

# Networks, Phillips Curves, and Monetary Policy

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## A new framework for monetary policy

- analytical framework with multiple sectors and a general input-output network
- full revisit of traditional results (Phillips curve, welfare function)
- guidelines to design better policies and better empirical analysis
- help explain puzzles in the data (flat/noisy Phillips curve), propose and implement better specification

## Textbook New-Keynesian model

- only one sector, no intermediate inputs
- central bank can stabilize employment and prices at the same time ("divine coincidence")
- strong relation between employment and consumer inflation (Phillips curve), consumer prices used as reference indicator and policy target

## Open questions

- Relevant inflation index in an economy with many sectors/intermediate inputs (consumer prices, producer prices, core inflation...?)
- With many sectors, can employment and inflation be stabilized at the same time? How should central banks trade off different sectors?
- Does the relation between inflation and employment (Phillips curve) depend on the input-output structure?

## Novel results

- consumer price Phillips curve is flat and noisy due to intermediate input linkages
- new "divine coincidence" inflation index restores strong Phillips curve (sufficient statistic for employment gap)
- no first best: tradeoff aggregate vs relative employment
- new inflation target for optimal policy: very different from consumer prices; quantitatively similar to "divine coincidence" index

## Model

- firms use labor and intermediate inputs:  $y_i = A_i F_i(\{x_1, \dots, x_n\}, L_i)$
- unrestricted sector-level input-output + labor + consumption shares, elasticities of substitution, price adjustment probability

## Phillips curve(s)

- sector-level and aggregate (same form):

$$\pi = \kappa y + u$$

inflation   empl gap   residual

- intermediate inputs -> flattening
- productivity shocks -> endogenous residual (cost-push shock)

## "Divine coincidence" index

$$DC = \lambda^T (I - \Delta) \Delta^{-1} \pi = (\gamma + \varphi) y$$

sales shares   discount flex sectors   from labor supply curve

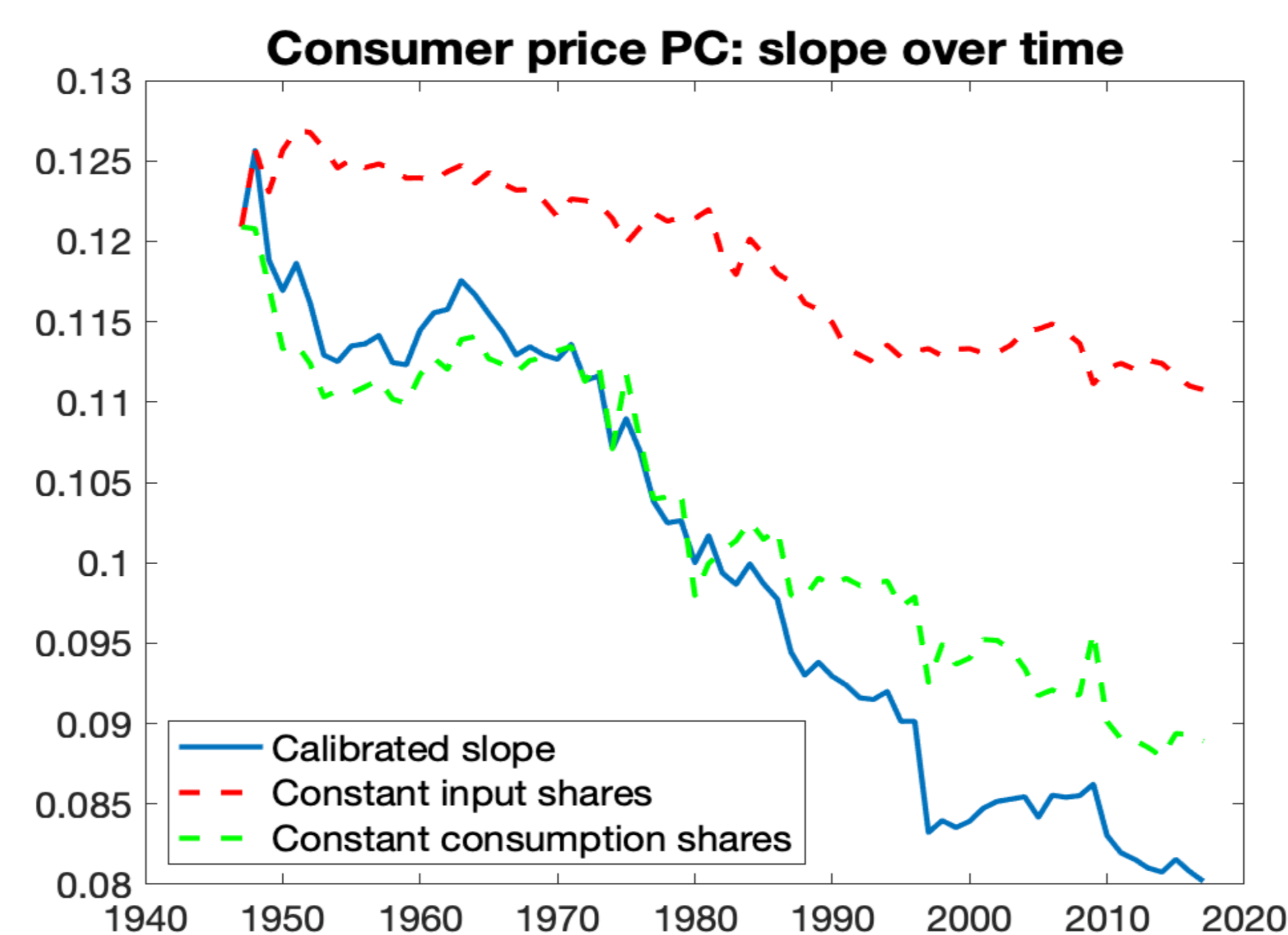
- "divine coincidence" Phillips curve does not flatten with intermediate inputs & has no endogenous cost-push shocks
- sufficient statistic for employment gap

