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Bank discrimination in transition economies: ideology, information, or incentives?

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This paper analyzes bank discrimination against private firms in a transition country. Theoretically, we show that banks may discriminate for non-profit reason, but that this discrimination diminishes with the incentives and human capital of bank managers. Employing matching bank–firm data from China, we examine empirically the extent, sources and consequences of discrimination. The survey design allows us to disentangle sample truncation, omitted variable bias, and endogeneity issues. Our empirical findings confirm the theoretical predictions, and also indicate that, as a result of discrimination, private firms resort to more expensive trade credits. *Journal of Comparative Economics* **31** (3) (2003) 387–413. University of Toronto, 150 St. George St., Toronto, ON M5S 3G7, Canada; The Chinese University of Hong Kong, Shatin, Hong Kong, China.

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1. Introduction

The banking sector plays a crucial role in economic transition. Bank behavior determines the hardness of the budget constraints facing enterprises, and thus, influences firm incentives. Banks also play an important role in the intermediation of savings and in the allocation of credit to existing and especially newly established firms. Because of these links and the banking systems' potential effects on the real sector, some observers

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argue for enterprise restructuring, privatization, and banking reform to be implemented simultaneously (Brainard, 1991).

Since the early 1990s, the private sector has been the most dynamic sector of the Chinese economy. Between 1990 and 2000, the average annual growth rate of output in this sector was almost 60 percent (China Statistical Yearbook, various years; Zhang and Ming, 2001).[1] This sector includes not only *de novo* private firms but also many State Owned Enterprises (SOEs), and especially Township and Village Enterprises (TVEs), that were privatized since 1993 (Brandt et al., 2003; Cao et al., 1999; Li and Rozelle, 2003).[2] By the end of 2000, the private sector was producing more than one-third of China's industrial output.

Although the private sector is growing rapidly, borrowing from China's state-owned commercial banking sector by private firms remains meager.[3] According to a recent World Bank (2000) Report, in the late 1990s, the private sector received less than one percent of the total lending of China's commercial banks.[4] Most investment and working capital are financed through retained earnings, informal networks, and inter-firm credit (Lardy, 1999; Zhang and Ming, 2001). The sharp contrast between private sector growth and the loans the sector receives from the banking system raises a fundamental question. Are private firms being discriminated against in the formal financial markets? This paper investigates bank discrimination against private firms by drawing on a matching bank–firm data set collected by the authors in rural China in 1998.[5] Bank behavior in China towards private firms has important implications for the ongoing privatization process, and more generally, economic growth (Brandt and Zhu, 2000, 2002).

Discrimination against private firms may come from a number of sources. The primary source of discrimination is tastes (Arrow, 1998; Becker, 1957; Yinger, 1998). Becker (1993) asserts that discrimination in the market place consists of voluntarily relinquishing profits, wages or income to cater to prejudice. Banks may discriminate against a certain group because they dislike the applicants for cultural or historical reasons. In China, banks are state-owned so that they may have a purely ideological preference for lending to government-owned firms over private firms. Lending to government-owned firms may also generate perks to banks that they do not receive when lending to private firms. More generally, banks may be willing to sacrifice profits in order to seek political, ideological or personal goals rather than the profits. The lack of competition in China's banking system helps to sustain such behavior.

There are three other reasons why private firms may face difficulty in accessing credit from the formal sector. In each case, differential lending practices can be

[1] These numbers are slightly misleading because of the very low base from which they are calculated; however, private firms did grow rapidly over this period.

[2] In the 1980s, the TVE sector was the most rapidly growing segment of the economy.

[3] China's banking sector is dominated by four state-owned banks, namely, the Bank of China, Industrial and Commercial Bank of China, Construction Bank of China, and the Agricultural Bank of China. Rural areas are also served by the Rural Credit Cooperatives, while the Urban Commercial Banks, formerly, the Urban Credit Cooperatives, also service urban areas.

[4] These figures may underestimate the lending to the private sector; however, state and collectively-owned firms are receiving a disproportionate share of the credit.

[5] To our best knowledge, we are one of the first to study ownership discrimination in transition countries. Most of the existing literature considers gender or racial discrimination.

defended on profitability grounds. First, differences in lending practice may arise because banks possess better information on a certain group of loan applicants (Arrow, 1998; Fafchamps, 2000). When it is costly to acquire information about an applicant's true creditworthiness, banks may base their decisions on group characteristics, which is the basis for statistical discrimination (Schwab, 1986; Arrow, 1998; Darity and Mason, 1998; Yinger, 1998). If the credit history of a certain group is bad, all members in that group will face discriminatory behavior. In China, banks have been dealing almost exclusively with government-owned firms so that they have developed good channels for obtaining credit information about these firms. Newly established, private firms may find themselves at a disadvantage in this regard; hence, they face discriminatory lending practices for informational reasons. Second, discrimination in other markets can affect bank-lending decisions. If a certain group is discriminated against in either the input or product markets, it is more likely for the loan applicants in this group to default. Knowing about such discrimination, banks may decide not to lend to loan applicants in this group (Ladd, 1998; Loury, 1998). In addition, banks may discriminate against private firms because they are perceived as being riskier than government-owned firms that pool risks and guarantee liquidity (Park and Shen, in press). In the event of default, the government can use either fiscal resources or funds from other government-owned firms to repay a firm's loan.

The empirical literature analyzing discrimination against minorities and women in mortgage market and small business loans is directly related to our concerns. Employing the ordinary least squares (OLS), probit or logit models of loan denial rates, Yinger (1986), Munnell et al. (1996) and Blanchflower et al. (1998) find that race and gender dummies are significantly positive, which implies that women and minorities are less likely to get loans, other things equal. Interpreting these finding as discrimination is potentially problematic because the regressions may exclude variables that are important in the banks' lending decisions, most notably, measures of creditworthiness. Hence, omitted variable bias in the estimates of the effect of race and gender may lead researchers to conclude that groups are being discriminated against, when in fact they are not (Neal and Johnson, 1996; Heckman, 1998; Darity and Mason, 1998; Yinger, 1998). Several methods are available for dealing with unobserved variable bias. The first is simply to find good measures for creditworthiness and include them as additional controls in the regression (Munnell et al., 1996). The second method is to check if there is equal treatment for loan receivers (Blanchflower et al., 1998; Ladd, 1998). If the study group has to pay a higher interest rate or meet a higher loan standard, all else equal, discrimination against this group can be inferred. The third method is to examine if other creditors are also unwilling to provide loans to the study group (Blanchflower et al., 1998). The fourth method is to compare the default rate of the study group with that of the control group (Ladd, 1998). If a group of loan applicants is discriminated against, only the more creditworthy applicants in the group should be able to obtain bank loans. This suggests that the *ex post* loan performance of the study group should be better than that of the control group.

Sample design issues, notably, the use of data on loan applicants only, introduce potentially offsetting biases (Heckman, 1998). Suppose the cost of a loan application is the same for both groups. If firms in the study group believe that the probability of getting a loan is low, they may not be willing to incur the application cost. As a result, many firms in the study group decide not to apply so that using a sample of loan applicants only will

underestimate the effect of discrimination because the only firms in the study group to apply are those that are most likely to get a loan. To solve this problem, information on the demand for loans for all firms, not just those that applied for a loan, must be obtained.

Finally, Heckman (1998) argues that discrimination by a randomly selected party does not necessarily imply market discrimination. A particular financial institution may not want to lend to a private firm, but if other financial institutions are willing to lend on as good terms, discrimination is not an issue. What matters is the behavior of the marginal lender or set of lenders. This suggests that we will want to look at a firm's access to all sources of credit, i.e., their entire debt structure.

Our data allow us to examine empirically the extent, sources and consequences of discrimination. The survey design allows us to disentangle sample truncation, omitted variable bias, and endogeneity issues, and to identify with much confidence ownership discrimination in the formal loan market. Our empirical work also identifies the sources of discrimination, notably, the incentives and attributes of bank managers. Because the banking system in China is undergoing reform, heterogeneity at the local level gives rise to significant institutional differences across localities, especially with respect to incentive systems for bank managers. We exploit these differences to help identify differences in bank lending behavior across ownership groups. Finally, we use additional information on the firm's entire debt structure to investigate market discrimination of private firms as opposed to discrimination of these firms by a single bank. As Becker (1957) and Heckman (1998) note, it is at the margin, i.e., where firms actually borrow, that economic values are set. Our empirical findings indicate that, as a result of discrimination, private firms resort to more expensive trade credits for financing.

