# Accept or Reject: Do Immigrants Have Less Access to Bank Credit? Evidence from Swedish Pawnshop Customers[*]

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## Abstract

This paper studies to what extent immigrants have less access to mainstream credit than their native counterparts. For this purpose I use a large, unique data set with a panel of Swedish pawnshop customers. The data allow me to investigate to what extent pawnshop customers actively apply for mainstream bank credit and how successful they are by comparing credit applications from immigrants and natives and the corresponding bank decisions.

I do not find that immigrants have a different propensity to apply for mainstream bank credit. However, I do find that banks have a lower propensity to grant loans to immigrants from African descent compared to their Nordic-born counterparts. Robustness tests based on data from recent immigrants only suggest that the demand for credit varies with the duration of residence while differences in loan-granting rates are enduring.

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# 1 Introduction

A central question facing researchers and policy makers is the extent to which immigrants will adapt to economic, social, and political life. A crucial determinant of economic and social well-being is wealth accumulation and the access to financial markets. While there is a rich literature that examines the sources of immigrant-native differences in labor market, health, and educational outcomes, relatively little is known about the determinants of differences in access to financial markets between immigrants and the native born.

Since financial markets provide important tools for enhancing welfare – means to transfer resources across time and across states of the world, to make payments, to mitigate risk and to fund investments – low rates of participation within the mainstream financial sector and relatively more reliance on more expensive alternative credit by immigrants are likely to be associated with lower welfare.

Previous research on immigrants and financial markets includes US studies on immigrant holdings of checking and savings accounts (Osili and Paulson, 2006), relationships with financial institutions (Osili and Paulson, 2008), and ownership of stocks and mutual funds (Chatterjee, 2009 and Bogan and Seto, 2010). Despite a substantial amount of anecdotal evidence that immigrants are over-represented outside mainstream finance, there is no study, to my knowledge, that uses micro data to analyze immigrants' effort and ability to obtain regular bank credit.

This paper uses a unique data set that allows me to compare immigrants and natives in their pursuit of and access to mainstream credit. More precisely, I start with investigating the group of pawnshop customers that actively apply for mainstream credit. For this group I study the success rate of loan applications by comparing immigrants and Swedish-born pawnshop customers. I estimate a proportional hazard model for immigrants in which Swedish-born pawnshop customers function as the benchmark, to see if these differences are driven by a different propensity to apply for regular credit or a different propensity for a loan application to be granted.

From earlier research, Bos (2009) we know that the vast majority of pawnshop customers do not try to get regular credit before they take pawn credit. For this group I explore the possibility that immigrants' knowledge about their own chances to obtain regular credit differs from that of Swedish-born pawnshop customers. For this purpose I compare the out-of-sample predicted probabilities that a group of immigrant and Swedish-born pawnshop customers will have a fictional loan application accepted.

The data set contains 135,036 pawnshop customers, of whom 41,996 are foreign born, and 17,554 are second-generation immigrants. Everyone is followed at a bimonthly frequency over the period 2000 - 2005. The data include all registered information that pawnbrokers and the national credit bureau Upplysningscentralen AB (UC) have on these individuals. For the purpose of this study I gathered additional information from Statistics Sweden (SCB) that enables me to identify the region of origin, date of arrival in Sweden for all customers and their parents.

In Sweden pawn credit is regularly used by four percent of the Swedish adult population. I find that immigrants are over-represented among pawn credit customers: 31 percent of them are immigrants compared to 14 percent in the Swedish population. In addition immigrants are six percent less likely to be accepted when applying for mainstream credit, relative to their Swedish-born counterparts. This holds in particular for immigrants of African descent, who are 15 percent less likely. This effect disappears for second-generation immigrants with African parents. I don't find that immigrants have a different propensity to apply for mainstream credit, but I do find a lower propensity for loan granting compared to their Swedish-born counterparts.

Among the group pawnshop customers who do not apply for a loan at mainstream banks before taking a pawn loan, the discouraged borrowers. I find evidence that merely five percent of the first- and only four percent of the second-generation immigrants would have had a loan application granted had they applied. This suggests that immigrant discouraged borrowers are at least equally well-informed about their chances of obtaining regular credit as their Swedish-born counterparts.

The remainder of this paper is organized as follows: Section 2 briefly discusses the existing literature, Section 3 describes the data and presents some descriptive statistics, Section 4 presents the empirical analysis, Section 5 looks at the discouraged borrowers and Section 6 summarizes and concludes.

## 2    Background

Osili and Paulson (2006) find that immigrants in the US have a lower rate of ownership of  financial assets such as checking and savings accounts.  This persists even for immigrants who have lived in the United States for many years.  Osili and Paulson (2008) also find that immigrants from countries with financial institutions of higher quality are more likely to use formal financial markets and to have a relationship with a bank after their move to the United States.

Chatterjee (2009) finds that immigrant Americans in the US are less likely to own financial assets such as stocks and mutual funds compared to natives, though he suggests that participation increases as the length of their stay in the United States increases.  For both immigrants and natives, Chatterjee (2009) also concludes that risk tolerance is a positive predictor of financial market participation.  Bogan and Seto (2010) decompose the immigrant population by country of origin and find that there is a significant variation in the rates of asset holdings by the immigrants' country of origin.  Cavalluzzo, Cavalluzzo and Wolken (2002) examine bank market structure to draw inferences concerning the role of discrimination in credit markets for small businesses.  In this paper they find that white men and women can expect similar treatment in credit markets, with some benefits to female-owned firms located in concentrated banking markets. Minorities, by contrast, fare worse than whites. Cavalluzzo and Wolken (2005) examine the impact of personal wealth on small business loan turndowns across demographic groups. They find substantial unexplained differences in denial rates between African-American-, Hispanic-, Asian-, and white-owned

firms.

# 3 Data

The data set used in this study consists of a representative sample of Swedish pawn-shop customers. It consists of 200,313 unique individuals and the individuals are observed at a bimonthly frequency from February 2000 until October 2005. The data stem from three administrative sources, (i) the pawnbrokers, (ii) the credit bureau and (iii) Statistics Sweden. The pawnbrokers that supplied their data account for 70 percent of the annual pawn loan volume in Sweden. They provided all registered information on their pawnshop customers. The credit bureau, upplysningscentralen (UC) and Statistics Sweden (SCB) supplemented these data with their information by exploiting the unique personal number that each resident of Sweden has. Before handing over the combined data for analysis the personal numbers were removed.[1] SCB variables identify the country of origin, of both the pawnshop customers and their parents, their arrival date, their highest educational obtainment, and their family build up. The data set provides a detailed look at the pawnshop customers-their immigrant status and their use of credit both at the regular bank and at the pawn-shop. In this study I focus on the individuals that use pawn credit in sample, which is a total of 135,036 individuals.

In order to compare the proportion of first- and second-generation immigrants with the Swedish population, SCB drew a random sample from the Swedish population for the same years as the panel. This random sample consist of 1.2 million individuals 18 years or older. For this random sample SCB supplied the same information on immigrant status.

This combined data set is well suited for the purpose of this study for several

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[1]The pawnshop federation supplied the personal numbers of their customers starting in 1980 which enabled the credit bureau to exclude these individuals in the control group.

reasons. First, it has comprehensive information on the region of origin of both the pawnshop customers and their parents. Second, the credit bureau data enable me to control for creditworthiness and other personal characteristics relevant within the regular financial system. Third, the data allow me to observe both loan applications at mainstream banks and these banks' decision to reject or grant the application. Last, exact information is available on the timing of any pawn loan that is subsequently taken by the individual. Together this allows me to analyze whether immigrant pawnshop customers have less access to mainstream credit than their Swedish-born counterparts.

## 3.1 Descriptive statistics

In this section I describe the over- and under-representation of immigrant groups by comparing the distributions of the pawnshop customers with the random sample taken from Swedish society for the years 2000-05.

### 3.1.1 First-generation immigrants: region of birth

Table 1 provides the distribution of first-generation immigrants over their country of birth present in the pawnshop sample and the sample of the Swedish population. There is a over-representation of first-generation immigrants. Among the pawnshop customers 31 percent are immigrants compared to 14 percent in the Swedish population.

