.org/OR14.

Source: PC 2014b, p. 14, Table 1.6, and authors' calculations based on PC 2014b, p. 85, Table 27.1.

Figure 3: FPS volume, 2008–2013 (in millions).

As shown in Figure 4, faster payments in the United Kingdom consist primarily of three types of payments:

- Single immediate payment (SIP) - a one-time payment initiated via Internet banking, telephone banking, or an ATM, to be executed immediately. For example, a consumer might use an SIP to pay a credit card bill. In May 2013, SIPs were the dominant type of faster payment by volume: 51 percent of all FPS transactions by number.
- Forward-dated payment (FDP) - an instruction to a bank to make a one-time payment on a future date. For example, a business or consumer might schedule a tax payment due on a future date. In May 2013, FDPs were 16 percent of all FPS transactions by number.
- Standing order (SO) - regular recurring payments for a set amount, to be made on the same day of every month or week. For example, a business might schedule a monthly payment to a cleaning service. Standing orders can be set up at any time, but this payment type is only sent Monday through Friday. In May 2013, SOs represented 33 percent of all FPS transactions by number (FP 2013).

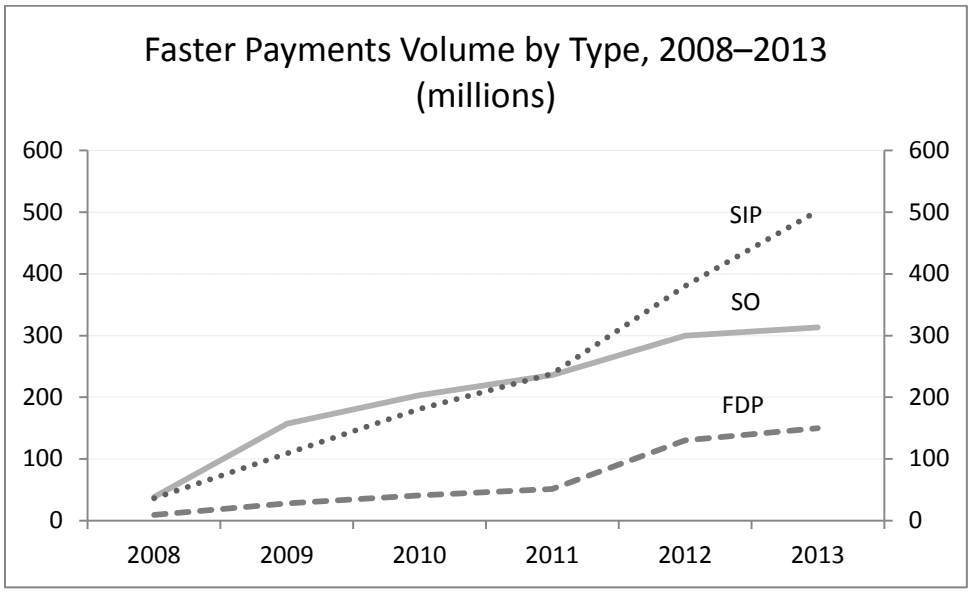


Source: FP 2013.

Figure 4: Shares of faster payments types (by number of payments) in the United Kingdom, May 2013.

Previously, these types of payments initiated via telephone or online banking were executed via the Bacs system, where the payer initiated the payment on business day 1 and the payee received the payment on business day 3. At best, the money would reach the beneficiary two days later (for a payment made on Monday the beneficiary would be credited on Wednesday), but since this was a Monday-through-Friday service and had an evening cut-off time, a payment initiated on a Friday evening would reach the beneficiary on the following Wednesday. For all FPS, including the almost half of these faster payments scheduled in advance (Figure 4), this multi-day timeline from initiation to receipt no longer applies.

Figure 5 shows the strong growth between 2011 and 2013 in SIP, that is, one-time payments authorized online or by phone or ATM. The number of SIP and FDP made using the FPS grew by more than 75 percent in 2012 (PC 2013c, p. 82).



Source: PC 2014b, p. 14, Table 1.6.

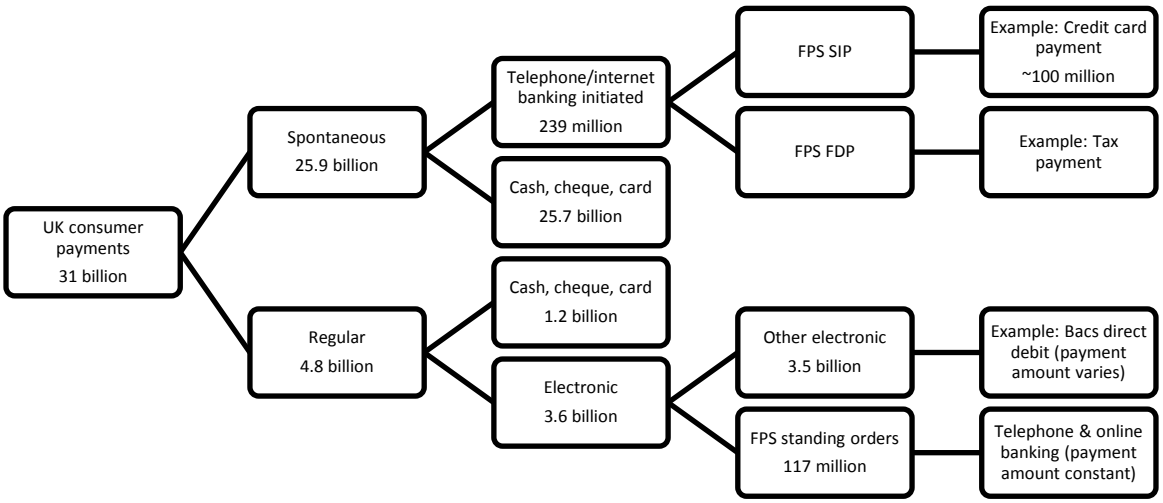
Figure 5: FPS volume by type, 2008–2013.

As noted above, consumers, businesses, and governments use the FPS. Much of the analysis in this section relies on the "2013 Faster Payments Service Traffic Survey" (FP 2013), which provides data on all transactions over the FPS for five dates in May 2013.[24] Unfortunately, the report does not provide full information about the payer or payee of the transactions and provides only very limited information about the transaction. It makes use of sort codes, which are codes associated with each transaction that primarily identify the bank. As it happens, knowledgeable sources are able to recognize some sort codes as being associated with banks that particularly specialize in businesses, consumers, or governments, and this provides some information. But sort codes cannot be used to identify the specific payer or payee.

