How has cash usage evolved in recent decades? What might drive demand in the future?

By Tom Fish and Roy Whymark of the Bank's Notes Directorate.[1]

- Cash is often in the media spotlight. While some predict its impending demise, most people continue to use banknotes in their day-to-day lives. Although consumers are less likely to use cash for transactions than they were in the past, aggregate demand for banknotes is increasing.
- This article considers how cash usage has evolved in recent decades, how cash is used today, and why the Bank of England needs to prepare for a future where cash remains important.

Overview

The issuance of banknotes is probably the most recognisable function of the Bank of England. People use banknotes as a store of value and as a medium of exchange when buying or selling goods and services. The Bank of England seeks to ensure that demand for its banknotes is met, and that the public retains confidence in those banknotes.

The payments landscape has changed considerably in recent decades. People can now make payments using debit and credit cards, internet banking, mobile 'wallets' and smartphone apps. Yet cash continues to be important in the United Kingdom, with demand for Bank of England notes growing faster than nominal GDP (see **summary chart**). There is now the equivalent of around £1,000 in banknotes in circulation for each person in the United Kingdom.

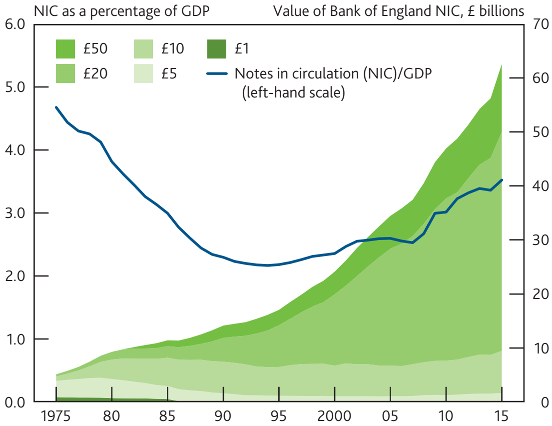
The growth in demand has been driven by three different markets. The evidence available indicates that no more than half of Bank of England notes in circulation are likely to be held for use within the domestic economy for transactions and for 'hoarding'. The remainder is likely to be held overseas or for use in the shadow economy. However, given the untraceable nature of cash, it is not possible to determine precisely how much is held in each market.

The future rate of growth in demand for cash is uncertain and will depend on a number of factors including alternative payment technologies, retailer and financial institution preferences, government intervention, and socio-economic developments. Finally — and probably most importantly — it will depend on the public's attitude towards cash.

Over the next few years, consumers are likely to use cash for a smaller proportion of the payments they make. Even so, overall demand is likely to remain resilient. Cash is not likely to die out any time soon.

As such, the Bank continues to invest in banknotes. Within the next few years, the Bank will be launching new banknotes for the £5, £10 and £20 denominations. The new notes will be made of polymer — a cleaner and more durable material — and will incorporate leading-edge security features that will strengthen their resilience against the threat of counterfeiting.

Summary chart Value of Bank of England notes in circulation: 1975 to present[(a)]



Sources: Bank of England and ONS.

(a) See footnote (a) of **Figure 1** on page 6. Based on annual data. For 2015, chart uses data up to end-July for NIC and data up to 2015 Q2 for GDP.

Click here for a short video on cash usage filmed in the Bank of England's cash vaults.

(1) The authors would like to thank Kevin Finan for his help in producing this article.

Most people in the United Kingdom use physical currency ('cash') in their daily lives.[1] Yet today, consumers have greater choice than ever in how they pay for goods and services. This choice has prompted some reports that cash is in the final stages of its life.

Although there are many ways to pay, cash remains important, and the aggregate demand for banknotes continues to grow faster than nominal GDP. This article outlines how the use of cash has evolved over time and considers what factors might influence cash usage in the future.

The first section reviews what money is and the Bank of England's responsibilities with respect to banknotes. The second section explores the evolution of payment technologies. The third section examines the different sources of demand for cash. Finally, the article considers different factors that might influence the future demand for cash and how cash-issuing authorities should prepare. Throughout, the article draws on a range of data and research, including the findings of a survey commissioned by the Bank in 2014 into the public's attitudes towards cash. A short **video** discusses some of the key topics covered in this article.[2]

Money and the Bank of England's role in issuing banknotes

What is money?

A common way of defining money is through the functions it performs. As explained in a previous *Bulletin* article,[3] money serves as:

(i) **a medium of exchange** — money is used to facilitate transactions, and is exchanged for goods and services;

(ii) **a store of value** — money retains value over a period of time, thereby allowing people to transfer purchasing power from today to some future date; and

(iii) **a unit of account** — money allows goods and services to be priced in a comparable manner.

There are two types of money held by firms and households: cash and bank deposits.[4] Ninety-seven per cent of the money belonging to people in the United Kingdom is held electronically as deposits, with the remainder held in physical form. When a consumer withdraws cash from his or her bank account, they are exchanging electronic deposits for physical currency — the total amount of money in circulation remains unchanged.

Money is principally created through commercial banks making loans. Whenever a bank makes a loan, it creates a deposit in the borrower's bank account. The borrower is then able to access and spend this money. This can be done electronically (for example, using a debit card) or by withdrawing and then spending cash. To provide this cash to customers, banks need to purchase banknotes. For instance, commercial banks buy banknotes from the Bank of England in exchange for central bank reserves.[5] Effectively, commercial banks exchange electronic funds for banknotes in the same way that households draw down on their bank deposits when they take out cash from an ATM.

Commercial banks need enough notes to meet anticipated customer demand. While the Bank, through its monetary policy, plays a key role in influencing overall demand for money, it does not seek to influence the proportion of money that the public demands as banknotes. This is driven largely by public preference.[6]

What is a Bank of England note?

