Intermediation Premium and Commercial Banks: The Case of China

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This paper deals with dynamic behavior of the lending-deposit rate spread in commercial banks in China between 1990 to 2012. Threshold autoregressive (TAR) model is used to find out possibility of asymmetric adjustment process. The results reveal that the People's Republic of China's intermediation premium is stable and adjusts to its long-run threshold asymmetrically. It also indicate that lending institutions respond more slowly when the deposit rate falls relative to the lending rate, widening the intermediation premium, than when the deposit rate moves in the opposite direction. These suggest that China's lending institutions exhibit predatory pricing behavior. The study depicts that the short-run dynamic Granger-causality between the deposit rates to the lending rates were prevailing. Aforesaid observations are important for policy makers in formulating their countercyclical monetary policy.

Field of Study: Asymmetry; countercyclical monetary policy; lending rate; deposit rate; intermediation premium; People's Republic of China.

1. Introduction

One of the most important roles commercial banks play as a financial intermediary through charging spread between the lending rate they charge to the borrowers and the deposit rate they pay to the savers. This spread not only provides interest income to financial intermediaries, but it also influences a country's level of savings and investment, and it influences the effectiveness of central banks' monetary policy. One portion of the spread is risk related; the remainder portion which exceeds a "risk free" level as measured by the treasury bill rate—constitutes a risk premium or loan premium. Analysis of this "risk or loan premium" portion illuminates and provides insights into bank behavior. Asymmetries in the Chinese financial sector illustrate that the rate charged borrowers and the rate paid lenders, which resulted in a "loan premium" larger than a free market determined spread.

Theoretically, three main explanations help explain the rate-setting behavior of the banking sector: the bank concentration hypothesis, the consumer characteristic hypothesis, and the consumer reaction hypothesis. The bank concentration hypothesis posits that oligopolistic banks raise lending rates quickly in reaction to favorable market forces but are much slower in raising deposit rates.   The reverse is the case in declining markets as they react quickly to adjust downward the rates paid depositors and slower to reduce the rates charged borrowers (Neumark and Sharpe, 1992; Hannan and Berger, 1991). The consumer characteristic and consumer reaction hypotheses posit that the greater the proportion of

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unsophisticated consumers coupled with higher search and switching costs, the greater the banks' ability to adjust rates to widen the spread and hence increase the banks' advantage (Calem and Mester, 1995; Hutchison, 1995; Rosen, 2002).

Asymmetric adjustment in lending rates may be influenced by a further asymmetry. Banks may be reluctant to raise rates to the full extent allowed by a rising market because this could lead to an adverse selection pool of predominantly higher risk loans. Restraint in maximizing lending rates encourages a broader base of loans with an inherent lower detrimental risk pool (Stiglitz and Weiss, 1981). Mckinnon (2013) argued that when the Fed sets short rates at zero, this unleashes a flood of hot money into surrounding countries - particularly higher growth emerging markets, such as China or Brazil, whose natural rates of interest are much higher.

The People's Republic of China's transitional economy has maintained high growth rates over the past three decades. Since the start of reforms in 1978, growth has averaged close to 10 percent and inflation has remained relatively subdued. Productivity growth has been rapid and capacity has been expanded by very high levels of investment. The commercial banking sector has also grown rapidly and become more diversified. Banks' lending to households, though low compared with other countries, has picked up sharply following the housing sector reform a decade ago (IMF Country Report No. 11/321, 2011).

However, as indicated in recent IMF's report (IMF Country Report No. 11/321, 2011), despite of these reforms strengthen the financial sector, China confronts a steady buildup of financial sector vulnerabilities. The system is becoming more complex and inter-linkages between markets, institutions, and across international borders are growing. In addition, informal credit markets, conglomerate structures, and off-balance sheet activities are on the rise. Relatively inflexible macroeconomic policy framework and the government's important role in credit allocation, through policy directed-lending at the central and provincial levels, have led to a build-up of contingent liabilities. These could affect the needed reorientation towards domestic demand and new sectors of growth. These vulnerabilities cannot easily quantified, however, in part due to limitations on monitoring, data collection, and inter-agency information exchange.

Podpiera (2006) pointed out that banking reforms are the core of China's economic modernization whose strategy is to improve the intermediation of its large private sector savings over the last twenty five years. China replaced the monobank system with a multilayered system that separates commercial lending and central banking functions. However, lending by state owned commercial banks (SCBs) were resulted a large number of nonperforming loans in the portfolios of lending institutions which led to several attempts to recapitalize and reform banks. One of such actions came in the year 1999, when the government transferred a substantial amount of nonperforming loans to asset management companies at book value. Another initiative started in late 2003 to cope with the prospect of facing increased competition when, at the end of 2006 under the World Trade Organization agreement, the sector was opened to foreign banks. In these reform measures, the authority recapitalized two of the four major SCBs and introduced changes in legal structure, corporate governance mechanism, and risk management, with the goal of bringing in strategic investors and eventually listing the banks.

