

Cash-strapped communities: the loss of free access to cash in Britain

Contents

1 Executive summary	3
2 Introduction	6
3 The importance of cash for consumers	8
4 The UK's ATM network	10
5 Analysis and results	13
Methodology	13
Results	14
Finding 1: More than 5,300 free-to-use (FTU) ATMs were lost in the UK between January 2018 and May 2019.	14
Finding 2: When a FTU ATM closes in a rural area, residents have to travel around three times as far to the nearest FTU ATM than those in urban areas.	17
Finding 3: Conversions from FTU to pay-to-use (PTU) ATMs have been concentrated in more rural and deprived areas.	20
Finding 4: 8% of ATMs designated as protected by LINK have closed or convert to PTU.	23
6 Conclusions and recommendations	24
7 Technical Annex	27
7 References	32

1 Executive summary

The way that people pay for goods and services is changing as more and more consumers opt for digital payments over cash. In 2017, debit cards overtook cash as the most common payment method. Despite this, cash is still widely used, and while it is estimated that 1.9 million people in the UK mainly use cash for their day to day spending (UK Finance, 2019), nearly everyone (97%) still carries cash and 85% of people keep cash in their home (Access to Cash, 2019). Though there is still widespread use of cash, the overall fall in cash spending has impacted on the demand for cash withdrawals from ATMs.

In response to this, free-to-use (FTU) ATMs have been closing or converting to pay-to-use (PTU) at a rate of around 600 a month in the most recent data (LINK 2019b). In total, the FTU ATM network has shrunk by around 10% percent since January 2018, meaning that more than 5,000 ATMs have closed or converted in this time.

This reduction in the ATM network is not in everyone's interest and could lead to considerable harm, particularly for those who continue to rely on cash because they are less able to switch to digital payments. People often need to use cash because poor digital infrastructure means that shops or individuals are unable to accept or make payments that require online access, and this disproportionately impacts on rural areas.

Further, vulnerable consumers and those on lower incomes are more likely to need or prefer to use cash, for instance for help with budgeting. The ATMs that these people rely on may be located in places that are more costly to serve, and where the loss of FTU ATMs could lead to financial exclusion.

Given this context, Which? believes we need to protect a geographical spread of access to cash in order to:

- prevent an increased risk of financial exclusion for those who currently need cash,
- ensure there remains access to a secure and reliable form of payment that can provide a 'back-up' for consumers,
- protect consumer choice and competition when it comes to payment methods that meet a consumer need or preference.

The risks associated with losing free access to cash are not new and steps have been taken previously to attempt to address the problem. LINK, the network which processes almost all UK ATM withdrawals, has introduced measures to protect ATMs in specific locations. This includes a financial inclusion subsidy for transactions at ATMs in deprived areas and subsidies for 'protected' ATMs in locations with no other FTU ATM within a 1km radius. Most recently, in August 2019, LINK also made a commitment to keep a FTU ATM on every high street.

Unfortunately however, we know that these measures have not been successful in preventing the loss of FTU ATMs as more than 200 that had been designated 'protected' have either closed or converted to PTU (LINK, 2019a).

In this report, we use data provided to us by LINK to analyse the entire population of ATMs in the UK at two points in time, January 2018 and May 2019. We examine the loss of FTU ATMs, which may have either closed or converted to PTU during this period.

Our findings shed light both on where and which FTU ATMs have been lost and on whether those who rely on cash are likely to find it harder to withdraw cash free of charge. Our main findings are:

- 1. More than 5,300 FTU ATMs were lost in the UK between January 2018 and May 2019.** This loss in FTU ATMs is equivalent to 9.2% of the total ATM estate. Losses represents a mixture of closures, when the ATM is taken out of service, and conversions from FTU to PTU. Our analysis shows that:
 - The vast majority of FTU ATMs lost (70%) are the result of Independent ATM Operators (IADs) closing or converting ATMs.
 - Losses have been fairly broadly spread with most areas losing between 8 and 11% of their FTU ATMs.
 - When an individual FTU ATM is lost, typically, all other nearby ATMs are closed or converted.
- 2. The loss of a FTU ATM to an individual consumer is likely to be greater in rural locations.** When a FTU ATM is lost in a rural area, residents have to travel around three times as far to the nearest FTU ATM than those in urban areas.
- 3. Conversions from FTU to PTU ATMs have been concentrated in areas that are more rural and more deprived.** In the 20% most deprived areas there has been a net conversion of 979 FTU to PTU ATMs, compared with 223 in the least deprived affluent areas. Our calculations suggest that an additional 1,500 ATMs may become pay-to-use in the most deprived areas if Notemachine goes ahead with publicly announces plans.
- 4. The rate at which 'protected' FTU ATMs are closing is only marginally lower than the average for all UK ATMs.** While FTU ATMs which have been designated as 'protected' by LINK were about 4 percentage points less likely to be lost, the rate at which 'protected' ATMs are closing is only marginally lower (8%) than the average for all UK ATMs (9.2%).

Our findings show that, over the past two years, those in rural and deprived communities have been put at greater risk of experiencing harm, as ATM closures or conversions to pay-to-use make it harder for people to access cash. Individuals in rural areas are more likely to need cash due to poor digital infrastructure, but will have to travel considerably further to reach their next nearest ATM than those in urban areas. People in the most deprived communities are most likely to see their ATMs convert to PTU, meaning that those on a lower income, who are more likely to rely on cash for payments, face a greater risk of financial exclusion.

The research has also highlighted the extent to which provision depends on the business decisions of a small number of independent operators that are sensitive to the level of the interchange fee. Worryingly for consumers, as the proportion of local ATMs that are pay-to-use increases, the incentive to keep nearby ATMs FTU is likely to decrease. This means that the market works in such a way as to accelerate the loss of free access to cash. This is despite our research showing that changes to the interchange fee to subsidise the provision of ATMs in certain locations can help prevent FTU ATMs being lost.

Which? acknowledges that as demand for cash falls there will be a reduction in the number of FTU ATMs available. However, it is vital that people continue to have a good choice of payment

method and this is necessary to ensure that those who find it harder to make the transition to digital payments do not suffer harm.

Given this, Which? recommends the following actions need to be taken:

Recommendation 1: The Payments Systems Regulator (PSR) should act immediately to regulate UK ATM interchange fees.

Cash has a vital role for many consumers and yet there remains a significant risk that without immediate intervention the market will fail to protect FTU ATMs for people who need them. This is evident by the fact that, despite the efforts made by LINK since January 2018, the loss of FTU ATMs has seen deprived and rural communities hit the hardest.

As a first step, to prevent the continued acceleration of FTU ATM losses, the PSR must regulate interchange fees to support its stated aim of protecting cash access for UK consumers who need or want to use it as a payment method.

The structure of such interchange fees should depend on objective criteria that will ensure a widespread geographic provision of FTU ATMs and that will create incentives to provide cash in remote or low income areas where a greater incentive may be needed to ensure sufficient access to FTU ATMs.

Recommendation 2: The government must legislate to give the PSR a defined duty to maintain a suitable geographic spread of access to cash, free of charge.

Cash will continue to play an important role in the UK for years to come. It is essential that cash remains a viable alternative to card or digital payments until such a time that there is no longer a need for cash. It is particularly vital to ensure that no one is excluded or left unable to access payment methods as we transition to a more digital world.

Given that we are already seeing rapid changes taking place in the market, the government must act now and give the PSR a duty to maintain access to cash across the UK to ensure that in the coming years:

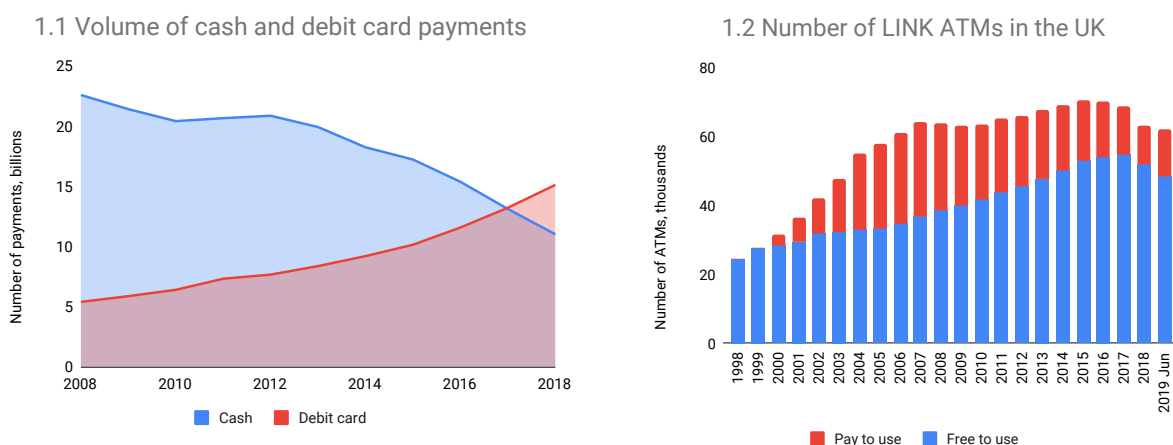
- People in deprived communities, who are more likely to need cash, are not penalised by having to pay to access cash.
- People, particularly those in rural areas and small towns, are not forced to travel unreasonable distances to access cash free of charge.

