

DISCRIMINATION BY FORMAL LENDERS IN SOUTH AFRICA

by

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ABSTRACT

Censored (Tobit) regression is used to estimate the effects of race, location of residence, and sex of the household head on formal debt held by South African households. The magnitude of the effects suggests that lenders discriminate and that formal financial markets could be improved even without technical innovation.

I. Introduction

This study uses censored (Tobit) regression to examine discrimination by formal lenders in South Africa. Per capita household debt from formal sources is regressed on economic variables (proxies for income, assets, and human capital) and non-economic variables (race, location of residence, and sex of the household head). The magnitude of discrimination is indicated by the estimated effects of the non-economic variables on the probability of having positive debt and on the expected amount of debt, if positive.

The magnitude of discrimination turns out to be large. For example, a black, rural, female-headed household has 29 percentage points less probability of having positive debt and, if debt is positive, has R155,165 less debt on average than a white, metropolitan, male-headed household with the same economic status.¹ The importance of non-economic factors suggests that, even in the absence of the reduced transactions costs and the improved technical efficiency that normally drive the expansion of the frontiers of formal financial markets, the frontier of formal finance may also be expanded through the reform of institutions, policies, and procedures.

This paper has three more sections. Following the introduction, section II describes the data and the variables. Section III explains the model, the hypothesis, and the test. Section IV presents the results and the conclusions.

¹ One dollar was worth about 3.6 Rands in mid-1995.

II. Data and Variables

1. Data

The data were derived from a national, random survey of 8,848 households conducted on the eve of the end of apartheid (Aug.-Dec. 1993) by the South African Labour and Development Research Unit at the University of Cape Town.² The survey was intended to measure comprehensively the economic status of households in South Africa. The survey covered a plethora of variables, including demographics, expenditures, transfers, assets, employment, and education. It also asked for the amount of household debt and for the sources of debt.

2. Dependent variable

The dependent variable was taken to be total household debt from formal sources. To control for household size, the figure was divided by the number of scaled adult equivalents in the household.³

Almost 50 percent of South African households have some debt from formal lenders, informal lenders, or both. Three considerations drove the choice of *formal* debt rather than *all* debt as the dependent variable:

² The data are in the public domain. The authors thank Simon Mpele and Dudley Horner for providing the data.

³ As in May, Carter, and Posel, the number of scaled adult equivalents was calculated as

$$\left\{ Adults + \frac{Children}{2} \right\}^{0.9}$$

- Results on informal debt have few policy implications because informal debt is outside the purview of policy;
- Informal debts tend to be smaller and shorter than formal debts and thus demand for the two may differ;
- Discrimination in informal markets is highly unlikely because informal lenders know borrowers personally.

The mean per-capita household debt from formal sources for all households (including households with no formal debt) was R4,149. Median debt was zero, as 70 percent of the households had no formal debt. For households with positive debt, the mean was R13,674, and the median was R1,540. Almost all formal debt, both in amount and in numbers, was for housing or for consumer appliances/furniture (Schreiner, Graham, and Coetzee).

Several aspects of the dependent variable warrant emphasis:

- It measures only *debt*, the condition of having acquired a loan and being obligated to repay, and not the ability to get loans, also known as *credit*;
- It is associated only with households, not individuals;
- It measures only debt on the day of the interview;
- It is assumed not to be endogenous with other economic variables of the household;
- It ignores debt from informal sources;
- It may include debt from multiple formal sources.

3. Independent variables

a. Economic variables

The data provide an extensive set of measures of the economic status of South African households. Income is measured by expenditure, pensions, and net remittances.⁴ The distribution of monthly per-capita expenditure is extremely skewed: the mean is R660, but the median is R342. The 27 percent of households with pensions received an average of R216 (per

⁴ Households may send and/or receive remittances.

capita). These households tended to be rural, black, and among the poorest. Thirty-five percent of households reported remittances.

Assets are measured as the value of agricultural land owned, the number of cattle owned, and the value of assets used in productive activities. Less than 1 percent of the households owned agricultural land that they had the right to sell. About 7 percent of the households owned cattle (median 4 head), and about 11 percent owned assets used in productive activities, although the median was only R20.