As one might expect, this over-representation is mostly driven by non-Western born immigrants, since one can assume that on average it is easier for immigrants born in Europe and North America to integrate into Swedish society. The over-representation is the highest among immigrants born in Africa. Again this difference is more than double. with 13.8 percent within the pawnshop customers and 5.5 percent in the Swedish population. Second is the over-representation of immigrants born in South America and third, immigrants born in Asia.

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### 3.1.2 Second-generation immigrants: parents' region of birth

A second-generation immigrant is born in Sweden but has one or both parents who were born outside Sweden. Tables 2 and 3 respectively present the distribution over the parents' region of birth for first-, second-generation immigrants who have one and both parents born abroad

Again, second-generation immigrants in general are over-represented among the pawnshop customers but not as much as the first-generation immigrants. Of the Swedish population in this period (2000-05) around 10 percent were second-generation immigrants and among the pawnshop customers this number is 13 percent.

**One parent born abroad** As shown in Table 2, in both the Swedish population and the pawnshop sample it is slightly more common to find the combination of a mother born abroad with a father born in Sweden: 60 percent in the pawnshop sample and 57 percent in the Swedish population.

When it is the mother who is born abroad, it is the mothers born in Nordic countries excluding Sweden and the EU25 group that are over-represented. For the children with a father born abroad and a mother born in Sweden, there is an over-representation of pawnshop customers with a father born in Africa, Asia and the six European countries that are not included in the EU25 or the Nordic group.

**Both parents born abroad** There are slightly more pawnshop customers whose parents are both born abroad than is prevalent in the Swedish population: 5.1 compared to 4.1 percent (see Table 3). When both parents were born abroad, it is most likely that both parents were born in the same region. Within the pawnshop customers this is the case 85 percent of the time and 90 percent within the Swedish population. In both populations the parents are most likely both born in Nordic countries, the EU10 or the rest of Europe. These three regions are slightly over-represented within the pawnshop customer group plus Africa.

# 4 Empirical analysis

In order to get a better understanding of the factors that have led to the over-representation of immigrants among the pawnshop customers, I will first see if there is a difference in the acceptance frequency of loan applications by mainstream banks, the so-called success ratio, of immigrants and Swedish-born pawnshop customers. In order to avoid having the outcomes influenced by differences in creditworthiness between the two groups, I use propensity score matching to select from the sample of Swedish-born pawnshop customers those that are most similar from a creditworthiness perspective. Second, with a Cox proportional hazard model I look to see if these differences in acceptance ratios between the groups are driven by differences in propensities to apply for a loan or loan acceptance. Since the latter results are evaluated from the first pawn loan the individual takes in the sample, I take a separate look at the group of immigrants that immigrated in sample to see if and how much the results alter. The advantage of this immigrated in-sample group is that we can be sure we observe their actual first loan application and granting in Sweden. The drawback is that we loose the parallel with the Swedish-born pawnshop customers. Instead this group is compared with the Nordic-born immigrants that similarly immigrated in-sample. The final analysis focuses on the group of pawnshop customers that did not apply for a mainstream bank loan before they took pawn credit, the so-called discouraged borrowers. For this group I explore the possibility that immigrants' knowledge about their own chances to obtain regular credit differs from that of the Swedish-born pawnshop customers. To do this I compare the out-of-sample predicted probabilities that a fictional loan application will be accepted at a mainstream bank for immigrants and for Swedish-born pawnshop customers given their characteristics. This prediction is based on a probit model describing the bank's decision to grant a loan, or not, estimated on a representative sample of the whole Swedish population.

## 4.1 Obtaining regular credit

The question I investigate is whether there is a difference in the likelihood of obtaining regular credit for immigrant and non-immigrant pawnshop customers while controlling for creditworthiness. I check if there is a significant difference in the number of loans granted as a share of loan applications between the immigrant groups $k$ and its non-immigrant counterpart. To select individuals from the non-immigrant group that are similar to the individuals in the respective immigrant group. I will make use of propensity score matching; see Leuven and Sianesi (2003).

### 4.1.1 Common support

Following Leuven and Sianesi (2003) I estimate a probit model for the immigrant group[2]

$$
\begin{aligned}
I_K \;=\; & b_0 + b_1 Age_i + b_2 Male_i + b_3 bigcity + b_4 income_{i,y} + b_5 capinc + .. \\
& b_6 House\_value_{i,yc} + b_7 \text{zerolim}_{i,y} + b_8 claims_{i,y} + .b_9 zero\_crdt\_rmrk_{i,y} + .. \\
& b_{10} Balance\_inc_{i,y} + b_{11} good\_score_{i,y} + \varepsilon,
\end{aligned}
$$

where the dependent variable $I_K$ is the immigrant group dummy, with $k = first-, second-$ $generation$ and the explanatory variables (the variables for which we want the non-immigrants to be more similar) are defined in Table 4; it contains all variables that are most relevant for the decision by a mainstream bank to grant a loan, or not; see Bos (2009). These variables are evaluated at year $y$ with $y = 2000, 2001, .., .2005$. I fit the model for the sample that includes both immigrant group $k$ and the non-immigrant group. I then use the individuals' propensity scores, which are simply the in-sample predicted probabilities of belonging to the immigrant group $(I_k = 1)$ to find the common support. The common support is the range of propensity scores of the non-

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[2]I make use of the first part of the program: psmatch2 within Stata in order to directly obtain the propensity score for every individual and not have to create the in sample predicted probabilities separately.

immigrant group that is supported by the immigrant group. For the area where the two density functions overlap, I select only those individuals from the non-immigrant group that have a propensity score that falls in the common support range.

Tables 5 and 6 show the difference in the mean values of the explanatory variables for first- and second-generation immigrant pawnshop customers compared with the Swedish-born pawnshop customers before propensity score matching. After propensity score matching the 'bias' was on average reduced by 83.2 percent.

### 4.1.2 Success ratio

The average annual success ratio is defined as follows;

$$average\ Succes\ Ratio_{K\ and\ Kc,Y} = \frac{\sum loan\ granting_{i,y}}{\sum loan\ applications_{i,y}},$$

where $Kc$ is the common support Swedish-born counterpart of the immigrant group $K$. I will test if the differences are significant with a standard t-test. The results are presented in Table 7. In general, the differences in success ratios between the immigrant groups and their Swedish-born counterparts are not large, but nevertheless significant.

### 4.1.3 Immigrant versus Swedish-born pawnshop customers

Table 7 contains the average success ratios of the first-generation immigrant pawnshop customers and their common support Swedish-born counterpart. On average first-generation immigrant pawnshop customers have a success ratio of 26.7 percent. For Swedish-born pawnshop customers belonging to the common support, this ratio is 28.6 percent. A t-test rejects the hypothesis that these success ratios are equal.

The same result holds for second-generation immigrants unless the mother is Swedish-born. A possible explanation for this result may be that children spend more time with their mothers when growing up. Having a Swedish mother may be more favorable for integration than having a Swedish father when the other parent

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is foreign born. When both parents of the pawnshop customer are foreign born the success ratio worsens slightly to 25.1 percent and the difference between them and the common support Swedish-born pawnshop customers consequently widens.

I also look at two groups of immigrants: those who themselves were born in Africa and those who have at least one parent born in Africa. These two immigrant groups are of particular interest for two reasons, First, the financial system in this region is on average less developed. This may make it harder for immigrants to maneuver within the Swedish financial system. Second, because of skin color members of this group are most likely identified as non-natives. Both characteristics are expected to be associated with lower success ratios. The results in Table 7 confirm this prediction for the first-generation immigrants born in Africa. Their success ratio is the lowest of all groups, 24.5 percent, and significantly different. The Swedish-born counterparts have a success ratio of 28 percent. The success ratios are more or less equal for second-generation immigrants who have at least one parent born in Africa.

## 4.2   Propensity to apply for and obtain mainstream credit

In the previous section I presented evidence that suggests it is harder for immigrants than for their Swedish-born counterparts to obtain regular bank credit. In this section I investigate whether these differences in acceptance rates can be explained by a more active search for bank credit, i.e., higher application rates, by immigrants rather than by more restrictive lending.

First, I compare the propensity of first- and second-generation immigrants to apply for regular bank credit with that of their common support Swedish-born counterparts. Next, I compare the propensity of regular banks to grant loan applications. Both propensities are measured by pawn loan.[3] I estimate the following Cox proportional

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[3]I ran the same regression for the following 'origins': the starting time when individuals are definied to be at risk; (i), the second pawn loan and (ii) a randomly picked pawn loan within the window of the panel. The results did not change significantly.

