

Inflation: Energy shocks, sectoral inflation, and the energy transition

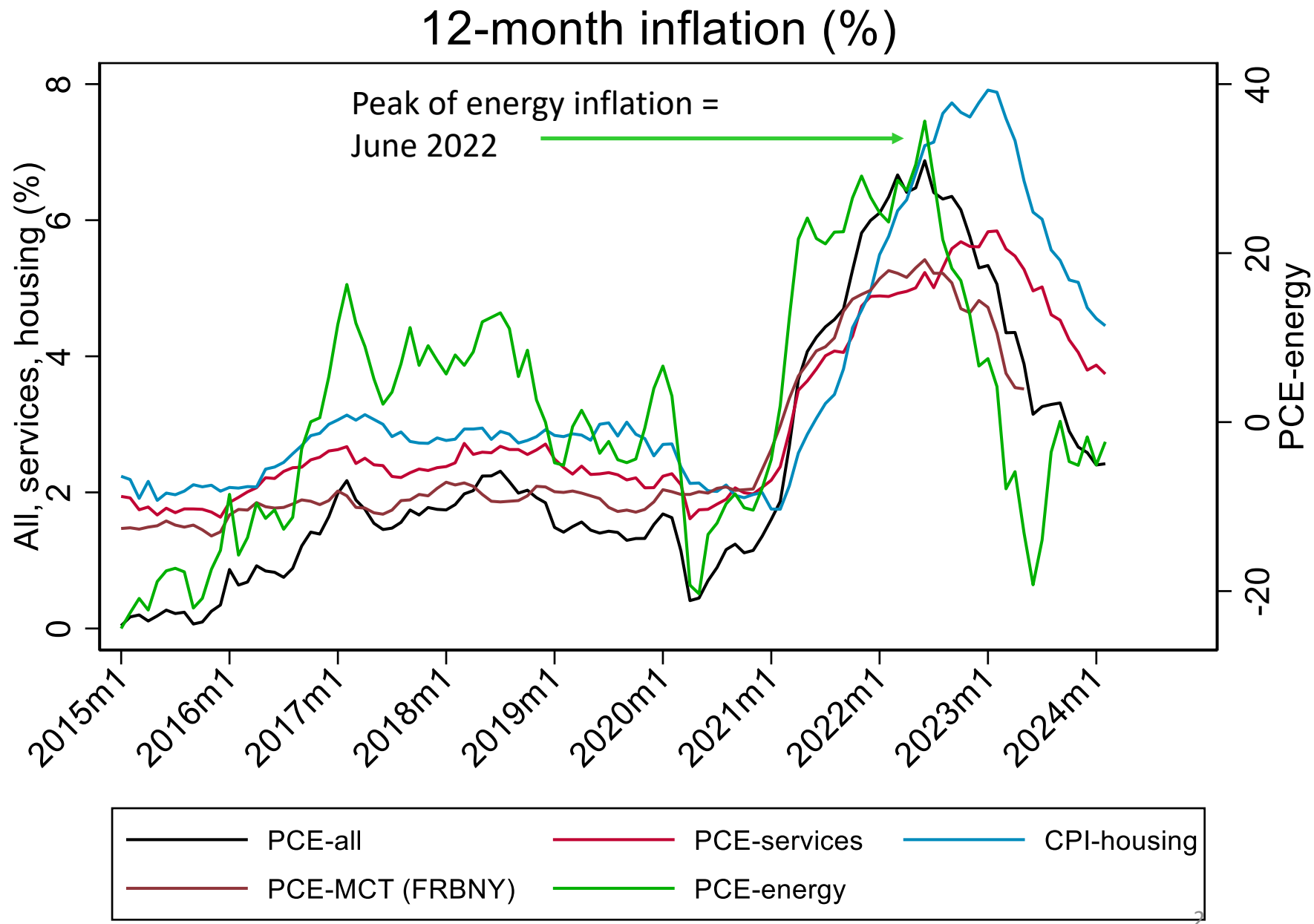
James H. Stock, Harvard University