Information is necessary for the policy makers in general and the monetary policy authority is to conduct its countercyclical policy effectively -how the target variables are responding to the policy actions and the time lags? In light of the structural changes and the operating environment of its financial sector from 1990s, People's Republic of China has curiosity for observing how commercial banks set their lending, deposit rates, and intermediation premium in responding to the counter cyclical monetary policy actions.

Research question of the paper is whether the China's commercial banks respond to counter-cyclical monetary policy actions as reflected in changes in the deposit-lending rates and also intermediation premium?

To comply with the aforesaid research question ,this paper examines the People's Republic of China's financial sector in general and the behavior of its banks in particular with a focus on the factors that affect the spread or the "intermediation premium," and in turn the dynamic, interrelationship of the elements that determine the premium. Specifically, this study first endogenously determines whether intermediation premium experienced a structural break over the period 1990:08-2012:09. Second, how Chinese commercial banks respond to counter cyclical monetary policy actions as reflected in symmetric/asymmetric adjustments to the long-term threshold of the intermediation premium is investigated? Finally, if the asymmetries exist, whether such asymmetries reveal collusive or competitive behavior by the Chinese commercial banks?

The paper is organized as follows: Section 2 provides an overview of Chinese banking sector, while section 3 deals with literature review; Section 4 depicts Methodology; Section 5 describes Asymmetric Error-Correction Model and Empirical Model. Section 6 discusses Analysis of the Findings and Section 7deals with Conclusion.

2. China's Economy and Banking Sector[1]: An Overview

After the establishment of the People's Republic of China in 1949, the government nationalized all of the pre-1949 capitalist companies and institutions by the 1950. Therefore, in the new institutional arrangements from 1950 to1978, China's financial system consisted of a single bank − the People's Bank of China (PBOC), a central government owned and controlled bank under the Ministry of Finance. PBOC served as both the central bank and a commercial bank, controlling about 93 percent of the total financial assets of the country and handling almost all financial transactions.

At the end of 1979, the PBOC, which was China's central bank, became independent of the Ministry of Finance. Three state-owned banks took over some of PBOC's previous commercial banking businesses: The Bank of China was given the mandate to specialize in transactions related to foreign trade and investment; the People's Construction Bank of China, originally established in 1954, was assigned to handle transactions related to fixed investment the Agriculture Bank of China was set up (in 1979) to deal with all banking business in rural areas. These structural changes formally established the current two-tier banking system in China. Finally, the fourth state-owned commercial bank, the Industrial and Commercial Bank of China was formed in 1984, and took over the rest of the commercial transactions of the PBOC.

The most significant event for China's financial system in the 1990s was the inception and growth of China's stock market. Shanghai Stock Exchange and Shanzhen Stock Exchange were established in 1990 and grew very fast during the 1990s. However, the developments of a supportive legal framework and institutions have been lagging behind to properly handle the stock markets. Following the Asian Financial Crisis in 1997, financial sector reform has focused on state-owned banks and especially the problem of non-performing loans. China's entry into the WTO in December 2001 marked the beginning of a new era, during which competition from foreign financial institutions increased and more frequent and larger scale capital inflows.

Financial sector development process in the People's Republic of China was started; Kumiko (2007) argued that the financial-system reform process in China began in 1978. The main goal then was to the mono-banking system into a plural-banking system consisting of a central bank and various kinds of financial institutions. The reform moved forward rapidly after the concept of the "socialist market economy" was formally recognized at the 14th National Congress of the Communist Party of China (CPC) in 1992, the government began significant testing with financial markets.

Following the announcement of the Resolution of the CPC Central Committee on Issues Regarding the Establishment of the Socialist Market Economic System in November 1993, the State Council issued the Resolution on Financial System Reform in December 1993, setting the targets of the financial system reform measures are given below: (1) the establishment of an independent macro-economic control mechanism by the PBC (independent from local governments, but under the direction of the State Council), (2) the establishment of policy banks, (3) the transformation of state-owned specialized banks to actual commercial banks, (4) the establishment of unified, open, well-ordered, competitive, and well-managed financial markets, (5) the reform of foreign-exchange control, (6) the issuance of appropriate guidance for the development of non- bank financial institutions, and (7) the development of a financial-service infrastructure and the establishment of a modern financial-management system.

A series of arrangements were made to implement this policy. The government set up three policy banks in 1994 (China Development Bank, the Export and Import Bank of China and the Agricultural Development Bank of China) to separate policy lending from commercial lending, and the four existing specialized banks became known as "state-owned commercial banks" (SOCBs). The promulgation of the Law of the People's Republic of China on Commercial Banks (also known as the Commercial Bank Law) in 1995 was an effort to enhance the independence of the commercial banks. However, since this law also required commercial banks to conduct business under the guidance of the national industrial policies, the SOCBs had to provide lending to inefficient sectors, such as stagnant SOEs, and they accumulated large volumes of nonperforming loans.

In 1995, several other basic laws covering the financial arena were also promulgated: the Law of the People's Republic of China on the People's Bank of China (the Central Bank Law), the Insurance Law of the People's Bank of China, the Law of the People's Republic of China on Negotiable Instruments (the law on bills of exchange, promissory notes, and checks), and the Guarantee Law of the People's Republic of China. Although these

measures did not cover the newly developing financial activities completely, they did provide a legal foundation for the rule of law in the financial sector.

