Banking structure and industrial growth: Evidence from China

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CONTENTS

Introduction and literature review

China puzzle

- Financial development **promotes** economic growth
- China： **non-positive and even negative** nexus
- Large and inefficient banking system dominated by four largest stated-owned banks (***Big Four***)

	Data set	***level***	***variables***	***results***
Aziz and Duenwald(2002)	1988-1997	province	Bank loan and GDP	NO evidence for a positive relation
Liang and Teng(2006)	1952-2001	nation	Bank credit and GDP	unidirectional causality from economic growth to financial development
Boyreau-Debray(2003)	1990-1999	province	Credit and economic growth	Negative
Guariglia and Poncet(2008)	1989-2003	province	Bank credit and household saving and GDP growth	Negative But declined in more recent years

Introduction and literature review

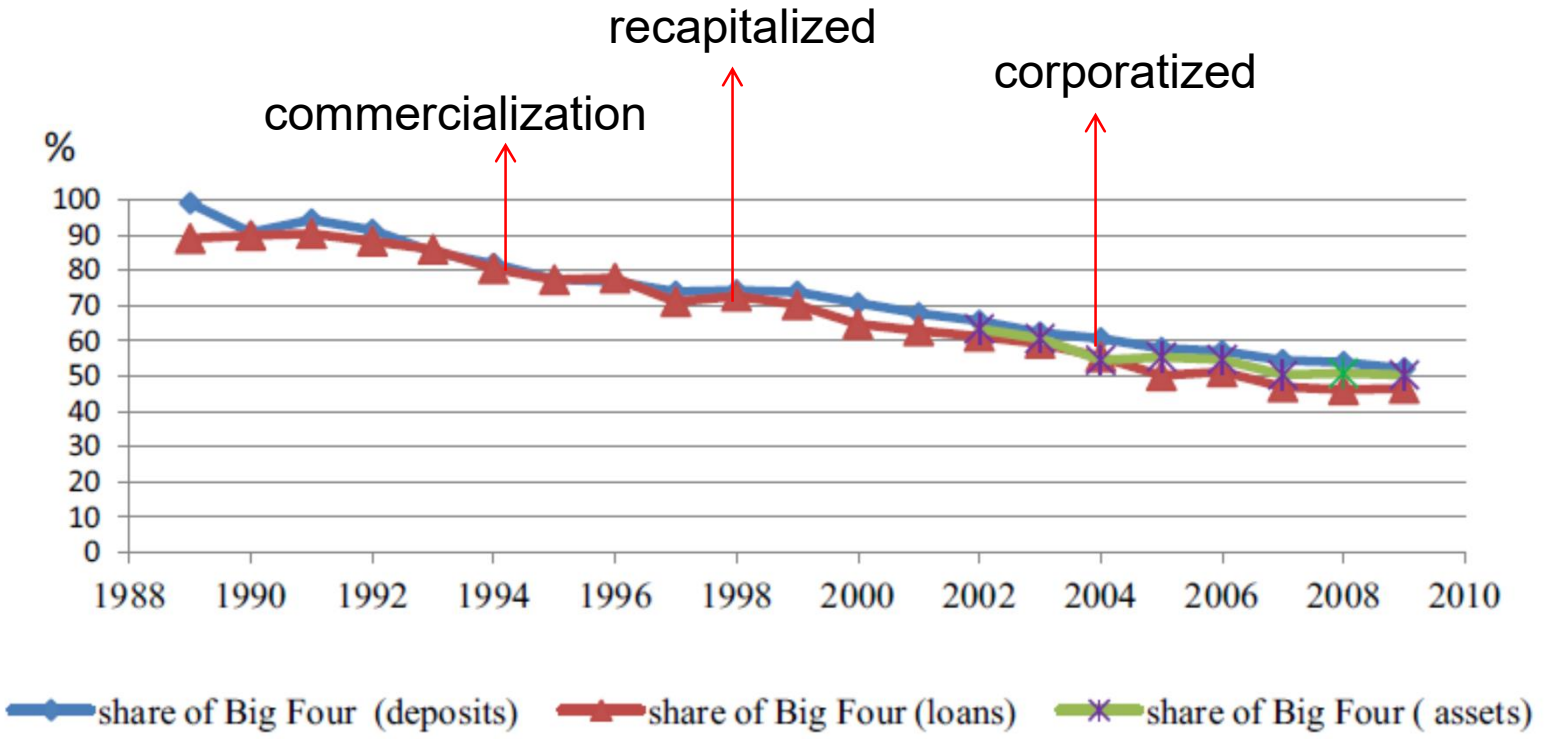
Non-positive and negative relation between financial growth and economic growth in china (continued)