## Optimal monetary policy

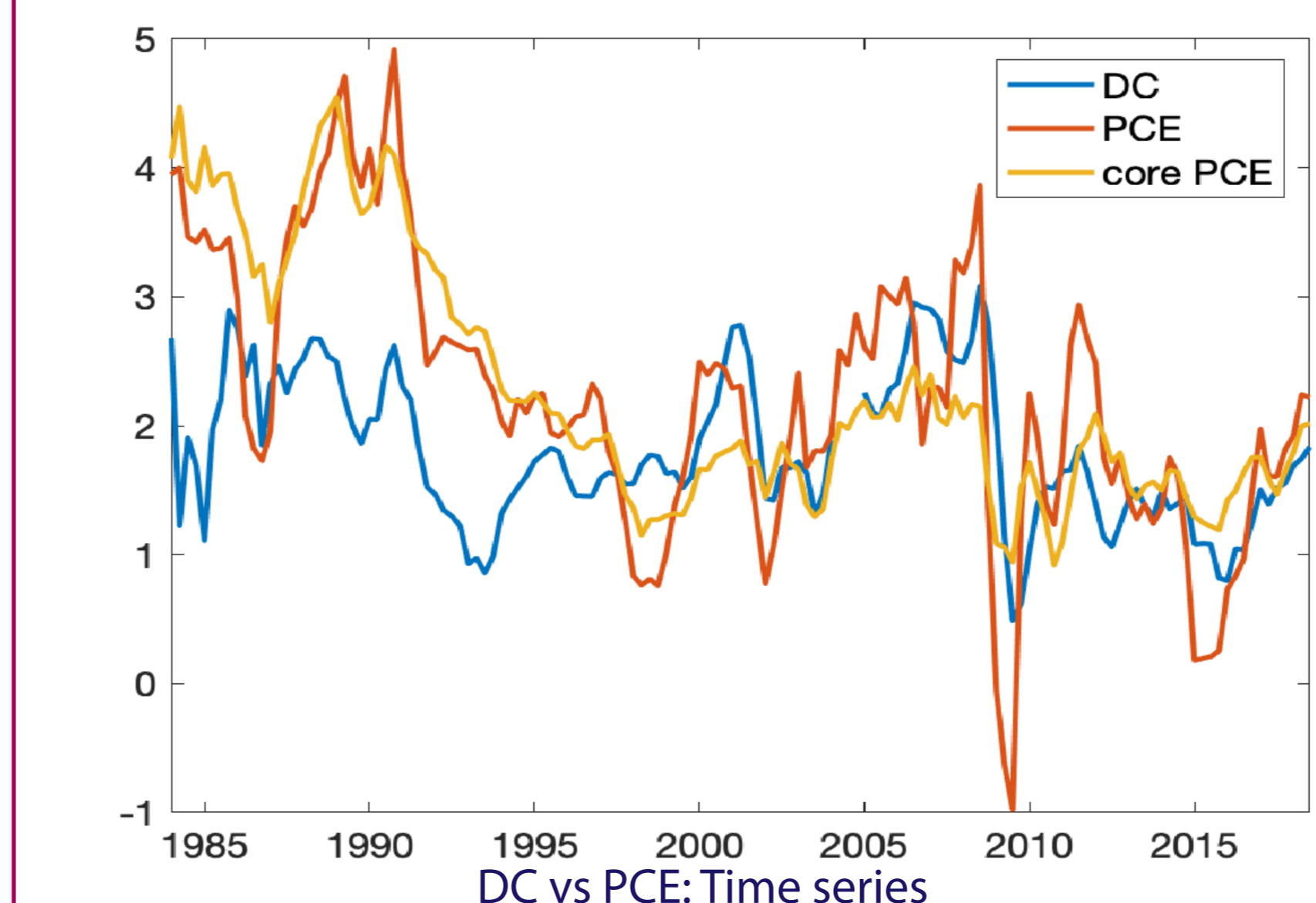
