

Online Intermediation and the Terms of Consumer Credit

GUSTAV ALFELT, MARIEKE BOS AND KASPER ROSZBACH*

Gustav Alfelt works in the Research Division of the Monetary Policy Department at the Riksbank. Marieke Bos works at Stockholm University and is a visiting scholar at the Swedish Institute for Financial Research (SIFR). Kasper Roszbach is Head of the Financial Stability Department at the Riksbank.

Many developed countries have experienced substantial growth in consumer, that is, uncollateralized, credit over the last two decades. Part of this growth has been driven by technological changes, such as the ability of banks to have automated evaluations of loan applicants (credit scoring), lowered entry barriers due to internet technology, and the emergence of internet-based market places for banks. The uptake of different types of credit varies greatly across the income distribution. This is likely to have consequences for households' responsiveness to financial shocks, for example shocks to interest rates and the supply of credit. In this article we briefly describe how web-based intermediation of credit to households works. Using data from a Swedish internet-based marketplace for consumer credit we provide some descriptive statistics on how much credit households apply for and what quantities, durations and interest rates they are offered.

Developments in consumer credit markets

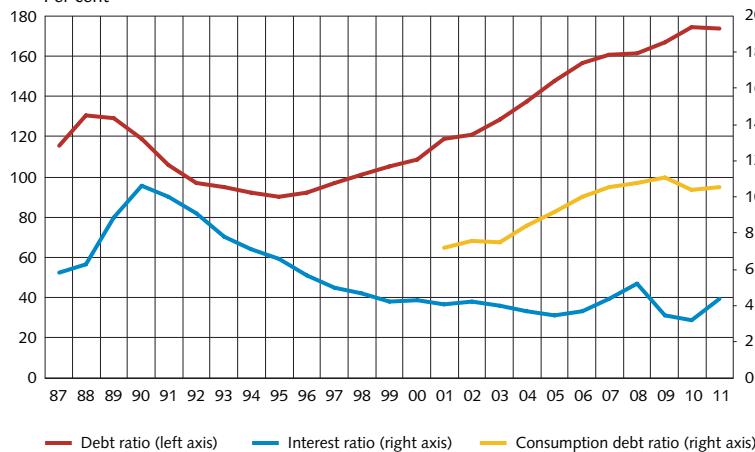
The objective of this article is to provide a basis for improving our understanding of consumers' credit decisions and the factors that determine their terms of credit. For this purpose, we exploit data from a relatively new web-based intermediary that enables consumers to receive and evaluate offers from multiple banks on a single credit application. This setting facilitates direct competition between banks and allows us to cast new light on two little-studied aspects of consumer credit markets. First, we provide new data that, to our knowledge, for the first time provides quantitative evidence on the span of interest rates that households are offered when credit bids are made by multiple banks. Second, we show that the terms of credit vary widely between households, for example by income and age.

The article is organized as follows. First we depict the development of different types of consumer credit relative to income in Sweden. Secondly, we continue with a brief description of the workings of web-based intermediation of credit to households. In the next section we characterize the households that apply for credit through the internet-based marketplace and compare them with the general Swedish population. Fourthly we illustrate what credit quantities and durations households apply for as well as what they are offered and choose. In the last section we conclude.

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Many developed countries have witnessed an enduring, strong growth of consumer credit in the last two decades. In Sweden, total outstanding credit obligations as a share of disposable income have on average increased from 100 per cent in 1992 to 170 per cent in 2011 (see Figure 1). Although households' total interest expenditure simultaneously fell from nine to four per cent of their yearly disposable income, their uptake of consumption credit has risen from six to nine per cent of disposable income over the last decade.

Figure 1. Swedish household debt, interest expenditures and consumption, 1987-2011
Per cent



Note. Swedish household debt as a percentage of disposable income (red line, left axis) and after tax interest expenditures as a percentage of disposable income (blue line, right axis) over the period 1987-2011. Consumption debt as a percentage of disposable income (yellow line, right axis).