[24] This annual survey reports on all transaction data for five dates in May 2013, month-end and month-start (April 30–May 1), a mid-month weekend (Friday, May 17 [encompassing May 18 and 19 because these payments settled on Monday May 20]), and two days around the middle of the month (May 21–22).

4.1 Consumer Payments

According to the Faster Payments Service Traffic Survey (FP 2013), consumers made an estimated 487 million payments, or approximately 60 percent of the payments sent via the FPS in 2012 (FP 2013, p. 23). Another data source, a survey of U.K. consumers, found a smaller number of faster payments by consumers in 2012, 356 million (PC 2013b). As noted above, the limited content of the traffic survey means that judgment was used to assign payments to categories of payers. For the consumer survey, uncertainty was introduced because consumers had difficulty distinguishing faster payments from other types of payments (PC 2013b.). Figure 6 shows how the U.K. consumer payment survey classifies consumer payments.



Source: PC 2013b.

Figure 6: Consumer reported payments in the United Kingdom in 2012.

4.1.1 One-Time Payments by Consumers

In the United Kingdom in 2012, consumers made almost 31 billion payments, including 25.9 billion "spontaneous" payments, which the Payments Council defines to include purchases in person, by mail, and online; payments for services, for example at hotels and restaurants; and

payments to individuals (PC 2013b).[25] Spontaneous payments also include one-time credit card payments. Of the 25.9 billion spontaneous payments, 239 million (1 percent) were electronic payments.

Through the first quarter of 2014, the FPS was not commonly used for retail purchases at the POS or to make online ("spontaneous") purchases. This may change as the FPS technology develops.

The most common type of payment made via the FPS is payment of a credit card bill (FP 2013, p. 23–24). In 2012, more than two-thirds of all credit card bill payments were made using FPS (FP 2013, p. 35). This suggests that consumers are taking advantage of same-day receipt to pay credit card bills on time with the most up-to-date knowledge of their financial situation.

The Faster Payments Service Traffic Survey (2013) found that about half of single immediate payments (by definition, "spontaneous" payments) were made in the evening. Before the FPS was implemented in 2008, evening payments could not have been completed until the following day or, in the case of Friday and Saturday, until Monday.

By value, the largest total value amount of FDPs according to the Faster Payments Service Traffic Survey (2013) was paid to public sector sort codes. FDPs also are one-time payments. This suggests that consumers are using FDPs to schedule the payment of taxes.

4.1.2 Regular Payments by Consumers

In 2012, U.K. consumers also made 4.8 billion payments for "regular," or recurring, commitments, including household expenses like rent, gasoline, and insurance, and personal commitments like health insurance, subscriptions, and loan repayments. Of these recurring consumer payments in 2012, 3.6 billion (75 percent) were electronic payments (PC 2013b).

Almost all constant-value recurring payments authorized by telephone or online are executed via FPS standing orders (nonparticipating banks would be the exception): 94.6 percent

[25] As of this writing (July 2014), consumer survey data for 2013 were not yet available. The remainder of this section uses 2012 data for comparability.

(PC 2013a). The remainder are processed via Bacs. Thus, the FPS system has almost entirely taken over the standing order market.

PC (2013b) reports 117 million payments by FPS standing orders in 2012. FP (2013) arrived at a similar estimate for recurring payments made by telephone or online. Use statistics for the FPS in May 2013 show that about one-third of all payments associated with individuals were made on the last day of the month. Of payments by individuals on the last day of April and first day of May, 80 percent were standing orders (FP 2013, p. 25). That is, about one-quarter of the use of FPS by individuals (129 million payments) is for SOs at the end of the month, most likely for recurring monthly bills for constant amounts.

According to FP (2013), FPS SO payments are for lower values than FPS one-time payments. More than half of SOs at both the beginning of the month and the middle of the month were for £100 or less. On all days surveyed in May 2013, about 20 percent of SOs were for £10 or less, "many for £4.33 and £4.34 exactly, probably monthly payments of £1 weekly commitments" (FP 2013, p. 21). This suggests the FPS is being used to automate small payments by individuals to other individuals, for example, for workplace coffee clubs or lottery pools.

An important consideration is that if the payment level varies from month to month, such as with a typical telephone bill, automatic payment cannot be done by SO. Therefore, these constant-value payments, for example, for rent or life insurance, are much more likely to be processed over the FPS than are payments for, say, electric utility bills, which vary in value from month to month. This is an important limitation of the FPS as implemented in the United Kingdom.[26]

[26] In practice, direct debits make up the majority of recurring, scheduled, payments by consumers.

4.2 Business and Government

In the United Kingdom in 2012, businesses made 3.5 billion payments (PC 2013c, p. 87). Approximately 324 million business (including government) payments (calculated as 40 percent of FPS by number), or 9 percent of business payments by number, were made via the FPS.

4.2.1 Business to Business

For business-to-business payments, PC (2013d) reports that of the 832 million automated payments in 2012 (made by Bacs direct debit or direct credit, standing order, FDP, and SIP), 60 million (about 7 percent) were FDPs or SIPs via the FPS (PC 2013d, pp. 39-40). Small and medium-sized businesses now may choose to receive credit and debit card merchant payments via the FPS (reducing settlement time by as much as three days) (PC 2013d, p. 46).

4.2.2 Business to Consumer

Business-to-consumer payments were about 264 million by number in 2012. For business-to-consumer payments, FP (2013) found that sort codes associated with businesses sent more payments on Friday, May 17, than on any of the other four days of the survey. "*This was in part driven by employment agencies and payroll companies making weekly wage payments*" (FP 2013, p. 15). This suggests a potential benefit of faster payments. When the payment of wages and salaries can be based on contemporaneous data on employment status or hours worked, payments are more accurate and timely. FP (2013, p. 14) reports "*Employment agencies paying staff on weekly bases using the Faster Payments Service tend to use single immediate payments because of its flexibility*." In addition, government can use the FPS to pay benefits to recipients. Currently, however, most workers are paid wages and salary via Bacs Direct Credit. In 2013, 90 percent of working adults in the United Kingdom were paid by Bacs Direct Credit (PC 2013b, p. 31).

According to the FPS, financial users and businesses users were the second and third largest users, respectively, of SIPs. Some of these financial users and businesses seem to be using speed of payment as a competitive advantage. FP (2013, p. 27) commented on the growing use of faster payments by businesses to pay customer refunds and insurance claims. For example, in the wake of natural disasters, it could be helpful to enable insurance companies

to send funds to consumers as fast as possible. Previously, consumers would have received a claim check in the mail, which they had to deposit and then wait for the check to clear. The Payments Council (PC 2013d, p. 34) notes that "*a number of new businesses have emerged in recent years advertising speedy payment*," citing businesses that buy second-hand cars or jewelry, lenders, and gaming companies.