The structure of the paper is as follows. Section 2 describes financial institutions, firms and our survey in rural China. Section 3 builds a simple theoretical model that generates predictable hypotheses of ownership discrimination. Sections 4–6 examine the extent, consequences, and sources of discrimination econometrically. Section 7 concludes with policy implications.

2. Financial institutions and firms in rural China

Two financial institutions dominate the formal financial system in rural China, namely, the Agricultural Bank of China (ABC) and the Rural Credit Cooperatives (RCC). In the late 1990s, these two institutions held nearly eighty percent of all rural deposits and were the source of an equal percentage of loans, nearly half of which went to local township and village enterprises (TVEs) (Park et al., 1997). The ABC is one of four specialized state-owned banks. Historically, it was responsible for lending to support agriculture and rural development and has branches in almost every township in rural China.[6] Officially, the RCCs are autonomous, collectively-run local institutions; however, through the early 1990s, they were usually supervised by local ABC branches. In some cases, the same

[6] The township or town is the lowest level of government in China's administrative hierarchy and the county is immediately above it.

individual managed the two institutions. In 1994 the supervision of the RCCs shifted to China's central bank, the People's Bank of China (PBC), so that the separation between the RCCs and ABCs branches became more distinct.

Township level branches of the ABC report to county level branches of the same bank; RCCs, on the other hand, report to county-level RCC associations (*xinyong lianshe*). For both financial institutions, township branch managerial incentives, loan size limits, and credit quotas are set at the county level. ABC and RCC township managers are also appointed by banking authorities at the county level; however, in both cases, township-level governments and party officials can exercise important influence over these decisions. Unlike the lending to state-owned enterprises by state-owned banks (Cull and Xu, in press), lending to TVEs was not mandated administratively as part of a credit plan.

Throughout the 1980s and early 1990s, TVEs dominated China's rural industrial sector (Che and Qian, 1998; Chen and Rozelle, 1999). Beginning in 1993, local governments were given permission to privatize these firms as part of a nationwide policy on enterprise ownership restructuring, or *zhuanzhi*. Previously, privatization had been strictly prohibited. Reflecting the high degree of administrative decentralization in China, local governments were effectively given discretion over interpreting and implementing the new policy. By the end of the 1990s, nearly two-thirds of all TVEs had been privatized in the provinces that we surveyed, although considerable differences exist across townships as to the extent of privatization (Brandt et al., 2003).

Our analysis draws on a bank–firm survey that the authors conducted with Chinese colleagues in the summer of 1998. The survey was carried out in 59 townships in 15 counties in the coastal provinces of Jiangsu and Zhejiang for the period between 1994 and 1997. The selection of the counties and townships was designed to ensure a representative cross-section of the region. The unique dimension of the survey is the matched bank–firm data. In each township, we sampled randomly three firms from the pool of all TEs that operated in 1994, and all private firms that were of comparable size.[7] We interviewed each firm manager at length, asked about bank borrowing, and also collected detailed data on the firm's operations, e.g., employment, sales, and financial assets and liabilities.

Altogether, 168 firms were selected randomly and surveyed, or three per township. Out of these firms, 33 were established as private firms, denoted PEs. The remaining 135 firms were originally set up and owned by the local township government, denoted TEs. Between 1994 and 1997, 88 out of these 135 TEs were sold to private owners; hence, they become privatized firms. Privatization means that majority ownership shifted from the government to private individuals; 1994 effectively marks the beginning of privatization efforts in the region. At the end of 1997, 47 firms remained government-owned, i.e., TEs.

We surveyed the township branch of the ABC and the local RCCs to obtain data on lending to each of the surveyed firms. We also collected information on bank managers, their incentive structures, and branch performance, primarily in the form of detailed balance sheet data. There are considerable differences across townships with respect to managerial incentives, and the role of profitability; we exploit this heterogeneity in the empirical analysis. Finally, we also have credit rating information on our sample of

[7] Enterprises were required to have at least 20 employees and a minimum fixed capital of 200,000 RMB.

firms from each of the banks. This unique feature of the data allows us to control for creditworthiness in our regressions. The credit rating is on a scale from 1 to 6, with 6 as the highest ranking; it was constructed separately by each bank for each firm.

3. The model

In this section, we consider a stylized model of bank monitoring that links bank discrimination against private firms to non-profit incentives. The model generates testable hypotheses, e.g., discrimination diminishes with the incentives and human capital of the bank manager. Although we model only *ex post* monitoring and do not consider the role of *ex ante* bank screening, we test empirically whether information is an important source of discrimination.

Suppose $2N$ firms exist in the economy; half of these are township enterprises (TEs) and the other half are private enterprises (PEs). Assume that the TEs are identical to the PEs in all respects other than ownership. Each firm has a project that requires an investment of 1 unit, which it finances in full by borrowing from the bank at a fixed gross interest rate equal to r. A firm's project generates stochastic returns. If a project succeeds, it generates a payoff larger than r; if it fails, it yields nothing. The probability of a successful project is given by β, where β also represents a firm's profitability type. A successful project does not mean that the loan will be repaid since firms can default strategically (Park and Shen, in press). Suppose that the probability of a firm defaulting strategically is $(1 - e)$ where e is the bank manager's monitoring effort. The cost of monitoring is given by $C(e)/b$, where $C'(e) > 0$, $C''(e) > 0$. The parameter b represents the bank manager's ability, and monitoring costs decrease in b. Assuming that β and e are independent, the probability of the bank getting repaid is given by βe, which increases with both β and e so that β and e are complementary. Assume that β has the same distribution for TEs and PEs on the interval $[0, \bar{\beta}]$.

The bank's expected profit from lending to a firm is $\beta er - 1$. For a PE, the bank manager cares about the profitability of lending only. Thus, the utility of lending to a PE is given by

$$U_1 = a(\beta er - 1) - C(e)/b, \tag{1}$$

where a is the profit incentive of the bank manager. For a TE, the bank also cares about the perks generated from lending, denoted L, that are tied to the bank manager's relationship with township government leaders.[8] Thus, when lending to a TE, the bank's utility is given by

$$U_2 = a(\beta er - 1) - C(e)/b + L. \tag{2}$$

If a TE and a PE are equally profitable, and thus have the same β, the bank manager will exert the same optimal effort, e^*, in both firms. Since there is a lump-sum perk from lending to a TE, the bank prefers to loan to a TE.

[8] This follows the formulation of Becker (1957) in which an economic agent cares about taste in addition to profits.

Assume that the bank has sufficient resources for funding M firms, where $M < 2N$, so that only some firms will be financed. The bank manager maximizes the sum of its utilities from each of the M firms to which it lends, which is given by

$$\sum Y_i U_{1i} + \sum Y_j U_{2j}, \tag{3}$$

where $Y = 1$ if a firm receives a loan but it equals 0 otherwise and i and j are indexes for a PE and TE, respectively. For simplicity, assume that total monitoring effort is less than available effort so that $\sum e_i^* + \sum e_j^* < \bar{e}$.[9] In this case, we show that the marginal PE financed is more profitable than the marginal TE financed. Define β_1 and β_2 as the profit types of the marginal PE and TE obtaining bank loans. For firms that get loans, β_1 is the lowest profit type of a PE and β_2 is the lowest profit type of a TE. Proposition 1 states these results while proofs of propositions are provided in Appendix A.

Proposition 1. *When there are only perks for lending to TEs, banks will discriminate against PEs, because the marginal PE financed is more profitable than the marginal TE financed, i.e.,* $\beta_1 > \beta_2$.

The intuition for Proposition 1 is simple. The bank manager chooses firms to finance so as to maximize total utility. This process involves first ranking all firms according to the utility received from lending to each firm and then picking the M top-ranking firms. The marginal PE and marginal TE must generate the same additional utility for the bank; otherwise, the bank manager can increase total utility by lending to more (less) of the firms in the ownership group with the high (low) marginal utility. Because lending to a TE generates perks, the marginal PE is more profitable than the marginal TE, which implies $\beta_1 > \beta_2$. Hence, more TEs than PEs get bank loans and the average profitability of TEs is lower than that of PEs. Proposition 1 also implies that bank manager's effort in the marginal PE is higher than it is in the marginal TE. This is Lemma 1.

