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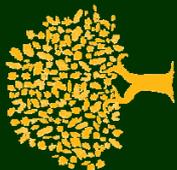
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How Much Has Private Credit Lending Reacted to Monetary Policy in China? The Case of Wenzhou

Duo Qin, Zhong Xu, Xuechun Zhang*

Abstract

This study investigates empirically what the major factors are which have driven Wenzhou's informal credit market and how much that market is responsive to monetary policies and the formal banking conditions nationwide. The main findings are: (i) the informal credit lending rates are highly receptive to monetary policies; (ii) the market is dominantly demand driven; (iii) the informal lending is substitutive to bank savings in the short run but complementary to banking lending in the long run; and (iv) the market is complementary to excessive investments in the local real estate market.

Keywords: informal credit market, monetary policy

JEL classification: G19, E52, O16

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1. Introduction

The existence of informal credit market alongside the formal banking and capital markets constitutes a key feature in many developing and emerging-market economies. Recently, the rapid growth of the informal or private shadow banking system in China has attracted a great deal of attention. The attention is mainly triggered by a severe debt crisis erupted in Wenzhou in 2011, e.g. see Herrero *et al* (2011), Zhu *et al* (2012) and The Economist (2012). In March 2012, the Chinese government designated Wenzhou as a ‘special financial zone’ to pilot a number of reform measures which aim at gradually regulating and legitimising the informal credit market.

The choice of Wenzhou is not an accidental or expedient decision. A prefecture-level coastal city in Zhejiang province, Wenzhou is well-known for its vibrant business activities with abundant entrepreneur spirits. In fact, Wenzhou enjoys the reputation of being the birthplace of China's private economy through the early and rapid developments of household and small-enterprise based manufacturing industries and various specialised markets since the economic reforms, which started in the late 1970s. Subsequently, there came a phenomenal growth of private assets and with it the emergence of a private and informal (referred to as ‘*min-jian*’ in Chinese, meaning ‘non-governmental’) credit market. Due to its leading position in China, Wenzhou’s market caught the attention of the People’s Bank of China (PBC) over a decade ago and a regular monitoring system was put in place as early as 2003. The market is now one of the most developed *min-jian* credit markets in China. Its size is estimated to be roughly one fifth of the total formal lending by Wenzhou’s local banks (see Wu, 2011).

However, the past decade has seen Wenzhou’s informal credit market through a bumpy ride. Most of its activities had been involved in local industrial and commercial businesses until 2005, when the Chinese economy switched into a phase of rising excess

liquidity, e.g. see Zhang (2007). Unfortunately, Wenzhou's industry has failed to upgrade itself as swiftly as what the market competition demands. As a result, there rose a shortage of real-sector investment opportunities for the rapidly accumulating private capital because of the sizeable presence of state-monopolised sectors. Subsequent declines in the local demand for bridging capital and business investments drove Wenzhou's informal lending activities out of their geographic boundary into other locations in China and also into opportunities of relatively highly speculative types, such as commodity trading and real estate properties. The resulting increase in the investment risk was further exacerbated by the double blows from the downturn in the local export-led economic activities on one hand and the swift fiscal and monetary measures taken by the Chinese government on the other in the wake of the 2008 global economic recession. The eruption of the 2011 crisis became inevitable.¹

The present paper reports a pilot exploratory study into a monthly sample-survey data set of Wenzhou's informal credit market collected by the PBC for the period of 2003M1-2011M5. This study is specifically focused on how the dynamics of Wenzhou's local informal credit market has evolved and reacted to the monetary policy measures and the formal banking conditions nationwide. The available literature on the informal credit market and shadow banking system is relatively sparse and disparate. Within the theoretical domain, the relationship between the informal and formal credit markets is commonly examined using game theory models, e.g. see Gupta and Chaudhuri (1997) and Madestam (2008). Recently, the relationship has been calibrated by means of a dynamic stochastic general equilibrium (DSGE) model by Ngalawa (2010). Ngalawa derives his inspiration from empirical studies of informal financial markets in a number

¹ According to the statistics released by the Intermediate Court of Law in Wenzhou, over 2600 cases of informal lending disputes were lodged with them during the second quarter of 2011, a 20% increase if compared to the figure a year before (see "21st Century Economic Report" [in Chinese], 16 August, 2011).

of African countries which are known as quasi-emerging market economies. An extensive description and analysis of the relationship between formal and informal institutions in Sub-Saharan Africa is provided in Nissanke and Aryeetey (1998).

When it comes to more detailed empirical studies, however, objectives and findings are often disparate and subject largely to the diversity of available data. For example, Khandker (2000) finds certain substitutive effect between microfinance and informal borrowing from household survey data collected in rural areas of Bangladesh; Guirkingier (2006) delves into, using panel household survey data in Peru, the different motives of household demand for informal loans and different practice of informal lenders in handling contractual risk as compared to formal lenders. In the case of using enterprise-based survey data, Atieno (2009) investigates how different linkages between small enterprises and financial institutions affect the financing of the enterprises and their performance, based on data collected from two urban centres of Kenya; Okpukpara (2009) analyses the main factors affecting the probability of small enterprises to obtain loans based on data collected in rural Nigeria. None of these studies look directly into the issue of how informal financing is related to the macro monetary policies of the country concerned. In fact, a similar situation can be found from empirical studies using the Chinese data. For instance, the nexus between financing sources and growth forms the primary objective of a number of recent studies exploring firm survey data, e.g. see Allen *et al* (2005), Ayyagari *et al* (2010) and Degryse *et al* (2012).

