Interest rate pass-through in Thailand: New evidence from loan-level data

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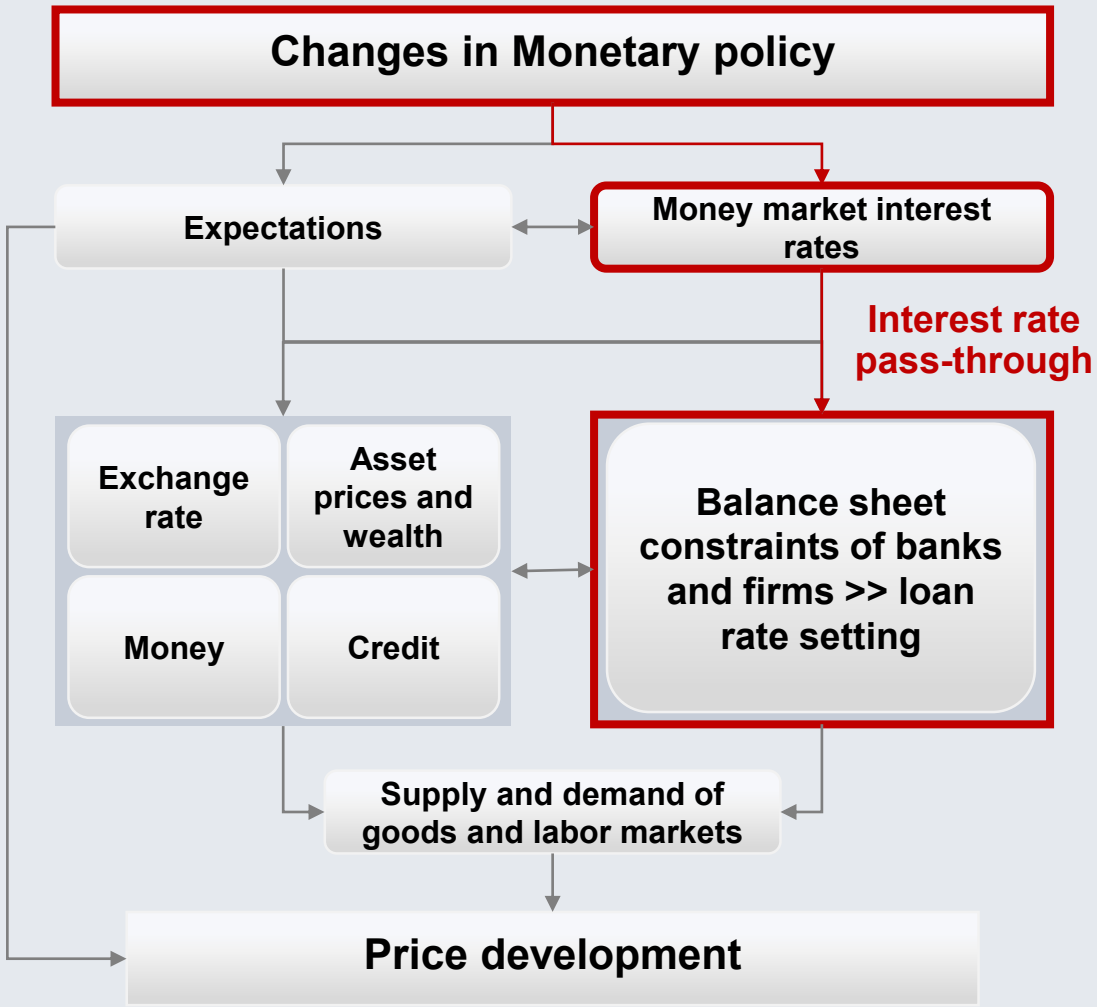
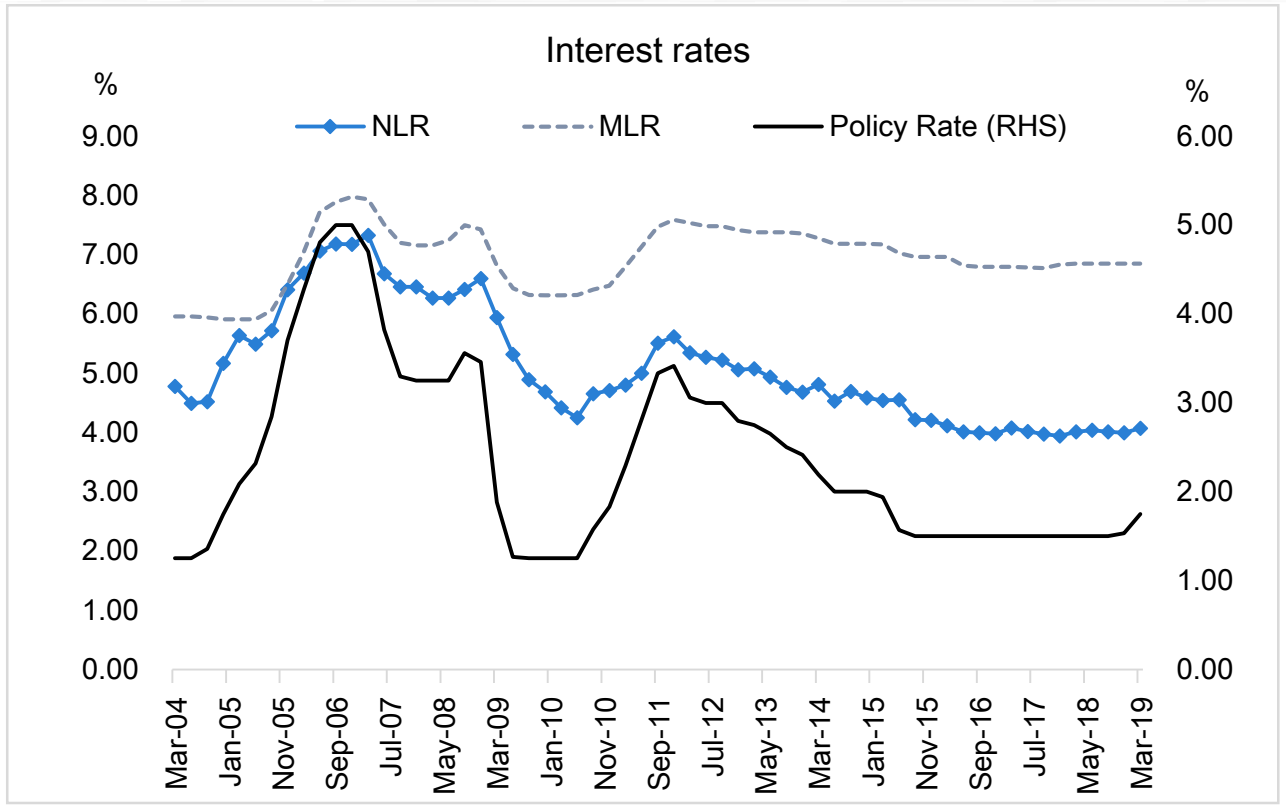
Motivation