Lemma 1. *Effort in the marginal PE is higher than that in the marginal TE, or* $e_1^* > e_2^*$.

Lemma 1 follows immediately from Proposition 1. Since incentives and effort are complementary, larger incentives in the marginal PE mean a larger effort level. We use Lemma 1 for simple comparative statics, which illustrate how discrimination changes with the change of parameters a, b, and L. These comparative statics are summarized in Proposition 2.

Proposition 2. *The degree of discrimination decreases with the bank manager's incentives,* a*, and the bank manager's ability,* b*, but it increases with the amount of perks,* L*. At the same time, more PEs and less TEs will be financed, while the average profitability of lending will increase. Algebraically,*

$$\frac{\partial \beta_1}{\partial a} < 0, \qquad \frac{\partial \beta_2}{\partial a} > 0, \qquad \frac{\partial \beta_1}{\partial b} < 0, \qquad \frac{\partial \beta_2}{\partial b} > 0, \qquad \frac{\partial \beta_1}{\partial L} > 0, \qquad \frac{\partial \beta_2}{\partial L} < 0.$$

[9] This assumption can be justified if it is easier for banks to hire additional people to monitor firms than it is to obtain more funds for lending. In fact, funding is typically a bottleneck for Chinese banks.

The intuition for the change of incentives is straightforward. When incentives increase, bank managers will exert more effort monitoring all the firms receiving loans and the increase of effort, together with the increase of incentives, increases the maximized utility of lending to each firm. This argument also applies to the marginal PE and TE. However, since the marginal PE is a larger profit type than the marginal TE and both firm profit type and effort are complementary with incentives, the increase in utility for the marginal PE is larger than that for the marginal TE, i.e., $\partial U_1^*/\partial a > \partial U_2^*/\partial a$. This implies that, with the increase of incentives, the utility of lending to the old marginal PE is larger than that of lending to the old marginal TE. In order to equalize the utility of lending to the two marginal firms, the bank has to lower the profitability of the marginal PE and increase that of the marginal TE. This change not only reduces discrimination, but also improves the total profitability of the bank since the new PEs getting bank loans are better than those old TEs that lose their loans.

The change in the bank manager's ability has a similar effect. When a manager's ability increases, he will exert more effort monitoring the marginal firms, which increases the maximized utility of each firm. However, since ability and effort are complementary, the increase of utility for the marginal PE is larger than that for the marginal TE, i.e., $\partial U_1^*/\partial b > \partial U_2^*/\partial b$. This implies that, with the increase of ability, the utility of lending to the marginal PE is larger than that of lending to the marginal TE. In order to equalize the two, the bank has to lower the profitability of the marginal PE and increase that of the marginal TE. However, fewer TEs and more PEs get loans. The effect of a change of perks is direct. A decrease of bank perks does not change bank efforts for each firm, but it does decrease the utility of lending to a TE. In order to maintain equality between the utility of lending to TE and PE on the margin, the bank must lower the profitability of the marginal PE and increase that of the marginal TE.

4. Does ownership matter? Empirical results

If private and privatized firms are discriminated against, they are less likely to get a bank loan or if they do they will obtain smaller loans, all else equal. Banks may also apply a higher lending standard for private and privatized firms. We examine both the probability of a firm obtaining a bank loan and differences in loan application requirements.

Table 1 presents summary data for 1994 and 1997 on loans from the ABC and RCC branches by ownership group for 152 of the 168 firms.[10] There are significant differences in access to credit between PEs and TEs in both years. In 1994, more than half of all PEs received no loan from either bank branch; slightly more than a third received a loan from one of them and only 6 percent received loans from both. In contrast, slightly more than 80 percent of all TEs received loans, with a third actually receiving loans from both institutions.[11] There are also significant differences in the size of loans received. On average, TEs received four times as much credit in 1994 as PEs, i.e., 1.65 million RMB versus 0.43 million RMB.

[10] We lose 16 observations due to missing values for some variables.

[11] In 1994, township firms include firms identified in Table 1 as privatized TEs.

Table 1
Firm loans from Rural Credit Cooperative and Agricultural Bank of China

	Ownership			
	TEs	Privatized TEs	PEs	Total
Number of observations	39	81	32	152
Loan from ABC and RCC in 1994				
Percentage of firms with:				
no loan	18	20	56	27
one loan from RCC or ABC	51	44	38	45
loans from both RCC and ABC	31	36	6	28
Average amount of loan (million yuan)	2.08	1.45	0.43	1.40
	(3.56)	(2.32)	(1.07)	(2.57)
Average amount of loan conditional on having	2.32	1.63	0.72	1.69
a loan in at least one year (million yuan)	(3.68)	(2.40)	(1.32)	(2.73)
Loan from ABC and RCC in 1997				
Percentage of firms with:				
no loan	13	19	50	24
one loan from RCC or ABC	36	49	41	44
loans from both RCC and ABC	51	32	9	32
Average amount of loan (million yuan)	3.12	1.51	0.64	1.74
	(4.13)	(1.98)	(1.44)	(2.75)
Average amount of loan conditional on having	3.48	1.70	1.07	2.10
a loan in at least one year (million yuan)	(4.22)	(2.02)	(1.75)	(2.90)

These differences persist in 1997, with one important addition. Between 1994 and 1997, the gap in the average amount of credit received by TEs and those that were subsequently privatized widened. In 1994, the difference was 0.63 million RMB; by 1997, it had increased to 1.61 million. Over this three-year period, credit to privatized TEs remained relatively constant. Table 1 indicates that most of the new credit extended by ABC and RCC branches between 1994 and 1997 to the firms in our sample went to the 39 TEs that remained under government ownership.

To analyze more formally the effect of ownership on credit access, we estimate separate probit models for 1994 and 1997 of the probability of a firm obtaining a bank loan. We also report tobit estimates on loan size for comparison. The literature estimates loan denial equations, based on bank loan application data. The problem with this approach is that it excludes firms that may not have applied because they expected to be rejected. In our empirical work, we include all firms that reported a demand for loans from the ABC or RCC. Our implicit assumption is that banks are not willing to lend to those firms that reported bank loans equal to zero.

The key to identifying the effect of ownership on firm access to credit is to control for firm-level variables, e.g., creditworthiness, which are also likely to be correlated with firm borrowing. Failure to do so may result in omitted variable bias in our estimation of the effect of ownership on credit access, which would lead us to confer too much weight on its effect in bank decision-making. Our survey provides information on each firm's assets, sales, age, debt–asset ratio, capital–labor ratio, and bank credit rating, in addition

Table 2
Probit regressions examining the determinants of having a bank loan in 1997 or 1994 conditional on firms demanding a loan

Independent variables (dF/dx)	1997 (1)	1997 (2)	1997 (3)	1997 (4)	1994 (5)	1994 (6)	1994 (7)
Ownership indicators							
Private	−0.382***	−0.544***	−0.514***	−0.491***	−0.409***	−0.650***	−0.632***
	(−3.32)	(−3.99)	(−3.67)	(−3.28)	(−3.21)	(−3.71)	(−3.56)
Privatized between	−0.201***	−0.212***	−0.199**	−0.176**	−0.018	−0.027	−0.004
1994 and 1997	(−2.56)	(−2.68)	(−2.48)	(−2.03)	(−0.21)	(−0.31)	(−0.04)
Creditworthiness							
Credit rating			0.051***	0.046***			0.036*
			(2.94)	(2.61)			(1.95)
Firm manager's education		0.031*	0.026	0.020		−0.002	−0.008
		(1.73)	(1.42)	(1.10)		(−0.08)	(−0.43)
Firm manager's age		−0.004	−0.002	−0.003		0.002	0.003
		(−0.67)	(−0.43)	(−0.56)		(0.48)	(0.59)
Firm's age, which equals 1 if		0.222**	0.204**	0.193*		0.367**	0.361**
it was established after 1990		(2.20)	(2.00)	(1.81)		(2.43)	(2.43)
Sales (lagged)				0.002			
				(1.17)			
Debt asset ratio (lagged)				−0.079			
				(−0.69)			
Capital labor ratio (lagged)				0.0005			
				(0.09)			
Other control variables							
Bank type	−0.116*	−0.119	−0.092	−0.096	−0.162**	−0.160**	−0.137*
(RCC = 0, ABC = 1)	(−1.82)	(−1.84)	(−1.38)	(−1.45)	(−2.36)	(−2.30)	(−1.93)
Province (Zhejiang = 1)	−0.072	−0.062	−0.072	−0.072	−0.060	−0.070	−0.082
	(−1.03)	(−0.80)	(−0.91)	(−0.90)	(−0.81)	(−0.88)	(−1.02)
Observations	238	238	238	238	216	216	216
Pseudo R-squared	0.09	0.12	0.15	0.15	0.13	0.13	0.14

Notes. The dependent variable is zero if the firm has no bank loan and one if the firm has a bank loan. The omitted category is TEs. The coefficients are dF/dx. The numbers in parentheses are t-ratios. Industry dummies are not shown.

