Decreasing Output while Decreasing Unemployment in the US

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Outline

- Background
- Research Question
- Literature Review
- Data
- Empirical Strategy
- Data Analysis
- Conclusion

Background

- Covid-19 began in Jan. 2020, and Spreads quickly.
- There are some significant impacts on the U.S. economy and people's standard of living.
  - Inflation rate increased
  - About 1 million Americans are forced to leave the workforce
  - The cost of health care has risen, etc.
- Government policy
  - Fiscal policy
    - Decreased the Federal Funds Effective Rate
    - Quantitative Easing
  - Monetary policy
    - Issued a total of three rounds of bailouts
    - Issued subsidies to various industries

Background

- In any recession period in history the unemployment increases while the output decreases.
- There is only one exception that from the second quarter of 2021 till now output decreases while decreasing unemployment.
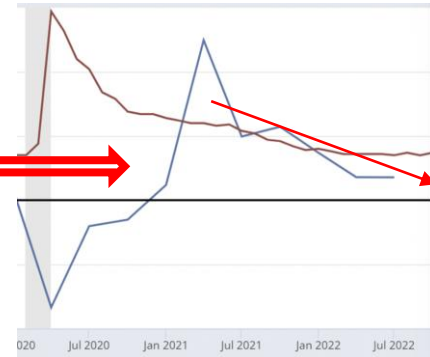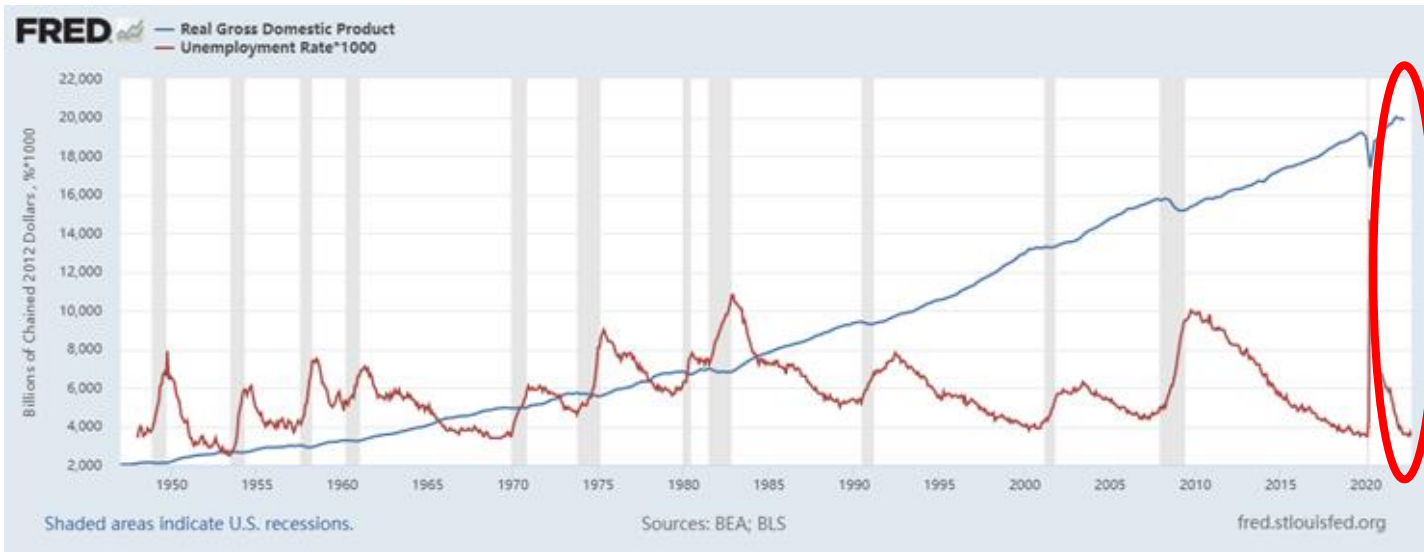
Objective and Research Questions

- **Objective:** Study the impact of the COVID-19 on the relationship between output and unemployment.
- **Main Question:**
  - Does the relationship between output and unemployment (Okun's Law) change in the later years of the pandemic (2021-2022) compared to the previous long-term scenario?
- **Secondary Questions**:
  - What factors change so that the relationship between output and unemployment becomes positive?
  - Are those factors influenced by the Covid-19 weaken the Okun's Law?

Literature Review

- **Soylu et al. (2018)** analyzed the relationship between economic growth and unemployment in Eastern European countries for the period of 1992-2014 within panel data framework in the context of Okun's Law which describes a negative relationship between output and unemployment. Okun's coefficient varies over time and across countries.

- **Mussida et al. (2022)** found a shock in Okun's coefficient with the COVID-19 pandemic, especially in countries that suffered most in terms of real GDP reduction because of national and local lockdowns but without a significant increase in the unemployment rate.

Literature Review

- **Feldmann (2013)** found that a rise in the real interest rate worsens labor market performance all over the world. It increases the unemployment rate, raises the share of long-term unemployed, and reduces the employment rate.

