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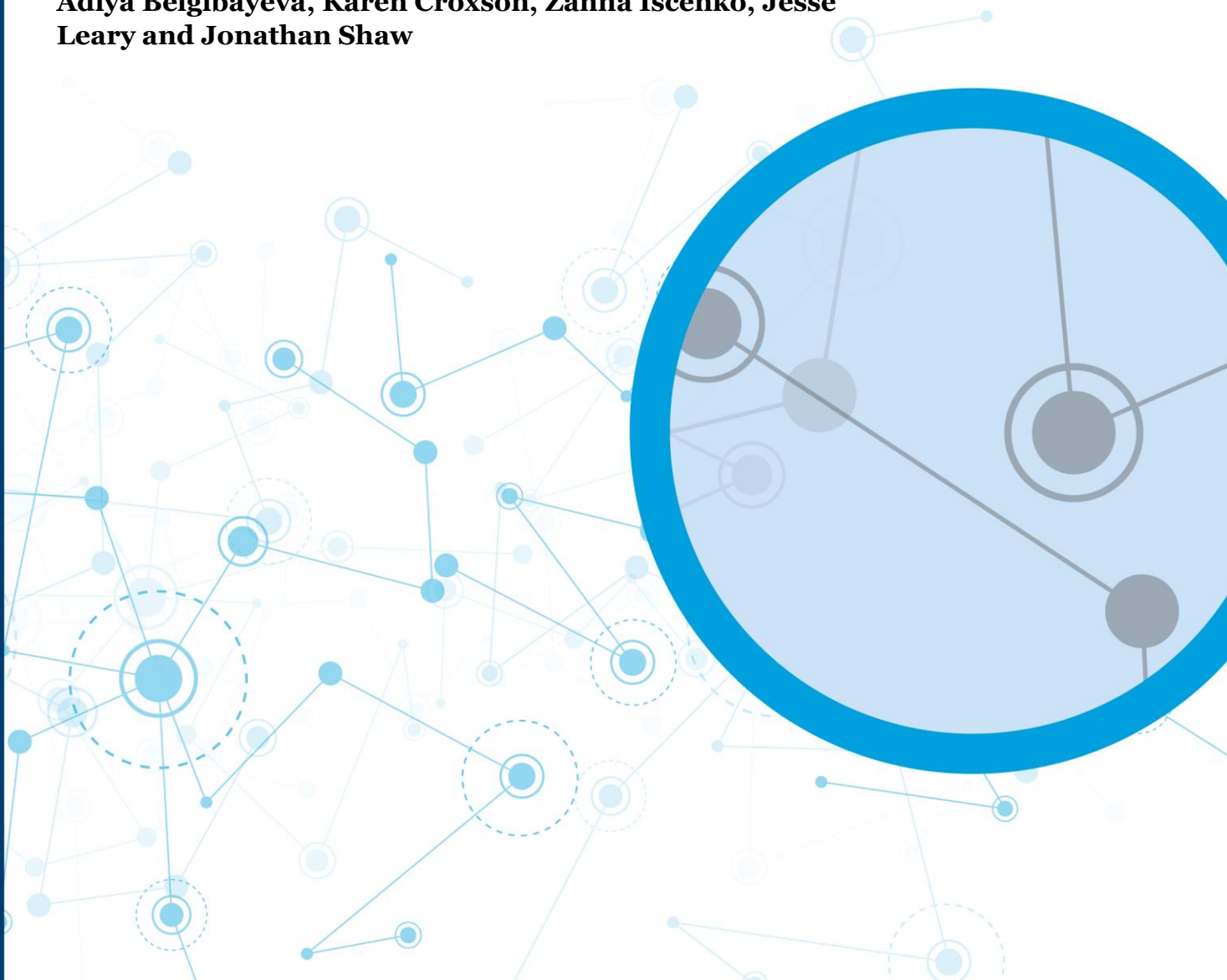
Occasional Paper

Borrower subgroups and the path into distress: commonalities and differences

Adiya Belgibayeva, Karen Croxson, Zanna Iscenko, Jesse Leary and Jonathan Shaw

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Abstract

Against a backdrop of rising household leverage during a period of falling interest rates, concerns have been raised about the risk of borrowers falling into financial distress. Although a number of studies have investigated how the composition of consumer debt varies across individuals and the experiences of those in financial distress, limitations with the survey datasets used have made it hard to understand these patterns in detail.

We exploit a rich administrative dataset containing the credit files of a large, representative sample of UK borrowers to investigate this topic. We use statistical cluster analysis to identify four data-driven subgroups of borrowers: mortgage-holders, standard-cost borrowers, high-cost borrowers and those with household bills only. We then analyse for each cluster the incidence of distress, how this links to personal characteristics and credit usage six months prior to distress, and some features of the path from there into difficulty.

We find incidences of distress varies markedly across clusters, with high-cost borrowers more than twice as likely to get into difficulty. Those who go on to experience distress tend to share some common characteristics six months prior to hitting problems, regardless of cluster: they are typically younger, lower income and have higher debt. But we also find interesting differences by cluster. For example, for mortgage-holders, those that fall into distress actually have slightly lower total debt balances than the non-distressed; for high-cost borrowers, income is actually slightly higher for the distressed than the non-distressed. There are also commonalities across cluster on the path into difficulty: individuals tend to experience a fall in income, increase their credit limits and take out additional credit. But mortgage-holders are notable for tending to protect their mortgage on the way into distress.

1   Introduction

Against a backdrop of rising household leverage during a period of falling interest rates, concerns have grown about individual borrowers falling into financial distress. According to the FCA's 2017 Financial Lives survey, 15% of UK adults have recently missed - or are struggling to make - domestic bill and credit repayments. In this paper, we utilise a unique large-scale panel of UK credit-file data to analyse those entering financial distress and understand how distress links to their personal characteristics and consumer credit use. We also study how individual circumstances change in the run-up to distress.

We begin by using statistical cluster analysis to identify four data-driven subgroups of borrowers: mortgage-holders (40% of individuals), standard-cost borrowers (34%), high-cost borrowers (18%), and those with household bills only (4%). The borrower clusters differ in terms of the primary form of debt held, so we have labelled them accordingly. But there are also marked differences across clusters in terms of age, (a proxy for) income, credit score, total debt balances and number of credit products held. Clustering into subgroups provides a basis to investigate and compare the different experiences of distinct groups of borrowers.

We analyse for each cluster: the incidence of distress; how this links to personal characteristics and credit usage six months prior to distress; and some features of the path from there into difficulty. We find that the incidence of distress varies markedly across clusters: 18% of high-cost borrowers fall into distress over the period January 2015 to February 2018, more than twice that of standard-cost borrowers (8%) three times that of mortgage holders (6%) and those with household bills only (5%).

Those who go on to experience distress tend to share some common characteristics six months prior to hitting problems, regardless of cluster: they are typically younger and lower income; they have a lower credit score and higher total debt balances; and they tend to hold more expensive forms of debt. But we also find interesting differences by cluster. For example, in the cluster of mortgage-holders, those that fall into distress actually have lower total debt balances than the non-distressed because they have smaller mortgages on average (possibly a consequence of binding loan-to-value or loan-to-income constraints when the mortgage was taken out). Mortgage-holders and standard-cost borrowers both have a substantial amount of unused credit that is fungible (ie that can be used for any form of spending), in contrast to high-cost borrowers and the household bills only group. For high-cost borrowers, we find that – unlike other clusters – income is actually slightly higher for the distressed than the non-distressed. These differences may partly reflect differing availability of credit to individuals with different characteristics, as well as differences in demand.

There are also commonalities across clusters on the path into difficulty: individuals tend to experience a fall in income, increase their credit limits and take out additional credit. But, the fall in income is larger on average for standard-cost borrowers than for other clusters. Mortgage-holders are notable for protecting their mortgage on the way into distress – presumably because they risk losing their home if they fail to do so.

The associations we uncover here are not necessarily causal but do suggest avenues to explore in future work investigating the drivers of financial distress. Our work also informs discussion about whether individuals likely to fall into distress in the future can be identified in advance.

This work builds on a number of recent studies that have sought to measure financial distress, understand what happens as individuals fall into distress and begin disentangling causal explanations for distress.

One component of our Credit Card Market Study MS14/6.3 (FCA, 2016) investigates problem credit card debt. To assess its scale and nature, four measures of distress of differing severity are used, one of which is close to the measure we adopt. The analysis assesses the causes of unaffordable borrowing by consumers and the drivers of firms' unaffordable lending. It finds that 6.9% of cardholders (around 2m individuals) are in arrears or default at a point in time and uncovers evidence of people struggling under their debt burdens, and people paying more in debt service cost and taking longer to pay off debt than they need to. It also finds some evidence of consumers' behavioural biases leading to overborrowing and under-repayment. Our work in this paper takes a broader perspective on financial difficulty, including a wide range of different credit products, not just credit cards.

Our findings relate to previous studies on household indebtedness. Hood et al. (2018) uses the Wealth and Assets Survey (WAS) to explore problem debt in the UK focusing specifically on unsecured consumer credit. They find that arrears on debts or other payment obligations (such as utility bills) are highly concentrated amongst the lowest-income households: 16% of those in the lowest income decile are in arrears compared with just 1% of those in the highest decile. Those with lower incomes are more likely to have trouble servicing their debts, but servicing pressure is typically due to a rise in debt servicing costs rather than a fall in income. They also consider the ability of individuals to repay their debts over the longer term. As with immediate servicing pressure, it is low-income and younger households that look most likely to struggle to repay. Whittaker (2018) uses a number of different survey sources to investigate households' debt holdings and sensitivity to rises in interest rates, finding that rate rises would be likely to create significant financial difficulty for a minority of borrowers. Our work complements these studies, using objective information from credit files rather than survey data.

Also based on WAS data, Gathergood and Guttman-Kenney (2016) characterise consumer indebtedness in the UK. They consider a narrow objective measure of financial distress (being two or more payments in arrears on at least one credit product) as well as a broad subjective measure that additionally identifies individuals as distressed if (i) they regard their debts as a heavy burden, or (ii) they report being behind on some or many financial commitments. They find that while only 2% of individuals are in financial distress under the narrow objective measure, 17% are classified as such under the broad subjective measure. Individuals in financial distress under the broad measure have lower life satisfaction and higher anxiety. The debt-to-income (DTI) ratio is a strong predictor of future financial distress, as are life events – such as unemployment, divorce and worsening health – though noticeably less so than the DTI ratio. Our work draws on credit file data to calculate the extent of financial distress and the characteristics associated with it.

Guttman-Kenney and Hunt (2017) explore data on almost 15m payday loan applications between January 2014 and June 2015, linked to credit history data from two credit reference agencies (CRAs). They use this information to predict future financial distress, in the form of loan delinquency, based on information available at the time of the application. Interestingly they find that a high DTI ratio (especially if it is at or above 1) is associated with an increased likelihood of future financial delinquency on these loans, but this information doesn't seem to be fully reflected in credit scores.