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hazard model:

$$\log\ h_i(t) = \alpha(t) + \beta x_i + \varepsilon_i$$

or equivalently

$$h_i(t) = h_0(t) + \exp(\alpha(t) + \beta x_i + \varepsilon_i)$$

Here, $h_i(t)$ is the hazard rate of individual $i$ at time $t$, $\alpha(t) = \log h_0(t)$, and $x$ contains all the non-time-varying covariates. In the first group of regressions, displayed in Table 8, the main variables of interest are individuals' instantaneous probability of applying for a regular bank loan conditional on having taken a pawn loan. In the second panel of Table 8, I display results for the probability of obtaining a regular bank loan.Shown in Table 8, first-generation immigrants born in Africa are more likely to apply for a regular bank loan than the Swedish-born pawnshop customer (the benchmark).[4] At the same time the probability of loan granting by regular banks is reduced by 7 percent for immigrants born in Africa compared to the Swedish-born.

## 4.3   In-sample immigration

Looking at immigrants that entered Sweden before the start of my sample period may create a bias in the above regressions. Even when I control for the length of time immigrants are in Sweden, the first loan application observed in-sample can be the third loan application for one individual and the twentieth for another. Since both the propensity to apply for a loan and the propensity to be granted a loan may be influenced by past experiences, the results may be tainted by these differences.

I will therefore take a separate look at a group of immigrants, 3,457 individuals, that arrive in Sweden in-sample (2000-2005) to see if the results will alter. The advantage for this group is that I can exactly observe when they apply for their first

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[4]I tested the proportionality of the hazards by letting the first generation immigrants born in Africa interact with time linearly. There is no evidence that the effect varies with time.

loan at a regular bank, when their first loan application was granted and when they took their first pawn loan in Sweden. A disadvantage is that I no longer can compare them with their Swedish-born counterparts, since I still do not know when the latter made their first loan application and when their first loan was granted. To resolve this problem I instead compare non-Nordic-born immigrants with the immigrants that are born in one of the Nordic countries, excluding Sweden. The level of development of the Nordic countries is comparable and Nordic citizens have free movement of labor with complete and immediate access to each other's social security system. I therefore expect Nordic-born immigrants to adopt relatively easily to Swedish society and have participation rates that are very close to those of the native population.[5] In line with the analysis in the previous section I construct a common support and select those immigrants from the Nordic countries that are most similar from a creditworthiness perspective to the respective immigrants who immigrated in-sample.

Table 9 presents the percentage of immigrants who immigrated in-sample by their region of birth. Compared to the total pawnshop sample from before, this sample contains slightly more immigrants born in Africa and substantially more immigrants of Asian descent. Table 10 summarizes their average credit scores at the time they are first observed in the panel. Since the credit bureau data have a bimonthly frequency and the immigration data give an exact date, it is possible that two months have passed before we observe them for the first time. This explains how individuals were able to have already obtained credit: one percent has outstanding credit and, more surprisingly, one percent have a credit remark. Interestingly 90 percent have a good credit score when they are first observed. It is also notable that their average age is younger than that of the average pawnshop customer.

Table 11 shows the average number of days between the entrance into Sweden

[5] The latter part of Table 10 presents the Nordic-born pawnshop customers that immigrated in-sample and the Swedish born pawnshop customers, to confirm that both groups are indeed similar from a creditworthiness perspective. Since the Nordic-born just arrived in Sweden, they naturally have a lower percentage capital income, house-value and claims.

and the immigrants' first mainstream loan application, mainstream loan granting and pawn loan. On average it takes 467 days before the first-generation immigrants apply for a regular bank loan, 751 days before a loan application is granted and 681 days before the first pawn loan is taken. This average pattern suggests that first-generation immigrants first try to get mainstream bank credit, but do not immediately succeed. There is more than a year between applying for and obtaining mainstream credit; in the meantime pawn credit is obtained to satisfy their credit needs.

Immigrants born in the Nordic region are the quickest to apply for a loan and to obtain a loan. Immigrants born in Asia are the slowest in both categories, while immigrants from one of the EU10 countries are the fastest in taking a pawn loan. Immigrants born in Asia wait the longest before taking a pawn loan.

Table 12 displays the propensity to apply for bank credit and banks' propensity to grant loans for all immigrants excluding the Nordic-born (the benchmark) and for immigrants of African descent. As mentioned above, the benchmark group is formed by the common support immigrants from the Nordic countries excluding Sweden. When we consider only immigrants that immigrated in-sample and compare them to the immigrants of Nordic descent, immigrants of African descent no longer have a higher propensity to apply for mainstream bank credit. The propensity for all immigrants except the Nordic-born is still not significantly different from the common support Nordic-born counterparts. This is also true for the African-born. This underminds the earlier finding that immigrants from African descent are more likely to apply for a regular bank loan. The finding in the previous section that immigrants of African descent have a lower tendency to get loan applications approved, however, holds for immigrants of African descent who immigrated in-sample as well. Therefore, I conclude that the pawnshop customers of African descent face the highest risk of suffering from a disadvantaged position within the regular credit market compared to their Swedish-born counterparts. This effect, however, disappears for second-generation immigrants whose parents were born in Africa.

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# 5 Discouraged borrowers

So far, the analysis has focused on the group of pawnshop customers that actively apply for mainstream credit to see if there is a difference in the propensity to apply for and obtain regular credit between Swedish- and foreign-born pawnshop customers. The vast majority of pawnshop customers, however, do not apply for mainstream bank credit before taking pawn credit. For this group I explore the possibility that immigrants' knowledge about their own chances of obtaining regular credit differs from that of the Swedish-born pawnshop customers, expressed by a difference in the share of individuals that have a reasonable chance to obtain mainstream credit despite the fact that they do not apply for it.

As in Bos (2009) I define these individuals to be *'discouraged borrowers'* and assume that they do not apply for regular credit because they expect to be rejected. The data enable me to identify discouraged borrowers, without uncertainty about their need for credit; since I observe them taking pawn credit. Han et al. (2009) argue that discouragement can be viewed as a self-rationing mechanism in the application decision, implying that bad as well as good borrowers can be discouraged. Discouragement is therefore defined as efficient when 'bad' borrowers are discouraged but inefficient when good borrowers are discouraged or if bad borrowers get into the loan pool.

## 5.1 Descriptive statistics of the discouraged borrowers

Of all pawnshop customers in the sample, 73.7 percent take pawn credit but do not apply for regular bank credit for the 12 months preceding the date at which the pawn loan was taken. Table 13 shows that first-generation immigrants are not over-represented in the group of discouraged borrowers compared to the total pawnshop customers group: Roughly 31 percent of all discouraged borrowers are first-generation immigrants. Second-generation immigrants (Table 14) are largely over-represented,

with 22.5 percent among the discouraged borrowers and 13 percent among the total pawnshop customers compared to 10 percent in the total Swedish population.

### 5.1.1 Regions of origin

The distribution of first-generation discouraged borrowers over the regions of origin is very similar to the total pawnshop customer group, with only somewhat more African and fewer Asian born among the discouraged borrowers.

As mentioned above, second-generation immigrants are largely over-represented within the group of discouraged borrowers. This over-representation stems mostly from immigrants born in Africa, South America, and countries in Europe other than the EU25 and Nordic countries. Most striking is the over-representation of second-generation immigrants with a mother or father born in Asia. This group represents a relatively small share among the total group of pawnshop customers but accounts for 7-8 percent of the discouraged borrower group of pawnshop customers.

When both parents were born abroad, there is an extreme over-representation of immigrants with parents who were both born in Asia, 16 percent compared to 4 percent in the total pawnshop group; see Table 15.

### 5.1.2 Creditworthiness

First, I briefly describe the general differences in average creditworthiness among the first- and second-generation, (i) discouraged borrowers, (ii) total group of pawnshop borrowers and (iii) Swedish-born pawnshop borrowers. Tables 16 and 17 present the descriptive statistics of the three kinds of pawnshop customers for first- and second-generation immigrants respectively. Among pawnshop customers, the Swedish-born are most creditworthy; the first-generation immigrants among the total group of pawnshop customers are not far behind while first-generation immigrant discouraged borrowers are the least creditworthy.