* Significance level of 0.1.
** Significance level of 0.05.
*** Significance level of 0.01.

to information on the manager's education and experience. Tables A.1 and A.2 provide summary data on these variables for the three ownership groups.

Tables 2 and 3 present the results from the probit and tobit analyses for 1994 and 1997, using several alternative sets of firm-level controls.[12] In each regression, we include a set

[12] We have credit rating information for 1994 only for a small subset of firms so that we use the 1997 credit rating in the 1994 regressions. For those firms for which we have credit rating information for both years, the ratings are similar. Using the 1997 credit rating in the regression for 1994 does not introduce any bias as long as access to credit in 1994 does not influence the credit rating in 1997 by itself.

Table 3
Tobit regressions examining the determinants of loan amount in 1997 or 1994 conditional on firms demanding a loan, left censored at zero

Independent variables (dF/dx)	1997 (1)	1997 (2)	1997 (3)	1997 (4)	1994 (5)	1994 (6)	1994 (7)
			Ownership indicators				
Private	−605.3***	−652.2***	−641.2***	−466.3***	−340.7***	−256.2**	−252.9**
	(−5.33)	(−5.16)	(−5.04)	(−3.70)	(−3.58)	(−2.24)	(−2.20)
Privatized between 1994–1997	−330.4***	−341.9***	−336.7***	−219.8***	−68.0	−65.9	−63.6
	(−4.37)	(−4.69)	(−4.61)	(−3.03)	(−1.11)	(−1.08)	(−1.03)
			Creditworthiness				
Credit rating			13.1	−6.72			5.1
			(0.81)	(−0.44)			(0.38)
Firm manager's education		42.7**	40.8**	21.4		−3.1	−4.1
		(2.55)	(2.42)	(1.34)		(−0.24)	(−0.31)
Firm manager's age		−8.6*	−8.4*	−13.3*		−1.8	−1.8
		(−1.78)	(−1.75)	(−2.96)		(−0.59)	(−0.58)
Firm's age, which equals 1 if it was est. after 1990		13.4	9.63	−113.2		−123.7	−123.0
		(0.14)	(0.10)	(−1.17)		(−1.35)	(−1.34)
Sales (lagged)				3.7***			
				(5.35)			
Debt asset ratio (lagged)				−386.4***			
				(−3.73)			
Capital labor ratio (lagged)				−0.9			
				(−0.33)			
			Other control variables				
Bank type (RCC = 0, ABC = 1)	−12.4	−5.6	1.1	−12.8	−2.6	−3.5	1.1
	(−0.20)	(−0.09)	(0.02)	(−0.23)	(−1.11)	(−0.07)	(0.02)
Province (Zhejiang = 1)	86.47	114.4	110.5	113.0	26.7	25.8	110.5
	(1.24)	(1.55)	(1.50)	(1.62)	(0.49)	(0.45)	(1.50)
Observations	238	238	238	238	216	216	216
Pseudo R-squared	0.02	0.04	0.03	0.04	0.01	0.01	0.14

Notes. Numbers in parentheses are t-ratios. Industry dummies are not shown.
* Significance level of 0.1.
** Significance level of 0.05.
*** Significance level of 0.01.

of dummies for industry sector, bank type, and province. As a benchmark, we report the probit and tobit results with only the ownership dummies included, using controls for bank type, province and industry sector. The parameter estimates for the effect of ownership for each year are consistent across the rows of Tables 2 and 3.[13] For 1994, PEs were nearly sixty percent less likely to obtain a loan than TEs. On average, a PE received 250,000 RMB less in loans than a comparable TE as Table 3 indicates. However, there are no

[13] We report the marginal effect on probability of each independent variable (dF/dx) rather than the estimated coefficients.

significant differences in the likelihood of credit access or loan size between TEs and those TEs that were later privatized. In 1997, PEs are again less likely than TEs to obtain credit, although the probability difference is lower than in 1994 at about fifty percent compared to sixty percent. However, the gap in loan size doubled in Table 3. In 1997, TEs that were privatized during the previous three years experienced a significantly lower probability of receiving a bank loan than firms that remained under government-ownership. Moreover, they also received considerably smaller loans than TEs as Table 3 indicates.

The most important control variable measuring a firm's creditworthiness is the firm's credit rating, which has a positive and significant effect in each of the probit regressions for 1997. The credit rating is a score given by each bank to a firm based on the firm's past credit history, profitability, sales, and the firm manager's attributes. If PEs and privatized TEs are actually less creditworthy, including their credit rating as a control variable should reduce significantly the magnitude of the coefficients on the ownership indicators. However, the results in Tables 2 and 3 suggest that PEs and privatized TEs may not be less creditworthy. Including the credit rating has a negligible effect on the coefficients of the ownership indicators as indicated by a comparison of columns 2 and 3. PEs and privatized TEs remain significantly less likely to have access to credit from the ABC or RCC and, when successful, they receive smaller loans. These results suggest that the credit ratings of PEs and privatized TEs are fairly similar to those of TEs.

To examine further whether ownership itself is an important determinant of a firm's credit rating, we estimate the firm's credit rating function using OLS. The independent variables include those from Table 2 and measures of a firm's credit history and performance. PEs and privatized TEs may have lower credit ratings, all else equal. There are two potential reasons why. First, banks might observe certain unobservable credit qualifications. Second, private ownership may be discriminated against in determining the credit rating. In this case, some of the effects of discrimination could go undetected due to the inclusion of the firm's credit rating.

The regressions suggest that after controlling for a number of firm-level variables, credit ratings are not lower for PEs or privatized TEs as Table 4 indicates. The variables with the most explanatory power are loan history and firm size. We find that the credit rating increases with firm size and loan history, but decreases with bad credit history, i.e., overdue loans. However, none of the ownership indicators are significant. These results increase our confidence that the credit rating is a good measure of a firm's creditworthiness and that the ownership indicators are picking up the effect of bank discrimination.

Discrimination against private ownership can also be tested if PEs and privatized TEs are subject to higher loan standards. The literature on bank discrimination uses interest rates and loan length as indicators of discrimination in *ex ante* loan requirements (Blanchflower et al., 1998). However, in China, interest rates and loan length are not particularly good measures because they are not market-determined. Base interest rates for short and long-term loans are determined by the People's Bank of China (PBC) and local bank branches have only minor discretion in adjusting actual rates above the PBC base. Loan length is also set by PBC rules; a majority of loans are short-term, of which almost all are for 6 months. China's banking sector does have several unique indicators for loan requirements, including the percentage of a loan that is collateralized. There are

