Indra Astrayuda, Laurence Ball and Sandeep Mazumder: "Inflation Dynamics and the Great Recession: An Update"

Discussion by Henrik Jensen

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Objective of paper

- Examination of one of the most central relationships in macroeconomics:
- The Phillips Curve

- Focus is a price-inflation Phillips curve with backward-looking expectations for the US economy
- Focus is the issue of "missing deflation" in the recent crises: Dynamic forecasts of inflation for recent years based on pre-crises estimations suggest lower inflation than experienced

New approaches and results

- Paper extends Ball and Mazumder (2011, BPEA) who suggested two major explanations for the “puzzle”:
  - “Core inflation” should be measured by median inflation across industries
  - The slope of the Phillips curve should be allowed to be time-varying (it turns out to be much flatter recently) (so, robust estimations should start in 1980s)
- So, with lower median inflation in 2007q4, and a flatter (and more robustly estimated) Phillips curve, there is no “missing deflation”
  - Except for “now,” 2011q1-2012q4, where the model “breaks down”, and there is again “missing inflation”
- Current paper suggests, and analyze, three different explanations
  - Anchoring of inflation expectations: Backward-looking expectations seem to be replaced by constant expectations
  - Use of short-term unemployment as driving variable: In 2010-2012 it is lower than long-term unemployment
  - Downward nominal wage rigidity (still in progress)

Comments: An expectations-augmented Phillips curve

- The central equation throughout is

$$\pi_t = \pi_t^e + \alpha\left(u - u^*\right)_t + \epsilon_t$$

- Apart from timing issues, completely conventional

- Expectations modelling "follow a long tradition in applied work that assumes backward-looking expectations"

$$\pi_t^e \equiv \frac{1}{4}\left(\pi_{t-1} + \pi_{t-2} + \pi_{t-3} + \pi_{t-4}\right)$$

- Could also be a place to rethink

Comments: Conventional estimation

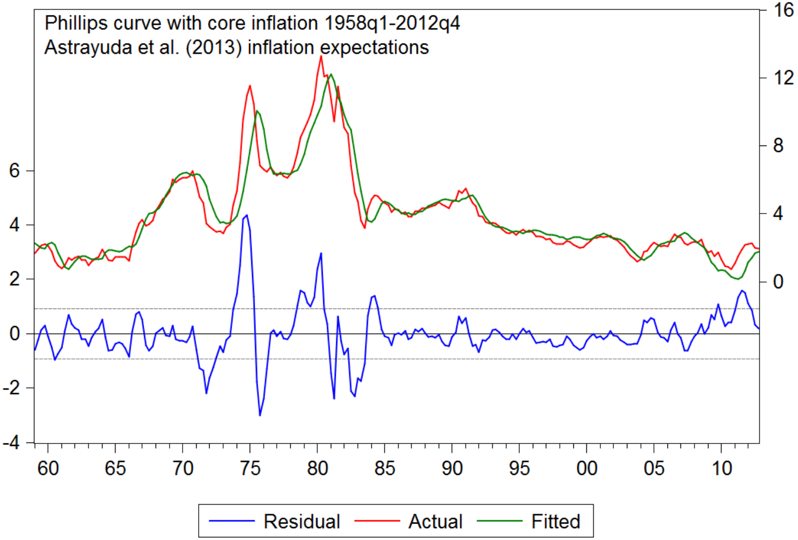
- All estimations I do is on core inflation measured as prices on all items excl. food and energy; “XFE” (I call it “XPE” in database for unknown reasons.)