As expected, first-generation immigrant discouraged borrowers more often have

zero outstanding loans at mainstream banks, and least often have a good credit score or no credit remarks. They are also more likely to live in a big city compared to the other two groups of pawnshop customers. The same holds more or less for second-generation immigrants who belong to the discouraged borrowers group. Even fewer individuals have a good credit score, zero credit remarks, and more have outstanding claims. The descriptive statistics thus suggest that the predicted probabilities are lower for both the first- and the second-generation immigrant discouraged borrowers compared to the Swedish-born discouraged borrowers.

### 5.1.3 Predicting loan approval

For this purpose I use the empirical model that describes the bank's decision to grant a loan application, or not, obtained in Bos (2009). The model is outlined in appendix A and Table 18 in appendix B summarizes the estimation results based on a representative sample of the whole Swedish population, including non-pawnshop customers. The out-of-sample prediction to obtain regular credit for the discouraged borrowers is based on this empirical model. In line with the analysis in Bos (2009), I base the cut-off point on the median predicted probability of the individuals whose loan was actually granted: a predicted probability of 0.78.

Table 18 contains the share of discouraged borrowers that have a predicted probability equal or above the cut-off point for several groups of immigrants. Overall 7.4 percent of all discouraged borrowers have a predicted probability that is larger than 0.78 to get their loan application approved.

This proportion is smaller for first- and second-generation immigrants, in particular, if they or their parents were born in Africa or Asia. Among the Swedish-born this share is higher than that for all discouraged borrowers: 9 percent. If I exclude those who have immigrant parents from the Swedish-born, this percentage rises to almost 11 percent.

It is striking how well people seem to be able to predict their own chances of

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obtaining a loan at the regular bank. At most 11 percent of the Swedish-born excluding the second generation immigrants would have a predicted probability above the cut-off point. From the perspective of Han et al. (2009) the discouragement of this group of pawnshop customers could be viewed as efficient, since the vast majority of their loan applications would have been denied if the discouraged borrowers had applied at regular banks.

There are a number of reasons why people would prefer pawn credit over regular credit independent of the price difference. I will name three, but there are many more. First, pawn credit is much faster. Leaving aside the travel time to and from the pawnshop, one can have cash in hand within 10 minutes. Second, the decision to grant a pawn loan is based purely on the value of the collateral so there is no need for the borrower to hand over proof of creditworthiness, which can be viewed as invasive and bothersome. Third, pawn credit does not bear the risk of future exclusion from regular credit. If I, for example, judge the risk of default a priori to be high, then defaulting on one's pawn loan will be unknown to the credit bureau and thus to any future lender. This stands in stark contrast with defaulting on a regular loan in which case such an event will remain on the individual's credit report for three years. Therefore it is possible that the higher share of individuals with a predicted probability of getting mainstream credit above the cut-off point among the Swedish-born discouraged borrowers is explained by a preference for pawn credit.

# 6  Summary and Conclusions

Participation rates of immigrants in mainstream financial markets are typically substantially lower than for natives. At the same time, immigrants tend to be over-represented among the customers of fringe banking institutions. In Sweden, for example, 31 percent of all pawnshop customers are immigrants compared to 14 percent in the adult population. This over-representation is most prevalent among immi-

grants born in Africa, South America and Asia. Second-generation immigrants are only slightly over-represented.

Having access to credit markets is important for households' ability to smooth consumption. Lower participation rates in mainstream financial markets and a greater reliance on alternative, more expensive, short-term types of credit may therefore be associated with lower welfare. Therefore, an important question for economists is to what extent these differences between immigrants and natives are driven by differences in demand or by differences in the supply of credit.

This paper studies to what extent immigrants have less access to mainstream credit than their native counterparts. For this purpose I use a large, unique data set with a panel of Swedish pawnshop customers. The data allow me to investigate to what extent pawnshop customers actively apply for mainstream bank credit and how successful they are by comparing credit applications from immigrants and natives and the corresponding bank decisions.

I first investigate the success ratios of bank credit applications for immigrants and Swedish-born pawnshop customers while correcting for differences in backgrounds with the aid of propensity scores. My results show that immigrants are six percent less likely to be accepted when applying for bank credit, relative to Swedish-born. This discrepancy is particularly large for immigrants of African descent, who are 15 percent less likely to be granted bank credit than native Swedes. For second-generation immigrants with African parents this effect disappears.

Next, I estimate a proportional hazard model to verify if the above differences may be driven by different propensities to apply for mainstream bank credit or by different propensities to grant loan applications. I find that immigrants of African descent have both a higher probability to apply for credit and a lower probability to be accepted by the mainstream bank.

I do not find that immigrants have a different propensity to apply for mainstream bank credit. However, I do find that banks have a lower propensity to grant loans

to immigrants from African descent compared to their Nordic-born counterparts. Robustness tests based on data from recent immigrants only suggest that the demand for credit varies with the duration of residence while differences in loan-granting rates are enduring.

Interestingly, immigrant pawnshop customers that do not apply for mainstream bank credit before they take pawn credit are found to make well-informed decisions. By exploiting implied acceptance-rejection probabilities based on data from a representative sample from the Swedish population, I conclude that merely five percent of the first-generation immigrants would have had a chance to get their loan application granted had they applied. For second-generation immigrants these odds are four percent. These numbers suggest that discouraged borrowers with immigrant backgrounds are at least equally well-informed about their chances of obtaining regular credit as their Swedish-born counterparts.

These results suggest that immigrants, although they display higher activity rates than natives, are likely to be confronted with less access to mainstream credit. This raises a number of questions. Is it possible that higher rejection rates in credit applications by immigrants are driven by unobserved heterogeneity? Do immigrants, for example, lack skills that are essential in the loan application process? Or is it possible that there are systematical differences between pawnshop customers with immigrant and native backgrounds?

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# A  Probit model: The bank's decision to grant a loan

If individual $i$ applies for a loan, then the bank must decide whether to accept or reject the application. Let $y_{1i}^*$ represent the bank's expected economic benefit of granting the loan to the individual $i$ and assume

$$y_{1i}^* = x_{1i}\beta_1 + v_{1i}$$

where $x_1$ is a vector containing characteristics of the applicant, and $v_1$ is an unobserved disturbance. Although $y_{1i}^*$ is unobserved, the bank's decision to grant a loan is observed' $y_{1i}$ takes the value one if the loan application was granted and 0 if the application was rejected:

$$y_{1i} = \begin{cases} 1 \text{ if loan granted; } y_{1i}^* > 0 \\ 0 \text{ } otherwise. \end{cases}$$

As mentioned in section 4, in order to get an unbiased result I need the estimation results of the model that describes the decision by the regular bank to grant or reject a loan estimated with a representative sample of the total Swedish population. Table 18 reports the estimation results from Bos (2009).[6]  To make the predicted probabilities comparable with the results in Bos (2009) I use the same group of discouraged borrowers and match the newly obtained immigrant variables with the discouraged borrowers through their unique identification key.

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[6]If we would estimate the same model based only on pawnshop customers, we would over-estimate the predicted probabilities of the discouraged borrowers later on, since we know from Bos (2006 and 2009) that the total Swedish population is more creditworthy on average than the population of pawnshop customers.