	Data set	*level*	*variables*	*results*
Chang et al. (2010)	1991-2005	province	Bank fund reallocation /bank loans and regional economic growth	No correlation But appears to be positive in recent years
			Bank deposit and growth	positive
Demetriades et al.(2008); Ayyagari et al.(2010)		Firm	Bank financing and firm growth	Positive
Zhang et al. (2012)	2001-2006	City	Banking development and city economic growth	positive

Non-positive relationship using early data, but alleviated in recent years.

This paper focus on the non-positive relationship (more consistently been found in the literatures)

Introduction and literature review



Introduction and literature review

Two mechanisms

Ownership-structure view **Size-structure view**

- ***Ownership-structure view***

State ownership and corresponding government intervention
⇒ Ownership bias in lending
⇒ Favor state-owned enterprises (SOE) and against private business (non-SOE
⇒ SOEs are generally less efficient than private firms.

Boyreau-Debray (2003), Liang and Teng (2006),
Guariglia and Poncet (2008), and Ferri (2009). Allen et al. (2005) Cull et al.(2009)

Introduction and literature review

Two mechanisms

Ownership-structure view **Size-structure view**

- ***Size-structure view***

Improper dominance of large size banks

- Labor abundant and capacity scarcity
  comparative advantage in labor-intensive industry (often small business)
- Organization complexity and consequent difficult makes it hard for big banks to collect soft information of small business

(e.g. Many layers from headquarter to local officer , local offices have large cost to convince higher management to lend to the local firms

***Optimal path**:*

banking sector should be dominated by small and regional banks

Lin and Sun (2008) Chong et al.(2013)

Introduction and literature review

	Ownership-structure view	Size-structure view
Problem	State ownership	Large size
Lending bias	Lend to SOEs	Lend to capital-intensive firms Rather than small,local or labor-intensive firms
Policy implementation	Restrict state ownership Private the big four	Free entry of smaller, regional banks Downsize four banks giants

Big four are both state-owned and also the largest banks.
Any measure of the dominance of big four will capture both the two effects

Purpose and contribution:

Disentangling the two effects and examine the channel through which banking structure affects industrial growth

Methodology and data

1. **Distinguish two effects**: use Interaction terms

Ownership-structure view: big four lend to SOEs
Size-structure view: big four lend to capital-intensive enterprises

*Bank structure*non-SOEs enterprise share* ⟶ Capture Ownership-structure view
Bank structure*labor-intensive enterprise share ⟶ Capture size-structure view

2. Reverse causality
Bank structure ⟶ economic growth
Economic growth ⟶ bank structure :
economic growth due to small and non-SOE firms' development , which gives other financial institutions incentive to expand to meet the demands, crowding out the market share of big four.

For the key variables:
bank structure, non-SOEs enterprise share, labor-intensive enterprise share,
Measured by data of initial year in the sample period

Methodology and data

Data set:

- **Period: 1999-2007**
- **Industry: 28 manufacturing sectors**
- **Province: 30 provinces**

Data source:

Bank sector*: Almanac of China's Finance and Banking*
Industry*: China Data online ,China Industrial Economical Statistical Yearbook*
Macro: *China Statistic Yearbook*

Methodology and data

$$g_{jk} = \delta_0 + \delta_1 lkr_j * nonbig4_k + \delta_2 nonsoe_{jk} + \delta_3 nonsoe_{jk} * nonbig4_k + \delta_4 initialshare_{jk} + \sum \delta_{5j} dummy1_j + \sum \delta_{6j} dummy2_k + \mu_{jk}$$

Dependent variable		
Industrial growth	g_{jk}	annual compounded growth rate in real valued-added for industry j in province k
	g1	adjusted by PPI by industry
	g2	adjusted by PPI by province

Independent variables		
initial share of each industry	$initialshare_{jk}$	$\frac{value-added\ of\ industry\ j\ in\ province\ k\ in\ 1999}{total\ industrial\ GDP\ of\ province\ k\ in\ 1999}$
dummy	*dummy1*	Industry dummy
	dummy2	Province dummy

