Does Financial Repression Inhibit Economic Growth?

Empirical Examination of China's Reform Experience[*]

Yiping Huang and Xun Wang

China Center for Economic Research, Peking University, China

First Draft: 16 May 2010
First Revision: 30 August 2010

[**Abstract**] This paper examines the impacts of financial repression on economic growth during China's reform by period using both time series and provincial panel data. The aggregate financial repression index suggests that China's financial liberalization has been nearly half way through. Empirical estimation confirms that repressive policies held down GDP growth by 3.0-3.6 percentage points in 1978 and by 1.7-2.1 percentage points in 2008. Various robustness checks validate these findings. Financial repressions hurt growth probably through inhibition of financial development. Specifically, we find that state sector's share of bank loans and capital account controls have the greatest impacts on economic growth, while those of interest rate and reserve requirement regulations are important but relatively more modest in magnitudes.

Key words: Financial repression, financial liberalization, economic growth, China

JEL Codes: E44, G18, O53

Does Financial Repression Inhibit Economic Growth?
Empirical Examination of China's Reform Experience

Introduction

Economic theories suggest that financial repression should impact economic growth negatively (Schumpeter 1911; McKinnon 1973). The literature has identified a number of possible mechanisms through which financial liberalization promotes growth, including facilitating financial development, improving allocative efficiency, inducing technological progress and enhancing financial stability (Shaw 1973; Levine et al. 2000). A large number of empirical studies also confirms positive correlations between financial liberalization and economic growth (Levine 2005; Trew 2006). Such beliefs were probably behind the waves of global financial liberalization beginning from the early 1970s.

Other economic studies, however, raise questions about this definitive theoretical prediction. Prasad et al. (2003), for instance, find no clear-cut relationship between economic growth and financial globalization by examining a global dataset of emerging market economies. In addition, the period of global financial liberalization during the past decades also coincided with increased frequency of financial crises. Stiglitz (2000) attributes the rising financial risks to financial market liberalization in developing countries. Perhaps developing countries are more able to manage money supply and financial stability under repressive financial policies (Stiglitz 1994).

The Chinese experience during the reform period offers an interesting case study for this important theoretical and policy question. Despite more than thirty years' economic reform, the Chinese economy still possesses typical characteristics of financial repression: heavily regulated interest rates, state influenced credit allocation, high official reserve requirement and strict capital account controls. In the meantime, China has achieved very strong GDP growth, averaging 10 percent for the reform period, and has been the leader of global economic growth. If China was able to maintain strong macroeconomic performance in presence of repressive financial policies, is

financial liberalization necessary or even desirable?

The Chinese story may also offer some important policy lessons for other developing countries. Since the late 1970s, China has focused more on liberalization of product markets. Its financial liberalization generally lagged other developing countries, especially those in East Asia (Ito 2006). Does this asymmetric liberalization approach provide a more advisable reform model for other developing countries? However, this is possible only if either repressive financial policies do not matter for economic growth or the benefits of those policies outweigh their costs.

The main purpose of this paper is to empirically examine the impact of financial repression on economic growth and then shed some lights on the possible mechanisms behind this correlation. We follow the proposition by McKinnon (1973) and Shaw (1973) that poorly functioning financial systems in developing countries may affect negatively quality and growth rate of the economy. And the central hypothesis of this study is that the Chinese paradox does not contradict conventional theoretical prediction that financial liberalization should promote growth. Though still highly repressive, the Chinese financial system is a lot freer now than thirty years ago. Perhaps it was not financial repression but *reduction* in financial repression that contributed to China's strong growth performance.

We conduct the analyses in three steps. First, we construct a quantitative measure of financial repression for China, by applying the principal component analysis approach. Second, we then investigate effects of financial repression on economic growth using both national time series and provincial panel data for the entire reform period. And, finally, we examine possible mechanisms through which repressive financial policies affect economic growth.

This study reveals some important findings. Although its financial system remains highly repressive, China experienced significant financial liberalization during the reform period. Both time series and panel data analyses discover significant and

negative impacts of financial repression on economic growth. The negative effects can be explained by inhibition of financial development, dominance of financial resources by the state sector, capita account controls and interest rate regulations. These findings have important policy implications for not only China but also other developing countries.

The remainder of the paper is organized as follows. In the next section we first review the existing literature and then briefly discuss the central hypothesis. Section three constructs the financial repression index (FREP) for China during the reform period. Section four examines the impacts of FREP on economic growth during China's reform period using both time series and panel data. In section five we explore the likely channels of impacts of FREP by assessing roles of individual variables used for constructing FREP and the financial development index. And the final section concludes the paper.

Literature Survey and the Hypothesis

The relationship between financial system and real economy is an old and controversial subject. Schumpeter (1911), for instance, argued that a well developed financial sector should help allocate financial resources to the most productive and efficient use. Thus services provided by the financial intermediaries would be important for promoting production and innovation. In the meantime, Robinson (1952) suggested that financial development did not have a causal effect on, but followed economic growth.

In examining the causal relationship between financial development and economic growth, Patrick (1966) distinguished 'demand-following' and 'supply-leading' phenomena. In his conceptual framework, 'demand-following' referred to the phenomenon in which creation of modern financial institutions and related financial services is in response to the demand in the real economy. By contrast, 'supply-leading' referred to the phenomenon in which creation of financial institutions and related financial services in advance of demand for them.

The main body of the literature in this area, especially those focusing on developing country experiences, grew during the past two decades (Pagano 1993; Trew 2006). This was because worldwide financial liberalization was a relatively recent phenomenon. The increase in frequency of financial crises, including the 1994 Latin America debt crisis and the 1997 East Asian financial crisis, also prompted strong research interest in this area. Up to now, however, economists remain divided on economic consequences of financial liberalization.

The concept of financial repression was initially proposed by McKinnon (1973), who defined financial repression as government financial policies strictly regulating interest rates, setting high reserve requirement on bank deposits, and compulsory allocating resources. Such repressive policies, commonly observed in many developing countries, would impede financial deepening and hinder efficiency of the financial system. Therefore, they should impact economic growth negatively (McKinnon 1973; Shaw 1973). Repressive policies are generally more common in banks than in capital markets.

