

# New Evidence of Lease-Debt Relationship from China's Interest Rate Liberalization Reform: Estimation based on Difference-in-Differences Model

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**Keywords:** Finance Leases, Difference-in-Differences Model, Lease-Debt Relationship, Interest Rate Liberalization Reform.

**Abstract:** This paper examines the relationship of leases and debt in China using the interest rate liberalization reform as an exogenous shock. The Difference-in-Differences results show that leases and debt are substitutes in China. Specifically, compared with large-sized firms, small-sized firms increase more loans, especially long-term loans, and decrease more leases after the lending-rate-floor reform. Moreover, the substitution relationship of leases and debt applies to state-owned-enterprises instead of private enterprises. This paper provides new evidence about the lease-debt relationship in emerging markets.

## 1 INTRODUCTION

The relationship of leases and debt has generated extensive debate in literature. Traditional financial theories suggest that leases should substitute for debt because leases use up debt capacity (Beattie et al., 2000; Yan, 2006). However, some theoretical models also show that leases and debt can be complements. For example, Lewis and Schallheim (1992) and Eisfeldt and Rampini (2009) explain that leases can expand debt capacity from the view of tax arbitrage and repossession ability. Therefore, the lease-debt relationship has two possibilities theoretically, making empirical tests necessary and important. But most previous empirical studies may suffer from an endogeneity problem since the factors simultaneously affecting leases and debt are hard to control. Moreover, existing empirical evidence mainly focuses on developed countries, especially in the U.S. and Europe, while the leasing markets in developing countries remain under researched. In fact, during recent years, the leasing industries have been booming in several emerging markets, among which China is the most prevalent. From 2007 to 2016, China's leasing market had a remarkable growth. The leasing investment volume rose from RMB 46 billion to RMB 1794 billion, with a compound growth ratio of 50%. The international ranking

of China's leasing investment volume rose from No. 27 to No. 2, second only to the U.S..

In this paper, we use the cancellation of the lending rate floor, a big step in the interest rate liberalization reform in China, as an exogenous shock. In July 2013, China liberalized the lending rate floor, before which the lending rate floor was 70 percent of the benchmark lending rate. This reform intensified banks' competition for high-quality customers with strong repayment ability (Obstfeld, 1994; He and Wang, 2012). In order to win high-quality customers, banks would cut the lending rate and thus earn lower profits from these customers. To offset the lower profits from high-quality customers, banks would offer more loans for low-quality customers, who have weaker bargaining power due to their poor repayment ability. As a result, compared with high-quality customers who have always been preferred by banks, the loan availability for low-quality customers would increase significantly after the lending-rate-floor reform.

The lending-rate-floor reform was decided by People's Bank of China, the central bank, and cannot be affected by firms. So we regard this reform as a natural experiment for the loan availability of low-quality customers. We use the firm size to measure the repayment ability and define large-sized firms as high-quality and small-sized firms as low-quality. By

taking small-sized firms as the treatment group and the large-sized firms as the control group, we use the Difference-in-Differences (DID) method to estimate the lending-rate-floor reform's impact on loans and leases for the two groups.

This paper contributes to existing literature in three aspects. First, as far as we know, this is the first paper exploring the lease-debt relationship in China using comprehensive hand-collected data of leasing. Second, the DID method could solve the endogeneity problem of leases and debt, and reach a more robust conclusion. Third, this paper first gives advice that leases can be used to address challenges of fintech.

## 2 DATA AND MODEL

Our sample includes all non-financial Chinese A-share firms during the period 2007-2016. Data about finance leases<sup>1</sup> is hand collected from the annual reports of the listed firms, and data of other financial variables comes from the China Stock Market and Accounting Research (CSMAR) database. We delete samples that lack relevant information about finance leases and other variables. Finally we obtain 16386 firm-year observations. All the continuous variables are winsorized at the 1 and 99 percentiles to reduce outliers.