Cocco et al. (2016) explore the causes and consequences of financial hardship in a UK context based on 18 years of data from the British Household Panel Survey. Uncovering causal explanations is challenging, but the primary explanation for a significant decline in financial well-being is higher expenditure (52%) rather than lower income (24%). Cost of living, life events (divorce, childbirth etc) and psychological well-being all seem to play some role in becoming financially distressed. There is some evidence that good financial management reduces the risk of becoming financially worse off. Households seem to respond to becoming worse off by reducing discretionary spending.

One strand of the literature focuses on the causal effects of high-cost credit in particular on financial distress. Evidence here has been mixed. Most studies have focused on the US. Melzer (2011) finds no evidence that payday loans alleviate economic hardship; in fact, loan access seems to lead to increased difficulty paying mortgage, rent and utilities bills. Morse (2011) finds that existence of payday lenders helps to alleviate the impact of natural disasters and larcenies (but not burglaries or vehicle thefts). Bhutta et al. (2015) find that the effects of payday borrowing on credit scores and other measures of financial well-being are close to zero. For the UK, Gathergood et al. (2019) show that payday loans provide short-lived liquidity gains and encourage consumers to take on additional credit but cause persistent increases in defaults and lead consumers to exceed their bank overdraft limits. An earlier version of the analysis helped inform the decision by the FCA to cap charges for payday loans in the UK from January 2015 onwards.[1]

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[1] For recent analysis of the market for high-cost short-term credit, see https://www.fca.org.uk/data/consumer-credit-high-cost-short-term-credit-lending-data-jan-2019.

2 Data and methodology

2.1 Data

We use a panel dataset based on a 1% sample of individuals with a credit file at a UK CRA between January 2015 to February 2018, a period of just over three years (38 months). CRA data cover the vast majority of credit users, as well as most consumers that have a current account or a contract with a utilities or telecommunications provider. Importantly, however, they do not include any information on student loans, which are a widespread form of borrowing, particularly for younger cohorts. Nevertheless, student loans in the UK are fundamentally different from commercial credit because they have an income-contingent repayment schedule. The data include detailed monthly information about individuals' credit portfolios, such as the types of debt held, outstanding balances and details of any arrears, as well as balances and turnover in current accounts.

For the purpose of our analysis, we make several sample restrictions. Since our interest is financial distress, we focus on consumers who have some form of financial obligation that they could – at least in principle – struggle to repay; consumers who are debt-free and are not responsible for regular bills during the sample period are excluded. We also drop (a small number of) individuals with business loans since our focus is households rather than businesses.

Finally, because we are interested in the path into financial distress, we also exclude consumers permanently in arrears or who are never out of distress for at least 6 consecutive months; this affects 6% of individuals, or 25% of individuals in distress at some point over our observation period. We also exclude those for whom we do not have sufficient months of data. These restrictions, jointly, reduce the number of individuals in our sample by 25%.

After imposing these restrictions and dropping observations with missing essential data[2] and outliers, we get a final sample of 428,097 individuals, and use this for results in the paper unless stated otherwise.

2.2 Defining financial distress

Financial distress can be assessed using objective measures (eg missed payments) or subjective measures based on self-reports from individuals. These alternatives are complementary, with each shedding light on individuals' circumstances and financial well-being. Guttman-Kenney and Gathergood (2016) show that reasonable objective measures of financial distress often capture far fewer individuals than subjective measures.

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[2] The main drivers for incomplete data are missing current account turnover (used to approximate income) and credit scores, which are absent for 24% and 11.7% of observations, respectively.

Given our data, we focus here on objective measure of distress that can be measured using individuals' credit and bill histories. By omitting the subjective component, however, our reported proportions of individuals in distress may understate the total number of individuals who experience some form of financial distress.

We define financial distress based on a measure of serious delinquency used by the US Federal Reserve.[3] An individual is deemed to enter distress in a given month if at least one of the following events occurs:

- They reach arrears of 90 days (or a default) on any credit product or bill.
- A county court judgement (CCJ) is issued against them.
- They are declared bankrupt.
- One of their credit accounts is passed to a debt collector.

Within our baseline sample, just under 12% of individuals experience one or more periods of distress between January 2015 and February 2018.[4]

For borrowers that experience distress, we define their distress date as the date at which they first satisfy the above definition. We compare distressed borrowers at their distress date with a randomly selected date for non-distressed borrowers, where the distribution of these randomly selected dates is chosen to match that for actual distress dates.

We take a two-step approach to analysing the journey to distress in this paper. First (in the next section) we apply statistical cluster analysis to our full sample of individuals to create clusters – or subgroups – of borrowers. Second, for each cluster, we identify those individuals who go into financial distress (per our definition) and those who do not. We study differences between these subgroups in terms of their characteristics and patterns of debt accumulation.

2.3 Identifying borrower subgroups – a clustering approach

Relatively little is known about how the composition of debt varies across individuals from objective data sources. As a first step in our analysis, we take our sample of credit users and apply statistical clustering to divide them into meaningfully distinct groups based on observed characteristics and debt usage.

We utilise a K-means clustering algorithm, an unsupervised machine learning method that partitions the observations in a dataset into a set of clusters where each observation belongs to one cluster only. The K-means algorithm minimises the total within cluster variance. That is, it chooses clusters and cluster centres ('centroids') such that observations within each cluster are as similar to each other as possible across a number of pre-selected variables (`features'). The algorithm involves the following two steps:

1. Initialise cluster centroids $\mu_1, \mu_2, \ldots, \mu_k$, typically chosen randomly, where k is the prespecified number of cluster to use

2. Repeat the following until convergence:

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[3] See, for example, Federal Reserve Board (2007).

[4] It is not straightforward to compare this number with previous work, e.g. Gathergood and Guttman-Kenney (2016), which typically has reported statistics for distress at a point in time.

a. For each centroid μ_j, identify the set of data points $x^{(i)}$ that is closer to it than all other centroids. The closeness between the centroid and the data point is calculated as a Euclidian distance based on the vectors of data features.

$$c^{(i)} := argmin_j \parallel x^{(i)} - \mu_j \parallel^2$$

b. For each cluster, j, calculate means of each data feature and use this mean vector as a new centroid for that cluster.

$$\mu_j := \frac{\sum_{i=1}^m 1\{c^{(i)} = j\} x^{(i)}}{\sum_{i=1}^m 1\{c^{(i)} = j\}}$$

An important design choice in clustering is the number of clusters to use. We use the elbow method to determine the appropriate number of clusters. This method looks at the total within-cluster sum of squared distances between each data point and its corresponding cluster centroid, a measure of the variability of the observations within each cluster.

Adding more clusters inevitably enables the algorithm to fit the data better (signified by a lower within-cluster sum of squared errors) but, beyond a certain point, there may be a marked decrease in the value of additional clusters. This manifests itself as an 'elbow' (a kink) in the graph of the total within cluster sum of squares plotted against the number of clusters. The kink is used to determine how many clusters to use.

We use the following data features (variables) to define the clusters:

*   total debt balances (secured plus unsecured)
*   first and second mortgages as a proportion of total debt balances
*   standard-cost credit as a proportion of total debt balances
*   high-cost credit as a proportion of total debt balances
*   outstanding household bills as a proportion of total debt balances
*   credit score
*   age (as of 2015)
*   total monthly incomings into current accounts (a proxy for income that we refer to as 'current account turnover')

These variables describe the main features of individuals' credit portfolios and also include key individual demographic characteristics. All are measured six months prior to entering distress (or six months before a randomly selected date for consumers who do not enter distress).

Although we don't observe the interest rates charged on products, we distinguish between standard-cost and high-cost credit on the basis of typical APRs for advertised products in the category. Standard-cost credit includes forms of credit with APRs up to (and including) that of credit cards, ie motor finance, personal loans, charge card borrowing and credit card borrowing. High-cost credit includes high-cost short-term credit ('payday loans'), home-collected credit, rent-to-own products, guarantor loans, logbook loans, store card borrowing, catalogue credit, retail finance, running accounts and current account overdrafts. This list is consistent with our Feedback Statement FS17/2: High-cost credit and review of the high-cost short-term credit price cap (FCA, 2017). Household bills include communication services and utility accounts. Pay as you go, pre-paid accounts, council tax and rent are generally not included.

3 Results

3.1 Borrower subgroups

Following the methodology set out above, Figure 1 plots the relationship between number of clusters and total within-cluster sum of squares in our data. The kink (or 'elbow') at four clusters suggests that this is a sensible number of clusters to use.[5]

**Figure 1: 'Elbow' plot to determine number of borrower type clusters**
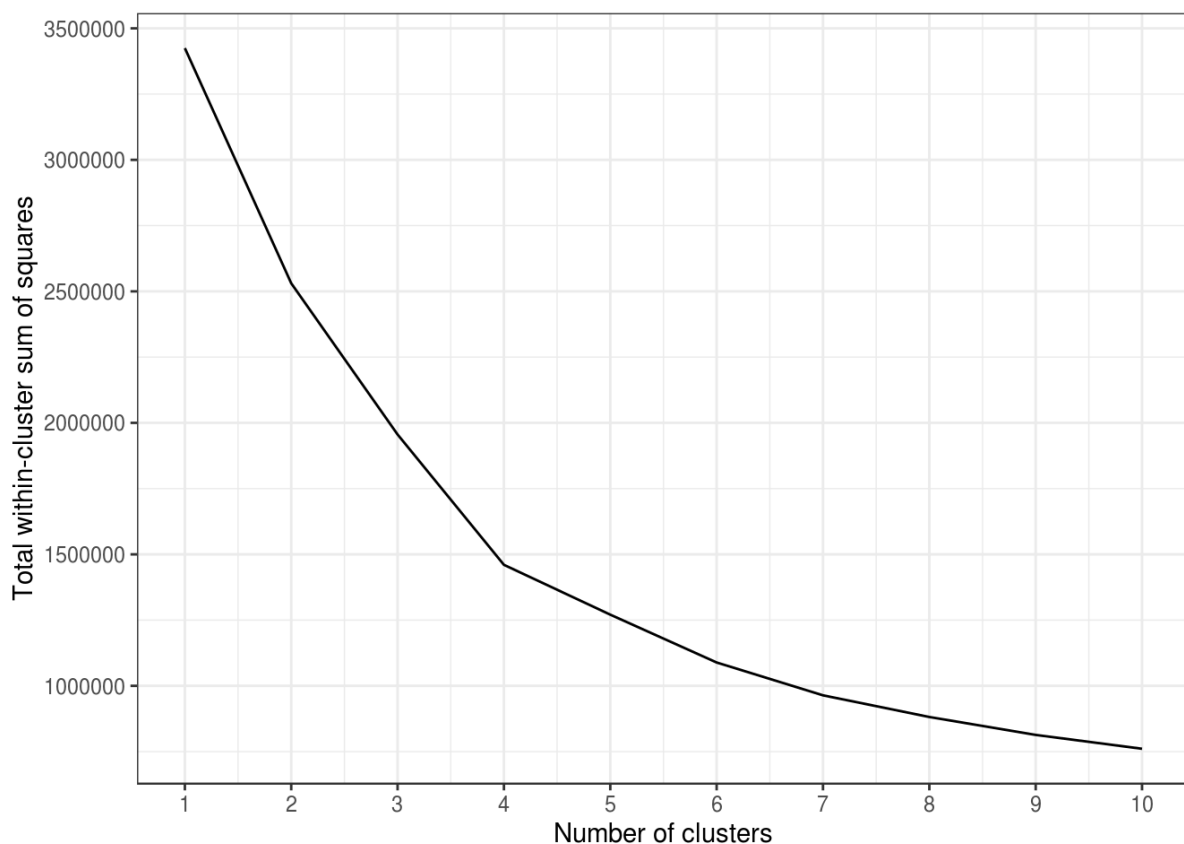
Notes: This figure plots the relationship between number of clusters and a measure of how different individuals in the same cluster are (total within-cluster sum of squares). Lower numbers indicate a greater degree of similarity. The kink at four clusters indicates less benefit to having more than four clusters, hence our choice of four clusters for the analysis below.