This line of argument is widely accepted by many economists and is the theme of a large body of literature (Levine 2005). Pagano (1993) showed that financial policies such as interest rate controls and reserve requirement lower financial resources available for financial intermediating activities. Likewise, Roubini and Sala-i-Martin (1992) presented theoretical and empirical analyses of the negative relationship between repressive financial policies and long-term economic growth. King and Levine (1993) developed an endogenous growth model to illustrate that financial sector distortions reduce rate of economic growth by lowering rate of innovation.

But there are also opposing views. Stiglitz (2000), for instance, argued that the recently increased frequency of financial crises was closely associated with financial market liberalization in developing countries. Arestis and Demetriades (1999) pointed out that the conventional financial liberalization hypothesis is based on a set of strong assumptions including perfect competition and complete information. These assumptions, however, often do not hold in many countries. And these countries may

be more able to deal with problems of market failure under financial repression (Stiglitz 1994).

Empirical findings are equally controversial. Roubini and Sala-i-Martin (1992) demonstrated that a fraction of weak growth experience in Latin American countries could be explained by financially repressive policies. Using time series data for Malaysia, Ang and McKibbin (2007) also discovered that financial liberalization, through removal of repressive policies, had a favorable effect on stimulating financial development. On the contrary, Arestis and Demetriades (1997) and Demetriades and Luinte (2001) revealed that financial repression in South Korea had positive effects on its financial development.

Chinese experiences probably inject more controversy to this discussion. Compared with its East Asian neighbors, China probably has the most repressive financial system, yet it also enjoys the strongest growth. In addition, China escaped more devastating damages from the 1997 East Asian financial crisis and the 2008 U.S. subprime crisis, mainly due to its repressive financial policies and closed capital account. These call for a reassessment of costs and benefits of financial liberalization.

Maswana (2008) suggested that, although repressive financial policies were bad for allocative efficiency, they probably created what he described as 'adaptive efficiency', an ability for the government to quickly adapt to the changing environment. Li (2001) also argued that mild financial repression helped China maintain financial stability needed for reform. But over time financial repression inflicted increasing costs in terms of lowering economic efficiency. Moreover, it tends to be self-propelling and self-sustaining, creating a low-efficiency trap that prevents financial sector liberalization.

Lardy (2008) estimated that financial repression, mainly through negative real interest rates, cost Chinese households about 255 billion yuan (US$36 billion) or 4 percent of GDP, in addition to lowering overall economic efficiency. According to Lardy, the

corporate, the banks and the government, respectively, captured one-quarter, one quarter and half of the implicit net tax imposed on households by financial repression. Liu and Li (2001) also confirmed positive contributions of financial liberalization to economic growth during China's reform period.

We propose the central hypothesis of this study that repressive financial policies impact negatively on economic growth during China's reform period. A natural extension of the above hypothesis is that *reduction* in financial repression or financial liberalization contributed to China's strong economic growth. China is not an exception of the conventional theory of financial repression, pioneered by McKinnon (1973) and validated by many economists (Levine 2005).

This may appear ironic since the repressive financial policies, including interest rate regulation and credit allocation, were originally introduced to promote growth in China.[1] But they end up hurting growth. There are probably many mechanisms for this negative correlation, and here are three possible examples. First, heavy interest rate regulations probably prevent the credit market from achieving its equilibrium. Second, financial repression most likely suppresses private investment and, therefore, reduces overall investment efficiency. And, third, repressive policies also inhibit financial development, which, in turn, slows economic growth.

Constructing the Financial Repression Index (FREP)

In order to conduct empirical examination, we need to construct an aggregate measure of financial repression, which, by definition, covers a list of policy variables (McKinnon 1973). In this study, we follow Ang and McKibbin (2007) by applying the principal component analysis (PCA) approach, which was originally adopted by Demetriades and Luintel (1997; 2001). The advantage of the PCA approach is that it deals with problems of both multicollinearity and over-parameterization. Later on, we also apply alternative

---

[1] We thank the Editor of this journal for pointing out the fact that repressive financial policies were initially motivated by achieving strong growth.

measures of financial repression, such as negative real interest rates and simple average of the individual variables, to check robustness of the estimation results.

We adopt a relatively broad definition of financial repression, which includes indicators in six areas: (1) negative real interest rate; (2) interest rate controls; (3) capital account regulations; (4) statutory reserve requirement; (5) public sector share of bank deposits; and (6) public sector share of bank loans. We first collect information for these six variables and then derive a uniform index through statistical analysis.

The first variable is real deposit interest rate (RID). Following Agarwala (1983) and Roubini and Sala-i-Martin (1992), we set RID to 0 if real interest rate is positive and to 1/2 if real interest rate is negative but higher than minus 5% and to 1 if real interest rate is lower than minus 5%.

The second variable is interest rate control (ICI), which is the proportion of types of interest rates subject to government controls. At the start of the reform, there were a total of 63 types of interest rates under controls. These included 14 types of deposit rates, 14 types of lending rates, 19 types of preferred lending rates, 10 types of foreign currency deposit rates and 6 types of foreign currency lending rates. Each category is set to 1 if there was control and to 0 otherwise. Since foreign currency rates are relatively less significant, we assign to them only half the weight of local currency rates.[2]

The third variable is capital account control (CAC), which is built on the method adopted by Jin (2004). Applying classifications by OECD and China's State Administration of Foreign Exchange (SAFE), we estimate degrees of restrictions for all 11 categories of capital account transactions. We first set each category to 1 for the years before 1978, meaning strict control. Likewise an index of 0.75 refers to strong control, 0.5 moderate control, 0.25 less control and 0 liberalized. CAC is the average score of all categories. A higher score represents stricter capital account control.

---

[2] There are 47 types of local currency interest rates and 16 types of foreign currency interest rates. 16 foreign currency rates are regarded as 8 as we only assign half of the weight of a local currency rate. So the total calculated number of types of interest rates is 55.

The fourth variable is statutory reserve requirement ratio (SRR). Before 1984, there was no reserve requirement policy. By definition, statutory reserve is the financial resources that commercial banks cannot lend out by discretion. For the years before 1984, we set SRR to the ratio of the deposit that the central bank cannot allocate itself, such as fiscal deposit, basic construction deposit and deposit of non-profit institutions.[3] After that, SRR was the actual ratio set by the People's Bank of China (PBOC).[4]

The fifth variable is the share of the state sector in total outstanding deposits (PDR), while the sixth variable is share of the state sector in total outstanding loans (PCR). High readings of these variables imply heavier influences of the state in allocation of financial resources.

