The Active Role of the Natural Rate of Unemployment

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RESEARCH PROGRAM ON CYCLICAL RECOVERIES AS MEASURED BY UNEMPLOYMENT
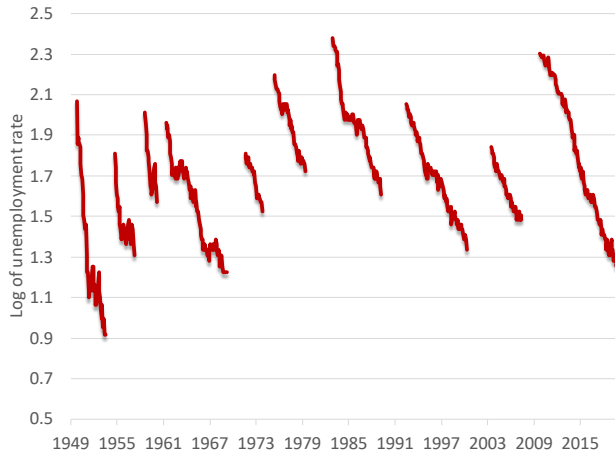
Hall and Kudlyak's Research program on cyclical recoveries as measured by unemployment,

► "The Inexorable Recoveries of Unemployment" *Journal of Monetary Economics*

► "Why Has the US Economy Recovered So Consistently from Every Recession in the Past 70 Years?" *Macro Annual*

► "The Unemployed with and without Jobs" *Labour Economics*

► Google Marianna Kudlyak for these and other papers.

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Shows that the slope is downward biased if a constant natural rate of unemployment is used in place of the true natural rate which is positively correlated with actual unemployment.

Proposes a new identification framework and analyzes recent methods that find that the natural rate is quite closely correlated with the actual rate.

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Under our view of inflation, during recoveries, inflation pressure is low because the unemployment gap is close to zero. Under a contrasting, sticky-price view, inflation pressure is low because the Phillips curve's slope is close to zero.

The New Keynesian model: Phillips curve and the natural rate of unemployment

PHILLIPS CURVE

$$\pi_t - \pi_t^* = -\phi_t \cdot (u_t - u_t^*)$$

π_t is the actual rate of inflation.

π_t^* is the inflation anchor.

u_t^* is the natural rate of unemployment

$-\phi_t \cdot (u_t - u_t^*)$ is the downward effect on inflation from higher unemployment.

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We consider the possibility that π^*, ϕ, and u^* change over time.

THE INFLATION ANCHOR π_t^*

► is the inference that a price-setter makes about how to set a price that will remain in effect for some time into the future.

► Often, π_t^* is taken to be expected inflation.

► It reflects the success and failure of monetary policy in stabilizing inflation.

► It depends on the current speed of adjustment of prices—if information becomes more volatile, sellers will choose to change prices more frequently.

RESPONSE OF INFLATION: $-\phi_t \cdot (u_t - u_t^*)$

▶ measures the decrease in inflation when unemployment rises relative to the natural rate.

▶ Sellers choose the amount of inertia in pricing by varying the time between repricing events: more frequent repricing reflects greater response to the pressure. Sellers can also vary the size of the repricing change.

Price flexibility versus price stickiness

▶ Phillips curve

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▶ ϕ controls the influence of inflation on real activity, as measured by unemployment

▶ If high, the economy has flexible prices and fits the real business cycle paradigm.

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ϕ CAPTURES THE PRICE-FLEXIBILITY OF THE ECONOMY

▶ If high, the economy has flexible prices and fits the real business cycle paradigm.

▶ With full monetary neutrality, ϕ is large and unemployment tracks u_t^*.

▶ If close to zero, prices are somewhat or fully sticky, and monetary factors have important involvement in the determination of real variables.

Observed data and inferred measures

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► This paper focuses on the natural unemployment rate and the Phillips curve's slope, and presumes that the anchored value of inflation has been properly modeled.

Identification issue in estimation of the Phillips curve by regression

REGRESSION OF INFLATION UNEMPLOYMENT

► $\pi_t - \pi_t^*$ and u_t are observed and ϕ_t and u_t^* are unknown.

► Suppose the natural rate u_t^* is unobservable and so, is left out. The regression then is

$$\pi_t - \pi_t^* = -\hat{\phi} u_t$$

► The coefficient is

$$\hat{\phi} = \frac{\text{Cov}(-(\pi_t - \pi_t^*), u_t)}{\text{V}(u_t)}$$

or

$$\hat{\phi} = (1 - C)\,\phi$$

where C is the unobservable regression coefficient of u_t^* on u_t.

  ► If C is zero, the regression gives the true slope of the Phillip's curve, ϕ.
  ► If the natural rate is a positive component of total unemployment, C is positive, and the regression coefficient $\hat{\phi}$ understates the true relation between inflation and the unemployment gap.

