Viability of Self-Employment

M.T. NZIRAMASANGA*, S. BHATTACHARJEE** & M. LEE***
*Washington State University, School of Economic Sciences, USA, **Mississippi State University, USA, ***Peking University, Graduate School of Business, China

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ABSTRACT Empirical studies on self-employment uniformly cite the high mortality rate in both developed and developing countries. Several studies on the entry into self-employment incorporate a savings constraint. Policy makers and international aid agencies have responded by providing credit to would-be entrepreneurs yet the mortality rate persists. We formulate a model of the viability of self-employment that incorporates the impact of cost perceptions at the time of entry. We use the ability to meet monthly loan repayment ratios as a measure of viability since loans are usually the largest explicit cost. Our results have important policy implications on the desirability of interest rate subsidies, the size of initial capital relative to market size and criteria for granting additional credit to existing enterprises.

I. Introduction

Entry into self-employment and the viability of such enterprises are equally important aspects of labour markets and policies. Yet more attention has been paid to facilitating entry into self-employment than on its duration. Governments facilitate entry by providing specialised credit facilities, including subsidised interest rates. However, its duration is relatively short. A significant percentage of the enterprises does not last beyond the first year, with an average survival of three to four years (Evans and Leighton, 1989; Cressy, 1996a, b; Taylor, 1999). These high failure rates have been attributed to capital constraints, imperfect information about costs at the time of entry, and a less than workable matching of the personal attributes of the entrepreneur and the chosen activity. Yet policy measures to improve the duration do not go beyond providing start-up capital and some technical assistance. Questions also arise as how best to allocate official credit to start-ups. Do interest rates matter for viability? Which is the better strategy for viability – starting with excess capacity or small capacity relative to the potential market size?

Empirical studies have focused on duration as a measure of viability due to the lack of time series data. Duration estimates use the total period of the enterprise’s...
existence as the dependent variable. Measuring duration presents some difficulties that limit the policy relevance of the results. Survey estimates are likely to be subject to errors in recollection. The self-employed may not remember (ex post) when the business actually failed. Self-selection bias is likely since the interviewees are most likely survivors only. There is little consideration as to just how financially precarious or otherwise that interim period was. In addition, duration estimates rely on cross section data that do not adequately explain the role of each individual’s characteristics in responding to changes in the macro environment. For that it is necessary to observe the participants over time. Finally, estimates based on annual data lose valuable information that is contained in monthly observations. This is pertinent for firms that fail in the interim period between observations.

We propose a simple utility maximisation model and apply it to monthly data on loan re-payments as a way of answering these important questions and suggesting policy alternatives. Our model is based on the following stylised facts. First, the self-employed are a heterogeneous group. Individuals that are self-motivated are pulled into the sector as a way of controlling their destiny (see Evans and Leighton, 1989). Others are ‘pushed’ into self-employment by the lack of formal sector employment. The lower wage-workers, the unemployed and those with a history of job instability are likely to be unemployed (Evans and Leighton, 1989; Blanchflower and Oswald, 1998; Manser and Picot, 1999) and self-employment is likely to increase with the local and national unemployment rates (Simpson and Sproule, 1998; Shuetze, 2000). Those ‘pulled’ into self-employment are likely to have own start-up capital (saved or inherited). The unemployed rationed into the sector most likely have no savings and look to the revenues to fulfil basic subsistence needs first and then using the remaining proceeds to meet the loan repayment requirements.

We assume that revenue streams are not known with certainty at the beginning of the period and can vary from month to month. As the cited literature suggests, the self-employed are in the low-income group. Errors in revenue forecasts therefore, are more likely to affect loan repayments than consumption decisions. Those who overestimate revenues face a greater probability of involuntary failure, defined as the inability to make the necessary minimum loan instalments for a stipulated period. We explain the process leading to the involuntary termination of self-employment by using monthly loan repayment rates as a measure of viability.

The high turnover rates have also been attributed to imperfect information at the time of entry, leading to incorrect capacity relative to the size of the market. Insufficient capacity could conceivably be remedied through expansion financed by additional loans. Reduction of excess capacity may be more difficult to overcome. Both, however, require management expertise.

Our model is general enough to accommodate most of the underlying motives behind entry into self-employment and thus provide a practical way to measure involuntary exit. Entry into self-employment has been financed by a variety of sources, including own savings (Mesnard and Ravallion, 2006; Zissimopoulos and Karoly, 2007), informal lenders and inheritances. We focus on those who face a capital constraint and have to borrow. As a result, the ability to meet loan obligations is a minimum condition for viability. Secondly, unlike self-reported revenue and profits, loan repayments are not subject to reporting errors. This ability
to repay loans is therefore the best proxy for the unobservable profitability of a small enterprise financed by loans.

The rest of the paper is organised as follows. Section II summarises the literature on entry and duration of self-employment. Section III presents our own model on viability, followed by sections containing description of the data and policy background. Empirical estimates in section VI present our results.

II. Existing Literature

Duration Models

The implicit objective of self-employment is to maximise expected utility. However, some of the models focus on the opportunity costs. Blau (1985) and Holmes and Schmitz (1996) show that the turnover rate is related to the age of the enterprise – that the most recent entries are likely to fail. They, along with Levenson and Maloney (1997) suggest a relationship between duration of self-employment and the reasons underlying entry into self-employment. Wage employment (and by implication, human capital), has a major role in determining the duration of self-employment but the coefficient sign is ambiguous. There is an asymmetric response of duration to wage work experience (Evans and Leighton, 1989). That experience is found to yield a smaller return to self-employment and, thus, have a negative impact on duration. On the other hand, business experience yields the same return in wage work as in self-employment. Such personal characteristics as age, marital status and years of schooling were found to be insignificant, at least for their estimates using US census data.