Financial firms also use SIPs. "*Most payments by financial firms to individuals were around £100 or less and included a relatively large number of payments of less than £1. As noted earlier in this report, these could be interest payments from old savings accounts* (FP 2013, p. 27)."

4.3 Potential Benefits of the U.K. FPS

Research by the U.K. FPS found that person-to-person payments for coffee, lunch, shared housing expenses, etc. amount to £12.6 billion per year (PC 2014c). It is anticipated that the newly introduced Paym mobile method will make it easier for friends and family to settle IOUs.[27]

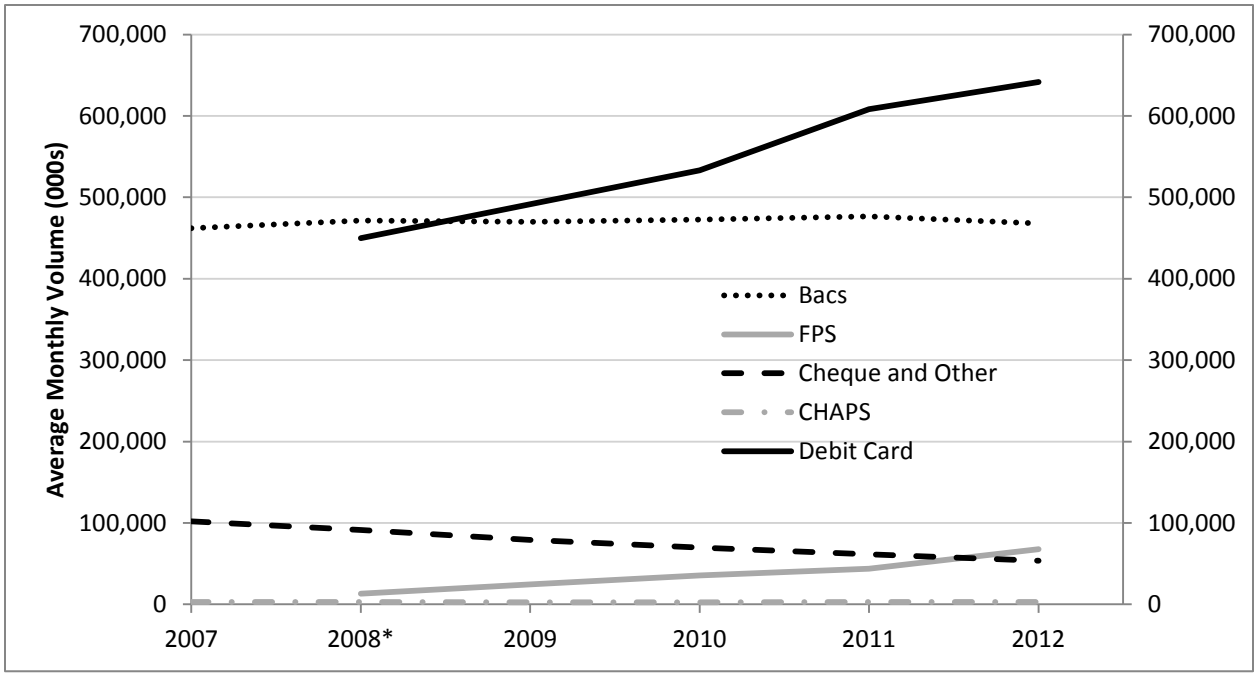
So far, the U.K. FPS does not offer technology for POS transactions. In theory, even without special-purpose POS hardware or software, it would be possible for a merchant to provide its 16-digit code, a customer to key in the code (correctly, while standing at checkout), and the merchant to receive confirmation. In practice, however, research has shown that speed at checkout is a relevant consideration (Klee 2008; Schuh and Stavins forthcoming); therefore, a payment method that slows down speed at checkout is not attractive. As Figure 7 below illustrates, debit card volume has not declined since the introduction of FPS and instead has actually increased. POS applications are expected to become easier over time. For example, an FPS system announced for this year would, when implemented, enable users to pay directly from their bank accounts by scanning a barcode or tapping an NFC reader with their mobile phones.[28] To date, costs to merchants for such a service are unknown. If costs prove smaller

[27] "Paym launch confirmed - Pay using just a mobile number from 29th April" http://www.fasterpayments.org.uk/news/paym-launch-confirmed-pay-using-just-mobile-number-29th-april.

[28] "VocaLink announces new mobile payment system 'Zapp'" http://www.information-age.com/technology/mobile-and-networking/123457153/vocalink-announces-new-mobile-payment-system--zapp-.

than merchant card fees (including interchange), merchants could surcharge consumers for the difference between the costs of accepting the two payment methods, as permitted by U.K. consumer protection rules. Discounts from the stated price for the use of a particular means of payment are permitted (BIS 2013).

FPS currently operates within the United Kingdom. Broader adoption of international standards such as the ISO 20022, the standard for financial services messaging, could facilitate the use of faster payments for cross-border payments. VocaLink suggested some benefits of international standards for cross-border payments. "*[T]he standardisation of approach reduces the burden of interoperability between systems, assisting both reconciliation and integration with the end to end business process, as well as enabling a greater "payload" of identifying information to accompany the payment*" (VocaLink 2013, p. 9). ISO 20022 includes standards for payment initiation, cancellation, and modification of payments, and settlement instructions.[29]



Source: PC 2013c.

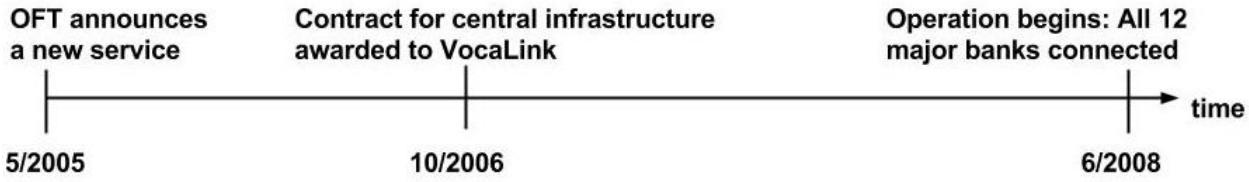
Figure 7: U.K. transaction volumes by payment method, 2007–2012 (before and after the FPS).

[29] ISO 20022 Payments Dashboard Business Processes Description http://www.iso20022.org/documents/dashboards/dashboard_payments_business_processes.pdf.