The baseline empirical specification is as follows:

$$\begin{aligned}
 Dep_{i,t} = & \beta_0 + \beta_1 After\_2013_t * Small\_sized_i \\
 & + \beta_2 \ln(asset)_{i,t-1} \\
 & + \beta_3 Cash\_flow_{i,t-1} \\
 & + \beta_4 Cash\_holding_{i,t-1} \\
 & + \beta_5 Leverage_{i,t-1} \\
 & + \beta_6 Tobinq_{i,t-1} + \beta_7 Tax_{i,t-1} \\
 & + FirmFE + YearFE \\
 & + \varepsilon_{i,t}
 \end{aligned} \tag{1}$$

First, we explore the impact of the lending-rate-floor reform on the loan availability for the treatment group and the control group. The dependent variable is Loans/total assets. After\_2013 is a dummy variable representing the lending-rate-floor reform, which equals to 1 after 2013 and 0 otherwise. Small-sized is a dummy representing the firm size, which equals to 1 for small-sized firms and 0 for large-sized firms. We calculate every sample firm's mean of asset size before 2013, denoted as Mean\_asset\_2013. Firms with the Mean\_asset\_2013 above the median level are identified as large-sized firms, and firms with the

Mean\_asset\_2013 below the median level are identified as small-sized firms. The cross term After\_2013\*Small-sized is the main independent variable, which captures the response difference between the treatment group and the control group. It is worth noting that Small-sized and After\_2013 are not added into Model (1) independently because they can be absorbed into the firm fixed effect and year fixed effect respectively.

Next we explore the impact of the lending-rate-floor reform on leases for the treatment group and the control group. The dependent variables are Lease dummy (which equals to 1 if the firm has finance leases and 0 otherwise) and Lease assets/total assets. Similarly, the cross term After\_2013\*Small-sized is the main independent variable. Following Sharpe and Nguyen (1995), we include a vector of control variables.

## 3 EMPIRICAL RESULTS

In Table 1, column (1)-(3) present the results regarding the change of loans after the lending-rate-floor reform. The coefficients on After\_2013\*Small\_sized are significant and positive for total loans and long-term loans, but not significant for short-term loans. So we can conclude that compared with large-sized firms, small-sized firms increase more long-term loans instead of short-term loans significantly after the lending-rate-floor reform.

Column (4)-(5) present the results regarding the change of leases after the lending-rate-floor reform. The coefficients on After\_2013\*Small\_sized are significant and negative in both columns, suggesting that small-sized firms decrease more leases after the lending-rate-floor reform compared with large-sized firms. Such results confirm the substitution relationship of leases and loans. Combined with the result in column (3), we can say that leases and long-term loans are substitutes. This finding is consistent with the results of Schallheim et al. (2013), which also show that leases and long-term debt are substitutes.

Considering that state ownership would influence Chinese firms' leasing decisions (Zhang and Liu, 2020), we explore the change of loans and leases for state-owned enterprises (SOEs) and private enterprises respectively and the results are presented in Table 2. In column (1)-(3), we can see that loans and

<sup>1</sup> We ignore operating leases because they only account for a very small fraction, less than 10% in terms of total volume (Zhang and Liu, 2020).

Table 1: The change of loans and leases after the lending-rate-floor reform.

	Total Loans/to- total assets (1)	Short-term Loans/total assets (2)	Long-term Loans/total assets (3)	Lease dummy (4)	Lease assets/to- total assets (5)
<i>Af- ter_2013*Small_sized</i>	0.0121*** (2.95)	-0.0011 (-0.31)	0.0133*** (4.84)	-0.0321*** (-2.72)	-0.0009** (-2.52)
<i>Ln(asset)</i>	0.0209*** (5.43)	0.0012 (0.36)	0.0207*** (8.25)	0.0332*** (3.98)	0.0004 (1.39)
<i>Cash_flow</i>	-0.1255*** (-8.28)	-0.0753*** (-5.71)	-0.0491*** (-5.32)	-0.0625** (-2.21)	-0.0019** (-2.22)
<i>Cash_holding</i>	-0.0812*** (-7.99)	-0.0729*** (-8.43)	-0.0090 (-1.52)	0.0305 (1.29)	0.0013* (1.79)
<i>Leverage</i>	0.2216*** (14.86)	0.1552*** (12.38)	0.0559*** (6.44)	0.1246*** (4.45)	0.0042*** (4.84)
<i>Tobin_q</i>	-0.0037*** (-3.85)	-0.0034*** (-4.22)	0.0000 (0.06)	-0.0034** (-2.03)	-0.0001* (-1.91)
<i>Tax</i>	0.0137** (2.52)	0.0053 (1.12)	0.0094** (2.40)	-0.0148 (-1.03)	0.0002 (0.32)
<i>N</i>	16386	16386	16386	16386	16386
<i>adj. R<sup>2</sup></i>	0.744	0.690	0.679	0.469	0.423

Notes: *T*-values are in parenthesis, based on standard errors clustered by firm. \*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% level, respectively. Firm fixed effect and year fixed effect are controlled (the same below).