One of the very few studies which examine the relationship between informal lending and monetary policy was by Carpenter (1999). The study employs a VAR (Vector AutoRegression) model to analyse how M2, the formal banking credits and market rates could affect the informal lending rates using quarterly data of Korea for the period of 1972-94. The model is justified theoretically via an extended IS-LM scheme with

financial dualism in a developing economy setting. The VAR approach is also adopted in a number of recent empirical studies analysing the same sample survey by the PBC mentioned above, e.g. see Zhou and Ren (2010) and Liang *et al* (2011). A major aim of these studies is to find out how much Wenzhou's informal credit market rates have reacted to the formal banking rates and key monetary policy variables.

However, the findings of those recent studies are not adequately robust and convincing due mainly to the limitations of the VAR approach. In particular, there are at least two limitations which deem the approach ill-suited for the present investigation – the limited number of variables practically includable in a VAR and the lack of rigorous specification, testing and also economic interpretation of individual regressors within it. Since there lacks established theories on the informal credit market, it is particularly important for empirical studies to try and find as precisely as possible what kind of statistically regular dynamic transmission channels there are between the variables representing the informal markets and the various postulated explanatory variables available. It is precisely out of such consideration that the present study chooses to follow the LSE (London School of Economics) dynamic model specification methodology.

The rest of the paper is organised as follows. The next section prepares the modelling work by a summary of the developments of Wenzhou's informal credit market and also the sample survey designed and conducted by the PBC. Section 3 describes the modelling procedure and discusses the key model results. The last section concludes with a summary of the main findings and their policy implications.

2. Economic Background and Data Description

The annual per capita GDP of Wenzhou is over 42,000 *yuan* according to the 2011 statistics, more than twice of the national average. Nearly a quarter of Wenzhou's population has migrated to other places and regions in China, and over 600,000 have

gone overseas, many of them are entrepreneurs, see Wu (2006). According to the estimates by the PBC, about 89% of Wenzhou's households and nearly 57% of enterprises are involved in *min-jian* credit activities, see Ye (2011, p71). Before we go into more details of these activities, it is useful to take a quick look at Wenzhou's formal credit market.

Figure 1 plots the banking lending to GDP ratio of Wenzhou versus the ratio at the national level over the last three decades. It is seen there that Wenzhou remained substantially below the national level until 2005. In fact, its lending activities entered a stage of steady and rapid growth since the late 1990s, when banks were encouraged to extend their business to non-state owned firms during the banking reforms. The growth has accelerated in the late 2000s, leading Wenzhou up to about 0.6 above of the national level. This is remarkable especially in view of Wenzhou's declining position in its loan-to-deposit ratio from the late 1970s up to the early 1990s, as shown in Figure 2. To a large extent, the declining position could reflect the expanding *min-jian* credit market, since investment yields from that market must have been much more attractive than deposits in the formal banking system. Interestingly, Wenzhou's loan-to-deposit ratio has moved above the national average since 2003. According to a PBC internal report in 2011, 10% of Wenzhou's formal banking lending is estimated to have ended up in its *min-jian* credit market, and a good portion of which has gone to speculative investments.

The development of Wenzhou's informal credit market has undergone several stages since the economic reforms in the late 1970s. It started mainly from informal lending between individuals and households and evolved into an informal credit market between firms and intermediaries from the latter half of the 1980s onwards. The last two decades saw Wenzhou's informal credit market expanding from supplying liquidity mainly to local industrial and commercial firms into businesses outside the local region

and of more speculative nature as well, e.g. see Chen *et al* (2010) and Wu (2011). Most of the liquidity supply comes from the savings of Wenzhou's households and firm owners. According to a report on Wenzhou's *min-jian* credit market by the PBC published in 2011, roughly 35% of the liquidity is used to finance business production, 20% into real estate business, and 20% taken by intermediaries for short-run circulatory purposes.

The above situation is only partially reflected in the sample survey to be analysed here. The survey was carried out by the Wenzhou branch of the PBC on a monthly basis, starting from 2003.² Specifically, there are 140 observation points in the survey (30 agricultural credit cooperatives, 28 small-credit lending firms, over 30 underwriting firms and the rest mortgage and pawnshops); the surveyed activities cover various loans and the associate lending rates via direct and indirect lending, by individuals and firms mainly for production and investment purposes, see also Wu (2011). Table 1 provides a number of descriptive statistics of the loans covered by the survey for the period of 2003M1-2011M5. If we look into the time profile of the loans by the different classifications, it becomes particularly noticeable (see Figure 3) that loans for investment purposes dropped drastically in 2005, as short-term loans rapidly increased. The increase is especially noticeable in the wake of the 2008 global financial crisis. As seen from Figure 3, there was distinctly high volatility during the 2004-7 period and much of that occurred with the short-run lending activities. The volatility indicates the high uncertainty in the demand for informal loans and also shallowness of the market.