To introduce order into the interbank money market, the PBC established local financing centers in 1995 and closed brokerage institutions run by commercial banks, although the lending rates in the local financing centers still varied greatly. In order to unify these rates, the PBC established the National Interbank Funding Center (which shared its computer system with the CFETS) in Shanghai in 1996 and transformed the local financing centers into the affiliates of the new national center.

Liu (2002) argues that China adopted a new commercial-bank law on July 1, 1995, that aimed at commercializing the country's banks by the year 2000 by stipulating technical requirements such as capital-adequacy ratios in line with international banking practice under finance capitalism. The relaxation of banking controls in China created serious macro-economic problems in 1992-93 when many banks and their affiliated non-bank financial institutions poured resources into imprudent activities, such as speculation in real estate and stock markets, diverting funds earmarked for agriculture and other development projects in defiance of a largely ignored national Five-Year Plan.

The relaxation of administrative controls led to mounting risks of instability in the banking sector. When monetary control was re-imposed in late 1993, these speculative investments suffered financial losses that caused instability in a banking system plagued by deregulation and lax supervision. The rising portion of non-performing loans in the commercial banks' total outstanding loans and the large household deposits in the commercial banks' total liabilities forced the banks to consider the quality of their assets and the liquidity risks involved.

As part of the 1994 monetary reform measures, commercial lending and policy lending in the state banking sector were separated. The four specialized banks were transformed into commercial banks to be operated for profit, while at the same time assuming full market and credit risks as stand-alone commercial institutions. Three policy lending banks - the Long-Term Development and Credit Bank, the Import-Export Bank and the Agricultural Development Bank - were set up. They will grant policy loans in accordance with state industrial policy and national plans. The capital sources of these policy banks will be mainly government budgetary funds, social insurance, postal and investment funds from a shrinking public sector.

Das (2014) argued that the Bank for International Settlements has warned that China's banking system has large and rapidly growing net foreign liabilities. Large capital outflows would result in these strategies suffering losses and being reversed. This would result in the tightening of domestic liquidity and higher interest rates, setting off financial instability and a domestic contraction. These concerns mean that authorities are proceeding slowly with reforms. Changes to regulation of banks, interest rates, capital flows and the currency are likely to be modest, for the foreseeable future. For example, decreases in controls over the capital account are likely to entail revised bureaucratic restrictions as well as price-based limits such as taxes on foreign holdings.

Now we are showing savings, deposit and loans in RMB and foreign currencies of China in Table: 1 below:

Table: 1 Savings Deposit and Loans in RMB and Foreign Currencies in All Financial Institutions and the Growth Rates at the End of 2013

Unit: 100 million yuan

Item	Year-end figure	Increase over 2012 (%)
Savings deposit	1,070,588	13.5
By households	465,437	13.5
Deposits in RMB	461,370	13.6
By non-financial enterprises	380,070	10.1
Loans	766,327	13.9
Domestic short-term loans	311,772	16.3
Domestic medium and long-term loans	410,346	12.8

(Source: National Bureau of Statistics of China , 2014)

According to National Bureau of Statistics of China(2014) Loans in Renminbi from rural financial institutions (rural credit cooperatives, rural cooperation banks, and rural commercial banks) totaled 9,164.4 billion yuan by the end of 2013, an increase of 1,332.4 billion yuan as compared with the beginning of the year. The loans in Renminbi for consumption use from all financial institutions totaled 12,972.1 billion yuan, an increase of 2,540.1 billion yuan. Of all consumption loans, short-term loans for individuals totaled 2,655.8 billion yuan, an increase of 719.8 billion yuan, and medium- and long-term loans for individuals reached 10,316.3 billion yuan, an increase of 1,820.3 billion yuan.

3. Literature Review

The rationale for theoretically hypothesizing asymmetric responses to the national countercyclical monetary policy can be attributed to the documented asymmetric rate-setting behavior of the commercial banks in the context of rates of return on financial market instruments. Arak et al. (1983), Goldberg (1984), Forbes and Mayne (1989), Levine and Loeb (1989), Mester and Saunders (1995), Dueker (2000), and Tkacz (2001) have reported asymmetries in the U.S. prime lending rate in the past. Thompson (2006) found asymmetries in the U.S. prime lending and deposit rates. Cook and Hahn (1989), Moazzami (1999), and Sarno and Thornton (2003) found asymmetries in U.S. Treasury securities in their studies. Nguyen and Islam (2010) found asymmetries in the Thai lending and deposit rates and attributed it to oligopolistic nature of the Thai banking industry. Frost and Bowden (1999) and Scholnick (1999) report asymmetries in mortgage rates in New Zealand, and Canada. Heffernan (1997) and Hofmann and Mizen (2004) indicated asymmetric behavior of retail rates in the United Kingdom. Hannan and Berger (1991), Neumark and Sharpe (1992), and Diebold and Sharpe (1990) examine various deposit rates for the same behavior. Scholnick (1999) reported asymmetries in mortgage rates in Canada.