Table 1 describes the four types of borrowers that emerge from this clustering exercise, showing for each cluster the mean values of each variable used to define the clusters as well as the mean values for a range of additional variables not used in the clustering exercise. Figures 2 to 6 pick out some of the key dimensions across which clusters differ, demonstrating that the 4 borrower subgroups differ in interesting and meaningful ways.

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[5] There are also kinks at two and seven clusters, so one could make a case for choosing either of these. This is a matter of judgment; we choose four clusters because the kink there is more pronounced.

Table 1: Descriptive statistics for borrower type clusters

	Mortgage holders	Standard-cost borrowers	High-cost borrowers	Household bills only
Clustering variables (6 months before distress)				
Mortgages: % of total balances	0.947	0.006	0.001	0.000
Standard-cost credit: % of total balances	0.047	0.951	0.050	0.005
High-cost credit: % of total balances	0.006	0.037	0.942	0.005
Outstanding household bills: % of total balances	0.000	0.005	0.008	0.990
Total balances (£)	135,919	5,095	1,179	91
Current account turnover (£)	2,465	1,992	1,328	1,321
Age	44	50	40	51
Credit score	613	607	572	595
Non-clustering variables (6 months before distress)				
Total number of products	7.0	5.2	3.7	3.2
Motor: % of total balances	0.013	0.109	0.006	0.000
Motor finance: % of total balances	0.000	0.004	0.000	0.000
Personal loans: % of total balances	0.022	0.150	0.025	0.001
Credit cards: % of total balances	0.025	0.684	0.148	0.034
Charge cards: % of total balances	0.000	0.003	0.000	0.000
Payday loans: % of total balances	0.000	0.000	0.014	0.000
Home credit: % of total balances	0.000	0.000	0.029	0.000
Rent-to-own: % of total balances	0.000	0.000	0.011	0.000
Guarantor loans: % of total balances	0.000	0.000	0.004	0.000
Store card credit: % of total balances	0.000	0.003	0.045	0.000
Mail order credit: % of total balances	0.001	0.008	0.168	0.001
Retail finance: % of total balances	0.003	0.013	0.207	0.001
Running account: % of total balances	0.000	0.000	0.003	0.000
Overdrafts: % of total balances	0.002	0.012	0.460	0.002
Credit score quantile	0.64	0.60	0.39	0.51
Number of observations	162,107	147,018	79,929	39,043

Figure 2: Share of total debt balance held in each type of credit, by cluster
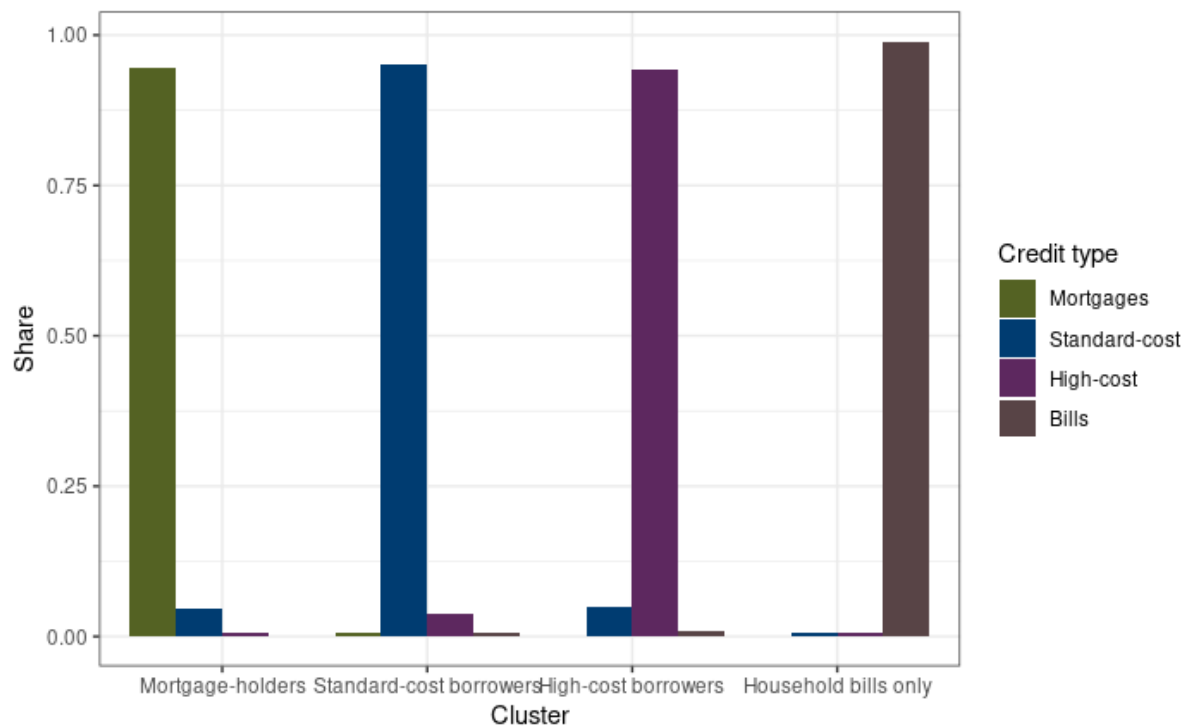
Notes: For each of the four borrower subgroups (clusters), this figure shows what proportion of their total debt balance is held in each of four different types of credit.

We find that debt holdings tend to be highly concentrated: 84% of consumers have more than 90% of their debt balances in a single category of debt. Split by cluster, we find (Figure 2) that on average 95% of debt held by those in the 'mortgage-holders' cluster is mortgage debt; 95% of debt held by 'standard-cost borrowers' is standard-cost credit; 94% of debt held by 'high-cost borrowers' is high-cost credit; and 99% of debt held by the 'household bills only' group is arrears in household bills. This explains the labels we've given the groups. We now describe other ways in which the clusters differ.

Cluster 1: 'Mortgage holders'. The algorithm assigns 38% of consumers in our sample to a cluster where typical members are mortgage holders. As Figure 3 shows, these individuals tend to have high total debt balances (£135,919 on average). Most of this is accounted for by their mortgage (95% of their total debt balances on average; see Figure 2). Members of the group typically use other credit sources too (they hold around 7 credit products on average) and their remaining credit balances tend to be split across credit cards (2.5%), personal loans (2.2%) and motor finance (1.3%). The group has an average age of 44 (Figure 4) and the highest average current account turnover among all of the clusters of £2,465 per month (Figure 5). It also has the highest credit score: 613 points on average, or in the 64th percentile on average (Figure 6).

Cluster 2: 'Standard-cost borrowers'. A further third of the consumers in our sample (34%) fall into a cluster of borrowers who tend not to hold mortgages, but are otherwise very similar to mortgage holders, in terms of their use of other forms of debt. They have 5.2 non-mortgage credit products on average and hold most of this debt in standard-cost credit, primarily credit cards (68%), personal loans (15%) and motor finance (11%). With an average age of 50, this group is somewhat older than mortgage holders, but

there is some evidence that it combines two distinct types of borrowers: younger individuals who haven't (yet) taken out a mortgage and older individuals who may already have paid off their mortgage (Figure 4). Current account turnover is £1,992 per month on average (Figure 5) and the credit score is 607 points on average (at the 60th percentile on average), as Figure 6 shows – both somewhat lower than the corresponding numbers for mortgage holders.

Cluster 3: 'High-cost borrowers'. A third cluster accounts for 18% of the consumers in our sample. Members of this group tend to be heavy users of high-cost credit products (Figure 2); they don't have mortgages and hold little standard-cost credit. Average total debt balance is low at £1,179 (Figure 3), but most of this is in current account overdrafts (46%), retail finance (21%) and mail-order credit (17%). It is the youngest cluster (average age 40 – Figure 4) and has the lowest average current account turnover (£1,328 per month) and credit score (572 points, 39th percentile on average) – Figures 5 and 6.

Cluster 4: 'Household bills only'. This final cluster, accounting for only 4% of our sample, is made up primarily of consumers with little or no observed credit product usage. The debts of these consumers are primarily arrears on household bills (Figure 2). Total balances for this cluster are extremely low at £91 on average (Figure 3). Average age is 51, making this the oldest cluster but, as Figure 4 shows, this cluster brings together young individuals – those who are yet to take out any credit – with older individuals who may have had credit obligations in the past but have now paid them all off. Average current account turnover is low, similar to that for high-cost borrowers (Figure 5). On average, this group also has intermediate credit scores, slightly lower than standard-cost borrowers (Figure 6).

Figure 3: Total debt balance distribution by cluster
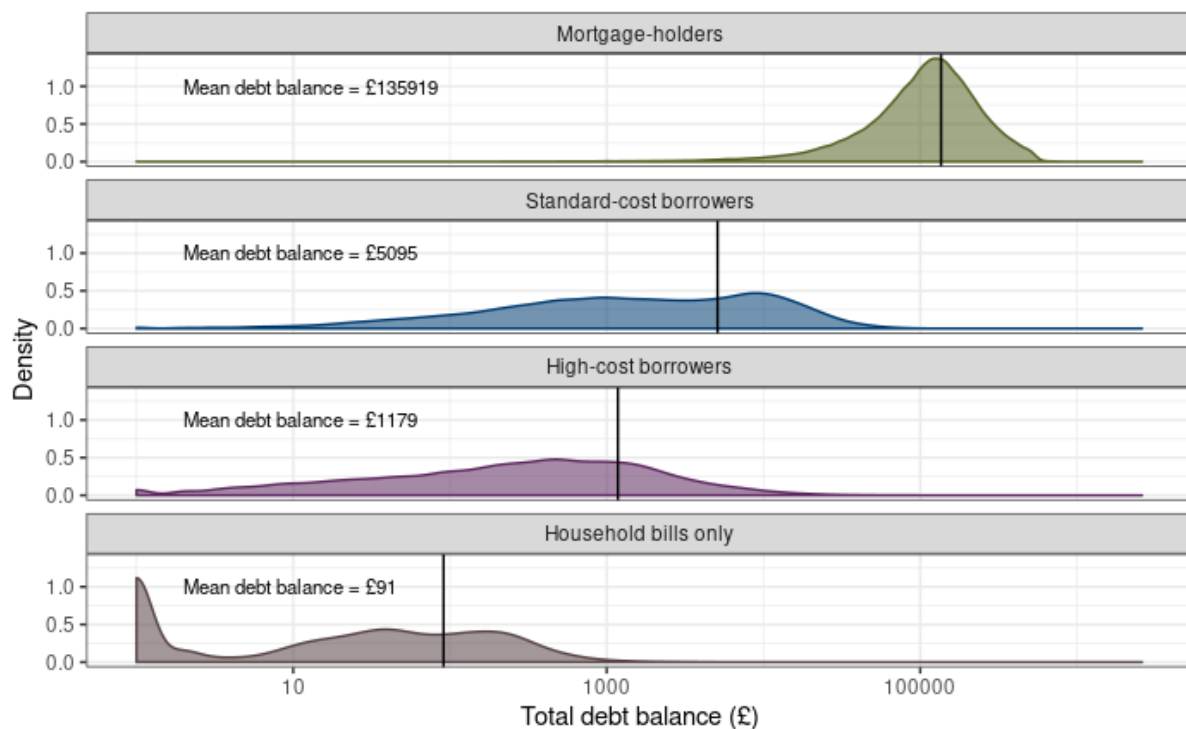
Notes: This figure shows how the distribution of total debt balances varies across the four borrower clusters.