Sources: The Riksbank, Statistics Sweden and Finansmarknadsrapporten 2012

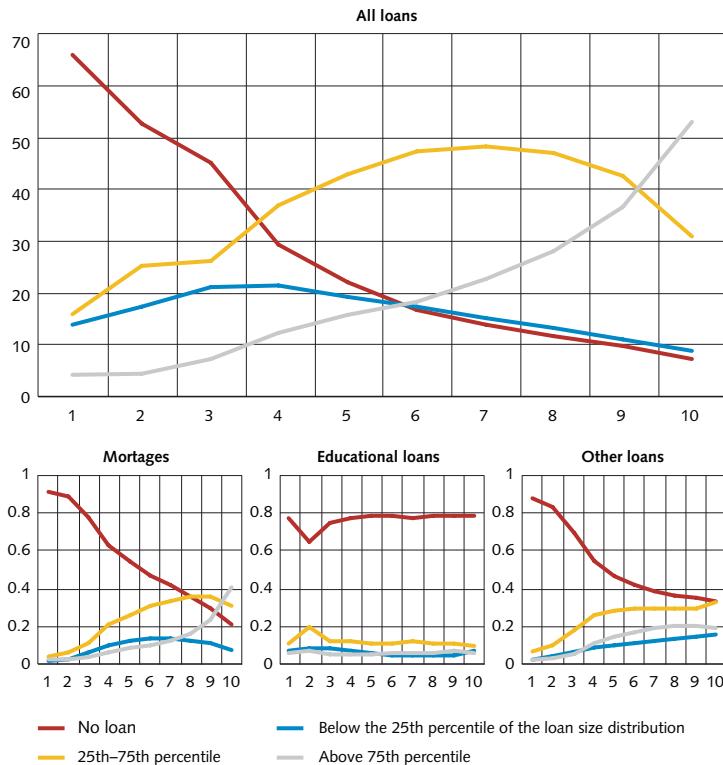
The steep increase in household indebtedness, combined with historically low interest rates, has created concerns among policy makers about both the risk of a credit-driven inflation of asset prices and the sustainability of these debt levels.

To be able to formulate effective policy measures in order to avoid excessive, that is, unsustainable, debt accumulation, it is important to understand the mechanisms behind consumers' credit decisions and any variation in the debt service that results from these decisions. For a start, it is important to realize that different types of debt matter more to some households than to others. There are, for example, large disparities over the income distribution in the types of debt that households hold. Figure 2 shows how lower-income households hold a substantially smaller share of their debt as mortgages and more as consumption credit (i.e. credit card-, installment-, educational loans and lines of credit). As disposable income increases, households hold steadily increasing shares of their debt in mortgages. This situation is to some extent comparable to, for example, the United States, where richer households concentrate debt in mortgages, while lower income households

hold greater shares of their debt as credit cards and uncollateralized consumer credit (see Survey of Consumer Finances, 2010). The heterogeneity in the debt-to-income ratios across credit types is substantial over the income distribution.

Figure 2. Relative importance of different types of credit among Swedish households in 2011

Frequency, per cent and income decile



Note. Households are sorted by disposable income and assigned to deciles. The relative importance of the type of credit is expressed, first, in the share of households that have the type of loan (y-axis) and second, the size of the loan; different line colors indicate different credit size quartiles¹, with the largest loan size in grey, and the smallest in blue. Other loans consists of credit card, installment and lines of credit.

1. Hedborg et al. (2013) divided the different loan sizes in quartiles: "All loans together": 1-25th percentile: (SEK 1-80 000), 25-75th percentile: (SEK 80 001-708 894), 75th-percentile: (SEK 708 895-); "Mortgages": 1-25th percentile: (SEK 1-242 060), 25-75th percentile: (SEK 242 061-900 000), 75th-percentile: (SEK 900 001-); "Educational loans": 1-25th percentile: (SEK 1-40 808), 25-75th percentile: (SEK 40 808-187 991), 75th-percentile: (SEK 187 992-); "Other loans": 1-25th percentile: (SEK 1-3 786), 25-75th percentile: (SEK 3 787-88 216), 75th-percentile: (SEK 88 217-).

Source: Hedborg et al., Strategi för att motverka överskuldssättning, SOU 2013:78

Access to credit is associated with both opportunities and risks. On the one hand it has facilitated households' ability to smooth consumption in the face of unexpected fluctuations in income. On the other hand readily available credit also exposes households to the risk of over-indebtedness, potentially leading to short-term or even long-term financial hardship. Baugh, Ben-David and Park (2014) show for the United States that households, on average, are financially constrained and exhibit myopic behavior. Dick and Lehnert (2010) document a link between credit supply in the United States and rising personal bankruptcy rates. They found that deregulation increased both lending and bankruptcy rates, but also led to lower loss rates on loans due to the adoption of new credit scoring technologies. In general, however, our understanding of whether and under precisely what conditions markets over-supply or under-supply credit, and why they do so, is still incomplete. For an overview of the current literature on this topic see Zinman (2013).

Although it is beyond the scope of this article to assess whether households on average gain or lose from the improved access to credit, the above data do strongly suggest that experiences differ substantially across different segments of the population. Such differences between households can influence households' sensitiveness to financial shocks, for example shocks to interest rates or the supply of credit.

Internet-based intermediation of credit

The intermediation of credit through the internet is a relatively new phenomenon and originated in the late 1990s. Initially, internet-based intermediation of credit was typically institution-specific, that is, applications for a credit card or line of credit went through a bank's website. Competition therefore mostly consisted of applicants searching online for alternative offers. Comparison sites, like Lending Tree in the United States, where one compares non-binding contract terms from different suppliers before applying, started out around 1998.

Peer-to-peer lending (P2P), a practice of lending money by individuals to other, unrelated, individuals or "peers" without going through a traditional financial intermediary started out in 2005. P2P allows for competition between individual credit suppliers when making credit offers.

