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Bank Debt Use and Firm Size: Indian Evidence

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ABSTRACT. The paper employs a sample of listed Indian manufacturing firms over the period 1995–2004 to examine the factors influencing the concentration of bank debt in total debt. The results indicate that the factors vary by firm size. Small to medium-sized firms have a high concentration of bank debt. The results support the reputation view that firms face differential debt choice as they grow larger. When evaluating bank regulations, policymakers need to consider the importance of the reputation-building service which banks provide to businesses.

KEYWORDS: bank debt, small firms, reputation, India

JEL CLASSIFICATION: G21, G32, E44

1. Introduction

The paper examines the use of bank debt by firms. Literature suggests that banks hold comparative advantage in business financing because they can overcome information asymmetries (Diamond, 1984, 1991). For instance, while an outside lender may find it difficult to evaluate and monitor a firm, a bank may find it easier to do so, because of its ongoing relationship with the firm. One important factor in the growth process is the availability of financing, as evidenced by the fact that industries that have easy access to external financing sources tend to grow faster (Rajan and Zingales, 1998).

The paper presents evidence from India regarding the choice of bank debt by firms across size groups. We choose India as a case study for two main reasons: first, it is one of the most important developing countries of the world, and second, in the post-reform period, the erstwhile controls of the pre-reforms era were dismantled, allowing greater role of market forces in the resource allocation process. This makes it interesting to examine as to how the use of bank debt varies by firm size when market forces are allowed to operate.

The reminder of the paper is structured as follows. Section 2 provides an overview of the received literature. The following section highlights the empirical strategy and explains the position of the paper in this field. Section 4 discusses the database. Section 5 is devoted to a discussion of the results and some robustness checks, followed by the concluding remarks, which is gathered in the final section.

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2. Use of bank debt by firms

The analysis seeks to examine how the determinants of bank debt concentration vary by firm size. Berger and Udell (1995) provide evidence that size reflects reputation in financing choices. Explicitly applying the theory to a firm's use of bank debt suggests that the relationship between bank debt and the explanatory variables is likely to vary by firm size groups.

It has been argued that a firm's choice between trade credit and bank debt may serve as a screening device (Smith, 1987). If a buying firm takes trade credit, then bank financing is not available, which signals to the seller that the buyer has a high default risk. This implies that a firm with a low default risk will depend on bank loans, while a firm with a high default risk is likely to use trade credit.

Secondly, the monitoring view of bank lending suggests that, since banks are well positioned to gather information on businesses on a continuous basis, they can act as valuable monitoring devices and contain the problem of moral hazard. Banks can, therefore, utilize economies

of scale in information production and access to inside information to bridge information asymmetries between borrowers and lenders (Diamond, 1984).

Moral hazard also explains why a firm finds value in the ability to renegotiate debt. Illustratively, a firm may choose bank debt, which usually involves a relatively stringent set of restrictions, because it limits moral hazard problem in which the firm would under invest when market conditions are unfavorable. However, when market conditions turn good, the firm may be limited by the terms of its bank debt and therefore, finds the ability to renegotiate valuable. This model implies that a firm with a moral hazard problem and a poor market is more likely to choose bank debt than a firm facing good market conditions (Berlin and Mester, 1992).

The empirical literature on bank debt concentration of firms focuses either on large firms (Easterwood and Kadapakkam, 1991) or small firms (Petersen and Rajan, 1994) in isolation. One interpretation of this empirical specification is that firm size can be considered to be indicative of its reputation. In that case, the reputation view suggests that the determinants of a firm's concentration of bank debt may vary by size. In order to examine this possibility, the paper employ a sample of firms across varying sizes to directly test the impact of firm size on bank debt concentration.

Available studies find evidence consistent with the notion that information asymmetry plays a role in determining a firms' bank debt concentration. For a sample of Fortune 500 firms, Easterwood and Kadapakkam (1991) uncover evidence that large firm's proportion of long-term debt is an important determinant of private debt. Hoshi et al. (1993) establish that, for Japan, low net-worth firms are more likely to use private debt than high net-worth firms. Petersen and Rajan (1994) show that relationships are valuable in bank financing for a sample of small US firms without access to public debt markets. Using survey data of 6,000 firms in 1992, Binks and Ennew (1996) demonstrate that information asymmetry might be an important factor in engendering a credit crunch, especially for growing firms.