Figure 4: Age distribution by cluster
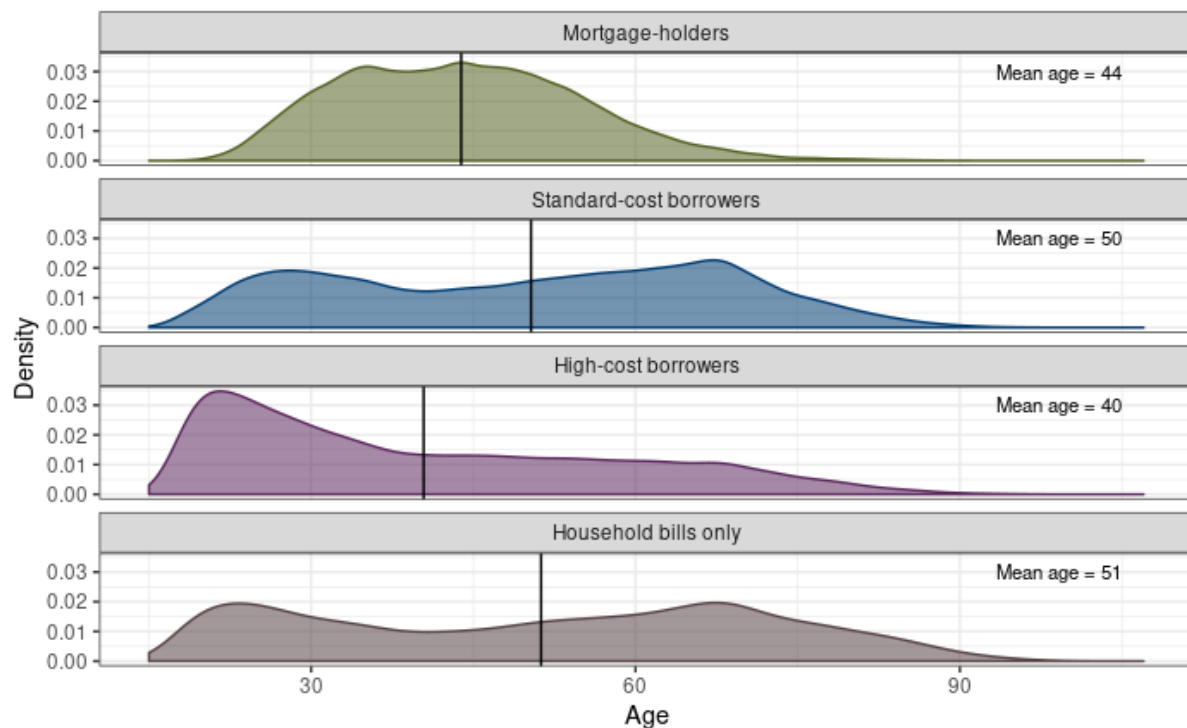
Notes: This figure shows how the age distribution varies across the four borrower clusters.

Figure 5: Current account turnover distribution by cluster
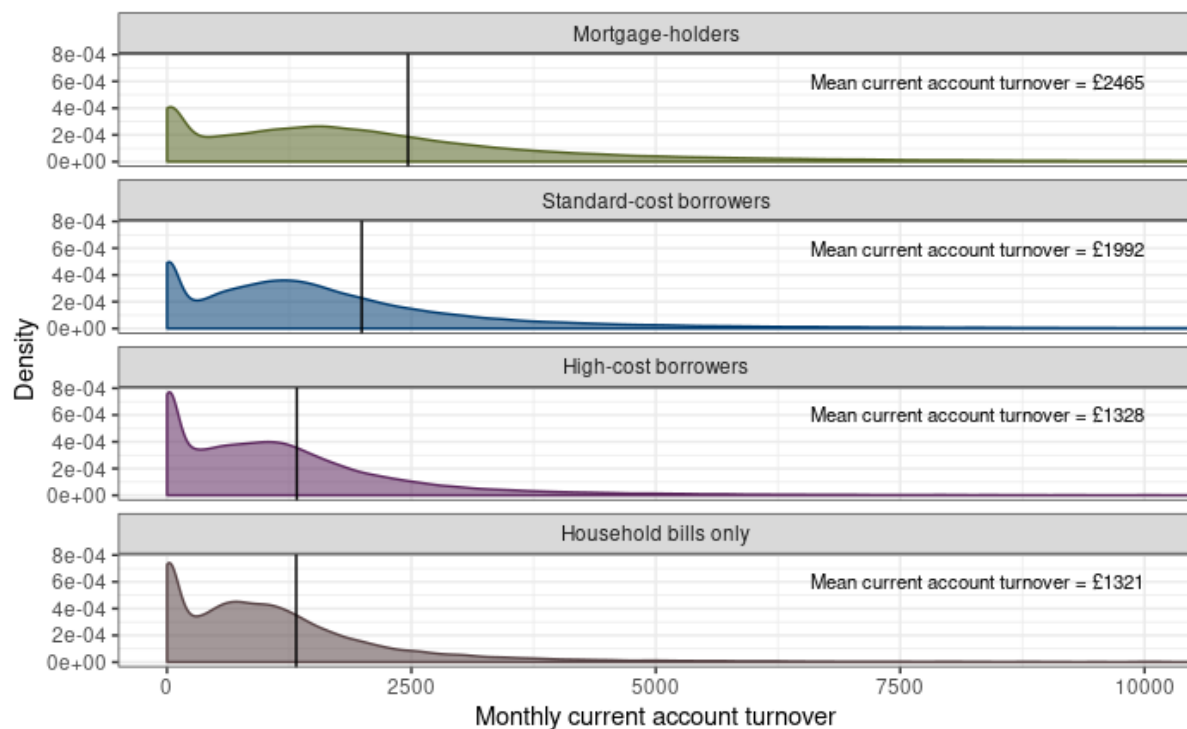
Notes: This figure shows how the distribution of current account turnover (a proxy for income) varies across the four borrower clusters.

Figure 6: Credit score distribution by cluster
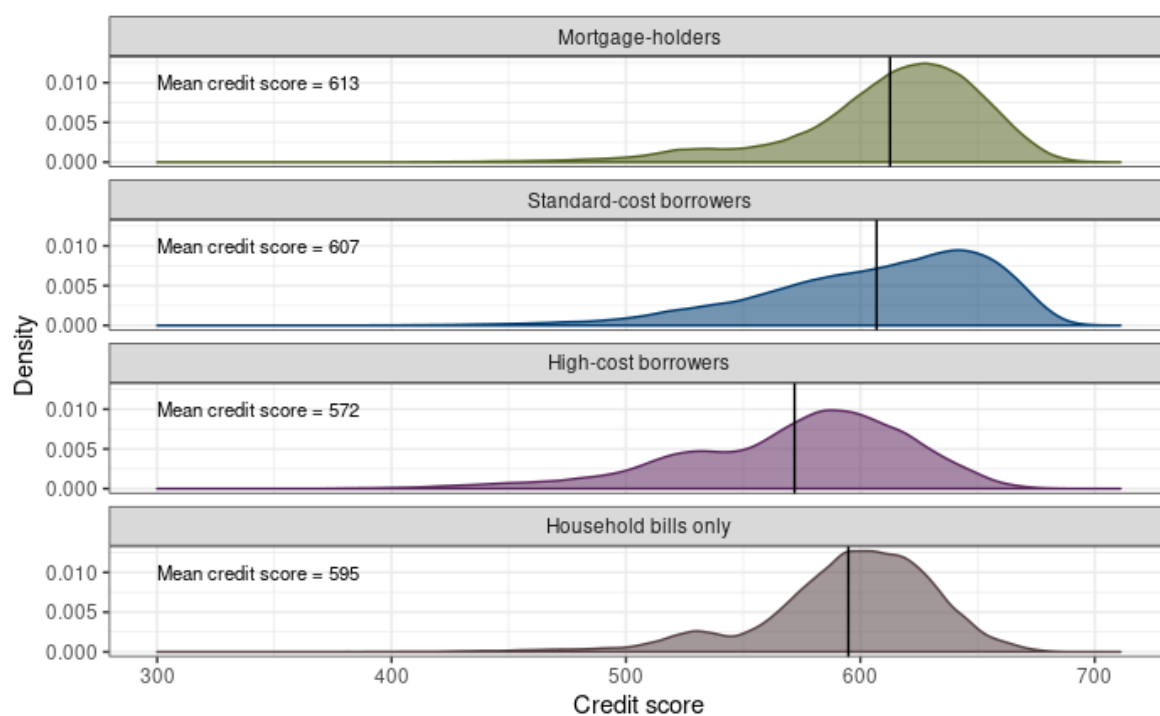
Notes: This figure shows how the distribution of credit score varies across the four borrower clusters.