Another approach explains failure as the result of imperfect information. Firms have a cost function that depends on location, entrepreneurial ability and other random factors (Hart, 1972; Jovanovic, 1982; Levenson and Maloney, 1997; Cunningham and Maloney, 1999). Initially the entrants into self-employment have only a vague idea of costs. Given a competitive environment, those who severely underestimate the costs are likely to fail. Those who guess correctly enjoy high profits and expand to their long-term size. The sector should, therefore, be heterogeneous with large, prosperous units co-existing with smaller entities, some of which are on the verge of failing. Cunningham and Maloney (1999) stratified their sample into clusters based on the personal characteristics as well as the self-reported dynamics of the entrepreneur, capital intensity and the source of funding. A small minority in their sample cited availability of credit as a constraint. The majority said a lack of clients, low earnings and ‘excessive competition’ (that is, revenues that were below expectations) were the major constraints. These self-reported constraints were not backed by independent market data. The data indicated that the firm and the entrepreneur are inextricably linked in the self-employment model (Hart, 1972).

The cross-sectional results based on survey data still leave some important empirical issues unresolved. It is not clear why errors in estimating future costs alone are the primary cause for failure. The major explicit cost for a small firm is the interest payments on loans. Such costs are likely to be known with a high degree of certainty from the beginning. The real problem could also be an overestimation of future revenues, either at the time of entry or during normal operations. Small
enterprises serve local communities. Transportation costs or market imperfections can create location-specific output prices. Revenue estimates are also a function of the new entrepreneur’s managerial ability.

We suggest a model to explain viability that encompasses the major elements of the previous studies. We also account for the possibility that some who seek self-employment have no other means of support or have meagre savings. They have to borrow the start-up capital. However, meeting their subsistence needs takes priority over all other obligations. If revenues are insufficient to meet both the subsistence needs in any period, they are unlikely to be able to meet any or all of their loan obligations and incur arrears to be met with future revenues. If the arrears keep accumulating then they will likely involuntarily exit self-employment. The higher the interest rate the faster the arrears grow, leading to a possible failure. Our model therefore can accommodate an occasional month or so of non-payment, even for successful entities.

III. A Model of Viability

Assume a two-period situation. The self-employed try to maximise the present value of his utility subject to net income constraints. The only explicit cost is the loan repayment. Net income is defined as the difference between revenues (net of other variable costs) and what the self-employed use for own consumption. If income is equal to subsistence consumption then no loan repayments will be made. The model can be summarised as follows:

\[ Y_i - C_i - R_i \geq 0, \quad i = 1, 2 \]  
\[ R^* = rK \]  
\[ R_i \leq R^* \]  
\[ C - C_1 \leq 0 \]

Equation (1) states that income in each period \( (Y_i) \) is equal to or greater than the sum of consumption \( (C_i) \) and loan repayments \( (R_i) \). In Equation (2), the monthly loan repayments \( (R^*) \) depend on the rate of interest and size of the original loan. Equation (3) is an assumption for the purposes of this illustration, since the borrower is free to pay more than the stipulated amount during the first period. Here we assume that the actual loan repayments in the first period \( (R_1) \) can be equal to or less than the stipulated amount.

Equation (4) stipulates the subsistence consumption requirement.

The loan is payable in equal monthly instalments \( (R^*) \). However, if the actual payment in period 1 is less than \( R^* \) then, in the second period, the new required instalment \( (R^*_2) \) includes interest on the shortfall, that is \( R^*_2 = R^* + r(R^* - R_1) \).

The self-employed seeks to maximise total utility subject to (1) and (4):

\[ L_2 = U(C_i, Z) - \lambda_i(Y_i - C_i - R_i) - \lambda_3(C - C_i) \quad i = 1, 2 \]
where $Z$ is a vector of exogenous macroeconomic variables and personal attributes to be specified later. Assuming an optimal repayment exists, then:

$$R^+ = R^+(r, K, Y, C, Z),$$

and for a given initial loan and interest rate,

$$R_Y^+ + R_C^+ = 0,$$

where $R_Y^+ \leq 0$, and $R_C^+ < 0$ are the partial derivatives of $R^*$ with respect to income and consumption, respectively.

The solution generates the desired optimal distribution of income between consumption and loan repayments as the enterprise grows. These ex ante revenue and distribution targets make up the business plan that justifies the initial investment and loan. Figure 1 gives a pictorial representation of the possible and actual outcomes. The loan repayments per period ($R$) are on the vertical axis and the level of the entrepreneur’s consumption ($C$) on the horizontal axis. The subsistence level is $C$. The revenue in any given period is represented by the dotted budget constraints whose slope is unity. Until revenue reaches point $B(R_1, C)$ no loan repayments will be made. The thick line $AA$ represents the desired optimal combinations of repayments and consumption as revenues increase. Assuming that the benefits from current and future consumption (the latter based on sustaining self-employment) are normal goods, then both should increase with income, as shown by the slope of $AA$.

Figure 1. Optimal consumption loan repayment combinations.
This desired combination is conditioned on the revenues being at least enough to meet subsistence needs and so AA could technically begin right at point B for some entrepreneurs.

Figure 2 shows the same analysis, but in the repayment/income space. The subsistence condition is equivalent to the point \( Y = C \) and it is quite possible that, for some small increments to income around \( C \) no repayments will be made. If we assume that both current consumption and self-employment are normal goods, a major reason non-payment does occur in some months even for viable enterprises is because income is not enough to cover subjective minimum consumption needs. It should be noted that the unobservable subsistence consumption is not a variable in the estimation of Equation (6) but it is replaced by (and accounts for) the observed zero payments at certain income levels.

This paper can now examine the various scenarios for both successful and failing enterprises. Revenues in the first period are likely to be low for most self-employed individuals. Should they be just enough to cover subsistence needs (that is, budget constraint \( R_1C \)), then no loan instalments will be met for that period. The second period’s payment will now be twice the required amount plus interest on the overdue amount, that is,

\[
R_2 = R^* + R'(1 + r), \quad \text{where } r \text{ is the rate of interest.} \tag{7}
\]

Revenues have to increase at least to the level \( R_2C_2 \) if the deficit is to be eliminated, and only if consumption was restricted to just subsistence needs (that is, at point D). Viability could be jeopardised for two reasons. First, macroeconomic factors and lack of business skills may limit revenue growth and the enterprise will fail. Second, lack of what we prefer to call revenue management foresight could also be a factor. The enterprise could still incur more arrears even if revenues were at least equal to \( R_2C_2 \). That can happen if consumption is increased to \( C_2 \), a level the owner may feel is justified given the

![Figure 2. Optimal loan repayments, revenues and subsistence consumption.](image-url)
revenues. On the other hand, an entrepreneur who is able to hold consumption at \(D\) can use the additional revenue to eliminate the arrears in the second period. At any point in time all of the self-employed will, therefore, lie in the space above the horizontal line \(BA\) and between the vertical subsistence level and the line \(AA\). Those on the verge of failure will have a low loan repayment ratio, defined as the actual repayment as a proportion of the required instalment \((R/R^*)\). Our estimated version of Equation (6) therefore will have as the dependent variable the ratio \(R/R^*\), the observed actual payment as a proportion of the stipulated amount \(R^*\).