Moreover, there are three main theoretical explanations for the commercial bank interest rate asymmetries: the bank concentration hypothesis, the consumer characteristic hypothesis, and the consumer reaction hypothesis. The bank concentration hypothesis

posits that banks in more concentrated markets are slower to adjust deposit rates upward and faster to adjust them downward, while exhibiting the opposite behavior regarding the lending rates (Neumark and Sharpe, 1992; Hannan and Berger, 1991). The consumer characteristic hypothesis asserts that the greater the proportion of unsophisticated consumers relative to sophisticated consumers in the market, together with the potential search-and-switching costs, the greater the banks' ability to adjust interest rates to their advantage (Calem and Mester, 1995; Hutchison, 1995; Rosen, 2002).

However, the asymmetric adjustment in lending rates may actually benefit consumers. As articulated by Stiglitz and Weiss (1981), the presence of asymmetric information may create an adverse selection problem in lending markets such that higher interest rates will tend to attract riskier borrowers. Therefore, banks would be reluctant to raise lending rates, even if the market rates rise. When their marginal cost of fund increases, then it will be offset by the benefits of not encouraging the higher-risk consumers to borrow. Porter and Xu (2013) described that the volatility of Chinese money market rates could be reduced through a change in the structure of reserve requirements from daily reserve requirements to reserve averaging, irrespective of the extent of liberalization. Second, by creating new channels for banks to attract deposits and compete, liberalization could also lead to excessive lending and place pressure on credit quality and the profitability of banks. Syed (2013) explained that as financial systems across the globe suffered severe setbacks, Chinese policymakers paused. In some ways, this was natural, but over the medium term China needs to accelerate the pace of change. Financial reforms still rebalancing the economy may prove elusive and the risks to macroeconomic stability may escalate.

4. Methodology

One of the challenges in empirical studies of transitional economies is the lack of desirable data. This study uses monthly data on the People's Republic of China's deposit rate and the commercial banks' lending rates over the period of 1990:08 to 2012:09 where data is available. The data was collected from the International Financial Statistics, published by the International Monetary Fund and also form National Bureau of Statistics of China. The monthly lending rates and the deposit rates are denoted by LR_t and DR_t, respectively. The difference between the lending rate and the deposit rate is defined as the intermediation premium, and is denoted by IP_t.

Figure 1: People's Republic of China Lending Rates, Deposit Rates and Intermediation Premium
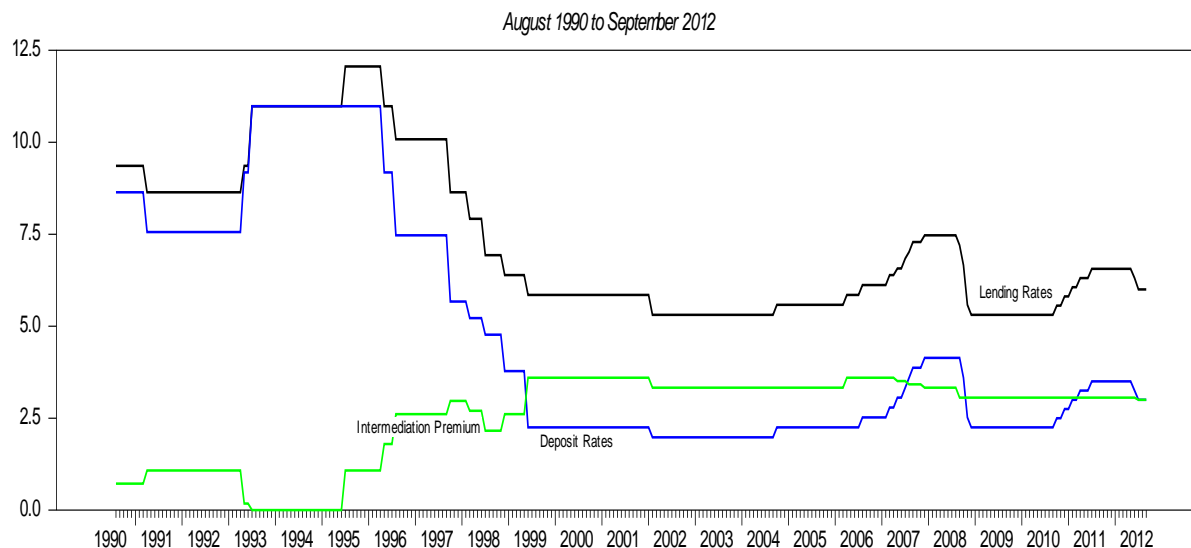

Figure 1 illustrates the behavior of the respective People's Republic of China's lending and deposit rates and intermediation premium over the sample period. As Figure 1 suggests, the lending was held constant from the beginning of the sample until the early 1991, took a sharp drop and stabilized until the early 1993. The lending rate increased about 2.00 percent and then stabilized until the early 1995. The People's Republic of China's lending rate increased sharply reaching its highest level over the sample period, stayed at that level until the end of 1995, and then oscillated around a steep downward trend until the middle of 1999. The lending rate fluctuated around its flat trend until the beginning of 2005, and then oscillated around an upward trend until the middle of 2008. It dropped sharply until the end of 2008, then stabilized until the end of 2010. The lending rate then oscillated around an upward trend until the middle of 2011 over the remainder of the sample period. Except for the second half of 1995, the People's Republic of China's deposit rate was constant, while the lending rate sharply increased to its highest level, stabilized and dropped rapidly to create a hump; the deposit rate tracked the lending rate very well over the sample period.