Human capital is proxied by the number of literate males and females in the household and by the number of males and females in the primary and secondary labor markets. On average, households had about 0.7 members in the primary labor market and 0.28 members in the secondary labor market. More males were employed than females. The average household had 1.9 literate members and 2.4 illiterate members.⁵

Demographic variables that may affect debt capacity are the age of the household head (mean 48 years), the presence of the household head (present in 92 percent of households), and having changed residences recently (12 percent had migrated in the past 5 years).

b. Non-economic variables

This study focuses on three non-economic variables: race, location of residence, and sex of the household head.⁶ About 75 percent of the households surveyed were black, about 50

⁵ As in May, Carter, and Posel, literacy is defined as having passed Standard Four, and the number of illiterate members is net of the full-time adult equivalents engaged in fetching water and fuel.

⁶ Location of residence is both an economic and a non-economic variable. For example, different debt capacities may be justified by the different economic opportunities and costs of exploiting them faced by otherwise identical rural and urban households. The nature and the

percent were rural, and about 25 percent had female heads. It is expected that the households that were disadvantaged under apartheid and its bundle of policies--black, rural, and female-headed households--had fewer debts and smaller debts than would be predicted by economic factors alone.⁷

III. The Model and a Test For Discrimination

Debt capacity is the amount of debt a household would be able and willing to repay as contracted. *Demand for loans* is less than or equal to debt capacity because a household may choose not to indebt itself to its limits. The supply of loans is also assumed not to exceed debt capacity. It is reasonable to expect, however, that more debt capacity implies a greater demand for loans, as well as a greater supply.

It is assumed that household preferences do not depend on non-economic variables and so a given household's debt capacity and thus its demand for loans are functions only of economic variables. Thus, given a level of economic status, debt capacity should not vary with non-economic variables such as race, location of residence, and sex of the household head. Households with identical economic statuses should, on average, have the same demand for loans, regardless of non-economic variables.

Demand for loans is unobserved; debt is observed. Debt depends on the amount of the original loan, which in turn depends on demand and supply. Although both demand and supply

extent of the differences in opportunities and costs, however, were largely shaped by the geopolitical divisions of apartheid, a non-economic factor.

⁷ Until recently, a woman in a customary marriage (that is, a marriage in tribal or homeland jurisdictions) was a legal minor in the custody of her husband, and she could not enter into written contracts without his permission.

are functions of the total cost of borrowing/lending and of the economic status of the borrower, *for a given level of economic status and in the absence of discrimination on the basis on non-economic variables*, the (unobserved) intersection of the (unobserved) demand and supply functions should not vary with a household's non-economic characteristics. Furthermore, if preferences and economic status do not vary seasonally nor secularly, observed debt will, on average, be half the size of the unobserved original loan.

Figure 1 illustrates the relation of observed debt and economic status (Panel A) to unobserved demand and supply functions for "poor" (Panel B) and "rich" (Panel C) households of different races. The demand curves in Panels B and C depend only on economic variables; thus, given an economic status, black and white households share a demand curve. The demand curve for "rich" households (Panel C) lies to the right of that of "poor" households (Panel B) because demand for loans increases with debt capacity and debt capacity increases with economic status.⁸ Debt observed is, on average, half the original loan.

Supply curves may depend on non-economic variables such as race. Suppose lenders discriminate by supplying smaller loans for a given total cost and economic status if the household is black. Then black households face supply curves farther to the left than do white households in Panels B and C, decreasing the amount of the original loan and thus the amount of observed debt.

Given a set of economic and non-economic variables, the econometric model estimates the expected amount of debt from formal sources. The estimated change in the expected amount of formal debt caused by a change in non-economic variables is illustrated by the

⁸ The supply curves are farther right for the same reason.

horizontal distance between the two curves in Panel A. In the absence of discrimination, this distance would be statistically insignificant.⁹

Censored (Tobit) regression is used because debt is constrained to be non-negative and because about 70 percent of the 7,780 households with non-missing values for the variables used in the regression had no debt from formal sources at the time of the survey. In this situation, estimates by Ordinary Least Squares are biased and inconsistent. Of course, this study focuses less on detecting the presence of discrimination through the statistical significance of the estimated regression coefficients themselves and more on measuring the extent of discrimination through the estimated magnitudes of the probability of having positive debt and of the expected amount of debt held, if positive (McDonald and Moffitt; Greene).

