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Estimating the impact of monetary policy on inequality in China



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Abstract

The paper estimates the impact of monetary policy on income inequality in China. The empirical modelling finds that a battery of monetary indicators, including a monetary overhang measure derived from a money demand equation, and the change in the unemployment rate lead to increases in the Gini coefficient. However, only unemployment is statistically significant. The lack of significance of the monetary indicators is robust to alternative specifications with variability in nominal aggregate demand instead of unemployment.

Keywords: monetary policy; inequality; inflation; unemployment; China.

JEL classification numbers: E52; D31.

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1 Introduction

The literature advances theoretical arguments for understanding the link between monetary policy and income inequality (e.g., Albanesi, 2007, and references therein). And there is a substantial empirical literature on the subject starting with Blinder and Esaki (1978); see also the related contributions by Romer and Romer (1998) and Coibion et al (2012). The empirical studies tend to focus on inflation and ancillary macroeconomic variables like unemployment and how they impact inequality measures such as the Gini coefficient. But, as the financial crisis that started in 2008 has demonstrated, even under low and stable inflation other factors such as deviations of policy from a historic benchmark could trigger adverse consequences and ultimately affect the distribution of income; see, for instance, the arguments in Taylor (2014). To be sure, inflation's potential redistributive impact warrants further attention in the empirical literature (Schneider, 2014).

This paper contributes by empirically investigating the link between monetary policy and income inequality in China at the aggregate level. China is an example of an economy struggling to improve income distribution (Wang et al, 2014) while balancing a complex and evolving monetary policy strategy (e.g., Chang et al, 2015). Thus the investigation seeks to answer the following questions: What is the impact of monetary policy, controlling for unemployment, on income inequality in China? Can considering alternative monetary indicators alongside unemployment help in identifying different channels of transmission from monetary policy to income inequality?

Wang et al (2014) survey the literature on various aspects of income inequality in China. But they do not specifically attempt to estimate the relationship between monetary policy and inequality in that economy. The present paper adds to the literature by using alternative indicators of the monetary policy stance in the context of the empirical strategy popularised by Blinder and Esaki's (1978) seminal contribution. The objective is to capture potential factors that could affect the distribution of income even under low and stable inflation.

The investigation focuses on quantity-based monetary policy measures given the limitations involved in using price-based indicators in China for the time span under consideration. There are various reasons substantiating that approach. Interest rates are unlikely to reflect market conditions in the light of the slow pace of financial sector reform in China.

For instance, Dobson and Kashyap (2006) focus on the challenges facing the Chinese authorities as they attempt to strike the right balance in reforming the banking system. Additionally, historical central bank behaviour is well-described by a monetary policy reaction function with an instrument like the monetary base (e.g., Mehrotra and Sánchez-Fung, 2010). Sánchez-Fung (2013) estimates the information content of monetary indicators alongside interest rates to explain future movements in inflation and finds that the former are superior.

The rest of the paper proceeds as follows. Section 2 calculates the monetary policy indicators. Section 3 explains the empirical models and runs the econometric analyses. Section 4 concludes.

2 Monetary policy indicators

The macroeconomic variables to be used in the econometric modelling are obtained from the World Bank's World Development Indicators (WDI). The data, with WDI codes inside parentheses, are nominal broad money (FM.LBL.MQMY.CN), real (NY.GDP.MKTP.KN), nominal output (NY.GDP.MKTP.CN), and the unemployment rate (SL.UEM.TOTL.NE.ZS). The measure of prices, the GDP deflator, is calculated by dividing nominal output by real output. Because there are no data on income shares for China to run time series models, the paper focuses on the Gini coefficient. The series for the Gini coefficient is obtained from Wang et al's (2014) Table 1, columns 2 and 8, page 690. In what follows small caps denote logs.

In estimating the impact of monetary policy on income inequality in China, the investigation will consider three indicators that are expected to contain information about the stance of monetary policy. The first indicator is inflation, computed as the difference in the log of the GDP deflator ($p_t - p_{t-1}$). The second measure is a real money gap calculated by passing real money through the Hodrick-Prescott filter using a value of 6.5 to obtain a measure of trend money growth. The real money gap indicator is given by $\{(m_t - p_t) - (m_t^* - p_t^*)\}$, where asterisks indicate trend values.