Overall, from a consumer perspective, it appears that consumers in retail settings in the United Kingdom and the United States have good options for fast payments. Debit and credit transactions appear immediately, and cash is often an option. Merchants may see this differently, as their payment may be delayed. But consumers tend to be the driving decision-makers in retail settings, and they have little reason to adopt something new, unless incentives change, for example, if merchants were to choose to offer discounts. However, person-to-person transactions are different. These are often completed by check, a slow process that often involves physically mailing a check or depositing at a bank, ATM, or via the Internet (by taking an image of the check). Similarly, real-time payments may be attractive in bill-pay contexts. Unlike the case with ACH or check payments, a consumer can schedule a real-time payment at the last minute, which supports better money management (and procrastination).

5. Costs of the FPS in the United Kingdom

The U.K. FPS experience provides a good example of how a general-purpose, fast payment system can be constructed and become operational in three years. Figure 8 below illustrates the construction time line.



Source: Faster Payments Service.

Figure 8: Time line for the construction of the U.K. FPS.

The FPS started operating in 2008. The key to its success is that commercial banks had a strong incentive to construct and connect to such a network. The whole process was pushed forward by the Office of Fair Trading (OFT, one of United Kingdom's antitrust authorities), which offered commercial banks no choice but to remove the float from funds transfers (VocaLink

2009). In addition, at that time, check clearing in the United Kingdom was planned to be phased out in October 2018 (since then postponed).[30]

5.1 The U.K. Payment System Investment Decision

To determine whether the benefits from an enhanced payment system outweigh the cost requires the decision-maker to examine various technological issues in general and all the available options related to existing electronic payment networks in particular. This is because the choice of technology has a direct impact on both the expected benefits and the expected cost. In general, such a debate would focus on four options:

1. Speeding up an existing A2A payment system; for example, making the Bacs (ACH batch based) clear transactions several times during a 24-hour cycle.
2. Building a totally new A2A faster payment system.
3. Modifying other existing payment networks to make them suitable for A2A transfers; for example, using an existing debit card or an ATM network.
4. Using an existing Real Time Gross Settlement (RTGS) network by reducing end-user fees for low-value funds transfers.

Note that option (4) is substantially different from options (1)–(3) because RTGS networks provide real-time settlement between the financial institutions. In contrast, options (1)–(3) are technologically simpler, because they permit the separation of settlement from clearing, in which case fast payments can rely on existing settlement procedures among banks.

At an early stage, the Office of Fair Trading in the United Kingdom commissioned a report that was later released as Milne and Tang (2005). The objective of that report was to "*identify the potential economic impacts of faster clearing cycles for automated payments in the U.K.*" By using the term "faster clearing cycles," the authors of that report seem to have left open all options as described in the above list. It should be noted that the report stated very clearly that "*It does not discuss the cost, either to banks or to central processors such as Voca, of upgrading systems to*

[30] www.gov.uk/government/news/frequently-asked-questions-on-the-closure-of-the-cheque-system.

support changes to clearing cycles," which means that the authors of that report abstracted from the cost considerations addressed below in this paper.

5.1.1 Speed Up Existing Systems

The RTGS payment networks (CHAPS in the United Kingdom and Fedwire in the United States) are "real-time" payment networks; therefore, by definition, they are fast. But these networks are also based on "real-time" settlements, which end users for the most part are not concerned with (exceptions could include transferring cash to a broker to purchase assets, for example). For this reason, this section discusses only speeding up batched systems (Bacs in the United Kingdom, which is the equivalent of ACH in the United States).

Milne and Tang (2005, pp. 6–8) saw three (nonexclusive) ways in which a batch-based Bacs system could be made faster:

1. By reducing Bacs' processing period to either "same day" or "next day."
2. By increasing the number of batch processing cycles each day.
3. By extending Bacs operations to weekends.

The processing of Bacs transactions was outsourced to a for-profit infrastructure company called Voca. Voca (in cooperation with Link, which operated the U.K. ATM network)[31] was awarded the contract to build the FPS in the United Kingdom; however, the FPS was not constructed as an enhancement to Bacs but as a totally independent system. In fact, as Milne and Tang (2005, p. 8) point out, "*Even with same day clearing and multiple batching, the processing cycle for automated payments can take a number of hours and a payment may not be completed until the following day*." In contrast, the FPS clears a transaction within a few seconds, whereas settlements (among banks) occur three times daily.

Another option for using an existing system was to modify the CHAPS so it could be used for low-value transactions. This RTGS system (similar to Fedwire in the United States) is costly to end users—around £20 ($31) per transaction for CHAPS in the United Kingdom and

[31] Voca and Link merged in 2007.

$20–$40 to a payer and separately to a payee for Fedwire in the United States. At these fees, frequent use is unlikely. However, Milne and Tang (2005) pointed out that some low-value transactions via CHAPS were observed, indicating that the demand for low-value faster payments exists (even at high fees).

Finally, a modification of the debit card network has been suggested. As Milne and Tang (2005, p. 16) point out, however, cards have limited use outside the POS. Cards are also used mainly for debit ("pull") transactions rather than for credit ("push") transactions. We are not aware of any complete plan under which debit card networks could be modified to provide instantaneous A2A credit and debit transactions.

5.1.2 Add New System

This is the path that was eventually chosen. Given the actual construction cost of the FPS (Section 5.2), the cost of constructing a new payment network need not differ very much from the cost of enhancing an existing system. This may also be the case for adoption costs by financial institutions that may need to modify their accounting to show transactions in real time.

In the case of the United Kingdom, the separation of the settlement stage from the authorization and clearing stages made the adoption of a brand-new network less costly because banks continue to settle via the Bank of England three times daily as they did before the FPS was introduced. As it turned out, this simplification may be the main factor that enabled the FPS to be up and running within three years.

Finally, another advantage of a new system is the ability to make a new system flexible with respect to compatibility with new payment protocols, such as ISO 20022, discussed earlier in this paper. Both ACH and RTGS systems were designed long before the e-commerce era. Although individual banks are able to modify their payment messages to adhere to new standards, a newly constructed network could facilitate adoption of existing and future payment messaging standards.

5.2 FPS Investment Costs

The costs to establish and maintain a faster payment service involve three main components:

1. The installation cost of constructing, deploying, and maintaining the central infrastructure of the FPS.
2. The connection cost to each *individual* bank of adopting new technology and capital to access the new fast payment network.
3. The transfer costs of possible reductions in the revenue of banks and nonbank money transmitters resulting from shifting some volume from other payment services to the new FPS. (Lost revenue is not a social cost; rather, it is a transfer from one agent in an economy to another; see section 5.4.)