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Failure of identification

▶ The explicit or implicit reliance on a belief that $C = 0$ is close to universal in research based on a regression of the inflation gap on unemployment.

▶ The Phillips curve regression with unobserved u_t^* rests on the identifying assumption that C has a known value. Absent a persuasive reason to believe this assumption, regression yields no usable information about the slope coefficient, ϕ, or the natural rate, u^*.

▶ The basic regression model is not identified—observations of the inflation gap and unemployment do not pin down the slope of the Phillips curve, ϕ.

How identification is achieved

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▶ We propose a new method and describe three existing methods that achieve identification, explicitly or implicitly.

Inferring the natural rate of unemployment during periods of anchored inflation
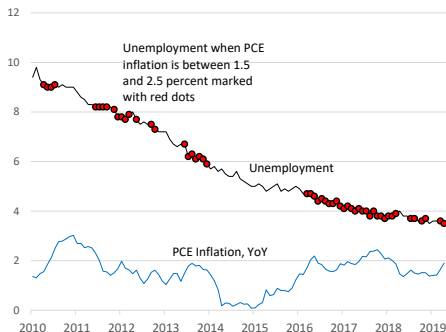
THE NATURAL RATE OF UNEMPLOYMENT

► is the unemployment rate when the rate of inflation is equal to the inflation anchor (Friedman (1968)):

$$u_t^* = u_t + \frac{1}{\phi_t}(\pi_t - \pi_t^*)$$

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▶ This statement requires that inflation responds to the gap, so that ϕ is positive.

WE DESIGNATE OBSERVATIONS WITH INFLATION RATES THAT COINCIDE WITH ANCHORED RATES

In the 2009-2019 recovery, u^* stayed close to u_t, given an inflation anchor of 2%

# Other approaches to modeling and calculating the natural rate of unemployment

Approach 1. The unemployment-trend method—the natural rate as a long-run trend in actual un-nt

▶ Assume that the natural rate of unemployment is constant or follows a smooth, low-volatility path determined by demographics (Congressional Budget Office and others)

  ▶ Estimates of the long-run path of the natural rate of unemployment: CBO's *noncyclical rate of unemployment*, Barnichon and Matthes (2017), Tasci (2018), Barnichon and Mesters (2018), Hornstein and Kudlyak (2019)

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- The resulting time series for the unemployment gap inherits most of the cyclical volatility of unemployment

The actual and the noncyclical rate of unemployment from the CBO
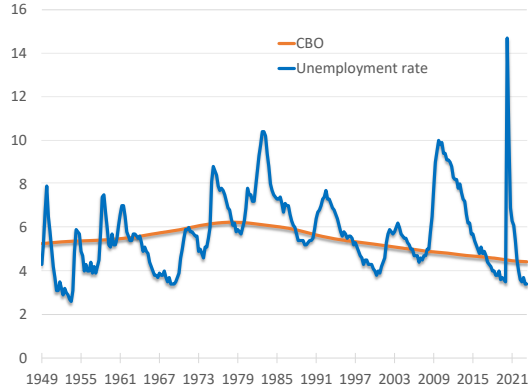
Approach 2. Sub-model for the natural rate to be jointly estimated with the Phillips curve

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- ▶ State-space models in which the natural rate follows a specified, typically random walk process
  - ▶ Gordon (1997), Laubach (2001), Crump et al. (2019), Crump et al. (2022), and Bok et al. (2023) (with many more cites)
  - ▶ Existing state-space models of the natural rate may overstate the pressure following recessions.

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- ▶ Vector-autoregression models in which the unemployment rate is estimated as an unobserved shock under certain identifying restrictions
  - ▶ King and Morley (2007) and the related literature
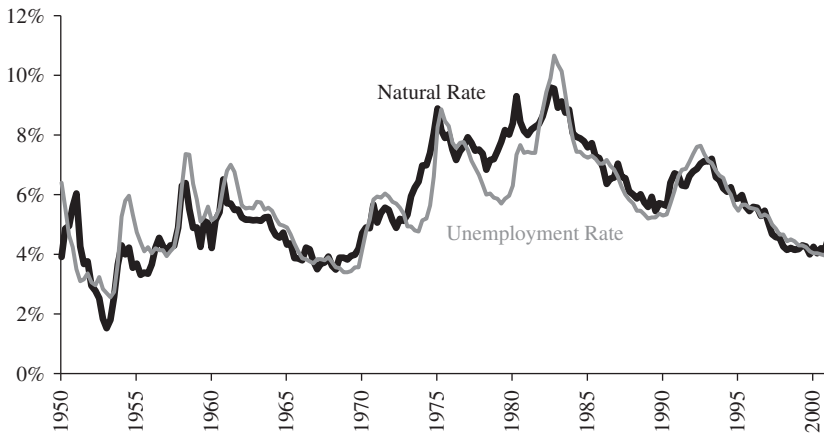
u AND u^* FROM KING AND MORLEY (2007)

Fig. 2. The natural rate of unemployment.