To construct a single FREP, we first estimate correlation matrix for all six variables (Table 1). The correlation coefficients are indeed quite high for most pairs of variables. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is 0.767 and the statistic of Bartlett's sphericity test is 201.6, both of which are much greater than their respective critical values. These suggest that the principal component analysis approach is appropriate.

Table 1. Correlation Matrix: Financial Repression Variables

	RID	ICI	CAC	SRR	PDR	PCR
RID	1.000					
ICI	0.654	1.000				
CAC	0.859	0.658	1.000			
SRR	0.423	0.908	0.563	1.000		
PDR	-0.193	-0.012	-0.089	0.147	1.000	
PCR	0.522	0.959	0.562	0.927	0.042	1.000

Source: Authors' estimation applying principle component analysis extraction method.

---

[3] The People's Bank of China (PBOC) served as both of the central bank and a commercial bank and did not set statutory reserve requirement until 1984.

[4] This treatment may be problematic since before 1984 the government directly controlled credit. Hopefully such controls might be reflected indirectly in some other variables such as interest rate controls and public sector shares of deposits and loans.

We then examine the total variance explained by the principal components (Table 2). Since the third eigenvalue is less than 1, we only extract the two principal components, which explain 84 percent of total variance contained in all variables. Based on the initial eigenvalues associated with relevant components, we can calculate FREP as the composite component using the following formulae:

(1)

**Table 2. Total Variance Explained: Financial Repression Variables**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.834	63.907	63.907	3.834	63.907	63.907
2	1.207	20.120	84.028	1.207	20.120	84.028
3	0.722	12.026	96.054			
4	0.169	2.810	98.863			
5	0.044	0.735	99.599			
6	0.024	0.401	100.000			

Source: Authors' estimation results applying principle component analysis extraction method.

To make it easier to read, we normalize the FREP series by first setting the reading for completely liberalized financial system to 0 and also setting the reading at the start of the sample period (year 1978) to 1 (Chart 1).[5] FREP fell from 1 in 1978 to 0.586 in 2008. In fact, the lowest reading was 0.516 in 2006. The index rebounded slightly in the following years, probably as responses to the global financial crisis. The readings of FREP reveal at least two important policy messages. One, the reform period did witness significant reduction in the degree of financial repression. And, two, financial liberalization is only less than half-way through. Compared with goods market liberalization, financial liberalization lags significantly.

---

[5] According to the derived raw data series of FREP, the number -7.4 represents the state of no financial repression.

Chart 1. Financial Repression Index for China, 1978-2008 (1978=1.0)
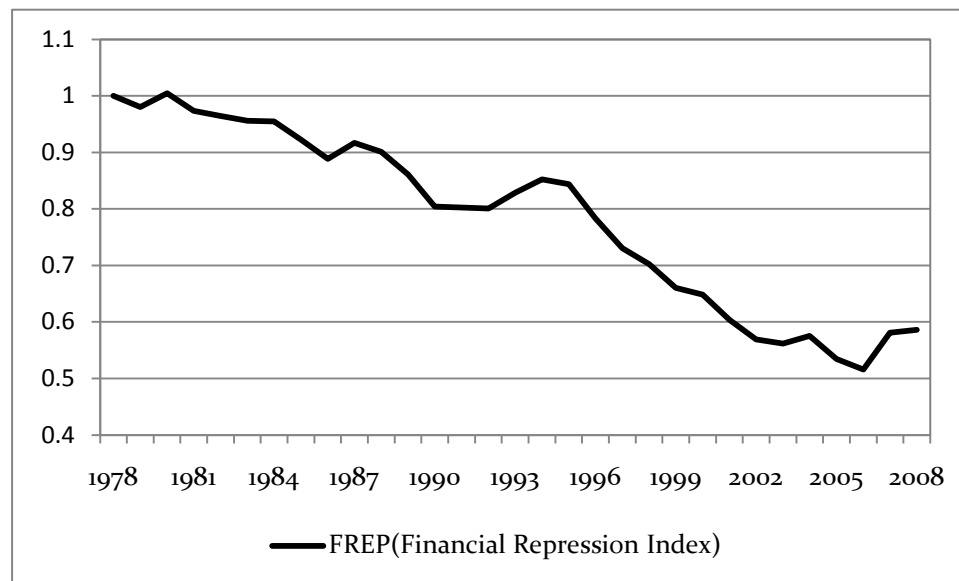
Impacts of Financial Repression on Economic Growth

We examine the impacts of FREP on economic growth in three steps. The first step involves time series data for the period 1979-2008. The second step addresses a panel data set of 25 provinces during the same period. And in the final step we conduct robustness checks in order to validate the findings.

<u>National Time Series Data Analyses</u>

As Nelson and Plosser (1982) pointed out, most macroeconomic series are non-stationary. We first use unit root test to each seriesto avoid the problem of spurious regression (Appendix Table 1). The results suggest that all variables have unit root but their first-order differences are stationary. We then conduct the Johansen co-integration test to identify the long-run equilibrium relations between the key variables by applying the following model:

(2)

where X is a vector of variables, including per capita real GDP in logarithmic form, FREP, INV (investment share of GDP), TRADE (trade share of GDP), EDU (share of university students in total population), GOV (government expenditure share of GDP),

SOE (state sector share of GDP) etc; is a vector of exogenous variables. α is the co-integration vector, which implies the long run equilibrium relationship among the variables; and β is the matrix of adjusting coefficients which indicates the convergence speed of a variable to its equilibrium state when suffered from an outside shock.

In order to identify long run relationship, we adopt FREP, INV, TRADE, EDU, GOV, and SOE as explanatory variables for LnRGDP.[6] To determine the lag orders, we first estimate level VAR which uses the original series (not the differenced series). Then the lag orders used in Johansen co-integration procedure are chosen by minimizing the information criterion, SIC as before.

Given the potential missing variable problem, we take into account the effects of political incident and financial crisis by introducing three dummy variables: the Tiananmen incident, D1 (1989), Asia financial crises, D2 (1997-1999) and US subprime crisis, D3 (2007-2009). Trace statistic and maximum eigenvalue statistic again show that there is one co-integration relationship between financial repression and economic growth. The diagnostic checks for serial correlation and normal distribution of residuals confirm that the model is well fitted (Table 3).[7]

---

[6] During our exercises initially we also included TRADE and EDU as independent variables of LnRGDP. However, both variables performed poorly in the co-integration equation. LR test shows these two variables should be excluded from co-integration equation. Therefore, we only report the results without these two explanatory variables.