As a result of the oscillations of the discount and the lending rates, the People's Republic of China's intermediation premium remained fairly flat until the early 1993, took a sharp drop to zero and stayed at that level until the early 1995. It oscillated around a steep upward trend until the middle of 1996, oscillated around its flat trend until the middle of 1999, and remained fairly flat over the reminder of the sample.

The mean lending rate during the sample period was 7.35 percent, and ranged from 5.31 percent to 12.06 percent with a standard error of 2.12 percent. The mean deposit rate over the same period was 4.83 percent, and ranged from 1.98 percent to 10.98 percent with a standard error of 3.19 percent. Their correlation was 97.91 percent. The mean intermediation premium during the sample period was 2.52 percent, and ranged from 0.00 percent to 3.60 percent with a standard error of 1.19 percent. Moreover, as suggested by

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Figure 1, it is likely that the People's Republic of China's intermediation premium experienced a structural shift over the sample period.

To search endogenously for the possibility of any structural break in the People's Republic of China's intermediation premium, this study utilized Perron's (1997) endogenous unit root test function with the intercept, slope, and the trend dummy to test the hypothesis that the premium has a unit root.

$$IP_t = \mu + \theta DU + \alpha t + \gamma DT + \delta D(T_b) + \beta SP_{t-1} + \sum_{i=1}^{k} \psi_i \Delta IP_{t-i} + \upsilon_t \qquad (1)$$

Where $DU = 1(t > T_b)$ is a post-break constant dummy variable; t is a linear time trend; $DT = 1(t > T_b)$ is a post-break slope dummy variable; $D(T_b) = 1(t = T_b + 1)$ is the break dummy variable; and ε_t are white-noise error terms. The null hypothesis of a unit root is stated as $\beta = 1$. The break date, T_b, is selected based on the minimum t-statistic for testing $\beta = 1$ (see Perron, 1997, pp. 358-359).

Table 2: Perron's Endogenous Unit Root Test, China's Monthly Data, 1990:08 to 2012:09

$$IP_t = 0.13177 + 0.16868DU - 0.00326t + 0.00310DT - 0.29109D(T_b) + 0.91646IP_{t-1} + \upsilon_t$$

$\quad$ (2.0926*) $\quad$ (2.6500*) $\quad$ (-2.0370*) $\quad$ (1.9101**) $\quad$ (-2.0370*) $\quad$ (56.7610*)

No. of augmented lags: $k = $ 11 $\quad$ Break Date: May 1995 $\quad$ $t(\alpha = 1) = -5.1738**$

Notes: Critical values for t-statistics in parentheses: Critical values based n = 100 sample for the break-date (Perron, 1997). "*" and "**" indicate significance at 1 percent and 5 percent levels.

The estimation results of Perron's endogenous unit root tests are summarized in Table 2. Both the post-break intercept dummy variable, DU, and the post-break slope dummy variable, DT, are positive and significant at any conventional level. The empirical results of these tests suggest that the Chinese lending-discount rate spread followed a stationary trend process with a break date of May 1995, corresponding to the enactments of the following basic laws covering the financial arena: the Law of the People's Republic of China on the People's Bank of China (the Central Bank Law), the Insurance Law of the People's Bank of China, the Law of the People's Republic of China on Negotiable Instruments and the Guarantee Law of the People's Republic of China.

5. Asymmetric Error-Correction Model and Empirical Model

An important implicit assumption of the Dickey-Fuller standard unit root tests and their extension is that the adjustment process is symmetric. If the adjustment process is asymmetric, then the implicitly assumed restrictive symmetric adjustment is indicative of model misspecification. To formally investigate the possibility of asymmetric adjustment process, the threshold autoregressive (TAR) model developed by Enders and Siklos (2001) were estimated to examine the behavior of the People's Republic of China's intermediation premium in the sample period.

The threshold autoregressive (TAR) model allows the degree of autoregressive decay to depend on the state of the intermediation premium in the previous period, i.e., the "deepness" of cycles. For instance, if the autoregressive decay is fast when the People's Republic of China's intermediation premium is above the trend and slow when the spread is below the trend, troughs will be more persistent than peaks. Likewise, if the autoregressive decay is slow when the intermediation premium is above trend and fast when the premium is below trend, peaks will be more persistent than troughs. In this model's specification, the null hypothesis that the People's Republic of China's loan premium contains a unit root can be expressed as $\rho_1 = \rho_2 = 0$, while the hypothesis that the premium is stationary with symmetric adjustments can be stated as $\rho_1 = \rho_2$.