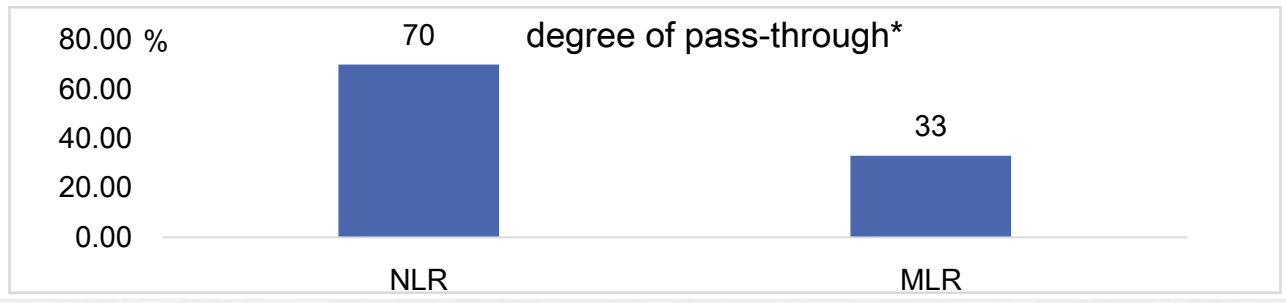


Source: modified from ECB

- Transmission of monetary policy has been at the center of attention for central banks.
- The interest rate channel plays a crucial role in monetary policy tramsmission
- A study of the interest rate pass-through to individual loans, along with balance sheet data for both banks and firms, can lead to a better understanding of the interest rate channel, as well as balance sheet and bank lending channels

Motivation





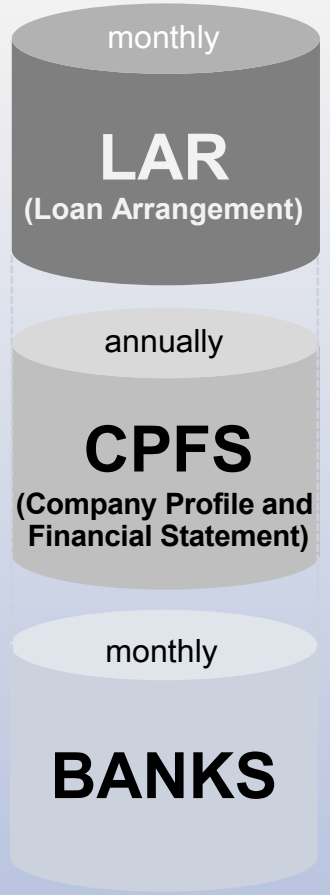
- **Theoretically, Minimum Lending Rate (MLR) should be the minimum lending rate per annum that the Bank charges its prime major customers on term loans.**
- **Previous studies of transmission in Thailand have utilized (MLR) and applied simple interest rate pass-through models. These studies found that the degree of pass-through, which was deteriorated after the 1997 crisis, was around 30 percent**
- **We will argue that conclusions from conventional interest rate pass-through analyses, conducted on MLR, could be invalid**
- **Our study will utilize new loan rates at the contract level to study pass-through.**

* Estimated by a simple interest rate model of the form: $Rate_{bt} = \alpha + \sum_{i=0}^{p} \beta_i RP_{t-i} + \varepsilon_{bt}$, where $Rate_{bt}$ represented either NLR or MLR of bank b at time t

Research Questions

1. The total pass-through from policy to lending rates and the loan rate setting behaviors of banks
2. Heterogeneity of interest rate pass-through across firm characteristics
3. Heterogeneity of interest rate pass-through across bank characteristics
4. The interest rate pass-through before and after the global financial crisis (Structural break)

Data



Firm	Date	Bank	Loan duration	Loan type	Loan purpose	NLR
A	1 Jan 05	Z	...	...	...	(max + min)/2