A banknote represents an IOU from the Bank of England to the holder of the note. Bank of England notes are able to circulate between consumers and businesses because of the promissory clause that appears on them, which states that the Bank will pay the bearer the sum of the banknote on demand. This enables the holder to trust that it is worth the value printed on it. As a bearer instrument, no ownership information is recorded for a banknote — the holder is simply assumed to be the owner. This means that when a banknote changes hands, a transfer of value takes place with immediate settlement finality.

Historically, the value of currency in the United Kingdom was tied to gold. In practice, this meant that the Bank would honour its promise by exchanging its banknotes for an equivalent value in gold. But since the United Kingdom left the gold standard in 1931, Bank of England notes have been 'fiat money' — money by government decree that is not convertible to gold (or any other commodity). The promissory clause still exists today, and banknotes will be repaid with new Bank of England notes, or via electronic payment or cheque.

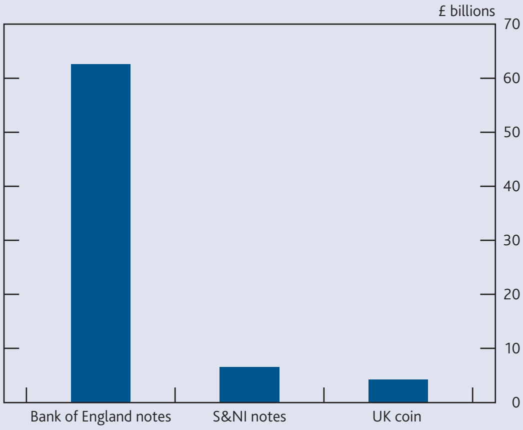
As discussed above, a banknote that is sold by the Bank to the commercial sector is paid for via an electronic funds transfer to the Bank. The Bank invests the funds received into an interest-bearing asset, such as a government bond. The Bank therefore receives interest income from the assets, yet pays no interest on the corresponding liability (the banknote). Once the costs of banknote production and issuance have been

(1) Throughout the article, use of the word 'cash' refers to both banknotes and coin.
(2) https://youtu.be/dXBLoAWzulU.
(3) See McLeay, Radia and Thomas (2014a) for a detailed introduction to money.
(4) A third type of money is central bank reserves — deposits placed by commercial banks with the Bank of England. Throughout this article 'banks' and 'commercial banks' are used to refer to banks and building societies together.
(5) Only a limited number of commercial banks buy banknotes directly from the Bank of England. See the section below on the Bank's note issuance objectives for detail.
(6) See McLeay, Radia and Thomas (2014b) for information on how money is created.

UK coin and Scottish and Northern Ireland banknotes

Although cash in circulation in the United Kingdom predominantly comprises Bank of England notes, there are two other components (**Chart A**).

Chart A Value of UK cash by component, 2015



Sources: Bank of England and Royal Mint.

The United Kingdom's coin policy is managed by HM Treasury, with coins produced by the Royal Mint. At the end of March 2015, there was £4.2 billion of coin in circulation.(1)

The Government also authorises seven commercial banks to issue banknotes in Scotland and Northern Ireland (S&NI banknotes). The Scottish issuers are: Bank of Scotland plc; Clydesdale Bank plc; and The Royal Bank of Scotland plc. The Northern Ireland issuers are: AIB Group (UK) plc (trades as First Trust Bank); Bank of Ireland (UK) plc; Northern Bank Limited (trades as Danske Bank); and Ulster Bank Limited. The aggregate value of S&NI banknotes in circulation totalled £6.6 billion at the end of February 2015.(2)

The Banking Act 2009 stipulates that the commercial issuers must fully back their notes in circulation with ring-fenced assets, which can take the form of Bank of England notes, UK coin and funds held in an interest-bearing account at the Bank. This gives holders of S&NI banknotes a similar level of protection to holders of Bank of England notes. If one of the authorised banks were to fail, there would be sufficient funds to reimburse all noteholders. The Bank monitors the seven banks' compliance with this legislative regime.

What is legal tender?

S&NI banknotes are not legal tender in the United Kingdom, and Bank of England notes are only classified as legal tender in England and Wales. However, legal tender has a narrow technical meaning in relation to the settlement of debt. If a debtor pays in legal tender the exact amount they owe under the terms of a contract, and the contract does not specify another means of payment, the debtor has a good defence in law if he/she is subsequently sued for non-payment of the debt. This has very little practical application to everyday transactions. The acceptability of any payment method is entirely at the discretion of the parties involved in the transaction.

(1) Source: Royal Mint.
(2) See Bank of England; www.bankofengland.co.uk/banknotes/Documents/about/scottish_northernireland_annualreport2015.pdf. There are also a number of non-UK sterling banknotes that are issued in the Isle of Man, Channel Islands and Gibraltar. These are issued under currency board arrangements, with banknotes backed one-for-one with UK pound sterling. However, unlike for the S&NI banknotes, the Bank of England has no involvement or oversight of these arrangements.

deducted from this income, the net income earned — referred to as 'seigniorage' — is passed on to HM Treasury. This amounted to £506 million in 2014–15.(1)

At the end of July 2015, there were nearly three and a half billion Bank of England notes in circulation, across the Bank's four denominations, totalling around £63 billion (**Table A**).

Table A Bank of England notes by denomination

£5	£10	£20	£50	**Total**
£1.7 billion	£7.8 billion	£40.5 billion	£12.6 billion	**£62.6 billion**
340 million notes	780 million notes	2,025 million notes	252 million notes	**3,397 million notes**

The Bank is not the only issuer of sterling cash in the United Kingdom. The box above briefly summarises arrangements for UK coin and banknotes in Scotland and Northern Ireland.

The Bank's note issuance objectives

In delivering monetary stability, the Bank maintains the public's confidence in the currency, achieved through monetary policy which is implemented through sterling market operations. The Bank also needs to make sure that the public remains confident in the banknotes it issues. Noteholders should be confident in the integrity of their banknotes — these should be of good quality, easy to authenticate and resilient against the threat of counterfeiting. Banknotes should also be readily available, and in the denominations that the public requires.