Which? believes it will be necessary, as the market continues to change, for **a form of minimum service guarantee to be introduced**. The government must ensure that the PSR has both the necessary incentives and powers to guarantee access to cash for as long as consumers need it - if necessary by introducing Universal Service Obligations.

2 Introduction

The way consumers pay for goods and services has undergone fundamental change in recent years and in 2017 the number of debit card payments overtook the number of cash payments in the UK for the first time ever, see Figure 1.1. This change has been rapid, with cash accounting for just 3 in 10 payments in 2018, compared with 6 in 10 a decade earlier.

Figure 1: The decline in cash and reduction in ATMs, 2008 to 2018



Source: UK Finance and LINK

This reduction in demand for cash has coincided with LINK, the UK's main ATM network, announcing a reduction in January 2018 in the interchange fee received by ATM operators for each withdrawal. This has led to a reduction in the number of FTU ATMs in the past two years, see figure 1.2 (LINK, 2019b), which in turn has sparked concerns that consumers - especially those who are more reliant on using cash - may increasingly find themselves in situations where they may lose access to cash free of charge.

Recognising the risk, LINK made a commitment in 2018 to maintain the spread of geographical access to cash and put in place premiums to try and protect FTU ATMs where there are no others nearby. Despite this commitment, FTU ATMs have continued to be lost either through closure - when the ATM is taken out of service - or conversion from FTU to PTU. This means there have been over 200 FTU ATM losses since January 2018 in areas where they should have been protected and over 5,000 FTU ATMs losses in total (LINK, 2019a).

Which? is concerned that the transition to a low cash society is happening without oversight, and without a plan to ensure that consumers who need or rely on cash still have access to it for as long as they need it. Which? believes everyone should have access to a good choice of payments, and for now cash remains part of that choice for most consumers. One key part of this will be protecting access to cash via FTU ATMs. Protecting access to cash free of charge is particularly important in remote or low income areas where individuals' needs for cash may be greater, but where overall demand may not be sufficient to support FTU ATMs under the current LINK interchange model.

While there has been widespread acknowledgement from key stakeholders, including a commitment from government and a call for views from the regulator, that it is important we protect access to cash, there has been little agreement on what the next steps should be.

Which? has called on the Payments Systems Regulator (PSR) to look at how ATMs are funded and has welcomed moves from the regulator to do so. However, we still need to see urgent action taken and believe that in order to guarantee access to cash in the UK the government will have to introduce legislation – either explicitly giving the PSR the responsibility to maintain a suitable geographic spread of access to cash, free of charge or legislating directly for a minimum guarantee on access to cash. To better understand the challenges faced in maintaining a spread of ATMs and to inform our ideas on how to protect consumers' access to cash, Which? has undertaken an analysis of LINK's ATM data to see what the effects have been in aggregate and on those in rural and more deprived communities.

This report, therefore, sets out:

- Why access to cash free of charge is important for consumers.
- The role of ATMs, LINK and the interchange fee in protecting free access to cash for consumers.
- A detailed analysis of the change in the availability of FTU and PTU ATMs in the UK between January 2018 and May 2019, through which we explore how changes are having an effect on access to FTU ATMs across the UK, and whether there are particular impacts for areas of higher deprivation or areas that are more rural.
- Which?'s recommendations on what should happen next to protect consumers who need access to cash.

3 The importance of cash for consumers

It is estimated that around 1.9 million people in the UK mainly use cash for their day to day spending (UK Finance, 2019). For other consumers cash is used as part of a range of payment methods. Around 8 in 10 people still use cash each week (Britain Thinks, 2019), while 97% of people carry cash and 85% keep cash in their home (Access to Cash, 2019).

There are fundamentally two reasons why access to cash is still important to consumers:

- 1. Many consumers need cash.** This is because the alternatives do not allow them to confidently and securely pay for goods and services or transfer money. There can be many reasons for this, including:
 - a. Poor digital infrastructure** that means shops or individuals are unable to accept or make payments that require online access. Over half of those that carry cash say it provides peace of mind (i.e. in case they can't pay for something with a debit or credit card) and 4 in 10 of those who keep cash at home do so because they need cash (i.e. paying tradesmen, window cleaner or gardener). As the only widely accepted non-digital payment system, cash also reduces systemic risk to the payments system. Since it is usually accessed using a LINK ATM, it offers a substitute if Visa or Mastercard networks fail. One in 5 people feel that it's good to have some cash in case IT systems go down (Access to Cash, 2019).
 - b. A failure of alternatives to meet the needs of vulnerable consumers.** For instance, people with visual impairments may be unable to read screens and can only confidently pay in cash. Also, those that rely on others to shop for them may use cash because they are unable, without support, to transfer money in another way. 14% of those who carry cash do so because they believe it is more convenient to settle debts with friends or family (Access to Cash, 2019).
- 2. Consumers have a preference for cash.** Three in 10 consumers prefer to use cash to make payment and many find using cash offers benefits not yet afforded by other payment methods. These benefits include:
 - a. Security.** Many consumers use cash as a backup or alternative, often holding cash in person or in their house. Four in 10 of those that keep it at home say it provides peace of mind.
 - b. Budgeting.** Consumers use cash to control and manage spending. One in 5 find it easier to control their money using cash.
 - c. Privacy.** Consumers use cash as a means of keeping their money and spending private with one in twenty using it to protect their privacy or because they don't trust the internet with their money.
 - d. Choice.** One in three consumers like to have a choice when paying for things (Access to Cash, 2019).

While most consumers still use cash for a number of reasons, there are those for whom cash is more important. For instance, we already know that those on lower incomes are more likely to be reliant on cash. In 2017, more than 15% of people with an income of less than £10,000 a year relied on cash for their day to day spending, which compares with less than 2.5% of all higher income groups (Access to Cash, 2019).

The issue of those in deprived areas being less likely to have easy access to a FTU ATM when they need it was highlighted by the Treasury Select Committee and Toynbee Hall in the work they have done to support LINK's Financial Inclusion Programme (FIP). They found that "*consumers who frequently used pay-to-use ATMs regularly incurred charges ranging between £3.70 and £9.25 per week from income which was largely, if not entirely, from benefits*" (Toynbee Hall, 2015). Further, a recent study investigating cash infrastructure in Bristol concluded that "the provision of cash infrastructure appears not to reflect the geographical need for it – the location of those who are most likely to depend on cash to be able to participate in society" (Tischer et al, 2019)

Cash is also more important for small towns and rural communities. Those in small towns have a significantly greater preference for cash with 37% expressing a preference for cash compared to 28% of the UK population (Britain Thinks, 2019). In addition to this, there are concerns about poor digital infrastructure in rural areas, so that consumers in those areas may be more reliant on cash as access to decent internet may prevent online and digital payment methods - such as card payments - being adopted. 12% of rural premises cannot get access to decent broadband, compared to 1% of urban premises (Ofcom, 2018).

Beyond this, there are also concerns about the cost of payments and competition in the payments market. The cost of payments are usually hidden from consumers, with card surcharging not allowed, and the cost of providing the means of payment - predominantly cards and cash - to consumers is covered by the issuers and/or charged to retailers. This means that the costs are borne by the consumers in either the value of the goods and services they purchase or in the costs associated with having a product with the card issuer (eg a current account or credit card).

Currently, the only alternative to card, especially for in-store payments, is cash. The loss of FTU ATMs in the near future would seriously undermine cash as an alternative to card payments and it would provide a barrier to consumers who would prefer to use cash to make payments for any of the above reasons.

4 The UK's ATM network

In the UK, ATM networks allow consumers to be able to withdraw cash from almost any ATM using a card from any payment services provider (eg banks). Over 90% of cash withdrawals in the UK are made using an ATM. Most people still find it relatively easy to make withdrawals, although 16% of people have to travel out of their way to access cash (Britain Thinks, 2019). Withdrawals not made at ATMs are either at a bank branch, a post office, or in store via cashback.

There are 3 major providers of ATM networks that are connected to nearly all UK ATMs - LINK, Mastercard and VISA. LINK is the UK's main ATM network which processes almost all UK ATM withdrawals. Most of the UK's main debit and ATM card issuers (eg banks) and all the main cash machine operators are members of LINK. There are some exceptions, for example Monzo, Starling and Virgin Money use Mastercard's ATM network, meaning it is Mastercard that processes their customers' withdrawals.

There are 32 ATM operators in the UK. Of these 21 are banks and building societies and 11 are independent ATM operators (IADs).¹ The cost of providing an ATM will vary greatly across operators and locations. Typically, we would expect that the marginal cost of provision will be lower for banks and building societies when the ATM is attached to a branch. The costs associated with cash delivery and ATM maintenance costs are likely to be greater in more rural and isolated locations.