The gist of the analysis is that for most self-employed the first commitment is to subsistence needs. Revenues are likely to fluctuate over time, and even efficient entrepreneurs can periodically face the subsistence constraints. The critical time for survival is during the early stages when revenues are likely to be low. Viability depends on the entrepreneur’s ability either to increase revenues or to restrict consumption to subsistence levels when necessary. It becomes important for policy purposes to identify the reasons behind the arrears, as well as the critical point beyond which arrears become insurmountable.

**Imperfect Information**

The above analysis presupposes that costs and revenues can be predicted with certainty. We now discuss the impact of imperfect information at the onset of self-employment and the possibility that estimates of the potential market size, and the required investment, turn out to be incorrect. This will be reflected in the size of the initial loan, the output level and the subsequent repayment obligations.

Overestimation of the capacity relative to market size, all else given, will have a negative impact on viability. Downsizing may not be possible and additional loans will only worsen the situation by increasing the repayment burden without generating additional revenue. Underestimating the initial capital requirements limits potential benefits, but it could be remedied with additions to capacity. In this case, additional loans should, therefore, increase the ability to pay.

In a heterogeneous sample, there will be new entrants who underestimated the costs and are faced with capital shortfalls at every level of output. Others will have correctly anticipated the cost structure, while the remainder may have overestimated the required plant size. Figure 3 shows the long-term average total cost curve as perceived at entry \((C^E)\) and the actual cost curve \((C^A)\). We assume that output at entry \((q_1)\) is less than full capacity output capacity and the actual costs \((C_1)\) turn out to be higher than anticipated. In a competitive output market with prices equal to the minimum average total cost, this firm would need an initial additional capital injection equal to \((C_1 - C_2)q_1\) soon after entry, to cover the loss. Otherwise, it would fail in a relatively short period. Survival in the long-term would then depend on the entrepreneur’s ability to adjust to the new actual cost structure \(C^A\) and the dynamic expansion to the full capacity output \(q^*\). That output is less than what they anticipated before entry \((q^*)\). Access to additional capital (credit or own savings) is thus a necessary condition in this scenario, but it may not be sufficient for viability. It has to be accompanied by the necessary managerial attributes if the firm is to be viable in the long-term.

Alternatively, the cost curve perceived at entry could be \(C^A\) and the actual costs turn out to be lower, with a smaller capacity capital outlay \((C^E)\). The excess capacity

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**M.T. Nziramasanga et al.**

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would increase the cost of producing \( q_1 \) by \((C_1 - C_2)q_1\). This would necessitate an immediate asset disposal and downsizing of capacity. If a loan financed the initial investment then the proceeds would have to be used to make a prepayment. Otherwise, the higher costs might precipitate an early exit out of self-employment. Whether the adjustment is possible or not depends on the type of activity and the business acumen of the entrepreneur, as well as market conditions.

A more complete approach would be to model the demand for loans as is done in studies that look at entry subject to own savings constraint and thus, can derive a demand function for loans (Evans and Leighton, 1989; Jovanovic, 2007 among others). Other models include the possibility of involuntary self-employment as a result of being rationed out of the labour market (Blau, 1987). Exit from self-employment could therefore be voluntary once the labour market improves. Such an approach could possibly distinguish between poor performers who obtained loans for purposes of bailing out and viable firms facing a genuine capacity constraint. We do not have either the savings data or the individual-specific wage information to allow for these possibilities. However, employment opportunities in the formal sector were very limited (see the discussion on the policy framework). SEDCO paid equipment suppliers directly from the loan funds, thus making it rather costly to divert loans to other uses. We feel that borrowing for purposes of bailing out of self-employment could not have been very significant.

**IV. Data and Variable Definitions**

We take advantage of a rich data set of the self-employed in Zimbabwe. It contains time series on dates of entry into and exit from self-employment, the age at entry, years of schooling, size of the initial loan and loan repayment schedule and type of
industry and location. The relatively large and heterogeneous sample allows us to test for most of the elements in previous empirical studies.

The Small Enterprise Development Corporation (SEDCO), a quasi-government agency that provides technical assistance and loans to small enterprises in Zimbabwe, provided the data. The total sample consisted of 2,800 individuals who entered self-employment at different times during the period 1991–1999. The loans all were subject to a variable nominal interest rate. If the total sample was used, then some firms would continue to exist beyond our sample period. This would necessitate using censoring techniques that are applicable to dynamic panel data. To avoid this, we included only those firms whose repayment period was fully contained in the data sampling timeframe (1991–1999). Therefore, we excluded participants who entered self-employment after 1993. Our final sample consisted of 1,806 individuals who entered self-employment between July 1991 and December 1993 and we have the specific entry day, month and year.

SEDCO provided the data on the monthly loan repayments that were stipulated in the loan agreements. Failure occurs when SEDCO declares the borrower to be in default and takes measures to collect the outstanding balance. The panel is unbalanced since the dates of entry into self-employment differ by individual, as do the dates of exit for those unable to meet their loan repayments. The individuals who are successful also complete their repayments on different dates. The country was divided into 10 regions, each of which contained a major urban area. Firms located within the metropolitan area were classified as ‘urban’ and the rest, ‘rural’. SEDCO required that the enterprise be located in an area zoned for business activity. As a result, the rural enterprises were located in clusters in designated business centres. Business centres are designated by the local authorities. The original loan is in the Zimbabwe currency but we use the log value in the estimation.

The estimated version of Equation (6) takes the following form

$$y_{it} = \alpha_1 X_{1it} + \alpha_2 X_{2it} + \beta_1 Z_{1i} + \beta_2 Z_{2i} + e_i + \eta_{it}$$  (8)

The subscript $i$ denotes the cross-sectional unit ($i = 1, 2, \ldots, N$), $t = 1, 2, \ldots, T$, the time period (in months) during which the unit ($i$) is viable.