Dependent Variable: XPE
Method: Least Squares
Date: 02/15/13 Time: 00:11
Sample (adjusted): 1959Q1 2012Q4
Included observations: 216 after adjustments
XPE=C(1)+0.25*(XPE(-1)+XPE(-2)+XPE(-3)+XPE(-4))+C(2)*UNGAPSR

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.113931	0.065092	1.750324	0.0815
C(2)	-0.280891	0.042676	-6.582003	0.0000

R-squared	0.877326	Mean dependent var	3.900637
Adjusted R-squared	0.876753	S.D. dependent var	2.626568
S.E. of regression	0.922098	Akaike info criterion	2.684885
Sum squared resid	181.9565	Schwarz criterion	2.716138
Log likelihood	-287.9676	Hannan-Quinn criter.	2.697511
F-statistic	1530.464	Durbin-Watson stat	0.393812
Prob(F-statistic)	0.000000		

Comments: Conventional estimation



Comments: Estimated "adaptiveness"

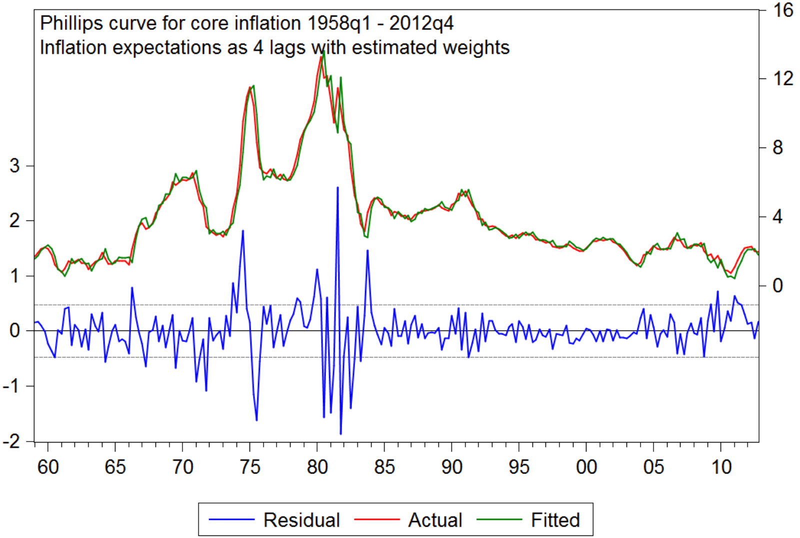
- $\pi_t^e \equiv c_2\pi_{t-1} + c_3\pi_{t-2} + c_4\pi_{t-3} + (1 - c_2 - c_3 - c_4)\,\pi_{t-4}$, where c_is are estimated

Dependent Variable: XPE
Method: Least Squares
Date: 02/15/13   Time: 00:16
Sample (adjusted): 1959Q1 2012Q4
Included observations: 216 after adjustments
XPE=C(1)+C(2)*XPE(-1)+C(3)*XPE(-2)+C(4)*XPE(-3) + (1-C(2)-C(3)-C(4))
*XPE(-4) +C(5)*UNGAPSR

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.036764	0.033423	1.099951	0.2726
C(2)	1.378024	0.068235	20.19532	0.0000
C(3)	-0.381102	0.116852	-3.261396	0.0013
C(4)	0.033715	0.116341	0.289799	0.7723
C(5)	-0.087193	0.023200	-3.758290	0.0002

R-squared	0.968389	Mean dependent var	3.900637
Adjusted R-squared	0.967790	S.D. dependent var	2.626568
S.E. of regression	0.471397	Akaike info criterion	1.356644
Sum squared resid	46.88740	Schwarz criterion	1.434775
Log likelihood	-141.5175	Hannan-Quinn criter.	1.388209
F-statistic	1615.965	Durbin-Watson stat	1.957610
Prob(F-statistic)	0.000000		

Comments: Estimated "adaptiveness"