In Sweden, a market for web-based intermediation of credit has existed since 2007. Online intermediation platforms and comparison sites have some important differences. One important difference is that comparison sites, like *Lending Tree* in the United States or *Compricer.com* and *Prisjakt.se* in Sweden, tend to provide generic, non-binding information on the terms of credit that banks offer to help people decide where to apply. Web-based intermediation platforms, like *Freedom Finance*, enable individuals to file a single loan application and receive multiple customized, binding offers from a range of banks. Below, we describe briefly how an online intermediation platform works and present some descriptive statistics about the applicants and their terms of credit.

HOW DOES WEB-BASED CREDIT INTERMEDIATION WORK?

Three Sweden-specific conditions that facilitate web-based intermediation of credit and the entrance of new market participants in general are the existence of a broadly-used personal national registration number, the existence of a centralized credit register (UC AB), and the availability of official register data on income, taxation, real estate property, past payment behaviour and register-based credit scores for all Swedish residents. As a consequence, online credit applications can be concise and processed as well as evaluated in a uniform way by all participating financial institutions.

People who apply for credit through the web-based intermediary face a number of choices: for example, they can either apply for new credit or to consolidate their current debts. In the latter case, consumers submit their current outstanding debt, including the credit terms and the amount of credit they apply for. The application includes between 10 and 15 entries. One group of entries concerns the characteristics of the desired loan, including the total amount, the amount to be consolidated, and the duration (3-12 years). A second group relates to information about the applicant, such as the personal national registration number, civil status, number of children, type of employment, duration of current employment, home ownership and an estimate of the applicant's share in the cost of living. Finally, the applicant can choose to have a co-applicant.¹

After filing, the intermediary forwards the credit application to all participating banks and opens up a 48-hour "evaluation window" at the credit bureau. While this window is open, all participating banks can request a copy of the applicant's credit report. Participating banks then have a fixed time window, currently 24 hours, to analyse an applicant and to decide what, if any, credit offer to make. Banks register their bids in the web interface and applicants receive a text message to notify the receipt of an offer.

Offers stay available for 30 days or until the applicant accepts an offer, upon which remaining offers are deleted automatically. To facilitate a comparison each offer is characterized along a fixed set of contract features: amount, duration, interest rate, effective interest rate, fees and repayment structure. Once an offer has been accepted, the contracting bank will take over all communication with the applicant. In cases where an application concerned debt consolidation, the granting bank amortizes the existing loans directly.

Who receives credit offers?

The data we use in this article contains all the information on the individuals' credit applications, their relevant background information and all information on the credit contracts offered by the participating banks. We use a sample of 6 891 credit applications filed between November 7 and December 7, 2012. As Table 1 shows, 65 per cent of the applicants received at least one offer. Unfortunately, other than the number, we lack

¹ Employment options are entrepreneur, fixed employment, temporary employment, paid by the hour, unemployed, retiree, or student.

further information on the rejected applicants. In addition, rejection rates are likely to vary substantially across credit types due to selection effects, making it difficult to compare these numbers with a common benchmark.²

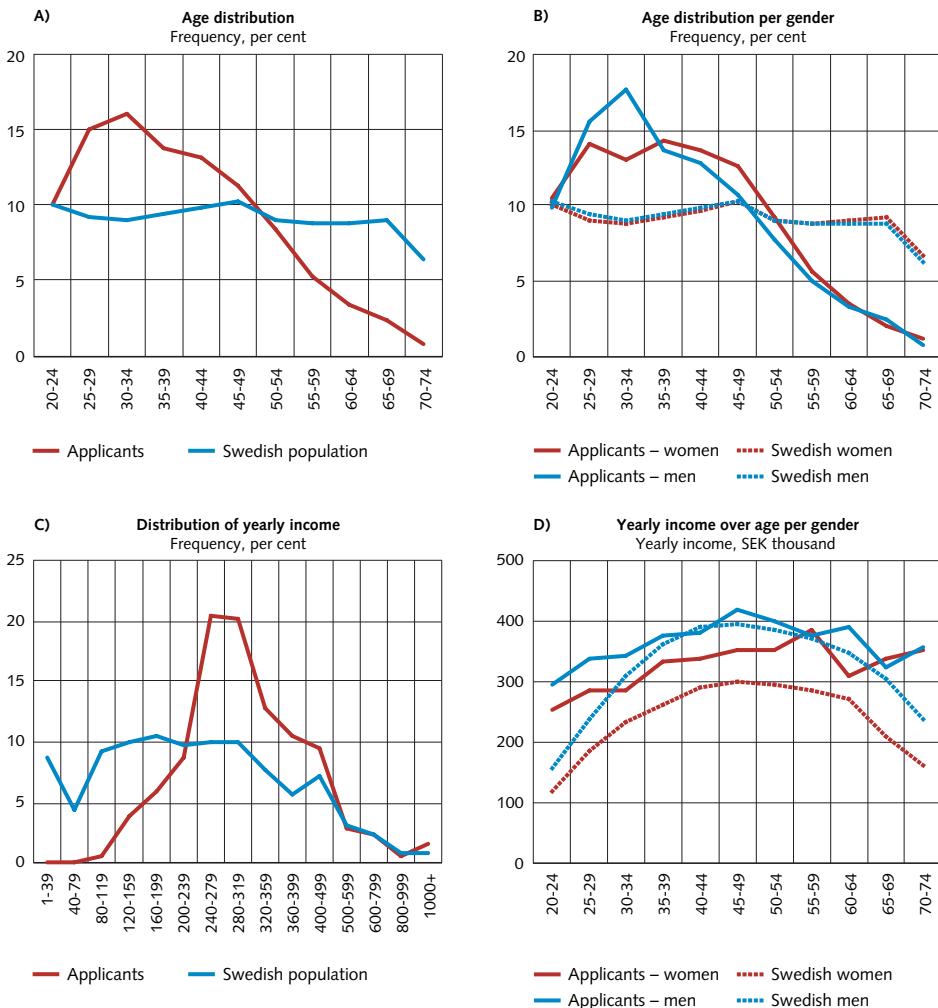
Table 1. Summary statistics for total sample of 6 891 credit applications