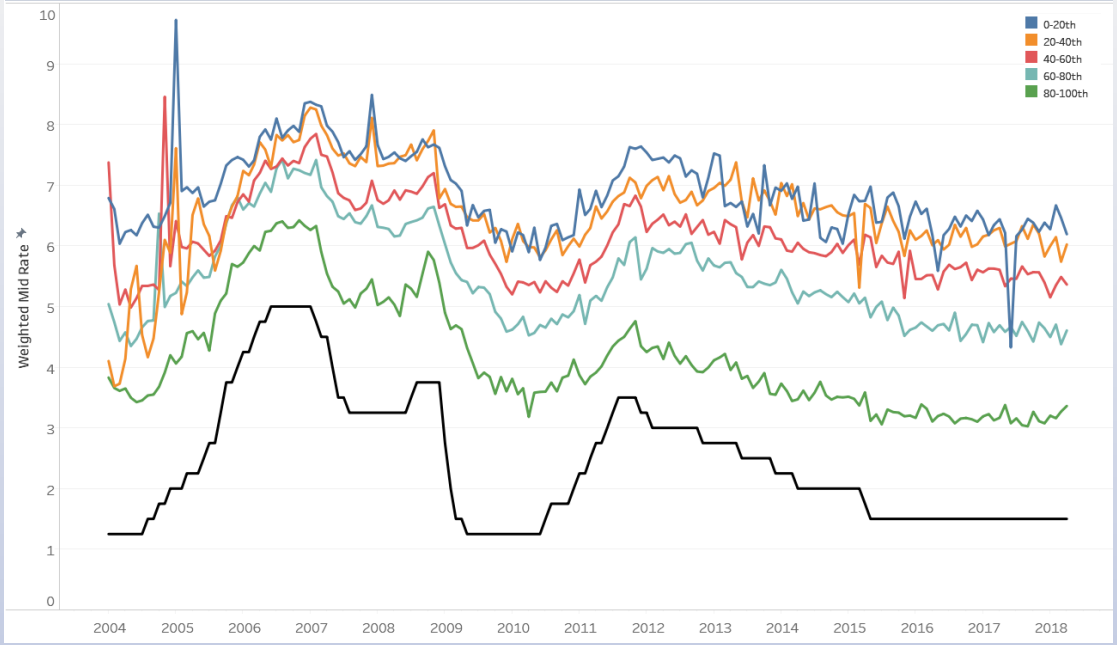
Firm	Date	Business type	# Bank relationships	Asset size	Key financial ratios
A	1 Jan 05	...	...	...	...

Date	Bank	CAR	LDR	CASA	Interest income ratio	NIM
1 Jan 05	Z	...	...	...	...	...

- **Loan outstanding in the LAR database accounts for 75 percent of total private corporate credit on average between 2004 and 2018**
- **Merging these three databases enable us to improve interest rate pass-through models as the loan-level data now include firm and bank characteristics**
- **Approximately 2.2 million loan records were used in our study.**

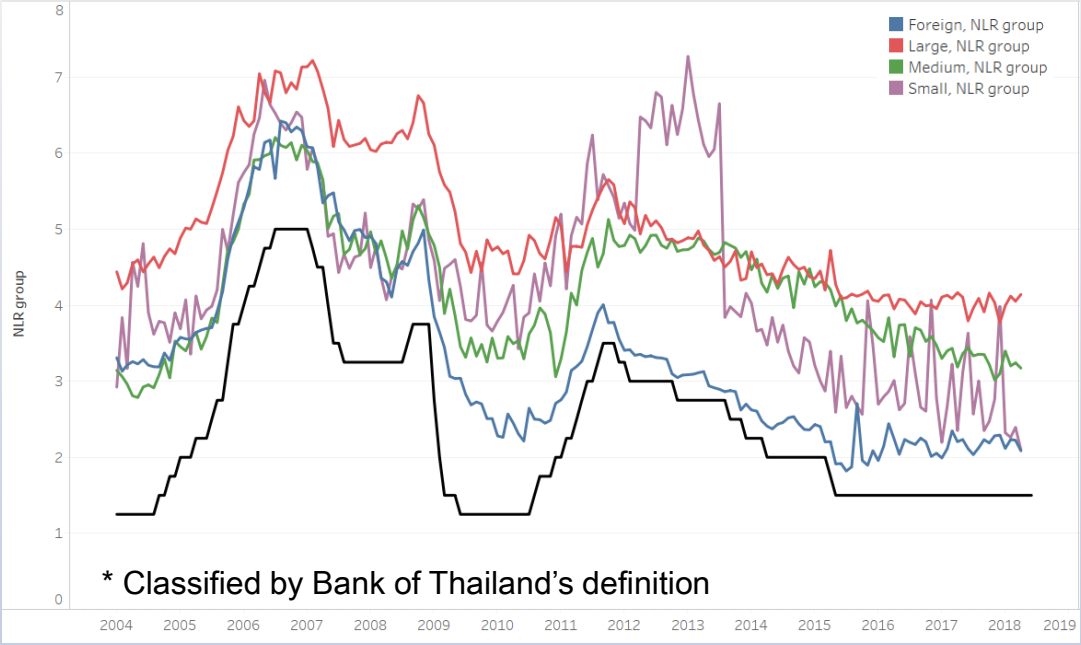
Stylized facts

NLR by percentile of firms' total assets



- Firms with the lowest assets receive the highest NLRs and firms with the highest assets receive the lowest NLRs.