IV. Results and Conclusions

Table 1 presents the estimated coefficients and the estimated effects of changes in the independent variables on the probability of holding positive debt and on the amount of debt

⁹ Formally, let \mathbf{E} be a vector of economic variables, \mathbf{NE} a vector of non-economic variables, and \mathbf{NE}' a different vector of non-economic variables. Let *status* be a function of \mathbf{E} whose value is a household's economic status, *capacity* a non-decreasing function of *status* whose value is a household's debt capacity, and *demand* an increasing function of *capacity* whose value is a household's demand for loans. Let *supply* in a non-discriminatory market be a function only of *capacity* and thus, via *status*, of \mathbf{E} . In a discriminatory market, *supply* is also a function of \mathbf{NE} . If *debt* is half the value of the intersection of *demand* and *supply* given \mathbf{E} and \mathbf{NE} , then the null hypothesis of no discrimination may be expressed as $debt(\mathbf{E}, \mathbf{NE}) = debt(\mathbf{E}, \mathbf{NE}')$.

held, if positive.¹⁰ Only three of the estimated coefficients are not statistically different from zero at the 5 percent level.¹¹

Economic variables influence debt as would be expected. Debt increases with income, assets, and/or human capital. For example, an increase in household per-capita monthly expenditure of R1 increases the likelihood of positive debt by 0.0078 percentage points, and it increases the expected amount of debt, if positive, by R42. An extra rand of remittances increases debt, and an extra rand of pensions decreases debt, a result explained by the fact that most pensioners are poor, elderly, and rural and are unlikely to borrow from formal sources in any case.

Both land and productive assets increase debt, although the magnitudes of the effects suggest that land is more valuable as security. Human capital (measured by literacy and by employment), age of the household head, presence of the household head, and migration status all effect debt in the expected direction and in economically significant magnitudes.

Non-economic variables also influence debt as hypothesized. Controlling for economic status, a black, rural, and/or female-headed household is less likely to have positive debt and will have less debt, if positive, on average than a non-black, non-rural, male-headed household. In the case of race, a black household is 21 percentage points less likely than a

¹⁰ The marginal effects were calculated for each observation and then averaged over observations. As McDonald and Moffitt note, this method is preferred to the usual practice of simply evaluating the marginal effects at the sample means of the independent variables. Usual practice would be particularly inappropriate in this context because the quasi-continuous variables have extremely skewed distributions.

¹¹ Of course, the estimated marginal effects are themselves random variables with distributions. Although standard errors and asymptotic confidence intervals could have been calculated with the delta method, this was not done due to the computational burden.

white household to have positive formal debt, and the estimated average reduction in the amount of debt, if positive, is R111,659. The effects for the other non-black races are similar.

Compared to male-headed households, female-headed households are 3 percentage points less likely to have positive debt and the estimated average reduction in debt, if positive, is R17,608. Finally, compared to non-rural households, rural households are about 5 percentage points less likely to have positive debt, and the expected reduction in debt, if positive, is about R25,000.

To a first-order approximation, these effects may be aggregated. Thus, a black, rural, female-headed household is estimated to be 29 percentage points less likely to have positive debt and to have R155,165 less of debt, if any is held, than a white, metropolitan, male-headed household.

The results suggest that household debt from formal sources does depend on non-economic variables, even after controlling for economic variables and thus debt capacity. This is not surprising, given apartheid and its bundle of policies. What is more surprising is the degree of discrimination, even on the eve of the end of apartheid.

It appears that formal lenders in South Africa did not, in the pursuit of profits, circumvent the strictures of apartheid to reach disadvantaged households. This analysis cannot address whether this resulted from a lack of pursuit due to laziness and/or prejudice, or whether it resulted from a lack of profits due to an environment where supplying debt to disadvantaged groups was prohibitively costly (including implicit costs caused by pressure from the government not to do so). Whatever the reason, it is clear that policy reform in the post-apartheid era should be able to increase the ability of disadvantaged groups to acquire

formal debt. Whether reform should be aimed at lenders, the overall policy environment, or both is an issue for further research.

Table 1. Results of censored (Tobit) regression on per-capita household debt from formal sources.