# B   Tables and Figures

<div align="center">

**Table 1**

**Percentage first-generation immigrants, by regions of birth**
**Pawnshop customers versus the Swedish population**

</div>

|  | Pawnshop customers % | Swedish population % | diff. % |
|---|---|---|---|
| Total 1st generation | 31.1 | 13.7 | 17.4 |
| Region of birth |  |  |  |
| Nordic (min SE) | 18.6 | 28.1 | -9.4 |
| EU 15 | 4.7 | 9.9 | -5.2 |
| EU 10 | 8.4 | 7.7 | 0.7 |
| Europe | 12.6 | 18.5 | -5.9 |
| Africa | 13.8 | 5.5 | 8.2 |
| North America | 2.0 | 2.4 | -0.4 |
| South America | 11.2 | 4.9 | 6.3 |
| Asia | 28.0 | 22.1 | 5.9 |
| Oceania | 0.1 | 0.3 | -0.2 |
| Soviet Union | 0.7 | 0.7 | 0.0 |
| Number of individuals | 41,996 | 16,440 |  |

## Table 2
## Percentage second-generation immigrants, by regions of birth
## Pawnshop customers versus the Swedish population
## One parent foreign born

|  | Pawnshop customers % | Swedish population % | diff. % |
|---|---|---|---|
| Total 2nd generation | 13.0 | 10.1 | 2.9 |
| Total one parent foreign born | 7.9 | 5.8 | 2.1 |
| Region of birth mother | 3.8 | 3.4 | 0.4 |
|     Nordic (min SE) | 66.9 | 62.1 | 4.8 |
|     EU 15 | 14.1 | 13.4 | 0.7 |
|     EU 10 | 9.0 | 8.9 | 0.1 |
|     Europe | 2.3 | 3.9 | -1.6 |
|     Africa | 0.9 | 1.5 | -0.6 |
|     North America | 2.7 | 3.4 | -0.7 |
|     South America | 1.4 | 1.8 | -0.4 |
|     Asia | 1.7 | 3.8 | -2.1 |
|     Oceania | 0.1 | 0.1 | 0.0 |
|     Soviet Union | 0.9 | 1.2 | -0.2 |
| Region of birth father | 4.1 | 2.4 | 1.7 |
|     Nordic (min SE) | 38.1 | 45.5 | -7.4 |
|     EU 15 | 24.8 | 24.0 | 0.8 |
|     EU 10 | 9.5 | 9.8 | -0.3 |
|     Europe | 9.3 | 6.2 | 3.2 |
|     Africa | 6.8 | 3.6 | 3.2 |
|     North America | 3.6 | 4.9 | -1.3 |
|     South America | 2.3 | 1.5 | 0.8 |
|     Asia | 4.6 | 3.4 | 1.2 |
|     Oceania | 0.2 | 0.1 | 0.1 |
|     Soviet Union | 0.8 | 1.2 | -0.4 |
| Number of individuals | 17,555 | 121,200 |  |

## Table 3
### Percentage second-generation immigrants, by regions of birth
### Pawnshop customers versus the Swedish population
### Both parents foreign born

|  | Pawnshop customers % | Swedish population % | diff. % |
|---|---|---|---|
| Total 2nd generation | 13.0 | 10.1 | 2.9 |
| Total both parents foreign born | 5.1 | 4.1 | 1.0 |
| Total both parents born in same foreign region | 84.7 | 90.1 | -5.4 |
| Region of birth both parents |  |  |  |
| Nordic (min SE) | 47.1 | 44.6 | 2.5 |
| EU 15 | 7.5 | 7.1 | 0.4 |
| EU 10 | 10.1 | 7.5 | 2.5 |
| Europe | 24.3 | 20.6 | 3.7 |
| Africa | 2.7 | 2.0 | 0.7 |
| North America | 0.0 | 0.2 | -0.2 |
| South America | 3.8 | 4.2 | -0.4 |
| Asia | 4.3 | 13.1 | -8.8 |
| Oceania | 0.0 | 0.0 | 0.0 |
| Soviet Union | 0.3 | 0.7 | -0.4 |
| Total both parents born not same foreign region | 15.3 | 9.9 | 5.4 |
| Region of birth mother |  |  |  |
| Nordic (min SE) | 48.4 | 41.7 | 6.8 |
| EU 15 | 14.0 | 18.8 | -4.9 |
| EU 10 | 14.78 | 13.3 | -3.7 |
| Europe | 9.5 | 8.7 | -6.3 |
| Africa | 2.4 | 1.6 | -0.6 |
| North America | 1.0 | 2.1 | 1.2 |
| South America | 3.3 | 1.8 | 2.5 |
| Asia | 4.3 | 6.7 | -6.6 |
| Oceania | 0.1 | 0.2 | 2.0 |
| Soviet Union | 2.3 | 5.1 | -2.9 |
| Region of birth father |  |  |  |
| Nordic (min SE) | 12.1 | 15.1 | -3.1 |
| EU 15 | 25.3 | 24.1 | 1.2 |
| EU 10 | 16.1 | 18.8 | -2.8 |
| Europe | 16.6 | 14.2 | 2.4 |
| Africa | 12.1 | 5.9 | 6.2 |
| North America | 2.7 | 2.8 | -0.2 |
| South America | 3.3 | 2.8 | 0.5 |
| Asia | 8.8 | 9.2 | -0.5 |
| Oceania | 0.0 | 0.2 | -0.2 |
| Soviet Union | 3.2 | 6.9 | -3.7 |
| Number of individuals | 17,555 | 121,200 |  |

## Table 4
## Variable definitions

Characteristics that determine the 'common support' of the immigrant and Swedish-born pawnshop customers groups. To calculate the propensity score and common support for both the immigrant group $k_n$ and its counter part Swedish-born group $k_n$ of pawnshop customers I have used psmatch2 in Stata. This program runs a probit regression with a dependent variable, the immigrant group $k_n$ and the independent variables are the characteristics that matter most for the loan-granting decision by the regular bank.

*Personal characteristics*

AGE — Age of the pawnshop customer

MALE — dummy, takes value 1 if applicant is male

BIG_CITY — dummy, takes value 1 if applicant lives in one of the three greater metropolitan areas around Goteborg, Malmö and Stockholm

*Income*

INCOME — Annual income from wages (x SEK 100)

CAPINC — dummy, takes value 1 if applicant has taxable income from capital

HOUSE_VALUE — the taxation value of the house (or the part owned )

*Regular bank credit history*

ZEROLIM — dummy, takes value 1 if applicant has no collateral free loans outstanding

CLAIMS — dummy, takes value 1 if applicant has a positive saldo at the national collection agency

ZERO_CRDT_RMRK — dummy takes value 1 if applicant has zero credit remarks

BALANCE_INC** — total collateral free credit facilities utilized divided by INCOME

GOOD_SCORE — dummy, takes value 1 if the credit score has a value smaller than 7

## Table 5
## Descriptive statistics
## Creditworthiness
## First- generation immigrants versus Swedish-born

The mean and the standard error of the mean for the characteristics that determine the 'common support' of the immigrant and Swedish-born pawnshop customer groups. A t-test is done to test the hypothesis whether the two means are equal.

| | First-gen. Immigrants Pawnshop cust. | | Swedish-born Pawnshop cust. | | |
|---|---|---|---|---|---|
| | Mean | std.err | mean | std.err | t-test* |
| *Personal characteristics* | | | | | |
| AGE | 39.43 | 0.01 | 42.92 | 0.01 | reject |
| MALE | 0.51 | 0.00 | 0.50 | 0.00 | reject |
| BIG_CITY | 0.73 | 0.00 | 0.66 | 0.00 | reject |
| *Income* | | | | | |
| INCOME | 709.75 | 1.77 | 969.72 | 2.15 | reject |
| CAPINC | 0.06 | 0.00 | 0.12 | 0.00 | reject |
| HOUSE_VALUE | 719.44 | 2.79 | 726.98 | 2.82 | not reject |
| *Regular bank credit history* | | | | | |
| ZEROLIM | 0.51 | 0.00 | 0.40 | 0.00 | reject |
| CLAIMS | 0.36 | 0.00 | 0.38 | 0.00 | reject |
| ZERO_CRDT_RMRK | 0.54 | 0.00 | 0.52 | 0.00 | reject |
| BALANCE_INC** | 0.68 | 0.04 | 0.60 | 0.02 | weak reject |
| GOOD_SCORE | 0.42 | 0.00 | 0.43 | 0.00 | weak reject |

* for the $H_0$: mean (immigrants) - mean (Swedish born) == 0

Table 6
## Descriptive statistics
## Creditworthiness
## Second generation immigrants versus Swedish-born not second generation

The mean and the standard error of the mean for the characteristics that determine the 'common support' of the immigrant and Swedish-born pawnshop customers groups. A t-test is done to test the hypothesis whether the two means are equal.