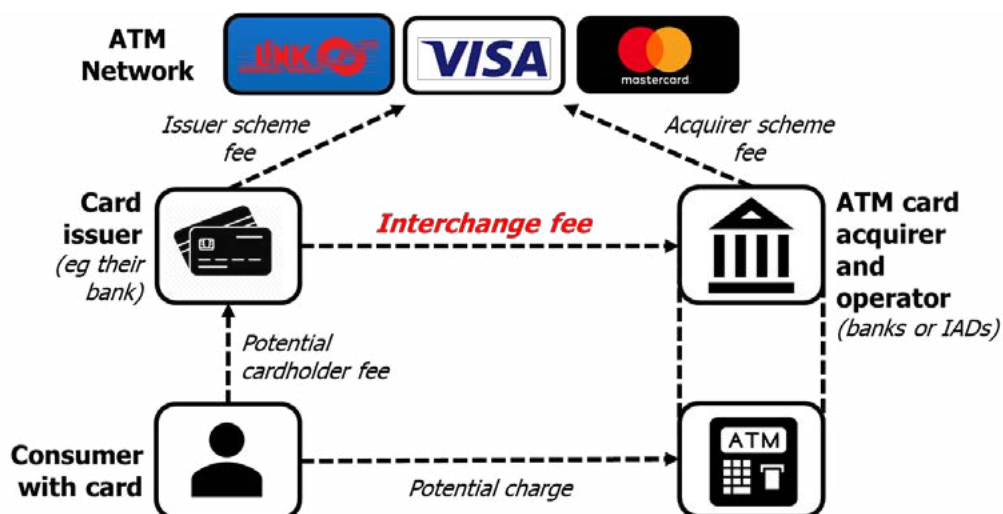
An ATM operator can generate revenue in one of two ways. First, by taking an interchange fee, which is a fee charged each time a consumer uses their card at a FTU ATM and which is paid by the consumer's own bank.² Second, ATM operators can charge the consumer to withdraw cash (or potentially use other services), but in which case the operator cannot also receive an interchange fee.

Research shows that consumers have a strong preference for FTU ATMs so that charging consumers could have a large impact on transaction volumes. More than half of consumers say they are willing to walk 10 minutes further rather than pay a 20p charge to withdraw cash, rising to over 6 in 10 for consumers who express a preference for using cash (Britain Thinks, 2019). All ATMs in the UK that charge consumers are operated by IADs.

1 This is taken from data on LINK's membership and so it does not include any ATM operators who are not members of LINK. It is calculated on the basis of separate banking brands of the same company, such as NatWest and RBS, being treated as separate entities

2 If a customer uses their own bank's ATM, then no interchange fee is charged. These are known as 'on-us' transactions.

Figure 2: ATM schemes



Source: Which?

The majority of ATMs in the UK are FTU with revenue generated from the interchange fee. Therefore the level of the fee and the number of withdrawals are the two key factors in determining the economic viability of the ATM. The level of the interchange fee is set by the ATM network, and so in the UK it is LINK's interchange fee that is paid for the vast majority of ATM cash withdrawals.

Until January 2018, LINK set the fee according to a cost-based formula, transparent to members, and approved by the Office of Fair Trading (PSR, 2019). To do this, an independent study was commissioned by LINK to review the costs to its members of providing FTU ATMs and setting a fair interchange fee that meant banks and IADs were reasonably reimbursed and able to operate ATMs across the UK. Prior to January 2018 the interchange fee was set at around 25p per withdrawal. In addition to the standard interchange fee, transactions at some ATMs receive a subsidy. Since 2006, LINK has had a Financial Inclusion Programme (FIP) to subsidise free access in the most deprived areas.

Since January 2018 there have been a number of changes to LINK's interchange fee. LINK announced that there would be a 20% (25p to 20p) reduction in its interchange fee, beginning with a 5% (around 1p) reduction from 1st July 2018 and with the rest to be phased in over subsequent years. LINK also announced a tripling of the financial inclusion subsidy from 10p to 30p and that 'protected' ATMs, which are any FTU ATMs located 1km or more 'as the crow flies' from the next FTU ATM, would not be subject to the reduction in the interchange fee.

Following pressure from Which? and others, who were concerned that the reduced fee would lead to a substantial reduction to the FTU ATM network, LINK decided to cap the reduction at 10%, a change which came into effect in January 2019. LINK also announced an increase to the subsidy that could be paid to 'protected' ATMs, with those with the lowest volume of transactions eligible for payments of up to £2.75 per withdrawal (see LINK, 2019c, for further details).

Despite this, it is known that large numbers of ATMs have been closing and converting to PTU, and that this has been an increasing trend. LINK's most recent data shows that an average of 595 lost a month in 6 months from December 2018, an increase from 214 per month in the year

previous (LINK, 2019b). Further, we know that the FIP and the geographical subsidies are not preventing protected ATMs from closing or converting to PTU. In May 2019 there were a total of 2,660 ATMs with protected status. Of these, 211 were no longer in operation, the majority of which are permanently closed or have switched to PTU (LINK, 2019a). An ATM can become protected if nearby FTU ATMs close or switch to PTU and 81 ATMs gained this status in May 2019.³

Given the continued loss of FTU ATMs and concern that those most reliant on cash may lose access to FTU ATMs, Which? decided to analyse UK ATM data to look at how the ATM network has changed since January 2018. The analysis and key findings are set out below.

³ In August 2019, LINK also made a commitment to keep a FTU ATM on every high street. It announced that it will directly commission free-to-use ATMs in any retail centre (a location with five or more qualifying retailers) that does not have free access to cash

5 Analysis and results

Methodology

The following findings come from analysis of a dataset of the locations of all ATMs in the UK. The data was provided to us by LINK and it covers the entire population of ATMs in the UK at two dates, January 2018 and May 2019. The data comprises the full ATM address, the operator, whether it is free to use or paid for, and if paid for, the withdrawal charge. LINK also provided the deprivation 'decile' for each ATM, which is determined by ranking all neighbourhoods according to the Indices of Multiple Deprivation (IMD). Lower index levels indicate higher deprivation, so those in the 0.01-10% multiple are identified as the most deprived whereas 90-100% are the least deprived (DCLM, 2015).

To the data provided by LINK, we appended the GPS coordinates of each ATM (based on the centroid of each postcode unit), a rural-urban classification marker, the population density at the 2011 census output area level and a public dataset identifying all ATMs designated as protected. We excluded from the data 31 'testing' ATMs that are not available at street level and 219 ATMs in the Channel Islands and Isle of Man. This leaves a total sample of 72,919 ATMs.

It is not uncommon for, especially independent, providers to relocate an ATM within the same area, and we identified a number of instances in which an ATM had closed and then reopened with the same operator in the same postcode sector between January 2018 and May 2019. Since the primary purpose of our analysis is to identify where ATMs have been lost then these pairs of ATMs were coded as a single ATM. There were 1,427 instances of this, so that the final sample size was 71,306.

The findings presented below are a mixture of descriptive and regression analysis. The regression analysis is described in full in the Technical Annex. This analysis is used to estimate the probability of an individual ATM changing status, by taking into account a range of factors that determine the demand for cash and the cost of provision. Our main regressions estimate the probability of an ATM that was FTU in January 2018 no longer being FTU in May 2019, i.e. being lost. Since this may occur because the ATM either closes or converts to PTU, we also model separately the probability of a FTU ATM closing and the probability of a FTU ATM converting to PTU.

The variables we use to estimate this probability reflect our interest in whether consumers who are more likely to suffer harm from loss of cash access are also more likely to be affected by the changing provision of ATMs. These are variables for the local level of deprivation (according to the IMD) and the local level of population density.

We also include other variables that might affect the demand for cash withdrawals. These are: the average age of people in an area, since research suggests that older people have a preference for cash; retail density, since areas with more shops are expected to have greater demand for cash for transactions; and distance to the next nearest ATM measured in kilometres, since ATMs with fewer near neighbours should have greater demand (all other things being equal).

Distance to the next nearest ATM might also affect the cost of maintaining an ATM as isolated ATMs may be more expensive to restock. Since other costs will be specific to the individual ATM provider, we also include variables for each of the ATM operators in the UK. This should control for individual

business decisions taken by the ATM operators since January 2018. Finally, we include a marker for whether an ATM has protected status.

Results

Finding 1: More than 5,300 free-to-use (FTU) ATMs were lost in the UK between January 2018 and May 2019.

This loss in FTU ATMs is equivalent to 9.2% of the total ATM estate and it represents a mixture of closures and conversions to pay-to-use (PTU), see Figure 3. In total, more than 20% of FTU ATMs changed status during the 16-month period, with about 10% (5,699) closing and a further 5.2% (3,013) converting to PTU. However, this was partly mitigated by new FTU ATMs opening and a small number of PTU ATMs converting to free. Overall, there were a similar number of net closures (2,557) and net conversions (2,781) in this period.