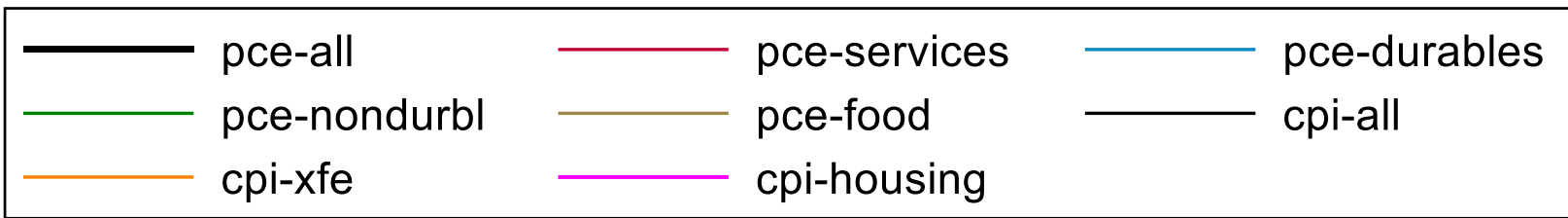
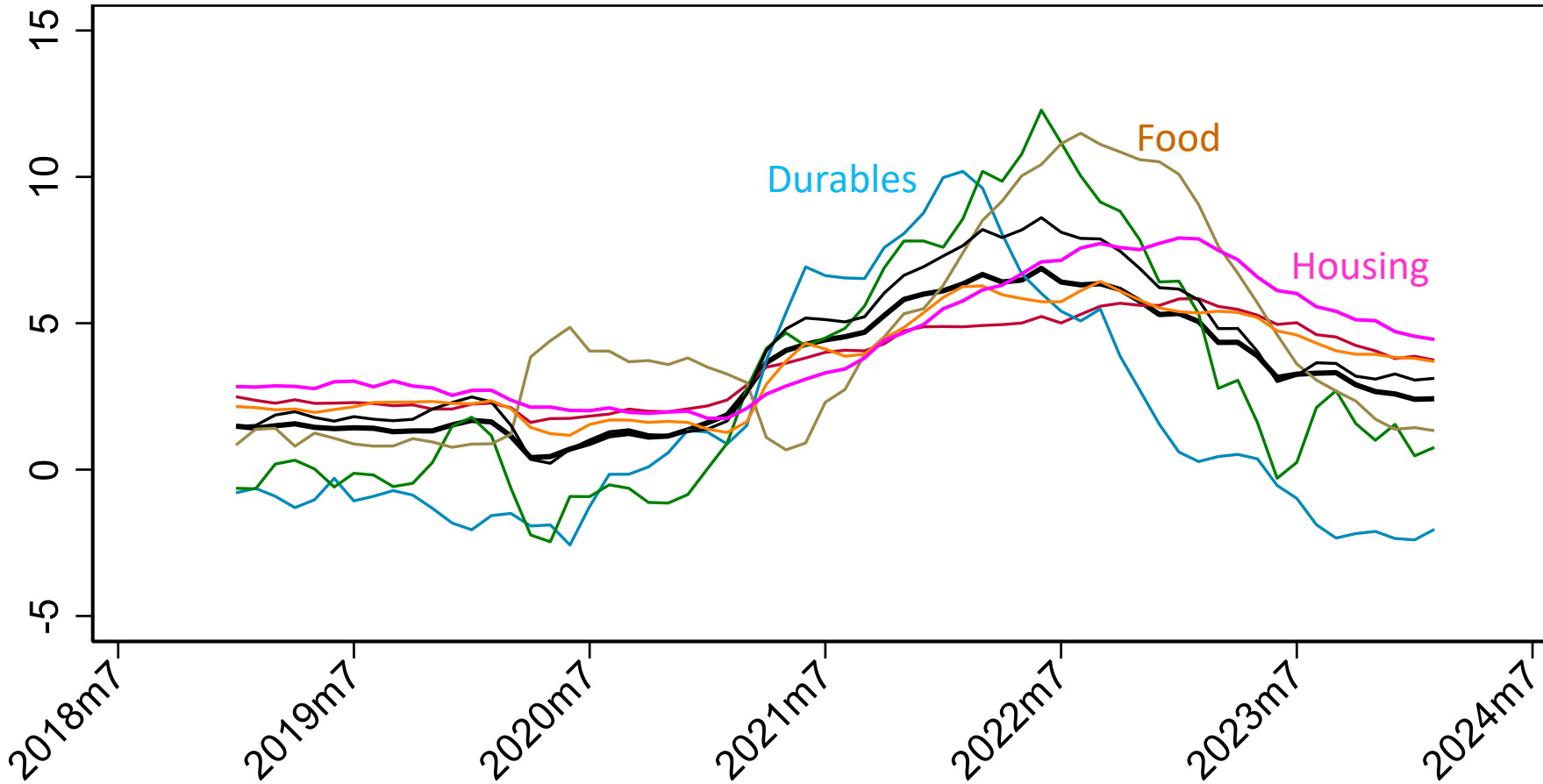
THE SALATA INSTITUTE
FOR CLIMATE AND SUSTAINABILITY
at Harvard University