To formally examine the behavior of the People's Republic of China's intermediation premium, the intermediation premium, IP_t, is regressed on a constant, linear trend and intercept dummy (with values of zero prior to May 1995 and values of one for May 1995 and thereafter). The saved residuals from the above estimated model, denoted by $\hat{\varepsilon}_t$, are then used to estimate the following TAR model:

$$\Delta\hat{\varepsilon}_t = I_t \rho_1 \hat{\varepsilon}_{t-1} + (1 - I_t)\rho_2 \hat{\varepsilon}_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta\hat{\varepsilon}_{t-p} + \hat{u}_t \qquad (2)$$

Where $\hat{u}_t \sim i.i.d.(0, \sigma^2)$, and the lagged values of $\Delta\hat{\varepsilon}_t$ are meant to yield uncorrelated residuals. As defined by Enders and Granger (1998), the Heaviside indicator function for the TAR specification is given as:

$$I_t = \begin{cases} 1 & if \ \hat{\varepsilon}_{t-1} \geq \tau \\ 0 & if \ \hat{\varepsilon}_{t-1} < \tau \end{cases} \qquad (3)$$

The threshold value, τ, is endogenously determined using the Chan (1993) procedure which obtains τ by minimizing the sum of squared residuals after sorting the estimated residuals in an ascending order, and eliminating 15 percent of the largest and smallest values. The elimination of the largest and the smallest values is to assure that the $\hat{\varepsilon}_t$ series crosses through the threshold in the sample period.

The empirical results of these estimations of the TAR model specified by equations (2) and (3) are summarized in Table 2. The overall empirical results in Table 2 indicates that the estimation results are devoid of serial correlation and have good predicting power as evidenced by the Ljung-Box statistics and the overall *F-statistics*, respectively. With the calculated statistic Φ_μ = 9.0129, the null hypothesis of a unit root ($\rho_1 = \rho_2 = 0$) is rejected at the 1 percent significance level (i.e. the intermediation premium is stationary). Given the partial test statistic F = 10.2542, the null hypothesis of symmetry, $\rho_1 = \rho_2$, is also rejected at 1 percent significant level. Thus, the empirical results indicate that adjustments around the threshold value of the People's Republic of China's intermediation are asymmetric. In fact, the point estimates suggest that the spread tends to decay at the rate of $|\rho_1| = 0.0243$ for

$\hat{\varepsilon}_{t-1}$ above the threshold, $\tau = -0.4093$, and at the rate of $|\rho_2| = 0.2304$ the decimal for $\hat{\varepsilon}_{t-1}$ below the threshold. Moreover, both ρ_1 and ρ_2 are statistically significant at any conventional level. Furthermore, as shown by Petrucelli and Woolford (1984), the necessary and sufficient condition for the intermediation premium to be stationary is: $\rho_1 < 0$, $\rho_2 < 0$ and $(1+\rho_1)(1+\rho_2) < 1$; thus, the estimates of ρ_1 and ρ_2 satisfy the stationary (convergence) conditions.

Table 3: Unit Root and Tests of Asymmetry, China's Monthly Data, 1990:08 to 2012:09

ρ_1	ρ_2	τ	$H_0 : \rho_1 = \rho_2 = 0$	$H_0 : \rho_1 = \rho_2$	aic	sic
-0.0243	-0.2304[*]	-0.4093	$\Phi_\mu = 9.0129$[*]	F = 10.2542[*]	-3.4588	-3.3911
$Q_{LB\,(10)} = 4.1180[0.9419]$			ln L = 86.9624		$F_{(4,259)} = 8.5165$[*]	

Notes: *The null hypothesis of a unit root, $H_0 : \rho_1 = \rho_2 = 0$, uses the critical values from Enders and Siklos (2001, p. 170, Table 1 for four lagged changes and n = 100). "*" indicates 1 percent level of significance. The null hypothesis of symmetry, $H_0 : \rho_1 = \rho_2$, uses the standard F distribution. τ is the threshold value determined via the Chan (1993) method. $Q_{LB\,(10)}$ denotes the Ljung-Box Q-statistic with 10 lags*

Given $|\rho_2| > |\rho_1|$, the People's Republic of China's *intermediation* premium adjusts to the long-run threshold value more slowly when an expansionary countercyclical monetary policy action causes the deposit rate to fall relative to the lending rate widening the intermediation premium than when a contractionary countercyclical monetary action causes the deposit rate to move in the opposite direction, narrowing the premium. Interestingly, this asymmetric adjusting pattern seems to support the position of the bank concentration hypothesis and the consumer characteristic hypothesis as well as the observed monopolistic/oligopolistic financial market structure and the dominance of the banking industry in the transitional economy of the People's Republic of China.

