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Inflation and economic growth: A dynamic panel threshold analysis for Asian economies

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ABSTRACT

This paper investigates the existence of a threshold level for inflation and how any such level affects the growth of Asian economies. We use a dynamic panel threshold growth regression, which allows for fixed effects and endogeneity. We observe a nonlinear relationship between inflation and economic growth for 32 Asian countries over the period 1980–2009. We detect an inflation threshold of approximately 5.43%, at a 1% level of significance. We find that inflation hurts growth when it exceeds 5.43% but has no effect below this level. Different estimation methods determine that the effect of inflation on growth is robust. Our findings may be useful to central banks as a guide for inflation targeting.

1. Introduction

A sustained high growth rate of output and low inflation are the two main goals of the majority of macroeconomic policies. Price stability is a key factor in determining the growth rate of an economy; hence, the central banks of many countries implement monetary policy to maintain inflation at a desirable rate. Very high inflation affects the economy drastically, but there is some evidence that moderate inflation also slows down growth (Temple, 2000 cited from Little et al., 1993). In addition, Aiyagari (1990), as well as Cooley and Hansen, 1991, suggest that the cost of lowering inflation toward zero is higher than the benefit.

In recent decades, there has been substantial theoretical and empirical research that investigates the inflation/growth trade-off. The results of existing research have been mixed and studies can be categorized as making one of four possible predictions. The first of these is that inflation has no effect on economic growth (e.g., Cameron, Hum, & Simpson, 1996; Dorrance, 1963; Sidrauski, 1967). The second is that there is a positive relationship between inflation and economic growth (e.g., Mallik and Chowdhury, 2001; Shi, 1999; Tobin, 1965). The third is that inflation has a negative effect on growth (e.g., Andres and Hemando, 1997; Barro, 1996; De Gregorio, 1992; Friedman, 1956; Gylfason, 1991, 1998; Saeed, 2007; Stockman, 1981). In addition, Feldstein (1996) notes that "shifting the equilibrium rate of inflation from two percent to zero would cause a perpetual welfare gain equal to about one percent of gross domestic product (GDP) a year."

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The last of the four types of studies suggests that the correlation between inflation and growth is nonlinear, and that the interaction between these two variables is positive or nonexistent below some critical level, but affects the economy when it exceeds that level. Fischer (1993) was one of the first authors to identify the possibility of such a non-linear relationship. He argued that inflation helps economic growth when it is below a threshold value, but has a negative influence if it is above that threshold level. Sarel (1996) demonstrated the existence of a point of inflection, which is equal to 8%. Ghosh and Phillips (1998) identified a considerably lower threshold effect, at 2.5% inflation rate a year. In contrast, Bruno and Easterly (1998) determined that 40% was the "natural" breakeven point between low and high inflation rate for 31 countries. Countries were examined based on their level of inflation crisis during a set period, and the authors demonstrated that high inflation crises lead to sharp decreases in growth rates, which recover when inflation falls.

Khan and Senhadii (2001) calculated the threshold as being 1–3% for industrialized countries and 11–12% for developing countries. They claimed that inflation impedes economic growth significantly beyond this level but does not have any statistically significant effect below the threshold. Drukker, Gomis-Porqueras, and Hernandez-Verme (2005) suggested that 19.16% is the critical threshold for 138 countries (full sample), but that there were two different threshold points, 2.57% and 12.61%, for industrialized countries. Bick (2010) concluded that allowing for different intercepts in each regime decreases the threshold from 19% to 12% and doubles the magnitude and marginal effect of inflation on growth. Kremer, Bick, and Nautz (2009) found that the threshold level is different for industrialized and developing countries, and stated that target inflation should be 2% for developed countries and 17% for developing countries.

Most existing empirical works include both industrialized and developing countries from different regions in the same sample. However, Temple (2000) has noted that "One should probably be careful about extrapolating findings from one set of countries to another." He suggests that "In general, it would seem best to study inflation's effect within OECD or a sample of relatively similar developing countries and not mix the two." With this in mind, in this study, we consider only Asian countries.[1]

Moreover, most of the growth empirics, which seek to identify a threshold level of inflation, are found through approaches that explicitly ignore any potential endogeneity bias (Bick, 2010; Khan and Senhadii, 2001). Some empirical literature, however, solves the problem of endogeneity bias by excluding initial income from the growth regression (Drukker, Gomis-Porqueras, & Hernandez-Verme, 2005). Hansen (1999) assumes that all variables are exogenous in his panel threshold model.[2] However, with regard to the panel data growth regression, we are uncertain about exogeneity restrictions, because some of the explanatory variables are endogenous by construction, such as initial income. Caselli, Esquivel, and Lefort, (1996) argue that estimates could be inconsistent in cross-country growth regressions for reasons related to: (i) country-specific fixed effects and (ii) the inclusion of endogenous variables among explanatory regressors in the model. In our model setup, we appropriately model these two issues to obtain consistent estimates. Therefore, the problem of endogeneity bias has been reduced in this growth regression.

Less-developed countries (LDCs) often suffer from macroeconomic instability and rely on international agencies such as the World Bank, International Monetary Fund, or Asian Development Bank in order to stabilize their economies. Different agencies have come up with different guidelines and suggestions, such as reducing or increasing prices, in many cases without proper coordination with each other. This makes it harder for policy-makers to determine the levels of inflation that Asian countries should maintain to stabilize their economies.

This article employs the dynamic panel threshold model to deal with country-specific heterogeneity and endogeneity issues. As suggested by Arellano and Bover (1995), we apply the forward orthogonal deviation operator to eliminate the individual fixed effect, and use an entire set of lags of the initial income as instruments to deal with endogeneity, utilizing Roodman (2009) "collapsed-form" generalized method of moment (GMM) style instruments. Our study estimates the potential threshold point, and investigates the effect of inflation on economic growth, for 32 Asian countries over the period 1980–2009. The sample size has been reduced by taking the average of the data for every two years in order to eliminate the fluctuations in the business cycle.

Our empirical results support existing evidence of nonlinear correlation between inflation and growth. Our estimated threshold is 5.43%, which is statistically different from existing empirical research findings, which range from 8% to 40% for developing economies and 1% to 3% for industrialized economies (Bick, 2010; Bruno and Easterly, 1998; Khan and Senhadii, 2001; Kremer, Bick, & Nautz, 2009). We find that inflation impedes growth significantly when it exceeds 5.43%.

Below, Section 2 explains the data and variables of our study. Section 3 describes the construction of the dynamic panel threshold model and our estimation method. Section 4 provides an estimation results for the model. Finally, our conclusion and the policy implications of this study are presented in Section 5.

[1] Our sample does, however, consist of four OECD countries (Japan, Korea, Israel, and Turkey) and one non-OECD developed country (Singapore). We have thus also dropped these five countries from our analysis and re-calculated the threshold point and its effect on economic growth to check the robustness of our result.

[2] Kremer et al. (2009) have considered initial income as an endogenous variable in their growth regression, but their sample includes both industrialized and developing countries.