Individuals with zero offers	per cent	35.5
Individuals with at least one offer	per cent	64.5
Individuals that do not choose an offer	per cent	24
Individuals that choose an offer	per cent	76
Average loan volume requested	SEK	101 205
Average loan volume offered	SEK	83 111
Average chosen loan volume	SEK	84 456
Average offered interest rate	per cent	13.1
Average chosen interest rate	per cent	12.4
Average requested duration	months	91.1
Average offered duration	months	84.2
Average chosen duration	months	87.5

Since our main interest lies in the terms of credit and the impact that contestability may have on these terms, we will concentrate on the applicants that received at least one offer.

From Table 1 we can see that the average requested loan amount (SEK 101 205) is above the average offered loan amount of (SEK 83 111), indicating that consumers are, on average, rationed in their credit demand. Furthermore, the average offered interest rate of 13.1 per cent is in line with interest rates that are charged on credit card debt (see Figure 7). Lastly, the average requested loan duration is seven and a half years, which is almost half of the maximum duration of 12 years that a consumer can request.

² Roszbach (2004), using Swedish credit card application data reports an acceptance rate of about 50 per cent.

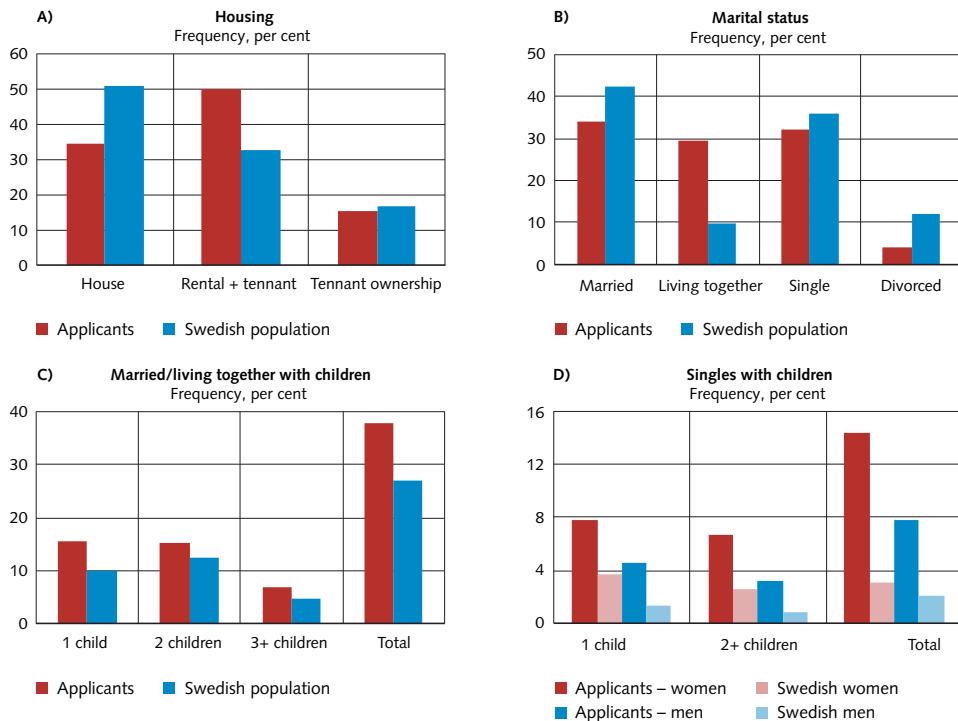
Figure 3. Age, gender and income distribution of individuals who received at least one credit offer

Note. Applicants at the financial intermediary are compared with the Swedish population aged 20 years or older along the distribution of three characteristics: age, gender and income. In panels A-C, the vertical axis displays the percentage share of people that fall in the interval displayed on the X axis. In panel D, the average income per age cohort is displayed.