The Bank has a specialist research team that assesses developments in banknote security and technology. Based on this research, the Bank will periodically launch new state-of-the-art banknotes. Printing of banknotes has been tendered to the commercial sector since 2003. The current printer is De La Rue plc.

(1) See Bank of England (2015a).

In order to meet demand for banknotes, the Bank works alongside the four members of the Note Circulation Scheme (NCS) — G4S Cash Solutions (UK) Ltd, Post Office Ltd, Royal Bank of Scotland plc and Vaultex UK Ltd (a joint venture between Barclays plc and HSBC plc).(1) NCS members undertake the wholesale processing and distribution activities required for effective circulation (including the identification and removal of counterfeit and 'unfit' banknotes). New banknotes are sold to NCS members by the Bank, and are only returned when they are unfit and ready for destruction. The Bank works with the NCS members to anticipate and meet near-term changes in demand.

Through a tiered system, NCS members supply commercial banks and large retailers with banknotes. These will, in turn, supply banknotes to smaller banks and retailers. The Bank also works with the broader cash industry to ensure robust authentication of banknotes at all stages of the note cycle.(2)

The Bank's approach to payments

The Bank does not seek to promote any one payment mechanism over another, but in supporting its mission, aims to protect and enhance the stability of the financial system.

The Bank operates the United Kingdom's Real-Time Gross Settlement (RTGS) infrastructure which settles interbank obligations arising from payments made through a number of payment schemes: Bacs; CHAPS; Cheque and Credit Clearing; the Faster Payments Service; LINK; and Visa Europe.(1)

The Bank also supervises those payment systems that are recognised as systemically important under the Banking Act 2009.(2)

Payment scheme supervision and the operation of the RTGS infrastructure are carried out by separate areas of the Bank.

(1) See Dent and Dison (2012) for a detailed explanation of the Bank's Real-Time Gross Settlement infrastructure.
(2) See Bank of England (2015b).

The evolution of payment technologies

To support the banknote distribution process, the Bank needs to anticipate how demand for cash may change over the long term. This article goes on to discuss the factors that may be driving demand for cash, of which there are many, followed by an assessment of how these may develop in the future. As a starting point, it is useful to review the developments in payment technology that have occurred to date, since they directly affect the public's reliance on cash for making payments, which is an important component of aggregate demand for cash.

A brief history of payment methods

In order for money to function as a medium of exchange, there needs to be a secure way of transferring it. This is the core function that different payment methods provide.

People have been using various forms of physical money for thousands of years. Although paper money dates back to the 7th century in China, banknotes did not become widely used in the United Kingdom until almost a thousand years later. In fact, they were pre-dated by cheques, which were introduced to the United Kingdom in the 14th century.

The Bank first issued banknotes shortly after it was established in 1694. At the time, private banks and goldsmiths also issued their own banknotes as receipts for deposits of gold. Over time, legislation was introduced to erode the note-issuing powers of private entities, and since 1921 the Bank has been the sole issuer of banknotes in England and Wales.

From the 17th century until the 1960s, cheques, banknotes and coin were the predominant ways in which transactions were settled. However, innovation in the past five decades has delivered great change in how we pay, with electronic exchanges of value becoming increasingly used alongside the physical exchange of cash.

In 1966, the credit card was introduced to the United Kingdom giving consumers more choice at the point of sale. This was quickly followed by the launch of automated electronic payments in 1968, enabling direct debits and credits. From this point on, regular payments (for example, wages and utility bills) no longer needed to be made in person, saving time and effort for both consumers and businesses. The introduction of debit cards did not take place until 1987.

More recently, the growth in e-commerce has led to further changes in how consumers pay. And the growth in online and mobile banking, alongside the introduction of the Faster Payments Service in 2008, has enabled individuals to transfer funds electronically almost instantly. See the box on this page for an overview of the Bank of England's approach to payments.

Payment habits today

Consumers need to make both regular and spontaneous payments. For simplicity, 'regular' transactions are defined as

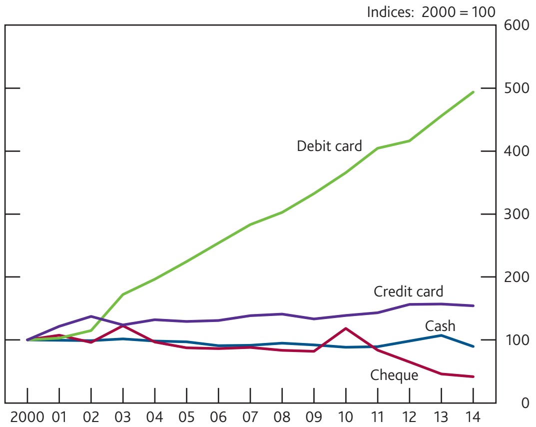
(1) See Allen and Dent (2010) for information on how the Bank works with the industry to manage the circulation of banknotes.
(2) See 'The code of conduct for the authentication of machine-dispensed banknotes'; www.cashservices.org.uk/sites/default/files/the_code_of_conduct_for_the_authentication_of_machine-dispensed_banknotes.pdf.

those that are made periodically (for example, utility bills) and are agreed in advance. 'Spontaneous' payments are made for goods and services that are purchased at the point of sale (for example, from retailers, either face-to-face, online, or via telephone).

The technological developments discussed above have reduced consumers' physical exchanges of money, particularly in the case of regular payments. The majority of regular payments are now facilitated by standing orders and direct debits, with only 10% paid for with cash in 2014. In value terms, the proportion is even lower.(1)

For spontaneous payments, cash has been more resilient: it remains the most commonly used payment method, accounting for 52% of spontaneous transactions in 2014. The value of spontaneous cash-based payments has, on the whole, been quite stable over the past fifteen years, as shown by the blue line in **Chart 1**.

Chart 1 Value of payment methods used for spontaneous payments



Sources: Payments UK and Bank calculations.