[7] Both of the trace statistic and maximum eigenvalue statistic imply unique co-integration relation. LM test for serial autocorrelation shows that we cannot reject the null hypothesis that there is no serial correlation in residual matrix at 5% significant level. JB test for normality shows that residual vectors follow joint normal distribution at 1% significant level. Therefore, residual diagnostic check implies the model is fitted well.

Table3. Johansen Cointegration Test and Diagnostic Check

H₀		λ_trace Statistic test		H₀		λ_max Statistic test	
	H₁	statistic	critical value		H₁	Statistic	critical value
r=0	r>0	96.60***	69.82	r=0	r=1	43.83***	33.88
r≤1	r>1	42.78	47.86	r=1	r=2	23.41	27.58
r≤2	r>2	29.37	29.80	r=2	r=3	17.87	21.13
r≤3	r>3	11.50	15.49	r=3	r=4	9.35	14.26
r≤4	r>4	2.15	3.84	r=4	r=5	2.15	3.84

Residual diagnostic check
LM test for AR(1): P-value of Chi-square statistic=0.485
JB test for Normality: P-value Chi-square statistic=0.174

Notes: "***", "**" and "*"indicate 10%, 5% and 1% level of significance, respectively.
Source: Authors' estimation results.

FREP, INV, GOV and SOE are significant at 1% significance level and all signs are consistent with predictions by economic theory (Table 4).[8] The co-integration equation is defined by the following equation:

$$(3)$$

Since the adjustment coefficient of FREP is insignificant, financial repression is weakly exogenous relative to economic growth. The results imply that repressive financial policies probably held down per capita GDP growth by 3.5 percentage points in 1978 or 2.1 percentage points in 2008. But the actual potential gains are probably smaller than those numbers since the equilibrium in a real world is probably not zero financial repression.

---

[8] Note that since variables in co-integration equation are non-stationary, traditional t-test is invalid and we shall use Likelihood Ratio (LR) testing the co-integration vector. Significant test statistics about the adjustment coefficient follows standard distribution for co-integration equation as a whole is stationary.

Table 4. Co-integration Equation and Adjustment Coefficient estimation

LnRGDP	FREP	INVT	GOV	SOE	C
Cointegration Equation					
1	3.495***	-3.956***	2.296***	1.429***	8.201***
Ajustment Coefficinet					
-0.076**	-0.18	0.042	0.062***	-0.008	
(0.037)	(0.356)	(0.046)	(0.023)	(0.073)	

Notes: numbers in parenthesis are standard errors. "***", "**" and "*"indicate 10%, 5% and 1% level of significance, respectively.

Source: Authors' estimation results.

<u>Provincial Panel Data Analyses</u>

To validate the findings of time series data analyses, we now examine the impacts of financial repression on economic growth using a panel data set of 25 provinces covering the same period. Following Dowrick and Nguyen (1989) and Drysdale and Huang (1997), among others, we specify the following two-way static model for empirical estimation:

$$ \qquad (4) $$

Where, again, LnRGDP is per capita real GDP in logarithm

ic form, INV is investment share of GDP, TRADE is trade share of GDP,   is the share of university students in total population, GOV is government expenditure share of GDP, and SOE is share of the state sector in GDP;   and   are the (unobserved) individual and time- specific effect;   represents the effects of those unobserved variables that vary over *i* and *t*. The Data Appendix at the end of the paper offers some descriptions of variable definitions and data sources.

We start from the basic growth regression on determinants of economic growth in provincial levels and add the measure of financial repression to the basic equations. This enables us to control the usual determinants of economic growth before examining the exact impact of financial repression. The regression results, using fixed effect (FE), random effect (RE), pooling regression (Pooling) and GEE population average estimation, are generally consistent with conventional expectations: positive contributions of investment, trade openness and education and negative contributions of the government expenditure and state sector to per capita GDP growth (Table5).

Furthermore, Hausman test suggests that fixed effect estimation is more appropriate than random effect estimation.

Table 5 Growth Equations: The Basic Model

Dependent Variable	FE	RE	Pooling	GEE
LnRGDP	1	2	3	4
INV	2.158***	2.404***	3.064***	2.287***
	(0.173)	(0.17)	(0.181)	(0.169)
TRADE	0.138*	0.218***	0.506***	0.178***
	(0.071)	(0.069)	(0.058)	(0.069)
EDU	70.84***	72.712***	76.414***	71.828***
	(3.98)	(3.907)	(3.565)	(3.9)
GOV	-5.135***	-4.773***	-4.062***	-4.945***
	(0.415)	(0.402)	(0.359)	(0.404)
SOE	-1.843***	-1.415***	-0.336***	-1.618***
	(0.176)	(0.162)	(0.117)	(0.167)
Hausman(P-Value)	0.000	-	-	-
Observations	750	750	750	750
R-Square	0.742	0.779	0.824	-

Notes: numbers in parenthesis are standard errors. "***", "**" and "*"indicate 10%, 5% and 1% level of significance, respectively.
Source: Authors' estimation results.

The ideal approach for this examination using provincial panel data is to construct FREP for individual provinces like what we did for the whole country. But that is not possible given data limitation. Fortunately, most repressive financial policies were the same across the country during that period. We first expand the basic growth model by directly adding FREP as an additional explanatory variable (Table 6). Column (1) and (3) report the results of fixed effect and GEE population average estimation when province specific effect is taken into account. Again, the coefficients of FREP are negative and significant and both suggest that bringing down FREP from 1 to 0 could boost per capita GDP growth by roughly 3.3 percentage points. After adding year-specific dummies to control the omitted variable problem, column (2) and (4), all results remain largely the same but the coefficient estimates for FREP range increased from 3.3 to 3.5.[9]

---

[9] Note that since FREP do not change across province, we cannot add all the year dummies into our model because of the problem of perfect linearity. Therefore, we use partial year

Table 6. Growth Equations: Impacts of Financial Repression

Dependent Variable	FE		GEE	
LnRGDP	1	2	3	4
FREP	-3.304***	-3.545***	-3.289***	-3.529***
	(0.072)	(0.073)	(0.072)	(0.072)
INV	0.959***	0.754***	0.979***	0.773***
	(0.091)	(0.088)	(0.091)	(0.088)
TRADE	0.119***	0.131***	0.129***	0.139***
	(0.036)	(0.034)	(0.036)	(0.034)
EDU	13.835***	5.566***	14.503***	6.236***
	(2.373)	(2.364)	(2.354)	(2.336)
GOV	-2.687***	-2.577***	-2.717***	-2.605***
	(0.217)	(0.215)	(0.215)	(0.212)
SOE	-1.173***	-1.114***	-1.141***	-1.087***
	(0.091)	(0.089)	(0.089)	(0.088)
Year-specific effect	NO	YES	NO	YES
Province-specific effect	YES	YES	YES	YES
Observations	750	750	750	750
R-Square	0.762	0.741	-	-

Notes: numbers in parenthesis are standard errors. "***", "**" and "*"indicate 10%, 5% and 1% level of significance, respectively.
Source: Authors' estimation results.