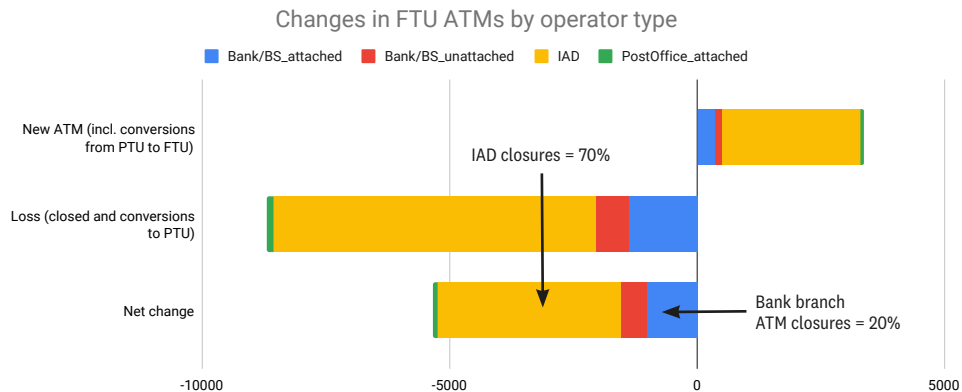
Figure 3: Change in status of FTU ATMs since January 2018



Source: Which? analysis of LINK data

Lost FTU ATMs have mostly been those operated by IADs. Of the net FTU ATM losses between January 2018 and May 2019, 70% have been due to IADs choosing to close FTU ATMs or to introduce charges (Figure 4). This represents a relatively greater proportion of losses than the share of the FTU ATM network that are owned by IADs (54%). A further 20% of the losses are due to closures at bank or building society branches, with the remaining losses being bank or building society ATMs not attached to branches and a small number of closures from post offices.

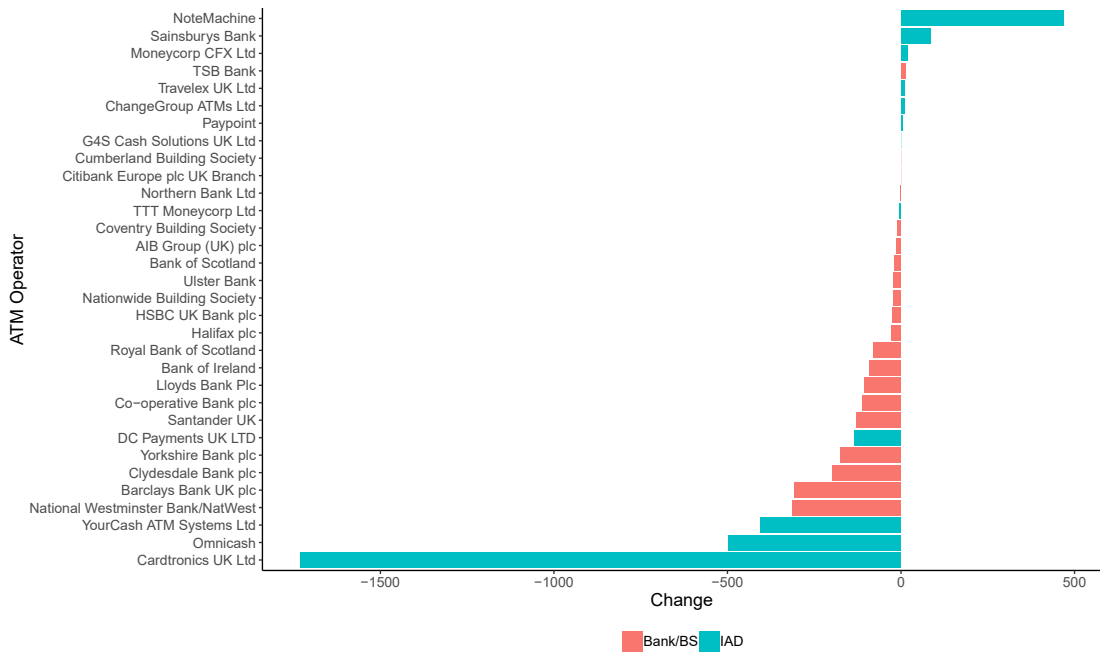
Figure 4: New and lost FTU ATMs by operator type



Source: Which? analysis of LINK data

Focussing on FTU ATM losses by operator, Figure 5 shows that a majority have reduced the size of their FTU network. However, losses have not been evenly spread across the ATM providers. The most significant reduction has been made by Cardtronics UK. Some of these may be due to rationalisation of their ATM estate following DC Payments’ acquisition of Cardtronics in 2017. Figure 5 attempts to exclude these,⁴ but even so, the loss is considerable. Around half of all losses to FTU ATMs between January 2018 and May 2019 were made by Cardtronics and two other IAD operators, Omnicash and YourCash ATM Systems, although these losses have been offset somewhat by an increase in NoteMachine’s FTU ATM network between January 2018 and May 2019.

Figure 5: Change in number of FTU ATMs since Jan 2018, by operator



Source: Which? analysis of LINK data

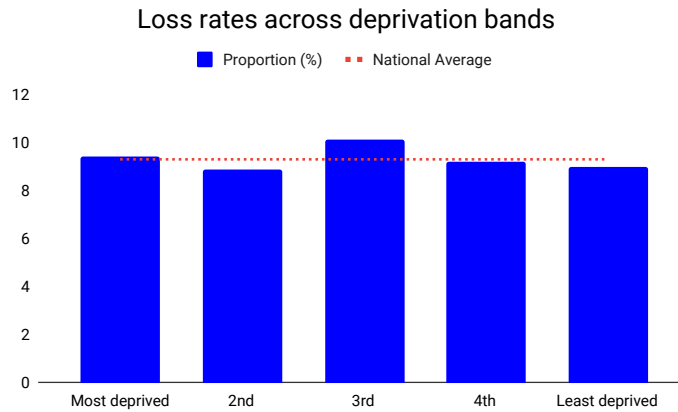
While the national decline in free access to cash has received extensive coverage,⁵ there has been little research into how FTU ATM losses has been spread across the country. As described above, the consumer harm from losing cash networks is likely to be more severe for some groups of individuals, specifically those on lower incomes and in rural locations. Since these consumers are likely to be concentrated in some locations, the spatial distribution of losses is important and so we have particularly investigated this.

We find that most areas have lost between 8 and 11% of their FTU ATMs, with no evidence of a relationship between the level of deprivation and the rate of loss. Figure 6 shows the proportion of FTU ATMs lost within each IMD quintile since January 2018 and no pattern is discernible. This is supported by the regression results, where IMD does not have a statistically significant relationship with the likelihood of a FTU ATM being lost.

4 To quantify this effect, we have calculated the number of Cardtronics and DC Payments FTU ATMs which have been lost in the same postcode sector (ie 4 or 5 digit postcode) since January 2018. This sums to 952 Cardtronics ATMs and 565 DC Payments ATMs, both of which have been removed from Figure 5.

5 For example, see <https://www.which.co.uk/news/2019/05/exclusive-1250-free-atms-started-charging-fees-in-just-one-month/>

Figure 6



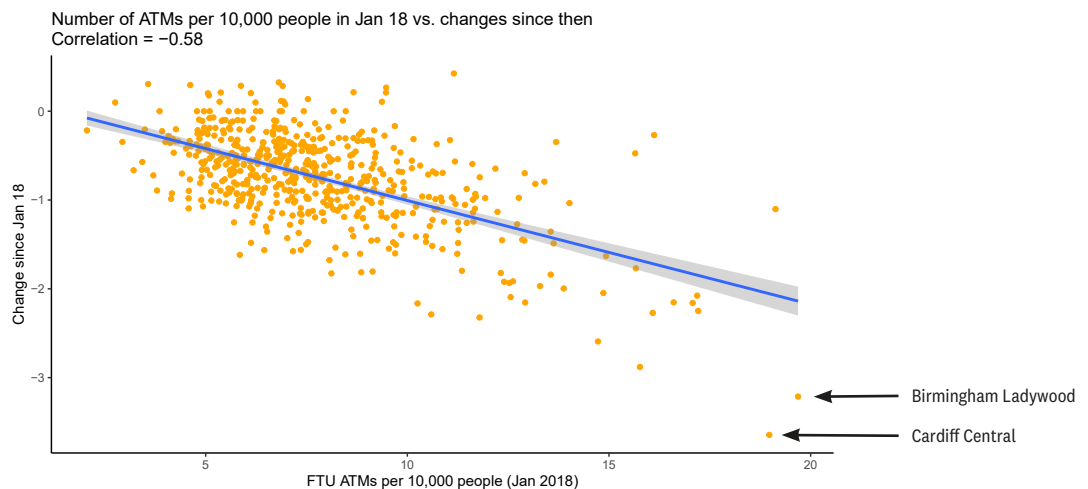
Source: Which? analysis of LINK data

Further, we do not find that rural areas have been more likely to lose FTU ATMs. On the contrary, we find evidence of a positive relationship between the rate of loss and population density, with the regression analysis finding that FTU ATMs losses are more likely as the population density of an area increases.