I will discuss:

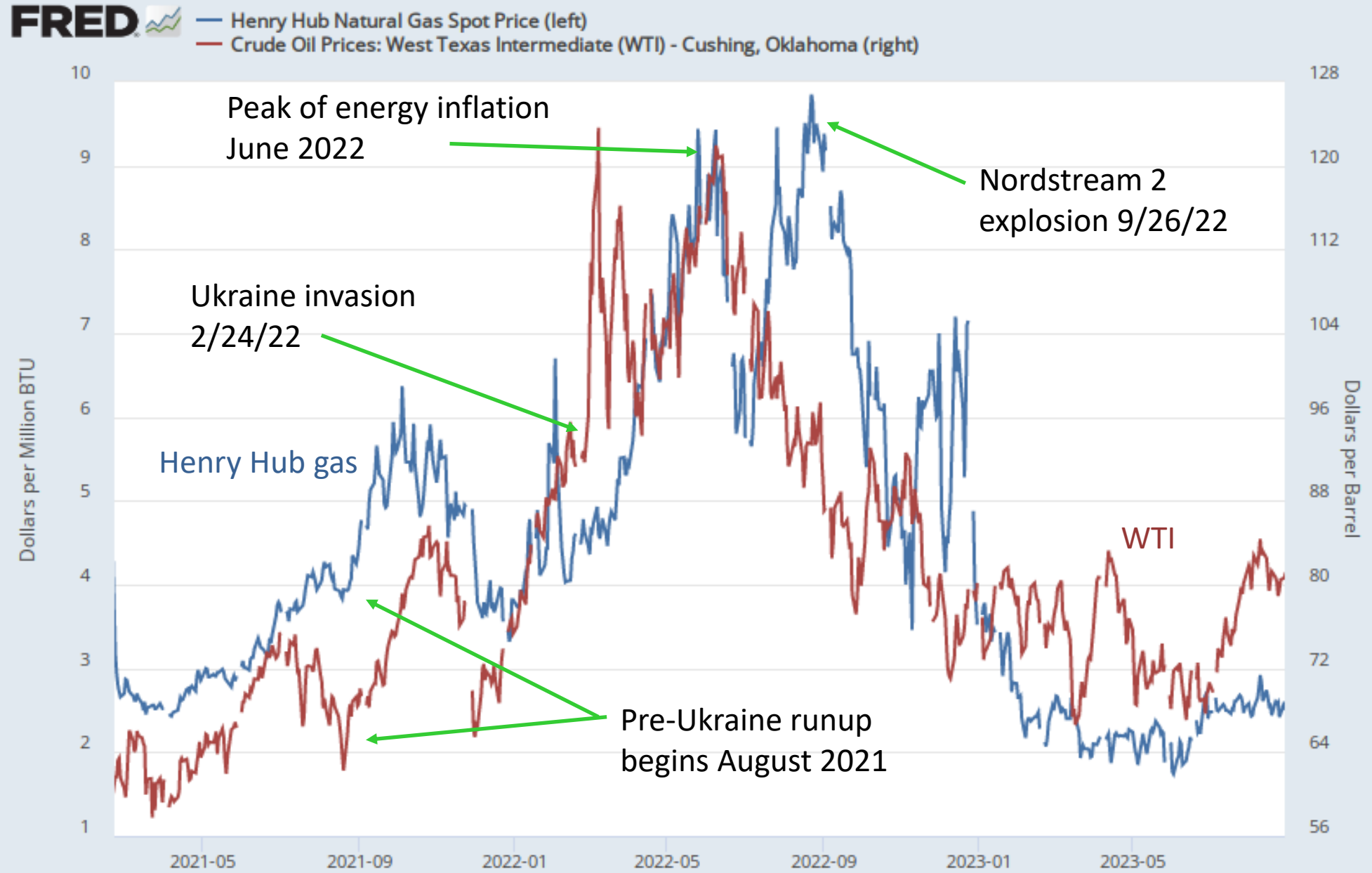
1. Persistence of **housing** and **services** inflation
2. **Energy** shocks and inflation
3. The energy transition and inflation
 - a. Recent trends in U.S. fossil fuel prices & price volatility
 - b. (Dis)inflationary impacts of renewables and EVs
4. Climate change and inflation