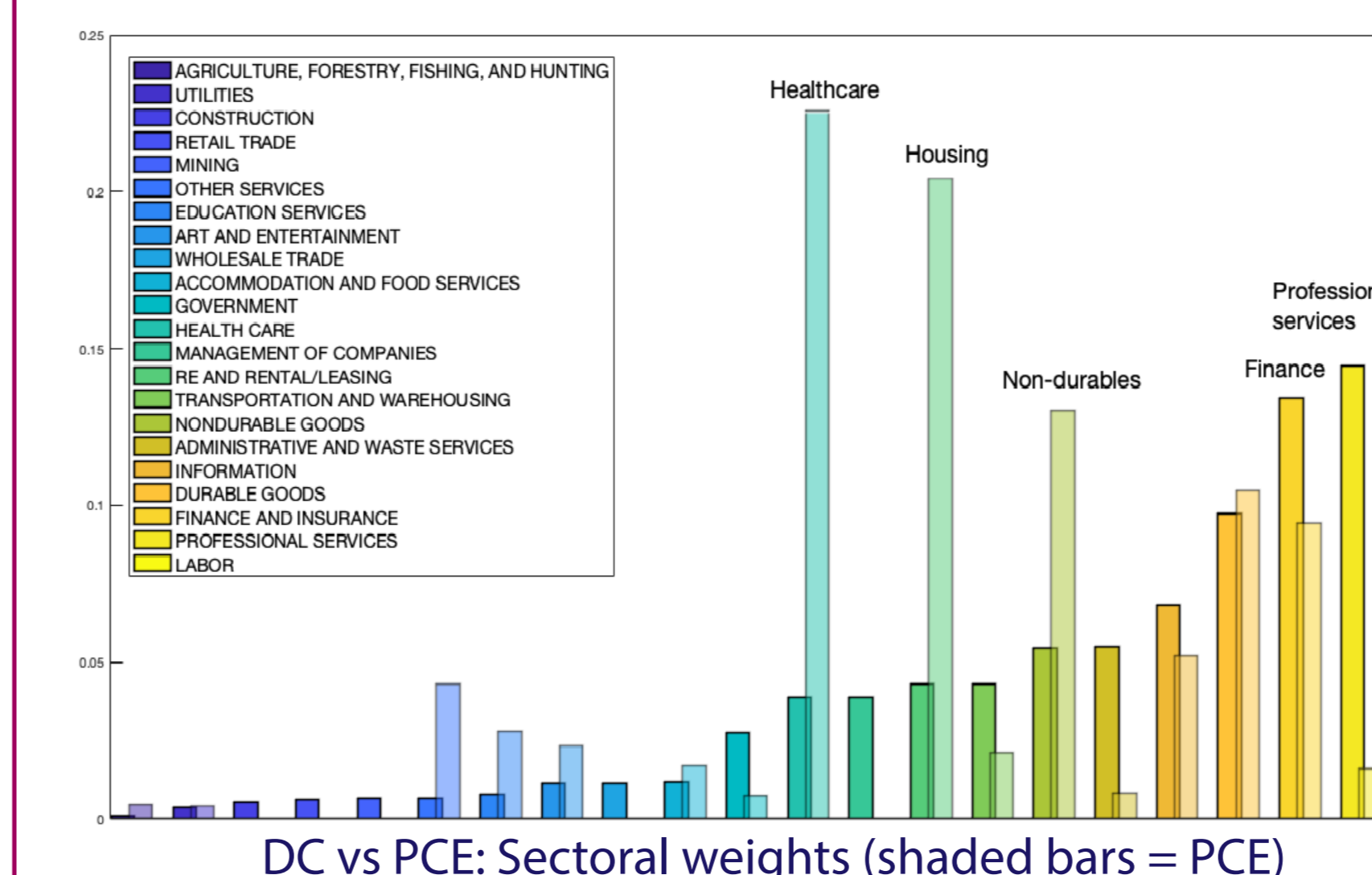
- tradeoff aggregate vs relative employment (across firms/sectors)