The third indicator is a monetary overhang measure derived from a money demand function estimated using the following partial adjustment specification

$$(m_t - p_t - y_t) = \mu + \varphi(m_{t-1} - p_{t-1} - y_{t-1}) + \omega(p_t - p_{t-1}) + \varepsilon_t. \quad (1)$$

The specification imposes real-income homogeneity –unitary income elasticity in harmony with the monetarist literature (e.g. Hendry and Ericsson, 1991). The dependent variable $(m_t - p_t - y_t)$ is non-stationary with ADF test statistic -2.37 and inflation $(p_t - p_{t-1})$, which enters as a proxy for the opportunity cost of holding money given the absence of market-determined interest rates for the whole sample under consideration, is also non-stationary, with ADF test statistic -2.84 . The outcome from computing equation (1) using OLS reveals a negative link between inflation and real money balances, as expected, and the coefficient is statistically significant at the 1% level. Since the residuals from equation (1), i.e. the measure of monetary overhang, are stationary [$ADF(-4.65)$ with MacKinnon 1% critical value of -4.25], there is a cointegrating money demand function and the corresponding coefficients are super-consistent in Stock’s sense. Thus the monetary overhang measure for 1982–2013 entering the subsequent modelling arises from the long-run relationship

$$(m_t - p_t - y_t) - \underbrace{0.07}_{0.01} - \underbrace{0.94}_{0.01} (m_{t-1} - p_{t-1} - y_{t-1}) + \underbrace{0.46}_{0.17} (p_t - p_{t-1}). \quad (2)$$

All the coefficients in equation 2 are significant at the 1% level; standard errors are reported under the coefficients. Figure 2 displays the three monetary policy indicators that will be used alongside the unemployment rate in estimating the link between monetary policy and income inequality in China.

3 Estimating the impact of monetary policy on income inequality in China

In the spirit of Blinder and Esaki (1978), the paper proceeds to investigate the following three specifications with the change in the Gini coefficient as the dependent variable

$$Gini_t - Gini_{t-1} = \alpha + \delta(U_t - U_{t-1}) + \beta(p_t - p_{t-1}) + \theta_t; \quad (3)$$

$$Gini_t - Gini_{t-1} = \alpha + \delta(U_t - U_{t-1}) + \beta\{(m_t - p_t) - (m_t^* - p_t^*)\} + \theta_t; \quad (4)$$

$$\begin{aligned}
Gini_t - Gini_{t-1} = & \\
\alpha + \delta(U_t - U_{t-1}) + \beta\{(m_t - p_t - y_t) - 0.07 - 0.94(m_{t-1} - p_{t-1} - y_{t-1}) & + \\
0.46(p_t - p_{t-1})\} + \theta_t . & \quad (5)
\end{aligned}$$

Table 1 reports the outcome from estimating equations 3 to 5 and includes heteroscedasticity and autocorrelation consistent standard errors. Equation 6 shows the result of estimating the impact of a change in unemployment and in inflation on the change in the Gini coefficient. Both variables get the expected positive signs, so that higher inflation or higher unemployment lead, on average, to increases in the Gini coefficient and therefore to a worsening distribution of income in China. However, only the unemployment rate is statistically significant.

Equation 7 in Table 1 reports the estimations obtained from using the change in the unemployment rate alongside the money gap indicator, and equation 8 reports those for considering unemployment together with the monetary overhang measure to explain the change in the Gini coefficient. In both equations the coefficient of the unemployment rate is positive and statistically significant. The money gap indicator and the monetary overhang measure get the expected positive signs but are not statistically significant at conventional significance levels. It is worth noting that of the three monetary indicators the coefficient with the highest t-ratio is the one affecting the monetary overhang derived from the money demand equation.

Robustness check

In order to test the robustness of the analysis so far, we run alternative specifications of equations 3 to 5 including nominal aggregate demand, measured by the deviation of nominal GDP growth from trend, instead of unemployment, in the spirit of exercises reported in Romer and Romer (1999). Table 1 shows the results of running models to match those in the first three columns. The outcome reveals that the three monetary indicators are not statistically significant, as before, and that is also the case for the added nominal aggregate demand measure.

