A Revisit of the Relation between Central Bank Independence and Inflation

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Abstract

Conventional wisdom argues that the relation between central bank independence (CBI) and inflation is negative. However, empirical studies based upon regressing inflation rates on CBI tend to reject this hypothesis and show that there is no negative relationship. This article investigates the effect of CBI on inflation by quantile regression. The empirical result shows that the relation could be negative or positive for different quantiles of inflation. Quantile regression provides a method for investigating the relation completely between CBI and inflation.

Keywords: Central bank independence, Inflation, Quantile regression

JEL classification: E58

1. Introduction

The relation between central bank independence (CBI) and inflation is an important issue and many research studies have focused on this relation; e.g.

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Cukierman (1992) has a complete description about this relation. It is argued theoretically that the relation between CBI and inflation should be negative, which means countries having more independent central banks exhibit lower inflation rates and help the economic stability of their countries; see Grill, Masciandaro, and Tabellini (1991) and Alesina and Summers (1993), among others. However, empirical studies based on regressing inflation rates on CBI tend to reject the hypothesis and show that there is no negative relationship. For example, Campillo and Miron (1997) find that when controlling for other explanatory variables, there is no negative effect of CBI on inflation; see also King and Ma (2001).

To solve the contraction between theory and empirical studies, some explanations are provided. Cukierman (1992) divides the sample countries into two groups: developed and developing countries. He finds that there is a negative relation between CBI and inflation in developed countries, but there is no such relation in developing countries. Similarly, Temple (1998) argues that the relation between CBI and inflation is sensitive to outliers and shows a negative effect of CBI on inflation in high income economies. In addition, Brumm (2000, 2002, 2006) claims that there are measurement errors when using the proxy variable to measure the CBI and therefore suggests using a measurement error method to solve the inconsistency between theory and empirical studies. Brumm's empirical results show that there exists a significantly negative effect of CBI on inflation.

This paper investigates the effect of CBI on inflation by quantile regression and finds that the relation between inflation and CBI can be negative and positive depending on the level of inflation: for 40% of countries that have lower inflation, the effects are negative, while about

60% of countries that have higher inflation, the effects are positive. This helps to explain why the least square regression usually leads to a positive estimate, as the opposite effects at two sides of the distribution of inflation cancel each other out in averaging. Therefore, quantile regression provides a method for investigating the relation completely between CBI and inflation. Our empirical finding is consistent with existing theory of a central bank.

2. Quantile Regression and the Data

This paper uses the quantile regression method provided by Koenker and Bassett (1978) to investigate the relationship between CBI and inflation. Since quantile regression enables one to study the conditional quantile behavior of the variable of interest, it provides a complete description for the relation of different quantiles of inflation. Temple (1998) finds that the relation between CBI and inflation is extremely sensitive to influential observations. Implementing quantile regression also helps to analyze the relation, because quantile regression is a robust method with respect to outliers.

In this article we regress the average inflation rate on the past inflation rate and CBI by a quantile regression technique. The regression equation we use is as follows:

$$\pi_i = \alpha + \beta\pi_{i-1} + \gamma\ cbi_i + e_i,$$

where π_i is the average inflation rate over 1973-1994, π_{i-1} is the average inflation rate over 1948-1972, one regressor cbi_i is the index of CBI, and e_i is the error term. Here, an average measure of the legal independence of central banks, LVAW (legal variable aggregate unweighted) of Cukierman (1992), is taken to represent the level of CBI. Data for all variables are

T	OLS	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Infl4872	3.3	0.59	0.787	1.77	1.91	1.9	2.37	4.79	4.99	4.63
	(0.39)	(0.67)	(0.77)	(0.86)	(1.07)	(1.29)	(1.46)	(1.51)	(1.27)	(0.98)
CBI	19.16	-5.67	-3.8	-1.12	-2.8	0.33	2.88	19.98	36.68	63.68
	(14.57)	(5.48)	(5.09)	(6.20)	(9.30)	(12.50)	(16.38)	(20.90)	(24.55)	(29.32)

obtained from the Brumm (2000) dataset with 44 countries.

Table 1: Regression results for average inflation rates, 1973-1994

3. Empirical Results

Table 1 reports the quantile regression and least square results. We can see that the least square regression estimate is 19.16, which shows that there is a positive relation between CBI and inflation. This result is also found in Campillo and Miron (1997) and King and Ma (2001). In addition, we present the coefficient estimates of 9 quantiles with quantiles 0.1, 0.2, …, 0.9. For the 0.1-0.4 quantiles, there is a negative effect of CBI on inflation and the effect decreases along with quantiles. The finding shows that for countries with inflation below the median rate, the empirical finding supports the hypothesis that inflation should be negatively related the CBI. Furthermore, the lower inflation is, the more negative the effects are. For the median and above quantiles, the relations between inflation and CBI are positive and the positive relation increases along with quantiles. Empirical results for upper quantiles do not support the conventional wisdom. This might because the measures of CBI are a bad indicator for high inflation countries; see also Temple (1998).