<u>Robustness Checks</u>

To check robustness of these panel data results, we run three additional sets of regressions. First, we apply dynamic ordinary least square (OLS) estimation approach to eliminate autocorrelation in the residual terms of static OLS estimation and to improve efficiency of the estimated coefficients. Second, we employ the common factor estimation method to deal with potential heterogeneous effects across provinces. And, finally, we also adopt some alternative measures of financial repression in the estimation, including real interest rates and simple average of the six indicators used for constructing FREP.

As Stock and Watson (1993) pointed out that mentioned, dynamic OLS (DOLS) is a

---

dummies instead. Specifically, Year dummies include the Tiananmen incident, D1 (1989), South Tour of Deng Xiaoping, D2 (1992), Commercial bank reform, D3 (1994), Asia financial crises, D4 (1997-1999), entry into WTO, D5 (2001) and US subprime crisis, D6 (2007-2009). Time trend is also included.

more appropriate estimation approach if the variables are non-stationary and co-integrated, since it takes care of problems such as autocorrelation. This judgment was later supported by Kao and Chiang (1999). Therefore, as the first step of robustness check, we apply panel DOLS to reexamine the empirical relations by adding the first-order lag and lead terms of every differenced explanatory variable to our model. The estimation results are broadly in line with those based on static estimation (Table 7). The coefficients for FREP are, however, slightly higher, at -3.7.

Table 7. Growth Equations: Dynamic Ordinary Least Square Estimation Method

Dependent Variable	FE		GEE	
LnRGDP	1	2	3	4
FREP	-3.706***	-3.736***	-3.684***	-3.714***
	(0.085)	(0.089)	(0.084)	(0.087)
INV	0.815***	0.790***	0.842***	0.818***
	(0.101)	(0.101)	(0.100)	(0.099)
TRADE	0.129***	0.123***	0.138***	0.131***
	(0.035)	(0.036)	(0.035)	(0.036)
EDU	12.782***	9.989***	13.554***	10.869***
	(2.604)	(2.836)	(2.572)	(2.785)
GOV	-2.703***	-2.689***	-2.740***	-2.729***
	(0.234)	(0.253)	(0.231)	(0.248)
SOE	-1.045***	-1.008***	-1.017***	-0.980***
	(0.091)	(0.094)	(0.089)	(0.092)
Year-specific effect	NO	YES	NO	YES
Province-specific effect	YES	YES	YES	YES
Observations	650	650	650	650
R-Square	0.747	0.741	-	-

Notes: numbers in parenthesis are standard errors. "***", "**" and "*"indicate 10%, 5% and 1% level of significance, respectively.
Source: Authors' estimation results.

One potential problem of all the regressions above is that FREP and its estimated coefficients do not vary across provinces. The homogeneity assumption is probably acceptable if the research focus is on aggregate economic growth. But it is obvious that the impacts of repressive financial policies varied considerably across provinces. In order to take into account this heterogeneous effect, we apply the common correlated effects (CCE) in empirical estimation.

The basic idea of CCE is to filter the province-specific regressors by means of cross-section average (Pesaran 2006). As the number of provinces becomes larger, the differential effects of unobserved common factors converge to zero asymptotically. Following Eberhardt and Teal (2009), the CCE estimator is obtained in two steps. First, we perform 25 OLS estimations by each province i and obtain coefficient   . Second, the CCE estimators are those averaged across sectors: The empirical results are also similar to those obtained from static or dynamic estimation. But the coefficients for FREP are lower, at about -3.0 (Table 8).

Table 8. Growth Equations: Common Factor Estimations

Dependent Variable	Common Factor Estimation	
LnRGDP	1	2
FREP	-3.021***	-2.966***
	(0.068)	(0.051)
INV	0.891***	0.877***
	(0.076)	(0.067)
EDU	5.823***	5.712***
	(2.107)	(2.389)
SOE	-1.108***	-1.063***
	(0.093)	(0.074)
GOV	-2.078***	-2.072***
	(0.045)	(0.038)
TRADE	0.132***	0.113***
	(0.012)	(0.011)
Time Trend		0.071***
		(0.016)
Observations	750	750

Notes: numbers in parenthesis are standard errors. "***", "**" and "*"indicate 10%, 5% and 1% level of significance, respectively.
Source: Authors' estimation results.

Finally, we employ some alternative measures of financial repression to check the results of FREP based on PCA. Following Agarwala (1983), FREP1 is a dummy variable for real deposit rates, equaling to 0 if real interest rate is positive, ½ if real interest rate is negative but higher than -5%, and 1 if real interest rate is lower than 5%. Following Gelb (1988) and Easterly (1990), FREP2 is also a dummy variable, equaling to 0 if the real interest rate is positive and 1 if it is negative. And, FREP3 is a simple average of the

six indicators used to construct FREP. Again, the estimation results applying the fixed effect estimation approach but alternative measures of financial repression all confirm negative contributions of repressive financial policies to economic growth (Table 9).

Table 9. Growth Equations: Alternative Measures of Financial Repression

Dependent Variable	FE		
LnRGDP	1	2	3
FREP1	-0.099***		
	(0.036)		
FREP2		-0.075***	
		(0.028)	
FREP3			-3.321***
			(0.141)
INV	2.236***	2.224***	1.682***
	(0.172)	(0.172)	(0.13)
TRADE	0.135*	0.13*	0.161***
	(0.071)	(0.071)	(0.053)
EDU	67.288***	69.366***	35.157***
	(4.116)	(4.08)	(3.382)
GOV	-5.192***	-5.064***	-4.213***
	(0.437)	(0.432)	(0.326)
SOE	-1.928***	-1.911***	-1.642***
	(0.183)	(0.182)	(0.136)
Year-specific effect	YES	YES	YES
Province-specific effect	YES	YES	YES
Observations	750	750	750
R-Square	0.741	0.746	0.767

Notes: numbers in parenthesis are standard errors. "***", "**" and "*"indicate 10%, 5% and 1% level of significance, respectively.
Source: Authors' estimation results.