The three original models do not provide evidence of an inadequate functional form, as reflected in the results from estimating Ramsey's functional form test reported at the bottom of Table 1. The F-test statistics shed light on the hypothesis that the coefficients of the

squared values of the fitted models are zero. However, equations 9 and 10 fail the test at the 5% level. Equation 11 does not fail the functional form test, and the corresponding monetary overhang indicator has the expected positive sign and a corresponding t-ratio above 1. Thus overall the monetary overhang is the most robust monetary policy indicator while nominal output variability does not appear to be a better measure than unemployment.

4 Conclusion

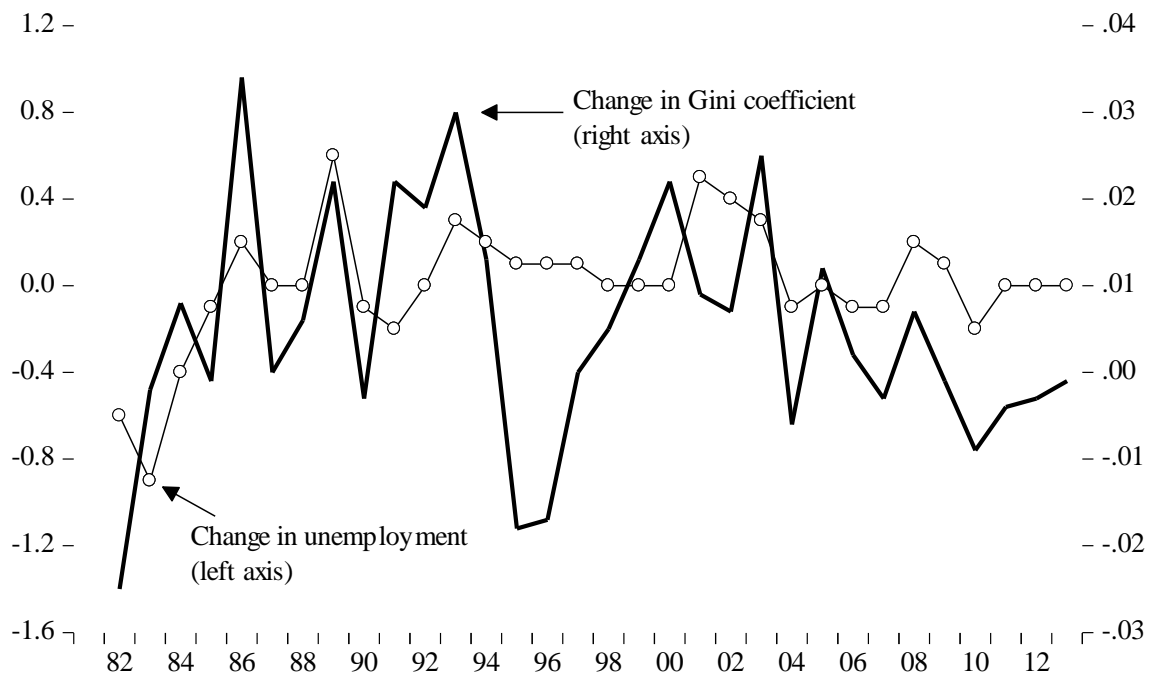
The paper estimates the impact of monetary policy on income inequality in China in the spirit of Blinder and Esaki (1978). The empirical modelling reveals that a battery of monetary policy indicators including inflation, a money gap, and a measure of monetary overhang lead to increases in inequality. However, only the change in the unemployment rate adversely affects the change in the Gini coefficient and is statistically significant in competing alongside the battery of monetary indicators. The lack of significance of the monetary indicators is robust to alternative specifications using nominal output as an alternative variable to unemployment.

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Figures and table

Figure 1 Change in Gini coefficient and change in unemployment rate, China, 1982–2013



Source: World Bank World Development Indicators, and Table 1, page 690, Wang et al (2014).

