A Test Of Okun’s Law for 10 Eastern European Countries

Introduction

Okun’s Law is one of those rare things in economics, describing an enduring relationship between two of macroeconomics’ most important variables. This study aimed to investigate this relationship and examine the significance of other variables that influence the Unemployment/real GDP relationship, and achieve this objective with some success. The nature of the countries that were under examination in this study also provides us with some extra insight into the relationship between these two principal economic variables by showing that the original estimate of Okun’s law that states three points of real GDP for each 1 percent reduction in the unemployment rate can be revised up to four points for those countries experiencing rapid economic development. This study also examines the significance of pooled estimates in order to see the significance of co-integration and discovers random effect show less significant results than fixed effects when pooled data is analysed. The precise aims of this project are; to collect the unemployment, economic growth, labour force and capital stock data for each country. To use the data to establish an economic relationship between the two variables unemployment and real GDP in order to form Okun’s coefficient. To use this data to find an accelerating growth rate of unemployment. A pool of data for each coefficient will then be created in order to analyse any possible significance of co-integration between the economies. These cross sectional time series will then be presented showing fixed effects and random effects. After reviewing the findings from the regressions and pools of these original variable it is necessary to explore the effects of other economic factors. Economic variables will be added to each country model, where possible, as a way of analysing what else underlies the Okun coefficient and explore any other problems as to why a particular country’s data may not be significant.

Theoretical Model

Real GDP = Okuns Coefficient (Annual change in unemployment = (labour force + Capital stock))

\[ G_{t-1} = -\beta \left( U_t - U_{t-1} - (L(t) + K(t)) \right) \]

This model shows how Okuns will be calculated. This approach differs from that of Blanchard as it has GDP as the independent variable, but this measurement is consistent with studies such as Freeman’s and Dritsakis’. I have also preferred to use capital stock as a measure to represent the trade increase in productivity that defines Okun’s law, rather than use Blanchard preferred method of industrial productivity. The capital stock measure I have used was derived from each countries GDP/CAPIT statistic, with an assumed depreciation rate of 1.1%. The calculation for \( K \) has been done thusly;

\[ K_{t-1} = (1 - 0.1) K_{t-1} \quad \text{Where} \quad K = \text{capital, I = GDP/CAPIT,} \quad \beta = \text{the rate of depreciation,} \quad \alpha \quad \text{and} \quad \beta \quad \text{is the previous years rate of growth.} \]

In Equilibrium

\[ K_{t+1} = (1 + \beta) K_t \quad \text{g = 0.015} \]

The next step is to perform a time series regression for the two variables economic growth and unemployment. This will give the value for the coefficient that allows us to see how responsive the unemployment rate is when economic growth slows down, or recession is entered. Okun states that the equation is “miss-specified as it is assumed that all other variables in the equation are on their equilibrium paths”, meaning that it is wrong to assume that the other variables do not influence the relationship. In capital formation and labour force, change with unemployment. This reason the significance of this capital formation or industrial production will be tested in regression results as well as the relationship between output and unemployment. This was done in other studies that I am aware of. By testing the significance of all variable over time the model would look like this, and this is the final composition of the equation that will be used in this study:

\[ G_{t} = -\beta (U_{t-1} - (L(t) + K(t)) \]

Data and Research

All of the data streams of macro-economic variables required in order to complete this study will be obtained from the economic and social data services. The ESOS chief and form data from source websites, and the data that will be sourcing from them will be originally IMF international financial statistics. The IMF is the most reliable and comprehensive compiler of international financial statistics. The data collected from them will be figures on unemployment, real GDP, Labour Force size, domestic capital formation and industrial production. I will also be using the ESOS in order to obtain labour market statistics and information. This will be useful because the conditions of the labour market in these countries will be the determining factors of the results I find, therefore I will need to access data such as migration and job availability in order to carry out a comprehensive analysis. The original source of the majority of this data will be from Eurostat – The European Union’s statistical compiling department. Finally data on trade union membership and density will have to be obtained. This is only available for some of the countries I am surveying because of data availability. This data will be collected from the OECD, and not all of the surveyed countries are OECD members. The OECD will also provide me with information on the type of trade union activity that takes place in the surveyed country, and this will help me to analyse the effects of a country’s trade union activity, rather than just analysing by looking at the statistics.