Class of explanatory variable	Variable (n=7780)	Estimated coefficients		Estimated effects of marginal change in explanatory variable	
				Probability of having some debt	Amount of debt, given positive debt
Race (default Black)	Coloured	12,450	**	0.12	65,472
	Indian	13,862	**	0.14	72,900
	White	21,233	**	0.21	111,659
Location of residence (default Rural)	Urban	4,409	**	0.04	23,187
	Metro	4,924	**	0.05	25,898
Sex of household head	Male head	3,348	**	0.03	17,608
Expenditure	Expenditure per capita (R)	8.0	**	0.000078	42
Transfers	Pension per capita (R)	-11.3	**	-0.00011	-59
	Net remit. per capita (R)	8.0	**	0.000079	42
Immovable assets	Value of land owned (R)	0.15	**	0.000001	0.8
Movable assets	Productive assets (R)	0.0066	*	0.00000006	0.03
	Cattle (head)	-76		-0.0007	-397
Labor market participation	Males in primary	4,213	**	0.04	22,157
	Males in secondary	-531		-0.01	-2,794
	Females in primary	5,408	**	0.05	28,443
	Females in secondary	2 368	*	0.02	12,453
Educated labor	Net illiterate labor	414	*	0.004	2,179
	Literate labor	1,758	**	0.02	9,245
Demographics	Head present	-247		-0.002	-1,301
	Age of head (years)	-259	**	-0.003	-1,362
	Migrated in past five years	-3,932	**	-0.04	-20,682
Model parameters	Intercept	-27,361	**	Not Applicable	
	Scale	24,588			

Log-likelihood: -29,130.

* Estimate significant at 5 percent.