**Dependent Variable – Loan Repayment Ratio**

The dependent variable $y_{it}$ is the ratio of actual monthly loan repayments as a proportion of the required amounts that are stipulated in the loan agreement (that is, the left-hand side of Equation (6) normalised by $R^*$). The self-employed were not always able to pay the monthly instalments in full, but the viable ones were able to cover the deficit in ensuing periods.

**Time Varying Covariates**

$X_{1it}$ is the vector of time-varying exogenous variables, namely the interest rate, an index of retail trade activity, and index of the real value of the total imports of intermediate goods.
The interest rate is the nominal lending rate charged on SEDCO loans and adjusted for inflation using the consumer price index. It would have been more effective to have information on individual enterprise revenues as an explanatory variable, but such data are not available. We use as the next best alternative region-specific, monthly indices of ‘retail trade.’ Ten separate regional indices of retail trade are published in the Government Central Statistical Office (CSO), *Quarterly Digest of Statistics*. The ‘retail trade’ is the real value of revenues (1990 prices) of small enterprises (both rural and urban-based), but exclude large department stores and chain supermarkets. Enterprises are included regardless of whether they sell own output (‘industry’ in SEDCO classification) or not (‘commerce’). SEDCO and the CSO use the same 10 regional classifications of the country.

The rationale for including imported inputs as an explanatory variable is given in section V. This is the index of the monthly value of total imports of intermediate goods as published in the *Quarterly Digest of Statistics*. Finally, \( \epsilon_i \) represents the loan repayment ratio of previous months. It is time-varying and endogenous to the model.

### Time Invariant Explanatory Variables

The vector \( Z_{1i} \) represents time invariant measures of the type of enterprise (commerce or industry) as classified by SEDCO, personal characteristics (age, gender and education), and the loan repayment period.

SEDCO classifies the entrepreneurial ventures as either ‘commerce’ or ‘industry’. The ‘commerce’ designation applies to those who sell goods purchased from elsewhere. Examples are pharmacies, liquor stores and general dealers. The ‘industry’ classification applies to those who sell their own output, such as small furniture manufacturers, grain millers and brick makers. ‘Commerce’ and ‘Industry’ are dummy variables assuming the value of 1 if the enterprise belongs to the respective sector and zero otherwise. Age is measured in years at the time of entry into self-employment. Gender assumes the value of 1 if the participant is female, and zero otherwise. Education is measured by the number of years of formal schooling at the time of entry into self-employment. The loan repayment period is the number of months during which the loan and interest are to be repaid. There was no prepayment penalty. The minimum period was 12 months, the maximum 72 months and the mean, 48 months.

\( Z_{2i} \) is endogenous, time invariant and represents the number of loans. It takes on the value zero for one loan and 1 for more than one loan. Second loans were granted at least 2.3 years after the entry into self-employment. We take this to mean that second loans were needed either for expansion or as a possible solution to other operational issues as described in our theoretical presentation.

The unobservable effects \( (\epsilon_i) \) are assumed to be distributed independently across individuals with variance \( \sigma_\epsilon^2 \). The other disturbance term, \( \eta_{ii} \), is assumed to be normally distributed with zero mean and constant variance \( \sigma_\eta^2 \). The amount paid in the previous month and the number of loans is assumed to be correlated with the unobserved individual-level random effects, \( \epsilon_i \). However, none of the explanatory variables are correlated with the idiosyncratic error term \( \eta_{ii} \). We include in \( X_{1ii} \), the interactive term of educational attainment and the type of activity.
SEDCO provided prospective borrowers with a step-by-step guide to formulating a business plan on which the loan would be based (SEDCO, undated). While the plan provides for proper accounting for revenues and costs, there is no evidence that SEDCO provides ongoing support nor did it request for measures of actual performance for diagnosing purposes. This makes the level of education, as well as previous experience, critical for success. SEDCO systematically asked for and received information on years of schooling, but did not collect evidence on previous employment.

Table 1 presents the summary statistics of our sample. The first column gives the number of firms classified by the size of the initial loan, measured in constant 1994 prices. The majority of the loans were below $38,000 and urban borrowers tended to have the largest loans. The second column breaks down the total sample by loan size, and column 3 the number of loans given to urban borrowers. Column 4 gives the total number of failed enterprises by loan size, and column 5 expresses this as a percentage of the total sample. Finally, column 6 gives the number of urban firms that failed, and column 7 expresses the urban failures as a percentage of total failures for each loan size. Failure rates in general seem to be negatively associated with loan size and urban enterprises failed at a higher rate. Table 2 gives the personal statistics. The mean age of the sample participants was 39 years, with about 11 years of formal schooling. The self-employed were therefore part of the labour force but with a higher level of formal schooling. They could have been rationed out of the wage labour market.

<table>
<thead>
<tr>
<th>Loan size</th>
<th>Sample total</th>
<th>Of which urban</th>
<th>Total failures</th>
<th>Per cent of sample</th>
<th>Urban failures</th>
<th>Percentage of total exits</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; $500,000</td>
<td>81</td>
<td>69</td>
<td>18</td>
<td>22.2</td>
<td>17</td>
<td>96.4</td>
</tr>
<tr>
<td>250,000–499,999</td>
<td>150</td>
<td>113</td>
<td>36</td>
<td>24.0</td>
<td>28</td>
<td>77.8</td>
</tr>
<tr>
<td>125,000–249,999</td>
<td>228</td>
<td>125</td>
<td>38</td>
<td>16.7</td>
<td>32</td>
<td>84.6</td>
</tr>
<tr>
<td>75,000–124,999</td>
<td>225</td>
<td>164</td>
<td>41</td>
<td>18.2</td>
<td>31</td>
<td>75.6</td>
</tr>
<tr>
<td>37,500–74,999</td>
<td>295</td>
<td>170</td>
<td>53</td>
<td>18.0</td>
<td>34</td>
<td>64.2</td>
</tr>
<tr>
<td>&lt; 37,500</td>
<td>979</td>
<td>236</td>
<td>154</td>
<td>15.7</td>
<td>57</td>
<td>37.0</td>
</tr>
<tr>
<td>Total</td>
<td>1,958</td>
<td>877</td>
<td>340</td>
<td>18.3</td>
<td>199</td>
<td>58.5</td>
</tr>
</tbody>
</table>