| | Second-gen. Immigrants Pawnshop cust. | | Swedish-born (not 2nd-gen) Pawnshop cust. | | |
|---|---|---|---|---|---|
| | Mean | std.err | mean | std.err | t-test* |
| *Personal characteristics* | | | | | |
| AGE | 33.10 | 0.01 | 45.20 | 0.01 | reject |
| MALE | 0.54 | 0.00 | 0.49 | 0.00 | reject |
| BIG_CITY | 0.70 | 0.00 | 0.65 | 0.00 | reject |
| *Income* | | | | | |
| INCOME | 782.55 | 4.59 | 1012.84 | 2.43 | reject |
| CAPINC | 0.11 | 0.00 | 0.12 | 0.00 | reject |
| HOUSE_VALUE | 737.47 | 5.26 | 725.59 | 3.12 | not reject |
| *Regular bank credit history* | | | | | |
| ZEROLIM | 0.51 | 0.00 | 0.38 | 0.00 | reject |
| CLAIMS | 0.39 | 0.00 | 0.38 | 0.00 | reject |
| ZERO_CRDT_RMRK | 0.51 | 0.00 | 0.52 | 0.00 | reject |
| BALANCE_INC** | 0.56 | 0.03 | 0.61 | 0.03 | weak reject |
| GOOD_SCORE | 0.39 | 0.00 | 0.43 | 0.00 | reject |

* for the $H_0$: mean (immigrants) - mean (Swedish born) == 0

## Table 7
## Average 'success ratios' for immigrants and Swedish-born pawnshop customers

The average 'Success ratio' is defined as:

$$average\ Succes\ Ratio_{K\ and\ Kc,Y} = \frac{\sum loan\ granting_{i,y}}{\sum loan\ applications_{i,y}}$$ where $Kc$ is the common support

Swedish-born counterpart of the immigrant group $K$. The t-statistic is reported in column 3 for

the $H_0 : Average(succes\ ratio_{imm}) - Average(succes\ ratio_{Swedish}) = 0$

| | | Average | | | No. Indiv. |
|---|---|---|---|---|---|
| | | Success ratio | std. err. | t-stat* | Common supp. |
| First-generation immigrant | | | | | |
| groups | Immigrant | 0.266 | 0.000 | | 33,868 |
| | Swedish born | 0.283 | 0.001 | | 73,569 |
| | *difference* | 0.017 | 0.001 | 20.7, reject H$_0$ | |
| Second-generation immigrant | | | | | |
| groups | Immigrant | 0.267 | 0.000 | | 17,427 |
| | Swedish born | 0.281 | 0.001 | | 72,806 |
| | *difference* | 0.014 | 0.001 | 12.4 , reject H$_0$ | |
| Second-generation only father foreign born | | | | | |
| groups | Immigrant | 0.281 | 0.002 | | 5,089 |
| | Swedish born | 0.280 | 0.003 | | 72,803 |
| | *difference* | 0.002 | 0.001 | 0.97, not reject H$_0$ | |
| Second-generation only mother foreign born | | | | | |
| groups | Immigrant | 0.273 | 0.002 | | 5,463 |
| | Swedish born | 0.273 | 0.000 | | 72,800 |
| | *difference* | 0.007 | 0.002 | 3.359, reject H$_0$ | |
| Second-generation both parents foreign born | | | | | |
| groups | Immigrant | 0.251 | 0.002 | | 6,875 |
| | Swedish born | 0.281 | 0.000 | | 71,805 |
| | *difference* | 0.029 | 0.002 | 17.05, reject H$_0$ | |
| First-generation immigrants born in Africa | | | | | |
| groups | Immigrant | 0.243 | 0.002 | | 4,650 |
| | Swedish born | 0.280 | 0.000 | | 70,296 |
| | *difference* | 0.037 | 0.002 | 18.24, reject H$_0$ | |
| Second-generation immigrants both parents, at least one born in Africa | | | | | |
| groups | Immigrant | 0.247 | 0.005 | | 550 |
| | Swedish born | 0.284 | 0.000 | | 70,764 |
| | *difference* | 0.037 | 0.005 | 7.07, reject H$_0$ | |

* H$_0$ : mean (immigrant) - mean (Swedish born) = = 0

## Table 8
## Cox proportional hazard model
## Propensities to apply for a loan, and loan granting
## First- and second-generation immigrants compared to Swedish-born

The Swedish-born pawnshop customers form the baseline hazard. Hazard ratios are reported, with standard errors in italics below, for the propensity first, to apply for a loan at a mainstream bank and second, loan granting by the mainstream bank. These propensities are measured from the time the individual takes his/her first pawn loan in-sample. *, ** and *** denote significance at the 10, 5, 1 percent levels respectively.

|  | Loan application | | Loan granting | |
|---|---|---|---|---|
| **First-generation** | | | | |
| All | 1.03 | | 1.07 | |
| | *0.03* | | *0.03* | |
| African born | | 1.14 *** | | 0.93 *** |
| | | *0.06* | | *0.06* |
| **Second-generation** | | | | |
| All | 1.07 | | 1.01 | |
| | *0.04* | | *0.04* | |
| African-born parent | | 1.06 | | 0.93 |
| | | *0.15* | | *0.21* |
| Number of subjects | 10,729 | 6947 | 14,050 | 9044 |
| Number of failures | 7,292 | 4714 | 4,841 | 3145 |
| Loglikelihood | -63337.6 | -38960.2 | -44329.0 | -27432.5 |

| | | | | |
|---|---|---|---|---|
| 7,430 | 8,374 | 9,661 | 10,941 |
| 5,066 | 5,694 | 3,340 | 3,770 |
| -42190.3 | -48057.8 | -29358.9 | -33590.1 |

## Table 9
## Percentage pawnshop customers that immigrated to Sweden in sample by regions of birth

|  | Pawnshop customers imm in-sample | Pawnshop customers | Swedish population |
|---|---|---|---|
|  | % | % | % |
| Total 1st generation | 100.0 | 31.1 | 13.7 |
| Region of birth |  |  |  |
| Nordic (min SE) | 5.2 | 18.6 | 28.1 |
| EU 15 | 3.1 | 4.7 | 9.9 |
| EU 10 | 6.3 | 8.4 | 7.7 |
| Europe | 13.1 | 12.6 | 18.5 |
| Africa | 17.8 | 13.8 | 5.5 |
| North America | 3.1 | 2.0 | 2.4 |
| South America | 8.5 | 11.2 | 4.9 |
| Asia | 42.9 | 28.0 | 22.1 |
| Oceania | 0.1 | 0.1 | 0.3 |
| Soviet Union |  | 0.7 | 0.7 |
| Number of individuals | 3,457 | 41,996 | 16,440 |

## Table 10
### Descriptive statistics
### Creditworthiness
### Pawnshop customers that immigrated to Sweden in-sample

The mean and the standard error of the mean for the characteristics that determine the 'common support' of the immigrant and Nordic-born pawnshop customer groups. The mean is measured when the individuals enter for the first time in the data. The Swedish-born pawnshop customers, who did not immigrate, are shown in order to facilitate easy comparisons with the Nordic-born pawnshop customers.

| | All, but Nordic Pawnshop cust. immi insample | | African-born Pawnshop cust. immi insample | | Nordic-born Pawnshop cust. immi insample | | Swedish-born Pawnshop cust. | |
|---|---|---|---|---|---|---|---|---|
| | Mean | std.err | Mean | std.err | Mean | std.err | mean | std.err |
| *Personal characteristics* | | | | | | | | |
| AGE | 31.35 | 0.03 | 30.19 | 0.06 | 35.52 | 0.18 | 42.92 | 0.01 |
| MALE | 0.51 | 0.00 | 0.49 | 0.00 | 0.60 | 0.01 | 0.50 | 0.00 |
| BIG_CITY | 0.69 | 0.00 | 0.73 | 0.00 | 0.73 | 0.01 | 0.66 | 0.00 |
| *Income* | | | | | | | | |
| INCOME | 324.44 | 2.04 | 339.26 | 4.57 | 499.86 | 14.01 | 969.72 | 2.15 |
| CAPINC | 0.01 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.12 | 0.00 |
| HOUSE_VALUE | 834.35 | 25.57 | . | . | 461.75 | 35.23 | 726.98 | 2.82 |
| *Regular bank credit history* | | | | | | | | |
| ZEROLIM | 0.75 | 0.00 | 0.78 | 0.00 | 0.74 | 0.01 | 0.40 | 0.00 |
| CLAIMS | 0.12 | 0.00 | 0.12 | 0.00 | 0.13 | 0.01 | 0.38 | 0.00 |
| ZERO_CRDT_RMRK | 0.84 | 0.00 | 0.82 | 0.00 | 0.76 | 0.01 | 0.52 | 0.00 |
| BALANCE_INC** | 0.52 | 0.04 | 0.26 | 0.02 | 0.63 | 0.20 | 0.60 | 0.02 |
| GOOD_SCORE | 0.68 | 0.00 | 0.68 | 0.00 | 0.40 | 0.01 | 0.43 | 0.00 |