Figure 7: Regional variation in the location of clusters
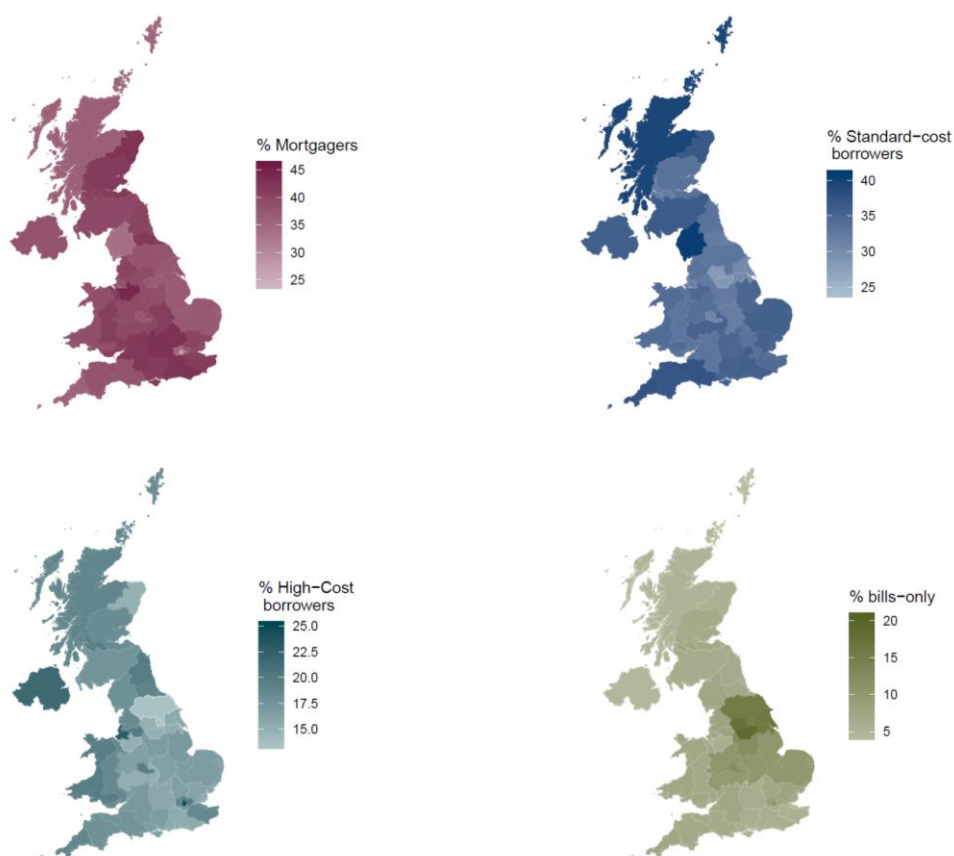
Notes: This figure shows the proportion of individuals in each region that belong to each cluster.

To summarise, we observe that mortgage holders have the highest total debt balances, followed by standard-cost credit users, high-cost credit users and finally the household bills only group. There are also marked differences across clusters in terms of age, current account turnover, credit scores and number of credit products held. Figure 7 shows that there is some interesting regional variation in the location of clusters. For example, high-cost borrowers are over-represented in London and the urban areas in the North West, while the household bills only group are disproportionately in North East England. There is also an interesting hierarchy of types of credit held: mortgage-holders have some standard-cost and high-cost credit, standard-cost borrowers have some high-cost credit but not mortgages, high-cost borrowers do not have mortgage debt and have little standard-cost credit. Finally, household bills debtors have little credit across all three traditional credit categories (mortgages, low-cost and high-cost).

3.2 Commonalities and differences for those who fall into distress

In this section, we take a closer look at those in each cluster who fall into financial distress and compare these individuals with other individuals within the same cluster. We also look at the ways in which distress arises. We observe some interesting patterns across clusters in terms of the share of individuals falling into distress, the characteristics of those who fall into distress, and what happens in the run-up to the distress date (or randomly selected date for non-distressed borrowers).

Figure 8: Age distribution by distress status and cluster
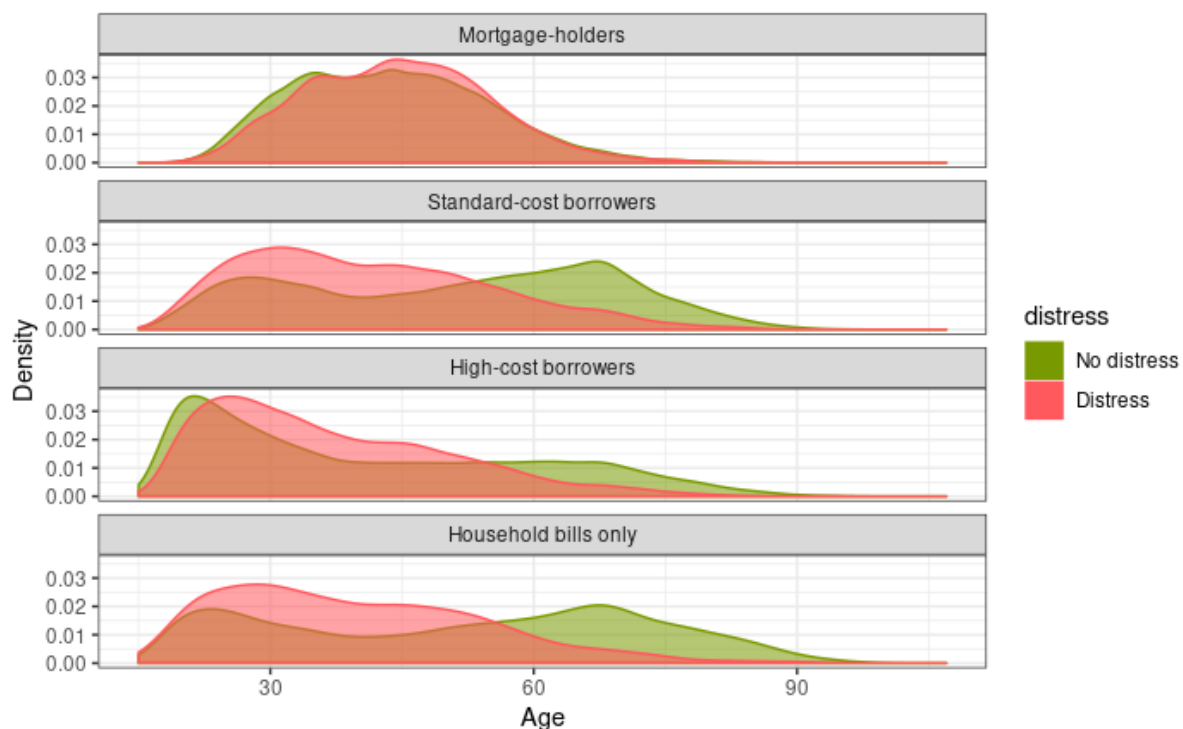
Notes: This figure shows how the age distribution varies by whether individuals fall into distress, split by the four borrower clusters.

'Mortgage holders' in distress. Around 1 in 20 (6%) in this group suffers financial distress at some point during the 38 months of our sample. In contrast to the other clusters, the distressed have a similar age profile to the non-distressed (see Figure 8).

Six months before distress, the distressed have current account turnover that is 9% lower on average (£2,163 vs £2,484 per month, based on our proxy from current account turnover) and a credit score that is around 80 points (or 40 percentiles) lower on average. Possibly as a consequence, they also have slightly lower total debt balances before distress (£128,334 compared to £136,402). While the vast majority of their debt is in mortgages (just like the non-distressed group), they hold 28% more standard-cost credit and double the amount of high-cost credit. As a result, their unsecured DTI ratio is double that of the non-distressed (5.93 vs 2.68), perhaps suggesting an already precarious financial situation. The distressed are disproportionately located in the West Midlands, North West and Wales (Figure 13).

Over the 6 months leading up to distress, those affected tend to prioritise mortgage repayments and get into trouble first on other products, particularly standard-cost credit (Figure 9). They reduce their mortgage balance by more on average than the non-distressed, primarily because they don't (or can't) take out additional mortgage borrowing (see Figure 10). The distressed take out substantial additional standard-cost and high-cost credit (£807 and £319 on average), much more than those not affected, and considerably more standard-cost credit than the other clusters (Figure 11).

Although available credit falls by around £360 on average for distressed mortgage holders in the run-up to distress, they still have £4,000 of available credit on average (Figure 12), much of it fungible credit that can be used for any form of spending (credit cards and current account overdrafts). They experience a modest fall in current account turnover (£91 on average, Figure 14), with more of them experiencing a fall in current account turnover in excess of 50% (15 vs 12% in the non-distressed group). In terms of distress durations, 38% leave distress within 3 months and more than half within 12 months.

'Standard-cost borrowers' in distress. Around 1 in 12 members of this group (8%) enter financial distress. They are substantially younger (10 years on average) than the non-distressed in this group (Figure 8).

Six months before distress, their current account turnover is 4% lower on average (£1,924 vs £1,998 per month), their credit score is almost 90 points (or 45 percentiles) lower on average and total debt balances are two thirds higher (£7,980 compared to £4,836), leading to an unsecured DTI ratio that is more than twice that of those in the group who avoid distress (5.55 compared to 2.56%). Available credit is more than £4,800 lower for those who go on to experience distress (£2,664 vs £7,471), while the share of their debt in high-cost credit products is more than double (7 vs 3%). Those affected by distress are disproportionately located in London, the West Midlands and the North West (Figure 13).

Over the 6 months leading up to distress, they take out substantial additional standard-cost and high-cost credit (£482 and £366 on average) unlike those not affected, who take out little additional credit (Figure 11). As a result, available credit falls by £483 in the distressed group while there is a small increase for the non-distressed (Figure 12). The distressed experience a negative shock to current account turnover of £177 on

average, with a 3 percentage point increase in the proportion of individuals with turnover of less than £100; this compares with the non-distressed group, who see a small increase in current account turnover on average and no change in the proportion with less than £100 (Figures 14 and 15).

Figure 9: Mortgage-holders' product holdings compared with first product in distress
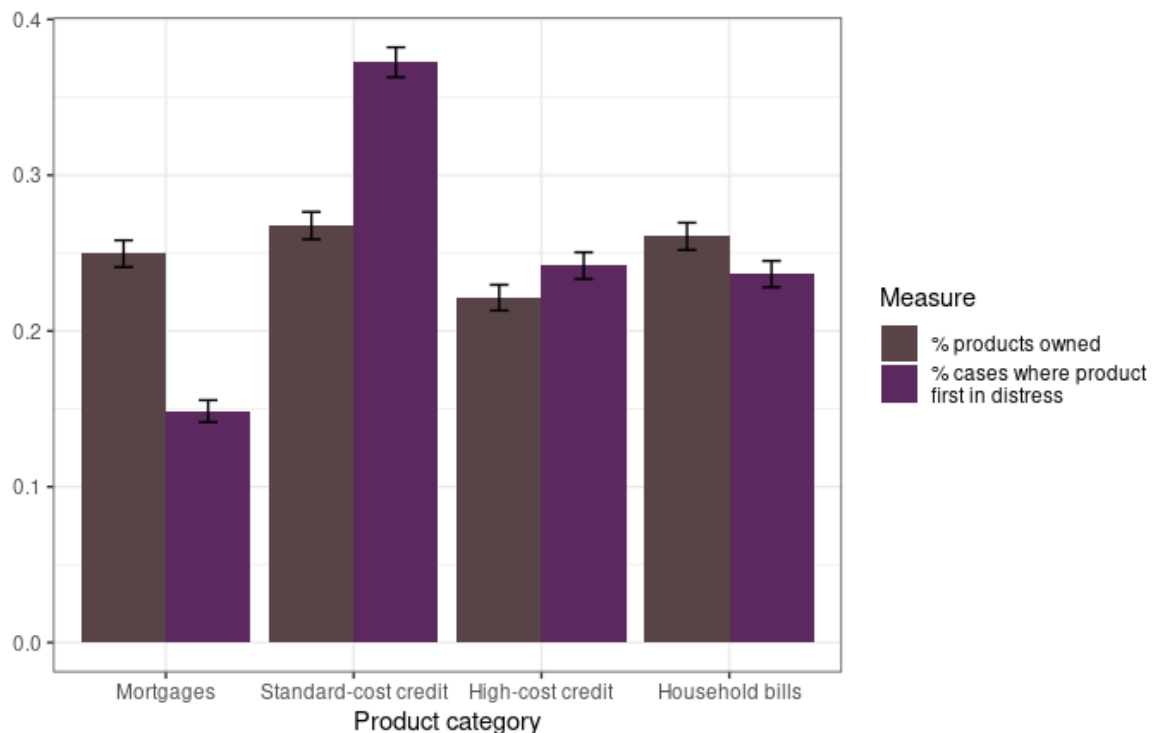
Notes: This figure shows, for distressed mortgage-holders, the proportion of products held in each of the four product categories (brown bars) and the proportion of cases where the first product in distress is in the product category indicated (purple bars). If the first product into distress were chosen at random, then the purple and brown bars would have equal heights. Error bars show the 95% confidence interval.

