Output Variability and Economic Growth: The Case of Australia

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Abstract

This paper looks at the relationship between output variability and economic growth in Australia using the ARCH-M model. Quarterly data for growth rates of industrial production and of GDP are used for the analyses. However, the growth of GDP does not show any ARCH effects. The variability is found to be significantly negatively related to the growth rate of industrial production. Unlike Caporale and McKiernan (1998), our empirical results do not support Black's (1987) hypothesis, which is that there is a positive relationship between output variability and economic growth. Our results support the Keynesian position. (JEL C30, E22, O10)

Introduction

The determinants of economic growth as well as short run fluctuations (i.e., business cycles) around a non-stochastic trend have been of academic and policymakers' interest for a long time. Generally, business cycle models explain short-run variations in aggregate output and employment and the traditional as well as the new endogenous growth models attempt to explain long-run economic growth. Generally, research in these areas has been carried out independently (of each other). However, Solow (1957) finds that technology shocks influence short-run fluctuations as well as long-run growth rates. Recently, this dichotomy in macroeconomics has been critically reassessed. For example, Black (1987) hypothesizes that economies face a positive risk-return trade-off and, therefore, one should find a positive relationship between volatility and growth. Conversely, Woodford (1990), Bernanke (1983), Pindyck (1991) and economists as far back as Keynes (1936) have argued and found evidence of a negative relationship between volatility and growth. However, Friedman (1968) implicitly argues that business cycles are independent of output around its natural growth rate. Understanding the determinants of economic growth is a central goal of macroeconomics because it has welfare implications.

The objective of this paper is to examine the relationship between output variability and the level of economic growth for Australia.

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Economic growth and its determinants have been a constant preoccupation of economists for a couple of centuries. For example, Smith (1776), Ricardo (1817), and, much later on, Ramsey (1928), Knight (1944), and Schumpeter (1934) provided the basic building blocks that are now incorporated in the modern growth theories. The main theoretical findings from this literature have centred on the role of diminishing returns and its relationship to the growth of physical capital and the growth rate of the labor force. Other main findings have included the relationship between income and the growth rate of population, the effects of technological progress in terms of increased specialization of labor, and the advantages of having monopoly power in providing an incentive for technological advancement. Solow (1956) and Swan (1956) make a further and more important contribution. A prediction from this work was that per capita income growth must grind to a halt. However, Romer (1986) demonstrates that it is possible to devise mathematical models in which there are spillover benefits of investment that will prevent an economy from grinding to a halt. Over the past 15 years, this technical breakthrough has sparked a great deal of academic interest in unraveling the factors that influence economic growth. Most studies have focused on cross-country comparisons. However, time series analysis on the causes of growth has been quite sparse.

As Caporale and McKiernan (1996, 1998) correctly assert, there is no theoretical consensus regarding the direction of association between output variability and economic growth. In a nutshell, there are three broad schools of thought. The first school of thought can be attributed to Black (1987). Black's hypothesis is that there should be a positive relationship between output growth and volatility—that is, investment will only be undertaken if the expected rates of return are sufficiently high to compensate for the greater risk. Caporale and McKiernan (1996), employing a GARCH-M model and monthly U.K. data for the period 1948-1991, test this hypothesis and find a positive and significant relationship between output variability and U.K. growth. In a related paper, Caporale and McKiernan (1998), employing an ARCH-M model and U.S. annual data for the period 1871-1993, test and reaffirm their broad support for the Fisher business cycle hypothesis. Kormendi and Meguire (1985, p.148) also test Black's hypothesis for 47 countries, and their evidence suggests "that the risk return trade-off facing countries yields approximately 1 percent greater economic growth in exchange for an increase of 2 percent in the standard deviation of the rate of economic growth." Grier and Tullock (1989, p. 264) find, using annual data on 113 countries to construct a pooled cross-section and time series data set and controlling for other explanatory variables (i.e., initial per capita real GDP, the growth of government's share of GDP, population growth, inflation, etc.), that the variability of GDP growth (as measured by the standard deviation of growth) "is also positive and significant, indicating there is a modest historical aggregate trade-off between risk and return." However, their empirical results from this study are reported with several caveats imposed on them. Sandmo (1970) in a theoretical paper hypothesizes a positive relationship; however, the basis of the argument is from a different perspective. Sandmo postulates the notion that greater output and income variability leads to an increase in savings which therefore leads to higher growth via increased investment. In a parallel argument, Mirman (1971) has argued that higher volatility will lead to an increase in saving and this will therefore induce a greater rate of investment. Thus, if it can be demonstrated that there is a positive relationship between investment and growth, then this will lead to an increase in growth.

The second broad school of thought argues that there is an inverse relationship between output variability and economic growth. This hypothesis emphasizes the importance of entrepreneurial expectations on investment. It is argued that the level of risk increases when there are fluctuations in economic activity and this may, in turn, reduce the level of investment and output growth. Uncertainty has long been regarded as a significant influence on the decision to invest. Keynes