NLR by bank types*



* Classified by Bank of Thailand's definition

- Small Thai banks have NLRs that are more volatile than other groups
- Foreign banks have the lowest NLRs, and large Thai banks have the highest rate over the whole timespan

Empirical Strategy

Total pass-through and the determinants of loan rate setting (baseline model)

The total interest rate pass-through

$$NLR_{lbkt} = \alpha + \sum_{i=0}^{p} \beta_i RP_{t-i} + \boldsymbol{\gamma}' loan\ charateristics_{lt} + \boldsymbol{\delta}' bank\ charateristics_{bt} +$$

$$\boldsymbol{\theta}' firm\ charateristics_{kt} + \boldsymbol{\varphi}' macro_t + \mu_b + \mu_k + \varepsilon_{lbkt}$$

Bank and firm fixed-effects
to control unobserved heterogeneity

The determinants of loan rate setting

where
(1) $\mathrm{NLR}_{\mathrm{lbkt}}$ represents new loan rate of each loan contract l that bank b gives to firm k at time t,
(2) $\mathrm{RP}_{\mathrm{t-i}}$ denotes Bank of Thailand policy rate at time $\mathrm{t} - \mathrm{i}$,
(3) $\mathrm{loan\ charateristics}_{\mathrm{lt}}$ is the loan characteristics, including loan duration, loan types, and loan purposes, of loan contract l at time t,
(4) $\mathrm{bank\ charateristics}_{\mathrm{bt}}$ represents bank characteristics, including CAR, LDR, CASA ratio, interest income to total income, operating cost to total assets, NIM, of bank b at time t,
(5) $\mathrm{firm\ charateristics}_{\mathrm{kt}}$ denotes firm characteristics, including number of bank relationships, firm's asset size, quick ratio, DE ratio, and DSCR, of firm k at time t, and
(6) $\mathrm{macro}_{\mathrm{t}}$ represent the macroeconomic variables, including GDP, headline inflation, VIX, and yield slope at time t.

Empirical Strategy

Heterogeneity of interest rate pass-through across firm and bank characteristics

$$NLR_{lbkt} = \alpha + \sum_{i=0}^{p} \beta_i RP_{t-i} + \boldsymbol{\gamma}' loan\ charateristics_{lt} + \boldsymbol{\delta}' bank\ charateristics_{bt} +$$

$$\boldsymbol{\theta}' firm\ charateristics_{kt} + \boldsymbol{\varphi}' macro_t + \mu_b\ or\ \mu_k + \boldsymbol{\omega}' \boldsymbol{interaction\ terms} + \varepsilon_{lbkt}$$

- with bank fixed-effects to observe heterogeneity of pass-through across firms
- with firm fixed-effects to observe heterogeneity of pass-through across banks

Heterogeneity of pass-through across firms and banks

Structural break

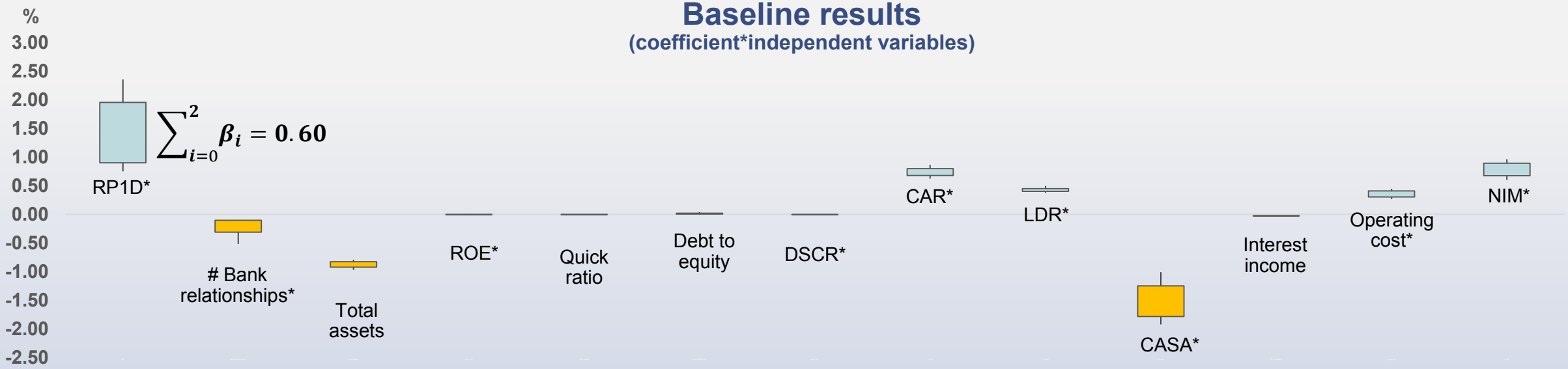
$$NLR_{lbkt} = \alpha + \sum_{i=0}^{p} \beta_i RP_{t-i} + \sum_{i=0}^{p} \chi_i RP_{t-i} * GFCdummy + \boldsymbol{\eta} GFCdummy +$$

$$\boldsymbol{\gamma}' loan\ charateristics_{lt} + \boldsymbol{\delta}' bank\ charateristics_{bt} +$$

$$\boldsymbol{\theta}' firm\ charateristics_{kt} + \boldsymbol{\varphi}' macro_t + \mu_b + \mu_k + \varepsilon_{lbkt}$$

Structural break of interest rate pass-through

Results: interest rate pass-through and loan rate setting



The degree of interest rate pass-through

- The effect of policy rate changes last for around 3 months and that the total degree of interest rate pass-through from policy rate to NLR is 60 percent

Determinants of loan rate setting

- Policy rate is the most powerful character determining loan rate.
- Bank characteristics contribute a greater amount to loan rate than firm characteristics .