Unsurprisingly, the rising demand for short-run funds of the post 2005 period is accompanied by the growing cost of borrowing, especially for borrowing of very short duration (less than one month) (see Figure 4). It is also noticeable from Figure 4 that the most pronounced interest rate hike occurred in between-firm lending, indicating how

² More information can be found at: <http://zj.sina.com.cn/finance/news/regional/31/2012/0517/17542.html> .

severe the shortage of bridging circulating capital was during the post-2008 crisis period. The hike was accompanied with a sharp rise of the rates for mortgage-backed lending, due largely to the increasing uncertainty in the pricing of the mortgaged properties at the time. When an aggregate rate is produced by taking a weighted average (see Figure 5), we can see clearly that the borrowing costs underwent an over two-year trough after 2005 and have remained fluctuating within the 10-20% range on the whole.

The aggregate interest rate plotted in Figure 5 and the total lending given in the left panel of Figure 3 are selected as the two modelled variables of the present study. We are particularly keen to find out how much, if any, these variables are responsive, in a statistically regular way, to the monetary policy measures, the formal banking sector conditions, the real estate price fluctuations, as well as the local economic conditions.

3. Econometric Modelling Procedure and Key Results

Let us denote the total lending covered in the survey by Lwz_t and its price, i.e. the loan-weighted average interest rate, by Rwz_t . A range of possible explanatory variables are selected and classified into two types, X and Z . The first type, X , consists of variables representing the formal banking system and monetary policy instruments, such as the required reserve ratio and various interest rates set by the central bank; the second type, Z , covers the local variables such as the inflation rate and industrial production output of Wenzhou, some of which can take a relative term with respect to the national level. The model takes the general form of the following conditional expectations:

$$(1) \quad \begin{aligned} E(Rwz_t | \bullet) &= f(Lwz, X, Z) \\ E(Lwz_t | \bullet) &= f(Rwz, X, Z) \end{aligned}$$

In view of the monthly series, Lwz_t and Rwz_t , as plotted in Figures 3 and 5, the two variables exhibit notable non-stationary features. Indeed, these are verified by the

unit-root tests on Lwz_t and Rwz_t , and also on their first differences (see Table 2).

The time-series properties shown in Table 2 remind us of the need of paying special attention to the dynamic specification during the modelling experiment. Therefore, we adopt here the principle of the LSE dynamic, general-to-specific specification approach (e.g. see Hendry 1995, 2009, 2011). In comparison to the VAR approach and the related cointegration analysis, this approach suits better to the present situation where the modelling experiment entails a great deal of exploratory data analysis, i.e. analysis which involves filtering through a relatively large number of variables of mixed time-series properties. Specifically, a dynamically general (from six lags) auto-regressive, distributed-lags (ADL) model is used as the starting model for each of the two equations in (1). The model is gradually reduced by means of a batch of testing and estimation tools to reach a data-congruous and parsimonious model which is reparameterisable into an error-correction model (ECM) with plausible economic interpretation. Note that a necessary criterion of data congruity is the verification of the residual term passing a batch of routine diagnostic tests, such as tests on residual autocorrelation, homogeneity and normality. The OLS estimator is used throughout the model reduction procedure since the ADL is a single-equation based model. In the event that simultaneity is present in the resulting parsimonious model, the IV method is then used to circumvent, as well as check the significance of, the OLS ‘simultaneity bias’.

Let us now look at the modelling experiment of the two equations of (1) in turn. For the interest rate equation, variables included in X are: RRR_t , the required reserve ratio, Rrd_t , the rediscount rate, $Rrepo_t$, the 30-day repo market rate, Rsv_t , the 6-month household savings deposits rate and $RRsv_t$, real Rsv_t , i.e. Rsv_t net of the CPI-based national inflation rate, $(Rll - Rls)_t$, an interest rate term-spread variable made up of the

difference between the 3-year-or-less lending rate and the 6-month lending rate, $(Rls - Rsv)_t$, a spread variable made up of the difference between the 6-month lending rate and the 6-month household savings deposits rate, and $\Delta \ln(Ls)_t$, the growth rate of the national short-term loan, and $\Delta_{12} \ln(Pp)_t$, year-on-year inflation of real estate properties; variables included in Z are: $Infwz_t$, CPI-based inflation rate in Wenzhou, $\Delta \ln(Ywz)_t$, the growth rate of the industrial output in Wenzhou, $(Rllwz - Rlswz)_t$, a term-spread variable of the Wenzhou's private lending rates, i.e. the difference between the rate for over 1-year lending and the 1-month rate, $\left(\frac{Infwz}{Inf}\right)_t$, ratio of the local inflation rate to the national rate, $\left(\frac{Lwz}{Ls}\right)_t$, ratio of Wenzhou's private lending to the national lending, $\Delta_{12} \ln(Ppzj)_t$, year-on-year inflation of real estate properties of Zhejiang, and also $\left(\frac{Ppzj}{Pp}\right)_t$, the ratio of the property price index of Zhejiang Province to the national property price index. A more detailed description of the variables and their data sources is given in the Appendix.