## Table 11
### Average duration, in days
### First: loan application, loan granting, pawn loan
### Pawnshop customers that immigrated to Sweden in sample
### by regions of birth

| | mean | st dev | min | max | obs |
|---|---|---|---|---|---|
| | Average duration first loan application | | | | |
| | mean | st dev | min | max | obs |
| Total | 495.0 | 467.0 | 0 | 2,071 | 2,561 |
| Region of birth | | | | | |
| Nordic (min SE) | 312.0 | 366.5 | 0 | 1,826 | 141 |
| EU 15 | 454.4 | 427.6 | 0 | 1,947 | 88 |
| EU 10 | 498.0 | 466.9 | 0 | 2,071 | 146 |
| Europe | 503.0 | 457.1 | 0 | 1,889 | 329 |
| Africa | 459.2 | 429.9 | 0 | 2,071 | 440 |
| North America | 401.1 | 389.8 | 0 | 1,704 | 88 |
| South America | 354.2 | 363.6 | 0 | 1,642 | 256 |
| Asia | 576.4 | 509.7 | 0 | 2,071 | 1,068 |
| | Average duration firs loan granting | | | | |
| Total | 751.4 | 505.2 | 0 | 2,071 | 1,479 |
| Region of birth | | | | | |
| Nordic (min SE) | 389.0 | 425.2 | 0 | 1,826 | 71 |
| EU 15 | 539.3 | 391.5 | 0 | 1,765 | 57 |
| EU 10 | 678.0 | 475.8 | 0 | 1,886 | 78 |
| Europe | 770.6 | 499.9 | 0 | 1,889 | 160 |
| Africa | 789.7 | 504.4 | 0 | 2,071 | 249 |
| North America | 510.6 | 387.2 | 0 | 1,947 | 59 |
| South America | 580.5 | 429.8 | 0 | 1,765 | 197 |
| Asia | 878.3 | 511.7 | 0 | 2,071 | 625 |
| | Average duration firs pawn loan | | | | |
| Total | 681.0 | 552.3 | 0 | 2,096 | 3,457 |
| Region of birth | | | | | |
| Nordic (min SE) | 477.8 | 640.6 | 0 | 1,875 | 1,875 |
| EU 15 | 551.1 | 583.8 | 0 | 1,845 | 106 |
| EU 10 | 452.5 | 477.7 | 0 | 1,845 | 216 |
| Europe | 645.1 | 514.4 | 0 | 2,073 | 451 |
| Africa | 684.3 | 525.7 | 0 | 2,050 | 616 |
| North America | 588.3 | 555.0 | 0 | 1,805 | 107 |
| South America | 550.5 | 529.9 | 0 | 1,990 | 292 |
| Asia | 790.4 | 547.8 | 0 | 2,096 | 1,484 |

**Table 12**
**Cox proportional hazard model**
**Propensities to apply for a loan and loan granting**
**Immigrants compared to Nordic-born pawnshop customers that**
**immigrated in-sample**

The Nordic-born pawnshop customers form the baseline hazard. Hazard ratios are reported, with standard errors in italics below, for the propensity first, to apply for a loan at a mainstream bank and second, loan granting by the mainstream bank. These propensities are measured from the time the individuals enter Sweden. *, ** and *** denote significance at the 10, 5, 1 percent levels respectively.

| | Loan application | | Loan granting | |
|---|---|---|---|---|
| All, but Nordic | 0.81 | | 0.97 | |
| | *0.13* | | *0.24* | |
| African born | | 0.95 | | 0.85 *** |
| | | *0.07* | | *0.05* |
| Number of subjects | 52,565 | 794 | 4,518 | 794 |
| Number of failures | 4,518 | 581 | 1,967 | 320 |
| Loglikelihood | -8120.60 | -3494.20 | -4802.00 | -1980.5 |

## Table 13
## Percentage first-generation immigrants, by regions of birth
## Discouraged borrowers

|  | Discouraged borrowers % | Pawnshop customers % | Swedish population % |
|---|---|---|---|
| Total 1st generation | 31.7 | 31.1 | 13.7 |
| Region of birth |  |  |  |
| Nordic (min SE) | 21.1 | 18.6 | 28.1 |
| EU 15 | 4.8 | 4.7 | 9.9 |
| EU 10 | 9.4 | 8.4 | 7.7 |
| Europe | 12.2 | 12.6 | 18.5 |
| Africa | 14.5 | 13.8 | 5.5 |
| North America | 2.0 | 2.0 | 2.4 |
| South America | 10.7 | 11.2 | 4.9 |
| Asia | 24.5 | 28.0 | 22.1 |
| Oceania | 0.0 | 0.1 | 0.3 |
| Soviet Union | 0.7 | 0.7 | 0.7 |
| Number of individuals | 9,379 | 41,996 | 16,440 |

# Table 14
## Percentage second-generation immigrants, by regions of birth
## Discouraged borrowers
## One parent foreign born

|  | Discouraged borrowers % | Pawnshop customers % | Swedish population % |
|---|---|---|---|
| Total 2nd generation | 22.5 | 13.0 | 10.1 |
| Total one parent foreign born | 10.8 | 7.9 | 5.8 |
| Region of birth mother | 6.4 | 3.8 | 3.4 |
|     Nordic (min SE) | 54.0 | 66.9 | 62.1 |
|     EU 15 | 7.6 | 14.1 | 13.4 |
|     EU 10 | 10.3 | 9.0 | 8.9 |
|     Europe | 5.1 | 2.3 | 3.9 |
|     Africa | 5.7 | 0.9 | 1.5 |
|     North America | 2.3 | 2.7 | 3.4 |
|     South America | 5.5 | 1.4 | 1.8 |
|     Asia | 8.5 | 1.7 | 3.8 |
|     Oceania | . | 0.1 | 0.1 |
|     Soviet Union | 1.1 | 0.9 | 1.2 |
| Region of birth father | 4.4 | 4.1 | 2.4 |
|     Nordic (min SE) | 34.5 | 38.1 | 45.5 |
|     EU 15 | 21.4 | 24.8 | 24.0 |
|     EU 10 | 9.7 | 9.5 | 9.8 |
|     Europe | 10.91 | 9.3 | 6.2 |
|     Africa | 9.2 | 6.8 | 3.6 |
|     North America | 3.4 | 3.6 | 4.9 |
|     South America | 3.4 | 2.3 | 1.5 |
|     Asia | 7.0 | 4.6 | 3.4 |
|     Oceania | 0.2 | 0.2 | 0.1 |
|     Soviet Union | 0.5 | 0.8 | 1.2 |
| Number of individuals | 6,657 | 17,555 | 121,200 |