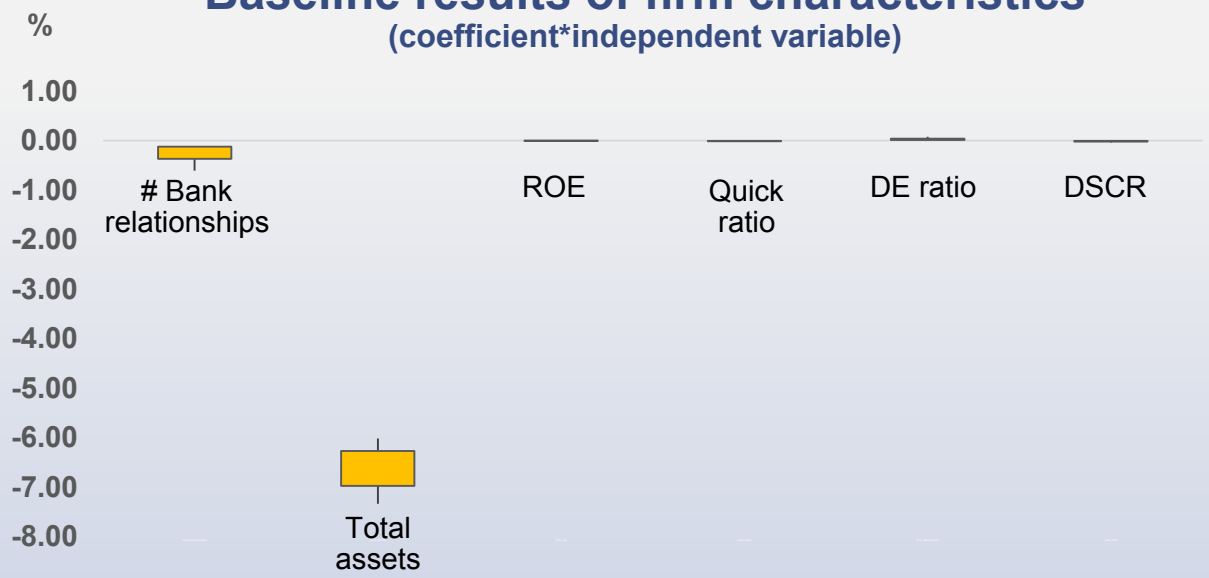
Results: loan rate setting – firm characteristics

Baseline results of firm characteristics
(coefficient)

Firm characteristic	coef. of interaction terms	25 pct.	50 pct.	75 pct.
No. bank relationships	- 0.1212***	1	2	3
ln (total assets)	- 0.3400***	18.43	19.38	20.51
Quick ratio	- 0.0083**	0.35	0.60	0.90
ROE ratio	- 0.0001	1.56	6.45	14.50
DE ratio	0.0079***	1.52	2.98	5.48
DSCR	- 0.0031***	1.15	1.86	4.02
Agriculture	- 0.4397***	-	-	-
Mining	0.1952	-	-	-
Commerce	0.0422	-	-	-
Construction	1.2161***	-	-	-
Real estate	0.2703	-	-	-
Utilities	- 0.0318	-	-	-
Service	0.3626**	-	-	-

***, **, * denotes significance level of 1, 5, and 10 percent, respectively

Baseline results of firm characteristics
(coefficient*independent variable)



- Firms in the construction and service sectors receive higher loan rates compared to industrials sector, while firms in the agriculatural sector receive lower rates
- Firms with higher bargaining power, more assets, more liquidity, less debt, and higher cash-flow-to-debt-costs receive lower loan rates. Only number of bank relationships is statistically and economically significant.

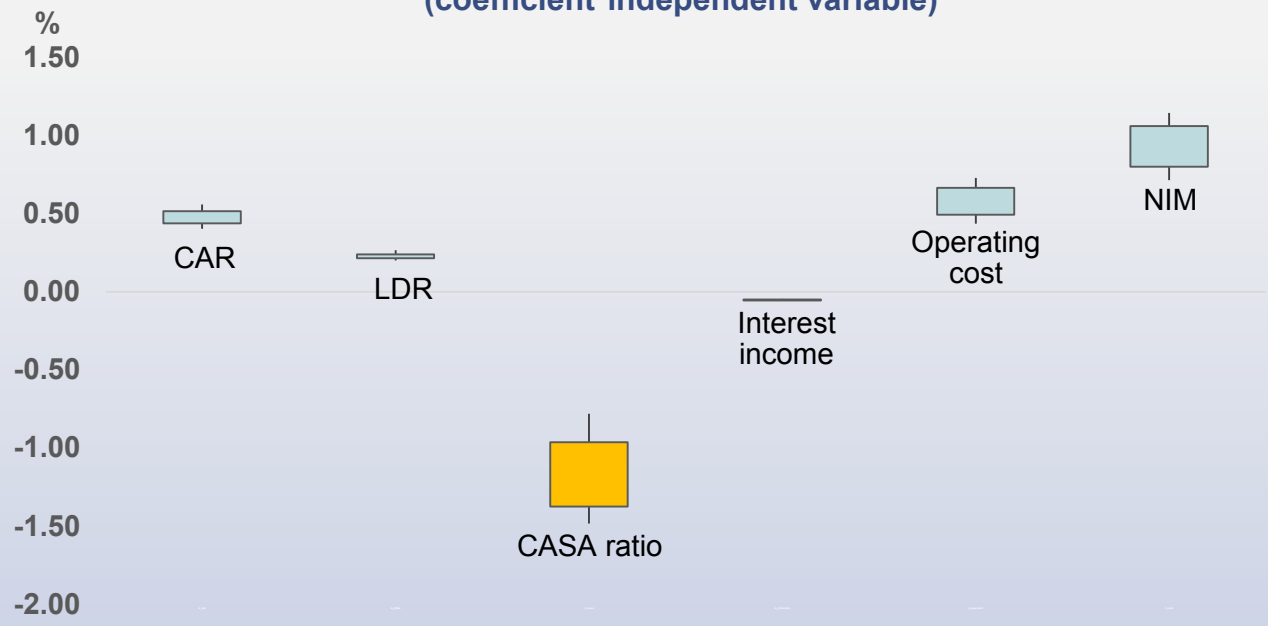
Results: loan rate setting – bank characteristics