Table 4
OLS regressions examining the determinants of credit ratings in 1997

Independent variables	Dependent variable: credit ratings in 1997			
	(1)	(2)	(3)	(4)
			Ownership indicators	
Private	−0.28	−0.31	−0.18	−0.14
	(−0.70)	(−0.70)	(−0.42)	(−0.34)
Privatized between 1994–1997	−0.33	−0.33	−0.12	−0.24
	(−1.13)	(−1.14)	(−0.42)	(−0.86)
			Loan history	
Loan94, which equals 1 if there is a loan in 1994				0.67***
				(2.88)
Overdue, which equals 1 if there is an overdue loan in history				−1.02**
				(2.73)
			Creditworthiness	
Firm manager's education		0.11*	0.06	0.07
		(1.78)	(0.96)	(1.09)
Firm manager's age		−0.02	−0.03*	−0.04**
		(−1.40)	(−1.94)	(−2.18)
Firm's age, which equals 1 if it was est. after 1990		−0.06	−0.07	−0.09
		(−0.16)	(−0.21)	(−0.25)
Sales (lagged)			0.024***	0.022***
			(5.37)	(4.93)
Debt asset ratio (lagged)			−0.17	−0.13
			(−0.44)	(−0.34)
Capital labor ratio (lagged)			2.15*	2.18*
			(1.83)	(1.89)
			Other control variables	
Bank type (RCC = 0, ABC = 1)	−0.45*	−0.44*	−0.38*	−0.27
	(1.89)	(−1.88)	(−1.76)	(−1.22)
Province (Zhejiang = 1)	−0.01	−0.075	0.150	0.005
	(−0.04)	(−0.27)	(0.57)	(0.02)
Observations	281	281	281	281
Adjusted R-squared	0.00	0.01	0.14	0.17

Notes. Numbers in parentheses are t-ratios. Industry dummies are not shown.
* Significance level of 0.1.
** Significance level of 0.05.
*** Significance level of 0.01.

three types of loans in China, namely, guaranteed, collateralized and credit-rating-based (*xinyong*) loans.[14] Before China issued the law on loan collateral in 1995, almost all loans were loans guaranteed exclusively by government agents or township enterprises. The 1995 law required more loans to be collateralized so that banks began to require borrowers to

[14] These three types of loans are not mutually exclusive. The bank can require both collateral and guarantees for a loan. For other loans, the credit rating may not enter into the assessment.

Table 5
OLS regressions examining the determinants of loan collateral

	Dependent variable: % loan collateralized				
	1997			1994	
Independent variables	(1)	(2)	(3)	(4)	(5)
			Ownership indicators		
Private	85.90***	74.83***	67.14***	25.11*	33.44**
	(6.34)	(4.83)	(3.72)	(1.81)	(2.03)
Privatized between	48.00***	47.79***	43.94***	9.25	13.25
1994 and 1997	(5.68)	(5.59)	(4.23)	(1.12)	(1.41)
			Creditworthiness		
Credit rating		−1.01	0.07		
		(−0.52)	(0.03)		
Firm manager's education		2.07	2.10		−2.62
		(1.07)	(0.97)		(−1.22)
Firm manager's age		0.13	0.05		−0.17
		(0.25)	(0.08)		(−0.31)
Firm's age, which equals 1		15.28	17.49		5.39
if est. after 1990		(1.40)	(1.31)		(0.44)
Sales (lagged)			−0.12		
			(−1.56)		
Debt asset ratio (lagged)			−5.79		
			(−0.44)		
Capital labor ratio (lagged)			−0.38		
			(−0.94)		
			Other control variables		
Bank type (RCC = 0, ABC = 1)	−2.69	−2.73	−1.89	0.89	1.88
	(−0.39)	(−0.39)	(−0.24)	(0.12)	(0.23)
Province (Zhejiang = 1)	−5.26	−2.18	1.51	−28.21***	−37.28***
	(−0.69)	(−0.26)	(0.07)	(−3.60)	(−3.87)
Observations	144	144	144	141	123
Adj. R-squared	0.27	0.26	0.23	0.08	0.08

Notes. Numbers in parentheses are t-ratios. The coefficients are $\mathrm{d}F/\mathrm{d}x$. Industry dummies are not shown.
* Significance level of 0.1.
** Significance level of 0.05.
*** Significance level of 0.01.

provide collateral. As is true for any law in China, this law was not implemented uniformly so that we observe differences across localities and firm ownership groups.

Table 5 presents the determinants of loan collateral from regressions of the percentage of a loan that was collaterarized on ownership dummies and the set of control variables used before. The regressions imply that loan collateral for PEs and privatized TEs is 70 percent and 40 percent, respectively, higher than for TEs in 1997. Even in 1994 when the collateral law was first being drafted, PEs pledged more collateral than TEs. In summary, PEs and privatized TEs are both less likely to obtain a bank loan and are subject to higher loan standards. By all indications, PEs and privatized TEs are discriminated against in China's formal loan markets.

Table 6
The debt structure of firms: means and standard deviations, in million yuan

	1994			1997		
	TEs	Privatized TEs	PEs	TEs	Privatized TEs	PEs
Number of observations	36	69	24	36	69	24
Debts						
Loan from ABC&RCC	2.23	1.59	0.56	3.29	1.47	0.67
	(3.66)	(2.43)	(1.22)	(4.25)	(1.79)	(1.47)
Loan from other banks	0.22	0.87	0.22	0.89	1.18	0.62
	(0.89)	(3.54)	(0.88)	(3.78)	(4.25)	(1.30)
Trade credit received	1.61	1.10	0.80	1.64	1.81	0.91
	(2.97)	(1.59)	(1.21)	(2.97)	(2.82)	(1.34)
Other debt	1.70	0.82	0.40	3.21	1.11	0.87
	(2.96)	(1.04)	(0.89)	(7.68)	(1.51)	(1.91)
Total	5.76	4.38	1.84	9.03	5.56	3.08
	(7.17)	(6.08)	(3.20)	(12.94)	(8.02)	(4.39)

Note. Other debts include mainly wage, tax, and township fee arrears.

5. Consequences of discrimination: alternative credit sources

RCCs and ABCs are not the only source of credit for firms; other banks and trade credits from suppliers are potential sources of borrowing. Firms also borrow directly from other firms, from individuals, and from non-financial institutions. The overall effect of the lending behavior of ABCs and RCCs on firms depends on their ability to access other sources of credit and the terms on which they can borrow. In principle, these other sources of credit can offset the observed difficulty of PEs and privatized TEs have borrowing from the ABCs and RCCs. Table 6 reports summary information on the debt structure of firms for 1994 and 1997. Overall, ABCs and RCCs were the most important source of credit for firms. In 1994, TEs and TEs that were subsequently privatized borrowed significantly more from ABCs and RCCs, and more in total, than did PEs. Moreover, almost half of the total credit extended to PEs came as trade credit from their suppliers.

Between 1994 and 1997, total credit from all sources increased for all three types of firms, but significant differences remained across these firms. For TEs, total credit increased by 16.2 percent per annum; this increase was 18.7 percent for PEs, but only 8.3 percent for privatized PEs. The main reason for these differences is the access to new credit from ABCs and RCCs. For TEs, credit from these two financial institutions increased by 13.8 percent on average; this increase was 6.2 percent for PEs, but credit from these sources actually declined by 2.5 percent for privatized TEs. Although the privatized TEs were able to access additional credit from other sources, the decline in credit from the ABCs and RCCs explains their slower growth in total credit.

In Table 7, the results of OLS regressions examining the determinants of alternative sources of financing for PEs and privatized TEs between 1994 and 1997 and the change between 1994 and 1997 are reported. Although the regressions include the same set of controls as in column 3 of Table 2, we only report the coefficients on the ownership dummies. These coefficients represent the differential impact on the total amount of, and change in, credit from each source in 1994 and 1997 relative to that received by a TE,

Table 7
Ownership indicators examining the determinants of amount of alternative finance sources

Specifications	PEs	Privatized TEs	Sample size
		Amount in 1994	
Total loan from ABC and RCC	−184.2*	−60.8	119
	(−1.49)	(−0.78)	
Total loan from all banks	−176.1	16.6	119
	(−1.07)	(0.16)	
Trade credit received	−52.1	27.1	119
	(−0.44)	(0.36)	
Other credit	−65.7	−22.3	119
	(−0.78)	(−0.42)	
Total firm debt	−293.9	21.4	119
	(−0.99)	(0.12)	
		Amount in 1997	
Total loan from ABC and RCC	−430.7**	−263.4**	119
	(−2.57)	(−2.50)	
Total loan from all banks	−601.0**	−211.9	119
	(−2.55)	(−1.43)	
Trade credit received	−67.6	152.9	119
	(−0.37)	(1.34)	
Other credit	−111.2	−58.1	119
	(−0.57)	(−0.48)	
Total firm debt	−779.8	−117.1	119
	(−1.63)	(−0.39)	
		Change of Amount between 1994 and 1997	
Total loan from ABC and RCC	−256.0**	−203.5***	119
	(−2.04)	(−2.71)	
Total loan from all banks	−367.0**	−228.1**	119
	(−2.41)	(−2.50)	
Trade credit received	31.0	148.5***	119
	(0.34)	(2.72)	
Other credit	88.4	1.98	119
	(0.72)	(0.03)	
Total firm debt	−247.5	−77.6	119
	(−1.14)	(−0.60)	

Notes. Numbers in parentheses are *t*-ratios. The regressors of the regressions generating these coefficients are the same as those in column (3) in Table 2.

