

Impacts of the Trilemma Policies on Inflation, Growth and Volatility in Greece

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ABSTRACT: This paper finds support for the trilemma for Greece, suggesting that there is a tradeoff among exchange rate stability, monetary independence and financial integration. The policy combination of monetary independence and financial integration has been prevalent. More exchange rate stability does not affect the inflation rate, the growth rate, inflation volatility and output volatility. More monetary independence reduces output volatility. More financial integration reduces inflation, inflation volatility and output volatility. Hence, more financial integration or monetary independence is beneficial to Greece.

Keywords: Trilemma; Exchange rate stability; Monetary independence; Financial integration; Inflation; Growth; Volatility

JEL Classifications: E44; E52; F31; F36

1. Introduction

For some countries, exchange rate stability, monetary autonomy and financial integration have become major economic policies in order to reduce exchange rate volatility, engage in monetary easing to stimulate a sluggish economy or monetary tightening to cool down an over-heated economy, and attract foreign investments. The trilemma of international economics and finance suggests that only two of these three policies can be achieved simultaneously (Ghosh et al., 1997; Edison et al., 2002; Prasad et al., 2003; Levy-Yeyati and Sturzenegger, 2003; Eichengreen and Leblang, 2003; Frankel et al., 2004; Shambaugh, 2004; Obstfeld et al., 2005, 2009, 2010; Henry, 2006; Kose et al., 2006; Prasad and Rajan, 2008; Aizenman et al., 2008b, 2011a; Aizenman and Ito, 2012; and others). Australia achieves independent monetary policy and free capital flows and allows the exchange rate to fluctuate based on market forces. China achieves monetary autonomy and exchange rate stability and imposes some controls on capital mobility. Hong Kong pursues exchange rate stability and free capital flows and abandons its ability to maintain an independent interest rate policy.

This paper tests the trilemma and examines potential impacts of these three trilemma policies on inflation, economic growth, inflation volatility and output volatility for Greece. As Greece has been trying to solve its sovereign debt and other economic problems (Alexiou, 2011), it would be interesting to know whether these three trilemma policies would bring about any positive benefits of low inflation, economic growth and less volatility. To the author's knowledge, none of the previous studies has examined the relationships between inflation, economic growth, inflation volatility and output volatility and these three trilemma policies for Greece using the well developed index for financial integration (Chinn and Ito, 2006, 2008; Aizenman et al., 2011b).

Several recent articles have examined the subject and related issues. Using a sample of eighteen industrial countries including Greece and twenty-eight developing countries, Frankel et al., (2004) reveal that in the short run, countries with floating exchange rates respond to international interest rates with slower speed, implying that they possess some degree of monetary autonomy. Although several large advanced countries can select their own rates over the long haul, most other countries with floating exchange rates react fully to international interest rates in the long run.

Based on a multi-country sample including Greece, Obstfeld et al., (2005) find that countries can consider the trilemma as a guiding macroeconomic policy framework. Countries with floating exchange rates and free capital flows would retain sufficient amount of monetary independence whereas countries with pegging exchange rates and free capital mobility would lose significant amount of monetary independence.

Using a large sample including Greece, Aizenman et al., (2008b) indicate that for developing countries, and more monetary independence results in higher inflation, and more exchange rate stability results in higher inflation and more output volatility. Aizenman et al., (2011a) show that more exchange rate stability or more financial integration reduces inflation whereas more monetary autonomy raises inflation and that more exchange rate stability increases output volatility and investment volatility whereas more monetary autonomy reduces output volatility. Aizenman and Ito (2012) reveal that the three trilemma policies in emerging economies are converging toward a middle ground as they pursue managed floating exchange rates backed up by large foreign reserves, moderate monetary autonomy, and medium level financial integration. These emerging economies experience less output fluctuations whereas emerging economies with relatively low foreign reserves as a percent of GDP would suffer relatively high output fluctuations if they select policy divergence.

2. The Model

Extending Aizenman et al., (2008b, 2011a), Aizenman and Ito (2012) and other previous studies, we can express the trilemma equation as:

$$K = f(ES_t, MI_t, FI_t) \quad (1)$$

where

- K = a constant,
- ES = exchange rate stability,
- MI = monetary independence, and
- FI = financial integration or free capital mobility

If the goodness of fit is relatively high, it suggests that these three policies are binding and constrained. An increase in the value of one of the trilemma policies will reduce the value of one or both of the other policies. Note that equation (1) is written in the general form because other functional forms will be considered and tested.