That said, as a share of total payments for spontaneous consumption, cash usage has been in gradual decline. As **Chart 1** shows, this largely reflects the steady increase in the use of debit cards over the past fifteen years. In 2014, by value, debit cards facilitated £362 billion of transactions, compared to £166 billion for cash — despite the latter being used in a greater number of transactions.

What factors drive demand for cash?

The use of cash for regular and spontaneous payments does not tell the whole story. **Despite consumers increasingly moving to other payment methods, the value of Bank of England notes in circulation continues to grow, and has trebled over the past two decades.** This is shown in the top panel of **Figure 1**. This growth, which has been concentrated in the two highest denominations — £20 and £50 notes — has outpaced growth in aggregate spending in the economy: the blue line on **Figure 1** shows that the ratio of banknotes in circulation to nominal GDP has been on an upward trend since the mid-1990s. And this trend is not unique to the United Kingdom. The box on page 7 considers international comparisons in cash usage in more detail.

Together with the findings noted above on the evolution of payments habits, this suggests that growth in demand for banknotes has not been driven solely by domestic transactions. However, as untraceable bearer instruments, it is not possible to locate where banknotes are being held at any one time.

In order to simplify the issue, this article considers six broad sources of demand for banknotes, based on two uses across three markets (**Table B**). Cash can be used either as a medium of exchange or as a store of value in: (i) the domestic economy — all activity within the United Kingdom that could be observed by the authorities, as well as legal informal transactions such as second-hand sales; (ii) the overseas market; and (iii) the shadow economy — in other words, all illegal activities, as well as any legitimate activities that are unlawfully concealed from the authorities.

Table B Different components of cash holdings

Market	Use	
Domestic economy	Medium of exchange (transactional holdings)	Store of value (hoarded funds)
Overseas		
Shadow economy		

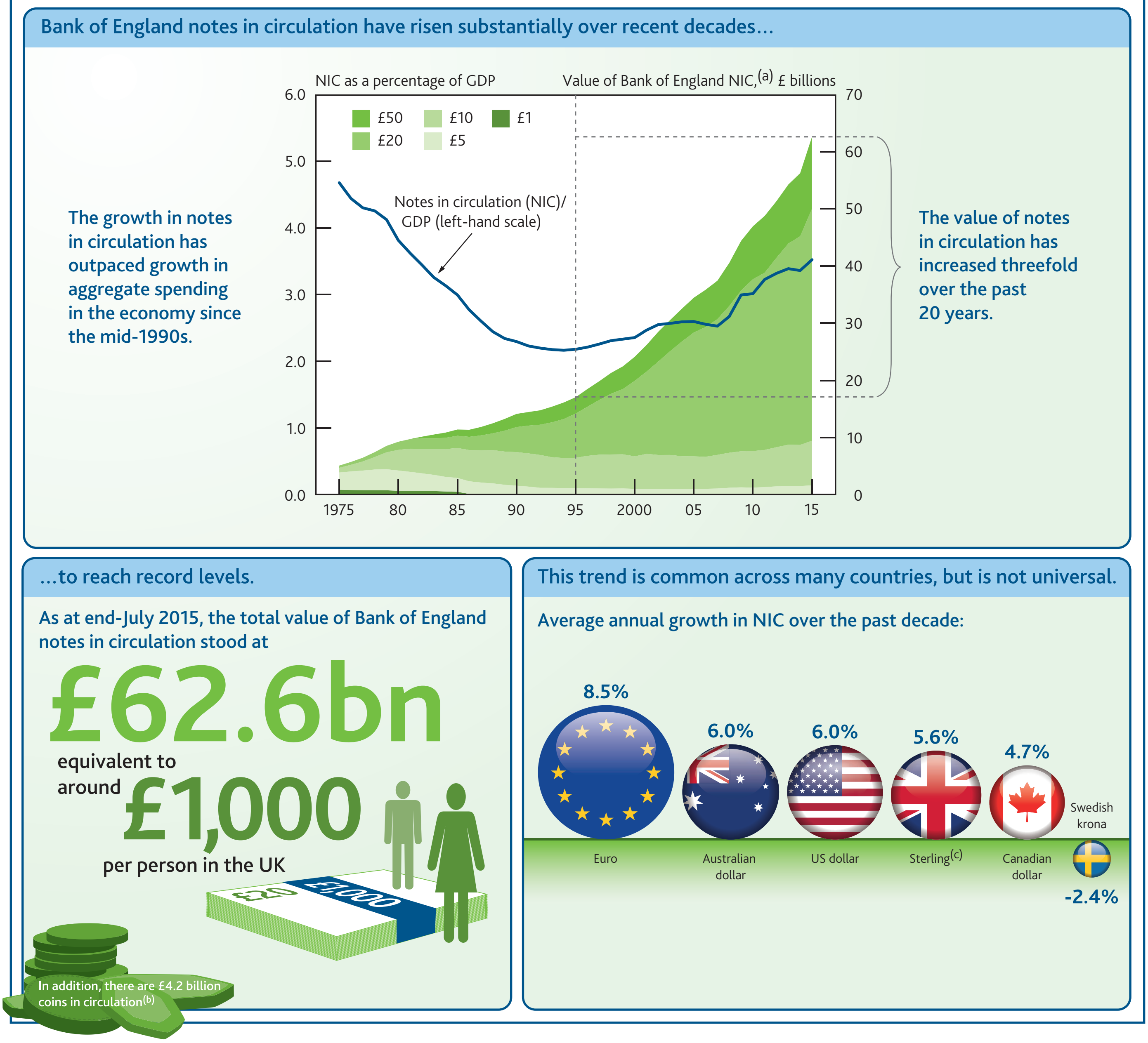
In reality, there will be regular movements between each category. For example, if a tourist brings cash from overseas and spends it in a shop in London, these funds will move from the overseas market to the domestic economy. Nonetheless, these categories are useful for illustrative purposes when considering the stock of cash at a snapshot in time.