# Table 15
## Percentage second-generation immigrants, by regions of birth
## Discouraged borrowers
## Both parents foreign born

| | Discouraged borrowers % | Pawnshop customers % | Swedish population % |
|---|---|---|---|
| Total 2nd generation | 22.5 | 13.0 | 10.1 |
| Total both parents foreign born | 11.5 | 5.1 | 4.1 |
| Total both parents born in same foreign region | 90.6 | 84.7 | 90.1 |
| Region of birth both parents | | | |
| Nordic (min SE) | 34.3 | 47.1 | 44.6 |
| EU 15 | 4.5 | 7.5 | 7.1 |
| EU 10 | 10.1 | 10.1 | 7.5 |
| Europe | 21.0 | 24.3 | 20.6 |
| Africa | 4.0 | 2.7 | 2.0 |
| North America | 0.2 | 0.0 | 0.2 |
| South America | 9.0 | 3.8 | 4.2 |
| Asia | 16.2 | 4.3 | 13.1 |
| Oceania | 0.0 | 0.0 | 0.0 |
| Soviet Union | 0.7 | 0.3 | 0.7 |
| Total both parents born not same foreign region | 9.4 | 15.3 | 9.9 |
| Region of birth mother | | | |
| Nordic (min SE) | 43.0 | 48.4 | 41.7 |
| EU 15 | 15.7 | 14.0 | 18.8 |
| EU 10 | 13.2 | 14.78 | 13.3 |
| Europe | 11.0 | 9.5 | 8.7 |
| Africa | 2.8 | 2.4 | 1.6 |
| North America | 0.0 | 1.0 | 2.1 |
| South America | 2.2 | 3.3 | 1.8 |
| Asia | 6.3 | 4.3 | 6.7 |
| Oceania | 0.0 | 0.1 | 0.2 |
| Soviet Union | 6.0 | 2.3 | 5.1 |
| Region of birth father | | | |
| Nordic (min SE) | 5.0 | 12.1 | 15.1 |
| EU 15 | 18.8 | 25.3 | 24.1 |
| EU 10 | 18.8 | 16.1 | 18.8 |
| Europe | 19.4 | 16.6 | 14.2 |
| Africa | 9.4 | 12.1 | 5.9 |
| North America | 3.1 | 2.7 | 2.8 |
| South America | 4.7 | 3.3 | 2.8 |
| Asia | 14.4 | 8.8 | 9.2 |
| Oceania | 0.3 | 0.0 | 0.2 |
| Soviet Union | 6.0 | 3.2 | 6.9 |
| Number of individuals | 6,657 | 17,555 | 121,200 |

## Table 16
## Descriptive statistics
## First-generation immigrants compared to Swedish-born, discouraged borrowers

The mean and the standard error of the mean for the characteristics that are used to estimate the probit model for the bank's decision to grant a loan or not

| | First-gen. Immigrants Disc. borrowers | | First-gen. Immigrants Pawnshop cust. | | Swedish-born Disc. Borrowers | |
|---|---|---|---|---|---|---|
| | Mean | std.err | Mean | std.err | mean | std.err |
| *Personal characteristics* | | | | | | |
| AGE | 41.19 | 0.14 | 39.43 | 0.01 | 42.92 | 0.01 |
| MALE | 0.51 | 0.01 | 0.51 | 0.00 | 0.50 | 0.00 |
| BIG_CITY | 0.75 | 0.00 | 0.73 | 0.00 | 0.66 | 0.00 |
| *Income* | | | | | | |
| INCOME | 710.23 | 0.97 | 709.75 | 1.77 | 969.72 | 2.15 |
| CAPINC | 0.02 | 0.00 | 0.06 | 0.00 | 0.12 | 0.00 |
| HOUSE_VALUE | 660.36 | 3.74 | 719.44 | 2.79 | 726.98 | 2.82 |
| *Regular bank credit history* | | | | | | |
| ZEROLIM | 0.67 | 0.00 | 0.51 | 0.00 | 0.40 | 0.00 |
| CLAIMS | 0.50 | 0.01 | 0.36 | 0.00 | 0.38 | 0.00 |
| ZERO_CRDT_RMRK | 0.38 | 0.01 | 0.54 | 0.00 | 0.52 | 0.00 |
| BALANCE_INC** | 0.12 | 0.00 | 0.68 | 0.04 | 0.60 | 0.02 |
| GOOD_SCORE | 0.34 | 0.00 | 0.42 | 0.00 | 0.43 | 0.00 |

## Table 17
## Descriptive statistics
## Second-generation immigrants compared to Swedish-born, excluding second-generation
## Discouraged borrowers

The mean and the standard error of the mean for the characteristics that are used to estimate the probit model for the bank's decision to grant a loan or not

| | Second-gen. Immigrants Disc. borrowers | | Second-gen. Immigrants Pawnshop cust. | | Swedish-born not 2nd gen Disc. Borrowers | |
|---|---|---|---|---|---|---|
| | Mean | std.err | Mean | std.err | mean | std.err |
| *Personal characteristics* | | | | | | |
| AGE | 33.38 | 0.14 | 33.10 | 0.01 | 45.20 | 0.01 |
| MALE | 0.56 | 0.01 | 0.54 | 0.00 | 0.49 | 0.00 |
| BIG_CITY | 0.72 | 0.01 | 0.70 | 0.00 | 0.65 | 0.00 |
| *Income* | | | | | | |
| INCOME | 702.12 | 1.26 | 782.55 | 4.59 | 1012.84 | 2.43 |
| CAPINC | 0.05 | 0.00 | 0.11 | 0.00 | 0.12 | 0.00 |
| HOUSE_VALUE | 605.77 | 3.42 | 737.47 | 5.26 | 725.59 | 3.12 |
| *Regular bank credit history* | | | | | | |
| ZEROLIM | 0.70 | 0.01 | 0.51 | 0.00 | 0.38 | 0.00 |
| CLAIMS | 0.55 | 0.01 | 0.39 | 0.00 | 0.38 | 0.00 |
| ZERO_CRDT_RMRK | 0.35 | 0.01 | 0.51 | 0.00 | 0.52 | 0.00 |
| BALANCE_INC** | 0.11 | 0.01 | 0.56 | 0.03 | 0.61 | 0.03 |
| GOOD_SCORE | 0.30 | 0.01 | 0.39 | 0.00 | 0.43 | 0.00 |

## Table 18
## The decision by the regular bank to grant a loan or not

The probit model described in appendix A. The dependent variable is the dummy variable that is equal to one if the individual's loan application was granted. This model is estimated on a representative sample of the whole Swedish population, including non-pawnshop customers. *, ** and *** denote significance at the 10, 5, 1 percent levels respectively.

| *Variables* | P (REG_LOAN=1) | |
|---|---|---|
| | Coeff. | std.dev |
| CONSTANT | 0.17 | 0.03 *** |
| *Personal characteristics* | | |
| AGE_18_35 | | |
| AGE_36_65 | 0.04 | 0.01 *** |
| AGE_66_99 | 0.15 | 0.03 *** |
| MALE | - 0.05 | 0.01 *** |
| RECENT_ALONE | 0.02 | 0.02 |
| BIGCITY | - 0.06 | 0.01 *** |
| *Income* | | |
| ENTREPR | 0.02 | 0.02 |
| log(INCOME) | 0.06 | 0.02 *** |
| CAPINC | 0.04 | 0.02 ** |
| log (HOUSE_VALUE) | 0.01 | 0.01 ** |
| *Regular bank credit history* | | |
| CUM_LOAN_DENIED | - 0.54 | 0.01 *** |
| ZEROLIM | - 0.80 | 0.02 *** |
| BALANCE_INC | - 0.04 | 0.01 *** |
| NR_TOTAL_CRDT | - 0.01 | 0.01 |
| CUM_FINAN_QST | 0.12 | 0.00 *** |
| BOTH_HIGH_UTIL | - 0.26 | 0.04 *** |
| CLAIMS | - 0.14 | 0.02 *** |
| ZERO_CRDT_RMRK | 0.31 | 0.03 *** |
| GOOD_SCORE | 0.29 | 0.02 *** |

## Table 19
## Out-of-sample predicted probabilities
## A loan application by discouraged borrowers would be granted

The out-of-sample prediction that the discouraged borrowers will obtain regular credit is based on the empirical model outlined in Appendix A, the bank's decision to grant a loan or not, where the estimation results, summarized in Table 18, are based on a representative sample of the Swedish population, including non-pawnshop customers. The cut-off point is based on the median predicted probability of the individuals whose loan was actually granted: a predicted probability of 0.78

|  |  | Percentage of individuals predicted probability > 0.78 | Number of individuals |
|---|---|---|---|
| Granted | Total | 50.00 | 34,949 |
|  |  |  |  |
| Discouraged borrowers | Total | 7.40 | 29,587 |
| Swedish-born | Total | 9.73 | 20,222 |
|  | excluding 2nd-gen | 10.86 | 16,563 |
|  |  |  |  |
| First-generation immigrants | Total | 5.30 | 9,373 |
|  | Africa | 4.49 | 1,358 |
|  |  |  |  |
| Second-generation immigrants | Total | 3.83 | 6,649 |
| One parent foreign born | Total | 4.60 | 3,194 |
|  | Africa | 3.07 | 228 |
|  | Asia | 4.36 | 252 |
| Both parents foreign born | Total | 2.98 | 3,385 |
|  | Africa | 3.08 | 162 |
|  | Asia | 2.13 | 563 |