Although a significant volume of literature on this aspect has been evolving for developed countries, limited work has been forthcoming in this area for developing countries. The extant literature for developing countries focuses primarily on the determinants of capital structure and that too, in a cross-country context (Booth et al., 2001). However, the limited cross-sectional variability in these studies restricts the appeal of such models. Country-specific studies, on the contrary, that exploit cross-sectional variation in large samples, tend to be more illuminating in this respect. In the Indian case, a study by Ramaswamy (1999) examined the productivity growth of 42 Indian manufacturing industries belonging to the consumer, intermediate and capital goods industries during two sub-periods: 1974–1982 and 1983–1989. The findings revealed that total factor productivity growth was higher during the latter period. However, the study was concerned primarily with the pre-liberalization era. Second, the study considered only a select set of industries and finally, although the study controlled for plant size, the association between bank debt across firms of varying sizes was not adequately addressed and this becomes a major concern of the paper.

3. The empirical strategy

The reduced form empirical specification to test this hypothesis can be presented as under

$$\begin{aligned} \mathrm{DEPVAR}_{it} = {} & \alpha_0 + \alpha_1 \mathrm{TAN}_{it} + \alpha_2 \mathrm{OPROF}_{it} \\ & + \alpha_3 \mathrm{GRSALES}_{it} + \alpha_4 \mathrm{RND}_{it} \\ & + \alpha_5 \mathrm{DEBT}_{it} + \alpha_6 \mathrm{LEV}_{it} + \alpha_7 \mathrm{AGE}_{it} \\ & + \alpha_8 \mathrm{ORIENT}_{t} \\ & + \alpha_9 \mathrm{DUM\_}Public + u_{it} \end{aligned} \tag{1}$$

where i (cross-section) is a firm indicator and t (time series) is a year indicator and u_{it} is the error term. In order to avoid selection bias in firm selection, we include all listed manufacturing firms over the sample period. Since all the firms were in existence over the entire length of the sample period, we end up with a balanced panel of firms, although information on some variables are not reported for several firms for certain years. The construction of the variables

TABLE I
Summary statistics for data sample

Variable	Definition	Mean, by firm size			
		Small	Medium	Large	All
Bank debt concentration (DEPVAR)	Total bank debt/total asset (%)	20.75	17.18	9.31	17.10
Tangible assets (TAN)	Plant, property and equipment/total asset (%)	55.28	57.62	62.71	57.67
Research and development (RND)	Research and development expenses/total sales (%)	0.45	0.48	0.31	0.47
Sales growth (GRSALES)	Annual growth in sales (%)	40.41	36.55	19.27	26.42
Profit (OPROF)	Operating profit/total asset (%)	–4.56	3.56	6.07	3.46
Total debt (DEBT)	Bank *plus* non-bank debt/total asset (%)	49.29	40.79	33.98	40.82
Age (AGE)	Number of years since the incorporation of the firm	14.01	27.00	41.65	27.65
Leverage (LEV)	Book value of long-term plus short-term debt/book value of equity	1.08	7.08	10.58	7.05
Financial system orientation (ORIENT)	Stock market capitalization/bank credit		1.55		
DUM_Public	Dummy variable = 1, if a firm belongs to the public sector; else zero		–		

Source: Author's calculations.

and the economic rationale for their choice are explained below (Table I).[1]

The dependent variable (DEPVAR) is the concentration of bank debt chosen by the firm, defined as the ratio of bank debt to total assets. In practice, a firm faces two decisions: the choice of the proportion of the bank debt to total debt and second, the choice of bank debt financing. Earlier studies were concerned with only the first aspect. The present study, on the other hand, concentrates on the second issue i.e., the question of reliance on bank debt.