Baseline results of bank characteristics
(coefficient)

Bank characteristic	coef. of interaction terms	25 pct.	50 pct.	75 pct.
CAR	0.0310***	14.15	15.35	16.63
LDR	0.0024***	88.32	92.76	98.21
CASA ratio	- 0.0225***	42.79	52.35	61.05
Interest income	0.0006	74.23	78.74	84.38
Operating cost	1.1855***	0.42	0.50	0.56
NIM	0.3065***	2.61	3.08	3.46
Medium bank	- 0.7801***	-	-	-
Small bank	0.0065	-	-	-
Foreign bank	- 0.2860***	-	-	-

***, **, * denotes significance level of 1, 5, and 10 percent, respectively

Baseline results of bank characteristics
(coefficient*independent variable)



- Foreign and medium-sized Thai banks set lower rates compared to large Thai banks.
- Banks with higher capital, tighter liquidity, less efficient operation, and higher risk appetite tent to set higher loan rates, while banks with more stable funding lend with lower rates.
- All of those variables, that are statistically significant, are also economically significant.

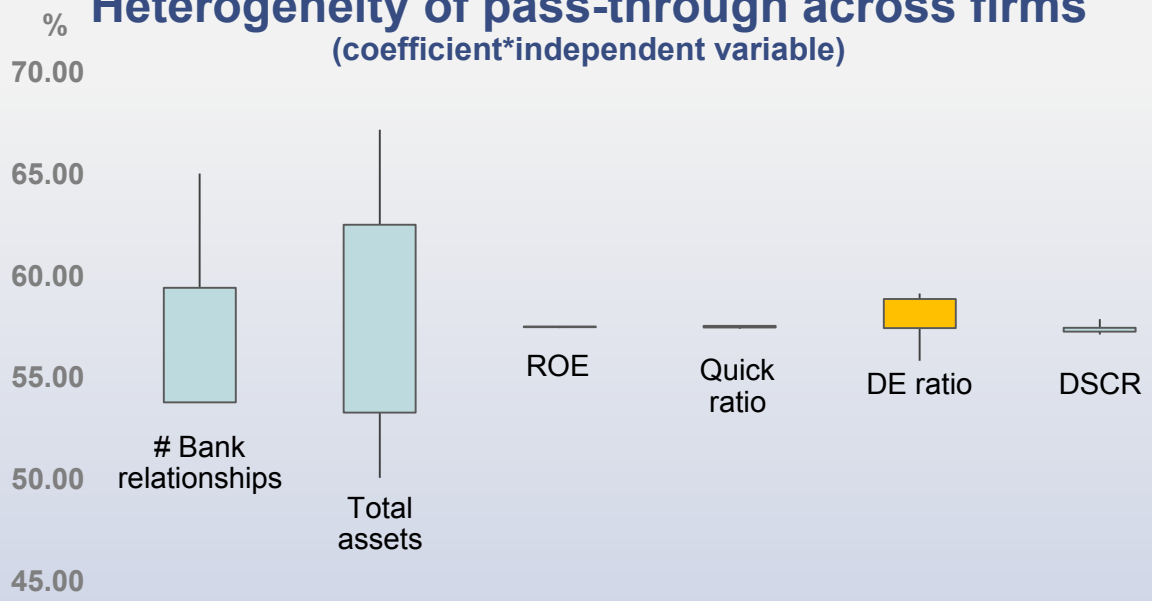
Results: heterogeneity of pass-through across firms

Heterogeneity of pass-through across firms
(coefficient)

Firm characteristic	coef. of interaction terms	25 pct.	50 pct.	75 pct.
No. bank relationships	0.0281**	1	2	3
ln (total assets)	0.0443***	18.43	19.38	20.51
Quick ratio	- 0.0016	0.35	0.60	0.90
ROE ratio	0.0000	1.56	6.45	14.50
DE ratio	- 0.0036	1.52	2.98	5.48
DSCR	0.0007**	1.15	1.86	4.02
Agriculture	- 0.1983	-	-	-
Mining	- 0.1844**	-	-	-
Commerce	- 0.0427	-	-	-
Construction	- 0.1076**	-	-	-
Real estate	- 0.0650	-	-	-
Utilities	- 0.1029*	-	-	-
Service	- 0.1494**	-	-	-

***, **, * denotes significance level of 1, 5, and 10 percent, respectively

Heterogeneity of pass-through across firms
(coefficient*independent variable)



- Firms with higher bargaining power, larger size, and higher cash-flow-to-debt-costs has a higher degree of pass-through.
- Almost every sector has a lower degree of pass-through compared to the industrial sector
- Only bargaining power and firm size contribute to a different level of pass through in descending order.

