Productivity and the Economic Disequilibria Curve

Dr. Ordean Olson
Finance and Economics Department
Nova Southeastern University

Abstract

This study presents an economic equilibrium model for determining economic equilibrium in economic systems. The productivity economic disequilibria curve is introduced to show not only the robust correlation between productivity and exchange rates but to plot the optimal rate of economic growth and interest rates along the economic disequilibria curve. This will be presented as a graphic presentation and solution.

Keywords: Exchange Rates, Labor Productivity and Economic Equilibrium

Introduction

Balassa (1964), Samuelson (1964) and Olson (2012) argue that productivity growth will lead to a real exchange rate appreciation when applied to the traded goods sector of an economy. Bailey and Wells (2001), argue that an increase in US productivity increases the rate of return on capital. Tille and Stoffels (2001) argue that increases in relative labor productivity account for part of the change in the external value of the US dollar over the last 30 years. Alquist and Chinn (2002) argue that there is a robust correlation between the United States and Euro labor productivity differential and the dollar/euro exchange rate. This study will employ an extension of the Olson (2013) model and introduce the economic disequalibria curve to determine the optimum rate of interest and rate of expansion of the whole economy. This is shown in Figure 1.

According to the Balassa-Samuelson model, the distribution of productivity gains is important for assessing the impact of productivity on the real exchange rate. Increases in productivity can lead to an increase in exchange rates and growth of the economy as shown in Figure 1 (productivity 1 to productivity 2 and price vector 1 to price vector 2).With this change the growth rate of the economy increases from A to B and the interest rate decreases from A to B. The increase in the exchange rate is shown as point A to point B (exchange rate 1 to exchange rate 2).The optimum growth and interest rate is at point B. The growth rate can be increased to point B but any further increase in the growth of the national output beyond Bwill result in a less than optimum rate of interest and growth rate.

Olson (2012) argues that the decline of the euro against the US dollar during the period 1995-2007 can be attributed to relative changes in productivity in the United States and the euro area. Figure 2 shows the impact of a change in relative productivity changes over these periods on the US GDP. Figure 3 shows the impact of a change in the dollar/euro real exchange rate on the US GDP and Euro GDP.The impact is significant in both areas.Refer to the figure 4 for the US and Euro productivity differentials which show the long-run impact of productivity shocks on the dollar/euro real exchange rate. Figure 4shows the significance of large gaps in the euro and US productivity differentials especially around the years 2001-2002 when the dollar started to depreciate against the euro.

The findings of Samuelson (1964) and Olson (2013) show that the US/Euro area productivity differentials have a significant impact on real exchange rates and economic growth. These factors play a role in the determination of the productivity processes necessary in achieving economic equilibrium and economic growth.

The findings of von Neuman (1936) and his Model of General Economic Equilibrium is used in this study as a guideline to determining economic equilibrium. The von Neuman conclusions are as follows:

1. The greatest factor of expansion of the whole economy.
2. The lowest interest factor at which a profitless system of prices is possible.

Summary

This study presents a model that can be instrumental in understanding the concept of economic equilibrium in economic systems. The introduction of the economic disequilibria curve helps plot the relationship between productivity and exchange rates and assist in visualizing the optimum economic growth and interest rates.

Fig 1 shows the relationship between productivity and exchange rates with the disequilibria curve plotting various possible outcomes of economic growth and interest rates. There is a point along the curve (point B) where there is the greatest expansion of the economy and the lowest interest rates. According to von Neuman's Model of General Economic Equilibrium the economy would be in economic equilibrium. At point C interest rates will increase with the increase in economic growth but the price level (interest rates) and the economy will be in disequilibrium.

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Appendix

The data for Olson (2012) was collected from the following sources:

Economic Data Base (FRED) of the Economic Research Department of the *Federal Reserve Bank of St. Louis*. The PPI and CPI are used as proxies for tradable and non tradable goods.

Data Bases and Tables of the *Bureau of Labor Statistics.*

The source of all of the graphs, figures and charts was the Software JMulTi. available from Lutkepohl, Helmut.Applied Time Series Econometrics.2004, Cambridge University Press.
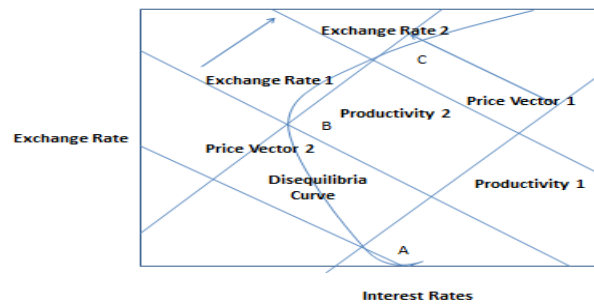
The Economic Disequilibria Curve

Figure 1

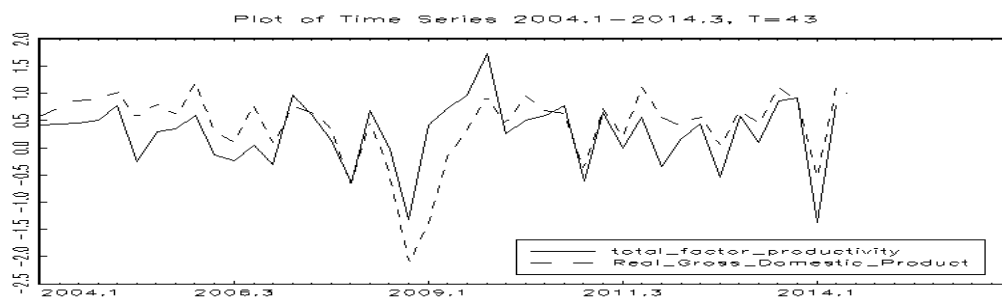**Figure 2: US Prod > Dollar/Euro Exchange Rate**
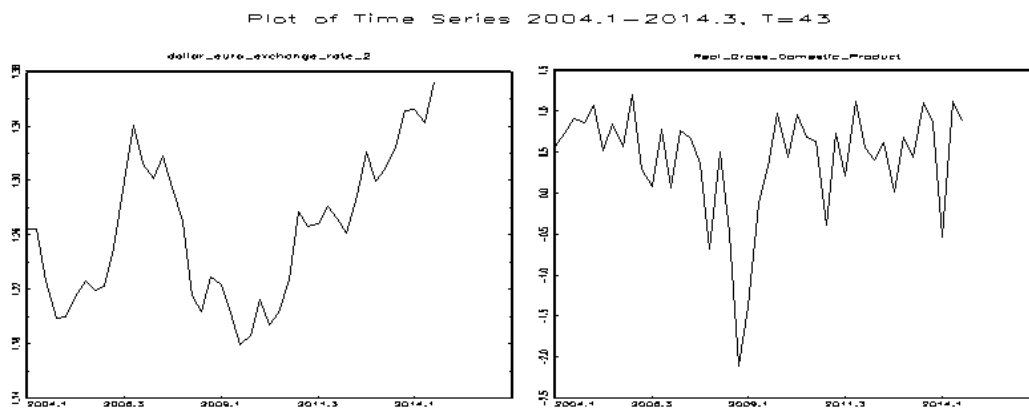

Figure 3: US GDP › USD/EURO Exchange Rate

Figure 4: Time Series Euro Productivity and US Productivity Dollar/Euro Real Exchange Rate