The screening view of bank debt suggests that a small firm with a very high *ex-ante* default risk will be denied credit, a firm in the middle risk category will obtain trade credit only, and a firm with a relatively low risk will be most likely to obtain a bank loan (Smith, 1987). The proxies for screening are variables such as firm sales and higher profits. Berger and Udell (1995) employ sales, while Easterwood and Kadapakkam (1991) employ profitability to control for firm's health. High sales (GRSALES) and/or higher profits (OPROF) tend to be associated with low default risk, so a positive association between these variables and bank debt concentration might be expected. On the other hand, according to the renegotiation view, a firm's reliance on bank debt will depend on both the severity of the moral hazard problem and the *ex-ante* market condition or credit risk of the firm. Two proxies available for market condition are the firm's growth in sales and net income. The theory implies that a firm with initially poor market conditions (i.e., low sales growth or low income) finds the option to renegotiate valuable and is likely to use bank debt.

Empirically, observability of a firm's activities can be proxied by the level of tangible assets (Kroszner and Strahan, 2001). A firm with more tangible assets (TAN) will tend to have activities that are more easily observable to outsiders. Another measure of observability is spending on research and development (RND). Specifically, RND projects usually involve a high level of managerial discretion and eventually generate considerable intangible assets (Graham, 2000). The monitoring and reputation views predict

that bank debt concentration for firms with high RND is likely be high.

The capital structure of a company can provide information about the value of a close bank relationship. Large firms are better placed to assume greater debt *vis-à-vis* smaller firms. Accordingly, we include the debt-equity ratio (DEBT), defined as the ratio of total (book value of) debt (long-term plus short-term) divided by the book value of equity. Intuitively, small firms are likely to have less access to bank finance and consequently, lower debt equity ratio, whereas large firms, with easy access to bank financing are likely to have higher debt equity ratio. This would imply a positive relation of bank debt with this variable across firm size.

We also include a variable AGE defined as the number of years since the incorporation of the firm. Firms that are in existence for a longer period are likely to have greater reputation about their activities and therefore, likely to exercise greater use of bank debt.

At the macro level, a switch from a bank-based to a more market-based system, as reflected in the development of the stock market can influence firm use of debt. To control for this possibility, we introduce the ratio of stock market capitalization to bank credit, which is the most commonly employed measure of financial system orientation (Ergungor, 2004). A negative coefficient on this variable would imply that as economies mature and the financing pattern of firm becomes more market-oriented, reliance on bank debt declines, irrespective of firm size groups.

Finally, in order to examine the differential debt use bank debt for public versus private firms, we employ a dummy variable, which assumes value 1, if a firm belongs to the public sector, and zero otherwise.

4. The database and sample period

The source of the study is the publicly available *Prowess* database (Release 2.4), generated and maintained by the Centre for Monitoring the Indian Economy (CMIE), a leading private think-tank in India. This database is similar to the *Compustat* database of US firms and is increasingly employed in the literature for firm-level analysis on Indian industry for analysis of issues like the effect of foreign ownership on the performance of firms (Chibber and Majumdar, 1999), the performance of firms affiliated to diversified business groups (Khanna and Palepu, 2000) and the role of monetary policy in corporate governance (Ghosh and Sensarma, 2004). The dataset contains financial information on around 8,000 companies, which are either listed on the stock exchanges or are major unlisted public limited companies having sales exceeding Rs. 10 million (US $1 ≈ Rs. 44). In addition, if an entity is not listed, it qualifies for inclusion in the database if the average sum of sales and total assets is at least Rs. 200 million as per the latest audited financial results. There is detailed information on the financial performance of these companies culled out from their profit and loss accounts, balance sheets including ownership pattern, product profile and plant location.

The selection of the sample is guided by the availability of data and proceeds in two steps. In the first step, we choose all firms that are listed on the National Stock Exchange, the state-of-the-art exchange for listed companies in India. This provided us with a total of 1,538

TABLE II
Distribution of sample firms by industry classification

Industry	Number of firms	Percent to total sample
Heavy	93	8.2
Drugs and pharmaceuticals	86	7.5
Chemical	127	11.1
Cement	37	3.2
Textile and textile products	131	11.5
Auto ancillaries	107	9.4
Food, sugar and beverages	83	7.3
Electrical machinery	152	13.3
Diversified	36	3.2
Plastic and plastic products	57	5.0
Metal and metal products	37	3.2
Paper and paper products	35	3.1
Others	160	14.0
Total	1,141	100.0

Source: Compiled from *Prowess* database.

firms for the period 1994–2004.[2] In the second step, given our focus on bank debt for manufacturing companies, we deleted all financial companies from the database. Accordingly, we were left with a balanced panel of 1,141 companies, in both the public and private sectors. The composition of the sample is presented in Table II. It can be observed from the table that around 35% of the firms belong to chemicals, machinery and textile, indicating that given the classification adopted for incorporation of firms in the database, a significant proportion belong to these three sectors.