Note: The loan size for an additional 20 firms in the total sample was not specified. The sample was reduced for estimation to 1806 because the other 152 were second loans.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number observed</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original loan size</td>
<td>1845</td>
<td>112522.40</td>
<td>501282.6</td>
<td>2,000</td>
<td>20,000,000</td>
</tr>
<tr>
<td>Age (years)</td>
<td>308</td>
<td>39.19</td>
<td>9.180856</td>
<td>22</td>
<td>72</td>
</tr>
<tr>
<td>Education (years)</td>
<td>306</td>
<td>10.92</td>
<td>3.948902</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Number of loans</td>
<td>1958</td>
<td>0.18</td>
<td>0.380323</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Gender</td>
<td>1851</td>
<td>0.86</td>
<td>0.344176</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Commerce</td>
<td>1855</td>
<td>0.58</td>
<td>0.493328</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Status (viable = 1)</td>
<td>1855</td>
<td>0.82</td>
<td>0.383435</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Scott and Feese, 2006.
Missing Data

Some 1,545 observations did not contain information on the age and years of formal education at the time of entry into self-employment. This was due to the logistics of recording the information. We wanted to be able to use all of the available information on the other covariates. In order to pool the two sets of data (those with and without observations of age and education), we have to show that the explanatory power of the time varying variables is the same for both sub-samples. This was done by fitting the Arellano-Bond estimator to the total sample and the two sub-samples (Arellano and Bond, 1991).

The results are shown in Table 3. We assumed an AR(1) process and the right hand variables are first-differences. The signs for the random effects are similar for the three samples and are as would be expected. The focus is on the whether the sample with full information on age and education reacts differently to the time variant variables than those without the information. We test for this by including dummy variables for the three variables (retail activity, imports and the interest rate) in the full sample. Each dummy takes on its actual value for the sample (304 observations) with full information, and the value zero otherwise. The test results appear in the last column of Table 3. All the dummy variables are statistically insignificant. The two sub-samples therefore belong to the same population and the ‘missing-ness’ of the observations by itself does not convey any additional information.

V. Policy Background

During the sample period, Zimbabwe initiated an economic reform programme that was to be implemented over five years (1990–1995). The self-employed were

<table>
<thead>
<tr>
<th>Table 3. Impact of time varying variables on viability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Lagged dependent variable</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Retail activity</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Interest rate</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Imports</td>
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<td></td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Dummy – retail activity</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Dummy – interest rate</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Dummy – imports</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Notes: Standard errors are in parentheses. ** significant at 1 per cent; * significant at 5 per cent.
affected by interest rate deregulation and the decontrol of imports, among other factors.

Until 1991, SEDCO had provided loans to small enterprise at regulated nominal rates that were sometimes lower than the inflation rates. In addition, until 1993, SEDCO charged rural enterprises an interest rate that was 2 percentage points lower than that of urban borrowers. This was a policy decision to support rural development. After 1993 all borrowers faced the same interest rate. The real rate increased steadily during the sample period, from a negative 7.83 per cent in July 1991 to 21.28 per cent by December 1999. The interest rate increase was therefore larger for rural borrowers but their average loan size was smaller.

The economic reform programme itself was instigated partly by the lack of growth, increasing unemployment and low level of capacity utilisation. This was attributed to:

the risks associated with uns sustainable fiscal deficits, the uncertainties and high costs associated with the foreign exchange allocation system and its impact on the availability of investment, intermediate goods and spares and the high costs of doing business in Zimbabwe. (Government of Zimbabwe, 1991: 2)

The reforms included a gradual but rapid liberalisation of imports and the deregulation of the foreign exchange rationing system. Allocations for investment goods were on a case by case basis and within the context of the total project. The more regular quarterly allocations were reserved for intermediate inputs only. Manufacturers had to be registered users of the input in order to receive a ‘basic’ quota whose size depended on the economic importance of the input and the user’s performance history. The self-employed had no access to individual quotas. Until the end of 1992, however, there was a variable quarterly fund (known as the Trinkets Allocation) earmarked for the importation of finished consumer goods destined for sale by the self-employed. The importation was done by the government and the goods sold to the self-employed, but it was not clear how the composition of the imports was determined. There was an implicit subsidy to the self-employed with access to the imports. The cost to them of the imports in local currency was at the official exchange rate at a time when there was a black market premium. The premium at the beginning of the reform programme was 50.01 per cent. Thereafter, it dropped to 32.63 per cent in 1992. At the end of 1992, importation of intermediate goods was liberalised through the introduction of a system of open generalised import licences (OGIL). Any intermediate good approved for OGIL designation could now be imported by registered manufacturers. In addition, an Export Retention Scheme (ERS) allowed exporters to retain 25 per cent of the export proceeds in foreign currency denominated accounts in their name. The ERS share was increased to 30 per cent in 1991/1992 and 35 per cent in 1993. The exporter could use these funds to import on their own account or sell to another importer at a negotiated exchange rate. The rest of the export proceeds would be surrendered to the central bank at the official exchange rate and they would be used for debt service, energy imports and central government requirements. The OGIL and export retention schemes liberalised the importation of intermediate goods and the quarterly allocation earmarked for the self-employed was terminated under the assumption that they could now purchase the same finished goods from domestic suppliers or import financed by ERS proceeds purchased from exporters (Government of Zimbabwe, 1992).
The increase in the volume of imports anticipated at the beginning of the reform programme did not materialise. This was because exports declined by 18 per cent in 1992 and then remained stagnant between 1992 and 1996 while the real exchange rate fell and debt service requirements rose (World Bank, 2008). As a result, the real value of intermediate goods imports (our explanatory variable) fell by 14 per cent during 1992–1993, and by 5 per cent over the period 1991–1996.5

The rest of the economic reform programme was also only partially implemented. Labour markets remained inflexible and heavily regulated. There were minimum wage stipulations for each sector. Temporary labour contracts as well as hiring and firing decisions were still subject to government approval. As a result, formal sector employment in 1997 was at the same level as in 1992.6

The impact of reforms on viability of self-employment would theoretically be mixed, since the special allocation reserved for the self-employed was also terminated. Import liberalisation would wipe out the economic rents of those previously privileged to earn them from the earmarked allocation. On the other hand, liberalisation would in theory allow imports to be rationed by the market and be available to more of the self-employed. We would expect an increase in the real value of imports to have a positive impact on viability for those whose output has high import content. However, since imports actually decreased the reverse would be true; those relying on imports would have a higher failure rate. Non-viable enterprises would respond positively to imports. Viable enterprises would be mostly those relying on goods and services with a high domestic content and for them the import coefficient should be either insignificant or negative.