The cost estimates here are from sources at VocaLink, which runs the central infrastructure and also conducts surveys of participating banks in order to learn about the cost to banks. VocaLink is 100 percent owned by banks. Sources at VocaLink have indicated that the cost to build and launch the U.K. FPS, plus the operation for the life of the initial contract (seven years) is estimated at somewhere between £150 and £200 million ($230–$307 million), of which £40–£50 million ($61–$77 million) was a fixed cost paid up front by the 12 participating banks for the construction and launch. These figures do not take into account individual bank costs. The costs to individual banks were wide ranging, depending upon the bank's existing capabilities and the extent of the changes each bank elected to include within the scope of its FPS project.

According to VocaLink, the cost of constructing Singapore's Fast was lower, due to experience with the U.K. system. It should be mentioned that VocaLink does not bear any volume risk because it does not charge banks any per transaction fee. That is, banks pay a flat fee to use the service, so the system is immune to demand fluctuations. Because it operates below capacity, volume also does not affect cost.

As for the second cost component, the adoption cost to each participating bank varied significantly among the banks, even when adjusted for volume. Some banks used this

opportunity to overhaul their entire accounting system in order to accommodate fast clearing. Some banks reported this cost to be in the hundreds of thousands of British pounds (rather than in the millions; see VocaLink 2009, p.16). On the other hand, some banks spent in the tens of millions of British pounds. The major problem in estimating bank-specific adoption cost is that for banks that overhaul their entire accounting system, it is difficult to isolate the portion that is attributable solely to the adoption of the FPS. Since banks are not charged any per transaction fee, any increase in volume does not add to a bank's total cost.

Table 3 provides a summary of the "real" overall cost of the implementation in the United Kingdom. The term "real" refers here to the diversion of human and physical resources from other activities. These can also be viewed as "social costs."[32]

Bearer	Cost Description (real)	Estimated Amount, min to max
Split by 12 banks	Central infrastructure: Construction (fixed cost)	£40 million–£50 million ($61 million–$77 million)
Split by 12 banks	Central infrastructure: Maintenance (variable cost)	£100 million–£150 million ($154 million–$230 million), spread over seven years between 2008 and 2015
Each of 12 banks	Adoption costs	£0.10 million–£50 million ($0.15 million–$77 million); max times 12 banks = £600 million ($922 million)

Source: VocaLink representatives in email and phone conversations with authors.

Table 3: Estimated cost of building and maintaining FPS in the United Kingdom.

We have already noted that the costs of FPS are very small relative to U.K. GDP (national income). Another way to evaluate the relative total cost of FPS is compare it to the per capita value of benefits required. With a U.K. population of 63 million people and estimated maximum total cost of £800 million ($1.23 billion), the FPS would require a per capita annual

[32] Gains or losses from float are not included in this table, as they are generally netted out in general equilibrium.

benefit of £2.05 ($3.15) to give the seven-year investment project a positive net present value.[33] For example, if the FPS helped avoid a late fee on one monthly bill per consumer per year, it would more than amortize the total costs.

5.3 Changes in Float

In a 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. Float gains or losses are more important to financial institutions that trade in large volumes or values. Float costs and gains can be divided into three types: (1) the float cost of delay between the time that the funds are deducted from the payer's account until the same amount is credited to the payee's account, (2) the interest gains to the sending bank from holding the funds deducted from the payer's account until settlement time, and (3) the interest cost between the time funds are credited to the receiver's account and the settlement time.

The payment environment analyzed in this paper has four main participants: Payer, payee, sending bank, and receiving bank. If capital markets were perfect (meaning that individuals and financial institutions faced similar interest rates), the sum of costs and gains from float to all four parties would be zero. However, because in the U.K. FPS process payers are debited and payees are credited within seconds, they do not bear any float gains or cost. Instead, the receiving bank bears some float cost associated with providing the funds to the payee before the receiving bank gets the funds from the sending bank (which gains from the delay in settlement).

In assessing the impact of the FPS process in the United Kingdom on the costs or gains from float, Milne and Tang (2005, p. 7) point out that a transition from Bacs (ACH) to FPS will not have any float-related impact on the sender and the receiver because even under the slow system, "*the debiting and crediting of customer bank accounts takes place on the same day so there is no float income for banks generated by either of these payment instruments*." This statement refers to "bulk credits," which are transfers such as salaries and pensions, as well as "bulk debits," which

[33] Calculated using a discount rate of 3 percent.

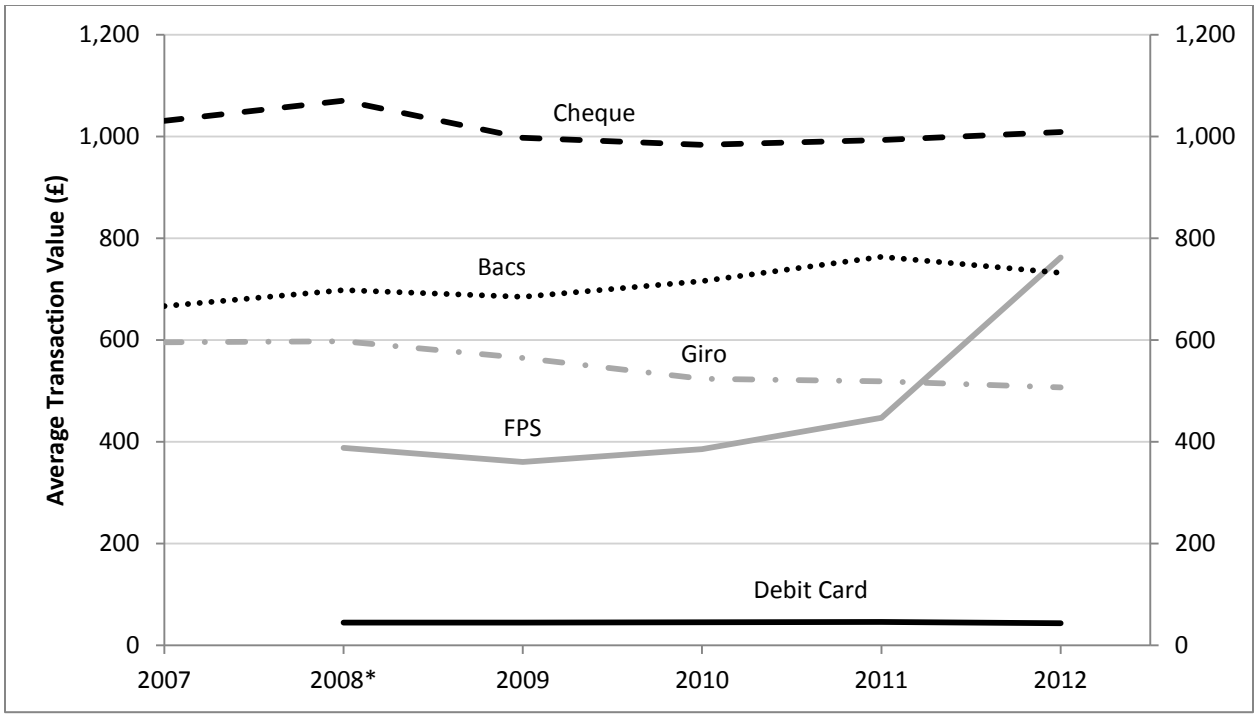
are payments for utility or other variable-amount recurring bills (as noted above, these variable-amount, recurring payments are not processed by the FPS). However, float can arise with standing orders (such as regular payments for magazine subscriptions and club dues), "*where it is usual for banks to debit customer accounts two working days before the crediting of the recipient account. However, recently some individual banks have changed their practice… so this change in practice eliminates float on standing orders paid by customers of the bank*."