- **Maximova (2015)** discussed about the Phillips curve. In the short-term, the Phillips curve shows an inverse relationship between inflation and unemployment. When inflation is high, unemployment is low, and vice versa.

- **Idan et al. (2022)** found that an increase in the money supply in the market encourages investment in economic activities and enhances productivity leading to an increase in economic growth.

Data

Model 1:

Purpose: Estimate and compare the Okun's coefficients pre and post Covid.

Type	Variables	Period	Measurement	Data Source
Dependent variable	Unemployment rate	2010Q1-2022Q3, Quarterly (1): 2010Q1-2020Q1 (2): 2011Q2-2021Q2 (3): 2012Q3-2022Q3	Quarterly, average	U.S. Bureau of Labor Statistics
Independent Variable	Output gap		The difference between the natural log of real GDP and the natural log of real potential GDP	
Variables used for measurement	Natural Rate of Unemployment		Noncyclical Rate of Unemployment	U.S. Congressional Budget Office
	Real GDP		Billions of Chained 2012 Dollars	U.S. Bureau of Economic Analysis
	Real Potential GDP		Billions of Chained 2012 Dollars	U.S. Bureau of Economic Analysis

Data

Model 2:
Purpose: Find variables that influence unemployment rate and output to change in the same direction.

Type	Variables	Period	Measurement	Data Source
Dependent variable	Unemployment rate	2010Q1-2019Q4, Quarterly	Quarterly, average	U.S. Bureau of Labor Statistics
	Real GDP		Billions of Chained 2012 Dollars	U.S. Bureau of Economic Analysis
Independent Variable	Money Supply		M2	Board of Governors of the Federal Reserve System (US)
	Federal Funds Rate		Federal funds effective rate	Board of Governors of the Federal Reserve System (US)

Type	Variables	Period	Measurement	Data Source
Independent Variable (Continued)	Participation Rate	2010Q1-2019Q4, Quarterly	Labor force participation rate	U.S. Bureau of Labor Statistics
	Subsidy		Federal government current expenditures: Subsidies	U.S. Bureau of Economic Analysis
	Unemployment Insurance		Personal current transfer receipts: Government social benefits to persons: Unemployment insurance	U.S. Bureau of Economic Analysis

The Review of Okun's Law

Okun's Law: empirically, a 3 percent decline in GDP growth produces 1 percent increase in the unemployment rate.

$$\Delta U_t = \alpha + \beta \Delta Y_t + \epsilon_t$$

- Okun's Law is an empirical correlation and is neither theoretically motivated nor strictly adhered to in the data.

- It appears to vary depending on sample period studied.

Empirical Strategy

$$U_t - U_t^* = \alpha + \beta(Y_t - Y_t^*) + \epsilon_t$$

- U_t is the unemployment rate at time t

- U_t^* is the estimated unemployment rate in the long-term level

- Y_t is the natural log of output

- Y_t^* is the natural log of output measured in the long-term level, which can be measured as the time-varying path of potential output using the method of Congressional Budget Office(CBO).

Empirical Strategy

With quarterly data, the fit of our equation improves if we include two lags of the output term.

$$\Delta U_t = \alpha + \beta_0 \Delta Y_t + \beta_1 \Delta Y_{t-1} + \beta_2 \Delta Y_{t-2} + \epsilon_t$$

The model is estimated focusing on different time windows of same length.

Period 1: Pre-Covid Period. (2010Q1-2020Q1)

Period 2: Post-Covid Period. (2011Q2-2021Q2)

Period 3: Post-Covid Period with government intervention. (2012Q3-2022Q3)

Data Analysis Results

	(1) du	(2) du	(3) du	(4) du	(5) du	(6) du
outputgap	-1.405*** (.108)	-1.025*** (.073)	-.902*** (.065)	-.775*** (.271)	-.898*** (.065)	-.798*** (.062)
ly				-.021 (.408)	-.262*** (.07)	-.217*** (.067)
lly				-.671* (.332)	-.075 (.065)	-.042 (.062)
_cons	-1.965*** (.283)	-1.245*** (.223)	-1.094*** (.176)	-2.23*** (.271)	-1.776*** (.221)	-1.426*** (.184)
Observations	39	39	39	39	39	39
R-squared	.82	.841	.84	.86	.902	.888

*** p<.01, ** p<.05, * p<.1

- The Okun's coefficient in Period 3 is always higher than in Period 2.
- From Okun's Law, we know that an increase in unemployment rate must be associated with a decrease in real output growth. But here the results shows that the Okun's Law was weaken.