Figure 10: Change in mortgage debt balances over the six months leading up to distress, by cluster
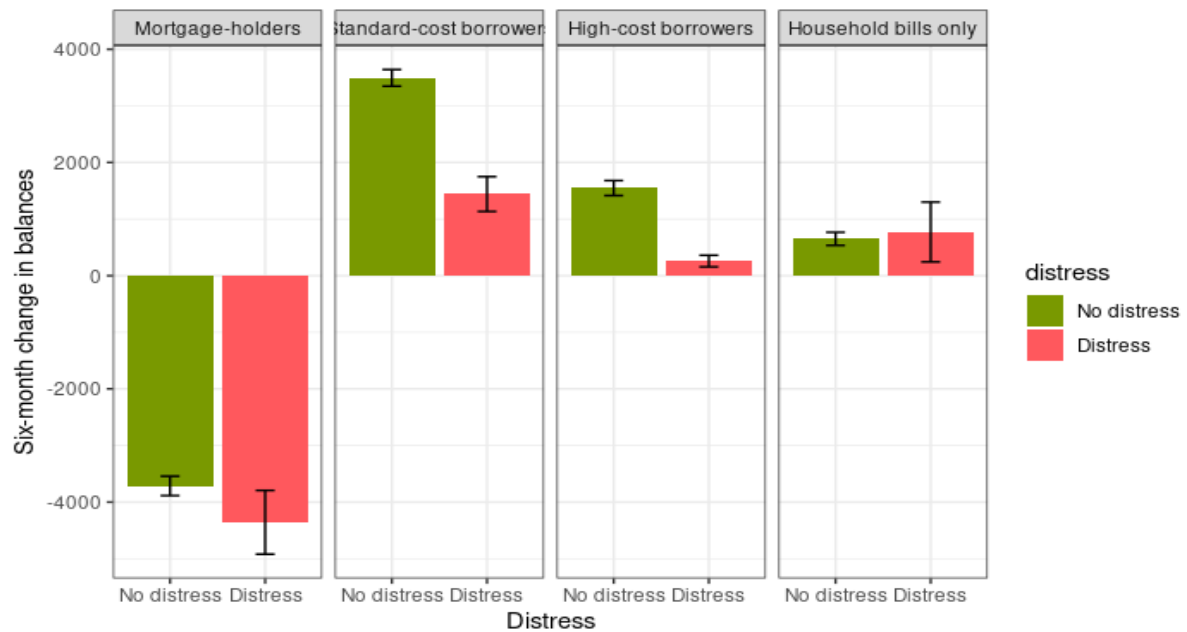
Notes: This figure shows how mortgage debt balances change over the six months before distress, split by cluster and distress status. For non-distress borrowers, we randomly selected distress dates, where the distribution of these dates is chosen to match that for actual distress dates. Error bars show the 95% confidence interval.

Figure 11: Change in total debt balances over the six months leading up to distress, by cluster and credit type (excluding mortgages)
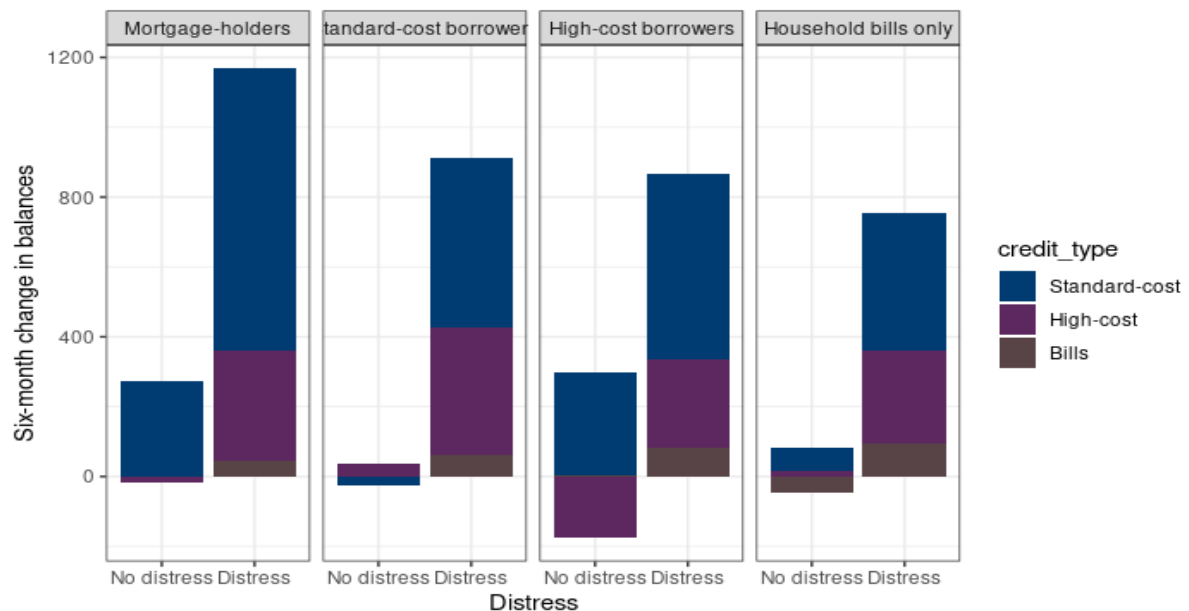
Notes: This figure shows how non-mortgage debt balances change over the six months leading up to distress, split by cluster and distress status. For non-distress borrowers, we randomly selected distress dates, where the distribution of these dates is chosen to match that for actual distress dates.

Figure 12: Available credit six months prior to distress and at point of entering distress, by cluster and distress status
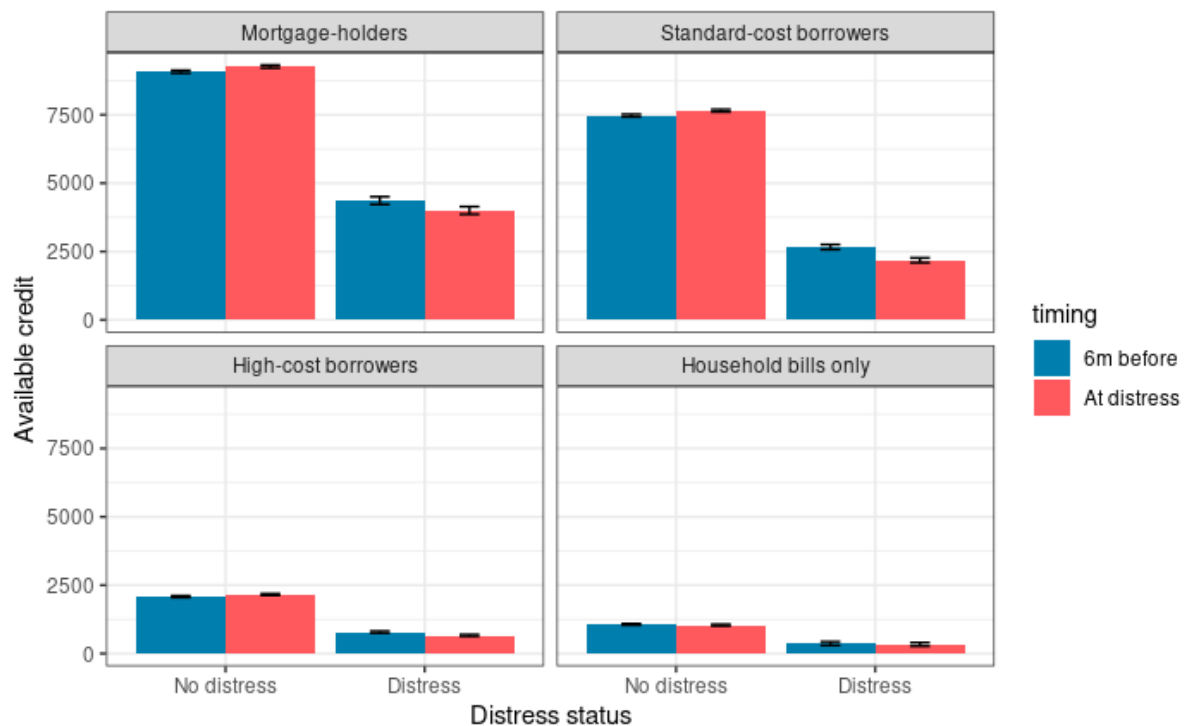
Notes: This figure shows available credit (£) six months before distress and at the point of entering distress, split by cluster and distress status. For non-distress borrowers, we randomly selected distress dates, where the distribution of these dates is chosen to match that for actual distress dates. Error bars show the 95% confidence interval.

'High-cost borrowers' in distress. This cluster shows the highest incidence of financial problems – almost 1 in 5 (18%) is hit by financial distress over the period of our data. They are around 4 years younger on average, primarily because very few of the distressed are over 60 (Figure 8).

Six months before distress, their current account turnover is very similar on average (£1,390 vs £1,314 per month) but their credit score is 74 points (31 percentiles) lower on average. Total debt balances among the distressed are double their non-distressed counterparts (£2,004 compared to £997), and their unsecured DTI ratio is almost 3 times as high (2.68 compared to 0.91). Interestingly, they hold a slightly lower proportion of their debts in high-cost credit and a slightly higher proportion in standard-cost credit, but the high-cost credit they hold tends to be the more expensive types (high-cost short-term credit, home credit and rent-to-own finance). Available credit is much lower (£785 vs £2,083). The distressed are disproportionately located in the West Midlands, urban North West and North East, Wales and Scotland (Figure 13).

Over the 6 months leading up to distress, they take out substantial additional standard-cost and high-cost credit (£529 and £256 on average); this contrasts with those not affected, who pay down their high-cost balances over the same period (Figure 11). Their available credit decreases by £120 on average in the run-up to distress compared to an increase of £74 for the non-distressed (Figure 12), demonstrating that high-cost borrowers not in financial difficulty are trying to reduce their high-cost credit exposure. At distress, available credit of the distressed is only £665 and almost half of this is in less

fungible types of credit (mail-order credit and store cards) that can only be used for specific types of spending, suggesting that these individuals have little room for manoeuvre. They experience a small fall in current account turnover of £45 on average, compared to a rise of £118 among the non-distressed in this group. There is a 3 percentage point increase in the proportion with current account turnover of less than £100 among the distressed compared to a 1 percentage point fall among the non-distressed (Figure 15). In terms of durations, almost two thirds (63%) experience distress lasting more than 12 months.

