Estimating the Stability of Okun's Law

Xinrui (Crystal) Wang, Fort Hays State University, ECON 601

Abstract

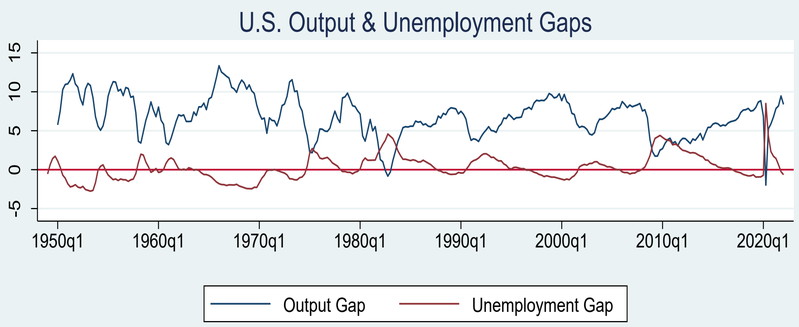
This study focuses on employing the gap version of Okun's Law, conducting regression analysis between the output gap and the unemployment gap to assess their effectiveness and long-term stability, and also estimates the significant relationship between the output gap and the unemployment gap. This study also compares the output gap dynamics during economic contractions and expansions.

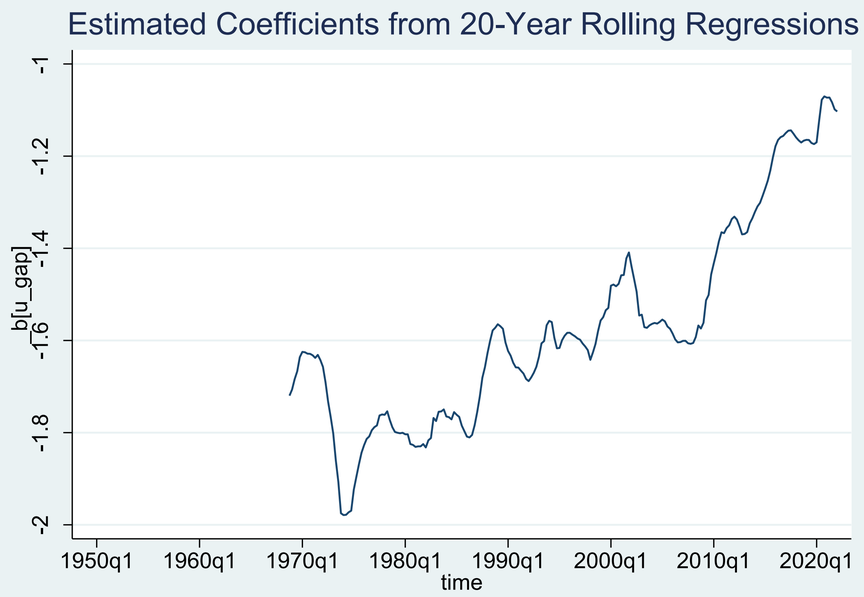
Introduction

In 2020, the outbreak's impact led to a sharp decline in output alongside an increase in the unemployment rate. This fourfold disparity between the output gap and the unemployment rate posed significant challenges in illustrating Okun's Law, which for every 1% increase in the GDP gap relative to potential output, the unemployment rate will fall by 2%. The gap version of Okun's Law demonstrates the relationship between output growth (the disparity between potential output and actual output) and the unemployment gap (the difference between the actual and natural rate of unemployment). This study adopts this version to estimate the statistical relationship between unemployment and GDP growth.

Summary Statistics

Variable	Observation	Mean	Standard Deviation	Min	Max
Output Gap	289	6.85	2.57	-1.98	13.35
Unemployment Gap	293	0.28	1.57	-2.76	8.50





Methodology & Model

This study will focus on the statistical correlation between the output gap (dependent variable) and the unemployment gap, time is another explanatory variable but not significant, and Recession as a dummy variable. 293 data imports from the FRED Federal Reserve Bank of St. Louis database from January 1949 to January 2022 quarterly. The preferred regression model was identified using the ordinary least squares method, which aims to minimize the sum of squared residuals in the regression. A significance level of 5% (α=0.05) is chosen to determine the statistical significance of the regression model. The study also uses rolling regression, encompassing 80 quarters of data, yields a unique set of estimated coefficients.

Selected Results

Summary Statistics, graphs of U.S. Output and Unemployment Gaps, and Okun's Law – Gap Version show that the output gap and the unemployment gap have an inverse relationship over time. Interestingly, in 2020, the output gap is 4 times related to the unemployment gap, which fluctuates the most.

In the rolling regressions, the Okun coefficient with -1.45 after running 80 quarters of data undergoes fluctuations over time, indicating variable changes across temporal segments.

The regression procedure utilizes the Prais-Winsten transformation and incorporates Newey-West autocorrelation robust standard errors to address autocorrelation concerns. Furthermore, for the sake of simplicity, influential data is excluded from the displayed regression outcomes on the right side.

	(1)	(2)	(3)
VARIABLES	**Output gap**	**Output gap**	**Output gap**
Unemployment gap	-1.451***	-1.466***	-1.424***
	(0.0431)	(0.0471)	(0.0426)
Time		0.000698	-0.000353
		(0.000890)	(0.000810)
Contraction			-1.463***
			(0.176)
Constant	7.236***	7.167***	7.477***
	(0.0690)	(0.112)	(0.107)
Observations	289	289	289

RECESSION, a binary variable (0 for expansion and 1 for contraction)

*** p<0.01, ** p<0.05, * p<0.1.

Selected Results Continued

The relationship between the unemployment gap and the output gap reveals a negative correlation. Specifically, a 1% increase in the unemployment gap corresponds to a 1.42% decrease in the output gap. Time variable is not significant for all models at the 10% significance level, it shows there is no statistical significance between the output gap and time. For the dummy variable, recession, the output gap in contraction is 1.46% less than one in the expansion cycle.

Conclusion

This article undertakes a reevaluation of the gap version of Okun's Law through regression analysis to substantiate its argument. However, empirical evidence suggests that while the output gap and the unemployment gap maintain a negative correlation overall, the Okun coefficient displays discernible fluctuations diverging from the original law across different periods. in the second quarter of 2020, the output gap and the unemployment gap exhibited a fourfold variance, notably representing the largest deviation from the initial legal coefficient as evidenced by rolling regression analysis. Furthermore, despite the general trend of higher gap values during expansionary periods compared to recessions, the output gap in the second quarter of 2020, amidst an expansionary phase, was even smaller than the lowest recorded value during the recession.