The specification reduction process has yielded the following ECM for Rwz_t :

$$(2) \quad \begin{aligned} \Delta(Rwz)_t = & 1.729 - 0.211 EC_Rwz_{t-1} + 0.247 Rrepo_t - 0.363 \Delta_3 RRR_{t-1} \\ & \begin{matrix} (0.386) & (0.035) & (0.055) & (0.091) \\ (0.037) & (0.046) & (0.029) & (0.051) \end{matrix} \\ & + 2.252 \Delta_2 (Rll - Rls)_t + 1.363 \Delta Rsv_{t-3} + 0.443 \Delta_2 \ln(Lwz)_{t-1} \\ & \begin{matrix} (0.613) & (0.365) & (0.134) \\ (0.056) & (0.178) & (0.035) \end{matrix} \\ & - 0.117 \Delta_2 Infwz_{t-1} - 2.375 (\Delta_{12} \ln(Ppzj) - \Delta_{12} \ln(Pp))_{t-5} + \hat{\varepsilon}_t^{Rwz} \\ & \begin{matrix} (0.035) & (1.199) & (0.364) \\ (0.101) & (0.413) & (0.295) \end{matrix} \end{aligned}$$

where EC_Rwz_{t-1} is derived from $Rwz_t = 0.5RRR_t - 0.6RRsv_t - 6(Rll - Rls)_{t-1} + EC_Rwz_t$, a long-run equilibrium relation obtained through the model reduction process. No problems are revealed from routine diagnostic tests of the residuals and the overall fit of (2) can be roughly measured by $R^2 = 0.556$. The statistics given in parentheses immediately below

the coefficient estimates and the residual term are standard errors; the statistics in the bottom parentheses are Hansen parameter instability test statistics (1992). The Hansen statistics are particularly important here and these will be marked by ‘*’ when the 5% significance level is failed. Empirically, within-sample parameter constancy is a prerequisite of conducting model-based forecasting; philosophically, empirical regularity constitutes a key factor for further theorisation. It is encouraging to see that none of the terms in (2) has failed the Hansen test. It is also seen in (2) that simultaneity is absent as the effect of Lwz_t is found to be lagged and in the form of a 2-month growth rate, $\Delta_2 \ln(Lwz)_{t-1}$. Hence the OLS estimates suffice. It is also shown that Rrd_t , $\Delta \ln(Ls)_t$ and $(Rls - Rsv)_t$ have dropped out from X while $\Delta \ln(Ywz)_t$, $(Rllwz - Rlswz)_t$ and $\left(\frac{Ppzj}{Pp} \right)_t$ have dropped out from Z .

Equation (2) exhibits several interesting features of the sensitivity of the pricing dynamics of Wenzhou’s market with respect to the monetary policies and the formal banking conditions. First of all, the long-run EC movement of Rwz_t is found to be positively affected by RRR_t but negatively affected by $RRsv_t$ and $(Rll - Rls)_{t-1}$, all the three variables belonging to X . In other words, the Wenzhou lending rate has been mainly driven by the national banking condition in the long run; it rises with the tightening of the money supply, as indicated by rises of RRR_t , a key quantitative tool of the PBC’s monetary policy; meanwhile, the lending rate falls with increase of the returns from the banking system, as represented by the real savings rates, as well as with widening of the term-spread of the bank lending rates (note that Wenzhou’s market is dominantly a short-term market as shown in Table 1). These capital price movements suggest that informal credits of Wenzhou’s market are complementary to formal credits

from the national banking system in the long run. However, the short-term impact of these price variables are found to be positive, i.e. $\Delta_2(Rls - Rsv)_t$ and ΔRsv_{t-3} , indicating a substitutive effect between informal credits of Wenzhou's market and formal credits of the banking system (e.g. see Gupta and Chaudhuri, 1997). Another interesting feature is the significantly positive impact of $Rrepo_t$ on $\Delta R wz_t$. Since the required reserve ratio is not frequently adjusted, the policy rate of the repo market becomes naturally a more sensitive and instantaneous barometer of the tightness of the money market condition. The interest rate adjustment is also found to be sensitive to the inflations in the real estate markets, albeit with a long lag. When inflation in the national property market exceeds that of the local market, as represented by the provincial price index, the interest rate is pushed up, indicating a tightening up of liquidity in the informal credit market. Finally, three local variables are found to be significant: the growth rate of informal credits, Lwz_t , the changes of inflation and the inflation rate in the provincial real-estate investment in excess to the national rate, all acting as short-run leading indicators. Since the impact of the quantity variable, i.e. $\Delta_2 \ln(Lwz)_{t-1}$, is strongly positive, it indicates a demand effect. The negative coefficient of the last variable in (2) indicates that the informal lending activities and the real-estate investments are complementary to each other.