The remainder of this section examines each of these sources of demand and considers which may have contributed to growth in demand for cash in recent years.

The evidence available indicates that no more than half of the stock of notes in circulation is likely to be held within the domestic economy, either for transactional purposes or as a store of value. The remainder is likely to be held either overseas or for use in the shadow economy, primarily as a store of value in both cases. **No single source of demand is likely to have been behind the sustained growth. Indeed, the stock of notes held within each of the three markets for cash is likely to have grown.**

(1) Based on data from Payments UK — *2015 UK cash and cash machines* and *2015 UK consumer payments survey*, available at www.paymentsuk.org.uk.

Figure 1 The evolution of notes in circulation in the United Kingdom and overseas



Sources: Bank of England, ONS, other central banks and Bank calculations.

(a) Banknotes are deemed 'in circulation' once they have been acquired by the commercial sector from the Bank for their face value. Notes in circulation (NIC) are a liability of the Bank. Stocks of notes that are held in Bank of England vaults or by members of the Note Circulation Scheme (under certain conditions) are not 'in circulation'. Based on annual data. For 2015, chart uses data up to end-July for NIC and data up to 2015 Q2 for GDP.
(b) As of the end of March 2015.
(c) Based on Bank of England notes in circulation. The box on page 7 discusses the other components of cash in the United Kingdom.

Domestic economy — transactional holdings

Cash is used in the domestic economy to facilitate transactions for goods and services. This transactional cycle involves cash moving between banks (in branches and ATMs), consumers (held in purses and wallets), and retailers (stored in tills or safes waiting to be banked). A bottom-up approach is used to estimate the value of banknotes that may be held within each of these three at any one time.

Data reported to the Bank indicate that £10 billion of cash was held on average by banks in 2014. This figure has grown by a third in the space of a decade. This growth partly results from historically low interest rates which have reduced the opportunity cost of holding non interest bearing assets. An additional factor is likely to be the expansion in the United Kingdom's ATM estate, which has grown by a fifth to 70,000 machines in the past decade.

The value of consumer transactional holdings is estimated in two stages. First, there is the average value of cash that households will hold at any one time to facilitate consumption (for both regular and spontaneous purchases). Second, a 'buffer' is added to account for the residual amount

The demand for cash: international comparisons

The trend of growing demand for cash is common across many countries, but it is not universal.

Growth in banknote demand has outstripped growth in GDP in recent years in Australia, Canada and the United States, as well as in the euro area. At around £1,000 per person, UK cash holdings are slightly higher than in Canada (£970), somewhat lower than in Australia (£1,220), and notably behind both the euro area (£2,130) and the United States (£2,500).

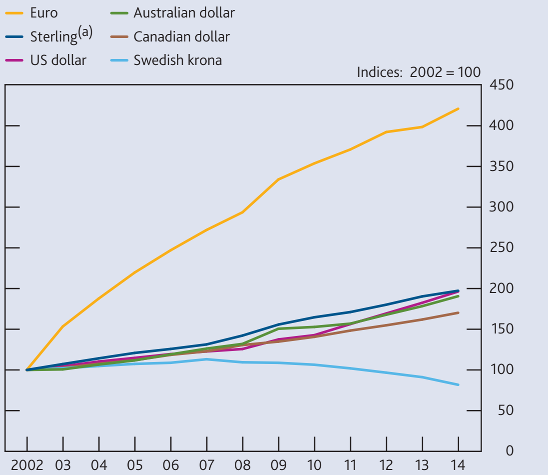
There are a number of factors behind these international variations: some countries will be quicker to embrace alternative payments than others; some nations' citizens will have a higher propensity to hoard cash as a store of value; some currencies see greater overseas demand; and higher income levels may support greater demand.

The significantly higher per capita holdings for the US dollar are not surprising given its common use outside of the United States. The dollar is often considered a 'safe haven' currency and held as a store of value, particularly by citizens in countries with less stable economies. It is also used as a medium of exchange in countries that have undergone 'dollarisation' — the process by which citizens of a country use a foreign currency in parallel with, or as an alternative to, a domestic currency. For example, Ecuador uses the US dollar, and adopted it as its official currency in 2000.

Given the difficulties in observation, direct measurements for the proportion of US currency held abroad is not available. Nonetheless, the Federal Reserve has estimated (using indirect methods) that around a half of US dollars in circulation were held abroad in 2012.(1) The euro performs a similar role with some estimates suggesting that a quarter of euro currency was circulating outside the euro area at the end of 2013.(2)

In Sweden, cash use has been falling. In recent years the value of Swedish krona banknotes in circulation has declined by around a fifth (**Chart A**). This is largely due to a very high penetration of alternative payment methods, with the public very engaged in embracing new technologies — indeed, it is common for children to be given pocket money using electronic payment methods.

Chart A Growth in notes in circulation across nations



Sources: Bank of England, Bank of Canada, European Central Bank, Reserve Bank of Australia, Riksbank, US Federal Reserve System and Bank calculations.

(a) Based on Bank of England banknotes.

This trend has been supported by the ability of Sweden's residents to buy almost any good or service with alternative payment methods. For example, homeless street vendors selling *Situation Stockholm* (akin to the United Kingdom's *Big Issue* magazine) are able to accept payment via debit or credit card. Increasingly, Swedish banks' branches and retailers have also moved towards cashless arrangements.

Even so, cash remains important in Sweden. In 2014, there was almost SEK 7,800 (around £590) in circulation for each person, and cash still accounted for around 20% of all payments. Indeed, a new series of krona banknotes will be issued from this autumn.

(1) See Judson (2012).
(2) European Central Bank (2011), 'The international role of the euro'; www.ecb.europa.eu/pub/pdf/other/euro-international-role201107en.pdf.

that individuals hold in their wallet for precautionary reasons.(1) Taking these together suggests that households held between £3 billion and £4 billion in transactional cash at any one time during 2014 (a range that has changed little over the past decade).