Methodology and data

$$g_{jk} = \delta_0 + \delta_1 lkr_j * nonbig4_k + \delta_2 nonsoe_{jk} + \delta_3 nonsoe_{jk} * nonbig4_k + \delta_4 initialshare_{jk} + \sum \delta_{5j} dummy1_j + \sum \delta_{6k} dummy2_k + \mu_{jk}$$

Independent variables		
Banking development	bdl_k	$\frac{total\ loans\ outstanding\ in\ province\ k}{GDP\ in\ province\ k}$
	bdd_k	$\frac{total\ deposits\ outstanding\ in\ province\ k}{GDP\ in\ province\ k}$
Banking structure	$nonbig4_k$	$1 - \frac{loans\ held\ by\ Big\ Four\ banks}{total\ loans\ in\ whole\ banking\ sector\ in\ province\ k}$
	$nonbig4\_dep_k$	$1 - \frac{deposits\ \ held\ by\ Big\ Four\ banks}{total\ deposits\ in\ whole\ banking\ sector\ in\ province\ k}$

Methodology and data

$$g_{jk} = \delta_0 + \delta_1 lkr_j * nonbig4_k + \delta_2 nonsoe_{jk} + \delta_3 nonsoe_{jk} * nonbig4_k + \delta_4 initialshare_{jk} + \sum \delta_{5j} dummy1_j + \sum \delta_{6j} dummy2_k + \mu_{jk}$$

Independent variables		
Share of non-SOEs	$nonsoe\_out_{jk}$	$\frac{gross\ output\ value\ of\ non-SOE\ enterprises\ of\ industry\ j\ in\ province\ k\ in\ 1999}{gross\ output\ value\ of\ industry\ \text{k in}\ 1999}$
	$nonsoe\_emp_{jk}$	$\frac{employment\ of\ industry\ j\ in\ province\ k\ in\ 1999}{total\ employment\ of\ industry\ j\ in\ province\ k\ in\ 1999}$
Labor Intensity	lkr_99_j	$\frac{the\ number\ of\ employees\ in\ industry\ j\ in\ 1999}{average\ balance\ of\ net\ value\ of\ fixed\ asset}$
	lkr_wu_j	WU(2008)
	lkr_us_j	average of labor-capital ratio of industry j in US from 1996-2005

Methodology and data

$$g_{jk} = \delta_0 + \delta_1 lkr_j * nonbig4_k + \delta_2 nonsoe_{jk} + \delta_3 nonsoe_{jk} * nonbig4_k + \delta_4 initialshare_{jk} + \sum \delta_{5j} dummy1_j + \sum \delta_{6j} dummy2_k + \mu_{jk}$$

- ***Labor-capital ratio***

1. *lkr_99*: official data
2. l*kr_wu*: Wu(2008) avoid problem from official data but based on several assumptions

3. *lkr_us*: *NBER-CES Manufacturing Database*

- *ranking order* of labor-capital ratio is consistent between US and China due to the intrinsic technology characteristic of industries
- avoid *endogeneity* issue caused by the endowment of Chinese economy
- since US financial market is more advanced and less constrained, labor-capital ratio should be the idea ratio exogenously determined by the pure technology property

Methodology and data

$$g_{jk} = \delta_0 + \delta_1 lkr_j * nonbig4_k + \delta_2 nonsoe_{jk} + \delta_3 nonsoe_{jk} * nonbig4_k + \delta_4 initialshare_{jk} + \sum \delta_{5j} dummy1_j + \sum \delta_{6j} dummy2_k + \mu_{jk}$$

- ***Interaction term: Predict δ_1 and δ_3 are positive***

$lkr_j * nonbig4_k$:
Positive effect of bank structure on industrial growth is stronger for more labor-intensive industry
Consistent with size-structure view

$nonsoe_{jk} * nonbig4_k$:
Positive effect of bank structure on industrial growth is stronger for industries with higher initial share of non-SOE
Consistent with ownership-structure view.