The modelling experiment of the second equations of (1) involves the same set of X while variable set Z is enlarged to include the total bank lending in Wenzhou, $Lbwz_t$, and the ratio of total lending to total deposits in Wenzhou, $\left(\frac{Lbwz}{Sbwz}\right)_t$. Following the convention, the log-linear ADL model form is adopted here and the specification reduction process has yielded the following ECM:

$$(3) \quad \Delta \ln(Lwz)_t = -12.162 - 1.27 EC_Lwz_{t-1} - 0.129 \Delta Rwz_t + 0.36 \Delta_6 \ln(Ywz)_{t-1} \\ + 13.235 \left(\frac{Infwz}{Inf} \right)_{t-6} + 0.461 \left(\frac{Ppzj}{Pp} \right)_{t-3} - 0.648 (\Delta_6 \ln(Ppzj) - \Delta_6 \ln(Pp))_{t-1} + \hat{\varepsilon}_t^{Lwz}$$

(2.239) (0.092) (0.042) (0.109)
(0.028) (0.027) (0.219) (0.073)

(2.326) (0.102) (0.234)
(0.028) (0.035) (0.137)

(0.201)
(0.865)*

with $R^2 = 0.715$. Similar to the reduction process in (2), the error-correction term in (3), EC_Lwz_{t-1} , is derived from $\ln(Lwz)_t = 0.08RRR_t - 0.04Rwz_{t-1} + 0.1\ln(Ywz)_{t-1} + EC_Lwz_t$. Note that the Hansen parameter constancy test for the residual standard error has failed at 5%. The problem is also reflected from the residual homoscedastic test results.³ This result is not surprising considering the highly volatile part of the sample data between roughly the 2004-7 period as shown from Figure 3. Fortunately, the non-constancy of the residual variance does not affect the relative constancy of individual parameter estimates, as shown in (3). Note also that simultaneity occurs in (3), subjecting the OLS method to the simultaneity bias. Hence, the equation is re-estimated by the instrumental variable (IV) method. Specifically, $Rrepo_t$ and $\Delta_2(Rls - Rsv)_t$ are chosen, with reference to (2), as the instruments for Δ_2Rwz_t . The resulting regression yields:

$$(3') \quad \Delta \ln(Lwz)_t = -11.5 - 1.23 EC_Lwz_{t-1} - 0.229 \Delta Rwz_t + 0.419 \Delta_6 \ln(Ywz)_{t-1} \\ + 12.465 \left(\frac{Infwz}{Inf} \right)_{t-6} + 0.502 \left(\frac{Ppzj}{Pp} \right)_{t-3} - 0.664 (\Delta_6 \ln(Ppzj) - \Delta_6 \ln(Pp))_{t-1} + \hat{\varepsilon}_t^{Lwz}$$

(2.424) (0.106) (0.118) (0.13)

(2.547) (0.115) (0.242)

(0.208)

Comparing to the estimates in (3), it is easily seen that the OLS 'bias' is statistically insignificant, a well-expected outcome from numerous empirical studies reported in the literature for over half a century, e.g. see Gilbert and Qin (2006).⁴

Let us now turn to the economic interpretation of the parameter estimates in (3). In contrast to the lending rate equation (2), the long-run EC relation imbedded in (3) involves dominantly local variables, i.e. Rwz_{t-1} and $\ln(Ywz)_{t-1}$, and both are one-month

³ Residual homoscedastic tests: $F(12,74) = 2.3796$, where the p -value is given in the squared bracket. [0.0118]*

⁴ The two instruments have passed the Sargan IV specification validity test. Note also that Hansen parameter constancy test is not available under the IV estimation.

leading indicators. Nevertheless, RRR_t is found to exert a long-run positive role again, albeit much smaller than that in (2). Both local variables are also found to exert significant short-run impact on the changing rate of Lwz_t . However, none of the variables in X are found to be significant as short-run driving factors. Likewise, many other local variables in Z , especially those representing the formal banking conditions, have dropped out. Interestingly, $\left(\frac{Infwz}{Inf}\right)_{t-6}$, the relative inflation variable, is found to have a highly significant positive impact. It indicates how economic overheating of the Wenzhou area relative to the whole country could drive up demand for informal lending. But what is particularly noticeable in (3) is its EC feedback parameter estimate. It demonstrates oscillatory dynamics around the long-run path as its magnitude is significantly smaller than -1 . The lack of simple convergence towards equilibrium via a dampening error-correcting mechanism leads us to further investigation into this feature. The following two equations report the results of two sub-sample estimation for the period of 2006M1-2011M5 and 2007M8-2011M5 respectively:⁵

$$(4) \quad \Delta \ln(Lwz)_t = -10.832 - 1.079 EC - Lwz_{t-1} - 0.146 \Delta Rwz_t + 0.492 \Delta_6 \ln(Ywz)_{t-1} \\ + 11.683 \left(\frac{Infwz}{Inf}\right)_{t-6} + 0.435 \left(\frac{Ppzj}{Pp}\right)_{t-3} - 0.857(\Delta_6 \ln(Ppzj) - \Delta_6 \ln(Pp))_{t-1} + \hat{\varepsilon}_t^{Lwz}$$

(2.684)
(0.124)
(0.051)
(0.168)

(0.024)
(0.022)
(0.603)*
(0.078)

(2.777)
(0.158)
(0.313)
(0.197)

(0.024)
(0.022)
(0.209)
(1.206)*

with $R^2 = 0.641$.

$$(5) \quad \Delta \ln(Lwz)_t = -9.257 - 0.951 EC - Lwz_{t-1} + 0.189 \Delta_6 \ln(Ywz)_{t-1} \\ + 10.597 \left(\frac{Infwz}{Inf}\right)_{t-6} - 0.415(\Delta_6 \ln(Ppzj) - \Delta_6 \ln(Pp))_{t-1} + \hat{\varepsilon}_t^{Lwz}$$

