INVESTMENT IN SEGMENTED CAPITAL MARKETS

by

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Abstract:
Bankers' screening devices are identified to determine firms' probability of borrowing in the 'formal' segment of the capital market in Pakistan. Incorporating this information, investment functions are estimated using a two stage switching regressions model with endogenous switching. It is concluded that firms that borrow in the 'formal' markets behave according to the flexible accelerator model of investment while non-borrowing firms plough back profits. Furthermore, the former have higher capital-output ratios and find it less difficult to adjust to their desired capital stocks compared to the latter. Investment determinants related to entrepreneurial and firm features are also identified.

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Section 1  Introduction

It is commonly observed that capital markets in developing countries are segmented (see, for example, Smith 1983, von Pischke et al, 1983, Virmani, 1985). Typically, 'formal' sources of credit, such as commercial banks and specialized lending institutions, ration out loans to selected firms at subsidized interest rates and easy terms, while the excluded firms rely on self-generated funds and/or lenders in the 'informal' markets, where capital is in short supply and interest rates are high. Two interesting issues that arise from this description of LDC capital markets are, firstly, how does segmentation come about and secondly, how does this influence firm investment decisions.

Mckinnon's (1973) explanation that LDC capital market segmentation is caused by government intervention has been challenged, at least at the macro level by Fry (1978) and Leff (1979). An alternative explanation is that rationing and segmentation result from incomplete information regarding firms' success in their investment ventures. For example, Stiglitz and Weiss (1981) argue that the interest rate is not like any other price since it involves future returns to loans rather than exchange value at a point in time. This feature of interest rates affects the lender's ability to recover loans and avoid default. For example, distinguishing borrowers through bidding up of the interest rate may result in adverse selection, i.e., borrowers that undertake more risky investments are likely to bid higher rates and this increases the probability of default. Thus lenders may choose to keep interest rates below the market clearing rate and resort to rationing using various screening devices to lower the risk of default. In this paper we
analyse banks' lending decisions and identify the screening devices used to select borrowers. Such screening, in effect, substitutes for price rationing in markets not characterized by incomplete information.

Financial 'dualism' which makes it easier for some firms to borrow compared to others is likely to influence firms' investment decisions. For instance, the favoured, non-rationed firms may perceive cost of borrowing to be low and may 'over-invest' resulting in excess capacity while potentially efficient but rationed firms may be starved of capital. For the society this implies costly misallocation of scarce capital. The second objective of this paper is to explore firms' investment decisions given segmented capital markets. Previous studies that have analyzed investment under such circumstances (see for example, Tybout, 1983) have not directly taken into account firms ability to borrow. In this paper we explicitly incorporate the information on firms' borrowing success in the rationed, 'formal', capital market while investigating investment decisions and thus avoid selectivity bias (Maddala and Nelson, 1975). The econometric model that we use is a two stage switching regressions procedure with endogenous switching.

The paper is organized as follows: Data and Pakistan's capital market is briefly described in Section 2. Firms' credit worthiness in the 'formal' market is discussed in Section 3. In Section 4, the investment function and the econometrics underlying our empirical work is outlined. The empirical determinants of investment identified by the statistical tests are reported in Section 5. Finally, concluding remarks are made in Section 6.
Section 2. Data and the Capital Market in Pakistan

The evidence on investment and workings of the capital market is taken from a survey of 119 firms manufacturing farm machinery in Pakistan conducted in 1983. The sample constitutes 23% of the total population of 514 firms in the industry (Pakistan Agricultural Machinery Division Census, 1983). Five broad categories of farm machinery manufactured are tubewells, threshers, tractor attachments such as seed and fertilizer drills, fodder cutters, and sugarcane crushers. Demand for this equipment increased rapidly in the 1970's due to the success of 'green revolution' and shortages of labor at peak periods of agricultural activity. Most firms in the industry are small: nearly 67% employ 10 or less workers (These are highly skilled workers and are retained throughout the year. At peak periods of manufacturing activity total work force more than doubles by hiring, in the main, unskilled workers). The largest firm in the sample employs 67 workers. A notable feature of the industry is that most firms are located in five towns in the Punjab which are Lahore, Faisalabad, Gujranwala, Daska and Mianchannu. The last two are small rural towns that are emerging as important centers of the engineering industry. Survey data on inventories and fixed assets such as buildings are poor while for machinery and equipment they are very good and detailed (carefully accounting for vintage, specification and depreciation). Investment in this paper is thus defined as changes in firms' machinery and equipment stock (for details of the survey and construction of the capital variable see Nabi, 1985a, 1985b).