As shown in Figure 3, panel A, younger people (20-45) are overrepresented while older cohorts (55-70) are underrepresented among the applicants – and recipients of an offer for credit through the financial intermediary relative to the composition of Sweden's population. In line with life-cycle theories, it should, however, be expected that the younger cohorts are in need of more credit than the older cohort, given the stage of their careers and the typical time of family formation. Moreover, the intermediary is web-based and the familiarity with online transactions may add to this differential. Figure 3, panel A, clearly marks the over-representation of men aged 25-34. Banks in general prefer clients with a stable income; the banks participating in the intermediary discourage the unemployed and students with no other form of income than their student grants and loans from

applying. Panel C demonstrates that individuals with an income below the median are thus underrepresented. Panel D demonstrates that women in the applicant pool overall have a somewhat higher income than in the population in general. For men this is only the case for the very youngest cohorts.

Figure 4. Representativeness of individuals who received at least one credit offer



Note. Applicants at the financial intermediary are compared with the Swedish population with respect to three characteristics: home ownership, their marital status and parental status. Within panel C and D, 2+ and 3+ children are defined as two or more and three or more respectively. The vertical axis displays the percentage share of people that display a characteristic.

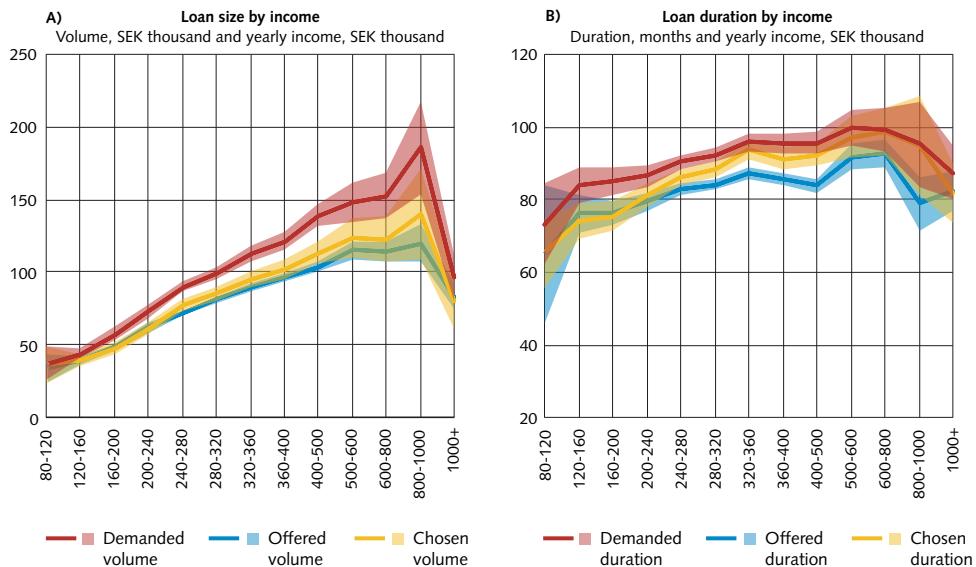
Continuing with Figure 4, Panels A-B, we see that applicants who receive at least one credit offer are substantially less likely to be home-owners or married and more likely to live together without being married. This finding is partly explained by the overrepresentation of younger cohorts. Panel C illustrates that those receiving offers are more likely to have children, while Panel D marks one of the more substantial differences between the customer base and the Swedish population: More than 14 per cent of the customer base consists of single women with children, compared to three per cent in the population. A possible explanation of this differential may lie in the fact that a recent divorce can bring about a short-term mismatch between financial obligations and income, thereby increasing the demand for credit to smooth consumption. Agarwal and Bos (2011) also document that a recent divorce correlates positively with an increase in both credit demand and application rejections.

Demand, supply and choice of credit and credit terms

In this section we describe some differences between the demand for, as well as the supply and choice of credit volumes, loan durations and interest rates.

As mentioned in Table 1, 65 per cent of all applicants receive at least one offer from the participating banks. Applicants that receive an offer demanded on average a loan of SEK 101 205 and a duration of 91.9 months (7.6 years). Of those who receive offer(s), 24 per cent choose not to accept any of the proposed credit contracts.³ For those who accept one of the offers, the average granted loan amounts to SEK 84 456 and has a duration of 87.5 months (7.3 years). Figure 5 shows that both the demanded, offered and chosen volume increases close to monotonically as applicant income rises.⁴ However, in the lower income ranges applicants solicit loans of approximately 30-50 per cent of their disposable annual income, while people in the upper income ranges apply for loans of up to about 20-30 per cent of their disposable income.

Figure 5. Demanded, offered and chosen loan size and loan duration by income



Note. The graphs show, plotted against different disposable income intervals of the applicants, the mean (solid lines) and 95 per cent confidence interval of the mean for (Panel A) the solicited, offered and chosen loan size and (Panel B) the requested, offered and chosen loan duration.