5.4 Revenue Impact on Existing Payment Networks

The question of whether the new service would generate substitution from other payment instruments, such as checks, cash, CHAPS, Bacs, and cards, was raised in a preliminary study commissioned by the OFT, Milne and Tang (2005, p.16). That study mentioned that a large portion of scheduled payment orders should be unaffected by the new service because they are scheduled in advance for fulfillment at a certain future date; such payments include salaries, utility bills, and pension payments.

Figure 7 above (computed from Payments Council 2013c) confirms that the increase in the volume share of the FPS transactions did not correspond to declines in the volume of CHAPS, Bacs, and debit card transactions. The only significant reduction in payments was in the volume of checks, which were scheduled to be phased out in the United Kingdom. Because checks are also used for person-to-person transfers, the FPS may have affected check volume.

Figure 9 displays average transaction values since the FPS was introduced in the United Kingdom. Note that the CHAPS average transaction value in 2012 was £2.11 million, which would fall above the vertical axis limit.



Source: PC 2013c.

Figure 9: U.K. transaction values by payment method, 2007–2012 (before and after the FPS).

The figure reveals a sharp increase in transaction values made via the FPS in 2012, partly because participating banks increased the limit on the amount that could be sent. Note that none of the other payment methods exhibited major change, except for the Giro, which fell about 10 percent, possibly hinting that some payments were shifted from the Giro to the FPS.

The volumes of Bacs and CHAPS have not decreased appreciably (Figure 7), but it is not possible to say how the introduction of FPS has affected these two electronic networks. A comprehensive model of the payment system is needed to properly estimate substitution among payment methods. For the sake of illustration, one way to approach this kind of computation would be to look at a potential loss of revenue to the banks if some volume from CHAPS switched to the FPS, which currently does not charge payers and payees.[34] The CHAPS volume in 2012 was 33,936,000. Banks charge £30 ($43) to send (they do not seem to charge for

[34] Due to lack of data on revenue generated by U.K. banks from Bacs services, similar estimates of potential loss of revenue from shifting volume from Bacs to FPS are unavailable.

receiving). The median CHAPS transaction value in 2003 was £17,000 ($27,086).[35] If a £10,000 ($15,365) restriction corresponded to 25 percent of the distribution, then the maximum revenue loss would be 1.018/4 = £ 0.255 billion ($0.362 billion) Based on this rough calculation, a potential loss to banks could be in the range of £0 to £0.255 billion ($0 to $0.362 billion).

5.5 Future Costs

Table 3 shows the estimated maintenance cost of the FPS in the United Kingdom to be in the range of £100–£150 million ($154–$230 million) for the entire first seven years of operation (2008–2015). This cost is likely to continue in the future because, so far, the capacity of the network seems sufficient for current traffic. This cost was divided among the 12 banks that started and owned the project since the beginning. The cost per bank falls as more banks join.

However, future enhancements that will use the FPS, such as POS applications, may incur additional costs. For example, the Paym mobile service also contains a user directory so that the consumer whose account is credited does not have to reveal his bank account to the sender. It is natural to assume that some add-on service of this type could also be provided by nonbanks, such as merchant organizations and merchants who adopt the FPS, who then could bear some cost of subsequent enhancements.

5.6 Revenues

Since operation began, banks in the United Kingdom have provided FPS to their customers free of charge. Therefore, no revenue has been collected. There may be two reasons for this: First, as with most new networks, to gain momentum, charging no fees could be viewed as providing "introductory offers" to end users so they could assess the gains from using the FPS. Second, the participating banks themselves were not charged any per transaction fees to use the FPS, only fixed fees that were spread over the first seven years of operation. Therefore, banks have borne zero marginal cost (the cost of making one additional FPS transaction). This means that if banks

[35]See http://www.bankofengland.co.uk/archive/Documents/historicpubs/fsr/2003/fsr14art5.pdf.

were to charge end users per transaction fees, the basis of the fee could not be marginal cost, but rather "demand" or "utility."

In the future, banks will have to decide whether to charge users nominal fees that would cover their initial investment and operating cost or whether to cross subsidize this service. VocaLink (2009, p. 4) has already questioned banks on their vision for future revenue, and the response received has been as follows: *"Two-thirds of banks interviewed were very positive that Faster Payments could deliver new revenue streams, with potential revenues identified in the business-to-consumer segment reaching £2.9 billion by 2018 and £1.9 billion in the business-to-business space."*

6. Implications for the United States

As in other countries that lack a faster A2A payments technology, policymakers in the United States see its potential benefits and are giving increased consideration to speeding up the payment system. The U.S. interest is not new. Benefits from an accessible, faster A2A payment network via the Internet with standardized technology and separate clearing and settlement functions were identified in BOG (2002) through interviews with managers in a wide variety of organizations and industries. Recent policy statements by the Federal Reserve reveal a clearer, stronger desire of the U.S. central bank to have faster payments. This section draws out key implications from the U.K. FPS for U.S. policymakers as they consider options for speeding up the U.S. payment system.