* Significance level of 0.1.
** Significance level of 0.05.
*** Significance level of 0.01.

controlling for differences in firm-level attributes.[15] On average, PEs and privatized TEs experienced a smaller increase in credit from the ABC and RCCs, which is reinforced slightly by less credit from other banks. Privatized TEs were able to draw on supplier credits to a greater extent than TEs, although the difference is small and insignificant for PEs. For privatized TEs, access to supplier credits narrowed the gap caused by the loss

[15] Other debts include mainly wage, tax and township fee arrears.

in credit from banks. For PEs, the gap in total persisted, although it is not statistically significant.

In summary, unlike privatized TEs, PEs were not able to offset their difficulty in borrowing from the ABCs and RCCs by finding other sources of credit. On the other hand, the relative costs of borrowing from these alternative sources is important for privatized TEs. If the cost of trade credits was less than or equal to that of bank borrowing, discrimination against private and privatized firms by banks would be less important. However, interviews with managers and anecdotal information suggest that trade credits and bank credits are not perfect substitutes.

Trade credits are inferior to bank loans for several reasons. First, the interest rate on bank loans was much lower than the market rate because of government regulation. From interviews with bank managers, the bank's lending rate in 1998 was about 9 percent for ABC branches and 10 percent for RCC branches, even though the bank managers thought that the market rate should be 15 percent. In fact, firms could make money by borrowing from banks and lending indirectly to other firms through trade credit. Hence, firms with access to bank credits would not prefer trade credit. Second, trade credits were typically for much shorter periods than bank loans, which limited their usefulness, e.g., a firm could not rely on these credits for financing long-term investment. Third, firms in the best position to offer supplier credits were much larger, and often, monopolies that had access to loans from state-owned banks. In general, firms relying on supplier credits would have paid a premium in the form of either higher prices or higher interest rates on overdue balances.

6. Sources of discrimination

PEs and privatized TEs have a lower probability of obtaining a bank loan, but this could be the result of factors other than discrimination. To show that differences are due to discrimination linked to bank incentives, we rule out either informational or statistical discrimination in China's bank loan market.

Private ownership may imply that banks possess less information about these firms for historical reasons or network effects (Fafchamps, 2000). Private firms did not exist in China at the beginning of economic reform in 1978. Throughout the 1980s, state banks had very limited experience dealing with PEs. The privatization of firms between 1994 and 1997 and bank loan data for both years enable us to examine the possibility of this informational explanation.

If information were the underlying reason for the lack of access to the formal loan market, it should be a handicap for PEs only and not for privatized TEs because banks should have had more experience dealing with them before they were privatized. If discrimination against privatized TEs is due to a lack of information, these firms should have been discriminated against the same way before they were privatized. We test this hypothesis by comparing either the probability of privatized TEs getting a bank loan in 1994 before privatization or the loan size in 1994 with these measures in 1997 after privatization. The regressions in Table 2 indicate that privatized TEs do not have a significantly lower probability of getting bank loans in 1994 than do TEs. However, privatized TEs have a significantly lower probability of getting a bank loan in 1997. Table 3

shows similar results for loan size. These results suggest that information is not the major reason behind discrimination against privatized TEs.

Banks may also be reluctant to lend to PEs because of information asymmetries. When banks do not observe the firms' true creditworthiness, they may be less willing to lend to PEs if these firms tended to default historically more on average than TEs. This phenomenon, known as statistical discrimination (Schwab, 1986; Arrow, 1998; Darity and Mason, 1998; Yinger, 1998), can be rational if banks find it too costly or impossible to collect detailed information on the creditworthiness of PEs. Rather, banks use the information at their access, namely, firm ownership, as the criterion for judging a firm's creditworthiness.

We test the hypothesis that discrimination is statistical by examining the *ex post* loan default rates of different ownership groups with the presumption that PEs and privatized TEs default more often than TEs. If we find otherwise, statistical discrimination is not supported statistically as the underlying reason for differential loan access. Estimating the *ex post* default rate also enables us to test if joint liability is a reason for discrimination. The joint liability theory predicts that TEs have lower default rates because these firms pool their risks (Park and Shen, in press). When a TE is facing loan repayment difficulty, other TEs help the firm repay its bank loans and avoid default.

We use as our measure of default an overdue loan. Since only one PE had an overdue loan in 1997 and none had one in 1994, PEs are eliminated from the estimation. However, their default history rules out the possibility of statistical discrimination. Table 8 reports probit regression results on the probability that a TE or a privatized TE had an overdue loan in either 1997 or 1994, conditional on the firm having a loan in that year. The coefficients on the privatized indicator are all negative and significant for 1997. All else equal, privatized TEs are 12 to 16 percentage points less likely to default than TEs. However, privatized firms in 1994, or prior to the year in which they were privatized, were as likely to have an overdue loan as TEs. These results are inconsistent with either the statistical discrimination hypothesis or the joint liability hypothesis.

Discrimination against private firms is likely to result from incentives. Bank managers are willing to sacrifice profitability to lend to TEs because they benefit only marginally from higher bank profitability, but they are able to enjoy perks available through good relationships with local government officials that are maintained through loans to TEs. In addition, local government officials often play a role in bank manager selection and promotion. Bank managers may enjoy other private benefits by maintaining good relationship with governments, e.g., local officials can use their political power to help arrange a job for a bank manager's relatives, or facilitate entry into the party.

Incentives of bank managers are heterogeneous across localities, reflecting the unevenness and decentralized nature of the reform process. Our theory predicts that bank mangers who have good incentive contracts care more about profitability and less about ownership itself; therefore, they are less likely to discriminate against PEs. In addition, our theory predicts that all else equal, there are higher returns to lending profitably than to pursuing perks through relationships with local government officials for better-educated bank managers. Hence, banks that have good incentive contracts or well-educated managers should be less likely to discriminate against PEs. Furthermore, banks with good connections to

Table 8
Probit regressions examining the determinants of loan performance conditional on firm having a loan

	Dependent variable: 1 = loan overdue		
	1997		1994
Independent variables (dF/dx)	(1)	(2)	(3)
		Ownership indicators	
Privatized between	−0.163***	−0.124***	0.017
1994 and 1997	(−2.96)	(−3.51)	(0.35)
		Creditworthiness	
Credit rating	−0.049***	−0.017*	
	(−3.56)	(−1.90)	
Firm manager's Education	0.013	0.006	−0.011
	(1.09)	(0.88)	(−0.86)
Firm manager's age	0.001	0.0002	−0.003
	(0.39)	(0.12)	(−0.92)
Firm's age, which equals 1	−0.047	−0.033	0.097
if it was est. after 1990	(−0.70)	(−0.97)	(1.09)
Sales (lagged)		−0.003	
		(−1.57)	
Debt asset ratio (lagged)		−0.065	
		(−1.37)	
Capital labor ratio (lagged)		0.002	
		(1.10)	
		Other control variables	
Bank type (RCC = 0, ABC = 1)	0.043	0.020	−0.046
	(0.91)	(0.76)	(−0.97)
Province (Zhejiang = 1)	−0.203***	−0.108***	−0.183***
	(−2.74)	(−2.61)	(−2.94)
Industry sectors	Yes	Yes	
Observations	161	140	158
Adj. R-squared	0.25	0.36	0.10

Notes. Numbers in parentheses are t-ratios. The coefficients are dF/dx. Industry dummies are not shown.
* Significance level of 0.1.
*** Significance level of 0.01.

the government should enjoy more perks from lending to TEs and, thus they should also discriminate against PEs.