To further investigate the distributional impact of FTU ATM losses (closures and conversions to PTU) we examine the change in the number of ATMs within parliamentary constituencies. We find that more than 95% of constituencies have fewer ATMs per person than in January 2018, but that losses have not been skewed towards lower income or more deprived areas.

Again, we find that there has been a slightly greater loss of FTU ATMs in constituencies with higher population density rates. There is, however, a reasonably strong negative correlation between the number of ATMs in January 2018 in each constituency and the subsequent change, as there have been greater losses in constituencies which had more FTU ATMs per person in January 2018, see Figure 7. For example, Cardiff Central and Birmingham Ladywood had more ATMs per capita than most other constituencies in January 2018 and this remains the case despite large reductions in the number of FTU ATMs.

Figure 7: Change in ATMs by constituency



Sources: Which? analysis of LINK data and ONS 2017 population estimates (only available for parliamentary constituencies in England and Wales). Note due to data cleaning, the results here may differ slightly with LINK's public ATM data on constituencies in May 2019.

Note: Chart excludes the Cities of London and Westminster, as the prevalence of ATMs per person is significantly higher than any other constituency

Another question related to the spatial distribution of FTU ATM losses is whether these are more or less likely to occur where there are multiple ATMs in the same location, as this will have different impacts on consumers. In some locations many ATMs are clustered together due to high demand. For example, Gatwick Airport’s North Terminal is home to around 41 FTU ATMs and Sheffield City Centre’s High Street contains 16 FTU ATMs. In such places the loss of an ATM might cause consumers to have to queue to take out cash, but in a location that only has one ATM then a loss would lead to travel to another location.

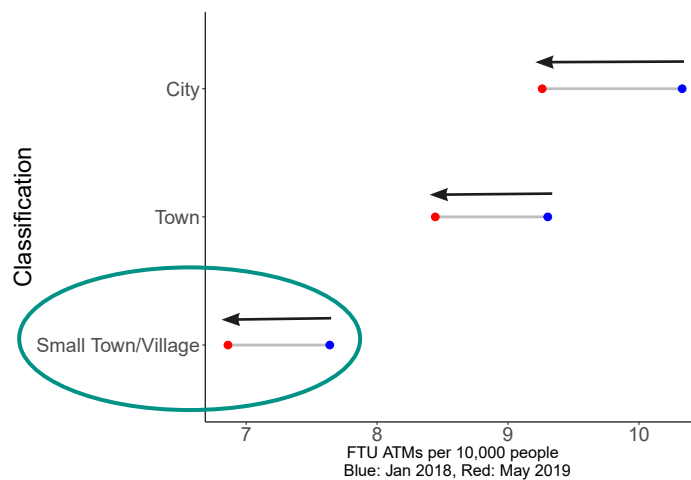
We define a FTU ATM cluster as a location that has one or more ATMs in the same street. On this basis we identify around 37,500 FTU ATM clusters, compared with around 57,500 FTU ATMs since Jan 2018. Examining the distribution of ATM losses suggests that most are the result of the loss of an entire FTU ATM cluster. Of the 37,500 FTU ATM clusters, 5,350 (14%) have been lost completely while only 2,200 have seen a partial loss. This means FTU ATM losses are often an ‘all or nothing event’ – either the entire cluster is preserved or lost.

The most compelling reason for this is ATM operators appeared to have had a greater incentive to rationalise their FTU ATM network (through closure or conversion) in clusters where they are the only operator. This means they may not be in direct competition with other operators, especially if the nearest FTU ATM cluster is not within walking distance. More than 90% of complete losses in FTU ATM clusters happened in such cases, compared with only 20% in cases of partial losses. This result is unsurprisingly driven by IADs, which were responsible for 80% of complete losses despite only accounting for 54% of the FTU ATM population.

Finding 2: When a FTU ATM is lost in a rural area, residents have to travel around three times as far to the nearest FTU ATM than those in urban areas.

Although we have found that FTU ATM losses to date have been slightly more concentrated in areas that had more ATMs in January 2018 and in more populated areas, the impact of the loss of a FTU ATM to an individual consumer is likely to vary across locations and we would expect it to be greater in rural locations where the next nearest ATM is further away. Figure 8 shows that there were fewer per ATMs per person in rural areas in January 2018.

Figure 8: Number of FTU ATMs per 10,000 people, by area type

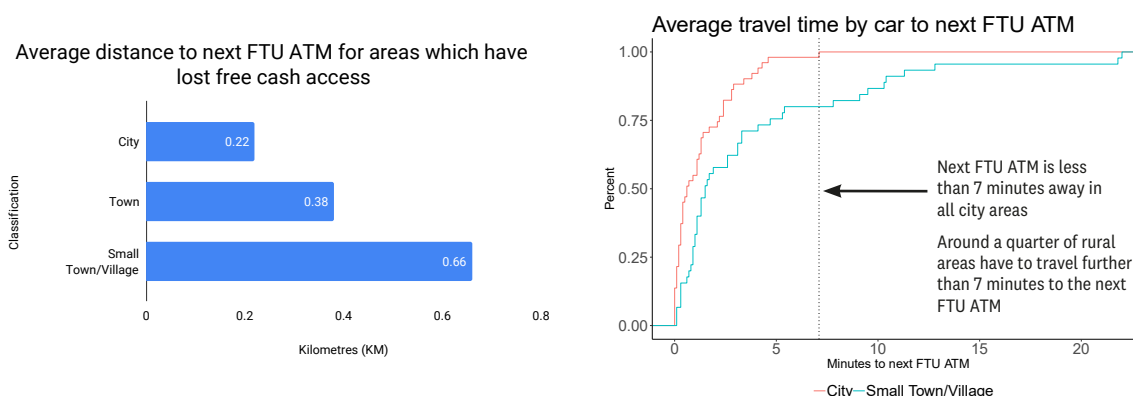


Sources: Which? analysis of LINK data, rural-urban classification for Great Britain (House of Commons Library) and Northern Ireland (Northern Ireland Statistics and Research Agency)

To explore the impact of the loss of a FTU ATM we calculate the average distance consumers have to travel to the next nearest FTU ATM when their local one is lost. We have identified more than 5,200 postcodes where the last FTU ATM has been lost (either through closure or conversion to PTU) and have calculated the distance to the nearest FTU ATM ‘as the crow flies’.⁶ Unsurprisingly, we find that losing a FTU ATM in city areas⁷ is often only a minor inconvenience, with the next one an average of 220 metres away, see Figure 9. However, in rural areas the average is 660 metres, with around 12% of postcodes in rural areas more than 1 kilometre away from the next FTU ATM.⁸

Considering the impact by actual travel time for a sub-sample of 250 postcodes gives a similar finding.⁹ The average travel time by car to the next FTU ATM is less than 7 minutes for almost all city areas, but around a quarter of postcodes in rural areas are more than 7 minutes away from the next FTU ATM, and several are more than 15 minutes away.¹⁰ These areas tend to be in remote locations (or areas previously with ATMs attached to service stations) where access to public transport and general banking services are likely to be poor, leading to a greater number of ‘ATM blackspots’.

Figure 9: Average distances and travel time to the next FTU ATM



Sources: Which? analysis of LINK data, rural-urban classification for Great Britain (House of Commons Library) and Northern Ireland (Northern Ireland Statistics and Research Agency), the geosphere (v1.5-10, Hijmans et. al, 2019) and OSRM (v3.3.1, Giraud et. al, 2019) packages

6 For computational reasons, this calculation was restricted to the same postcode area as the lost FTU ATM

7 Figure 8 and Figure 9, Panel A use a rural-urban classification based on a GB classification available [here](#): and a Northern Ireland classification available [here](#)

8 Even excluding the most rural 10% of areas, which are skewing the average distance upwards, we find that the average distance to the next FTU ATM is still around half a kilometre. Distances have been calculated using the geosphere package available in the R software environment.

9 To calculate the driving travel time between ATMs we have used software powered by Open Source Routing Machine. The 250 postcodes are based on a 5% sample (stratified by rural-urban classification) of all postcodes which have lost their last FTU ATM since Jan 2018. Note, we can only observe the latitude and longitude of the postcode centroid where each ATM is located, so distances and travel times are approximations.

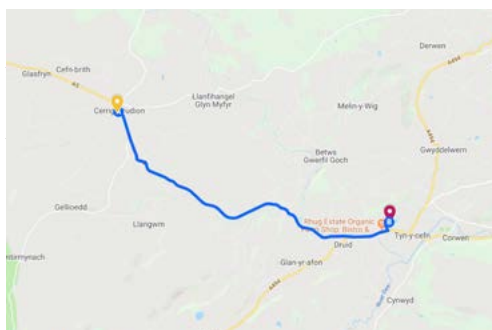
10 We have excluded 65 cases where the walking time to the next FTU ATM is likely to be less than the driving time, which tends to be the case in inner city areas. This allows for a fairer comparison between city and rural areas.