The average cash holdings of merchants are a function of cash takings, how frequently takings are banked, and the value of the 'float' and 'petty cash' that is retained at any one time. Based on anecdotal feedback from the retail sector, UK merchants are estimated to hold between £2 billion and £5 billion in cash in 2014.

These three components are aggregated in **Table C**, giving a range of £15 billion to £19 billion that may be held in the transactional cycle. This suggests that between 21% and 27% of total UK cash was held within the domestic transactional cycle at any one time in 2014.(2) Applying the same methodology to data from previous years suggests that the value held in the transactional cycle has risen, largely due to

(1) The value of cash held on aggregate at the point of withdrawals is estimated by dividing total consumer cash spending in 2014 (£191 billion) by the average number of cash withdrawals per person. Dividing this by two gives the average value held between withdrawals. Added to this is a buffer of £20 to £40 per adult, based on responses to the Bank-commissioned survey.
(2) Bank of England notes, S&NI banknotes and UK coin.

increased commercial bank holdings. However, as a proportion of UK cash, transactional holdings have been in gradual decline, down from between 34% and 45% since 2000.

Table C Estimated stock of UK cash in the domestic transactional cycle

	Lower bound	Upper bound
Financial institutions	£10 billion	£10 billion
Consumers	£3 billion	£4 billion
Retailers	£2 billion	£5 billion
Total	**£15 billion**	**£19 billion**

Source: Bank of England estimates.

These calculations are only illustrative and are impossible to validate given the untraceable nature of cash, yet the numbers are not inconsistent with the few comparator studies available. For example, Gresvik and Kaloudis (2001) estimate that between 37% and 47% of cash holdings in Norway could be explained by transactional use in 2000. Guibourg and Segendorf (2007) estimated the equivalent figure for Sweden to be 33% in 2004.

These indicative findings raise the question: if the majority of Bank of England notes are not being used for everyday transactions in the domestic economy, what are they being used for?

Domestic economy — hoarded funds

In the domestic economy, consumers may choose to hold cash as a store of value (and therefore are not intending to spend it in the short term). We refer to this as 'hoarding'. People may choose to save their money in a safety deposit box, or under the mattress, or even buried in the garden, rather than placing it in a bank account.

Economic theory suggests that hoarding should not take place unless there is a risk of a negative return to the individual of holding bank deposits, either due to negative interest rates, the possibility of financial loss due to the potential failure of the bank, or due to the inconvenience of depositing funds.

Interest rates in the United Kingdom have not turned negative, and the Financial Services Compensation Scheme (FSCS) offers full insurance against deposit losses of up to £85,000.(1) However, hoarding still occurs and did so long before the current period of record low interest rates begun. For such action to be considered as rational, those that are hoarding cash must be gaining a non-financial benefit that they value greater than the financial returns and physical security offered by a deposit account.

In 2014, the Bank commissioned a survey exploring consumer behaviour in relation to cash usage and hoarding.(2) Responses suggested that 18% of people hoarded cash, and those that did suggested the primary reason was to provide comfort against potential emergencies. Extrapolating the results indicated that a minimum of £3 billion was hoarded domestically — around £345 per hoarder. In 2012, a separate survey commissioned by the FSCS estimated that households were holding around £5 billion in cash at home.(3)

However, these surveys are likely to produce underestimates. Given the sensitivity of the subject, many are likely to have under-reported their cash holdings (and 7% of respondents to the Bank-commissioned survey preferred not to say). Limited samples also mean that surveys may fail to capture the effect of 'super hoarders' — based on anecdotal evidence, a small number of people are thought to hoard large values of cash. As an illustrative example, if one in every thousand adults in the United Kingdom were to hoard as much as £100,000, this would account for around £5 billion (nearly 10% of notes in circulation).

Overseas — transactional holdings

Cash can exit and enter the United Kingdom via a number of channels. Large-value movements will be facilitated by banks and foreign exchange wholesalers before filtering through a very fragmented market. Smaller transfers will primarily result from tourism and worker remittances.

Much of the cash located abroad — relating to its use as a medium of exchange — is the travel money purchased by inbound visitors to the United Kingdom, or the residual they store when they return home. Beyond this, there will be Bank of England notes held abroad in bureaux de change awaiting purchase. Market intelligence indicates that demand from Europe and North America is primarily for this purpose.

Overseas — hoarded funds

Overseas residents may also demand Bank of England notes as hard currency — as a safe store of value. Although no firm evidence is available, market intelligence gathered by the Bank suggests that our highest denomination (the £50 note — which makes up 20% of Bank of England notes in circulation, by value) is primarily demanded by foreign exchange wholesalers abroad, which would be consistent with overseas hoarding. The box on international comparisons on page 7 highlights the significance of this source of demand for other major currencies.

Shadow economy — transactional holdings

The shadow economy is defined broadly as covering 'those economic activities and the income derived from them that circumvent or otherwise avoid government regulation,

(1) From January 2016, the FSCS deposit limit will be £75,000. See www.fscs.org.uk/news/2015/july/new-deposit-protection-limit-coming-on-1-january/.
(2) The survey was conducted by GfK NOP and involved 1,000 respondents.
(3) See www.fscs.org.uk/uploaded_files/Press_Releases/press-release-2012-02-28.pdf.

taxation, or observation'.(1) This comprises of two elements: (i) legitimate activities that are concealed from the authorities; and (ii) illegal activities and transactions.

An Institute of Economic Affairs report estimated the size of concealed legitimate activities to be equivalent to 10.3% of GDP in 2012, with it having declined relative to GDP since the late 1990s. This estimate was one of the lowest of all OECD countries.(2) HM Revenue and Customs estimates that the value of uncollected tax, which includes estimates for hidden activity and tax evasion, has been broadly stable over the past decade.(3) In relation to illegal activities, data from the Home Office indicate that incidents of crime may have fallen in each year for the past decade, with significant reductions in robbery, theft and domestic burglary.(4)

Together, this evidence suggests that activity in the shadow economy has not seen significant growth, so transactional holdings of cash in the shadow economy are unlikely to have been the primary driver of the growth in banknote demand in recent years.