6.1 The Strategic Plan for Payments

In a public announcement on October 22, 2012, Sandra Pianalto, then the president of the Federal Reserve Bank of Cleveland and chair of the Financial Services Policy Committee (FSPC), outlined an updated plan to improve the U.S. payment system within a decade.[36] The plan for the payment industry in the future suggested organizational design, investments in technology, and industry outreach, based on the following three principles: (1) Move transactions faster

[36] See, http://www.clevelandfed.org/For_the_Public/News_and_Media/Speeches/2012/Pianalto_20121022.cfm.

from end to end (origination to settlement); (2) Function more efficiently and securely; and (3) Satisfy consumer (end-user) preferences.[37]

In September 2013, the Federal Reserve Banks published an industry consultation paper asking for public comments on how to reform the U.S. payment system (BOG 2013). The paper lists five "desired outcomes" to be accomplished within a decade: speed, security, efficiency via cost reduction by directly connecting and automating electronic transfers among end users, adhering to international payment standards, and cooperation among all stakeholders. The paper envisions one of the desired outcomes as follows (p. 5):

"*A ubiquitous electronic solution(s) for making retail payments exists that does not require the sender to know the bank account number of the recipient. Confirmation of good funds will be made at the initiation of the payment. The sender and receiver will receive timely notification that the payment has been made. Funds will be debited from the payer and made available in near real time to the payee*."

Speed is interpreted as a combination of the immediate transfer of funds and immediate notification to both senders and recipients, as described in Section 2.

The Fed's industry consultation paper received nearly 200 comments, which are posted to the public.[38] Thirty-five percent of the comments came from financial institutions, 22 percent from business and merchants, 12 percent from technology solutions providers, 10 percent from consultants, and 8 percent from consumers and academics. Three-quarters of the respondents agreed with the gaps and desired outcomes outlined in the consultation paper.

A summary of the comments received by the Fed (BOG 2014) states: "*To achieve this vision, the Federal Reserve Banks seek to engage with all organizations involved in delivering payment services to end users. We believe industry collaboration will be essential to any enduring strategic improvements.*" Respondents were divided as to whether the decision to pursue a faster payment service should be based on a solid business case that is supported and demonstrated by end

[37] The current status of the strategic plan can be found here: http://fedpaymentsimprovement.org/.
[38] See, http://fedpaymentsimprovement.org/user-submissions/ and a summary in http://fedpaymentsimprovement.org/wp-content/uploads/industry_feedback_summary.pdf.

user needs. One reason for this concern is that it is difficult to measure broad public benefits of an improved payment infrastructure and therefore difficult to do complete, quantitative cost-benefit analysis. Many respondents suggested that near-real-time confirmation of good funds and notification are more important than near-real-time posting of funds to end user accounts and interbank settlement. Many commentators suggested focusing on a credit (push) faster payment service for security reasons, although some commentators suggested that a faster debit system is also needed.

In 2014, the U.S. payments industry and policy makers face the same question as their U.K. counterparts did in 2007. Does the net present value of the benefits of investing in a faster payment service outweigh the costs of adopting the service?

6.2 Potential Benefits of Faster U.S. Payments

Given the marked similarities between the U.K. and U.S. payment systems, the potential benefits of faster U.S. payments are likely to be very similar to those experienced in the United Kingdom, as described in Section 4. However, the U.S. payments industry and policymakers have a distinct advantage in their decision-making because they can study and learn from the experiences of the United Kingdom and other countries with faster payment services. In particular, it may be informative to conduct more economic research that *quantifies* two factors: (1) the utility benefits to consumers, as in Koulayev, Rysman, Schuh and Stavins (2012) and Schuh and Stavins (forthcoming); and (2) the revenue and profit effects on financial and nonfinancial firms. Such research would give firmer economic foundations to any business and policy decisions about faster payments that may be made.

6.3 Potential Costs of Faster U.S. Payments

To achieve faster A2A payments, the U.S. payments industry and policymakers face essentially the same investment decision as in the United Kingdom. They can: (1) speed up and improve an existing payment network(s); (2) adopt a new faster payment service; or (3) wait until uncertainty about the supply and demand for faster payments is resolved more fully.

However, specific investment costs for faster payments in the U.S. situation differ somewhat from the U.K. situation prior to adopting the FPS.

6.3.1 Existing Payment Systems

One option is to improve the speed and accessibility of the ACH networks managed by the Federal Reserve (Fed/ACH) and The Clearing House's (TCH) Electronic Payments Network (EPN). The ACH could be used for A2A money transfers, provided commercial banks invest in providing full access to all bank depositors, but the cost of doing so is unknown. ACH payments are extremely low cost to banks (a fraction of a cent), so speeding up the ACH may be an attractive option.[39] ACH transactions are cleared overnight, but most transfers settle two or three days after origination. Recently, a new same-day ACH service was proposed to enable financial institutions to transfer funds during the same day.[40] However, in August 2012, the voting member banks of NACHA did not approve the Expedited Processing and Settlement Rule that would have supported the same-day ACH.[41] In March 2014, NACHA proposed a phased implementation of same-day ACH, beginning with payroll, person-to-person, and expedited bill pay, and said that new rules could be issued later in 2014.

Another, less-discussed option is expanding accessibility and affordability of payments to end users of Fedwire, a fast payment system featuring immediate settlement among financial institutions on every transaction. Banks charge end users $20–$40 per payment[42] while the incremental cost to banks is less than 30 cents.[43] Such high fees make Fedwire prohibitively costly for low-value transfers. Biehl, McAndrews, and Stefanadis (2002) proposed the possibility of differential pricing of Fedwire, whereby end users would be charged low fees for low-value transactions, but it is uncertain what effects this alternative pricing strategy would have on bank profits and payment system total costs. In any case, this suggestion has never been implemented.

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[39] ACH fees are listed in https://www.frbservices.org/servicefees/fedach_services_2014.html.

[40] See, http://www.frbservices.org/serviceofferings/fedach/sameday_service.html.

[41] For more, see, http://www.paymentsnews.com/2013/04/a-vote-of-support-for-same-day-ach-in-the-us.html and http://www.frbservices.org/fedfocus/archive_perspective/perspective_0713_01.html.

[42] www2.ed.gov/policy/fund/guid/gposbul/fedwire-memo.doc.

[43] Fedwire fees paid by banks are listed in http://www.frbservices.org/servicefees/fedwire_funds_services_2014.html. Explaining the source of the gap between fees paid by banks and fees paid by users is outside the scope of this paper.

A growing number of private-sector nonbank companies offer electronic (online and mobile) alternatives to payment services provided by banks. Most of these systems do provide instantaneous transfer of money among users. The only gap in time is caused by transferring money between users' nonbank accounts and their bank accounts, a process that relies on the ACH or a debit card network (both involve a delay of one or two days). In addition, nonusers may not be able to receive money. These nonbank alternatives may be important players in speeding up the U.S. payment system, but are outside the scope of this paper.[44]

6.3.2 A New Payment System

The United States could adopt an entirely new faster payment service. If so, it is not known whether the cost of installing and operating the network would be more, less, or about the same as the U.K. cost (less than £200 million, or $307 million) for seven years. Network design and construction costs may be lower now due to productivity gains and technological innovations stemming from prior experience of constructing other faster payment systems and learning by doing of payment system participants, as is common in early stages of new industries (Tirole 1989, p. 71) However, if adoption costs are proportional to the volume of payments or size of the payment system, they could be higher due to the larger U.S. population and economy.