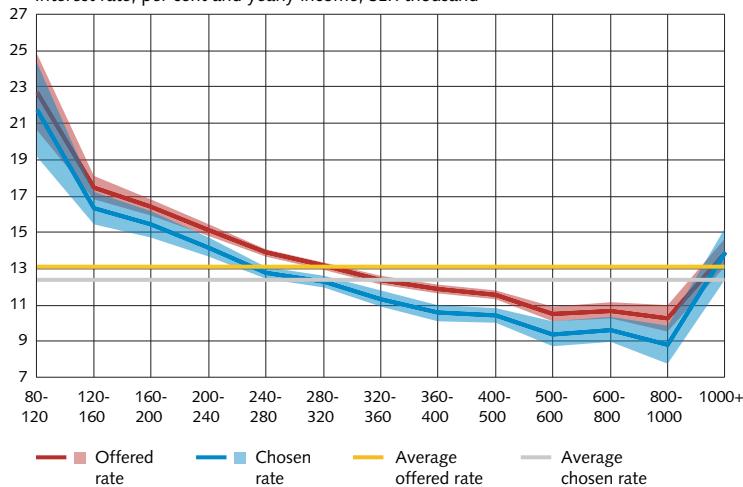
3 Irrespective of the actual gender of the applicants we will refer to them as "she" in what follows to avoid a cumbersome use of he/she.

4 In the highest income interval the number of observations is very small.

On average, loan applicants are rationed since their requested loan size is greater than the loan offered by the banks. The volume chosen by the consumers is located inbetween the requested and offered. Since individuals tend to pick the larger volumes, the average chosen volume is higher than the average offered volume. Furthermore, it is notable that the offered and chosen volumes are nearly identical in the lower income ranges, but diverge as income increases. Loan durations display much less variation over the income distribution and are on average around 90 months. Only in the lower part of the income distribution are loans with maturities of 50-80 months more common.

In Figure 6 we present information on the interest rates that applicants are offered and choose; applicants cannot specify a preferred interest rate in a loan application. The unweighted sample average of the offered rate is 13.1 per cent, while the corresponding accepted rate is 12.4 per cent. These rates can be compared with population-wide average interest rates charged on credit card debt of 10-14 per cent, and on consumption debt of 5-8 per cent over the period 2006-2013, as displayed in Figure 7.⁵ Here, we do not investigate further if rates offered are higher or lower than on credit supplied through conventional channels. Instead we concentrate on the differences in rates within the sample.

Figure 6. Offered and chosen interest rate by disposable income
Interest rate, per cent and yearly income, SEK thousand



Note. The graph shows the mean (solid lines) and 95 per cent confidence interval of the average offered and average chosen interest rates, plotted against disposable income of the applicants.

⁵ Aggregate credit market statistics on, for example, interest rates average out rates for a wide range of credit types. One therefore needs to be cautious in comparing these rates to the loans offered through internet intermediaries. Consumption credit, which offers lower average rates, can for example include loans collateralized by, for example, purchased electronics. Some credit card issuers can charge substantially higher rates than those mentioned here, but rates may sometimes apply only to credit that is not paid back within 30 or 45 days.

Figure 6 shows that not only the quantity of credit varies with income, but also the offered and chosen interest rates. While quantities increase sharply with income, rates fall rapidly as disposable income rises. Whereas people in the lowest income ranges pay interest rates between 19 and 24 per cent, the cost of credit is between 8 and 13 per cent for most customers in higher income categories. It should be observed, though, that we do not have any information on applicants' creditworthiness and thus cannot control for the correlation between income and riskiness. Part of the negative relation between income and interest rates is likely to be explained by an average positive relationship between income and repayment ability.⁶

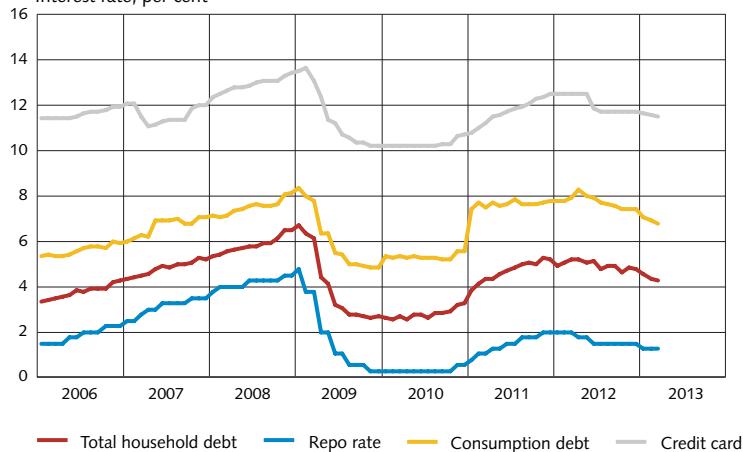
It is worth noting in Figure 6 that offered and chosen rates are very close to each other in the lower part of the income distribution, with overlapping confidence bands. In the middle range of the income distribution, however, there is less variation in the offered rates, consistent with the presence of more competition for these individuals. The data thus suggest, in other words, that there are signs of market segmentation or reduced competition in the lower and higher income segments.