The government abandoned the economic reform programme in 1996 but the economic indicators remained relatively stable throughout our sample period. The macroeconomic conditions became drastically unstable after 2003, well beyond our sample period.

VI. Empirical Analysis

Average Loan Repayment Trends

In this section, we look at the data to determine whether initial loan repayment shortfalls contributed to viability problems. Figure 4 shows the average loan repayment ratios for the 370 (including 75 failures) who entered self-employment during 1991. This pattern is the same regardless of the year of entry. The ratio clearly is lowest at the beginning but increases for the first 18 months before stabilising. This pattern is the same for all sub-samples. Figure 5 shows the same sample broken down by successes and failures. As would be expected, the former group has a much higher ratio for the first 18 months that is much higher than that of failures. The ratio does not equal unity even for the successful firms. This is partly because in the first year people enter self-employment at random and thus depress the average. It is clear that those who failed faced viability issues from the very beginning, while those who survived were able to overcome the early shortfalls.

Figure 6 shows trends in the time varying explanatory variables, namely the interest rates and the average retail index, both adjusted for inflation. The retail index used in this graph is an average of the 10 separate regional indexes that we use
in the actual estimation. While this measure may be an imprecise proxy for firm specific data, the trend shows a period of steady small sector growth. Interest rates were decontrolled in January 1992 in line with the economic reform programme. Real rates became positive and had a negative impact on the repayments, but this was ameliorated by the improved sector performance, especially during 1994 (months 36–48). The steady decline in viability after the middle of 1994 occurred despite relatively stable interest rates. This would seem to suggest that the

![Figure 4](image-url)

**Figure 4.** Loan repayment ratios for entrants for the year 1991.

![Figure 5](image-url)

**Figure 5.** Repayment ratios for entrants for the year 1991, viable and non-viable.
self-employed benefit from growth. The actual relationship, however, can only be untangled by formal statistical analysis. It is clear that those who succeed do so partly because they do not accumulate arrears in the first few months of operation or were able to make up for the shortfalls as their local market improved. Those who failed did so in the face of general growth. The reasons could partly be individual specific, including their lack of human capital or an inability to adjust expectations to changing market conditions. The trends support conclusions from previous studies on the relatively short duration of self-employment and are in line with our theory.

**Unit Root Test**

The total time frame of our panel is quite long and the potential presence of unit root cannot be ignored. As a first step we use the Fisher test to check for the presence of unit root in panel data. One of the primary reasons for selecting the Fisher test is that it does not require a balanced panel (Maddala and Wu, 1999). Our panel data are unbalanced because of different entry and exit dates. The test statistic is a combination of the p-values from the N independent unit root tests. The authors ran the test using one period (Augmented Dickey Fuller test for unit root for the individual series) and two-period lags (Phillips-Perron test). A miniscule number (1.34%) of the 1,806 series were non-stationary. The combined test statistic for both one and two lags shows the absence of unit root. We do not report the unit-root test result for each of the 1806 observations, but they can be provided on request.

![Figure 6. Loan repayment rates for all entrants for the year 1991.](#)
Estimation, Results and Discussion

Equation (8) is estimated using the Hausman and Taylor panel data random effects model. The primary reason for using this technique is that it allows for the estimation of the impact of time-invariant covariates in a panel data setting at the same time as the impact of time-dependent endogenous variables (Hausman and Taylor, 1981). Tables 4 and 5 give the coefficient estimates. In Table 4, the first column shows estimates based on the sample with no missing values for the time invariant explanatory variables. Results in the second column reflect those who involuntarily exited self-employment and those in the third column, the viable enterprises. The estimates in Table 5 show significant differences between the viable and non-viable.

The results can be summed up as follows. First, the persistence factor (the lagged dependent variable) is significant for all groups and across activities (Table 5) but the coefficient is larger for those who exited self-employment (0.30) than those who succeeded (0.24), and for urban entrepreneurs (0.34) compared to those in rural areas (0.19) (see Table 5). The results are in line with previous estimates in Table 3 and show the importance of market forecasts for the first few months. Individuals who operate non-viable enterprises find it more difficult to reverse the effects of cumulative arrears, a conclusion in line with Figure 4. Second, the response to

<table>
<thead>
<tr>
<th>Variables</th>
<th>Whole sample (300)</th>
<th>Sample of those who failed (117)</th>
<th>Those who were viable (183)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail activity</td>
<td>1.586* (0.85)</td>
<td>0.509 (0.71)</td>
<td>4.099** (1.39)</td>
</tr>
<tr>
<td>Interest rate</td>
<td>-0.119** (0.03)</td>
<td>-0.045 (0.026)</td>
<td>-0.163** (0.05)</td>
</tr>
<tr>
<td>Imports</td>
<td>1.747 (2.50)</td>
<td>6.330** (2.13)</td>
<td>-2.308 (4.06)</td>
</tr>
<tr>
<td>Lagged dependent</td>
<td>0.251** (0.01)</td>
<td>0.299** (0.01)</td>
<td>0.240** (0.01)</td>
</tr>
<tr>
<td>Original loans</td>
<td>-1.389 (1.37)</td>
<td>-0.001 (3.41)</td>
<td>-2.142 (2.15)</td>
</tr>
<tr>
<td>Loan repayment period</td>
<td>-252.006 (213.71)</td>
<td>-10.94 (27.61)</td>
<td>44.993** (18.18)</td>
</tr>
<tr>
<td>Gender</td>
<td>-4.069 (4.21)</td>
<td>1.811 (8.82)</td>
<td>-7.679 (6.61)</td>
</tr>
<tr>
<td>Age</td>
<td>0.271 (0.16)</td>
<td>0.045 (0.38)</td>
<td>0.005 (0.23)</td>
</tr>
<tr>
<td>Education × Commerce</td>
<td>0.863** (0.28)</td>
<td>0.182** (0.09)</td>
<td>0.546 (0.39)</td>
</tr>
<tr>
<td>No. of loans</td>
<td>-60.255** (27.61)</td>
<td>38.818 (76.90)</td>
<td>-46.570 (26.99)</td>
</tr>
<tr>
<td>Constant</td>
<td>-157.158 (58.63)</td>
<td>19.375 (116.02)</td>
<td>-125.127 (74.39)</td>
</tr>
<tr>
<td>Wald (χ²)</td>
<td>1394.55 (1394.55)</td>
<td>1128.74 (1128.74)</td>
<td>698.39 (698.39)</td>
</tr>
<tr>
<td>Rho</td>
<td>0.206</td>
<td>0.636</td>
<td>0.201</td>
</tr>
</tbody>
</table>