The 'formal' capital market which the industry faces consists of commercial banks and, more recently, specialized lending institutions such as the Pakistan Industrial Development Bank. Considerable difficulty is reported in obtaining funds from these sources since collateral requirements are strict
and scrutiny procedures require enormous paper work which many of the small firms in the industry are unable to cope with. Also repayment schedules are stringent with little possibility of rolling forward outstanding loans. These features reflect high effective interest rates. Nominal interest rates (between 12% and 14%) charged to those who can get it, however, are reported to be attractive particularly in view of an inflation rate of about 16% at the time of the survey.

The 'informal' capital market consists of the 'committee' or the 'chit' system. 'Committee' members usually belong to the same biradri. (Biradri is a much looser version of the Indian caste. Biradri membership helps to avoid default since few will risk biradri boycott which affects wider social interaction). Monthly installments are pooled together and then lots are drawn to determine the queue for allocating the pooled sum. It is common that those in front of the queue sell their pool at a premium decided through open bidding. According to some estimates the premium, or the real rate of interest, on such transactions varies between 18% and 25%. Self-generated funds, defined rather broadly to include firm's own savings as well as borrowing from friends and relatives, are also frequently reported as being important. The latter have become particularly important since the 1970's due to the large inflow of overseas remittances from migrants working in the gulf. (In 1982 remittances peaked at U.S. $3 billion which amounted to nearly 10% of Pakistan's gnp). Other 'informal' sources of finance are raw material wholesalers who defer payments on material and advances from customers. Thus several sources are available for financing investment which involve different terms of lending. Also access to these sources is differentiated by firm and owner characteristics. The most desirable sources for the firms, given the loan repayment period and other terms, are those identified as belonging to
the 'formal' sector but the funds available here are limited and, because market clearing interest rates are not allowed to prevail, they are rationed.

All 119 firms in the sample reported that they had applied for loans in the 'formal' capital market sometime in the last five years. However, only 43 firms reported success in borrowing. The rest had to rely on a combination of sources such as self generated funds and friends and relatives.

Investments undertaken by firms between 1980-82 are reported in table 1.

<table>
<thead>
<tr>
<th></th>
<th>Mean Investment</th>
<th>Past Capital Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Firms</td>
<td>8,258.60</td>
<td>0.12</td>
</tr>
<tr>
<td>Bank Borrowers</td>
<td>17,229.00</td>
<td>0.18</td>
</tr>
<tr>
<td>Non-Borrowers</td>
<td>3,605.00</td>
<td>0.05</td>
</tr>
<tr>
<td>Investing Firms</td>
<td>15,857.81</td>
<td>0.33</td>
</tr>
<tr>
<td>Bank Borrowers</td>
<td>20,022.97</td>
<td>0.27</td>
</tr>
<tr>
<td>Non-Borrowers</td>
<td>10,150.00</td>
<td>0.29</td>
</tr>
</tbody>
</table>

Two features of table 1 merit comment. Firstly, 6 firms that were successful in borrowing from banks did not report any investment between 1980-82. This was because even though they had secured loans towards the end of 1981, they had not actually committed these at the time of interview. The second feature is that firms that are successful in borrowing invest nearly twice as much as the unsuccessful firms. But they have considerably larger past capital stocks so that their investment as a proportion of past capital
stock is slightly less than that of non-borrowers. This suggests that the latter firms, when they have growth potential, are able to realize it by raising loans in the informal sector or by ploughing back past profits.

Section 3 Determining Firms' Creditworthiness

A careful examination of firms that succeed in borrowing suggests the following. The typical borrowing firm manufactures threshers and is likely to be located in a small town like Daska or Mianchannu. The owner of the firm belongs to the 'lohar' (iron-smith) biradri, is well educated and, surprisingly, has fewer years of experience in this or related business compared to the unsuccessful borrowers. The firm also has larger values of capital stock and profits compared to others. These features of the sampled firms are summarized in tables 2 and 3.