The presence of large variations in interest rates across households has a number of potentially important implications and raises several questions related to the calibration and effectiveness of economic policy. If households pay widely varying interest rates on their credit, they have similarly varying sensitivities to changes in interest rates. For example, if low-income households already pay high interest rates, and are less exposed to the real estate and mortgage market, it is possible that they will respond less to changes in the level of interest rates. As a result, changes in interest rates will affect these households' consumption and smoothing patterns differently.

⁶ Roszbach (2004), however, finds that income and default risks are negatively related for a sample of provided-in-store loans.

Figure 7. Interest rates in Sweden, 2006-2012

Interest rate, per cent



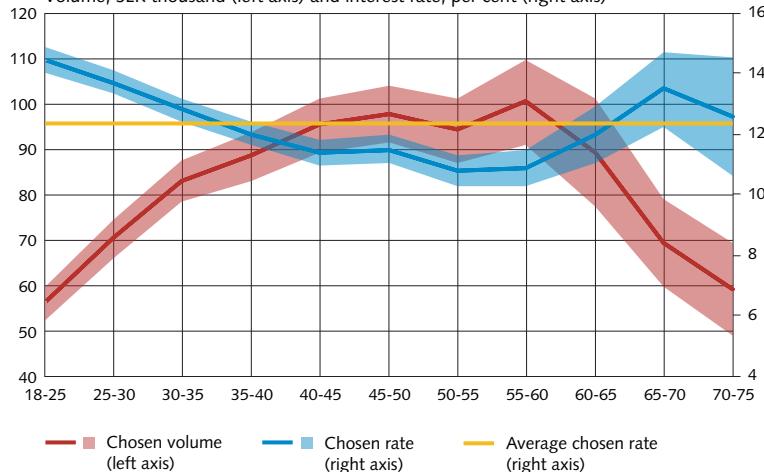
Note. The graph plots interest rates charged by Swedish MFI on new consumer loans, sorted by type of consumer loan. Total household debt includes mortgages (not depicted separately). Credit card interest payments are defined as the interest consumers pay on their credit card debt that is outstanding when the zero interest grace period has ended. The consumption debt rate is defined as the average rate on all consumption loans granted to households, excluding debt granted to entrepreneurs. Rates are weighted by volume of the loans.

Sources: The Riksbank and Finansmarknadsrapporten 2012

In Figure 8, we display the loan data against another commonly used characteristic, age. As one would expect given the positive relation between income and credit, interest rates not only correlate negatively with income, but also with the size of the loan. Although low rates on larger loans may seem counterintuitive at first sight, this is consistent with the notion that people aged 30-60 years, probably with safer or better jobs, borrow more, and at a more favorable rate. Figure 9 lends some support to this notion, as interest rates tend to fall with the length of job tenure. Up to 40 years, every additional year of employment is associated with an additional drop in rates of about 10 basis points. Figure 10 provides further indications that such a mechanism is at work: as the age of borrowers increases, their income rises and the interest rates they pay tend to fall. However, once people pass the age of 50-60, their income starts falling again and the interest rates they pay move upwards.

Figure 8. Loan rates and size of loans, by age groups

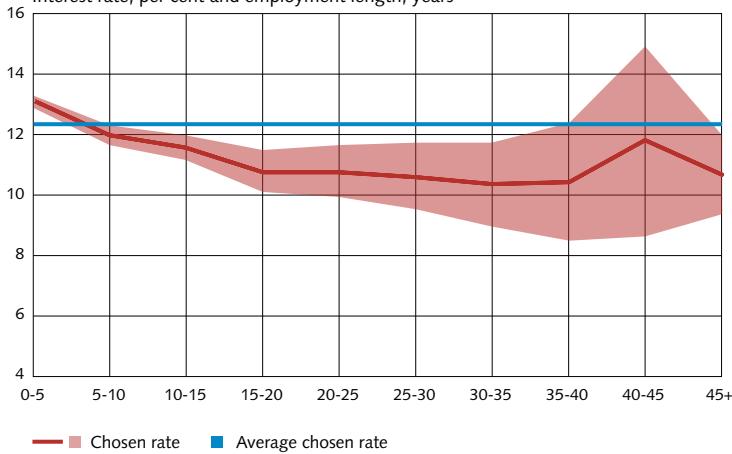
Volume, SEK thousand (left axis) and interest rate, per cent (right axis)



Note. The graph displays the mean (solid lines) and the 95 per cent confidence interval of the average chosen loan sizes and average chosen interest rates over the age distribution. Note that the top 1 per cent of the income distribution is excluded.