Inflation measures, 12-month pct chg (ar)



Background: Energy event timeline



Source: U.S. Energy Information Administration

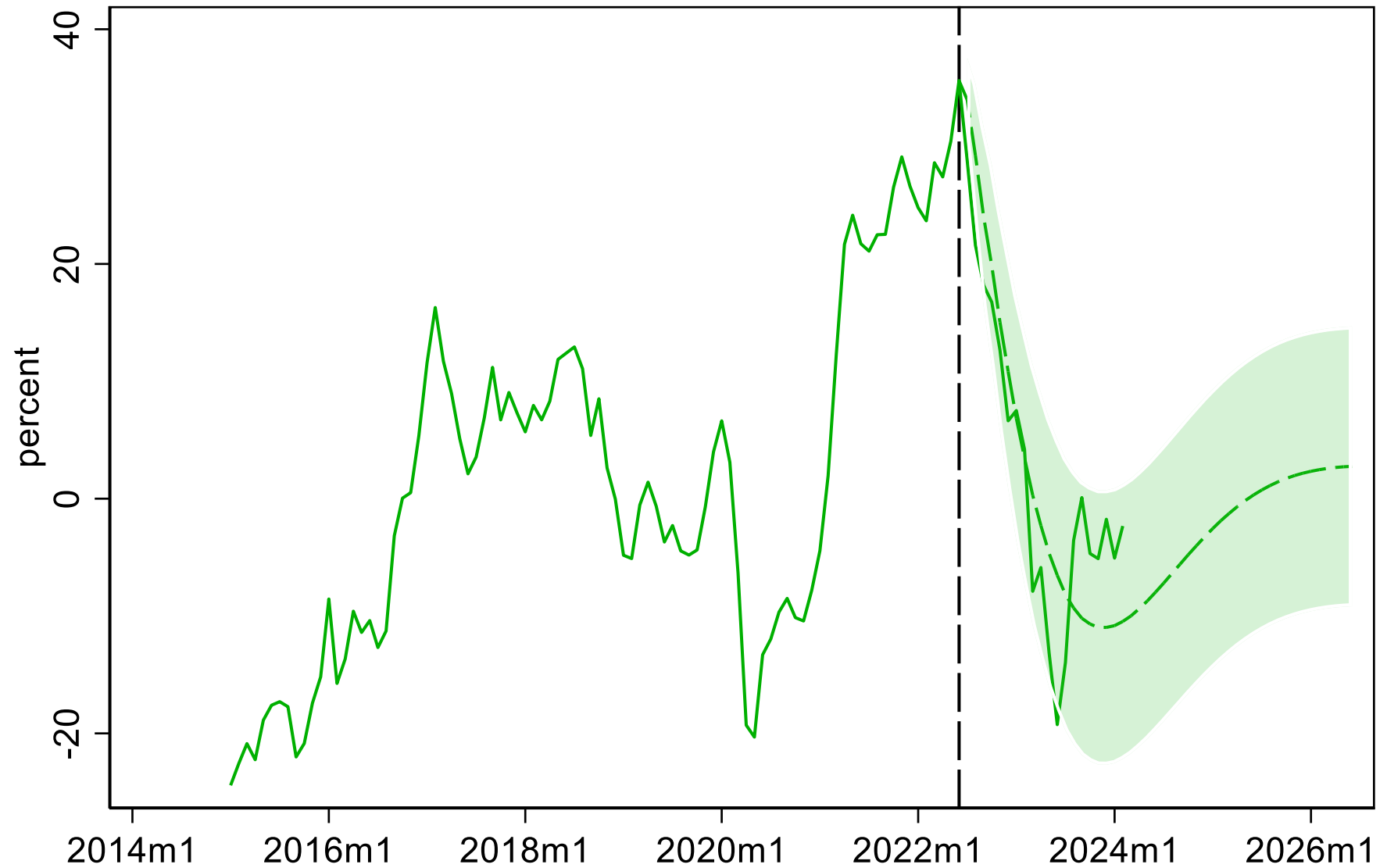
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1. Persistence of housing & services inflation