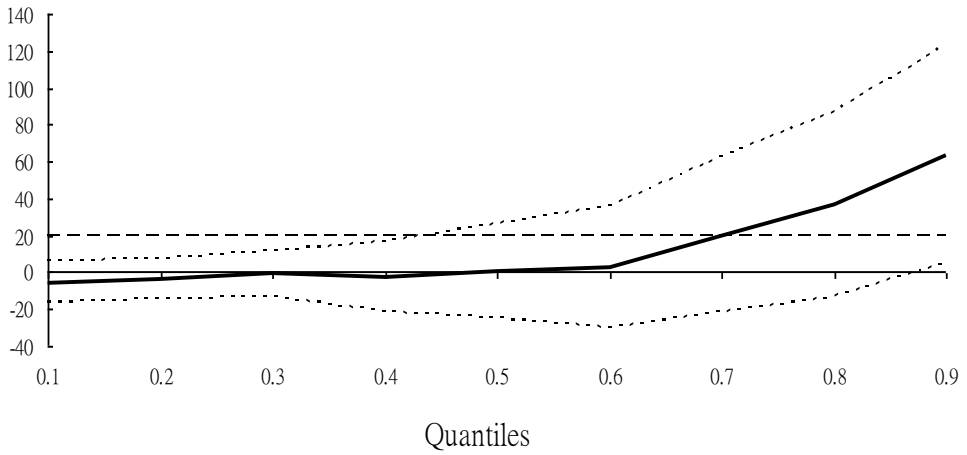

Figure 1: Quantile regression estimates for 9 quantiles

It is noted that the least square regression result only shows the mean effect of CBI on inflation, and thus a conclusion based on the least square result may be suspect. In the empirical study of quantile regression, the regression estimates are negative for countries with lower inflation rates and are positive for those with higher inflation rates. This gives an explanation that the least square regression result may come from the canceling out of the negative and positive effects and does not reveal the real relation between CBI and inflation. Furthermore, the empirical results for lower quantiles are close to the findings of Temple (1998), who drops countries with high inflation. However, the quantile regression is not only robust to data with outliers, but also one does not need to drop data when analyzing the relation on different quantiles of inflation. Therefore, our result is more reliable when the sample of data is not large. For example, when analyzing the relation of low inflation countries, the sample size is 44 in this paper, but is 18 in Temple's paper. Moreover, different from Temple (1998), this

paper provides the relations for other quantiles of inflation. It shows that for these countries with higher inflation rates, CBI has positive effects.

Figure 1 presents quantile regression coefficient estimates on CBI with 9 quantiles where the horizontal axis is quantiles from 0.1 to 0.9. This figure plots the estimated regression coefficients in a solid line and their 95% confidence intervals in dotted lines. The least square estimate is plotted in a dashed line. The regression lines in Figure 1 are similar to that with the larger sample in Temple (1998). One may note that by quantile regression, the whole sample is used to investigate the effect on different quantiles of inflation rates. The quantile regression method allows researchers to study the relations of higher inflation countries as well as the relations of lower inflation countries. In contrast, Temple (1998) shows the effects of CBI on inflation with increasing sample sizes. Temple's method only shows the relations of low inflation economies with small sample sizes and the relations of overall inflation economies. Temple's method does not reveal the effects of CBI for countries with higher inflation countries.

4. Conclusion

By using the quantile regression technique, we conclude that there are both positive and negative effects of CBI on inflation. The empirical result supports the conventional wisdom on the negative relationship between CBI and inflation in those countries with low inflation. Furthermore, our empirical finding shows the positive relation between CBI and inflation in those with higher inflation. Using the least square regression method may help conclude that there is only a positive effect that could come from canceling the positive and negative effects. For further studies, it would be interesting to note that the estimated coefficients of CBI are not statistically

significant except in the 0.9 quantile.

References

Alesina, A. and L. Summers, 1993, Central bank independence and macroeconomic performance: some comparative evidence, Journal of Money, Credit, and Banking, 25, 151-162.

Brumm, H., 2000, Inflation and central bank independence: conventional wisdom redux, Journal of Money, Credit and Banking, 32, 807-819.

_____, 2002, Inflation and central bank independence revisited, Economics Letters, 77, 205-209.

_____, 2006, The effect of central bank independence on inflation in developing countries, Economics Letters, 90, 189-193.

Campillo, M. and J. Miron, 1997, Why does inflation differ across countries? In: Reducing Inflation, C. Romer and D. Rome reds, University of Chicago, Chicago, 335-357.

Cukierman, A., 1992, Central Bank Strategy, Credibility, and Independence: Theory and Evidence, MIT Press.

Grilli, V., D. Masciandaro, and G. Tabellini, 1991, Political and monetary institutions and public finance policies in the industrial countries, Economic Policy, 13, 341-392.

King, D. and Y. Ma, 2001, Fiscal decentralization, central bank independence, and inflation, Economics Letters, 72, 95-98.

Koenker, R. and G. Bassett, 1978, Regression quantile, Econometrica, 46, 33-50.

Temple, J., 1998, Central bank independence and inflation: good news and bad news, Economics Letters, 61, 215-219.