Comments: "Hybrid" "New Keynesian" GMM example

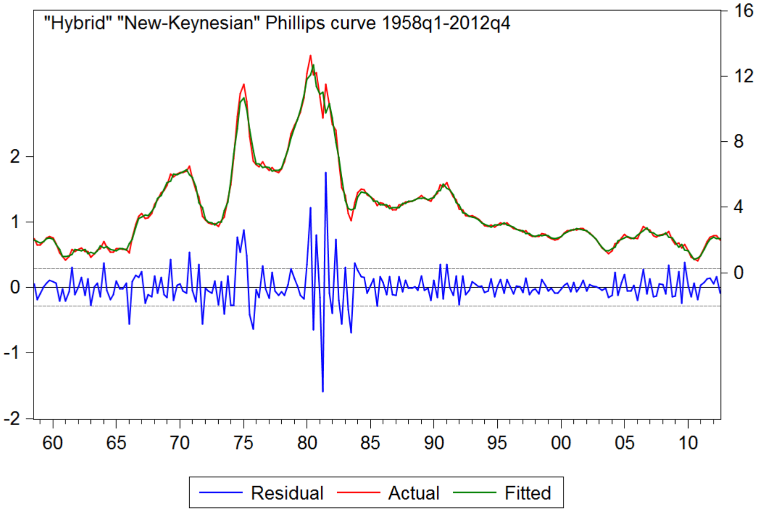
- Alternative would be a bit less traditional:
  $\pi_t^e = \beta c_2 \mathrm{E}_t \pi_{t+1} + (1 - c_2)\, \pi_{t-1}$

Dependent Variable: XPE
Method: Generalized Method of Moments
Date: 02/15/13 Time: 00:29
Sample (adjusted): 1958Q3 2012Q3
Included observations: 217 after adjustments
Linear estimation & iterate weights
Estimation weighting matrix: HAC (Prewhitening with lags = 4 from SIC maxlags = 6, Bartlett kernel, Newey-West automatic bandwidth = 1.9969, NW automatic lag length = 4)
Standard errors & covariance computed using estimation weighting matrix
Convergence achieved after 10 weight iterations
XPE = C(1) + C(2)*0.99*XPE(+1)+(1-C(2))*XPE(-1) + C(3)*UNGAPSR
Instrument specification: XPE(-1) XPE(-2) UNGAPSR(-1) UNGAPSR(-2)
Constant added to instrument list

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.011627	0.005936	1.958784	0.0514
C(2)	0.471892	0.023198	20.34193	0.0000
C(3)	-0.011855	0.007672	-1.545092	0.1238

R-squared	0.988163	Mean dependent var	3.891090
Adjusted R-squared	0.988052	S.D. dependent var	2.624305
S.E. of regression	0.286855	Sum squared resid	17.60915
Durbin-Watson stat	2.550741	J-statistic	3.700091
Instrument rank	5	Prob(J-statistic)	0.157230

Comments: “Hybrid” “New Keynesian” GMM example

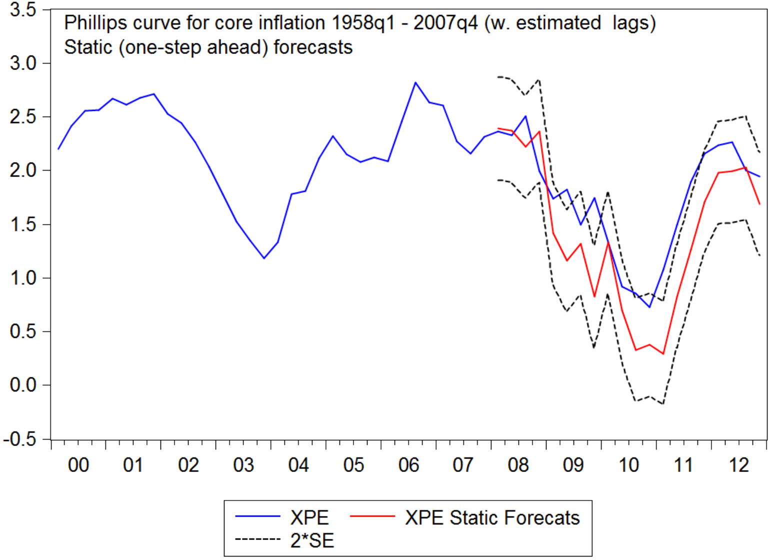


Comments: Dynamic Forecasts?

- There is something schizophrenic about the dynamic forecasts
  - Your inflation brain is stuck in 2007q4
  - Your unemployment brain keeps track of time and process new information
  - With this "mixed" mind you asses inflation in, say, 2012q1. Would a policymaker do this?