Another factor that may influence the relative adoption costs of a new U.S. system is the structure of the U.S. banking system. The United States has many more depository institutions than the United Kingdom and deposit accounts in the U.S. banking system are less concentrated among the largest banks, as shown in Table 4. If adoption costs of a new payment network depend on the number of banks or the dispersion of deposits among banks, then U.S. costs could be higher, but further research is needed to understand the cost structure for banks of various sizes. Each bank must also invest in technology and human capital to connect to a new system. These fixed costs, which were estimated to be £0.10 million to £50 million ($0.15 million

[44] Examples using U.S. currency and bank accounts include PayPal (www.paypal.com), Dwolla (www.dwolla.com), Square (https://square.com/cash), and Popmoney Instant Payments (owned by Fiserv). Private virtual currencies, such as Bitcoin, also provide relatively fast transfers of virtual currency among users.

to $77 million) per bank in the United Kingdom, are unknown for U.S. banks and likely would depend on which faster payment service was adopted. The cost structure for small U.S. banks to adopt a faster payment service is not well known and, if higher than for large U.S. banks, could pose a challenge for universal bank participation. If access costs for small banks are relatively high, the costs may be ameliorated by third-party payment service providers that serve small banks.

U.K. banks		**U.S. banks**	
Ranked by percentage share of deposits		**Ranked by percentage share of deposits**	
HSBC Holdings	33.8%	JPMorgan Chase & Co.	15.4%
Barclays	19.0%	Bank of America Corporation	13.3%
Lloyds Banking Group	17.4%	Wells Fargo & Company	12.9%
Royal Bank of Scotland Group	17.4%	Citigroup Inc.	11.5%
Standard Chartered	10.2%	U.S. Bancorp	3.1%
Deposit share of top 5	97.8%	Deposit share of top 5	56.2%

Source: S&P Capital IQ, most recent annual results as of 8/14/2014. Used with permission.

Table 4: The largest banks in the United Kingdom and the United States, by deposits.

Operating costs of a new service with frontier technology may be lower than operating costs of existing networks. For example, the ACH and Fedwire have protocols initially developed for older computational technology such as mainframes, long before servers and the Internet became widely used. Furthermore, as defined here, a new faster payments service can provide most—and perhaps more—of the functionality of the existing ACH system; hence, the unit cost of such services may be lower. By comparison, the *annual* cost of operating the FedACH was $116.3 million in 2013, almost 38 percent of the seven-year cost of the U.K. FPS.[45] This $116.3 million cost does not include the cost of the EPN, which comprises approximately half of ACH traffic.

Finally, potential revenue transfers associated with a U.S. faster payment system that induces substitution among payment networks may be different from those in the U.K.

[45] The FedACH's operation costs are publicly posted, see http://www.federalreserve.gov/publications/annual-report/2013-federal-reserve-banks.htm#subsection-134-2E261FFA
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experience. If payments shifted from the ACH or Fedwire to a new faster payment service in a manner similar to the U.K. transfers thus far, U.S. banks might lose some revenue associated with those networks. However, banks and payment card networks could lose even more revenue if a U.S. faster payment service competed successfully with payment cards.

In the short run, the U.S. experience with transfers might be similar to the U.K. experience but the eventual long-run effects of transfers might differ between the two countries. A key determinant of whether banks lose net revenue from payment network substitution is whether or not they would be able to earn revenue from a new faster payment service.

6.4 Who Would Own and Operate a Faster U.S. Payment System?

If a faster payment system is introduced in the United States, who would own and operate the system? The obvious options would be:

- Owned and operated by private banks.
- Owned and operated by a private-sector nonbank(s) with cooperation from banks.
- Owned and operated by a public-private organization. For example, the Fed (public) and The Clearing House (private) collaborate in operating portions of the ACH (Fed/ACH and EPN, respectively) through a governing body NACHA, the Electronic Payments Association.
- Owned and operated by the public, such as the Federal Reserve, U.S. Treasury, or other government body.

Ownership of a faster payment system is important not only because the owner must pay the costs to install and operate the service but also because the owner(s) may determine access fees for the service as well as how revenue would be split among the participating institutions. Thus far, the U.K. FPS does not generate such revenue but it is unknown whether it will do so in the future or whether a potential U.S. faster payment service would generate any revenue. The revenue stream is potentially important because fees may compensate financial institutions for potential revenues lost from substitution among payment networks.

Concern about ownership and revenues is well understood by the private sector. The Clearing House (TCH), which is owned by large commercial banks, has pointed out that banks need to find a business reason for investing in a new payment system. In TCH (2013, section C), The Clearing House states that "*Simply put, payment system providers will not invest in a payment system without the prospect of reasonable return on their investments…TCH believes that the ability for all providers to earn an a* [sic] *reasonable return on investment is not merely a way to justify funding; it is a design criterion that needs to be addressed at every stage of planning and development*."

If the net benefits of a faster payment service are positive, why would government agencies need to be involved in the creation of a faster payments system? Perhaps the costs outweigh the benefits. Economic theory suggests that this kind of outcome could potentially result from some sort of market failure. [46] In the United Kingdom, official statements appear to have focused on float as a disincentive to invest in a new system. More generally, we might characterize this concern as being about potential cannibalization of existing profitable products by a faster payment system. An alternative source of market failure could be coordination failure among multiple parties.

Although a full analysis of potential market failure in the payment system is very difficult and beyond the scope of this paper, it is critical for determining whether or not it would be social-welfare maximizing for the federal government or Federal Reserve System to have a role in creating or mandating a market for faster A2A payments.

Finally, regardless of who owned and operated a U.S. faster payment service, would all banks (including other depository institutions) and end-users (consumers and businesses) voluntarily connect to the service and use it for payments without reservation? If so, the service could reach its full potential benefit. If not, however, and if connectivity or participation were a

[46] Market failures can be found anywhere, especially in industries characterized by network externalities, such as payments, telecommunication, and transportation (Laffont and Tirole 2002, p. 71). They also may stem from other types of externalities or the public good nature of goods and services. Competition in network industries may lead to a market failure that might be alleviated by the existence of a regulating agency with enforcement power that would mandate "access pricing," described in the telecom regulation literature (Loffont and Tirole 2002).

problem for a faster payment service, it is unclear whether and how these could be encouraged successfully or even required (if necessary).

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