Methodology and data

Table 1
Summary statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
g1	804	0.184	0.107	−0.371	0.615
g2	804	0.163	0.11	−0.393	0.591
bdl	804	1.11	0.313	0.635	1.872
bdd	804	1.246	0.551	0.752	3.802
nonbig4	804	0.35	0.059	0.168	0.469
nonbig4_dep	804	0.324	0.067	0.142	0.435
lkr_us	804	10.675	7.705	1.05	34.91
lkr_wu	804	19.963	14.356	3.098	58.14
lkr_99	804	17.902	10.008	4.187	44.819
nonsoe_out	783	0.618	0.287	0	1
nonsoe_emp	783	0.503	0.268	0	1
initialshare	804	0.017	0.026	0	0.414

Table 2
Correlation coefficients.

	g1	*bdd*	*bdl*	*nonbig4*	*nongib4_dep*	*lkr_us*	*lkr_99*	*lkr_wu*	*nonsoe_out*
bdd	−0.16*	1							
bdl	−0.14*	0.72*	1						
nonbig4	0.10*	−0.04	−0.04	1					
nongib4_dep	0.08*	−0.08*	−0.32*	0.55*	1				
lkr_us	0.06	−0.03	−0.02	0.01	0.00	1			
lkr_99	0.05	−0.01	−0.02	−0.00	−0.00	0.83*	1		
lkr_wu	0.05	−0.02	−0.03	0.00	0.01	0.82*	0.96*	1	
nonsoe_out	0.04	0.00	−0.17*	0.11*	0.29*	0.36*	0.34*	0.36*	1
nonsoe_emp	0.001	−0.02	−0.19*	0.17*	0.32*	0.34*	0.32*	0.35*	0.91*

Notes: *Significance at the 10% level.

Results

1. Bank development(size),bank structure and industrial growth (with industry dummy)

Table 3
Banking development, banking structure, and industrial growth.

Variables	(1) *g1*	(2) *g1*
initialshare	−0.431*** [0.000]	−0.430*** [0.001]
bdl	−0.044*** [0.000]	−0.043*** [0.000]
nonbig4		0.177*** [0.005]
*lkr_us*nonbig4*		
nonsoe_out		
*nonsoe_out*nonbig4*		
nonsoe_emp		
*nonsoe_emp*nonbig4*		
Constant	0.236*** [0.000]	0.173*** [0.000]
Obs.	804	804
R-squared	0.191	0.200

- traditional measure of bank development (size) *bdl* **:** **significant negative** in (1)-(7)
- adding bank structure *nonbig4* in (2) : bank structure matters.

Both size and structure should be considered to measure bank development
(example Shanghai vs Ningxia)

Results

1. Bank development(size),bank structure and industrial growth (with industry dummy)

Variables	(3) *g1*	(4) *g1*	(5) *g1*
initialshare	−0.456*** [0.000]	−0.452*** [0.000]	−0.457*** [0.000]
bdl	−0.042*** [0.000]	−0.043*** [0.000]	−0.044*** [0.000]
nonbig4	0.185*** [0.003]	0.134** [0.037]	0.151** [0.024]
*lkr_us*nonbig4*	0.023** [0.023]		0.019* [0.071]
nonsoe_out		−0.315*** [0.001]	−0.252*** [0.004]
*nonsoe_out*nonbig4*		0.927*** [0.000]	0.729*** [0.004]
nonsoe_emp			
*nonsoe_emp*nonbig4*			
Constant	0.183*** [0.000]	0.185*** [0.000]	0.191*** [0.000]
Obs.	804	783	783
R-squared	0.209	0.222	0.227

- (3) lkr_us*nonbig4 : positive
Consistent with size-structure view
- (4) nonsoe_out*nonbig4: positive
Consistent with ownership-structure view
- (5) after controling each other, the two effects are still significant

Results

2. Bank structure and industry growth (with region and industry dummy)

Variables	(1) *g1*	(2) *g1*	(3) *g1*	(4) *g1*
initialshare	−0.372** [0.013]	−0.397*** [0.006]	−0.382*** [0.001]	−0.388*** [0.001]
*lkr_us*nonbig4*		0.021** [0.030]		0.018* [0.056]
nonsoe_out			−0.310*** [0.005]	−0.243** [0.021]
*nonsoe_out*nonbig4*			0.871*** [0.004]	0.661** [0.021]
nonsoe_emp				
*nonsoe_emp*nonbig4*				
Constant	0.134*** [0.000]	0.147*** [0.000]	0.133*** [0.000]	0.144*** [0.000]
Obs.	804	804	783	783
R-squared	0.347	0.354	0.373	0.377