The positive results of the above asymmetric co-integration tests from estimating the above TAR model necessitate the use of a Threshold Autoregressive Vector Error-Correction (TAR VEC) model, specified by equations (4) and (5), to further investigate the asymmetric dynamic behavior of the People's Republic of China lending rates and the deposit rates. The estimation results of this model can be used to study the nature of the Granger causality between the commercial bank lending rates and the deposit rates. The empirical determined nature of the Granger causality will help to evaluate whether, and how, the lending rates and the deposit rates respond to changes in the intermediation premium. The Granger causality from the deposit rates to the lending rates indicates that the People's Republic of China's commercial banks respond to monetary policy as reflected in the deposit rates.

$$\Delta LR_t = \alpha_0 + \sum_{i=1}^{n} \alpha_i \Delta LR_{t-i} + \sum_{i=1}^{q} \gamma_i \Delta DR_{t-i} + I_t \rho_1 \hat{\varepsilon}_{t-1} + (1 - I_t) \rho_2 \hat{\varepsilon}_{t-1} + u_{1t} \qquad (4)$$

$$\Delta DR_t = \tilde{\alpha}_0 + \sum_{i=1}^{n} \tilde{\alpha}_i \Delta LR_{t-i} + \sum_{i=1}^{q} \tilde{\gamma}_i \Delta DR_{t-i} + I_t \tilde{\rho}_1 \hat{\varepsilon}_{t-1} + (1 - I_t) \tilde{\rho}_2 \hat{\varepsilon}_{t-1} + u_{2t} \qquad (5)$$

Where $u_{i,t} \sim i.i.d.(0, \sigma^2)$, $i = 1, 2$ and the Heaviside indicator function, I, is set in accord with (3). This model specification recognizes the fact that the mutual responses between the countercyclical monetary policy action of the People's Republic of China as reflected in the deposit rate and the lending institutions may be different, depending on whether the policy action causes the deposit rate to rise or to decline.

As pointed out by Thompson (2006), the above specified TAR-VEC model differs from the convention error-correction models by allowing asymmetric adjustments toward the long-run equilibrium. Also, the asymmetric error correctional model replaces the single symmetric error correction term with two error correction terms. Thus, in addition to estimating the long-run equilibrium relationship and asymmetric adjustment, the model also allows for tests of the short-run dynamic between the changes in the deposit rates and the lending rates. This in turn reveals the nature of their Granger causality.

In reporting the estimation results, the partial F_{ij} represents the calculated partial *F-statistics* testing the null hypothesis that all coefficients *ij* are equal to zero. "*", "**" and "***" indicate the 1 percent, 5 percent and 10 percent significant levels of both the *F-statistics* and the *t-statistics*. $Q_{LB\,(10)}$ is the Ljung-Box statistics and its significance is in square brackets, testing for the first ten of the residual autocorrelations to be jointly equal to zero. *lnL* is the log likelihood. The overall *F-statistic* tests the overall fitness of the model. The retentions of estimated coefficients α_i, γ_i, $\tilde{\alpha}_i$, and $\tilde{\gamma}_i$ are based on the 5 percent level of significance of the calculated *t-statistics*.

Table 4: Asymmetric Error Correction Model, Monthly Data, 1990:08- 2012:09

Eq. (6)	**Independent Variables**			
	Overall $F_{(9,231)} = 4.6479^*$; lnL = 27.0651 $Q_{10)}=10.0910[0.4326]$; $\bar{R}^2 =$ 0.1203			
ΔLR_t	$\alpha_9 = \alpha_{13} = \alpha_{24} = 0$	$\gamma_2 = \gamma_{13} = \gamma_{14} = \gamma_{17} = 0$	ρ_1	ρ_2
	Partial F_{11}-stat.=6.4565*	*Partial F_{12}-stat.= 7.0629**	0.0759***	-0.0001
Eq. (7)	**Independent Variables**			
	Overall $F_{(11,233)} = 7.1408^*$; lnL = -14.1784 $Q_{(10)} =8.8650[0.5449]$; $\bar{R}^2 =$ 0.2168			
ΔDR_t	$\tilde{\alpha}_9 = \tilde{\alpha}_{10} = \tilde{\alpha}_{13} = \tilde{\alpha}_{20} = 0$	$\tilde{\gamma}_2 = \tilde{\gamma}_{10} = \tilde{\gamma}_{13} = \tilde{\gamma}_{14} = \tilde{\gamma}_{16} = 0$	$\tilde{\rho}_1$	$\tilde{\rho}_2$
	Partial F_{21}-stat.= 12.1899*	*Partial F_{22}-stat. = 11.3137**	0.1154*	0.0608

Notes: *Partial F-statistics for lagged values of the lending rates and the Central Bank discount rates respectively, are reported under the specified null hypotheses. $Q_{(10)}$ is the Ljung-Box Q-statistics to test for serial correlation up to 10 lags. Overall F-statistics are for the respective overall equations. "*", "**" and "***" indicate 1 percent, 5 percent and 10 percent significance levels respectively.*

Table 4 reports the results of asymmetric error correction model. A general diagnostic analysis of the overall empirical results indicates that the estimated equations (4) and (5) are devoid of serial correlation and have good predicting power as evidenced by the Ljung-Box statistics and the overall F-statistics, respectively. In the short-run dynamic adjustment, the calculated partial statistics, partial F_{12} and F_{21}, in equations (4) and (5) indicate

bidirectional Granger causality between the countercyclical monetary policy action of the People's Republic of China as reflected in changes in the deposit rates and the lending rates charged by lending institutions. These results imply that the countercyclical monetary policy action of the People's of Republic of China's Bank and the lending rates affects each other's. This Granger bidirectional causality indicates that the People's of Republic of China's Bank uses its countercyclical monetary policy to manage the short-run macroeconomic conditions and lending institutions respond to the countercyclical monetary policy actions in the short run.