Shadow economy — hoarded funds

Unless money is filtered back into the domestic economy, or is recycled for transactions in the shadow economy, criminals and tax evaders will hoard funds. Therefore, even if the flow of cash moving into the shadow economy is stable (or even shrinking), the stock of cash held could be rising. Articles in the media covering the large seizures of cash during police raids suggest the values involved may be sizable. However, given its bearer-instrument status, there is limited research to confirm the extent of cash held for use in the shadow economy, which will vary significantly across nations.

Lost, destroyed or forgotten

A small amount of cash is also likely to have been inadvertently lost or destroyed. Some will also have been retained indefinitely by collectors. Data from euro-area countries that imposed a deadline for the exchange of their legacy domestic currencies with euros suggest this may account for around 1% of cash in circulation.

What might influence the demand for cash in the future?

The future rate of growth in demand for cash is uncertain and there are many variables that could influence the use of cash (as both a medium of exchange and as a store of value) domestically, overseas, or within the shadow economy. These can be grouped into six broad themes: (i) alternative ways to pay; (ii) alternative currencies; (iii) retailer and financial institution preferences; (iv) government intervention; (v) socio-economic developments; and (vi) the public's attitude to cash.

Alternative ways to pay

Over the coming years, the number of alternative ways of paying is expected to grow, and is likely to reach greater numbers of consumers. Most of these payment methods are 'wrapper' services — payment methods that improve the user interface while relying on existing infrastructure. For example, card issuers continue to add contactless technology, with the functionality now available on around 69 million cards.(5)

Mobile wallets have also entered the market. These can store payment cards digitally, allowing contactless payments to be made using a smartphone. They can also provide additional security — for example, the new Apple Pay wallet (launched in July 2015) requires fingerprint authentication via an iPhone.

Of course, the availability of technology is not enough by itself. Retailers need to be in a position to accept the new technologies. Most larger retailers have accepted plastic cards for many years, and an increasing number now accept card payments using contactless terminals.

It is also becoming easier for alternative payments to be accepted by smaller businesses and by those that do not operate from fixed premises. For example, technologies such as iZettle allow small businesses, that typically rely on cash payments (for example, market stalls, window cleaners and taxi drivers) to accept card payments. Furthermore, an increasing number of services can be paid for using smartphones without needing to have a card present — for example, the Uber app allows users to pay for a private-hire vehicle automatically using pre-stored card details.

Alternatives are also making it easier to make person-to-person payments. For example, PayM (using the Faster Payments Service infrastructure) links users' mobile phone numbers to their bank accounts, and enables payments via text message.

Alternative currencies

Beyond alternative payment methods, some consumers can now use alternative currencies.

In recent years, several local currency schemes have been introduced in towns and cities across the United Kingdom.(6) For example, in Brixton, people can use Brixton Pound vouchers to buy goods in the local area. Local currencies are established to support local sustainability by incentivising

(1) See Dell'Anno and Schneider (2003).
(2) See Schneider and Williams (2013).
(3) HM Revenue and Customs (2014), 'Tax gap estimates for 2012–13'; www.gov.uk/government/uploads/system/uploads/attachment_data/file/364009/4382_Measuring_Tax_Gaps_2014_IW_v4B_accessible_20141014.pdf.
(4) www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-373433.
(5) According to the UK Card Association. See www.theukcardsassociation.org.uk/news/contactlesslimitrise2015news.asp.
(6) Naqvi and Southgate (2013) consider local currencies in detail.

spending at, and between, participants of the scheme. They rely on users trusting a new currency as a unit of account and as a medium of exchange. This is usually achieved by the local currency being backed by, and remaining on a fixed exchange rate with, sterling.

These schemes remain small (both individually and in aggregate) relative to the value of Bank of England notes in circulation and are unlikely to have a significant impact on demand for cash in the long term.

Technological innovation has also led to the creation of digital currency schemes such as Bitcoin.(1) A digital currency scheme incorporates both a new currency and a decentralised payment system — payments can be made without relying on intermediaries such as banks. Most of the schemes use a publicly visible ledger which is shared across a computing network.

Digital currencies remain a nascent technology, and are still used for only a tiny proportion of transactions, but the underlying technology has the potential to be more widely used in the financial system. Since they can enable the anonymous (or pseudonymous) exchange of value, digital currencies could become more widely used by those that are concerned about the privacy of transactions.

Retailer and commercial bank preferences

Changes in the future demand for cash will also be influenced by consumers' ability to access it, and where they can spend it. Today, it is easy to access cash in the United Kingdom, with around 70,000 ATMs, of which over 50,000 are free to use (accounting for 98% of all ATM withdrawals in 2014). There are also thousands of bank branches providing deposit and withdrawal facilities, as well as retailers that offer a 'cash-back' service.

A change in these distribution channels could deter people from using cash. For example, a reduction in the number of ATMs, or a move to charging for withdrawals would increase the cost and effort incurred. Alternatively, a move to cashless bank branches (as seen in Denmark and Sweden) would make it harder for businesses to deposit cash takings, and may influence them to phase out accepting cash.

While possible, there is no evidence to suggest these developments are likely in the United Kingdom in the near term. Banks continue to serve different payment needs, and the recent growth in ATMs suggests that the public's demand for cash will continue to be met by the financial sector.

Most retailers still accept cash, with many smaller businesses relying on it. If the proportion of retailers' takings received in cash declines (given consumer choice), the average cost of processing cash transactions would increase, and in time, it could become cost effective for retailers to steer customers towards alternatives. However, there are no signs that this outcome will occur in the near term. According to the British Retail Consortium's 2014 payments survey, the cost for a retailer of accepting cash is eight times cheaper than a debit card transaction, and over 30 times cheaper than a credit card transaction.(2)

As long as cash remains useful as a medium of exchange and is easy to acquire, it will also retain utility as a store of value. Cash hoarded by the public is held on the belief that it can be converted for goods and services, or deposited into a bank account, at some future point. This logic applies equally to cash held for use within the shadow economy.