Test of Okun’s Law for 10 Eastern European Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Average Real GDP growth %</th>
<th>Average annual % change in unemployment</th>
<th>Average Unemployment rates %</th>
<th>Average annual % change in Capital stock</th>
<th>Average annual % change in labour force.</th>
<th>Estimate of Okuns Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgaria</td>
<td>10.13%</td>
<td>-2.15%</td>
<td>11.87%</td>
<td>12.54%</td>
<td>5.94%</td>
<td>7.92%</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>2.12%</td>
<td>0.03%</td>
<td>7.94%</td>
<td>5.78%</td>
<td>0%</td>
<td>1.73%</td>
</tr>
<tr>
<td>Hungary</td>
<td>7.78%</td>
<td>-0.12%</td>
<td>7.98%</td>
<td>16.52%</td>
<td>0%</td>
<td>4.96%</td>
</tr>
<tr>
<td>Latvia</td>
<td>13.0%</td>
<td>0.13%</td>
<td>7.93%</td>
<td>10.1%</td>
<td>-0.86%</td>
<td>2.43%</td>
</tr>
<tr>
<td>Lithuania</td>
<td>8.08%</td>
<td>-0.11%</td>
<td>8.14%</td>
<td>3.35%</td>
<td>-4.8%</td>
<td>1.67%</td>
</tr>
<tr>
<td>Poland</td>
<td>5.4%</td>
<td>-0.25%</td>
<td>14.42%</td>
<td>5.11%</td>
<td>-0.08%</td>
<td>1.48%</td>
</tr>
<tr>
<td>Slovakia</td>
<td>3.55%</td>
<td>-0.23%</td>
<td>7.88%</td>
<td>19.38%</td>
<td>0.14%</td>
<td>5.91%</td>
</tr>
<tr>
<td>Slovenia</td>
<td>3.38%</td>
<td>-0.43%</td>
<td>13.16%</td>
<td>5.18%</td>
<td>0.52%</td>
<td>0.72%</td>
</tr>
<tr>
<td>Croatia</td>
<td>0.29%</td>
<td>-3%</td>
<td>12.22%</td>
<td>8.61%</td>
<td>0.39%</td>
<td>2.86%</td>
</tr>
</tbody>
</table>

Table 1: Value of the Variables

Test of Additional Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Trade union density</th>
<th>Net Migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pooled sample results</td>
<td>0.91</td>
<td>0.37</td>
</tr>
<tr>
<td>Average value of t-statistic</td>
<td>2.88</td>
<td>2.08</td>
</tr>
<tr>
<td>p-value</td>
<td>0.01</td>
<td>0.0292</td>
</tr>
</tbody>
</table>

Table 2: Significance of the Variables and Okun’s Coefficient

Results

- Most significant values of the Okun’s Coefficient are around 4%.
- Unemployment has greatest effects on GDP in Hungary, and least effects in Bulgaria and Latvia.
- Unexpected results in Latvia and Poland can be explained by a fall in Labour force size.
- There is also a much higher increase of capital stock in Latvia when compared to other countries, indicating jobless growth.
- In Poland unemployment is falling at the same time as GDP growth is slowing.
- Significant and expected results for the relationship between unemployment and output for Bulgaria, Hungary, Romania, Slovakia and Slovenia.
- Insufficient results for the relationship between unemployment and output for Czech Republic, Latvia, Lithuania, Poland, but these aren’t significant.
- Significant and expected results for the relationship between Labour force size and output for Bulgaria, Hungary, Lithuania, Poland, Romania, Slovakia and Slovenia.
- Insufficient results for the relationship between Capital Stock and Output and Poland for Czech and Hungary.
- Unemployment has greatest effects on GDP in Hungary, and least effects in Latvia.
- Significant and expected results for the relationship between Capital Stock and Output for Poland.
- Significant results between the relationship between Capital Stock and Output for Bulgaria, Czech Republic, Hungary, Lithuania, Poland, Romania, Slovakia and Slovenia.
- Significant results between the relationship between Capital Stock and Output for Poland.

- When calculating the significance of the data using a cross sectional time series we can see that trade union effects produce much larger significant results than random effects.
- This shows that the results we are testing do not arise from random and unrelated causes.
- Capital stock appears to have the most consistent and reliable effects on output.
- Trade union density is shown to have a significant effect on how unemployment effects output.
- Net migration is not shown to have a significant effect on Okun’s law for most countries tested, but it is shown to be significant for Poland and Latvia, where there has been a much larger negative net migration than anywhere else.
- We can best incorporate trade union density into the full Okun equation by seeing subtracting its effect from the Nagri statistic. This would allow unemployment to be at a higher level, without affecting economic growth, which is exactly the effect of trade unions.
- A revised estimate of the Okun equation could therefore be:

\[ G_{t} = -\beta (U_{t-1} - (L(t) + K(t)) \]

Summary and Conclusion

- The relationship between real GDP and real GDP for those countries with significant result of the coefficient is generally higher for the countries that have been tested in this study compared to the results of Okun’s original study, and other studies such as those by Freeman or Dritsakis that test the relationship for developed countries by one percentage point of GDP.
- Aside from those that make up the original Okun equation such as trade union membership and Net migration in certain circumstances have a significant value and can be used to further improve the accuracy of analysis of how real GDP and unemployment react to each other.
- Most importantly we can conclude that despite slight departures from the expected results, Okun’s law continues to keep its aura of enduring permanence in the world of macroeconomics.