Figure 9. Loan rates and size of loans, by co-applicant age groups

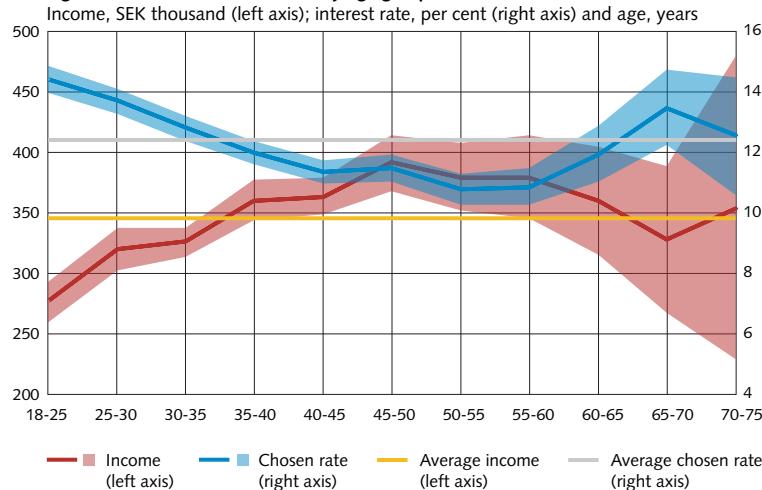
Interest rate, per cent and employment length, years



Note. The graph displays the mean (solid lines) and the 95 per cent confidence interval of the average chosen interest rates over the duration of employment.

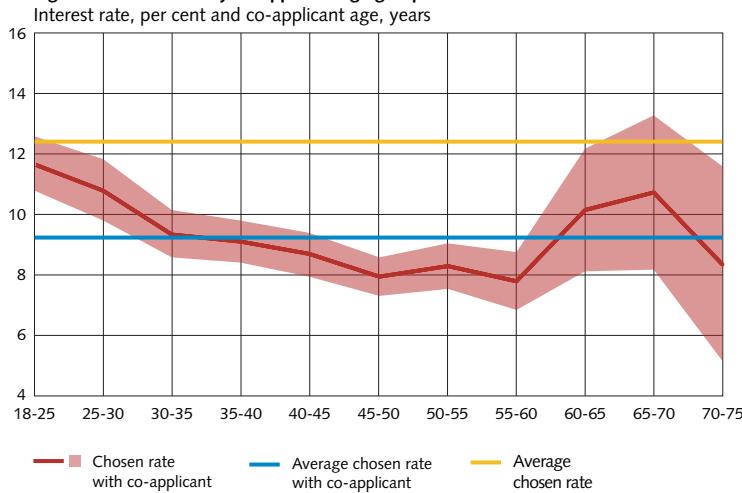
Finally, Figure 11 shows that having a co-signer on a loan contract can provide substantial financial benefits. Applicants with a co-signer, for example a parent or a partner, pay on average 300 basis points lower interest rates than their single-signing peers. Co-signed rates tightly follow a path that resembles the rates charged to the co-signer, most likely because the availability of a co-signer decreases the credit risk for the bank. However, when the applicant or the co-signer approaches retirement the rate starts rising again.

Figure 10. Loan rates and income by age groups



Note. The graph displays chosen interest rate and yearly income by age of the applicant.

Figure 11. Loan rates by co-applicant age groups



Note. The graph displays the chosen interest rate for individuals applying for credit with a co-applicant by age of the co-applicant.

Concluding remarks

The internet-based intermediation of credit is a relatively new phenomenon that has potentially big implications for how credit is allocated across households. We show that not only the amount of credit, but also the interest rate charged can vary widely across households. In the particular sample we study, lower income households that are likely to be associated with higher repayment risk, pay substantially higher interest rates than higher income households. Interest rate differentials can be up to 15 per centage points. This raises several questions for economic policymakers. For example, if the variation in interest rates paid on consumer credit is large, how does this affect the transmission of changes in interest rates? Moreover, if low-income households already pay high interest rates, and are less exposed to the real estate and mortgage market, will they be likely to respond less to changes in the level of interest rates? To what extent the benefits of better access to credit, even at high rates, outweigh the risk of over-indebtedness or financial distress by households remains unclear. Zinman (2013) reviews the extant literature on this complex trade-off. We hope that future research, some using the data presented in this article, can analyse some of the questions that have a bearing on monetary policy, macroprudential policy and the trade-offs that consumers face.

References

- Agarwal, Sumit and Marieke Bos, (2011) "Rationality in the Consumer Credit Market: Choosing between Alternative and Mainstream Credit," Available at ssrn.com/abstract=1978574.
- Baugh, Brian, Itzhak Ben-David, and Hoonsuk Park, (2014), "Disentangling Financial Constraints, Precautionary Savings, and Myopia: Household Behavior Surrounding Federal Tax Returns," *NBER Working Paper* No. 19783.
- Dick, Astrid, and Andreas Lehnert, (2010), "Personal Bankruptcy and Credit Market Competition," *Journal of Finance*, 65: 655-686.
- Roszbach, Kasper, (2004), "Bank Lending Policy, Credit Scoring, and the Survival of Loans," *Review of Economics and Statistics*, November, 86(4): 946-958.
- Statens offentliga utredningar, (2013), "Överskudssättning i kreditsamhället?, Betänkande av Utredningen om överskudssättning," SOU 2013:78.
- Survey of Consumer Finances, (2010), Federal Reserve Board, Washington D.C., USA; <http://www.federalreserve.gov/econresdata/scf/scfindex.htm>
- Zinman, Jonathan, (2013), "Consumer Credit: Too Much or Too Little (or Just Right)?," *NBER Working Paper* No. 19682.