** Estimate significant at 1 percent.

Figure 1

Panel A

Economic Status

Rich

Poor

For blacks

For whites

Magnitude of Discrimination

Estimated Debt Given Economic Status

Debt

Panel B (poor)
Unit cost

Supply to poor blacks

Supply to poor whites

Demand for loans,
blacks and whites

$\frac{1}{2}$ Loan
Black Poor
Loan Black

$\frac{1}{2}$ Loan
White
Loan

Loan
Poor
White

Amt. loaned

Panel C (rich)
Unit cost

Supply to rich blacks

Demand of blacks and whites

Supply to rich whites

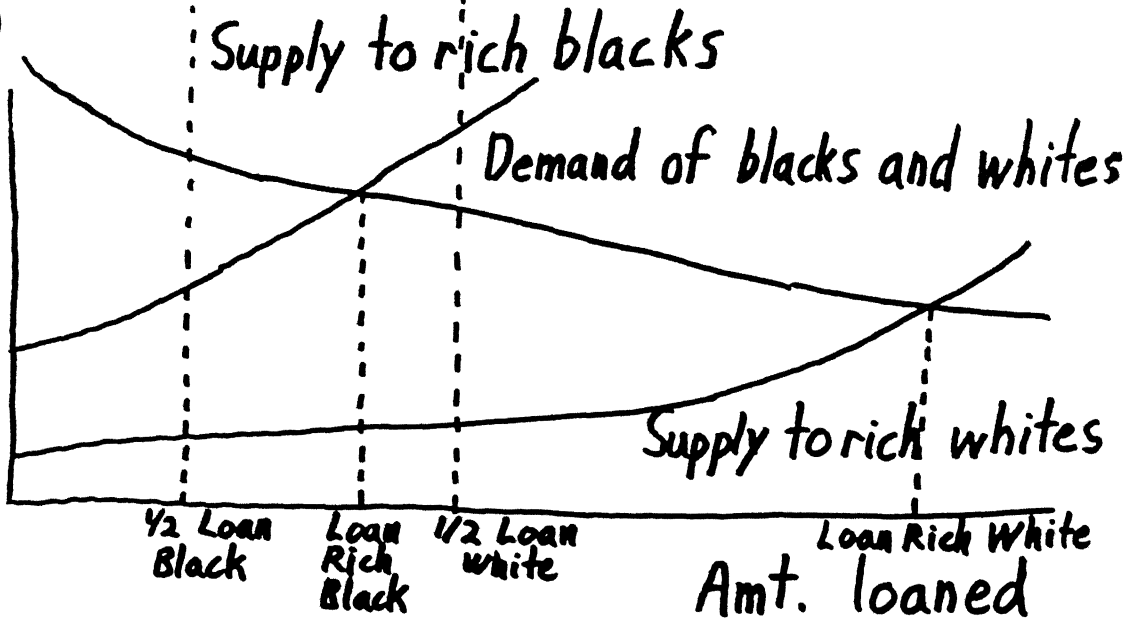
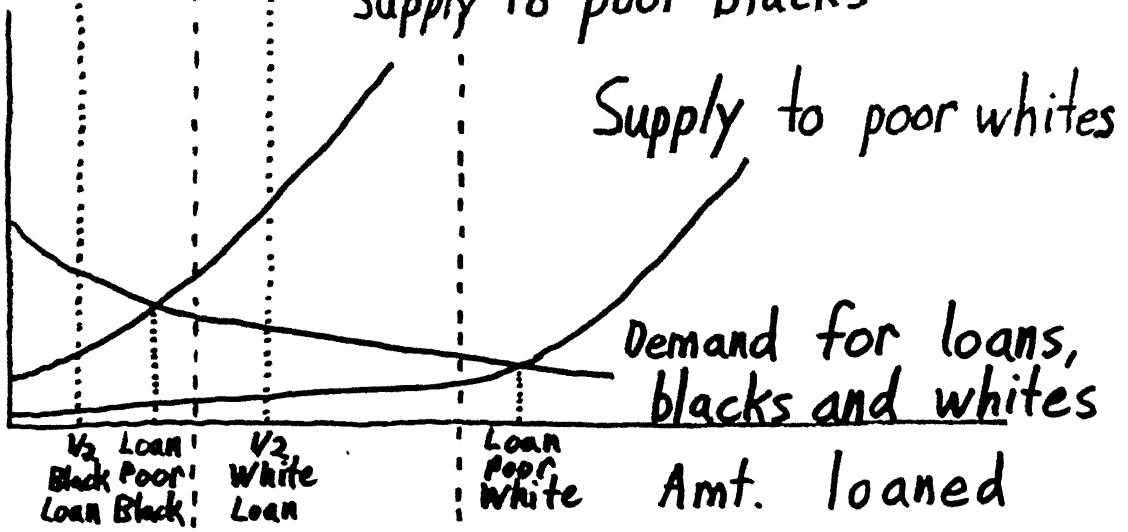
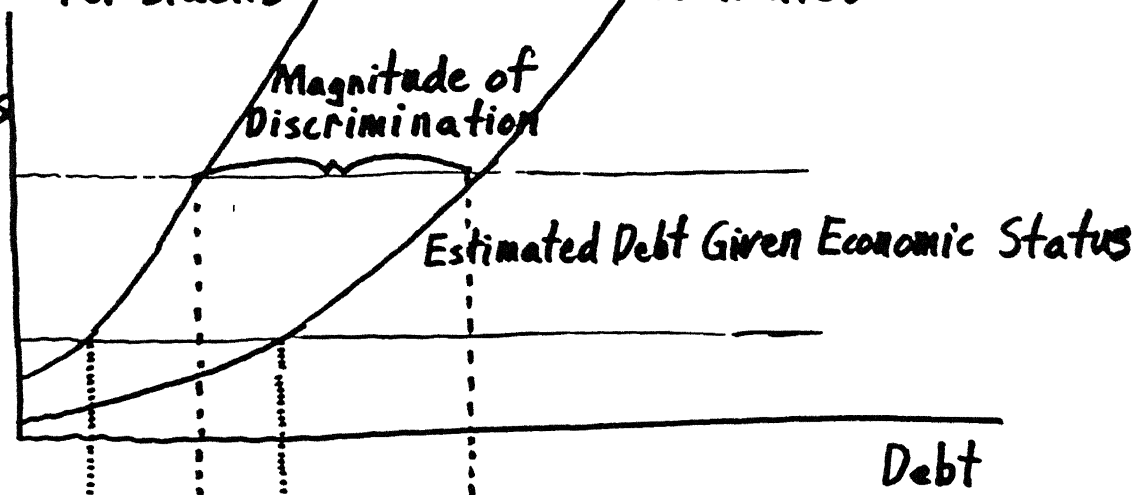
$\frac{1}{2}$ Loan
Black

Loan
Rich
Black

$\frac{1}{2}$ Loan
white

Loan Rich White

Amt. loaned



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