All the robustness checks, using different estimation methods and different measurement approaches, confirm that financial repression did have a significant and negative impact on economic growth during China's reform period. The coefficient estimates of the repression variables in these equations roughly range between -3.0 and -3.7.

Possible Mechanisms for the Negative Growth Effect

Why are repressive financial policies negative for economic growth? When the

policymakers devised those policies, such as interest rate restrictions, credit allocation regulations and capital account controls, their aim was certainly to achieve faster, not slower, economic growth (Lin, Cai and Li 1995). But in the end these policies turned out to inhibit growth. In this section we will explore several important mechanisms for the negative growth effect. These, however, do not form an exhaustive list of the potential candidates.

The most widely discussed mechanism in the literature is through the impact of financial repression on financial development (Arestis and Demetriades 1997, 1999; Levine, Loayza and Beck 2000; Ang and McKibbin 2007). In a market-oriented economy, financial intermediation is a factor facilitating expansion of economic activities. Repressive financial policies, however, directly restrict development of the financial sector, which, in turn, affects negatively economic growth.

This mechanism was explicitly examined for the Chinese case during the reform period. Huang and Wang (2010) constructed a financial development index (FDEV), which, like the FREP devised in this paper, was an aggregate measure applying PCA approach. The principal components were derived from three variables: proportion of broad money supply to GDP; share of private sector in total outstanding bank loans; and proportion of cash in circulation to total broad money supply. They found that if they set the initial reading of FDEV at 1 in 1979, the corresponding reading would be 2.1 in 2008. Co-integration analyses of FREP and FDEV confirmed that repressive financial policies had significantly negative effects on financial development during China's reform period.[10]

We may also examine impacts of the individual variables used for constructing FREP on economic growth. Such exercises may offer additional insights. Although we believe the negative impacts of FREP discovered in this study are robust and reliable, examination of individual policy variables may shed lights on which specific policies imposed more

---

[10] In the following exercise, Huang and Wang (2010) also discovered that financial development (FDEV) had positive impacts on economic growth during China's reform period.

stringent restrictions on economic growth. They may also provide important policy implications on priorities of future reforms.

Given the multicolinearity problems among these variables, we could not include all six variables in one equation. As an alternative, we add these variables one by one to the basic growth equation (Table 5). Estimation results confirm significant and negative impacts of these policy variables on economic growth (Columns 1-6 in Table 10). We should keep in mind that these estimated effects of individual policy variables may not add up since they are obtained from separate regressions. Yet, they still shed some lights on the possible magnitudes of the impacts, multiplying the estimated coefficients by the actual readings of the variables in 2008. And these policy variables can be ranked, from greater to smaller growth effects, in the following order: state sector's share in outstanding bank loans, capital account controls, state sector's share in total bank deposits, interest rate regulations, reserve requirement management and real interest rates.

Table 10. Growth Equations: Impacts of Individual Repressive Policies

Dependent Variable	FE					
LnRGDP	1	2	3	4	5	6
Public deposit ratio	-3.102***					
	(0.127)					
Public loan ratio		-8.756***				
		(0.206)				
Reserve Rate			-3.658***			
			(0.167)			
Interest Control				-2.669***		
				(0.082)		
Real Interest Dummy					-0.514***	
					(0.005)	
Capital Control						-7.009***
						(0.203)
INV	1.143***	0.732***	1.246***	1.074***	2.325***	0.885***
	(0.134)	(0.097)	(0.139)	(0.114)	(0.155)	(0.112)
TRADE	0.126***	0.154***	0.027	0.228***	0.124**	0.281***
	(0.054)	(0.038)	(0.055)	(0.045)	(0.064)	(0.044)
EDU	74.51***	2.162	63.296***	1.343	66.89***	15.5***
	(3.033)	(2.749)	(3.174)	(3.321)	(3.694)	(3.506)
GOV	-0.397***	-2.761***	-2.616***	-4.415***	-5.542***	-3.931***
	(0.371)	(0.236)	(0.352)	(0.275)	(0.393)	(0.267)
SOE	-1.055***	-1.101***	-1.26***	-1.599***	-1.879***	-1.076***
	(0.138)	(0.098)	(0.143)	(0.116)	(0.164)	(0.114)
Year-specific effect	YES	YES	YES	YES	YES	YES
Province-specific effect	YES	YES	YES	YES	YES	YES
Observations	750	750	750	750	750	750
R-Square	0.838	0.715	0.823	0.698	0.758	0.683

Notes: numbers in parenthesis are standard errors. "***", "**" and "*"indicate 10%, 5% and 1% level of significance, respectively.
Source: Authors' estimation results.

These findings indeed provide some information about mechanisms through which financial repression affects growth in China. The state sector's dominance of financial resources, especially bank loans, has a major negative impact on economic growth. Whenever economic growth slowed, the Chinese government relied on the state sector as well as fiscal and monetary policy to support economic activity. Such policy approach, however, effectively suppressed private investment and probably reduced overall efficiency of economic activities in China.

Capital account controls are another important negative factor for growth. The controls probably helped the government to maintain certain degree of financial stability at times of external financial crises. But this came at a very high cost to growth. Restrictions on capital mobility probably prevented investors from achieving higher returns and possibly also distorted costs of capital, both in terms of exchange rates and interest rates.

Interestingly, compared with effects of state sector dominance and capital account controls, the impacts of interest rate regulations and negative real deposit rates appeared to be more modest, although they were still very important. And the magnitude of the impact of reserve requirement was similar to that of real negative deposit rates.

Concluding Remarks

This paper attempts to add new evidence to the controversial subject of financial repression and economic growth in the literature by examining the Chinese experience during the reform period. A combination of strong economic growth and repressive financial policies in China is sometimes viewed as an important case study for questioning the real benefits of financial liberalization. Our study concludes that China achieved strong growth despite, not because of, financial repression. Indeed repressive financial policies impose a serious cost to China's economic growth.