- One could consider static forecasts (one-step ahead forecasts), where your inflation brain is rebooted.
  - Then, a model estimated up until 2007q4 does not look that bad

Comments: Static forecasts do not perform too bad



Comments: Unit Roots?

- It is hard to reject a unit root in core inflation
- I would therefore be executed at my department for even contemplating OLS in levels

- I therefore tried an estimation in first differences:

$$\Delta\pi_t = \Delta\pi_t^e + \alpha\Delta\left(u - u^*\right)_{t-1} + \Delta\epsilon_t$$

  with π_t^e being backward looking but with estimated weights
- And took it to the authors' dynamic forecast test

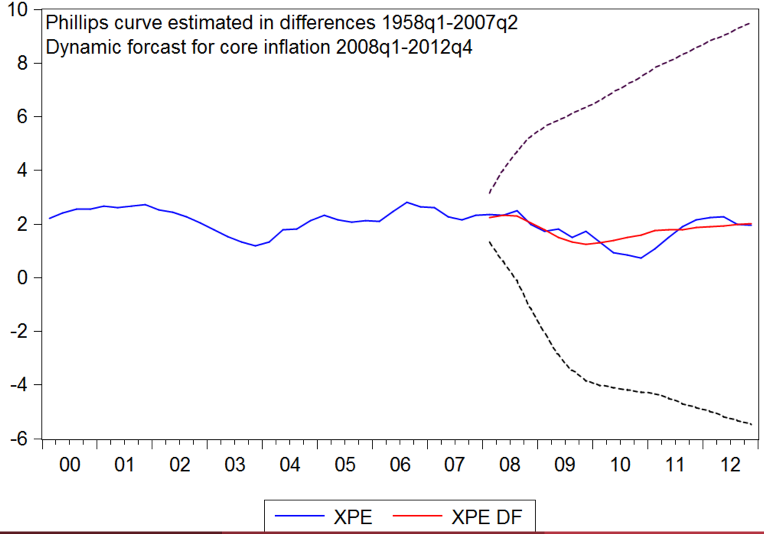
Comments: Estimation in differences

Dependent Variable: D(XPE)
Method: Least Squares
Date: 02/15/13 Time: 00:35
Sample (adjusted): 1959Q2 2012Q4
Included observations: 215 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001009	0.038088	0.026478	0.9789
D(XPE(-1))	0.187876	0.119268	1.575240	0.1167
D(XPE(-2))	0.171731	0.076205	2.253543	0.0253
D(XPE(-3))	0.280224	0.061651	4.545338	0.0000
D(XPE(-4))	-0.387396	0.064996	-5.960341	0.0000
D(UNGAPSR(-1))	-0.348385	0.103766	-3.357396	0.0009
MA(1)	0.308939	0.132034	2.339844	0.0202

R-squared	0.403193	Mean dependent var	0.001144
Adjusted R-squared	0.385977	S.D. dependent var	0.544891
S.E. of regression	0.426975	Akaike info criterion	1.167832
Sum squared resid	37.91992	Schwarz criterion	1.277574
Log likelihood	-118.5419	Hannan-Quinn criter.	1.212173
F-statistic	23.42019	Durbin-Watson stat	1.979677
Prob(F-statistic)	0.000000		

Comments: Dynamic forecast for difference specification



Concluding comments

- A lot of interesting results is presented for a relationship that is crucial for monetary policymaking
- Some more structure, however, would be welcome to better distinguish the various competing theories
- Also, it could be valuable to reconsider expectations formation; as seen, different specifications change a lot
- I like the parsimonious approach, but since this is about forecasting, a better lag-structure could be considered (unemployment gap and inflation are positively correlated contemporaneously, but the gap *leads* inflation)
- For how long should an empirical model be expected to be able to do well in dynamic simulations?
    - The current relationship may very well "break down" (from a 2007q4 perspective) again in 2015 (or later); if so, then what?
- The approach take by the authors, however, is gutsy and makes the paper a very informative and stimulating read