'Household bills only' in distress. One in 20 experience financial distress (5%) – a similar proportion to the mortgage-holders group. They are 12 years younger on average than the non-distressed in this group because it is overwhelmingly the young who get into difficulty (see Figure 8).

Six months before distress, there is little difference in current account turnover but their credit score is 78 points (37 percentiles) lower on average. While this group tends to have very low debt balances 6 months prior to distress (£91), those who experience distress have more than 3 times the debt balance on average than those who don't (£272 vs £81) and substantially lower available credit (£365 vs £1,067 – see Figure 12).

In common with the other clusters, the distressed accumulate more debt in total over the 6 months prior to distress than the non-distressed (Figure 11). There is little change in available credit for the distressed in the run-up to distress (Figure 10); at the point of entering distress, unused credit capacity is £336, suggesting that these individuals may be constrained. They experience a small fall in current account turnover on average (£31 compared to a rise of £10 among the non-distressed) and there is a 2 percentage point rise in the proportion with current account turnover of less than £100 compared to no change for the non-distressed (Figure 15).

Figure 13: Geographical concentration of financial distress
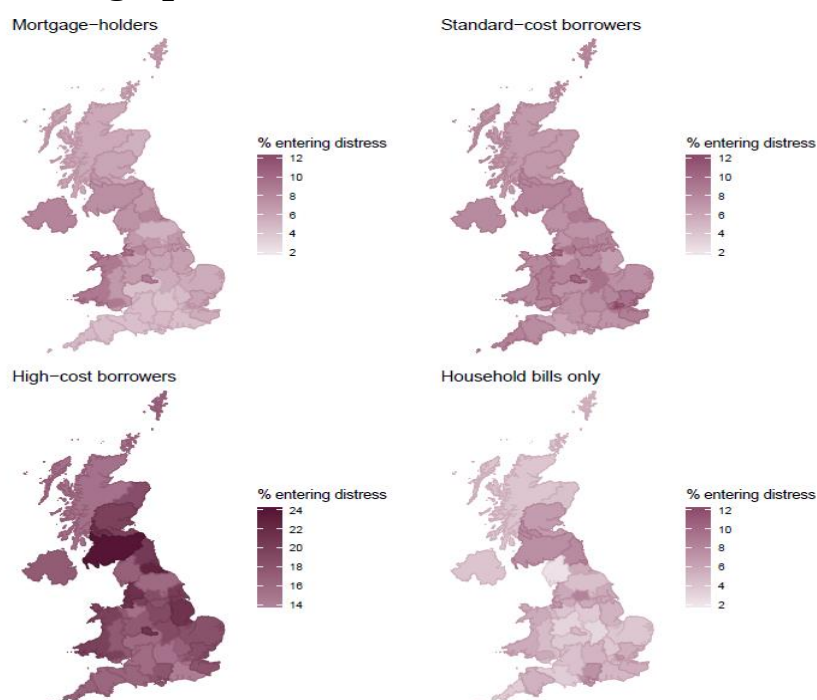
Notes: This figure shows how the concentration of distress varies across regions, split by cluster.

Figure 14: Current account turnover six months before distress and at distress, by cluster and distress status
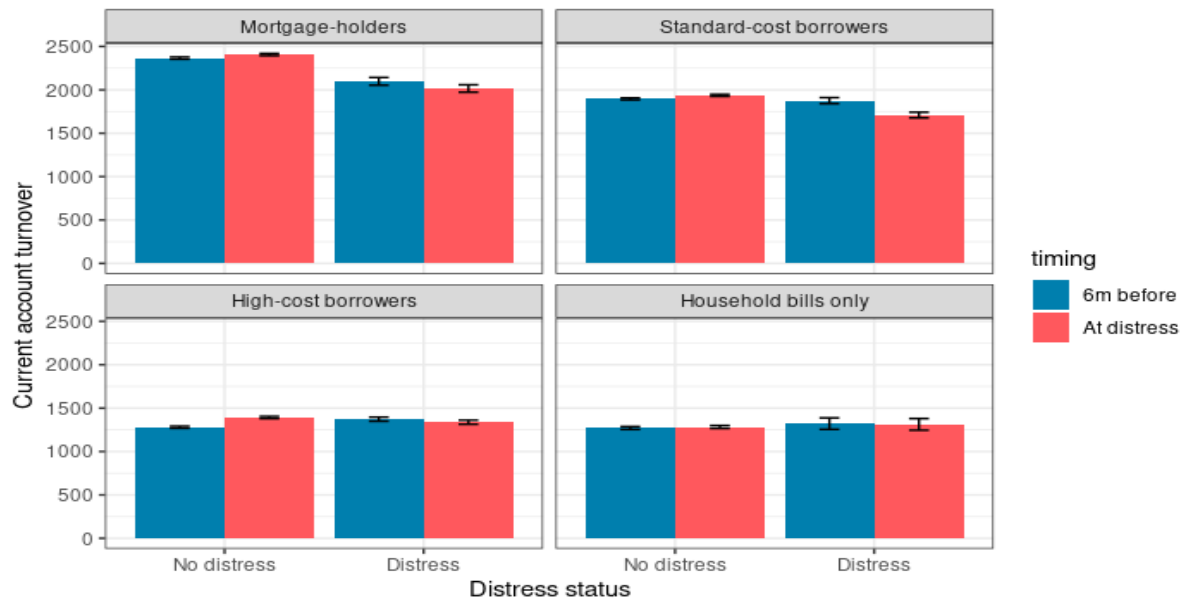
Notes: This figure shows current account turnover (£) – a proxy for income – six months prior to distress and at the point of entering distress, split by cluster and distress status. For non-distress borrowers, we randomly selected distress dates, where the distribution of these dates is chosen to match that for actual distress dates. Error bars show the 95% confidence interval.

Figure 15: Proportion with current account turnover less than £100 six months prior to distress and on entering distress, by cluster and status
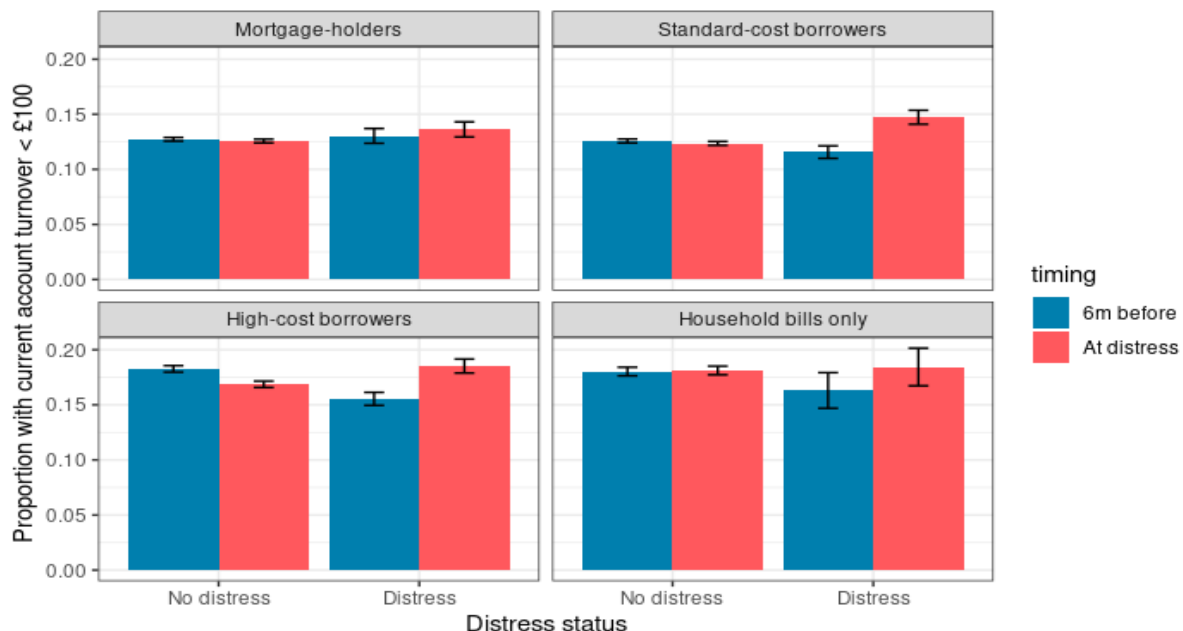
Notes: This figure shows the proportion of individuals with monthly current account turnover less than £100 six months before distress and at distress, split by cluster and distress status. For non-distress borrowers, we randomly selected distress dates, where the distribution of these dates is chosen to match that for actual distress dates. Error bars show the 95% confidence interval.

To summarise, we find that the incidence of distress varies markedly across clusters: 18% of high-cost borrowers fall into distress over the period January 2015 to February 2018, more than twice that of standard-cost borrowers (8%), three times that of mortgage holders (6%) and those with household bills only (5%). All differences in the incidence of distress are statistically significant.

Taking the group of distressed individuals as a whole, therefore, 25% are in the mortgage cluster, 32% in the standard-cost credit cluster, 38% in the high-cost credit cluster and 5% in the household bills only cluster.

Those who go on to experience distress tend to share some common characteristics 6 months prior to hitting problems, regardless of cluster: they are typically younger, have lower income, have a lower credit score, higher total debt balances and lower unused credit, and tend to hold more expensive forms of debt. And, as Figure 13 shows, they also tend to be disproportionately concentrated in major urban centres (London, West Midlands, the urban North West and North East and Southern Scotland).

But we also find interesting differences by cluster. For example, in the cluster of mortgage-holders, those that fall into distress actually have lower total debt balances than the non-distressed (and the difference is statistically significant) because they have smaller mortgages on average (possibly a consequence of being less financially secure when the mortgage was taken out). For high-cost borrowers, we find that – unlike other clusters – income is actually a little higher for the distressed relative to the non-distressed (again, this difference is statistically significant).

There are also commonalities across cluster on the path into difficulty: individuals tend to experience a fall in income, increase their credit limits, take out additional credit and reduce available credit. However, the fall in income is larger on average for standard-cost borrowers than it is for the other clusters (this is statistically significant). Mortgage-holders are notable for protecting their mortgage on the way into distress – presumably because they risk losing their home if they fail to do so. At distress, mortgage-holders and standard-cost borrowers both have a substantial amount of unused fungible credit (credit that can be used for any form of spending), in contrast to high-cost borrowers and the household bills only group.

While it may be puzzling that distressed borrowers do not exhaust fungible credit capacity to avoid going into distress, there are a range of possible explanations. Rational explanations include (i) unused capacity being insufficient to avoid distress (perhaps particularly relevant for distress on mortgage repayments), (ii) available credit being associated with high interest rates and charges likely to lead to greater trouble in the future, and (iii) a desire to keep some spare capacity as a precaution against unavoidable future spending shocks. Other explanations include the possibility that borrowers are unaware of unexhausted credit limits either due to poor financial literacy or lack of saliency of product features.