The study has uncovered some very important findings. First, despite continued financial repression in China, the financial repression index fell from 1.0 in 1978 to 0.58 in 2008. This decline by 42 percent is strong evidence that China has come a long way in financial liberalization, although much still needs to be accomplished. It is true that China's financial liberalization lagged behind that in many other emerging market economies but also liberalization of its own goods market. But importantly, the pace of declines in the index, or the pace of financial liberalization, appeared to be accelerating during the past decades, from 15.4 percent in the 1980s to 16.4 percent in the 1990s and

18.7 percent in the 2000s.

Second, financial liberalization during the reform period contributed positively to economic growth. According to the estimation results of this study, financial repression held down per capita GDP growth by 3.0-3.6 percentage points in 1978 or by 1.7-2.1 percentage points in 2008, depending on estimation methods (Chart 2). In other words, financial liberalization probably is adding 1.3-1.5 percentage points to per capita GDP growth currently, compared to thirty years ago. And China still has a lot more to gain through further liberalization. But the 1.7-2.1 percentage points range may be overstated since we do not expect the financial repression index to drop to zero in a real world. All these results passed various robustness tests.

Chart 2. How Much Does Financial Repression Hold Down GDP Growth? (Percentage Points)
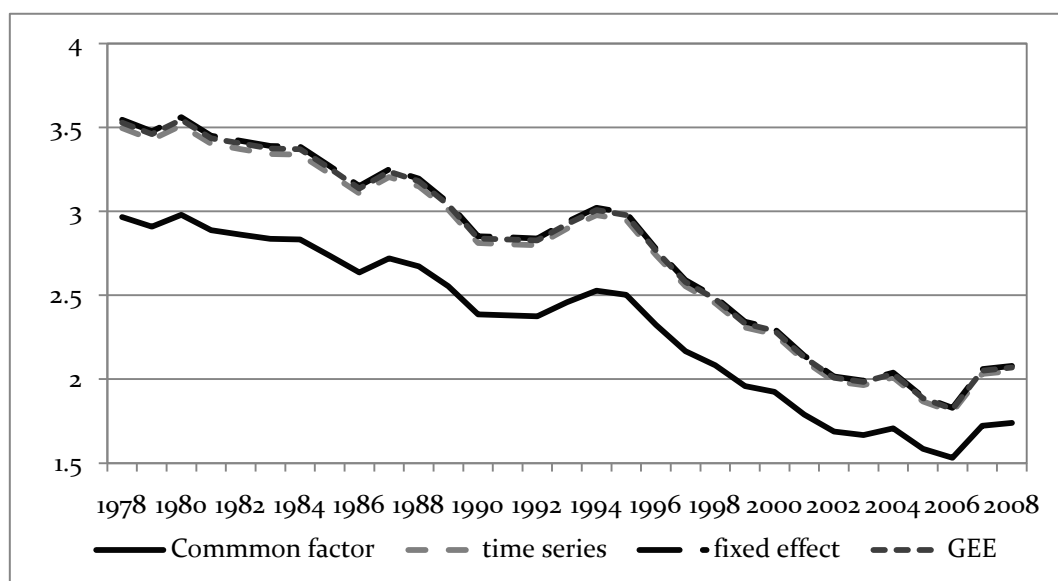
Source: Authors' estimation results.

And, third, this study also sheds some lights on possible mechanisms through which repressive policies negatively affect growth. The most widely discussed channel in the literature is financial development. In an earlier study, the authors also discovered that the financial repression index contributed negatively to the financial development index during China's reform period. More specifically, this study confirmed very large negative effects of the state sector's share in total bank loans and capital account

controls on economic growth. Clearly, state sector investment was less efficient than private investment and capital immobility also lowered allocative efficiency. Interest rate and reserve requirement regulations also had important, but relatively more modest, negative impacts on economic growth.

This study is subject to a number of shortcomings, which may be taken up in our future research. First, while we tried to uncover the real relations between financial repression and economic growth, we did not assess the effects of sequence and pace of financial liberalization. This is an important policy question. It certainly is a valid argument that if institutional capability is low, drastic financial liberalization could lead to sudden jump in financial risks. And this could be negative for growth. Second, we tried our best to include all important variables for financial repression measures. The importance and therefore weights of each variable, such as different interest rates in total interest rate control measure, may be refined. And, finally, for the provincial panel data analyses, it should be ideal to construct separate financial repression indices for individual provinces. But this was not possible due to lack of data. We intend to address this issue in the future when we are able to access more economic information.

Despite these qualifications, we think the findings of this paper have very important policy implications for not only China but also other developing countries. Financial liberalization, or reduction in financial repression, was a positive force behind China's strong economic growth during the past three decades. Policymakers should not read the Chinese story incorrectly by suggesting that financial liberalization is unnecessary or even undesirable for achieving strong growth. For China, it is vitally important for the liberalization process to continue. This study suggests that liberalization would generate highest growth returns in China in the following areas: reducing state sector dominance of financial resources and liberalizing capital account controls.

Appendix. Provincial Panel Data

LNRGDP: Logarithmic per capita Real GDP. Source: the National Bureau of Statistics (NBS) and author's calculation.

EDU: Ratio of students of universities and specialized institutions of high education to the total population of the region. Source: NBS and authors' calculation.

INV: Investment ratio, which is the ratio of gross capital formation to the GDP, reported by NBS.

GOV: Ratio of government expenditure to nominal GDP. Source: NBS and authors' calculation

SOE: Ratio of gross industrial output value of state owned and state-holding industrial enterprises gross industrial output value to that of all the industrial enterprises above designated size. Source: NBS and authors' calculation.

TRADE: Foreign trade as a share of GDP. Source: NBS and authors' calculation.

FREP: Financial repression index. Source: CEIC, NBS, China Financial Statistics, Almanac of China's Finance and Banking and authors' calculation.

Appendix Table 1. ADF Test of Time Series Variables

Variable	Type	lag orders	ADF(P-Value)	PP(P-Value)
LnRGDP	c,t	2	0.141	0.481
△LnRGDP	c,0	2	0.016	0.000
FREP	c,t	1	0.198	0.478
△FREP	c,0	1	0.003	0.004
INT	c,t	1	0.354	0.354
△INT	c,0	1	0.001	0.001
TRADE	c,t	1	0.547	0.446
△TRADE	c,0	1	0.004	0.004
GOV	c,t	1	0.470	0.934
△GOV	c,0	1	0.053	0.040
SOE	c,t	1	0.179	0.154
△SOE	c,0	1	0.000	0.000

Note: The Null Hypothesis is the variable has a unit root. Lag order is determined by the SIC.