A word is in order as regards the choice of the sample period. Till the inception of reforms, the corporate sector in India faced several constraints on its resource mobilization. Access to the equity market was controlled the Controller of Capital Issues (CCI), a regulatory agency under the Government, which imposed restrictions on corporates intending to raise funds through the equity route. Long-term debt was largely under the purview of development banks, which, either through direct lending or through refinancing arrangements, virtually monopolized the supply of debt finance to the corporate sector.

In the financial sector likewise, financial institutions faced heavy restrictions on application of funds prior to reforms. In July 1991, for instance, commercial banks had to hold in cash reserves and Government debt instruments, as much as 63.5% of increases in deposits. In addition, they had to extend 40% of their credit to priority sectors such as agriculture and small-scale industries, with sub-targets for each at subsidized rates differentiated by purpose, size of loan and borrower. Even the free portion of banks' resources was subject to ''credit norms'', which set inflexible limits to loans according to sector, purpose and security.

In 1992, as part of the sweeping set of reforms relating to the equity market, the CCI was abolished and corporate houses were provided the freedom to access capital markets and price their securities, subject to prudential regulations of the Securities and Exchange Board of India (SEBI), the regulator of stock markets. Furthermore, Indian firms in sound financial condition were allowed to issue equity and convertible bonds abroad. Likewise, as regards raising resources domestically through debt capital, institutional reforms have been aimed at curtailing the monopoly in supply of long-term funds by development banks, with banks being also permitted to enter long-term financing.

In the financial sector, the administered interest rate structure of banks was progressively rationalised since the 1990s. Interest rates on both loans and deposits were increasingly deregulated over a period of time. Simultaneously, the statutory pre-emption on bank deposits was gradually lowered, providing banks with greater freedom in credit allocation. The removal of these twin restrictions meant a greater role of the price mechanism (interest rate) in the resource allocation process and allowing corporates to freely raise resources from domestic capital markets.

From the data set, we classify firms according to size. Accordingly, we rank firms according to their asset size and classify as ''small'' firms with assets less than or equal to the 15th percentile, ''medium'' as those firms lying within the 16th to the 85th percentile and ''large'' firms as those exceeding the 85th percentile. Accordingly, firm size ranges from a minimum of about Rs. 500 million in the smallest category to Rs. 6,500 million in the large category.

Table I also provides the summary statistics of the data. Examining the means by firm size category shows that small firms hold the largest concentration of bank debt; total debt also tends

TABLE III
Frequency of bank debt use by firm size

Bank debt use	Firm size			
	Small	Medium	Large	All
No bank debt	18	59	2	79
(use = 0)	27%	6%	7%	7%
Some bank debt	49	985	28	1,062
(use = 1)	73%	94%	93%	93%
Total	67	1,044	30	1,141
	100%	100%	100%	100%

Bank debt use equals zero when a firm holds no bank debt and equals one when a firm uses bank debt. Column percentages are listed below the frequency.
The sub-columns may not add up to the totals since several firms do not report bank debt use.
Source: Compiled from *Prowess* database.

to be much higher for small firms as compared with medium-sized and large firms.

Finally, Table III compares the frequency of bank debt use across size categories. Bank debt use equals zero when a firm holds no bank debt and equals one, when a firm hold any amount of bank debt. The table shows that bank debt use is quite high across firms of all size groups, with the medium and large-sized firms reporting the highest frequency of bank debt use. Across all firms, bank debt use is quite high, with over 90% of the firms reporting some use of bank debt.

5. Results and discussion

Table IV reports the correlation matrix of the main variables. The correlation is the highest between our measure of the importance of financial factors: bank debt concentration and overall debt as well as leverage. In the first case, the correlation is 69%; in the second case, it is lower at 27%. Debt appears to be moderately correlated with leverage (correlation of 21%); the correlation between bank debt concentration and firm age appears to be weak.

The empirical model is estimated using Tobit procedure because several of the observations are censored to zero. The Tobit model adjusts for a limited dependent variable, which may be viewed as being censored. The variables are scaled differently across size group, to aid in convergence of the limited dependent variable models.