Government intervention

In the United Kingdom, neither the Bank nor the Government have a specific objective to influence the proportion of money that is held as cash. However, a definitive shift away from cash could be the by-product of a wide range of potential policy changes.

Moves by the UK Government to transition welfare payments away from cash (to deliver efficiency savings), coupled with the rollout of basic bank accounts to address financial inclusion, will open up the opportunity for a sizable minority of people to use payment cards for the first time.

In addition, any government intervention that impacts alternative payment methods could indirectly influence the future demand for cash. For instance, the EU Interchange Fee Regulations will place restrictions on the charges paid by retailers when processing card payments, and could lead to more widespread acceptance of card payments.

In the United Kingdom, there are few policies directly limiting the use of cash (although people are not permitted to use cash to buy scrap metal in England and Wales). Yet elsewhere, much more comprehensive limits have been placed on cash usage. For example, in many European countries, including France and Italy, there are prohibitions on all cash transactions above a certain value in order to deter tax evasion and money laundering activities. More broadly, any policy targeted at reducing crime or tax evasion could lead to a smaller shadow economy, and consequently reduce demand for cash.

Socio-economic and geopolitical developments

Demand for cash relating to each of the three markets could also be influenced by, among other things: changes (or anticipated changes) in macroeconomic indicators such as

(1) Ali *et al* (2014a) consider the emergence of digital currencies. Ali *et al* (2014b) consider the economics of digital currencies.
(2) See British Retail Consortium (2014), *Payments Survey 2014*; www.brc.org.uk/brc_policy_detail.asp?id=307&iCat=563&sPolicy=Payments&sSubPolicy=Retail+Payments+Survey.

GDP, interest rates, exchange rates and inflation; the demand for international tourism; long-run demographic trends; and geopolitical developments such as wars or changes in governments. Such external factors might be particularly pertinent for overseas demand, where the alternatives are greater, and the decision to hold Bank of England notes is largely financial rather than emotional or habitual.

The public's attitude towards cash

Over the coming years, it is likely that alternative payment methods will become cheaper, easier to access for consumers and more widely accepted. Yet, alongside these developments, the underlying preferences of consumers will continue to be a key determinant in how much cash is demanded.

Some change in payment preferences might be expected as demographics evolve. For example, as people become more confident in using (and trusting) new technologies, they will feel more comfortable in using alternative payment methods.

Even so, many consumers will continue to use cash. Despite the advancements in technology, cash continues to offer a unique set of attributes as a medium of exchange that sets it apart from the alternatives. The Bank-commissioned 2014 survey found that people like cash because it is fast and convenient, universally accepted, and helpful for budget management. Using cash for transactions also provides immediate final settlement at no visible cost to the consumer, and with no reliance on technology and central infrastructure. Finally, cash is entirely anonymous, enabling transfers of value without any record being kept.

Thus far, no single payment method has offered or improved upon this complete set of attributes. As such, cash remains a key part of the payment toolkit for large sections of society.

Less tangibly, but equally as important, the public retains an attachment to cash. Around a quarter of respondents to the Bank-commissioned survey revealed that they would continue to use cash for transactions regardless of the alternatives available, or the incentives that may come with them.

Conclusion

Over the next few years, consumers will enjoy even greater choice when paying for goods and services and for paying each other. As a result, cash consumption as a proportion of overall spending in the domestic economy will continue to decline. However, given consumer preferences, recent historical trends, and the absence of significant initiatives on the part of retailers, banks or government to push people away from cash, the absolute *amount* of cash used for transactions is likely to remain resilient.

But this is only part of the story. The available evidence suggests that there are multiple factors driving the non-transactional growth in demand for cash. For the United Kingdom, as with many other countries, this has resulted in demand for cash rising relative to GDP.

Of course, uncertainty remains over the future path of demand for cash. The Bank will therefore continue to monitor developments and respond as necessary. **Based on existing evidence, it is likely that demand for cash will continue to be substantial in the years ahead.** As such, cash-issuing authorities need to work with the cash industry and continue to invest in banknotes and coin.

In the United Kingdom, the Royal Mint is introducing a new and more secure £1 coin in 2017.(1) For banknotes, the Bank of England will, following many years of research, launch the next £5, £10 and £20 banknotes on polymer. Polymer provides a strong foundation for increasingly sophisticated security features, and the new notes will provide a step change in counterfeit resilience. The new £5, featuring Sir Winston Churchill, will be launched in Autumn 2016, followed by the new £10 featuring Jane Austen a year later. The new £20 will be launched in the next three to five years and will feature a historical character from the visual arts, which will be chosen following a public consultation.(2)

Cash remains important in the United Kingdom, and as Victoria Cleland, the Bank's Chief Cashier, recently remarked, 'because there is a lot of life left in cash [the Bank and the cash industry] need to work together to keep it healthy and fit for purpose'.(3) The investment being made will ensure the public can remain confident in it over the many years ahead.

(1) See www.royalmint.com/aboutus/news/the-new-1-pound-coin.
(2) From May to July 2015, for the first time, the Bank asked the public for nominations, from the field of visual arts, for who should appear on the next £20 note. In total 29,701 nominations were made, covering 589 eligible visual artists. At September 2015, the Bank of England's Banknote Character Advisory Committee was considering all eligible nominations, and together with input from public focus groups, was to produce a shortlist of three to five names from which the Governor would make a final decision. The chosen character is due to be announced in Spring 2016, alongside a concept image showing the portrait as it will appear on the note. See www.bankofengland.co.uk/banknotes/Pages/characters/nexttwenty.aspx.
(3) See Cleland (2015).

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