Approach 3. GE modeling

▶ Alternative definition of the natural rate of unemployment: It is the rate that would prevail if there were no wage frictions.

▶ This definition presumes that other types of friction are responsible for some part of the volatility of actual unemployment.

▶ Uses the Diamond-Mortensen-Pissarides model of unemployment to generate unemployment fluctuations in the absence of wage-price stickiness.

▶ Uses a well-known New Keynesian model stripped of its nominal stickiness to generate a counterfactual equilibrium with unemployment that satisfies the alternative definition of the natural rate—Galí, Smets and Wouters (2011). See also Furlanetto and Groshenny (2016).

u AND u^* FROM GALI, SMETS, AND WOUTERS
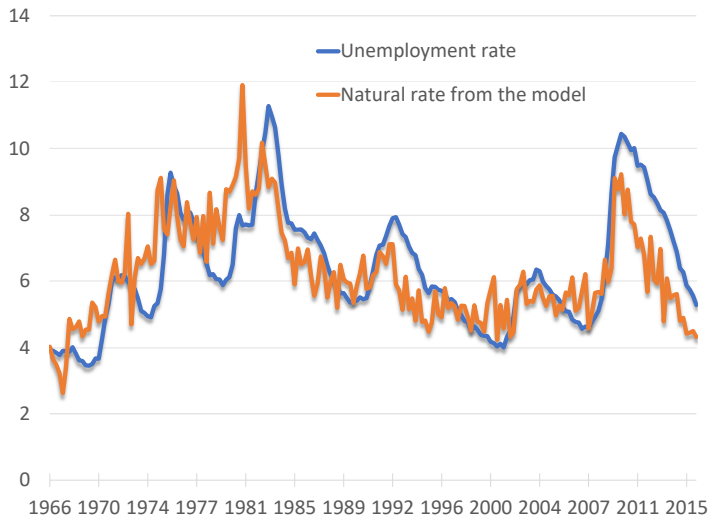
The natural rate and the flat Phillips curve

Summary of the approaches to modeling and calculating the natural rate

▶ The approaches deliver vastly divergent time series for the natural rate in terms of their correlation with the actual rate.

▶ We show that if the true natural rate of unemployment is highly correlated with the actual rate, Phillips curves estimated with constant natural rates or natural rates uncorrelated with the actual unemployment rate will inevitably be close to flat.

Implications of mis-specifying the natural rate in the Phillips curve regression

▶ Consider a Phillips-curve regression that includes an assumed path $\tilde{n}_t$ for the natural rate:

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▶ C is now the regression coefficient of u_t^* on $u_t - \tilde{n}_t$:
  ▶ If $C = 0$, the assumed natural rate is effectively correct and the regression coefficient $\hat{\phi}$ will be an unbiased estimate of the Phillips-curve slope, ϕ.
  ▶ If $C = 1$, then $\phi = 0$—the Phillips curve appears to be totally flat with the assumed natural rate, even though the true slope is robustly positive. In that case, the assumed natural rate is completely off base.

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▶ Using Galí et al. (2011)'s estimates of the series of the natural rate, $C = 0.60$, 1966-2015. So, the estimated slope of the Phillips curve is depressed to $1 - C = 0.40$ times its true value during that period.

Is inflation sticky or flexible?

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► According to the flexible view of inflation, the slope of the Phillips curve, ϕ_t, is substantial, while the unemployment gap, $u_t - u_t^*$, is small and transitory. A frequently used name in the literature is the "real business cycle model".

Alternative beliefs about the identified parameters of the Phillips curve

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▶ Both views fit the data. Additional data helping to reveal u_t^* or ϕ would be needed to determine which view is correct.

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▶ That is, during recoveries, an economy resembles a real business cycles economy, with $\frac{1}{\phi_t}$ being relatively low and the Phillips curve being steep.

▶ The flexibility of prices is the key differentiating factor. Our view requires that prices are somewhat flexible, so the Phillips curve is reasonably steep, whereas the opposing low and sticky view posits stickier prices and a flatter Phillips curve.

The pandemic and the Phillips curve

Endogenous inertia in the Phillips curve

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▶ This change weakens the inflation anchor and increases the sensitivity of inflation to its determinants such as the unemployment gap.

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▶ That means that the cost in terms of elevated unemployment of a policy to restore price stability may be lower than it would have been if inflation had become anchored at its current high rate.

Runaway inflation followed by rapid disinflation during and after the pandemic

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Conclusions

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▶ The gap, $u - u^*$, stayed fairly close to zero, with an inflation anchor of a constant 2 percent and actual inflation close to that level.

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