Box 1: FTU ‘ATM blackspots’

While the average distance between FTU ATMs is less than 1 kilometre, there are many examples where a lost FTU ATM creates an ‘ATM blackspot’. In these blackspots, residents - as well as those travelling for work and leisure - have to travel much further.

In Cerrigydrudion in North Wales, a Cardtronics ATM attached to a local café converted from FTU to PTU in the last 18 months. Residents now have to travel 8 miles (15 mins) east toward Corwen, or a 40 minute bus journey, to the nearest FTU ATM (see Figure A). This could also affect people travelling on the A5 motorway out of Snowdonia National Park. This ATM converted to PTU despite being on LINK’s Protected ATM list.

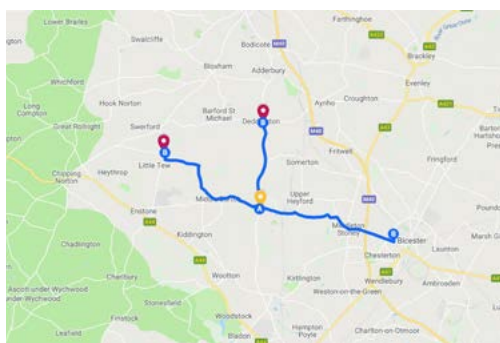
Figure A
Cerrigydrudion, Corwen, North Wales



Sources: Which? analysis of LINK data and Google Maps

In Steeple Aston, on the outskirts of Bicester in Oxfordshire, a YourCash ATM Systems FTU ATM at a service station has recently closed. The nearest FTU ATM more than four miles away in Deddington (North), Chipping Norton (West) or nearly 7 miles to Bicester (see Figure B). This provides an example of how the effect of an ATM closure can be significantly larger in certain communities, even if the total number of closures are similar.

Figure B
Steeple Aston, Bicester, Oxfordshire



Sources: Which? analysis of LINK data and Google Maps

Finding 3: Conversions from free-to-use (FTU) to pay-to-use (PTU) ATMs have been concentrated in more rural and deprived areas.

Between January 2018 and May 2019, around 2,780 FTU ATMs have converted (in net terms) to PTU, compared with 2,560 FTU ATM closures (net of new FTU ATMs). Conversion to PTU is generally considered a better outcome than outright closure, but the likelihood of conversion is expected to depend on the characteristics of the local community. As discussed earlier, consumers are prepared to travel further to a FTU ATM than use a PTU ATM in the immediate vicinity and demand for cash withdrawals is expected to be very responsive to price charges in general. However, in areas with little or no FTU provision, so-called ‘blackspots’, or in more deprived communities where car ownership is lower and a preference for cash is higher, consumers may be forced to pay to access cash and demand will fall less in response to a conversion to PTU.

ATMs which have converted since January 2018 charge an average of £1 per withdrawal, This means that for an average ATM cash withdrawal of £45 the effective fee is about 2.2%, but this increases for smaller withdrawals, see Table 1. This makes these fees potentially regressive and it is important to consider whether ATM conversions have been concentrated in areas in which consumers may be less able to afford these charges. It is also worth noting that while the average for converted ATMs is £1, the amount charged varies widely, with 1 in 8 PTU ATMs charging £1.99 or more.

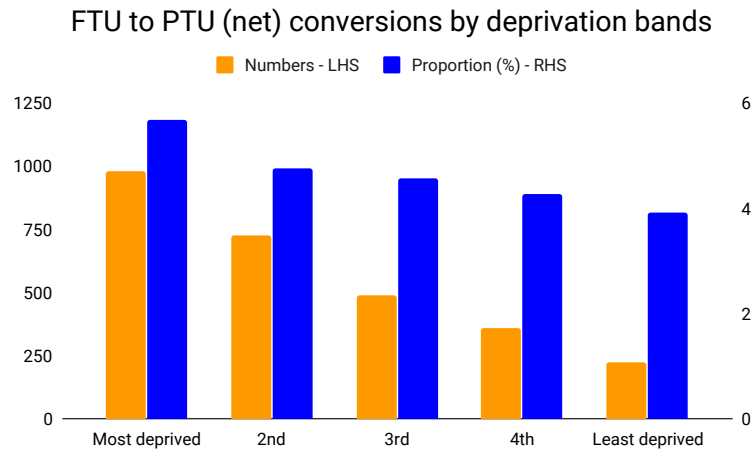
Table 1: Example effective charge rates at PTU ATMs

Fixed rate charge	Value of a cash withdrawal	Effective charge rate
£1 per withdrawal	£10	10%
	£45 (average)	2.2%
	£100	1%
£2 per withdrawal	£10	20%
	£45 (average)	4.4%
	£100	2%

Note: The average value of an ATM withdrawal was calculated by dividing the total value of cash withdrawals by the total volume in the week ending 11th August (LINK, 2019b)

We can examine this by splitting the gross number of conversions to PTU by IMD quintiles. Figure 10 shows that more conversions have taken place in more deprived areas. In the most deprived 20% of areas there has been a net conversion of 979 FTU to PTU ATMs, compared with 223 in the least deprived affluent areas. Although deprived areas have more FTU ATMs, this result also holds when looking at the proportion of FTU ATMs which have converted. Approximately 6% of FTU ATMs have converted to PTU in the most deprived areas compared with less than 4% in the least deprived areas.

Figure 10: FTU to PTU conversions by level of deprivation



Sources: Which? analysis of LINK data

Of course, conversions of ATMs to PTU may be related to other factors, and so we test this using the regression analysis to estimate the probability of a FTU ATM converting while controlling for other variables. This confirms the finding that ATMs are more likely to convert to PTU in more deprived areas. The conversion to PTU is always carried out by IADs and we find that 90% of the ATMs in deprived areas known to have converted from FTU to PTU are owned by Cardtronics. We have also found some evidence of particular areas with higher levels of deprivation that already had a high proportion of ATMs that are PTU, but which have seen further increases. This is explored in Box 2.

Finally, the regression analysis also found evidence that ATMs are more likely to convert to PTU in areas of lower population density. Since rural areas have lower levels of FTU ATMs per head of population, then it will be more difficult for consumers in these areas who need cash to be able to avoid paying a charge.

Box 2: The acceleration of conversion to PTU in deprived areas

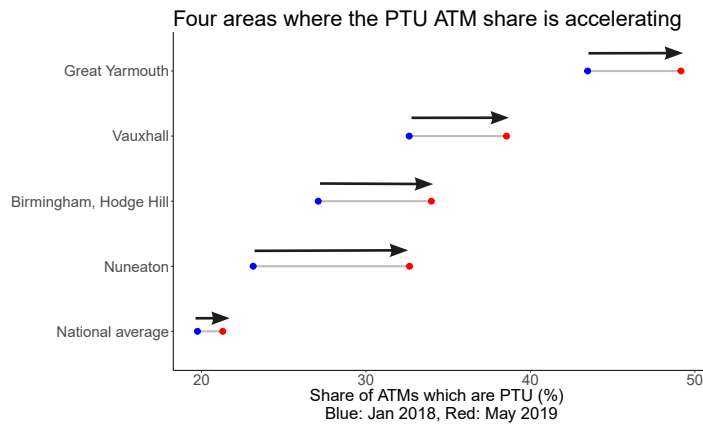
We have shown that ATMs in more deprived areas have been more likely to convert to PTU. However, some of these areas already had a greater proportion of PTU ATMs. In areas where a higher proportion of local ATMs are already PTU, it becomes more difficult for a consumer to find a FTU ATM to use instead.

While the introduction of a charge to withdraw cash from an ATM is likely to result in fewer people choosing to withdraw cash, it is also likely that in areas where it is harder to find an alternative FTU ATM, the reduction in cash withdrawals will be less than in areas where it is easier to find another FTU ATM. If an operator owns a significant proportion of local ATMs then it may convert these at the same time in order to try and reduce the impact on transaction volumes. If this is the case, since IADs are more likely to own ATMs in more deprived areas, this means that there may be an acceleration in the rate of conversion from free to PTU ATMs in more deprived areas.

We have identified 49 constituencies where this effect may be happening. In these constituencies the PTU ATM share in January 2018 was higher than the national average (20%), the PTU share has increased above the national average since January 2018 (+1.5pp), and the average IMD score is in the lower quartile when ranked across all constituencies.

Figure C shows the proportion of PTU ATMs and the change between January 2018 and May 2019 for four of these constituencies: Great Yarmouth (where almost half of all ATMs are now PTU); Vauxhall in London; Birmingham Hodge Hill; and Nuneaton (which has lost more than 20% of its FTU ATMs and approximately a third of ATMs are now PTU). There are obvious differences between these four areas, such as population density and access to public transport, but in all four cases the net conversion rate has been higher than the net closure rate and considerably above the national average (4.8%).

