The Mainstream Model of U. S. Inflation Dynamics: Explaining the Past and Addressing the Future

Jonathan W. Eller and Robert J. Gordon
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The Phillips Curve, discovered in 1958, has been Taking a Beating Since 1968

- The first generation 1958-68 Phillips Curve was attacked by the Friedman-Phelps NRH
- The second generation 1968-75 Phillips Curve incorporated NRH
  - but was attacked by Lucas-Sargent, who left Phillips Curve (and by association all of Keynesian economics) “lying in wreckage”
  - because U-p correlation in mid-1970s was positive not negative
Phillips Curve Survived

- Positive vs. Negative Correlation: Gordon-Phelps Model showing Macro Externalities of Supply Shocks.
  - Macro is about Demand and Supply, not either alone
  - Textbooks embedded this as basic macro in 1978
- Mainstream model since 1980: Key elements the “triangle” of inertia, demand, and supply
Meanwhile in the past five years, the NKPC has dominated macro journals and conferences

- Attempt to implement specific theoretical models of sticky prices (Calvo, 1983)
- Central component: Key Driving Force is “Expected Future Inflation”
- Second variable: Two Versions, output gap vs. marginal cost
- Not discussed further today
  - Rejected empirically, triple the SSR
  - Rejected, 3X to 10X post-sample simulation errors
From Theory to Practice: The “Missing Link” in Macroeconometrics

• In Applications Where the Driving Force is Lagged Dependent Variable, can’t test by Goodness of Fit (Oh, boy, my model shows inflation is a random walk)

• Instead: Post-Sample Dynamic Simulations
  – No Data from Simulation Period used to Estimate Coefficients
  – No Information on Actual Behavior of LDV is Used to Calculate Predicted Inflation During Simulation Period
Basic Data Show Negative and Positive U,p Correlation

Figure 1. Unemployment Rate and Four Quarter Rate of Change of PCE Deflator, 1960:Q1-2002:Q4
Quick Introduction to the Triangle Model

- “Mainstream” vs. “Triangle”
- The Triangle model in equation (1). Absorb this notation.
  - Long lags on past inflation
  - $D(t)$ defined relative to zero, $z(t)$ relative to zero
- The SSW and Gordon 1997 version: Estimating the TV-NAIRU while using overall framework equations (2) and (3)
We will look at a graph for the Unemployment Gap Later: Here are the Supply Shocks

• Change in Relative Price of Imports, zero when no effect
• Food-Energy Effect, change in headline PCE inflation minus core PCE inflation
• Medical Care Effect, defined same
• NOTICE BIG DIFFERENCES IN VERTICAL AXIS!
Supply Shock Variables, all equal to zero when no SS Effect: Start with Relative Price of Non-oil Imports
Food-Energy Effect: Headline PCE Deflator minus Core PCE
Medical Care Effect defined same as FaE: Notice Crash in 1993-96
Productivity: Impose Real Wage Aspirations or (later) introduce directly
Basic Triangle Model Estimates: Table 2

- All Coefficients or Sums of Coefficients Significant at 1 percent level, correct signs
- Post-sample simulations 1993-2002
  - No help from: coefficients or lagged p data
  - Look at errors for PCE deflator
- In comparing with other models or other results, remember SEE of 0.69, SSR of 64.4
Estimated TV-NAIRUs: Crucial Role of SS Variables
Tests of Robustness & Stability

• Significance of LDV lags 13-24
• Stability Over Sample Split
  – 1962-81, 1982-2002
• Rejection of Shift toward zero of PC coefficient in 1990s
Possible Criticism: Productivity Variable (Figure 4 bottom) is *ad hoc*

- Add real wage feedback directly
- Sims (1987): wage equation must contain all the same variables as the price equation
- See equation (9) without price feedback and (10) with price feedback
How to Get Rid of Productivity Variable, Enter Real Wage Feedback Directly?