VAR

- Variables:
 - PCE-energy (12 mo)
 - PCE-services (12 mo)
 - CPI-housing (12 mo)
 - Ugap
 - SPF-10 year expectations
- Energy ordered first
- Estimation 1984-2022m6
- Focus on dynamics (persistence) of the disinflation post-2022m6 – does observed persistence match actual?

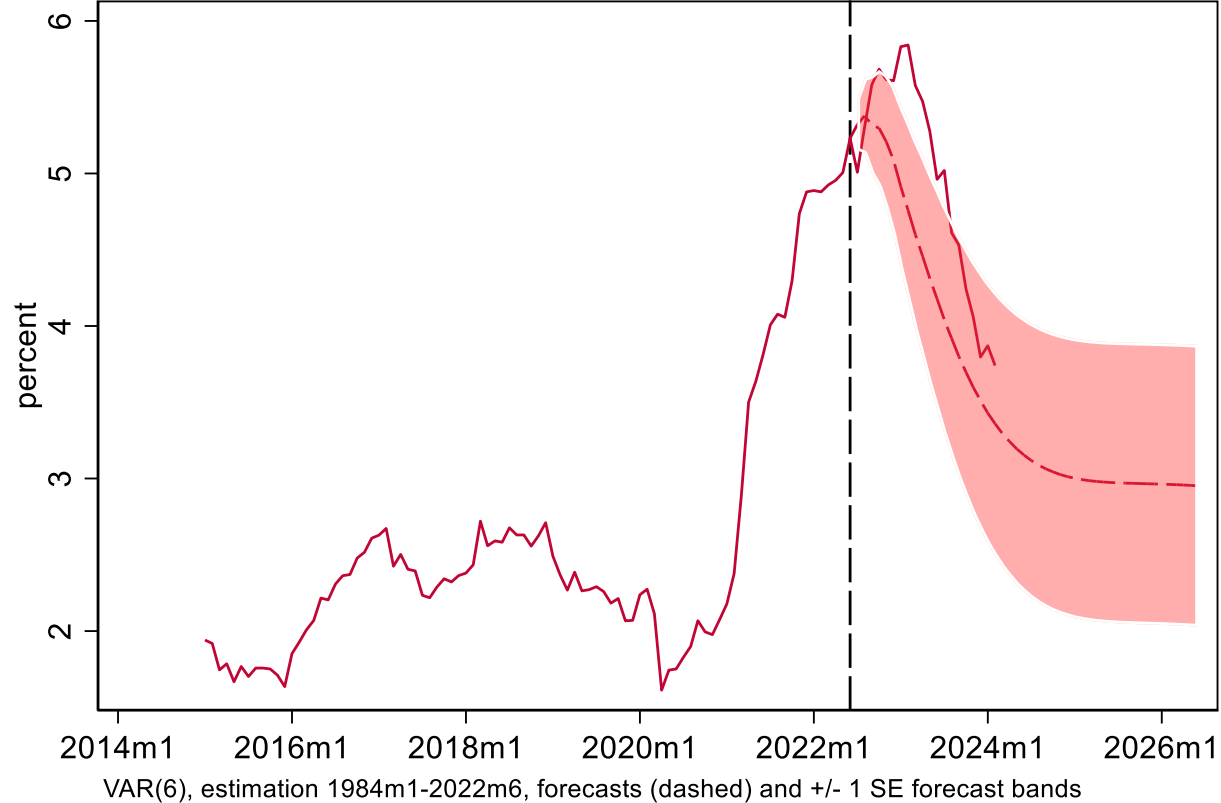
Forecast and actual: PCE-energy, 12-month inflation