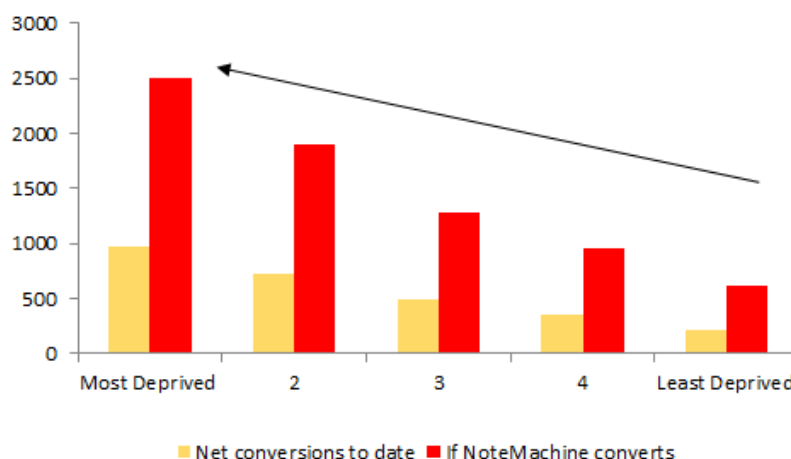
Figure C



Sources: Which? analysis of LINK data. Note due to data cleaning, the results here may differ slightly with LINK's public ATM data on constituencies in May 2019.

In addition to the conversions that have already been made, NoteMachine announced in May 2019 that it also intends to convert many of its ATMs to PTU unless the interchange fee rises back to its previous level (Guardian, 2019). Since NoteMachine has more FTU ATMs in the most deprived areas than the national average, this conversion will have a disproportionate impact on poorer areas. To explore this we allocated the anticipated conversions in proportion to how NoteMachine's ATMs are distributed across deprivation levels. Our calculations suggest that if NoteMachine carries out its proposed conversions, then an additional 1,500 ATMs will become PTU in the most deprived 20% of areas, which compares with only 390 in the least deprived areas (see Figure 11). This would increase the proportion of ATMs in the most deprived areas that have converted from 6% to almost 15%.

Figure 11: Number of ATMs converting to PTU by area deprivation level



Sources: Which? analysis of LINK data and Guardian (2019)

Finding 4: 8% of ATMs designated as protected by LINK have closed or converted to PTU, although this would have been even higher without intervention.

As we described above, LINK has designated 2,660 ATMs as protected. Of these, 211 were closed or had converted to PTU as at May 2019.¹¹ However, using regression analysis we have explored whether the protected ATMs have been more or less likely to be lost than other ATMs controlling for other factors including population density, level of deprivation and the distance to the next nearest ATM.

While we estimate ATMs with protected status were about 4 percentage points less likely to be lost, predominantly because they are less likely to convert to PTU, the rate at which ‘protected’ ATMs are being lost is only marginally lower than the average for all UK FTU ATMs.

Also, while the scheme has probably had a small positive effect in rural areas - as more than half of protected ATMs are situated in such location - only 6% of ‘protected’ ATMs are in the most deprived neighbourhoods. This suggests a ‘protected’ status based on distance may not be suitable for protecting free access to cash in more deprived communities.

6 Conclusions and recommendations

The analysis presented in this report has found that the reduction in the provision of FTU ATMs that has occurred since January 2018 has been, to some extent, a natural adjustment to falling demand for cash for consumers transactions. Locations that had greater levels of provision have typically seen greater reductions, especially in some urban areas.

However, the analysis has increased our understanding of the impact on consumers of the diminution of the ATM network. Previous research has found that consumers in rural locations and on lower incomes are more likely to need access to cash and hence experience greater harm when access is reduced. This report has shown that the loss of FTU ATMs most commonly leads to the removal of all local provision and that this will cause more harm for individual consumers in rural areas because the distance to the next nearest ATM is, on average, three times as far in rural areas than in cities.

Further, we have found that the most deprived communities are those most likely to see their ATMs convert to PTU. Over the period we analysed, 979 FTU ATMs were converted in the most deprived communities compared to just 229 in the least deprived communities, and given the public statements made by NoteMachine this trend is expected to worsen significantly. For those making small withdrawals, the effective charge rates on PTU ATMs are very high.

The research has also shed light on the supply side of the market and it has highlighted the extent to which provision depends on the business decisions of a small number of independent operators. These firms are, of course, sensitive to the level of the interchange fee and these business models appear to reach tipping points where the returns from interchange fees are considered too low and large proportions of their ATM estate is closed or converted to PTU. Worryingly for consumers, as the proportion of local ATMs that converts to PTU increases, the foregone income from converting another ATM is likely to be smaller. This means that the market might work in such a way as to accelerate the loss of free access to cash. The research has shown that regulating the interchange fee to subsidise the provision of ATMs can make a difference. Although 8% of protected FTU ATMs have closed or converted to PTU, this is less than would have been expected in the absence of any intervention.

Which? acknowledges that as demand for cash falls there will be a reduction in the number of FTU ATMs available to consumers, but we believe that, as the UK transitions to a lower cash society, it is vital that consumers continue to have a good choice of payment methods, and for now cash remains part of that choice for most consumers. This is necessary to ensure that those who find it harder to make this transition do not suffer harm. Currently, this means maintaining a widespread geographic access to cash, including protecting the current spread of free-to-use (FTU) ATMs.

Which? believes we need to protect a geographical spread of access to cash in order to:

- prevent an increased risk of financial exclusion for those currently need cash;
- ensure their remains access to a secure and reliable form of payment that can provide a ‘back-up’ for consumers;
- protect consumer choice and competition when it comes to payment methods that meet a consumer need or preference.

However, we are concerned that the current reduction in the ATM network is happening in a way which means that those who are more likely to rely on cash will increasingly have to pay or travel further to access cash. And while LINK's policy on protected ATMs has likely had some positive effect, with 8% of protected ATMs still closing or converting to PTU, it is clearly not sufficient to protect a geographical spread of FTU ATMs.

Given these concerns Which? recommends the following actions need to be taken:

Recommendation 1: The PSR should act immediately to regulate UK ATM interchange fees.

Cash has a vital role for many consumers and yet there remains a significant risk that without immediate intervention the market will fail to protect FTU ATMs for people who need them. This is evident by the fact that, despite the efforts made by LINK since January 2018, the loss of FTU ATMs has seen deprived and rural communities hit the hardest.

As a first step, to prevent the continued acceleration of FTU ATM losses, the PSR must regulate interchange fees to support its stated aim of protecting cash access for UK consumers who need or want to use it as a payment method.

Given the state of the market we are confident that regulating the ATM withdrawal interchange fee level and structure would be consistent with all three of the PSR's statutory objectives.¹² Indeed, the PSR is the economic regulator for payment systems and was set up with the express purpose and powers of regulating wholesale access fees in payment systems, such as ATM and other interchange fees.

We believe the risk associated with only one of the three major UK ATM networks having a commitment to protect geographical access to cash means it is essential that PSR regulates ATM interchange fees for all major UK ATM networks.

It is vital that the PSR recognises that there are significant economies of density in the distribution of ATMs, owing to costs associated with cash delivery and ATM maintenance costs, hence the overall distribution of ATMs will inevitably depend on the overall structure and level of interchange fees, rather than just the interchange fee for any specific ATM. This is why the changes in interchange fees for specific locations, such as LINK's various recent initiatives to protect certain ATMs, have had little effect.

The structure of such interchange fees should depend on objective criteria that will ensure a widespread geographic provision of FTU ATMs and that will create incentives to provide cash in remote or low income areas where a greater incentive may be needed to ensure sufficient access to FTU ATMs. These include:

- Levels of deprivation or similar socio-economic measures
- Rural and urban measures
- Other relevant factors which could include retailer density, as for most the need for cash will be associated with a need to spend

The structure of interchange fees should not primarily depend on endogenous, discretionary, or other non-transparent factors, such as the proximity of the nearest other ATM or bank branch. Using such criteria will result in an ATM funding structure that lacks the predictability necessary for sustained investment and innovation.

¹² The PSR's statutory objectives are:

1. to ensure that payment systems are operated and developed in a way that considers and promotes the interests of all the businesses and consumers that use them;
2. to promote effective competition in the markets for payment systems and services - between operators, PSPs and infrastructure providers, and;
3. to promote the development of and innovation in payment systems, in particular the infrastructure used to operate those systems.

The structure of interchange fees should not primarily depend on endogenous, discretionary, or other non-transparent factors, such as the proximity of the nearest other ATM or bank branch. Using such criteria will result in an ATM funding structure that lacks the predictability necessary for sustained investment and innovation.

Recommendation 2: The government should legislate to give the PSR a defined duty to maintain a suitable geographic spread of access to cash, free of charge.

Cash will continue to play an important role in the UK for years to come. It is essential that cash remains a viable alternative to card or digital payments until such a time that there is no longer a need for cash. It is particularly vital to ensure that no one is excluded or left unable to access payment methods as we transition to a more digital world.