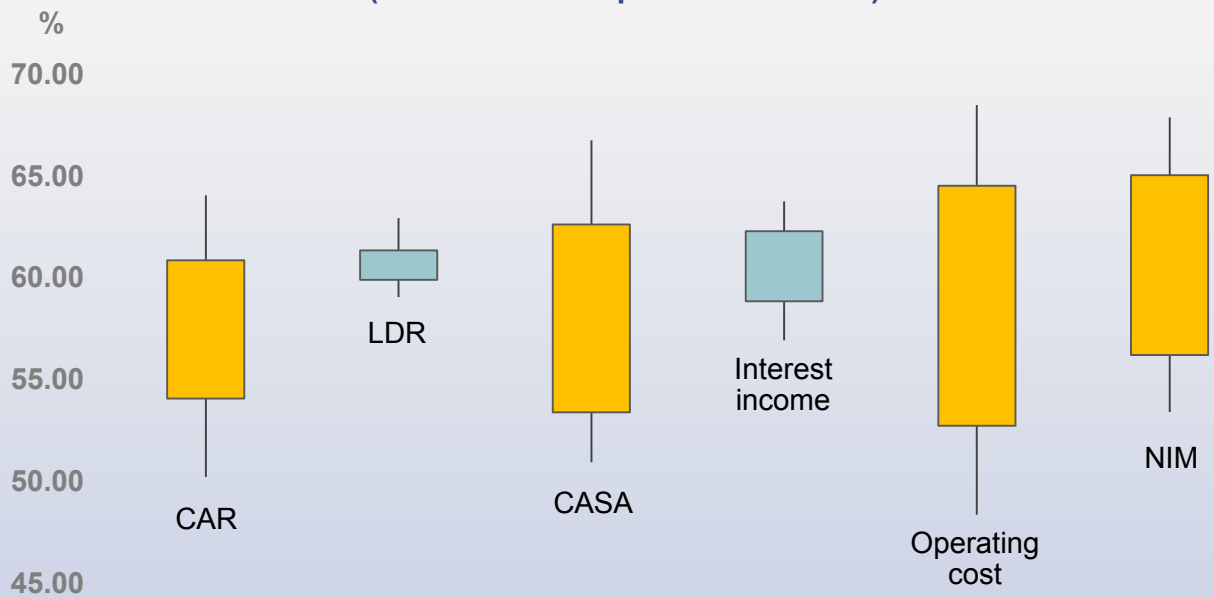
Results: heterogeneity of pass-through across banks

Heterogeneity of pass-through across banks
(coefficient)

Bank characteristic	coef. of interaction terms	25 pct.	50 pct.	75 pct.
CAR	- 0.0274***	14.15	15.35	16.63
LDR	0.0015***	88.32	92.76	98.21
CASA ratio	- 0.0051***	42.79	52.35	61.05
Interest income	0.0034***	74.23	78.74	84.38
Operating cost	- 0.8109***	0.42	0.50	0.56
NIM	- 0.1037***	2.61	3.08	3.46
Medium bank	0.0378	-	-	-
Small bank	- 0.1062***	-	-	-
Foreign bank	0.1115***	-	-	-

***, **, * denotes significance level of 1, 5, and 10 percent, respectively

Heterogeneity of pass-through across banks
(coefficient*independent variable)



- Banks with lower capital, tighter liquidity, less stable funding, higher share of interest income, less efficient operation, and higher risk appetite have higher degree of pass-through.
- Small banks are less sensitive to changes in policy rate, while foreign banks tend to pass policy shocks to customer more than large banks.

Results: Robustness check

Quantile regression

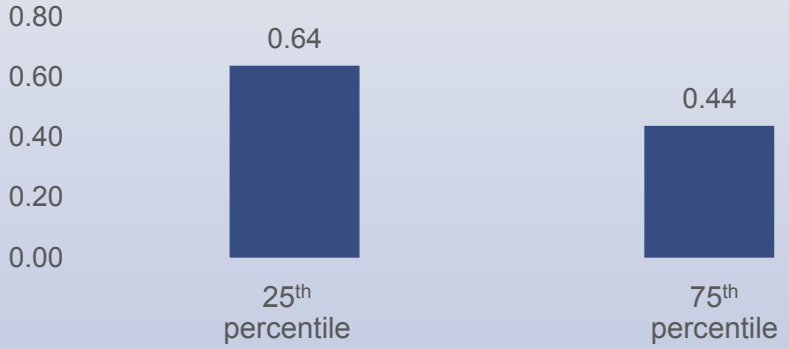
$$NLR_{lbkt}^{(q)} = \alpha^{(q)} + \sum_{i=0}^{p} \beta_i^{(q)} RP_{t-i} + \boldsymbol{\gamma}^{(q)'} loan\ charateristics_{lt} + \boldsymbol{\delta}^{(q)'} bank\ charateristics_{bt} +$$
$$\boldsymbol{\theta}^{(q)'} firm\ charateristics_{kt} + \boldsymbol{\varphi}^{(q)'} macro_t + \mu_b + \mu_k + \varepsilon_{lbkt}^{(q)}$$