(1.229)
(0.071)
(0.065)

(0.256)
(0.415)
(0.195)

(1.296)
(0.119)
(0.065)

(0.258)
(0.091)
(0.293)

with $R^2 = 0.82$. Note that two explanatory variables have dropped out in (5). More updated data information is thus needed for us to further extend this dynamic

⁵ Only the OLS results are reported here to save space. The IV estimation is also run but shows no statistical difference from the OLS results, similarly to the full-sample case.

specification experiment. Nevertheless, the above sub-sample results reveal that the oscillatory period is mainly a feature of the early sample period, i.e. prior to 2007. However, the unusual closeness of the feedback parameter estimate to -1 tells us that the Wenzhou informal lending is extremely susceptible to the long-run equilibrium condition as specified in (3)-(5). Equation (5) also confirms the finding from (3) that the informal lending activities are complementary to excessive local real-estate investments as compared to the national level. On the whole, the total lending is found to be far more sensitive to local conditions than the lending rate, especially with respect to short-run shocks.

4. Concluding Remarks

The dynamic modelling experiments have yielded two equations with statistically relatively satisfactory properties. The equations demonstrate that Wenzhou's informal credit market has been responsive regularly to a number of factors representing the monetary policy, the national formal banking conditions and the local economic conditions.

The rate equation is found to be more robust than the total lending equation in terms parameter constancy. There are, at least, three aspects of the rate equation, which deserve further discussion here. First, supply of liquidity exerts no constraint on the pricing of Wenzhou's informal lending activities. In fact, the short-run change in the liquidity position is found to exert a relatively substantial demand-side effect, suggestive of a strong need for the development of private-owned banks. Second, the ways that the rate reacts to the bank saving rates imply that the informal loans are substitutive to bank savings in the short run but they are complementary in the long run. Both of the two aspects are supportive of the choice of Wenzhou by the PBC as a pilot for legitimising the informal credit markets. Third and perhaps the most important from a policy perspective,

the rate movements have remained highly receptive to the monetary policy measures, such as the required reserve ratio, and also the formal banking conditions at the national level, such as the term spread of the bank lending rates. This is encouraging for policy makers to monitor the market and influence its developments.

Indeed, further development of Wenzhou's informal credit market is desired in order to let it become a more reliable source of financing. The lack of depth of the market is reflected not only from the high borrowing costs shown from Figure 4, but also from the oscillatory tendency of the loan equation. Moreover, this equation reinforces the rate equation by demonstrating that the lending activities are dominantly demand-side driven, both in the short run and the long run as well. In addition, it is also sensitive to the quantitative monetary policy measure – the required reserve ratio.

Finally, it is shown from both equations that Wenzhou's informal lending activities are complementary to the local real estate investments. Booms of the local real estate investments in excessive of the national level exert negative impact on the informal credit market, confirming that such investments have acted as a significantly destabilising force to the informal credit market. It is thus imperative to put in place policy measures which would actively channel the private capital into the real economy away from the real estate speculative activities. Such measures should include permissions to establish privately owned banks, especially small- and medium-sized banks, and to enhance the investment channels of the private capital in the state-monopolised sectors.

Acknowledgments

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Appendix: Variable Definitions and Data Sources

LWZ_t	Total loans from Wenzhou's informal credit market survey, in million <i>yuan</i>
RWZ_t	Loan-weighted interest rate from Wenzhou's informal credit market survey
$Rllwz_t$	Within 1-month interest rate from Wenzhou's informal credit market survey
$Rlswz_t$	Over 12-month interest rate from Wenzhou's informal credit market survey
RRR_t	The required reserve ratio, from CEIC
Rrd_t	The rediscount rate, from CEIC
$Rrepo_t$	30-day repo market rate, from CEIC
Rsv_t	6-month household savings deposits rate, from CEIC
Rll_t	3-year-or-less lending rate, from CEIC
Rls_t	6-month lending rate, from CEIC
Ls_t	Short-term loan, national, from CEIC
Inf_t	CPI-based year-on-year inflation, national, from CEIC
$Infwz_t$	CPI-based year-on-year inflation of Wenzhou, from Wenzhou Statistical Yearbook
Pp_t	Real-estate price index, national, from CEIC
$Ppzj_t$	Real-estate price index of Zhejiang Province, from CEIC
Ywz_t	Industrial output in Wenzhou in million <i>yuan</i> , from Wenzhou Statistical Yearbook
$Lbwz_t$	Total bank lending of Wenzhou, from Wenzhou Statistical Yearbook
$Sbwz_t$	Total bank deposits of Wenzhou, from Wenzhou Statistical Yearbook

Note: all data series are in monthly frequency.