Given that we are already seeing rapid changes taking place in the market, the government must act now and give the PSR a duty to maintain access to cash across the UK to ensure that in the coming years:

- People in deprived communities, who are more likely to need cash, are not penalised by having to pay to access cash.
- People, particularly those in rural areas and small towns, are not forced to travel unreasonable distances to access cash free of charge.

Which? believes that, as the market continues to change, **a form of minimum service guarantee** will be necessary to guarantee access to cash for as long as consumers need it.

We believe that in legislating to give the PSR this duty the government can ensure that the regulator has the necessary incentives and powers to assess the state of the market and, when necessary, put in place the structures to support such a minimum guarantee for access to cash – if necessary by introducing Universal Service Obligations.

7 Technical Annex

To support the descriptive statistics in the report and to further understand whether rural and deprived neighbourhoods have been more affected by FTU ATM losses, we estimated multivariate linear regressions that aim to control for the various drivers of supply and demand for cash withdrawals.

The three dependent variables we have modelled are:

1. *Lost FTU* – A binary categorical variable for whether an ATM that was FTU in January 2018 remains a FTU ATM in May 2019, ie whether it has been lost as a FTU ATM;
2. *Closed* – A binary categorical variable for whether an ATM that was FTU in January 2018 was closed by May 2019;
3. *Converted* – A binary categorical variable for whether an ATM that was FTU in January 2018 being converted to PTU by May 2019.

The explanatory variables of most interest in are those with the lowest levels of IMD (i.e. most deprived areas) in the *IMD* variable and the *Population density* variable which proxies for how rural different neighbourhoods are.

To control for other factors which could affect demand for cash withdrawals we included:

- The *average age* of people in an area. Research suggests that older people have a preference for cash, so ATM losses may be lower in areas with higher average ages.
- *Retail density* in each neighbourhood. ATMs are likely to be located in areas where there is a lot of footfall and clusters of retail units. Ordnance Survey data was used to construct this variable.
- *Converted* – A binary categorical variable for whether an ATM that was FTU in January 2018 being converted to PTU by May 2019.

We have also tried to control for the supply of ATMs by including binary categorical variables for each of the 31 ATM operators in the UK. This should control for any variation in business decisions taken by the ATM operators since January 2018. Due to discrepancies in how the ATMs of RBS and NatWest are coded across datasets that we have merged, for the purposes of the regression analysis we treat these as the same operator.

Finally, we also included a variable (*Protected*) which indicates whether an ATM is on LINK's Protected list. Full details of the variables used are in the Summary Table are in Table A.1

Before running the modelling below, we made some adjustments to the dataset:

- ATMs which closed and then reopened with the same operator and in the same postcode sector were treated as either the 'same' or as a 'conversion'. This accounted for 2,854 ATMs out of 72,919, with 1,427 ATMs removed from the dataset
- We removed 31 'Testing' ATMs which are not available at street level. 155 ATMs were removed after merging with LINK's (May 2019) Protected ATM Dataset
- Since data on population density is only available for England and Wales, our total sample is 62,371. But this falls to 55,811 when *Retail density* is included because 6,560 ATMs (6,372 in

England and 188 in Wales) are located in electoral wards for which there is no readily available data on area size.

- A small number of missing data in the ATM Operator Name field in the LINK dataset were also removed. Overall this accounted for 309 ATMs.

The set of models were estimated using an (unconstrained) OLS linear probability approach. The results are presented in Table A.2. Estimating these models using a logistic regression approach gave qualitatively similar results.

Table A.1: summary statistics

Variable	Observations	Mean	Std deviation	Min	Max	Notes	Sources
<i>Lost FTU</i>	71,306	0.12	0.33	0	1.0	1 = FTU ATM has been lost due to closure/ conversion, 0 if not	LINK dataset
<i>Closed</i>	71,306	0.08	0.27	0	1.0	1 = FTU ATM closed, 0 if not	LINK dataset
<i>Converted</i>	71,306	0.04	0.20	0	1.0	1 = FTU ATM converted, 0 if not	LINK dataset
<i>IMD</i>	71,306	4.40	2.67	1	10.0	IMD bands assigned 1 if the IMD score is between 0% and 10% (most deprived), 2 if between 10.01% and 20% etc. More on IMD scores can be found in the sources column	LINK dataset, and IMD information available here
<i>Population Density</i>	62,371	1,899.14	6,429.85	59	127,654.0	Population density for each 2011 census output area based on workday population (England and Wales only)	Nomis
<i>Population age</i>	71,306	39.44	4.72	26	52.0	Average age in each area (at the Parliamentary Constituency level)	ONS
<i>Retail density</i>	55,811	2.66	7.59	0	550.5	Total number of retail stores divided by the area size of the electoral ward	Ordnance Survey and ONS
<i>Distance</i>	71,300	0.35	0.87	0	38.9	Kilometres to the next ATM ('as the crow flies') in the same (two digit) postcode area. Based on the latitude and longitude of the postcode centroid where the ATM is located.	Calculated using LINK's dataset and the geosphere package available in CRAN
<i>Protected</i>	71,306	0.04	0.19	0	1.0	1 = Protected ATM, 0 if not. 97% (2,574) matched with the LINK ATM dataset out of 2,660	LINK
<i>ATM Operator</i>	70,999	-	-	-	-	Dummy variables for the 31 ATM operators across the ATM network	LINK dataset

Table A.2: Econometric modelling results (Jan 2018–May 2019)

	Dependent variable:				
	Lost FTU			Closed	Converted
	(1)	(2)	(3)	(4)	(5)
IMD - Decile 1 (<i>Most Deprived</i>)	-0.004 (0.005)	-0.014** (0.006)	-0.015*** (0.006)	-0.024*** (0.005)	0.014*** (0.005)
IMD - Decile 2	0.006 (0.005)	0.0002 (0.006)	-0.0004 (0.006)	-0.009* (0.005)	0.013** (0.005)
IMD - Decile 3	-0.0004 (0.005)	-0.006 (0.006)	-0.007 (0.006)	-0.012** (0.005)	0.008 (0.005)
IMD - Decile 4	0.009 (0.006)	0.005 (0.006)	0.005 (0.006)	-0.002 (0.005)	0.010* (0.005)
IMD - Decile 5	0.011* (0.006)	0.007 (0.006)	0.007 (0.006)	0.002 (0.005)	0.007 (0.006)
IMD - Decile 7	0.005 (0.006)	0.004 (0.006)	0.005 (0.006)	0.003 (0.005)	0.003 (0.006)
IMD - Decile 8	0.004 (0.006)	0.006 (0.007)	0.007 (0.007)	0.007 (0.006)	0.001 (0.006)
IMD - Decile 9	0.003 (0.007)	0.004 (0.007)	0.005 (0.007)	0.012** (0.006)	-0.010 (0.006)
IMD - Decile 10 (<i>Least Deprived</i>)	-0.011 (0.008)	-0.013 (0.008)	-0.011 (0.008)	0.001 (0.007)	-0.017** (0.007)
log(Population density)	0.012*** (0.001)	0.009*** (0.001)	0.009*** (0.001)	0.012*** (0.001)	-0.005*** (0.001)
log(Retail density)		-0.004*** (0.001)	-0.004*** (0.001)	-0.005*** (0.001)	0.002*** (0.001)
Population age		-0.0004 (0.0003)	-0.0004 (0.0003)	0.0002 (0.0002)	-0.001*** (0.0003)
Distance		-0.027*** (0.002)	-0.024*** (0.002)	-0.013*** (0.002)	-0.013*** (0.002)
Protected			-0.041*** (0.008)	-0.014** (0.007)	-0.028*** (0.006)
ATM Operator Fixed Effects?	Yes	Yes	Yes	Yes	Yes

	Dependent variable:				
	Lost FTU			Closed	Converted
	(1)	(2)	(3)	(4)	(5)
Constant	-0.001 (0.011)	0.031*** (0.012)	0.033*** (0.012)	0.007 (0.010)	0.153*** (0.010)
Observations	62,089	55,538	55,538	55,538	35,027
R ²	0.056	0.059	0.059	0.051	0.062
Adjusted R ²	0.056	0.058	0.059	0.050	0.061
Residual Std. Error	0.312 (df = 62052)	0.310 (df = 55498)	0.309 (df = 55497)	0.261 (df = 55497)	0.227 (df = 35002)
F Statistic	102.376***	88.836**	87.346***	74.421***	95.605***

*p<0.1; **p<0.05; ***p<0.01

Notes:

All regressions are based using an OLS linear probability approach

Robust standard errors are in parentheses

All regression specifications are based on England and Wales only due to missing data on population densities for Scottish and Northern Irish Output Areas.

Specifications 1,2 and 3 model the probability that a FTU ATM has either closed or converted to PTU since Jan 2018

Specification 4 models the probability that a FTU ATM has closed since Jan 2018

Specification 5 models the probability that a FTU ATM has converted to PTU since Jan 2018. Banks and building societies have been removed from the sample set, as only IADs have converted ATMs to PTU.

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