Figure 2 Monetary policy indicators for China, 1982–2013

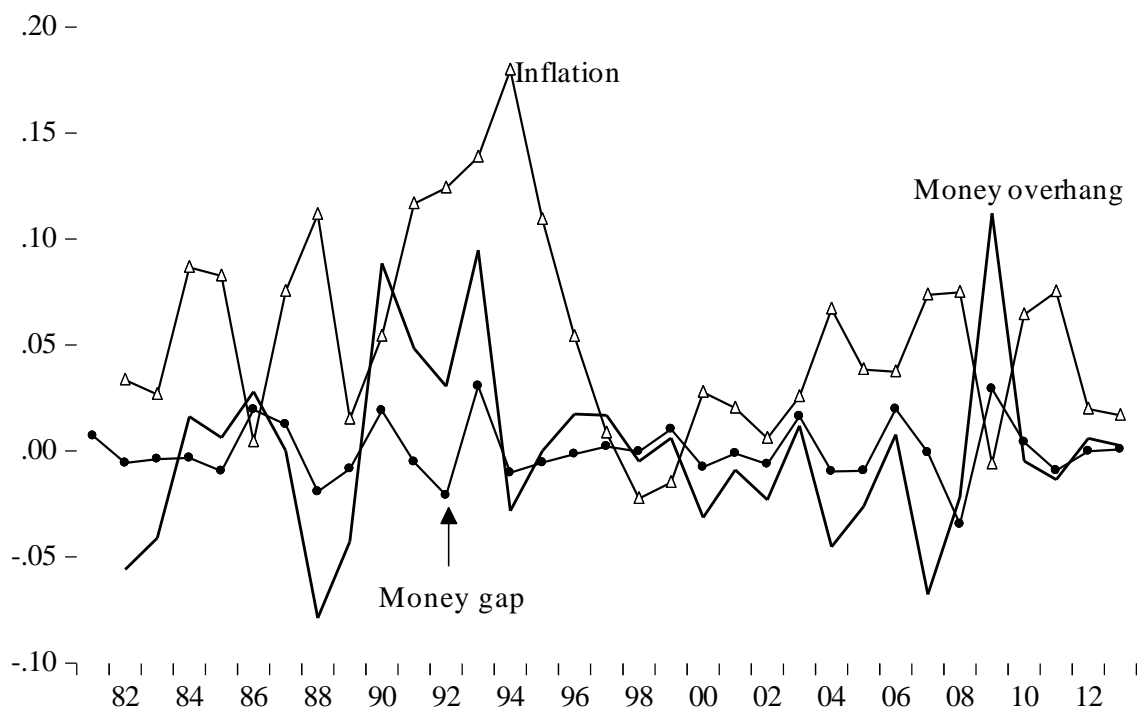


Table 1 Estimating the impact of monetary policy on income inequality in China, OLS
 Dependent variable is change in Gini coefficient ($Gini_t - Gini_{t-1}$)

1982–2013

Right-hand-side variables	Blinder and Esaki			Romer and Romer		
	Equation 6	Equation 7	Equation 8	Equation 9	Equation 10	Equation 11
Constant	0.003 (0.003)	0.005 (0.002)	0.004 (0.002)	0.003 (0.005)	0.005 (0.002)	0.005 (0.002)
Change in unemployment	0.021 (0.004)**	0.021 (0.004)**	0.020 (0.005)**	–	–	–
Deviation of nominal GDP growth from trend	–	–	–	–0.031 (0.075)	0.025 (0.065)	0.041 (0.073)
Inflation	0.022 (0.051)	–	–	0.032 (0.086)	–	–
Money gap	–	0.112 (0.133)	–	–	0.170 (0.209)	–
Monetary overhang	–	–	0.050 (0.048)	–	–	0.085 (0.074)
SER	0.012	0.012	0.012	0.014	0.014	0.013
Ramsey's RESET	0.71 (0.40)	1.24 (0.27)	0.71 (0.40)	4.23 (0.049)*	4.36 (0.046)*	0.224 (0.639)

Note. (1) OLS: ordinary least squares. (2) Table reports heteroscedasticity and autocorrelation consistent standard errors (HACSE) inside parentheses. (3) Variables used in the regressions reported in Table 1 have the following ADF test statistics: change in Gini coefficient (–5.03**), change in unemployment rate (–3.33*), deviation of nominal GDP growth from trend (–5.55**), inflation (–2.84), money gap (–10.36**), and money overhang (–4.65**). Values inside parentheses are ADF t-statistics; ** and * indicate rejection of unit root hypothesis at 1% and 5% levels; a unit root in the rate of inflation is rejected at the 6% level. (4) SER: standard error of the regression. (5) RESET is Ramsey's functional form F-test, which examines the hypothesis that the coefficients of the squared values of the fitted model are zero; probability values are inside parentheses. (6) ** and * indicate coefficient significance at 1% and 5% levels.

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