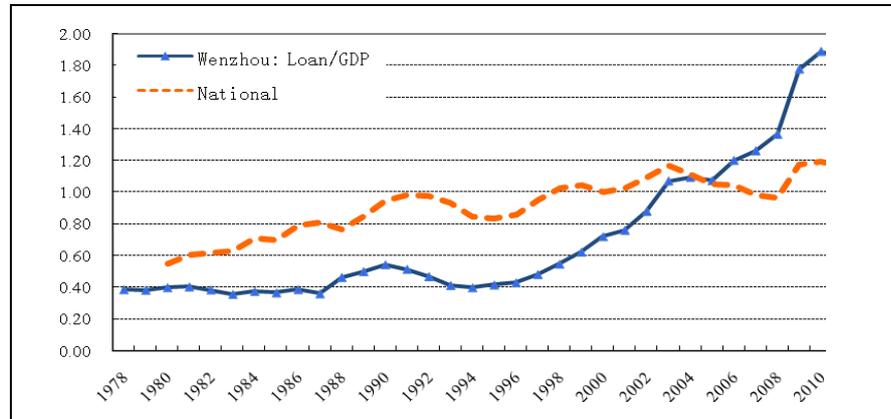
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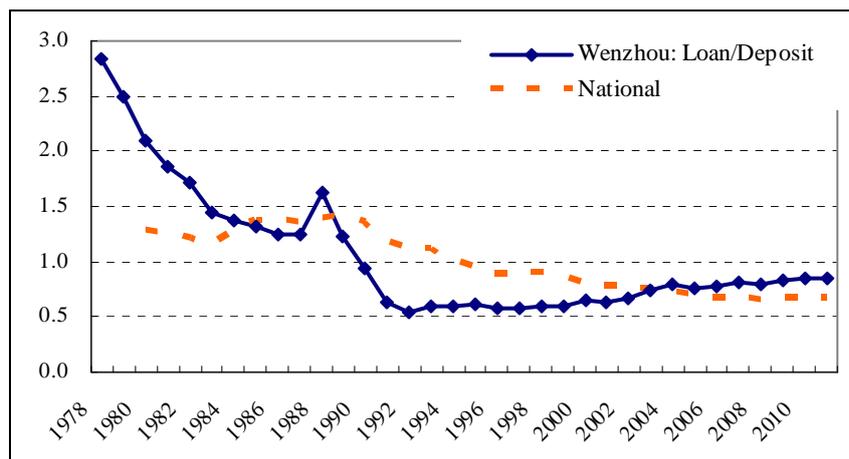
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Figure 1. Ratios of Bank Lending to GDP



Data source: Wenzhou Statistics Yearbook and Wind Data Retriever

Figure 2. Ratios of Bank Loans to Deposits



Data source: as in Figure 1.

Note: Deposit data prior to 1991 included deposits of national banks and rural credit cooperatives, which differed from data after 1991 which include deposits of all banking institutions.

Figure 3. Lending Activities of Wenzhou's Informal Credit Market (million yuan)

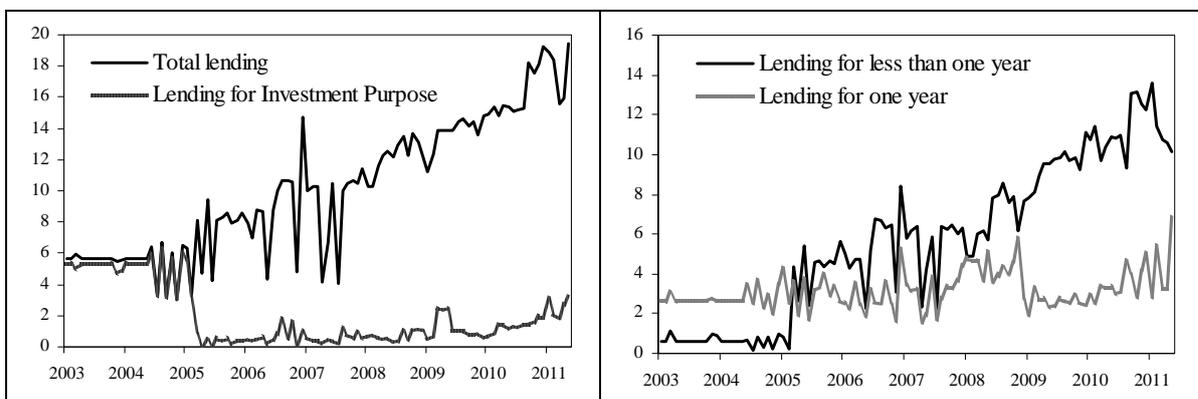


Figure 4. Lending Rates of Wenzhou's Informal Market (%)