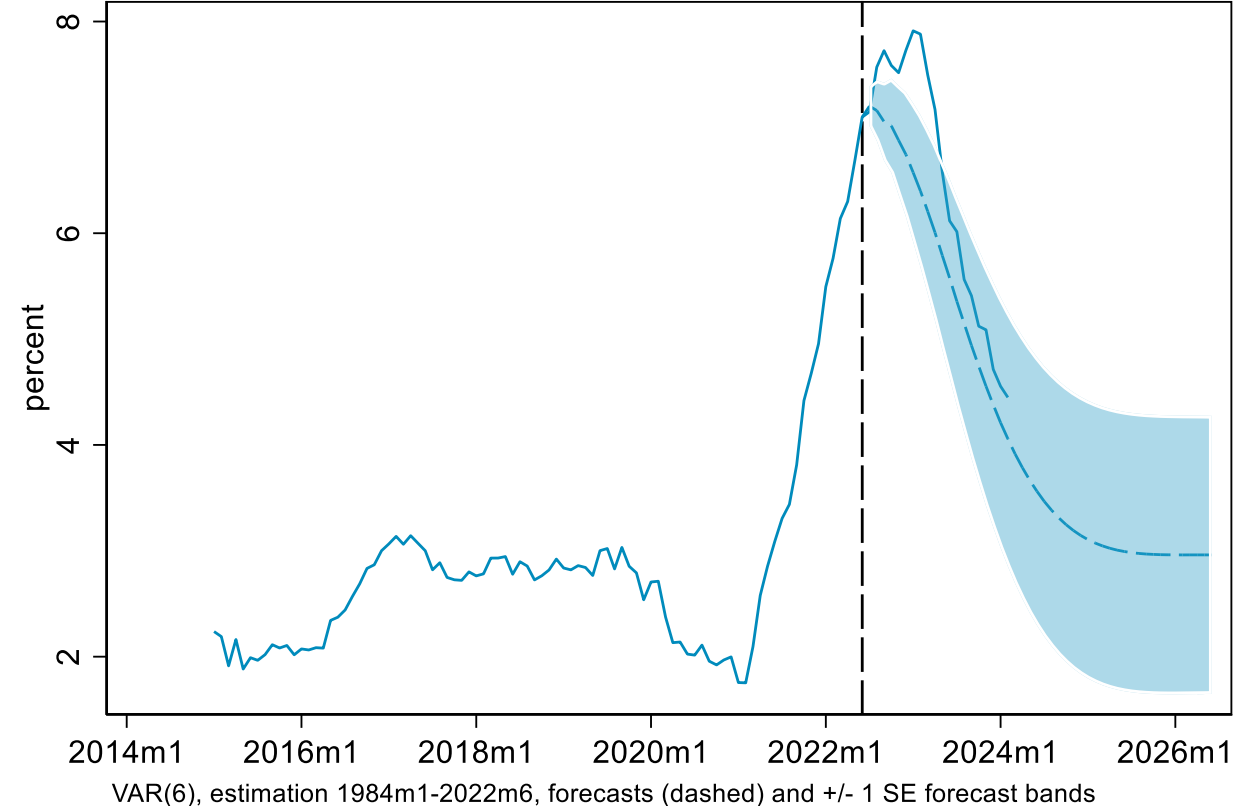
VAR(6), estimation 1984m1-2022m6, forecasts (dashed) and +/- 1 SE forecast bands