In addition, there are some interesting differences across clusters in terms of the length of time that the distress episode lasts. In particular, many more high-cost borrowers experience extended periods of distress than mortgage holders: for almost two thirds of high-cost borrowers, distress lasts more than 12 months compared to less than half of mortgage holders.

To understand who experiences long periods of distress, Table 3 below shows how the characteristics of individuals who exit distress within 3 months differ to those of individuals for whom distress lasts more than 12 months, again split by cluster. This shows clearly that long distress episodes tend to be experienced by borrowers that are less credit worthy (lower credit score, higher DTI ratio and lower unused credit capacity), have taken on more standard-cost and high-cost credit in the run-up to distress, and have experienced a bigger fall in income in the run-up to distress.

Of course, the patterns we have highlighted are not necessarily causal. For example, the fact that distressed individuals tend to accumulate more high-cost credit may reflect pre-existing financial circumstances that are less stable, rather than high-cost credit being the cause of financial distress.

Table 2: Characteristics of those who do and don't fall into distress, split by cluster

	Mortgage holders (non-distressed)	Mortgage holders (distressed)		Standard cost borrowers (non-distressed)	Standard cost borrowers (distressed)		High cost borrowers (non-distressed)	High cost borrowers (distressed)		Household bills only (non-distressed)	Household bills only (distressed)	
Clustering variables												
Mortgages: % of total balances, 6m before distress	0.948	0.929	***	0.006	0.005	***	0.001	0.001	**	0	0	**
Standard-cost credit: % of total balances, 6m before distress	0.046	0.058	***	0.954	0.914	***	0.038	0.104	***	0.005	0.009	***
High-cost credit: % of total balances, 6m before distress	0.006	0.012	***	0.034	0.073	***	0.955	0.879	***	0.004	0.027	***
Outstanding household bills: % of total balances, 6m before distress	0	0	***	0.005	0.008	***	0.006	0.016	***	0.991	0.964	***
Total balances: 6m before distress	136402	128334	***	4836	7980	***	997	2004	***	81	272	***
Current account turnover: 6m before distress	2484	2163	***	1998	1924	***	1314	1390	***	1321	1338	
Age	44	45	***	51	41	***	41	37	***	52	40	***
Credit score: 6m before distress	617	538	***	614	526	***	585	511	***	599	521	***
Non-clustering variables												
Motor: % of total balances, 6m before distress	0.013	0.015	**	0.106	0.139	***	0.003	0.015	***	0	0	
Motor finance: % of total balances, 6m before distress	0	0	**	0.004	0.009	***	0	0.001	**	0	0	

Personal loans: % of total balances, 6m before distress	0.022	0.029	***	0.144	0.221	***	0.016	0.056	***	0.001	0.011	**
Credit cards: % of total balances, 6m before distress	0.025	0.035	***	0.697	0.543	***	0.121	0.246	***	0.032	0.081	***
Charge cards: % of total balances, 6m before distress	0	0		0.004	0.002	***	0	0		0	0	**
Payday loans: % of total balances, 6m before distress	0	0	***	0	0.003	***	0.006	0.051	***	0	0.001	***
Home credit: % of total balances, 6m before distress	0	0.001	***	0	0.003	***	0.015	0.094	***	0	0.003	***
Rent-to-own: % of total balances, 6m before distress	0	0	***	0	0.001	***	0.004	0.046	***	0	0	
Guarantor loans: % of total balances, 6m before distress	0	0	***	0	0.001	***	0.002	0.015	***	0	0	
Store card credit: % of total balances, 6m before distress	0	0.001	***	0.003	0.007	***	0.047	0.037	***	0	0.001	
Mail order credit: % of total balances, 6m before distress	0.001	0.002	***	0.007	0.016	***	0.176	0.134	***	0.001	0.005	***
Retail finance: % of total balances, 6m before distress	0.003	0.003		0.013	0.013		0.229	0.104	***	0.001	0.003	***
Running account: % of total balances, 6m before distress	0	0	***	0	0.001	***	0.002	0.006	***	0	0	
Overdrafts: % of total balances, 6m before distress	0.002	0.005	***	0.011	0.03	***	0.475	0.391	***	0.002	0.015	***
Unsecured DTI ratio (interpolated): 6m before distress	2.679	5.934	***	2.559	5.554	***	0.91	2.675	***	0.247	1.748	***
Credit score quantile, 6m before distress	0.665	0.236	***	0.637	0.183	***	0.442	0.13	***	0.529	0.161	***
Available credit (£), 6m before	9071	4363	***	7471	2664	***	2083	785	***	1067	365	***

	V1	V2	Sig	V3	V4	Sig	V5	V6	Sig	V7	V8	Sig
Changes in available credit(£)	191	-362	***	179	-483	***	74	-120	***	-28	-29	
Mortgages: 6m change in balances	-3714	-4357	**	3494	1442	***	1547	258	***	651	771	
Standard-cost credit: 6m change in balances	272	807	***	-26	482	***	295	529	***	68	397	***
High-cost credit: 6m change in balances	-17	319	***	36	366	***	-176	256	***	15	266	***
Outstanding household bills: 6m change in balances	0	43	***	1	62	***	1	81	***	-48	93	***
Current account turnover: at distress, less 100	0.1257	0.1362	***	0.1235	0.1473	***	0.1686	0.1852	***	0.1812	0.1844	
Current account turnover: 6mn before distress, less 100	0.1273	0.1304		0.1258	0.1157	***	0.1827	0.1555	***	0.1802	0.1631	**
Current account turnover: 6m change	52	-91	***	44	-177	***	118	-45	***	10	-31	
Current account turnover: 6m change is decrease by more than 50%	0.115	0.153	***	0.123	0.202	***	0.14	0.183	***	0.137	0.174	***
First distress is mortgages	0.356	0.149	***	0.016	0.003	***	0.009	0.002	***	0.005	0.001	***
First distress is standard-cost credit	0.258	0.372	***	0.527	0.558	***	0.078	0.188	***	0.023	0.083	***
First distress is high-cost credit	0.076	0.144	***	0.065	0.153	***	0.206	0.383	***	0.01	0.133	***
First distress is household bills	0.267	0.237	***	0.294	0.221	***	0.312	0.249	***	0.892	0.708	***
First distress is overdrafts	0.034	0.098	***	0.027	0.065	***	0.158	0.175	***	0.006	0.073	***
Share of products: mortgages	0.356	0.25	***	0.016	0.004	***	0.009	0.001	***	0.005	0.002	***
Share of products: standard-cost credit	0.258	0.268	**	0.527	0.484	***	0.078	0.132	***	0.023	0.054	***

Share of products: high-cost credit	0.076	0.124	***	0.065		0.146	***	0.206	0.366	***	0.01	0.087	***
Share of products: household bills	0.267	0.261		0.294		0.262	***	0.312	0.266	***	0.892	0.778	***
Share of products: overdrafts	0.034	0.098	***	0.027		0.102	***	0.158	0.23	***	0.006	0.078	***
Length of the distress episode in months if within sample window	-	5.9		-		6.5		-	7.8		-	8.3	
Distress ends within observation period	-	0.573		-		0.484		-	0.464		-	0.54	
Number of observations	152404	9703		134922		12096		65514	14415		37038	2005	

Notes: stars indicate statistical significance of the difference in means between distressed and non-distressed borrowers in each cluster: * = 10%, ** = 5% and *** = 1%.

Table 3: Characteristics of those experiencing short and long periods of distress, split by cluster

Cluster	Mortgage-holders		Standard-cost borrowers		High-cost borrowers		Household bills only	
Length of distress	<=3 mths	>12 mths	<=3 mths	>12 mths	<=3 mths	>12 mths	<=3 mths	>12 mths
Total debt balances (£), 6m before distress	132,205	124,863	8,230	7,806	2,371	1,819	268	267
Credit score quantile, 6m before distress	0.272	0.204	0.208	0.17	0.139	0.125	0.196	0.141
Unsecured DTI ratio, 6m before distress	5.132	6.732	5.093	5.854	2.368	2.889	1.176	2.172
Available credit (£), 6m before distress	5,428	3,444	3,438	2,228	1,183	599	619	231
Standard-cost credit balance (£): 6m change	534	1,077	230	624	594	515	299	490
High-cost credit balance (£): 6m change	139	504	257	444	114	331	160	345
Current account turnover (£): 6m change	-37	-123	-119	-218	21	-71	-48	-35

4   Conclusion

In this paper, we exploit a large data set of UK credit files to analyse entry into financial distress and explore how distress links to personal characteristics and consumer credit use, and what changes in the run-up to distress.

Our first step is to apply statistical cluster analysis to group borrowers according to their characteristics and use of debt. Four clusters emerge, broadly following the contours of majority debt holdings – as shorthand we label these 'mortgage holders', 'standard-cost borrowers', 'high-cost borrowers' and 'household bills only'.

We define financial distress as being at least 3 months in arrears on one or more credit product, or being subject to some more serious form enforcement action (such as being declared bankrupt or having a credit product transferred to a debt collector). Based on this definition, we find that individuals who fall into difficulty come disproportionately from the group of high-cost borrowers: 18% of this group falls into distress over the period January 2015 to February 2018 compared to less than half this level for other borrower types.

Regardless of which cluster individuals belong to in our analysis, distressed individuals share many characteristics. For example, relative to the non-distressed, they tend to be younger, have a much worse pre-distress credit score, have lower current account turnover, be more leveraged and hold more expensive debt on average.

But there are also interesting nuances across clusters. For example, in the cluster of mortgage-holders, those that fall into distress actually have lower total debt balances than those who avoid distress because they have smaller mortgages on average (possibly a consequence of being less financially secure when the mortgage was taken out). Mortgage-holders and standard-cost borrowers both have a substantial amount of fungible unused credit, in contrast to high-cost borrowers and those in the household bills only group. For high-cost borrowers, we find that – unlike other clusters – income is actually slightly higher for the distressed than the non-distressed.

There are also commonalities across cluster on the path into difficulty: individuals tend to experience a fall in income, increase their credit limits and take out additional credit. But the fall in income is larger on average for standard-cost borrowers than it is for other clusters. Mortgage-holders are notable for protecting their mortgage on the way into distress – presumably because they risk losing their home if they fail to do so.

The associations we uncover are not necessarily causal but suggest avenues to explore in future work. First, building on Cocco et al. (2016) and work on payday loans (Gathergood et al., 2019), it would be useful to explore the causes of financial distress. For example, what proportion of individuals experience a loss of income or an expenditure shock in the run-up to distress? Is there any evidence that a spiral in debt servicing costs plays a role? Second, how do individuals respond to falling into financial distress? Do they try to rebalance or restructure their debt portfolios? What fraction seek help? And, as Zinman

(2015) asks, do individuals make appropriate use of the debt resolution channels available to them? We plan to explore some of these issues in future analysis.

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