How do these features contribute in assuring bank managers that loan applicants having them are less likely to default compared to others? Let us take product specialization. Thresher manufacturers have enjoyed high growth and profits in the recent past because farmer demand is high and is likely to continue to grow in the near future. There is considerable scope for innovation (and thus for product differentiation and secure markets) to suit the climatic conditions of different regions. All this indicates that thresher firms are likely to have relatively high rates of returns and thus
Table 2: Characteristics of Borrowers in 'Formal' Capital Markets

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successful Borrowers</td>
<td>43</td>
<td>-</td>
</tr>
<tr>
<td><strong>Of Whom</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thresher manufacturers</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Located in Daska and Mianchannu</td>
<td>26</td>
<td>61</td>
</tr>
<tr>
<td>'Lohars'</td>
<td>24</td>
<td>56</td>
</tr>
</tbody>
</table>

Note: Percentages in brackets are based on total (119) firms while others are percentages of firms that are successful in borrowing.

Table 3: Other Variables Important in Bankers' Lending Decision (Means)

<table>
<thead>
<tr>
<th></th>
<th>Borrowers</th>
<th>Non Borrowers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education (years)</td>
<td>7.22</td>
<td>6.024</td>
</tr>
<tr>
<td>Past Capital Stock (Rs)</td>
<td>94,820.17</td>
<td>71,386.00</td>
</tr>
<tr>
<td>Past profits (Rs)</td>
<td>237,190.00</td>
<td>117,100</td>
</tr>
<tr>
<td>Years in this Business</td>
<td>9.32</td>
<td>10.276</td>
</tr>
</tbody>
</table>
are less likely to default. Being located in small towns like Mianchannu and Daska may contribute to success in borrowing because the few bank branches in these towns enjoy monopoly in lending to successful ventures and branch managers have good knowledge of the likely success of ventures. 'Lohar' biradri is a proxy for the pool of engineering skills that an entrepreneur is likely to inherit (or acquire through association) which contributes to his success. Education may help in smoother transactions with applicants and may also be a proxy for the more general ability to acquire new skills and succeed. Firms with large initial stock of capital are more likely to succeed in borrowing because banks may regard it as indicative of success in the past. It also serves as good collateral. Thus the creditworthiness function is

\[
D = f(\text{past capital stock}, \text{past profits}, \text{entrepreneur's business experience}, \text{entrepreneurs' education}, \text{lohar' dummy, thresher dummy, small town dummy});
\]

(1)

D is a dummy dependent variable taking value 1 when a firm borrows, 0 otherwise.

The creditworthiness function is estimated using the following non-linear model:

\[
D = \begin{cases} 
1 & \text{if } \gamma Z_i \geq U_i \\
0 & \text{otherwise} 
\end{cases}
\]

(2)

where \(Z_i\) are the creditworthiness variables (screening devices) given in (1). (2) is estimated using probit maximum likelihood.

Table 4 presents probit estimates of the coefficients on the variables listed in (1). The statistically significant variables are firm's
profits, entrepreneur's education, 'lohar' entrepreneurs, firm's product specialization (thresher manufacturers) and being based in small towns like Daska and Mianchannu. Firm's past capital stock is on the border line of significance while entrepreneur's business experience is insignificant. Different versions of the education variable were used (e.g. the quadratic form and dummies using different cut-off points for years of schooling) but none of these were significant. Some of the borrowers in the sample have technical education and several dummies to capture this were tried but these were also insignificant. We did not include the education variable in the final regression reported in table 4.

We comment on the explanatory power of our credit worthiness equation by evaluating its success in matching the predicted status of a firm regarding borrowing with its observed status. To do this, probit estimates of the coefficients on variables reported in table 4 are converted into probabilities (using standard probit-probability tables) for each firm in the sample. This yields the estimated probability of a firm's success in borrowing. Taking the cut-off point at 0.5, the results are reported in table 5. Our model of credit worthiness correctly predicts the borrowing status of firms in 83.19% of the cases.

An explanation for why past business experience is not given much weight by lenders may be as follows: A large number of firms were established in the 1970's when this industry's growth potential was recognized and many entrepreneurs with success in other ventures (such as crop trading in small rural towns) moved in. Thus, even though these entrepreneurs have only few years of experience in this industry, their entrepreneurial performance elsewhere has been quite impressive. Banks lend to them more readily compared
Table 4: Probit Maximum Likelihood Estimates of Creditworthiness Function Equation