The results demonstrate that the regressions as a whole are statistically significant. The coefficient on TAN is negative across all firm sizes. This supports the view that firms with low observability are more likely to use bank debt than other large firms. The results both confirm and contradict previous studies. The negative coefficient on TAN for large firms is consistent with Hoshi et al. (1993).

The results also support the renegotiation model of bank debt for large firms, as indicated by the negative coefficient on operating profits. For medium-sized firms, the coefficient on sales growth is insignificant. For small firms, however, the sales growth coefficient is negative, which is what the theory predicts.

The coefficient on total debt and leverage are significantly positive for all categories of firms. For medium-firms, the sign on leverage is negative suggesting that medium-sized firms with high leverage take recourse to lower bank debt. Although the theories reviewed produce no direct implications for the relation between total debt and bank debt concentration, this result confirms the positive relation found in Johnson (1997). The negative sign on the AGE variable for large firms supports the reputation argument that recourse to bank debt for such firms are lower.

At the macro-level, the negative coefficient on ORIENT is clearly indicative of the fact that a graduation to a market-based economy leads to a decline in the role of banking system, and with that the use of bank debt across all firm size declines. This decline is however, significant only for medium and large firms, attesting to the reputation view that these categories of firms are best positioned to access non-bank finance as the orientation of the economy changes.

The dummy for public firms is negative for the medium category at conventional levels of significance. This suggests that, *vis-à-vis* private firms, medium-sized public firms resort to lower

TABLE IV
Correlation matrix of the firm-specific variables

	DEPVAR	TAN	RND	GRSALES	OPROF	DEBT	LEV	AGE
DEPVAR	1.00							
TAN	0.15	1.00						
RND	–0.002	−0.01	1.00					
GRSALES	0.006	−0.01	−0.0002	1.00				
OPROF	−0.43	−0.24	−0.01	0.01	1.00			
DEBT	0.69	0.31	0.005	0.001	−0.50	1.00		
LEV	0.27	0.04	−0.005	−0.005	−0.06	0.21	1.00	
AGE	−0.08	0.06	0.01	−0.02	−0.01	−0.11	0.16	1.00

use of bank debt. In other words, medium-sized public firms, being better known to outside investors and having an (implicit) guarantee are well positioned to access non-bank debt than their private counterparts.

The fourth column reports the Tobit estimation for the full sample, for comparison. The significance of the coefficients for the full sample broadly follows the patterns in the size-based regressions.

To ascertain the robustness of the results, the model can also be estimated using Probit regression. In this case, the dependent variable is redefined as bank debt use.[3] In this case, the dependent variable equals 0 when the firm employs no bank debt and 1, otherwise. Table VI reports the Probit estimates of the model by firm size. The results broadly confirm the Tobit analysis. The relationship of the monitoring variable to bank debt changes as firm size increase, as shown by the negative and then positive coefficient on RND. For small and medium-sized firms, the coefficient on RND is significantly negative. This testifies that lack of reputation acts as a constraint for these firms in obtaining bank loans. The coefficient on TAN is positive for large firms (contrary to Table V), suggesting possibly that tangible assets in this case act as a proxy for collateral, and not necessarily with observability as in the Tobit specification. It is also of interest that the financial system orientation variable is positive for medium-sized firms, suggesting that despite the increasing market-based orientation of the financial system, recourse to bank debt by this firm category is higher.

6. Concluding remarks

The findings of the paper are consistent with theories of bank debt concentration, which observe that banks play an important role in lending to business because of information asymmetries. This assumes relevance for emerging economies like India where the financial system tends to be primarily bank-based (Demirgüc-Kunt and Levine, 1999). The empirical evidence presented in the paper suggests that both the monitoring and screening roles of bank debt are important for firms, depending on the firm size.