We test potential impacts of exchange rate stability, monetary independence and financial integration on the inflation rate, the growth rate of real GDP, inflation volatility and output volatility:

$$W_t = g(ES_t, MI_t, FI_t) \quad (2)$$

where W stands for one of the following variables:

- π = the inflation rate,
- GR = the growth rate of real GDP,
- IV = inflation volatility, and
- YV = output volatility.

More exchange rate stability is expected to stabilize the currency value and price level, reduce uncertainty, and help economic growth. On the other hand, more exchange rate stability may increase or reduce inflation or inflation volatility, depending upon whether the pegged anchor currency would appreciate, depreciate or be volatile. Depending upon monetary easing or tightening, the timing and the magnitude, more monetary independence may increase or reduce the inflation rate, the growth rate of real GDP, inflation volatility and output volatility. More capital inflows are expected to increase aggregate demand and the supply of funds, reduce lending rates, help economic growth, and may increase or reduce the inflation rate or inflation volatility. However, large amounts of abrupt capital outflows or speculative attacks would reduce aggregate demand, destabilize an economy, cause currency depreciation, and may affect the inflation rate, economic growth, inflation volatility or output volatility (Chinn and Ito, 2008b; Aizenman, Chinn and Ito, 2011a; Aizenman and Ito, 2012).

3. Empirical Results

ES, MI and FI are obtained from Aizenman, Chinn and Ito (2008b, 2010, 2011b) and Chinn and Ito (2006, 2008) and have values ranging from zero to one. A higher value of ES, MI or FI indicates more exchange rate stability, monetary independence or free capital mobility. Exchange rate stability is represented by:

$$ES = 0.01[0.01 + s(\Delta \log(e)/0.01)]^{-1}, \quad (3)$$

where s and e stand for the standard deviation and the nominal exchange rate. Monetary independence is measured by:

$$MI = [1 - c(i, i^*)]/2, \quad (4)$$

where c , i and i^* stand for the correlation coefficient, the money market rate in Greece and the money market rate in the U.S. FI is calculated from the information for restrictions on current and capital account transactions, the presence of multiple exchange rates, and requirement of the surrender of export proceeds, which are published by the International Monetary Fund. π is represented by the percent change in the consumer price index. IV is represented by the standard deviation of the inflation rate over a five-year period. GR is measured by the percent change in real GDP. YV is measured by the standard deviation of GR over a five-year period. The consumer price index and real GDP are obtained from the IMF.

Table 1 presents estimated parameters, t-statistics and values of R-squared for the linear, log-log, log-linear and linear-log relationships in the trilemma equation. In order to test different functional forms and avoid any zero value after the transformation into the logarithmic scale, a value of 2 is added to each of ES, MI and FI. The Newey-West method is used if consistent estimates of the covariance and standard errors are required. As shown, values of R-squared are relatively high, and all the coefficients are significant at the 1% level. Hence, there is support for the trilemma. A comparison of these four different functional forms suggests that the log-linear regression has the lowest values of the mean absolute percent error and Akaike information criterion. The log-log, linear and linear-log regressions rank second, third and fourth, respectively.

Table 1. Estimated Regressions for the Trilemma Test

	Exchange rate stability	Monetary independence	Financial integration	R ²	MAPE	AIC
Linear	0.134 ^a (3.618)	0.493 ^a (25.824)	0.203 ^a (6.242)	0.9989	2.309	-2.484
Log-log	0.149 ^a (3.594)	0.440 ^a (21.030)	0.204 ^a (5.753)	0.9987	1.819	-4.357
Log-linear	0.047 ^a (3.618)	0.171 ^a (25.824)	0.070 ^a (6.242)	0.9989	1.602	-4.603
Linear-log	0.429 ^a (3.594)	1.270 ^a (21.030)	0.588 ^a (5.753)	0.9987	2.620	-2.238

Notes: Figures in the parenthesis are t-statistics. The superscript letter a indicates that a coefficient is significant at the 1% level. There is no intercept in the estimated regression. In the log-linear form, the dependent variable is transformed into the logarithmic scale. In the linear-log form, the independent variables are transformed into the logarithmic scale. Sample period: 1970-2010.

Based on the log-linear regression, Graph 1 presents different policy combinations, which are represented by $\alpha ES + \beta MI$, $\alpha ES + \delta FI$, and $\beta MI + \delta FI$, where α , β and δ are the estimated coefficients for ES, MI and FI, respectively. The policy combination of monetary independence and financial integration has been prevalent over the years. This finding suggests that Greece cannot impact the exchange rate of the euro and would expect the euro exchange rate to fluctuate as the market determines its fundamental value. Therefore, Greece can focus on the remaining two trilemma policies.