- welfare function:  $W = \underbrace{y^2}_{\text{aggregate empl}} + \pi^T \underbrace{D}_{\text{relative empl}} \pi$  --> optimal inflation target:  $\pi_T = [\lambda^T (I - \Delta) \Delta^{-1} + B^T D] \pi$

aggregate empl (DC)   relative empl



## "Divine coincidence" index:



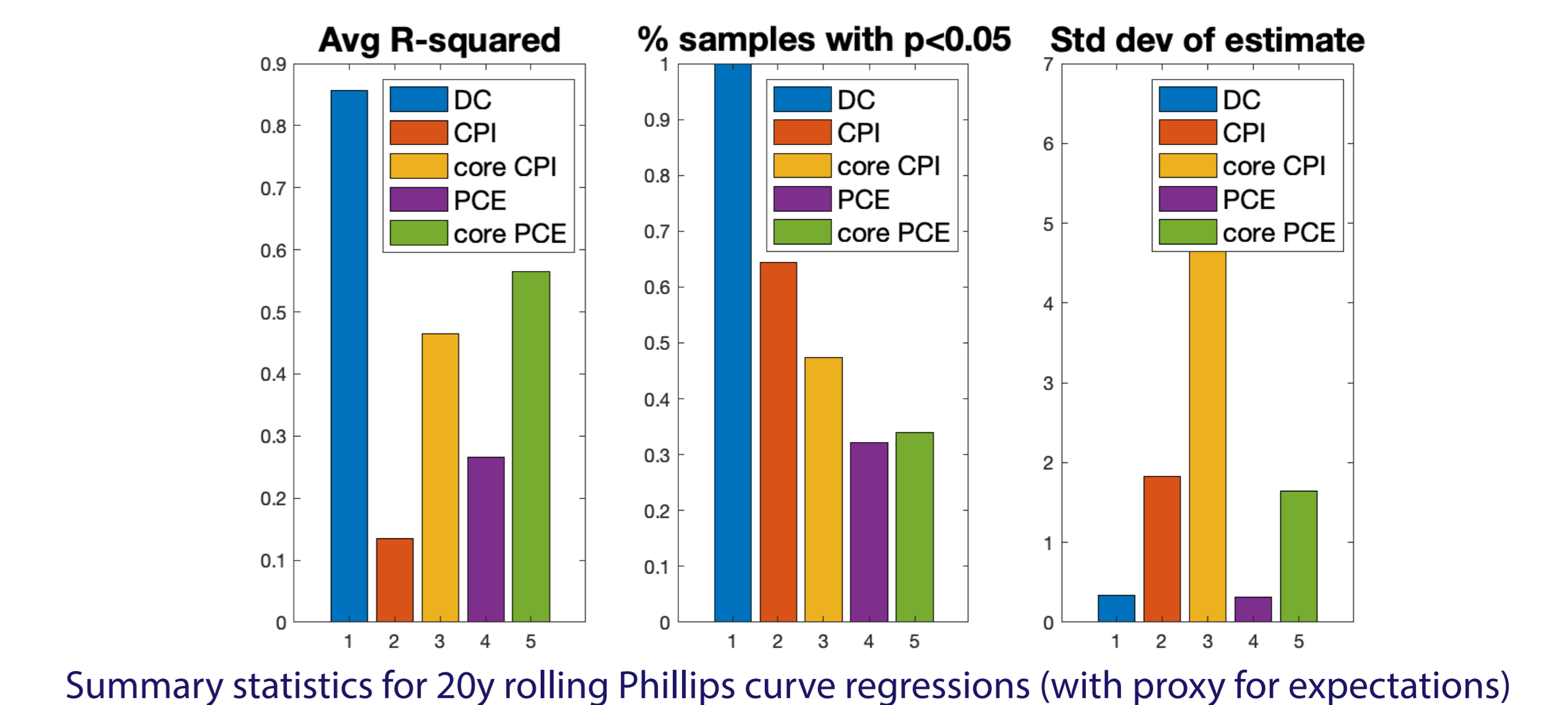
## Quantitative results

### Phillips curve regressions:

	DC	CPI	core CPI	PCE	core PCE
gap	-3.8814** (0.6329)	-0.2832** (0.0729)	-0.1839** (0.0642)	-0.1667** (0.0628)	-0.1007* (0.0565)
intercept	1.9842** (0.0475)	2.9052** (0.1196)	2.9021** (0.1052)	2.3978** (0.103)	2.372** (0.0926)
R-squared	0.2154	0.0991	0.0566	0.0489	0.0227

Regression results for the CBO unemployment gap (1984-2017)

- higher R<sup>2</sup> with DC index, model predicts slope well
- results are robust across sample periods:



Summary statistics for 20y rolling Phillips curve regressions (with proxy for expectations)

## Comparing policy rules

- employment gap good target, consumer prices poor target
- input-output structure matters