In addition to revealing the short-run dynamic Granger causality, the asymmetric error correction model also reveals the long-run behavior of the countercyclical monetary policy action of the Peoples of Republic of China's Bank. The results from estimating equation (4) reveal that $|\rho_1| > |\rho_2|$, and ρ_1 is significant at 10 percent level; while ρ_2 is statistically insignificant at any conventional level. These findings suggest that that the People's Republic of China's lending institutions only respond to expansionary countercyclical monetary policy in the long run. Also, the estimation results for equation (5) show that $|\tilde{\rho}_1| > |\tilde{\rho}_2|$. Also, $\tilde{\rho}_1$ is significant at any conventional levels; but $\tilde{\rho}_2$ is statistically insignificant even at 10 percent level. These findings suggest that the Peoples of Republic of China's Central Bank has been successfully in influencing the commercial lending rates with its expansionary countercyclical monetary policy in the long run.

6. Analysis of the Findings

The unit root results test indicates that the intermediation premium has experienced a structural break in May 1995, corresponding to the enactments and implementations of a series of new banking laws and regulations in 1995. The TAR model's estimation results indicate that the adjustments of the People's Republic of China's intermediation premium toward the long-run equilibrium are asymmetric and tend to adjust more slowly when the deposit rate is declining than when it is rising.

Behavior of the People's Republic of China's intermediation premium prevails so the estimation results suggest that the spread converges to its long-run threshold more slowly when it is above the threshold. With regard to the empirical results from the estimations of equations (4) and (5), these findings seem to suggest that the People's Republic of China's Central Bank has been able to affect the lending rate in the long run. As to the empirical results pertaining to the short-run dynamic causality, the calculated partial *F-statistics* from equations (4) and (5) reveal the bidirectional Granger causality from People's Republic of China'*s* deposit rate to the lending rates in the country.

As aforementioned, based on a 5 percent significance level, estimated coefficients $\alpha_i's$ and $\gamma_j's$ of equation (4) and the estimated coefficients $\tilde{\alpha}_i's$ and $\tilde{\gamma}_j's$ of equation (5) are retained. Economically, the inclusions of coefficients α_9, α_{13}, α_{24} and γ_2, γ_{13}, γ_{14}, γ_{17} of equation (4) indicate that the changes in the lending rate in the last twenty four months and the changes in the deposit rate seventeen months ago help predict the lending rate in the current month. Likewise, the inclusions of the coefficients $\tilde{\alpha}_9$, $\tilde{\alpha}_{10}$, $\tilde{\alpha}_{13}$, $\tilde{\alpha}_{20}$ and $\tilde{\gamma}_2$, $\tilde{\gamma}_{10}$,

$\tilde{\gamma}_{13}$, $\tilde{\gamma}_{14}$, $\tilde{\gamma}_{16}$ of equation (5) suggest that the changes in the lending rates twenty three months ago and the changes in the deposit rates sixteen months ago affects the deposit rate in the current month . These empirical findings of long time lags are   useful for the monetary policy makers in formulating their countercyclical monetary policy.

7. Conclusion

A threshold autoregressive (TAR) model (Enders and Siklos 2001) was used to investigate the behavior of the People's Republic of China lending and deposit rates and the intermediation premium. Following Perron's (1997) procedure, an endogenous unit root test function with the intercept, slope, and trend were specified and estimated to test the hypothesis that the People's Republic of China's intermediation premium has   unit root. The results of this test also indicate that the intermediation premium have experienced a structural break in May 1995, corresponding to the enactments and implementations of a series of new banking laws and regulations in the year 1995.

The TAR model's estimation results are consistent with the position of the bank concentration hypothesis and the consumer characteristic hypothesis as well as the observed monopolistic/oligopolistic financial market structure and the dominance of the banking industry in the transitional economy of the People's Republic of China. These empirical findings also suggest that the People's Republic of China's lending institutions in the conventional segment of the economy do not exhibit predatory pricing behavior.

The results of the Asymmetric Error-Correction Model imply a bidirectional Granger-causality between the People's Republic of China's lending and deposit rates prevail. These results imply that both the People's Republic of China's lending and deposit rates adjustments affected each other's movements, which parallel those reported by Thompson with respect to the prime lending rate and the one-month CD rate in the U.S. banking industry.

The empirical results indicated that both the China's lending rate and deposit rate responded only to the expansionary monetary policy which is responsible for widening the intermediation premium.

The study has not applied consistent Momentum Threshold autoregressive (MTAR) model which is very important when the adjustment tends to show more momentum in one direction to other. As MTAR model is designed to capture deep asymmetric movements in the series of deviations from long-run equilibrium so both the TAR and MTAR models should be estimated.

Endnotes

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[1] Much of the discussion were drawn heavily from Allen, Qian, and Qian (2009)

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