To examine these links, we divide the sample into two sub-samples using the medians of the bank manager's attributes, including the bonus to wage ratio, the weight on profitability, education, experience, and years of residence in the township of the bank branch. The bonus to wage ratio is measured *ex ante*, and indicates the size of the manager's bonus relative to their base wage if all branch targets are met. The coefficient on profitability measures the weight that the upper level bank branch puts on profitability versus other objectives, such as deposit growth, bank security and administration, when evaluating the performance of local bank branches. We use the bank manager's years of residence in the township as a measure of the connections with the local governments. We predict that bank

Table 9
Coefficients of ownership indicators of probit models examining the determinants of having bank loans in 1997, conditional on firms demanding a loan by using alternative specifications

Specification	PEs	Privatized TEs	Sample size
	Bank manager's bonus to fixed-wage ratio		
(1) Less than median (0.875)	-0.859^{***}	-0.374^{***}	125
	(-4.25)	(-2.67)	
(2) More than median	-0.040	-0.096	157
	(-0.26)	(-0.91)	
	Bank manager's weight on profitability		
(3) $<100\%$	-0.714^{**}	-0.320^{**}	105
	(-2.45)	(-2.42)	
(4) 100%	-0.321^{**}	-0.057	176
	(-2.52)	(-0.59)	
	Bank manager's schooling		
(5) <13 years	-0.606^{***}	-0.256^{**}	105
	(-2.77)	(-2.21)	
(6) $\geqslant 13$ years	-0.521^{***}	-0.044	177
	(-3.20)	(-0.46)	
	Bank manager's experience		
(7) No previous experience	-0.602^{***}	-0.220^{*}	133
as a branch manager or vice manager	(-3.37)	(-1.76)	
(8) Was a branch manager	-0.349	-0.271^{**}	135
or vice manager before	(-1.60)	(-2.52)	
	Bank manager's years of residence in the township		
(9) <6 years	-0.380^{**}	0.049	141
	(-2.39)	(0.46)	
(10) $\geqslant 6$ years	-0.457^{***}	-0.313^{***}	146
	(-2.62)	(-2.94)	

Notes. The numbers in parentheses are t-ratios. The coefficients are $\mathrm{d}F/\mathrm{d}x$. The regressors of the regressions generating these coefficients are the same as those in column (3) in Table 2. The number of observations may differ due to missing values of bank attributes. The median may not divide equally the sample because most of the bank attributes are discrete variables.

* Significance level of 0.1.
** Significance level of 0.05.
*** Significance level of 0.01.

managers with more powerful incentives, better human capital and less connections with the township will discriminate less.

Table 9 presents the coefficients on the two ownership dummies from estimating separate probit regressions for 1997, with the same set of controls as column 3 of Table 2, for firms in townships that have above and below the median for each bank-level attribute. All the coefficients on ownership indicators are negative and significant for the sub-sample of firms in townships with weak bank manager incentives or low human capital and those having strong connections with the township, i.e., rows 1, 3, 5, 7, and 10. For example, in localities in which the bonus to fixed wage ratio is less than the median, PEs and privatized TEs are 85.9 percent and 37.4 percent less likely to receive a bank loan. In townships in which the ratio is above the median, the same firms are equally as likely as TEs to

receive a loan. When profitability is given 100 percent weight in the bank's objectives, privatized TEs do not appear to be subject to discrimination. Although the coefficient on the ownership dummy is negative and significant for PEs, it is much smaller in absolute value than the coefficient for the smaller weight given to profitability, i.e., -0.714 versus -0.321.

The finding that PEs are more likely to receive loans in townships in which banks have good incentives or human capital might be due to omitted variable bias. If privately-owned firms are better relative to TEs where banks have good incentives and better human capital, we cannot rule out the possibility that bank attributes are picking up unobserved differences in the quality of private and privatized firms relative to TEs across localities. Our grouping of firms on the basis of bank attributes at the township level will automatically mean better PEs and privatized PEs in environments in which banks are better. If we cannot fully control for the effect of unobserved firm quality, the estimation of ownership effects will be biased upward for firms in the good bank attributes group, i.e., high quality private firms, and downward for firms in the weak bank attribute group, i.e., low quality private firms. We use four methods to test and control for unobserved variable bias. First, we calculate average performance measures for each ownership group and check whether PEs and privatized TEs are systematically better in areas in which banks have better attributes. Our performance measures include profit to capital ratio, profit to labor ratio, sales to capital ratio and sales to labor ratio. Although not reported, we do not find any evidence to suggest that privatized TEs are systematically better than TEs.

Second, we test whether privatized TEs in certain localities are less likely to get bank loans before privatization. If privatized TEs in localities in which banks have weak attributes are low-quality firms, they should also be less likely to get bank loans before privatization. If we fail to find that privatized firms in these localities are less likely to get loans pre-privatization, their post-privatization lower probability of getting a bank loan can be attributed to discrimination against private ownership. We divide the 1994 sample of firms by 1997 bank attributes, and estimate the effect of being privatized on the probability of having access to credit for the two sub-samples. The dependent variable is an indicator, which equals 1 if the firm has a loan in 1994 and 0 otherwise. The independent variables are the same as those in column 3 in Table 2. Regression results show that privatized TEs in the groups having good bank attributes do not get more loans before privatization because none of the coefficients on privatized firms are negative and significant in column 1 of Table 10. Hence, privatized TEs are not more creditworthy in the groups having good bank attributes.

Third, we consider firm fixed-effects by taking the first differences of all variables that vary across years and examine whether the change of ownership affects the change of loan in localities having different bank attributes. Assuming that unobserved firm quality does not vary across years, the firm fixed-effect model will eliminate these factors and provide unbiased estimations. PEs will drop out of the sample in the fixed-effect model because their ownership does not change over time. The dependent variable of the fixed-effect model is an indicator, which equals 1 if the firm has a loan increase between 1994 and 1997, and 0 otherwise. The independent variables include the change of the manager's education and age in addition to a privatization indicator. The regression results in column 2 of Table 10 confirm our earlier findings that banks with managers who have

Table 10
Coefficients of indicators for privatized TEs in probit models, testing for omitted variable bias

	Credit access in 1994[a]	Fixed-effect model[b]	Sample size for both
		Bank manager's bonus to fixed-wage ratio	
(1) Less than median	0.039	-0.307^{***}	111
	(0.37)	(−2.91)	
(2) More than median	−0.075	−0.096	121
	(−0.77)	(−1.06)	
		Bank manager's weight on profitability	
(3) < 100%	0.110	-0.446^{***}	91
	(0.93)	(−3.70)	
(4) 100%	0.001	-0.171^{**}	141
	(0.02)	(−1.96)	
		Bank manager's schooling	
(5) < the median	0.018	-0.242^{***}	171
	(0.23)	(−3.05)	
(6) ⩾ the median	0.065	−0.188	66
	(0.48)	(−1.49)	
		Bank manager's experience	
(7) No previous experience as a branch manager or vice-manager	−0.010	-0.325^{***}	103
	(−0.10)	(−2.96)	
(8) Was a branch manager or vice manager before	0.054	-0.229^{**}	129
	(0.60)	(−2.52)	
		Bank manager's years of residence in the township	
(9) < 6 years	0.237^{**}	−0.104	114
	(2.24)	(−1.00)	
(10)⩾ 6 years	−0.136	-0.266^{***}	121
	(−1.41)	(−2.86)	

Notes. Numbers in parentheses are t-ratios. The coefficients are $\mathrm{d}F/\mathrm{d}x$. The regressors used for column (1) are the same as those in column (3) in Table 2. However, those used to generate the coefficients in column (2) include only the privatization indicator and the change of the manager's education and age. The number of observations may differ due to missing values of bank attributes. The median may not equally divide the sample because most of the bank attributes are discrete variables. Regressions in this table have more missing values than those in Table 9 because we use 1994 information which has more missing values than 1997 information.

** Significance level of 0.05.

*** Significance level of 0.01.

[a] Firms divided on the basis of 1997 bank attributes 1 = a loan in 1994; 0 = otherwise. Independent variables are 1994 values.