Empirical Strategy

Same trend
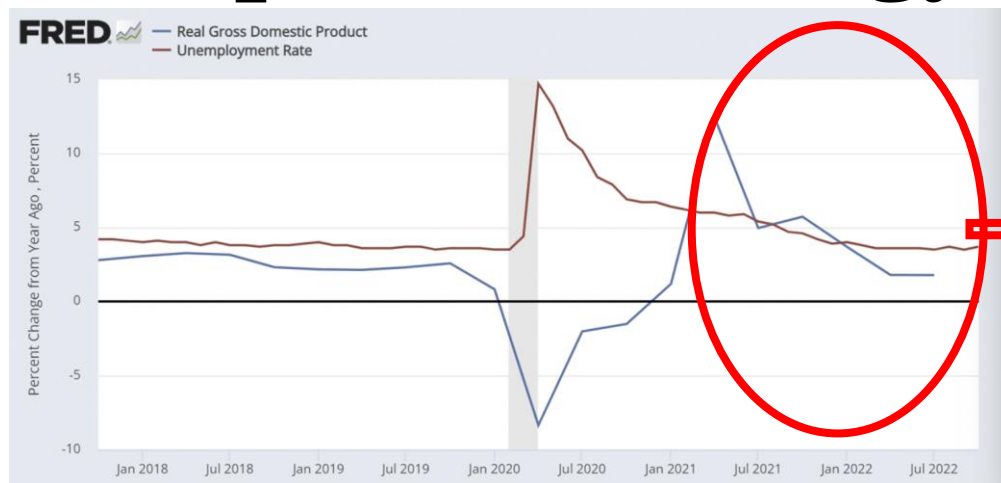
OLS(2010 Q1-2019 Q4)

- Dependent variables(5)：M2, federal funds effective rate, labor force participation rate, subsidy, unemployment insurance
- Y1: real GDP　Y2: unemployment rate
- Purpose：find significant variables that influence Y1 and Y2 in the same direction

Variables

Variable for **monetary policy**

- **M2**: refers to the cash in circulation outside the banking system plus corporate deposits, household savings deposits and other deposits
- **federal funds effective rate**:the rate set by the FOMC (Federal Open Market Committee) for banks to borrow funds from each other.

Variable for **fiscal policy**

- **Subsidy**: one of government expenditure to reduce company's cost
- **Unemployment insurance**:provides cash stipends to unemployed workers who actively seek employment

Labor force participation rate:the number of people in the labor force as a percentage of the civilian noninstitutional population

OLS regression

First Regression:

$$unemployment\ rate = \beta_0 + \beta_1 real\ GDP + \beta_2 M2 + \beta_3 unemployment\ insurance +$$
$$\beta_4 participation\ rate + \beta_5 subsidy +$$
$$\beta_6 federal\ funds\ effective\ rate$$

Second Regression:

$$Real\ GDP = \beta_0 + \beta_1 unemployment\ rate + \beta_2 M2 + \beta_3 unemployment\ insurance +$$
$$\beta_4 participation\ rate + \beta_5 subsidy + \beta_6 federal\ funds\ effective\ rate$$

OLS regression result

		(1) unemploymentrate		(2) realgdp
realgdp	(-)	-.001***		
		(0)		
m2	(-)	0**	(+)	.254***
		(0)		(.071)
insurance	(+)	.001	(+)	2.145
		(.005)		(2.313)
participationrate	(+)	.491*	(-)	-7.354
		(.244)		(118.236)
subsidy	(+)	.021***	(+)	6.931**
		(.006)		(2.987)
federalfundseff~e	(+)	.325**	(+)	238.84***
		(.122)		(45.342)
unemploymentrate			(-)	-238.242***
				(67.997)
_cons		-2.243		15480.191**
		(16.295)		(6953.59)
Observations		40		40
R-squared		.994		.996

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1

Pre-Pandemic	Beginning of Pandemic (2020Q1)	In the Middle of the Pandemic (2020Q2-2021Q1)	At the End of the Pandemic (2021Q2-now)
① **GDP↑** ② **Unemployment↓** ③ M2↑ ④ Inflation was relatively stable ⑤ the Fed's 6th rate hike ended	① **Unemployment↑↑, labor force largely exited** ② Production↓ C↓ ③ Rapid Deflation ④ Investment↓ ⑤ negative NX ⑥ **GDP↓↓**	① **Easy Monetary Policy + Expansionary Fiscal Policy** ② Savings Rate↓ ③ Inflation↑↑ (lack of supply capacity + low natural rate of interest) ④C↑↑**GDP↑**(C/Y≈80%) ⑤ **Unemployment↓** Labor Participation↑ ⑥ Wages and Prices spiraled	① G↓**(negative impact exists)** ② Inflation hit a forty-year high in 2022Q2 ③ Interest Rates↑, C↓ ④ g → less motivated ⑤ **GDP↓** ⑥meanwhile, Unemployment rate has recovered & labor force participation -1% lower (subsidies →retire early→ shortage of labor)

Conclusion

- **Does the relationship between output and unemployment (Okun's Law) change in the later years of the COVID-19 pandemic (2021-2022) compared to the previous long-term scenario?**

  Yes.

  - **What factors change so that the relationship between output and unemployment becomes positive?**

    Effective federal funds rate, M2, subsidy, unemployment insurance, labor force participation rate.

  - **Do these factors influenced by the COVID-19 pandemic weaken the Okun's Law? How?**

    Yes. Through easy monetary policy and expansionary fiscal policy, M2↑, subsidy↑, unemployment insurance↑, inflation rate↑↑, and labor force participation rate↓. At this time, the labor supply and demand are not yet cleared, and the unemployment rate returns to its normal level at a rate lower than the rate at which GDP reacts to policies, so the negative relationship between unemployment rate and economic growth is not obvious.

Reference

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