Source: Author's estimation results.

References

Agarwala, R., 1983. *Price Distortions and Growth in Developing Countries*. World Bank, Washington, DC.

Ang, J. B. and W.J. McKibbin. 2007. 'Financial Liberalization, Financial Sector Development and Growth: Evidence from Malaysia'. *Journal of Development Economics*, 84: 215-233.

Arestis, P. and P. O. Demetriades. 1997. 'Financial development and economic growth: assessing the evidence'. *Economic Journal*, 107: 783–799.

Arestis, P., and P. O. Demetraides. 1999. 'Finance Liberalization: the Experience of Development Countries'. *Eastern Economic Journal*, 25: 441-457.

Demetriades, P.O. and K. B. Luintel. 2001. 'Financial Restraints in the South Korean Miracle'. *Journal of Development Economics*, 64: 459–479.

Dowrick, Steve and D. T. Nguyen. 1989. 'OECD Comparative Economic Growth 1950-85: Catch-up and Convergence'. *American Economic Review*, 9(3): 341-71.

Drysdale, P. and Y. Huang. 1997. 'Technological Catch-Up and Economic Growth in East Asia and the Pacific'. *The Economic Record*, 73 (222): 201-211.

Eberhardt, Markus and Francis Teal (2009), "A Common Factor Approach to Spatial Heterogeneity in Agricultural Productivity Analysis," University of Oxford, CSAE WPS/2009-05.Easterly, W., 1990. Endogenous growth in developing countries with government-induced distortions, Mimeo. (World Bank, Washington, DC)

Gelb, A., 1988, Financial policies, efficiency, and growth: An analysis of broad cross-section relationships (World Bank, Washington, DC)

Huang, Y. and Wang, X. 2010. 'Financial Repression and Economic Growth in China', *CGC Discussion Paper* No. 5, China Growth Centre at Edmund Hall, University of Oxford.

Ito, H. 2006. "Financial Development and Financial Liberalization in Asia: Thresholds, Institutions and the Sequences of Liberalization", *The North American Journal of Economics and Finance*, 17(3): 303-327.

Jin, L. 2004. 'Research on the intensity of Capital Control in China'. (in Chinese). *Journal of Financial Research* (*Jin Rong Yan Jiu*). 294: 9-23.

Kao, C. and M. Chiang. 2000. "On the Estimation and Inference of a Cointegrated Regression in Panel Data". *Advances in Econometrics*, 15: 179 - 222.

King, R. G. and R. Levine. 1993. 'Finance, Entrepreneurship, and Growth: Theory and Evidence'. *Journal of Monetary Economics*, 32: 513-542.

Lardy, N. R., 2008, 'Financial Repression in China', Policy Brief, Peterson Institute of International Economics, Washington D.C.

Levine, R., N. Loayza and T. Beck. 2000. "Financial Intermediation and Growth: Causality and Causes," *Journal of Monetary Economics*, 46(1): 31-77.

Levine, R. 2005. "Finance and Growth: Theory, Mechanisms and evidence," in Aghion, P. and S. N. Durlauf (eds.) *Handbook of Economic Growth*, Elsevier.

Li, D., 2001, 'Beating the trap of financial repression in China', *Cato Journal*, 21(1): 77-90.

Lin, J. Y., F. Cai and Z. Li. 1995. *The China Miracle: Development Strategy and Economic Reform*, The Chinese University of Hong Kong Press, Hong Kong.

Liu, T. and K.W. Li. 2001. "Impact of Liberalization of Financial Resources in China's Economic Growth: evidence from provinces", *Journal of Asian Economics,* 12: 245-262.

McKinnon, R. I. 1973. *The Order of Economic Liberalization: Financial Control in the Transition to a Market Economy*. Baltimore: Johns Hopkins University Press.

Maswana, J. 2008. "China's Financial Development and Economic Growth: Exploring the Contradictions". *International Research Journal of Finance and Economics*, 19(2008): 89-101.

Nelson, C. and C. Plosser. 1982. 'Trends and Random Walks in Macroeconomics Time Series: Some Evidence and Implications'. *Journal of Monetary Economics*, 10: 139-162.

Pagano, M. 1993. 'Financial Markets and Growth: An Overview'. *European Economic Review*, 37: 613-622.

Patrick, Hugh T. 1966. 'Financial Development and Economic Growth in Undeveloped Countries'. *Economic Development and Cultural Change*, 14: 174-189.

Pesaran, M. Hashem (2006), "Estimation and Inference in Large Heterogeneous Panels with a Multifactor Error Structure," Econometrica 74(4), pp.967-1012.Prasad, E., Rogoff, K., Wei, S. and A. Köse. (2003), "Effects of Financial Globalization on Developing Countries: Some empirical Evidence," *Occasional Paper*, IMF No: 220. Washington D.C.

Robinson, J, 1952. *The Generalization of the General Theory and Other Essays*. The 2nd Edition, London: Macmillan, 1979.

Roubini, N and X. Sala-i-Martin. 1992. 'Financial Repression and Economic Growth'. *Journal of Development Economics*. 39: 5-30.

Shaw, A.S. 1973. *Financial Deepening in Economic Development*. New York: Oxford University Press.

Schumpter, Joseph A. 1911. *A Theory of Economic Development*. Cambridge, MA: Harvard University Press.

Stiglitz, J. E., 1994. 'The Role of the State in Financial Markets'. In M. Bruno and B. Pleskovic (eds.), *Proceeding of the World Bank Annual Conference on Development Economics, 1993: Supplement to the World Bank Economic Review and the World Bank Research Observer*. World Bank, Washiongton, D.C., 19-52.

Stiglitz, J. E., 2000. 'Capital Market Liberalization, Economic Growth and Instability'. *World Development*, 28: 1075-1086.

Trew, A. W. (2006), "Finance and Growth: A critical Survey," Economic Record, 82(259): 481-490.

Stock, J. H. and N. W. Watson. 1993. "A simple estimator of co-integrating vectors in higher order integrated systems", *Econometrica*, 61 (4): 783-820.