<table>
<thead>
<tr>
<th>Exogenous Variables</th>
<th>Coefficients</th>
<th>Standard Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past Capital Stock (Rs*1000)</td>
<td>0.0338</td>
<td>0.0181</td>
</tr>
<tr>
<td>Past profits (Rs*1000)</td>
<td>0.0041</td>
<td>0.0021</td>
</tr>
<tr>
<td>Entrepreneur's Business Experience (years)</td>
<td>-0.0169</td>
<td>0.0182</td>
</tr>
<tr>
<td>'Lohar' Entrepreneurs (dummy)</td>
<td>0.0705</td>
<td>0.0212</td>
</tr>
<tr>
<td>Product Specialization (Thresher dummy)</td>
<td>1.3788</td>
<td>0.3212</td>
</tr>
<tr>
<td>Small Industrial Town * (dummy)</td>
<td>0.6124</td>
<td>0.3158</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.8731</td>
<td>0.4172</td>
</tr>
</tbody>
</table>

Log Likelihood -56.518

N 119

Dummy Dependent variable = 1 if banks lend, 0 otherwise.
Note: * The towns are Mianchannu and Daska.

Table 5: The Credit Worthiness Models Success in Predicting Firm's Status

<table>
<thead>
<tr>
<th>Observed status</th>
<th>Predicted status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will Borrow</td>
<td>Will Not Borrow</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Successful firms</td>
<td>43</td>
</tr>
<tr>
<td>Unsuccessful firms</td>
<td>76</td>
</tr>
</tbody>
</table>

Percentage of successful and unsuccessful borrowers whose predicted status matches with their observed status = 83.19 (with cut-off point at 0.5).
to those who have had long experience in this industry but have performed less well. Unfortunately, we do not have data on business experience elsewhere to obtain a true measure of experience. (Our variable business experience may, in fact, reflect plant vintage since we have measured it as the number of years the firm has been in existence. A direct measure of vintage, firm age, was tried but was statistically insignificant).

Section 4. A Switching Regressions Model of Investment

Next we examine investment decisions by firms in our sample. Tybout (1983) has suggested an investment function for segmented capital markets. It consists of two components: the accelerator model with the usual adjustment coefficient and a profit variable which shows investment to be a function of firms' liquidity. It is hypothesized that the accelerator model is valid for non-rationed firms while the rationed firms simply plough back profits. The investment function specified to test this hypothesis empirically is:

\[
I(t) = \beta[aQ_t - K_{t-1}] + \delta \Pi_{t-1} + u_t
\]  

where \(I(t)\) is investment, \(aQ_t\) gives the optimal or desired capital stock as a function of expected output, \(K_{t-1}\) is the previous period capital stock, \(\beta\) is the adjustment factor which takes into account the costs of capital accumulation, \(\Pi_{t-1}\) is the previous period profits and \(u_t\) is the error term. It is predicted that non-rationed firms have higher values of \(\beta\) (they adjust to their desired capital stock more easily) and \(a\) (they desire more capital stock) compared to mildly rationed firms. Furthermore, for the severely
rationed firms $\delta$ takes zero value while for firms that can borrow in the official market, $\delta$ takes zero value. (3) may be tested using the maximum likelihood method.

If information on the working of the capital market is available, so that probabilities can be assigned to the firm's ability to borrow, then using ordinary least squares or the maximum likelihood method to estimate (3) is inefficient since information on firm selection is not used. The correct econometric procedure is to explicitly incorporate the probability of success in borrowing and then examine differences in investment behavior across firms. A two-stage switching regressions model with endogenous switching (Goldfeld and Quandt, 1973; Lee, 1978; Trost, 1977; Maddala and Nelson, 1975) outlined below enables this. The two regimes describing investment behavior of borrowing and non-borrowing firms, respectively, are:

\[ I_i = \lambda_{1i} X_{1i} + U_{1i} \text{ iff } \gamma Z_i > U_i \]  
\[ I_i = \lambda_{2i} X_{2i} + U_{2i} \text{ iff } \gamma Z_i < U_i \]

where $I_i$ is the actual investment undertaken by a firm and $X_{1i}$, $X_{2i}$ are the investment determinants for the two categories of firms, and $Z_i$ are creditworthiness determinants. $U_i$ are assumed to be correlated with $U_{1i}$ and $U_{2i}$ and this enables the endogenous switching in the model. Coefficients on $Z_i$, which were estimated in section 3 using the statistical model (2), assign probabilities of success to firms and sort them out into the two investment regimes (4) and (5).