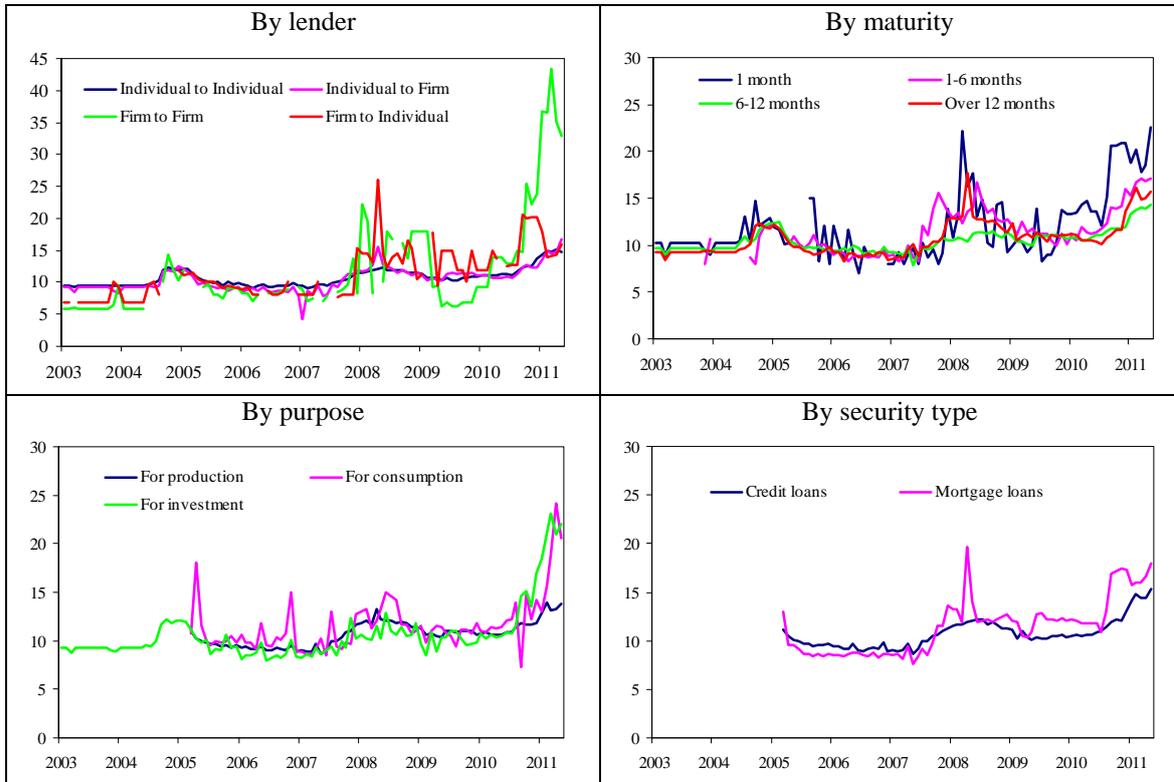


Figure 5 Aggregate Lending Rate of Wenzhou's Informal Market

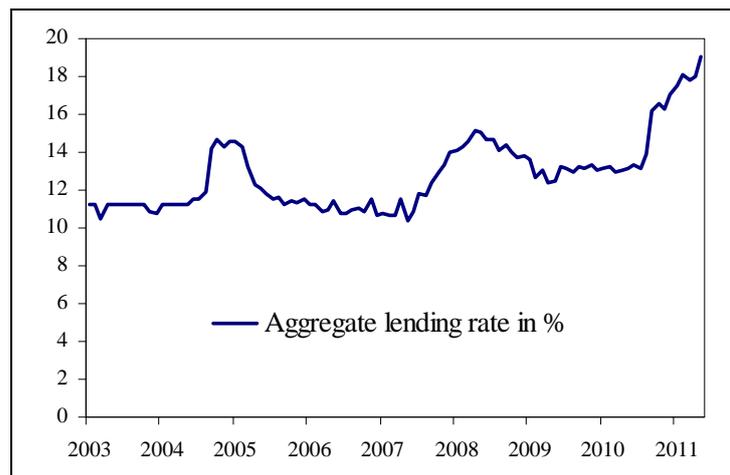


Table 1. Wenzhou's Informal Lending by Classification

By lender	Individual to individual	Individual to firm	Firm to firm	Firm to individual
Number of contracts (share)	26957 (74%)	8651 (24%)	303 (1%)	357 (1%)
Total loans in thousand <i>yuan</i> (share)	544.23 (53%)	427.26 (42%)	10.58 (4%)	38.07 (1%)
By maturity	Within 1-month	1-6 months	6-12 months	Over 12 months
Number of contracts (share)	1431 (4%)	3174 (9%)	17638 (51%)	12503 (36%)
Total loans in thousand <i>yuan</i> (share)	50.09 (5%)	82.1 (8%)	524.14 (54%)	318.27 (33%)
By purpose	Production	Investment	Consumption	Others
Number of contracts (share)	23105 (65%)	8103 (23%)	1243 (3%)	3058 (9%)
Total loans in thousand <i>yuan</i> (share)	724.79 (70%)	201.2 (20%)	18.51 (2%)	83.08 (8%)
By type	Credit	Mortgage	Others	
Number of contracts (share)	25928 (90%)	2339 (8%)	658 (2%)	
Total loans in thousand <i>yuan</i> (share)	709.52 (69%)	160.57 (16%)	157.49 (15%)	

Table 2 Dicky-Fuller (DF) and Augmented Dicky-Fuller (ADF) Unit-root Tests

	DF	ADF(1)	ADF(2)	ADF(3)
Rwz_t	0.448	0.152	0.2	-0.693
$\Delta(Rwz_t)$	-8.396**	-6.404**	-3.977**	-3.639**
$\ln(Lwz_t)$	-3.346*	-1.364	-0.819	-0.642
$\Delta \ln(Lwz_t)$	-21.72**	-13.24**	-8.846**	-7.625**

Note: Test statistics whose *p*-values fall below 5% and 1% are marked by * and ** respectively.