Notes: Standard errors in parentheses; ** significant at 1 per cent; * significant at 5 per cent. Dependent variable is the monthly loan repayment ratio.
changes in the retail index is now positive and significant for those who succeed (Table 4) and for those in ‘commerce’ (Table 5). The impact is positive but not statistically significant for rural locations (Table 5). The viable entrepreneurs increase their repayment ratio by an average of 4.1 percentage points for every one percentage point increase in the retail index, whereas the response of non-viable operators is statistically insignificant. The results support our contention that those who are viable respond to improvements in market conditions by using a greater percentage of any additional revenues to repay the loans. Given this relationship, the major reason they do not make payments in some months is because revenues in those months, though positive, are not enough to cover subsistence needs.

Interest rates have a negative and statistically significant effect on viability for all activities and all locations (Table 5). The impact is several times stronger for those who succeed (−0.17 compared to −0.05). Lowering the costs of borrowing is likely to make the viable individuals even more so than turning around those who are floundering. Females are more likely to fail, but the coefficients have different signs and are statistically insignificant.

Age is significant and positively linked to viability for the whole sample as well as for industrial activities and for those in urban areas. The results would seem to suggest that the young are more likely to fail (Table 4) but the coefficients are not statistically significantly different from zero. We believe age is a proxy for other

<table>
<thead>
<tr>
<th>Variables</th>
<th>Commercial activity (144)</th>
<th>Industrial activity (156)</th>
<th>Urban location (175)</th>
<th>Rural location (125)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail activity</td>
<td>2.958**</td>
<td>1.489</td>
<td>1.047</td>
<td>0.895</td>
</tr>
<tr>
<td>Interest rate</td>
<td>−0.165**</td>
<td>−0.20</td>
<td>−0.112**</td>
<td>−0.081**</td>
</tr>
<tr>
<td>Imports</td>
<td>−1.459</td>
<td>−4.050</td>
<td>−0.167</td>
<td>2.114</td>
</tr>
<tr>
<td>Lagged dependent</td>
<td>0.252**</td>
<td>0.261**</td>
<td>0.336**</td>
<td>0.189**</td>
</tr>
<tr>
<td>Original loan (log)</td>
<td>−3.10</td>
<td>−22.682**</td>
<td>−7.812*</td>
<td>0.929</td>
</tr>
<tr>
<td>Loan repayment period</td>
<td>36.727**</td>
<td>87.74**</td>
<td>44.301**</td>
<td>30.576</td>
</tr>
<tr>
<td>Age</td>
<td>0.0164</td>
<td>1.885**</td>
<td>0.714**</td>
<td>−0.092</td>
</tr>
<tr>
<td>Education</td>
<td>1.680**</td>
<td>0.476</td>
<td>0.506**</td>
<td>1.143**</td>
</tr>
<tr>
<td>No. of loans</td>
<td>−45.539</td>
<td>−203.394#</td>
<td>−77.994*</td>
<td>−110.33</td>
</tr>
<tr>
<td>Constant</td>
<td>−96.231*</td>
<td>−127.89</td>
<td>−92.636</td>
<td>−110.33</td>
</tr>
<tr>
<td>Wald χ²</td>
<td>647.16</td>
<td>357.03</td>
<td>1248.9</td>
<td>388.75</td>
</tr>
<tr>
<td>Rho</td>
<td>0.166</td>
<td>0.349</td>
<td>0.203</td>
<td>0.251</td>
</tr>
</tbody>
</table>

Notes: Standard errors in parentheses. ** significant at 1 per cent; * significant at 5 per cent; # significant at 10 per cent. Dependent variable is the monthly loan repayment ratio.
variables like experience. Elderly participants may also have relatively more income inelastic consumption and a greater ability to reduce arrears as incomes increase.

Everyone in the sample obtained a start-up loan. The cross section data allow us to capture the impact of the size of the loan, conditional on everyone having a loan. The size of the loan (all else constant) has a negative and significant effect on viability for industrial ventures and those located in urban areas. The initial capital investment on average was not justified by the size of the market or was probably based on overly optimistic revenue estimates. As would be expected, a longer repayment period (given a loan size) promotes viability by lowering the monthly instalments. However, this does not apply to those who eventually fail. Additional credit also has a negative impact on industrial enterprises and those in urban locations. The coefficient relating to more than one loan is negative and significant for the whole sample, negative and insignificant for those who were viable and positive but insignificant for those who failed. Additional credit was not significant in explaining differences in the ability to repay loans if the sample were controlled for viability. However, when the sample is pooled there is a significant difference, with those who obtained more than one loan more likely to have poorer repayment ratios than those who had only one loan. As stated in the data section, the second loans were acquired on average two years after entry. We interpret this to mean they usually applied for, and obtained additional financing either to forestall failure through expansion or reorganisation. This would suggest that the additional resources add more to the loan obligations than they do to revenues and it calls to question the criteria under which additional credit was granted.

It is also possible some could try to use the second loan as a ‘bail-out’ option, but we have no way of assessing this possibility.