We normalize $\text{var}(U_i) = 1$ and assume that $U_{1i}$, $U_{2i}$, and $U_i$ have a
trivariate normal distribution with mean zero and covariance matrix

$$\Sigma = \begin{pmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{1u} \\ \sigma_{12} & \sigma_2^2 & \sigma_{2u} \\ \sigma_{1u} & \sigma_{2u} & 1 \end{pmatrix}$$

(6)

The likelihood function for the statistical model outlined above is

$$L(\lambda_{1i}, \lambda_{2i}, \sigma_1^2, \sigma_2^2, \sigma_{1u}, \sigma_{2u})$$

$$= \left[ \int_{-\infty}^{\gamma Z_i} g(I_i - \lambda_{1i} X_{1i}, U_i) \, du \right] \frac{D_i}{\gamma Z_i} \left[ \int_{\gamma Z_i}^{\infty} f(I_i - \lambda_{2i} X_{2i}, U_i) \, du \right]^{1-D_i}$$

(7)

where $g$ and $f$ are, respectively, the bi-variate normal density functions of $(U_{1i}, U_i)$ and $(U_{2i}, U_i)$.

Maximizing (7) is cumbersome. Lee (1976) suggests a simpler alternative. The objective is to obtain the expected value of $U_{1i}$ and $U_{2i}$ in (4) and (5) where:

$$E(U_{1i} | U_i \leq \gamma Z_i) = E(\sigma_{1u} U_i | U_i \leq \gamma Z_i) = -\sigma_{1u} \frac{\phi(\gamma Z_i)}{\Phi(\gamma Z_i)}$$

and

$$E(U_{2i} | U_i \geq \gamma Z_i) = E(\sigma_{2u} U_i | U_i \geq \gamma Z_i) = \sigma_{2u} \frac{\phi(\gamma Z_i)}{1 - \phi(\gamma Z_i)}$$

Define Mills ratios $W_{1i} = \phi(\gamma Z_i)/\Phi(\gamma Z_i)$ and $W_{2i} = \phi(\gamma Z_i)/(1-\phi(\gamma Z_i))$

where $\phi$ and $\Phi$ are distribution and density functions, respectively, of the standard normal. Now (4) and (5) may be written as:
where the residuals

\[ \varepsilon_{1i} = U_{1i} + \sigma_{1u} \hat{w}_{1i} \]

\[ \varepsilon_{2i} = U_{2i} + \sigma_{2u} \hat{w}_{2i} \]

are uncorrelated.

The two stage procedure for estimating (8) and (9) is to utilize the probability estimates obtained from the probit maximum likelihood of section 3. This enables estimation of the Mill's ratios, \( W_{1i} \) and \( W_{2i} \). Ordinary least squares may then be used to estimate (8) and (9). The coefficients \( \lambda_{1i}, \sigma_{1u} \) and \( \lambda_{2i}, \sigma_{2u} \) may now be compared to comment on the investment determinants of borrowing and non-borrowing firms respectively.

Section 5 Investment Determinants: The Results

The prediction based on McKinnon's arguments represented in (3) (and its econometric variants (8) and (9)) is that the accelerator model is relevant in explaining investment decisions of firms that succeed in borrowing and not for others. This is confirmed by the results reported in table 6. (Here we report results only for our econometric model. OLS regressions without the Mills ratios were also run. The estimated R^2 and several individual coefficient values were lower compared to those reported in table...
6). The coefficients on the value of output and capital stock (which constitute the accelerator model) are statistically significant and have the predicted signs for firms that are successful in borrowing in the 'formal' capital market. For 'non-borrowing' firms these coefficients are

Table 6: Firms' Investment Decisions (Variants (8) and (9) of (3)).
Two stage Switching Regressions Model.
Dependent Variable: Investment in Rupees (all firms)