Table 2. The change of loans and leases after the lending-rate-floor reform for SOEs and private enterprises.

	SOEs			Private enterprises		
	Total loans/ total assets (1)	Lease dummy (2)	Lease assets/ total assets (3)	Total loans /total assets (4)	Lease dummy (5)	Lease assets/ total assets (6)
<i>After_2013 *Small_sized</i>	0.0139** (1.97)	-0.0544*** (-2.64)	-0.0020*** (-2.97)	0.0089* (1.75)	-0.0091 (-0.64)	0.0000 (0.06)
<i>Ln(asset)</i>	0.0239*** (4.07)	0.0451*** (2.99)	0.0003 (0.62)	0.0178*** (3.60)	0.0224** (2.36)	0.0003 (1.07)
<i>Cash_flow</i>	-0.1642*** (-7.29)	-0.0324 (-0.60)	-0.0014 (-0.83)	-0.0971*** (-4.89)	-0.0560* (-1.93)	-0.0018* (-1.94)
<i>Cash_holding</i>	-0.0557*** (-2.86)	-0.0229 (-0.42)	0.0029* (1.66)	-0.0922*** (-7.39)	0.0310 (1.37)	0.0003 (0.41)
<i>Leverage</i>	0.2274*** (9.60)	0.1642*** (3.12)	0.0072*** (4.63)	0.2045*** (10.63)	0.1023*** (3.52)	0.0024** (2.39)
<i>Tobin_q</i>	-0.0057*** (-3.24)	0.0029 (0.84)	-0.0000 (-0.03)	-0.0016 (-1.46)	-0.0038** (-2.20)	-0.0001* (-1.67)
<i>Tax</i>	0.0101 (1.37)	-0.0443** (-2.09)	-0.0005 (-0.63)	0.0168** (2.14)	0.0120 (0.61)	0.0006 (1.01)
<i>N</i>	7255	7255	7255	9131	9131	9131
<i>adj. R<sup>2</sup></i>	0.770	0.495	0.450	0.727	0.468	0.446

leases are substitutes for SOEs. However, the results in column (4)-(6) suggest that compared with large-sized private enterprises, small-sized private enterprises increase loans but do not decrease leases. This implies that the substitution relationship of leases and debt only applies to SOEs. A possible explanation is that Chinese private enterprises suffer from financial constraint, so they increase loans without cutting leases.

#### 4 ROBUSTNESS CHECK

We use two alternative measurement of leases for robustness check. The first is *Lease assets/PPE*, in line with Sharpe and Nguyen (1995). The second is *SLB\_dummy*, which equals to 1 if the firm has a sale-and-leaseback (SLB) transaction in year *t* and equals to 0 otherwise. We choose *SLB\_dummy* for two reasons. First, SLB is the most representative leasing

transactions in China, which accounts for roughly 80% of the total leasing volume. Second, SLB could satisfy the ceteris paribus condition, in which the assets of the firm do not change because of the leasing transaction (Schallheim et al., 2013). The robustness check results are presented in Table 3. After changing the measurements of leases, the coefficients on *After\_2013\*Small\_sized* are still negative and significant, consistent with previous findings.

Table 3: Robustness check.

	<i>Lease assets/ PPE (1)</i>	<i>SLB dummy (2)</i>
<i>After_2013*Small_sized</i>	-0.0020* (-1.68)	-0.0187** (-2.36)
<i>Ln(asset)</i>	0.0026*** (2.73)	0.0155*** (3.03)
<i>Cash_flow</i>	-0.0082*** (-2.68)	-0.0329 (-1.64)
<i>Cash_holding</i>	0.0039 (1.49)	0.0084 (0.59)
<i>Leverage</i>	0.0148*** (4.99)	0.0459*** (2.73)
<i>Tobin_q</i>	-0.0001 (-0.39)	0.0001 (0.06)
<i>Tax</i>	-0.0001 (-0.09)	-0.0014 (-0.10)
<i>N</i>	16386	16386
<i>adj. R<sup>2</sup></i>	0.429	0.236

## 5 CONCLUSIONS

By taking the interest rate liberalization reform as an exogenous shock, this paper uses DID method to explore the lease-debt relationship in China. Using comprehensive hand-collected data of leasing for Chinese listed firms, we find that leases and loans, especially long-term loans, are substitutes. The substitution lease-debt relationship applies to SOEs instead of private enterprises.

## 6 DECLARATION OF COMPETING INTERESTS

The authors have declared no conflict of interests.

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