The constant term is negative but significant only for those in commerce. This could mean our specification did not include some unobservable time invariant attributes. The index of imports of intermediate goods had a positive impact but only on non-viable firms. This is in line with our theoretical discussion. Since the real value of imports declined at a time when the domestic price of imports was increasing (with the devaluation and depreciation of the local currency), we would expect those whose goods had a greater import content to face a greater hardship. Educational attainment at the beginning of self-employment by itself has a positive and significant impact on viability except for those in industry. Its impact is also positive and significant when included as an interaction variable with the sector (commerce or industry), but not for all viable enterprises (Table 4). Educated entrepreneurs in commercial activities had a greater chance of not failing. We take this to support the ‘matching’ hypotheses, whereby viability partly depends on the ability of the self-employed to select an activity that suits their human capital. The commercial sector included pharmacies and other activities dominated by professionals, as well as others where diversity of skills was not essential. Industrial production on the other hand requires a broad range of skills. They cannot be encapsulated by the educational attainments of the owner alone. Our sample did not include enough observations of hired labour to refine our estimates.

In addition, we estimated the marginal effects (the log of odd-ratio). This is the partial derivative of the predicted probability or predicted rate with respect to the independent variable while all other variables are constant at their mean values.
Those of the time varying variables should be the same as the estimated coefficients of Equation (8), and they were. The results showed that the probability of failure increases by almost 49 per cent as the size of the initial loan goes from $2,000 to $20 million.\(^7\) This highlights the importance of the initial plant size, especially in the face of macroeconomic instability and rising interest rates. Macroeconomic stability is also critical for the survival of small enterprises. The probability of success increases by 43 per cent with an increase in the years of schooling at the time of entry from 0–22 years. Higher skills in the commercial area probably earn some monopoly rents or improve managerial ability. Similarly, the probability of success increases by 32 per cent with an increase in age from 22–72 years. We tested for diminishing returns to age but the coefficient was not significant. Gender was not a significant factor and this may be a direct result of policy decisions.

VII. Conclusions and Policy Implications

Our results show that interest rates and macroeconomic stability are important for sustainability of self-employment. Previous studies have not highlighted the impact of this variable that is really outside of the control of the entrepreneur. Interest rate increases have a greater negative impact on viable than non-viable enterprises and are thus detrimental to the whole sector. Interest rate subsidies will not necessarily make unsuccessful enterprises viable and their positive impact would be undermined in an inflationary environment by declines in general demand for goods supplied by the self-employed.

The results also suggest that human capital and the correct choice of activity is important for viability. They did not meet the ‘matching’ criteria for success. Those who selected the right activity for their skills were able to take advantage of the growth in retail activity and mitigate the impact of financial cost changes. The results are important at the project assessment stage when there is a tendency to grant credit solely on the basis of the applicant’s business plan. Small business agencies should be equipped to delve into the applicant’s suitability for the activity of choice, the timing of the investment and their responses to adversity and other non-quantifiable attributes. This recommendation is made because the significant lagged dependent variable would seem to suggest that some relevant, unobservable variables have been left out. Misconceptions about costs or market conditions at the beginning have a lingering effect, the availability of credit notwithstanding. Credit availability by itself is a necessary but not a sufficient condition, since our results show it is not the only binding constraint. The results also show that given the level of uncertainty, an initial capacity that is small relative to market size is preferable to excess capacity. The result is contrary to the usual assumption about economies of scale that, as our results show, may not be instantaneously realised in any case.

The choice of activity is also a function of the macroeconomic structure of the economy. Our results show that the matching of an entrepreneur to the appropriate sector for his skills improves the probability for success. For the Zimbabwean small-scale entrepreneur, commercial or retail activities were likely to be more successful than self-employment in manufacturing. This could be due to a number of factors. The manufacturing sector is small, has a high level of vertical integration, making it difficult for small enterprises to compete against large-scale operations unless there were
enforceable anti-monopoly regulations and incentives to promote outsourcing to small producers. Whatever the cause, choosing an activity most appropriate to the level of structural transformation and location specific advantages is critical for viability.

Our model formalises the role of subsistence in the investment and lending decision. Viability improved when higher revenues also generated higher rates of loan repayments. The results show that opposition to interest rate subsidies on the basis that they distort incentives may not be warranted. Our sample enjoyed negative real interest rates until 1992. When the reform programme took effect interest rates increased significantly, and yet we did not observe a significant change either in the rates of entry or viability thereafter. The very nature of subsistence gives it a priority over all other concerns and it may be important for two reasons. First, since it is a subjective measure, lenders would do well to get from the prospective self-employed their lifestyle expectations and whether they are in line with the lower bounds of the expected revenue stream. Assistance with financial planning may well have to extend household expenditures. In this regard, the self-employed should be encouraged to pay themselves a wage that is a proportion of revenues in order to separate consumption decisions from business management. Second, the general wisdom is for the self-employed to contribute as large a share of the total equity as possible in order to ensure their commitment to the project. However, it is equally important to be sure that the self-employed have personal savings that can be used to guarantee subsistence consumption when necessary.

Acknowledgement

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Notes


2. Personal communication with SEDCO officials confirm that the missing values for individual’s age and education occurred because of the data-entry errors rather than any other reasons. We would have ‘non-ignorable missingness’ in case it occurred because of the nature of the variables themselves or how they were collected.

3. One could consider the nature of the missing data to be ‘missing at random’ (MAR) and, therefore, use imputation techniques to generate different sets of the missing observations under the assumption that the mean value of these sets is the same as that of the observed sample. However, that turns out to be computationally troublesome. MAR means that the probability of missing data on a particular variable can depend on other observed variables, but not on that variable itself. The model used for the analysis also must match with the model used in the imputation. In our case, the last condition is difficult to meet because of the panel structure of our data. Finally, the imputation assigns random values of age and education where such values are missing. The random values can be negative or zero, provided the sample mean is maintained. The estimated coefficients for age and education are
therefore unrealistic and those for the time varying variables will also be distorted. Our main results are therefore based on the sample with complete information that we have shown to be a subset of the whole sample.

4. See New York University Research Institute, Global Development Network Growth Database.


6. The number and size of loans could be a function of viability and thus endogenous to the model. We therefore stipulated these variables as endogenous and STATA uses the lagged values of the time-varying variables and the other time invariant variables (age, education, sex) as instruments in a two-part estimation procedure. The interest rate is the same for all borrowers and is therefore exogenous.


References