Table 2 presents estimated regressions for the inflation rate, the growth rate, inflation volatility and output volatility. As the table shows, the explanatory power is relatively high for the regressions of the inflation rate and inflation volatility and relatively low for the regressions of the growth rate and output volatility. More exchange rate stability does not affect the inflation rate, the growth rate,

inflation volatility and output volatility. More monetary independence reduces output volatility. More financial integration reduces the inflation rate, inflation volatility and output volatility. Hence, Greece benefits from greater monetary independence and greater financial integration.

Graph 1. Analysis of Different Policy Combinations

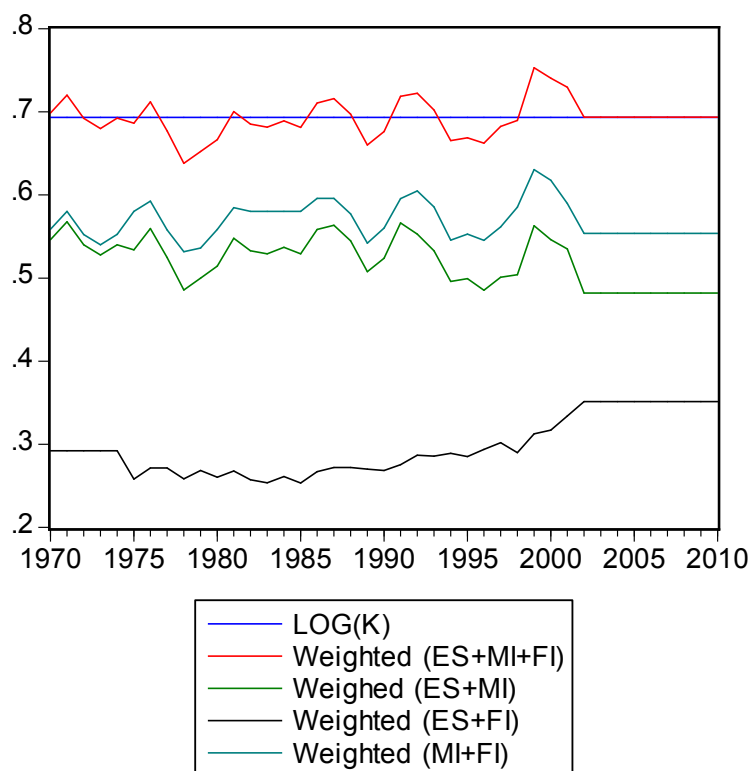


Table 2. Estimated Regressions for the Inflation Rate, the Growth Rate, Inflation Volatility and Output Volatility

Dependent variable	Exchange rate stability	Monetary independence	Financial integration	Constant	R ²
Inflation rate	-7.224 (-1.089)	-2.479 (-0.380)	-14.137 ^a (-2.669)	23.105 (5.327)	0.600
Growth rate	3.508 (1.028)	-1.433 (-0.368)	-2.987 (-0.927)	2.123 (0.891)	0.067
Inflation volatility	-1.203 (-0.650)	-2.037 (-1.224)	-4.816 ^a (-3.078)	6.769 (6.551)	0.413
Output volatility	-0.406 (-0.350)	-2.145 ^c (-1.917)	-2.692 ^a (-2.676)	4.748 (4.780)	0.210

Notes: Figures in the parenthesis are t-statistics. Letters a and c indicate that a coefficient is significant at the 1% and 10% levels, respectively. Sample period: 1970-2010.

4. Summary and Conclusions

This paper has confirmed the trilemma for Greece. It suggests that exchange rate stability, monetary independence and financial integration are binding and constrained. More exchange rate stability does not affect the inflation rate, the growth rate, inflation volatility and output volatility. More monetary independence reduces output volatility. More financial integration yields positive benefits of a lower inflation rate, less inflation volatility and less output volatility. In comparison, the negative impact of monetary independence on output volatility and the negative effect of financial integration on the inflation rate found in this study are similar to those reported by Aizenman, Chinn and Ito (2011a). However, the positive effect of monetary independence on the inflation rate and the significant impacts of exchange rate stability on the inflation rate and output volatility reported by

Aizenman, Chinn and Ito (2008b, 2011a) are not confirmed in this paper. Hence, empirical findings for an individual country may differ from the results using a large sample of pooled data.

There are several policy implications. In testing the trilemma, different functional forms need to be considered. The widely used linear relationship may result in larger forecast errors than other functional forms. As more exchange rate stability does not affect inflation, growth and volatility, Greece may need to improve labor productivity and reduce production costs in order to remain competitive globally. Monetary policy may need to be reviewed in order to determine whether it would produce more positive results in addition to less output volatility. The authorities may need to continue to reduce restrictions on international capital flows so that Greece will benefit more due to a lower inflation rate and less volatility.

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