• **Equation (12)**
  – Feedback entered through TULC
  – Can run dynamic simulations with endogenous wage via equation (11)

• **Results in Table 6**
  – wage feedback replaces productivity trend variable
  – So we didn’t need the *ad hoc* productivity variable – wage feedback is explicit and does better
Dramatic Improvement for GDP Deflator, less for PCE Deflator
Concluding Numbers for the Paper: 1993-2002 Dynamic Simulation for PCE Deflator

- Actual 4-quarter inflation 2002:Q4 = 1.80
- Simulated fixed NAIRU no SS = 4.87
- Difference 3.07
  - 2.38 Contribution SS Variables
  - 0.71 Decline in TV-NAIRU
- Residual 0.07
Triangle Model is Validated

- Stability of model and coefficients over 164 quarters
- Ability to track inflation 10 years after end of sample period with no help from
  - Coefficients estimated for 1993-2002
  - Help from actual LDV over 1993-2002
- Unified Framework in which Wage-Price-Wage Feedback is Handled Symmetrically
Baseline Forecasts of Future Inflation

• Look only at Performance for PCE Deflator
  – Why? Alan Greenspan’s Favorite
  – Why? It Does the Best in our 1993-2002 Simulations

• Start with Sensitivity to Future Unemployment Rates
  – Assume TV-NAIRU continues forever at 5.33
  – CRUCIAL: Assume NO supply shocks at all!
How Long Does It Take Model to Generate Deflation?

Simulations begin in 2002:4, different effects of GAP in absence of supply shocks

- actual
- unemployment = 5.33
- unemployment = 6.00
- unemployment = 6.67
- actual unemployment 2003:1 and 2003:2, slowly decreasing so that 2005:1 = 5.33
Sensitivity to Long Lags on Past Inflation

- Table 1: Including lags 1-24, 1-12, 1-4
- Intuitively, the longer are the lags, the more inertial is the model in generating deflation or accelerating inflation
- Sensitivity to shorter lags . . . .
Three deflation scenarios with no supply shocks

Effect of shortening LDV, sample period 1982-2002

- 24 lags LDV, U = 5.33
- 24 lags LDV, U = 6.67
- 12 lags LDV, U = 6.67
- 4 lags LDV, U = 6.67
Back to Basic Model, What Happens if Oil Prices Retreat

- Say Oil Prices go from $31 to $19 over next six quarters
- Two unemployment scenarios
  - $U = 6.0\%$ percent forever
  - $U = 6.67\%$ percent forever
Here’s What Oil Prices Do to the Food-Energy Effect
Deflation Comes Sooner!

Simulations begin in 2002:4, Unemployment 6.00 unless otherwise indicated, non-zero supply shocks

-2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5 3 3.5


actual
unemployment = 6.00
Food and Energy effects reflecting large drop in oil prices
Same Food and Energy Effect, U = 6.67

Food and Energy effects reflecting large drop in oil prices
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Opposite: What About a pro-Inflation Scenario?

- U returns from 6.1 to 5.33 by 2005:Q1
- Import prices reverse all of benefit of 1995-2002 dollar appreciation over the next seven years
- *Relative* Inflation in Medical Care Prices Continues at rate of 2002:Q4
Here’s What Import Prices Do

![Graph showing relative import prices from 1987 to 2011. The graph illustrates fluctuations in import prices over the years.](image-url)
Here’s What Medical Care Prices Do
High Inflation Scenario, U returns to 5.33, Import Price and Medical as shown, no Oil Price Retreat

Simulations begin 2002:4, uses non-zero supply shocks, except for Food and Energy effects, Unemployment gradually declines from 2003:2 level to 5.33 in 2005:1
What Does Import Price vs. Exchange Rate Relationship Look Like?

C4 Import Prices and Exchange rate
Conclusion: Deflation is Remote

• Why?
  – Unprecedented stimulus will drive U back to NAIRU
  – Decline in dollar has already happened
  – Real Medical Care inflation is not going away
  – Our leader recognizes that the natural gas part of the energy equation is dire
  – Sabotage to Iraqi oil fields and the absence of a postwar plan: “OK, we win, what then?!”