The different determinants of bank debt concentration across firms of varying sizes suggests that, while traditional banking activity of

TABLE V
Determinants of bank debt concentration by firm size

Variable	Small	Medium	Large	All
Constant	2.82 (0.00)*	5.51 (0.00)*	−1.63 (0.03)**	5.34 (0.00)*
TAN	−0.07 (0.08)***	0.01 (0.02)**	−0.04 (0.07)***	−0.05 (0.00)*
RND	−0.05 (0.85)	−0.003 (0.83)	0.25 (0.73)	−0.02 (0.33)
GRSALES	−0.0001 (0.02)**	−0.006 (0.32)	0.03 (0.20)	−0.008 (0.32)
OPROF	−0.02 (0.78)	−0.14 (0.00)*	0.12 (0.33)	−0.16 (0.00)*
LEV	0.09 (0.93)	−0.13 (0.00)*	0.08 (0.20)	0.08 (0.00)*
DEBT	0.68 (0.00)*	0.31 (0.00)*	0.29 (0.00)*	0.34 (0.00)*
AGE	−0.15 (0.10)***	0.02 (0.08)***	−0.05 (0.13)	−0.02 (0.00)*
ORIENT	1.38 (0.65)	−1.53 (0.08)***	−2.05 (0.10)***	−2.49 (0.00)*
DUM_Public	–	−3.54 (0.01)*	0.97 (0.50)	−2.63 (0.00)*
Diagnostics				
Time period	1995–2004	1995–2004	1995–2004	1995–2004
No. of Observations	99	9,224	169	9,492
Log-likelihood	−306.92	−3212.12	−547.27	−3302.40
Pseudo *R*-square	0.259	0.284	0.272	0.285
Wald test: chi-square (*P*-values)	267.81 (0.00)	1091.62 (0.00)	105.36 (0.00)	1124.67 (0.00)

P-values in brackets
*, ** and *** denote significance at 1%, 5% and 10%, respectively.

TABLE VI
Determinants of bank debt use by firm size

Variable	Small	Medium	Large	All
Constant	1.04 (0.03)**	0.61 (0.00)*	−1.89 (0.41)	0.62 (0.00)*
TAN	−0.04 (0.06)***	−0.001 (0.59)	0.01 (0.06)***	−0.002 (0.25)**
RND	−0.07 (0.09)***	−0.09 (0.05)**	0.95 (0.25)	0.111 (0.02)**
GRSALES	0.005 (0.78)	0.005 (0.85)	−0.01 (0.14)	−0.006 (0.82)
OPROF	0.04 (0.07)***	−0.01 (0.00)*	0.18 (0.01)*	−0.005 (0.12)
LEV	0.82 (0.98)	0.04 (0.00)*	0.06 (0.34)	0.05 (0.00)*
DEBT	0.13 (0.03)**	0.04 (0.00)*	0.07 (0.02)*	0.04 (0.00)*
AGE	−0.03 (0.16)	−0.003 (0.42)	−0.04 (0.08)***	−0.002 (0.51)
ORIENT	1.58 (0.15)	0.64 (0.00)*	−0.50 (0.32)	0.58 (0.00)*
DUM_Public	–	−0.51 (0.10)***	−0.58 (0.54)	−0.39 (0.08)***
Diagnostics				
Time period	1995–2004	1995–2004	1995–2004	1995–2004
No. of observations	99	9,224	169	9,492
Log-likelihood	−29.59	−1136.24	−23.69	−1208.82
Pseudo *R*-square	0.422	0.323	0.326	0.316
Wald test: chi-square (*P*-values)	20.47 (0.00)	443.90 (0.00)	15.06 (0.01)	468.92 (0.00)

P-values in brackets.
*, ** and *** denote significance at 1%, 5% and 10%, respectively.

lending and deposit-taking continues to remain the mainstay of banking business, the ongoing relationship between borrower and lender which allow banks to cultivate relationship lending and reduce monitoring costs are likely to gain prominence, especially in emerging markets as India. Policymakers would therefore need to be aware of the relationship between banks and their business customers when they consider policies which aim to stimulate credit availability to business and policies which aim to control default risks of lending.

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Notes

[1] Only book values of the variables are available.

[2] The National Stock Exchange became operative from the year 1994; consequently, the sample period begins from this year. Owing to the computation of growth rates, one year of observation is lost from the sample. Accordingly, the sample period extends from 1995 through 2004.

[3] Probit estimation allows for distinguishing between the effect of a variable on the proportion of bank debt used and the effect on the use of bank debt at all. The Tobit estimation estimates these effects together, while the Probit estimation specifically considers the latter effect (Greene, 2000).

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