- Drop *bdl* and *nonbig4* , but add regional dummy
- (2)(3)(4): interaction terms are still significantly positive both ownership and size effects exist
- When both interaction terms are added, the magnitudes are smaller,
- implies the positive relationship between labor-intensive companies and non-SOE companies (can refer to the correlation coefficient table)

Results

3. Robustness test : alternative measures of variables.

- Use lkr_99, lkr_wu
- Use g2

Similar results

3. Robustness test : *The share of small firm, bank structure and industry*

Logic to examine size-structure view before:
labor-intensive industries are smaller than capital-intensive industries

Test more directly

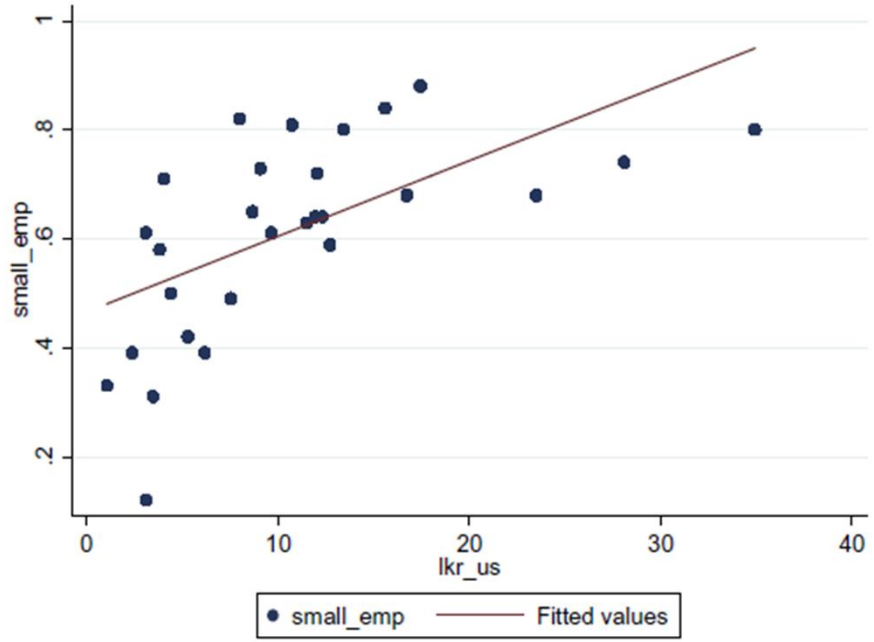
1. Are more labor-intensive firms smaller?
2. Replace *lkr*noonbig4* with *small_emp*nonbig4 / small_out*nonbig4*

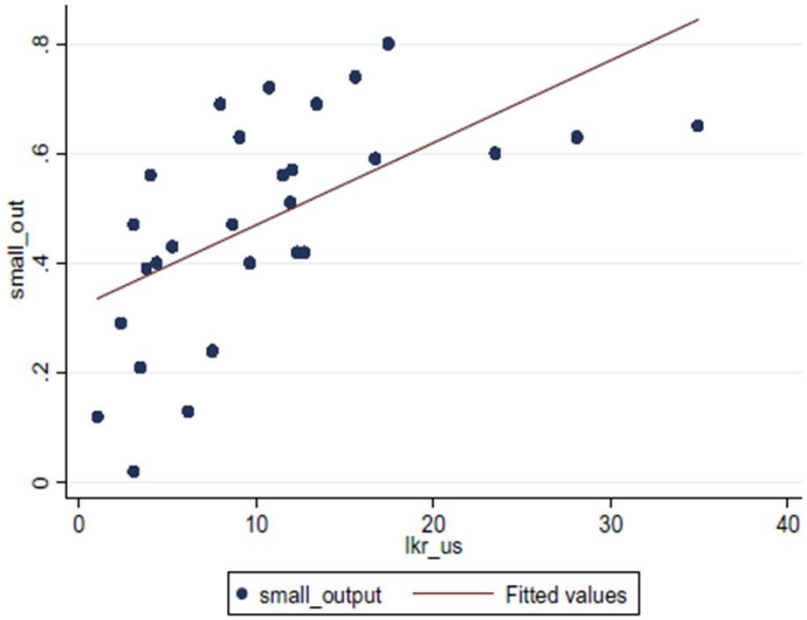
(*small_emp , small_out* :measure the share of small firms of each industry in 2004)

Results

3. Robustness test : *The share of small firm, bank structure and industry*

Are more labor-intensive firms smaller?