<table>
<thead>
<tr>
<th></th>
<th>Borrowers (D=1)</th>
<th>Non-Borrowers (D=0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of output ($a\beta$)</td>
<td>0.039</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>(0.011)c</td>
<td>(0.019)</td>
</tr>
<tr>
<td>Value of Past Capital Stock ($\delta$)</td>
<td>-0.368</td>
<td>-0.170</td>
</tr>
<tr>
<td></td>
<td>(0.201)b</td>
<td>(0.213)</td>
</tr>
<tr>
<td>Profits ($\delta$)</td>
<td>0.021</td>
<td>0.093</td>
</tr>
<tr>
<td></td>
<td>(0.314)</td>
<td>(0.014)c</td>
</tr>
<tr>
<td>Previous Years in Business</td>
<td>2211.00</td>
<td>621.129</td>
</tr>
<tr>
<td></td>
<td>(1188.21)a</td>
<td>(423.54)</td>
</tr>
<tr>
<td>Entrepreneurs' Education</td>
<td>-7342.10</td>
<td>638.267</td>
</tr>
<tr>
<td></td>
<td>(4387.3)a</td>
<td>(504.239)</td>
</tr>
<tr>
<td>Thresher Dummy</td>
<td>1298.13</td>
<td>1499.23</td>
</tr>
<tr>
<td></td>
<td>(611.17)b</td>
<td>(7522.20)b</td>
</tr>
<tr>
<td>Small Town Dummy</td>
<td>8719.00</td>
<td>23.438</td>
</tr>
<tr>
<td></td>
<td>(3719.00)c</td>
<td>(3638.31)</td>
</tr>
<tr>
<td>Mills Ratio</td>
<td>12400.00</td>
<td>-2950.51</td>
</tr>
<tr>
<td></td>
<td>(7317.00)a</td>
<td>(1141.00)b</td>
</tr>
<tr>
<td>Constant</td>
<td>-10502.00</td>
<td>-5930.90c</td>
</tr>
<tr>
<td></td>
<td>(58748)</td>
<td>(1023.11)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.432</td>
<td>0.191</td>
</tr>
<tr>
<td>N</td>
<td>43</td>
<td>76</td>
</tr>
</tbody>
</table>

Notes: Standard errors are in parentheses a, b and c imply 10%, 5% and 1% levels of significance, respectively.
insignificant but the coefficient on profits is highly significant (it is insignificant for 'borrowing' firms). Furthermore, the value of $\beta$ for the 'borrowing' firm is nearly twice as high as for the 'non-borrowing' firm which implies that the former more easily adjust to their desired capital stocks because of easy access to 'formal' capital markets. (Similar results are reported by Tybout (1983) for Columbia. His estimates of $\beta$ for large firms, who are more successful in borrowing is nearly three times larger than that for the small or the less successfully borrowing, firms.) The values for the coefficient on Mill's ratio for the two categories of firms are also interesting. They indicate that firms that succeed in borrowing in the 'formal' capital market invest more than the sample average and non-borrowers less. This result brings out more clearly McKinnon's arguments concerning imperfect capital markets and investment decisions and thus justifies the two stage switching regressions procedure used.

Of the other variables included in the investment function, business experience and small town location are statistically significant for the 'borrowing' firms while product specialization (thresher dummy) is significant for both 'borrowing' as well as 'non-borrowing' firms. Regarding product specialization and investment, we find that when product line is profitable and has a growing demand, firms unable to borrow in the formal capital market, can turn to other sources. Thus it appears that when firms are onto a "good idea", they can raise investment funds even if they do not satisfy the 'official' criteria of credit-worthiness.

We included the education variable (years of schooling) in the investment equation even though it was insignificant in the 'borrowing' equation to see if it has any influence on the investment decision.
Surprisingly, its coefficient takes a negative value for 'borrowers', which suggests that the growing firms are owned by entrepreneurs with little formal education, while the educated entrepreneurs are investing less. This may reflect the changing structure of the industry whereby the old established firms manufacturing tubewells (where educated entrepreneurs are to be found) have been declining compared to the new thresher manufacturing firms whose entrepreneurs have skills but little formal education.

Section 6 Concluding Remarks

Firms do not have equal access to the 'formal' subsidized capital markets. Bank managers in such markets appear to have considerable discretion in the choice of firms in their lending arrangements. In the absence of complete information regarding firm's success, lending decisions are based on other observable features of firms such as the size of capital stock, past profits and product specialization. The background of entrepreneurs also matters, in particular their 'biradri' connections and education weigh heavily in bank managers' lending decision. A probit model incorporating these firm and entrepreneurial features enables the estimation of each firm's probability of success of borrowing in the 'formal' capital market. This additional information is used to estimate the two-stage switching regressions model of investment with endogenous switching. The hypothesis (a la McKinnon) that firms having access to the 'official' capital market behave according to the flexible accelerator model of investment while firms without such access rely mainly on past profits, is supported by the econometric test. It is observed that borrowing firms invest more, have higher capital output ratios and more easily adjust to desired capital stock compared to other firms. Furthermore,
firms located in small towns invest more because of better chance of borrowing in the 'official' capital market. Finally, it is observed that firms that specialize in products with high and growing demand succeed in raising investment funds even when the 'official' capital market excludes them.
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