[b] 1 = a loan increase 1994–1997; 0 = otherwise. Independent variables are first differences, 1994–1997.

weak incentives, less education and experience, but strong connections with the township, are more likely to discriminate. The fixed-effect model may not correct completely for the omitted variable bias. If the change of ownership is correlated with bank attributes, the change of ownership itself is endogenous. Perhaps good firms are privatized in localities in which banks have good attributes, while bad firms are privatized in localities in which banks have weak attributes. In this case, bank attributes simply represent the quality of privatized TEs relative TEs in each group for the different localities.

Finally, we test directly whether ownership change is the result of the interaction between firm quality and bank attributes by applying a probit model to estimate the probability of privatization. The right hand side variables are firm attributes, bank attributes and interactions between bank and firm attributes. If the interaction terms are not significant, we reject the hypothesis that good firms are privatized in localities in which banks have good attributes, while bad firms are privatized in localities in which banks have weak attributes. In regressions not reported,the interaction terms are not significant. To summarize, our empirical analysis indicates that bank discrimination decreases with bank managers' incentives and human capital, but it increases with their connections with local governments. These results are robust to various ways of correcting for omitted variable bias.

7. Conclusions

Since the early 1990s, private and privatized firms have become an integral part of the Chinese economy. However, anecdotal evidence suggests that these firms experience considerable difficulty in accessing credit from the formal loan market. In this paper, we use matched firm-bank data drawn from a representative cross-section of townships in the provinces of Jiangsu and Zhejiang to analyze the extent to which this difficulty is the product of discrimination against these firms by Chinese banks.

Results from probit and tobit regressions indicate that both PEs and privatized TEs are discriminated against in the formal loan market. They are significantly less likely to obtain loans, receive smaller loans, and are subject to higher loan standards, all else equal. In the case of privatized firms, poorer access to formal credit after privatization cannot be attributed to informational problems because these firms were as likely as TEs to receive credit prior to the ownership change. Moreover, an examination of *ex post* default rates for different ownership groups rules out either statistical discrimination or the joint liability theory as the source of differential access to credit by these firms.

We also find that discrimination against private and privatized firms is not uniform across our sample of townships, and is systematically correlated with the incentives of local bank managers. Dividing our sample of firms on the basis of the attributes of bank managers, we find that in townships in which bank managers have good incentive contracts and care about bank branch profitability, private and privatized TEs are nearly as likely to obtain loans as TEs, all else equal. However, when incentive contracts are weak, branch managers' lending decisions are much more influenced by the perks they receive from maintaining long run lending relationships with TEs and local government officials.

Persistent discrimination has important consequences for the Chinese economy because bank credits do not go to the most profitable projects. As a result, the most efficient firms, i.e., private firms, have to incur higher costs if they wish to expand. In both the short run and long run, the growth of private firms will be affected by a lack of access to working capital and to financing for fixed investment. The same will be true for the growth of new employment opportunities, which is central to absorbing new entrants to the labor market and workers laid off by state-owned enterprises. Discrimination against PEs and privatized TEs also affects adversely both the profitability of China's commercial banks and their ability to deal with a legacy of non-performing loans.

Finally, results from our study highlight the need for the banking sector to continue to reform its governance structures and for the government to open the door for bank competition. New banks, especially smaller private domestic banks, can be an important source of credit for the emerging private sector.[16] More generally, competition from both private and foreign banks can exert additional pressure on China's state banks to relinquish their discriminatory behavior and to become more profit-oriented in their lending behavior.

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Appendix A

A.1. Proof of Proposition 1

If no PEs are financed, the problem is trivial; hence we only consider the case in which PEs are financed. Define β_2 as the type of the marginal TE and β_1 as the type of the marginal PE. Since the bank must be indifferent between lending to the two ownership types at the margin,

$$U_1(e_1^*) - U_2(e_2^*) = 0, \quad \text{where } U_2(e_2^*) = a(\beta_2 e_2^* r - 1) - C(e_2^*)/b + L, \quad \text{and}$$
$$U_1(e_1^*) = a(\beta_1 e_1^* r - 1) - C(e_1^*)/b.$$

Since $\partial U(e^*)/\partial\beta > 0$, it follows that $\beta_1 > \beta_2$. □

A.2. Proof of Proposition 2

To compute the comparative statics, totally differentiate the maximized utility functions with respect to a. This yields $\partial U_2^*/\partial a = \beta_2 e_2^* r - 1$, and $\partial U_1^*/\partial a = \beta_1 e_1^* r - 1$. Since $\beta_1 > \beta_2$ and $\partial e/\partial\beta > 0, e_1^* > e_2^*$, which implies that $\partial U_1^*/\partial a > \partial U_2^*/\partial a$. At the old margin, lending to a PE is more profitable than lending to a TE. However, the bank must be indifferent between the two ownership types at the margin, so that the profit type must be lower than before for the marginal PE and higher than before for the marginal TE. Algebraically, $\beta_1' < \beta_1$ and $\beta_2' > \beta_2$. Since discrimination exists in equilibrium, it follows that $\beta_2 < \beta_2' < \beta_1' < \beta_1$. Hence the old borrowing TEs in the profit range $[\beta_2, \beta_2']$ are replaced by new borrowing PEs in the profit range $[\beta_1', \beta_1]$; thus, the average profitability of the bank improves.

The proofs for the effect of the changes in b and L are similar and are not presented. □

[16] On our recent field trip to southern Zhejiang, we saw several successful private commercial banks, which lend substantially to private firms. These private banks are ready to expand once the restrictions on them are lifted.

Table A.1
Sample firm attributes: mean and standard deviation

	1994			1997		
	TEs	Privatized TEs	PEs	TEs	Privatized TEs	PEs
Number of observations	39	81	32	39	81	32
Employment	261	200	90	278	166	230
	(251)	(283)	(88)	(308)	(272)	(665)
Sales	16.2	9.8	6.1	26.7	14.8	21.0
	(23.1)	(17.7)	(12.1)	(46.7)	(38.0)	(62.8)
Profits	0.71	0.20	0.25	1.95	0.35	1.16
	(1.9)	(0.7)	(1.0)	(5.1)	(1.0)	(4.9)
Percentage of firms with negative profit, %	14	24	20	29	30	24
Assets	14.4	7.9	3.8	26.5	10.2	7.2
	(19.1)	(10.1)	(5.0)	(47.2)	(14.8)	(10.2)
Physical capital stock	5.3	2.8	1.3	9.2	3.3	3.0
	(6.4)	(4.4)	(2.3)	(13.7)	(5.5)	(4.6)
Debts	5.8	4.4	2.0	9.0	5.6	3.1
	(7.2)	(6.1)	(3.0)	(12.9)	(8.0)	(4.4)
Equity = assets − debts	8.6	3.5	1.8	17.5	4.6	4.1
	(17.0)	(5.0)	(3.2)	(39.1)	(7.9)	(6.3)
Credit ratings:						
RCC	3.7	3.3	2.8	3.9	3.6	3.9
	(1.5)	(1.7)	(1.7)	(1.5)	(1.6)	(1.7)
ABC	4	3.4	2.7	3.7	3.2	3.4
	(1.4)	(1.4)	(2.1)	(1.5)	(1.4)	(2.0)
Manager's:						
education	11.0	10.6	10.1	11.1	10.7	10.2
	(2.2)	(2.2)	(2.2)	(2.3)	(2.2)	(2.3)
age	43.5	43.7	40.7	44.6	44.9	42.7
	(7.1)	(9.0)	(8.4)	(8.5)	(7.2)	(8.8)

Note. The entries for assets, debts, and equity consist of only 129 observations because of missing observations for assets in 1994.

Table A.2
Bank manger's attributes ($N = 118$)

Specification (bank's 1997 attributes)	1994	1997
Bank manager's bonus to fixed-wage ratio	0.62	0.77
	(0.31)	(0.36)
Bank manager's weight on profitability,	0.26	0.59
denoted 1 if weight on profitability is 100%.	(0.44)	(0.49)
Bank manager's schooling (years)	12.0	12.6
	(2.19)	(1.63)
Bank manager's experience	0.43	0.53
(1 if a bank manager had this job before)	(0.50)	(0.50)
Bank manager's years of residence in the township	28	18.2
	(21)	(19.8)

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