Results

3. Robustness test : *The share of small firm, bank structure and industry*

*Replace lkr*noonbig4 with small_emp*nonbig4 / small_out*nonbig4*

Table 7
The share of small firms, banking structure, and industrial growth.

Variables	(1) *g1*	(2) *g1*	(3) *g1*	(4) *g1*
*small_emp*nonbig4*	0.727**	0.449		
	[0.025]	[0.169]		
*small_out*nonbig4*			0.604*	0.468
			[0.061]	[0.138]
nonsoe_emp		−0.377***		−0.378***
		[0.006]		[0.005]
*nonsoe_emp*nonbig4*		0.992***		0.992***
		[0.007]		[0.006]
Obs.	804	783	804	783
R-squared	0.352	0.384	0.351	0.385

(1),(3) : interaction terms are still significantly positive.
Small banks are more capable of serving small firm.

(2),(4) interaction terms are positive but much smaller and less significant.
High correlation between share of small firms and share of non-SOEs

Results

3. Robustness test : *The effect of foreign bank*

Nonbig4 contains the effect from foreign bank

Foreign banks concentrated in large cities

Exclude Beijing,Shanghai,Shenzhen and Guangzhou samples

Similar results

Results

4. **Structure change test**: *Has lending bias been alleviated in recent years?*

Divide the sample period into two periods
1999-2003 and 2004-2007

Table 9
Regression results for two short periods.

Variables	1999–2003			
	(1) *g1*	(2) *g1*	(3) *g1*	(4) *g1*
*lkr_wu*nonbig4*	−0.002	−0.004		
*lkr*nonbig4*			−0.002	−0.003
nonsoe_out	−0.43***		−0.43***	
*nonsoe_out*nonbig4*	1.31***		1.29***	
nonsoe_emp		−0.57**		−0.55**
*nonsoe_emp*nonbig4*		1.73***		1.67***
Obs.	758	758	758	758
R-squared	0.267	0.277	0.267	0.276

1999-2003:
Interaction terms are significantly positive and large magnitude
Ownership bias is severe in early stage

Results

4. **Structure change test**: *Has lending bias been alleviated in recent years?*

Variables	2003–2007			
	(5) *g1*	(6) *g1*	(7) *g1*	(8) *g1*
*lkr_wu*nonbig4*	−0.01	−0.01		
*lkr*nonbig4*			−0.01	−0.01
nonsoe_out	−0.05		−0.04	
*nonsoe_out*nonbig4*	0.14		0.13	
nonsoe_emp		0.05		0.05
*nonsoe_emp*nonbig4*		−0.07		−0.06
Obs.	737	737	737	737
R-squared	0.390	0.390	0.390	0.390

2004-2007: Interaction terms are no longer significant

Structure changes over two periods

Possible reasons:
1. Behavior of SOE banks changes. Reduced ownership bias
2. Ownership bias still exists, but the performance of SOE enterprise improved.
3. Redistribution channels: bank loans granted to SOEs flow to non-SOEs

Conclusion

- Controlling for the size-structure effect, ownership-structure effect exists

in provinces where non-Big-Four banks have larger market shares,

industries with higher shares of non-state-owned enterprises grow faster than industries with higher shares of SOEs

- Controlling for the ownership-structure effect, size-structure effect exists

in provinces with more active small banking institutions

more labor-intensive industries grow faster than more capital-intensive industries

- The paper also implements a **structural change** test over two short periods,

1999–2003 and 2003–2007.

- Policy implementation: not only reform the ownership structure, but also promote small banking institution.

Comments

1. Use interaction terms to examine different mechanisms separately

2. **Endogeneity**

Use the initial value of sample period (to avoid reverse causality)

Use data out of sample(e.g from another country) to reflect the intrinsic characteristic and avoid endogeneity as well

3 **Robust test**

Try various measure of variables

Use correlation coefficient to explain the magnitude and significant changes among models

4. Divide sample period to test structure change