Bank-type and firm-type fixed-effects

Loan Rate Setting – Mean vs Median

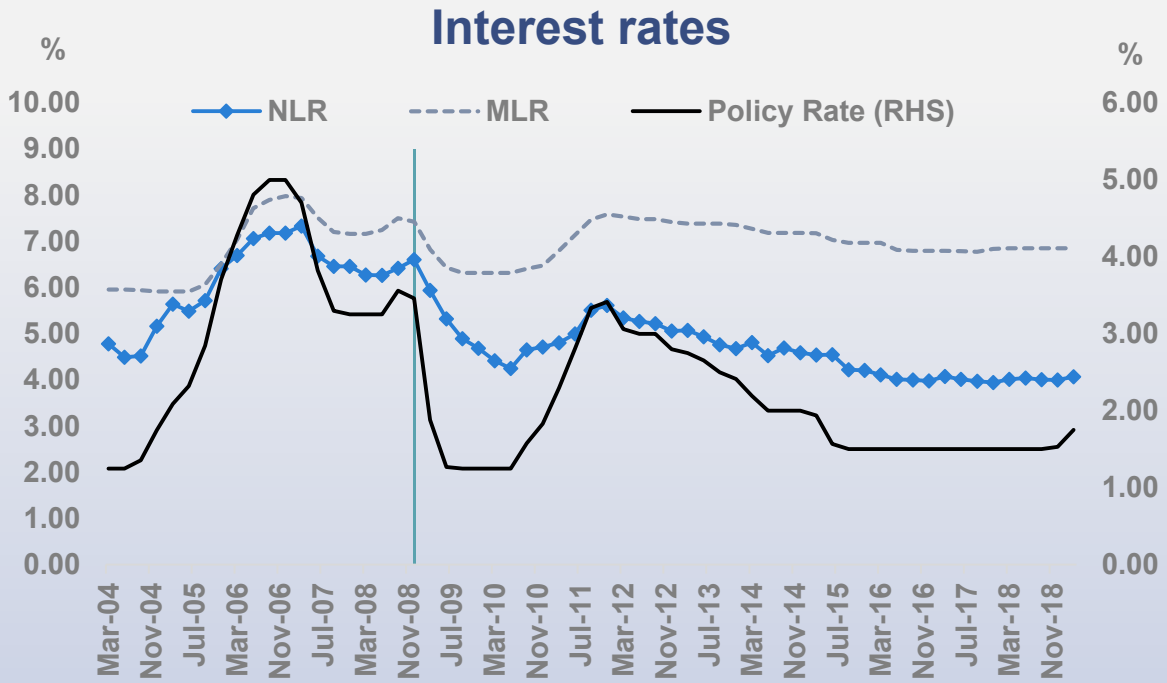
Variable	Mean	Median
RP	0.51	0.48
Bank characteristics/ Firm characteristics	These two models give similar results that is almost all coefficients except for commercial activity have the same sign and similar magnitude	

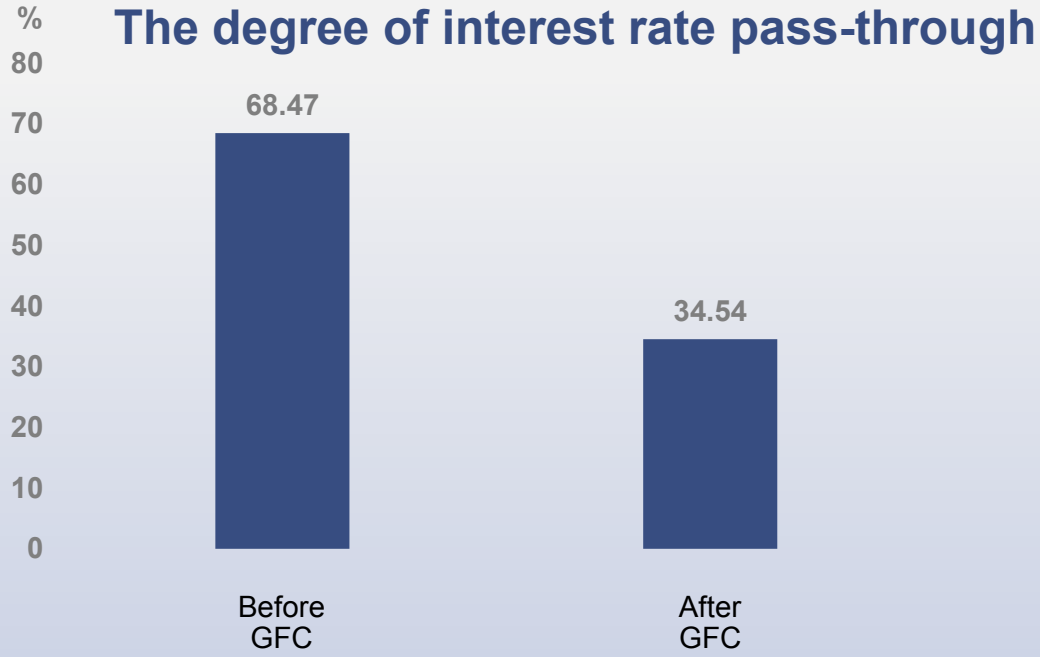
Degree of interest rate pass-through



- Results from mean and median are mostly in agreement
- The degree of interest rate pass-through is higher for the 25th percentile compared to the 75th . This also confirms firm heterogeneity results that firms receiving lower rates get more pass-through.

Results: structural break





- GFC represents a structural break in our dataset.
- The overall transmission was markedly lowered after the global financial crisis, decreasing from 0.68 to 0.35 possibly due to an increase in excess liquidity in the Thai banking system.

Conclusion

- **Misspecification: pass-through is much stronger on NLR than their window counterpart; the conclusions reached from conventional transmission analyses conducted on MLR could be invalid.**
- **Loan rate setting: firms with riskier risk profile do receive higher loan rates, while banks with more constraints tend to set rates higher.**
- **Heterogeneity of pass-through: (1) difference in bank and firm characteristics do contribute to a difference in the degree of interest rate pass-through and (2) policy rate have more of an effect on less risky firms and banks that have more constraints on balance sheet.**
- **The monetary policy rate pass-through was considerably weaker after the global financial crisis in 2008**