1. Persistence of housing & services inflation, ctd.

Forecast and actual: PCE-services, 12-month inflation



Forecast and actual: CPI-housing, 12-month inflation



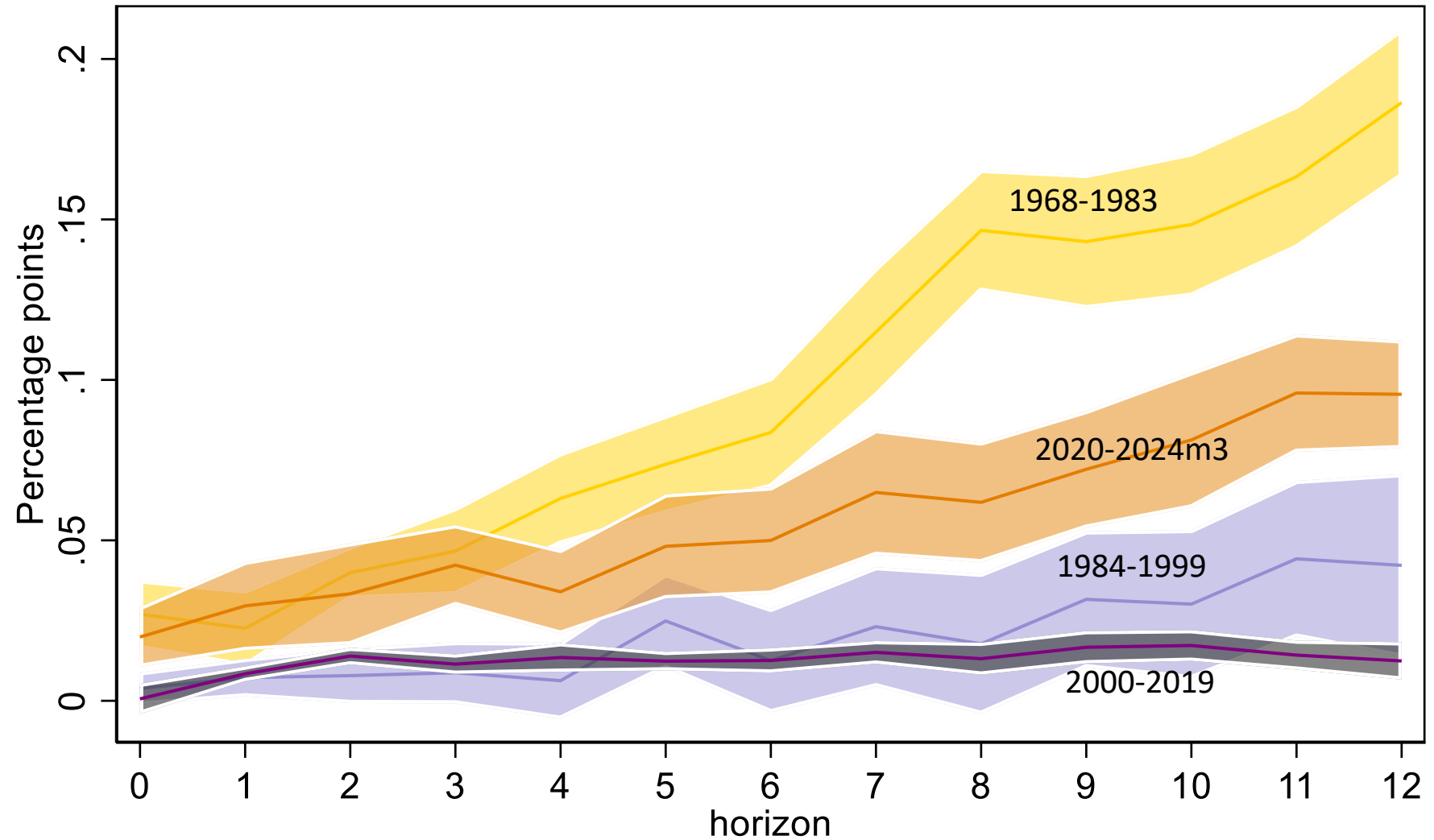
- Persistence/dynamics during the disinflation largely match the post-1984 historical dynamics
- Many of the energy shocks are plausibly exogenous (Ukraine-related, mild U.S. & European winters)
- As energy shocks have reverted, so have services and housing prices
- Implications: Absent energy price shocks, housing and services inflation will be in normal range in 8-12 months
- *A (too?) simple story – no supply chain disruptions, no v/u, no nonlinearities, no FTPL, not even COVID-induced consumption switching*

2. Energy price shocks and inflation – a pass-through perspective

$$\pi_t = \alpha + \beta(L)w_t + u_t$$

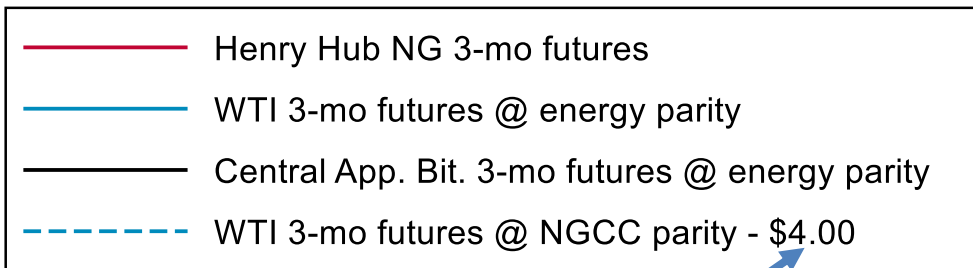
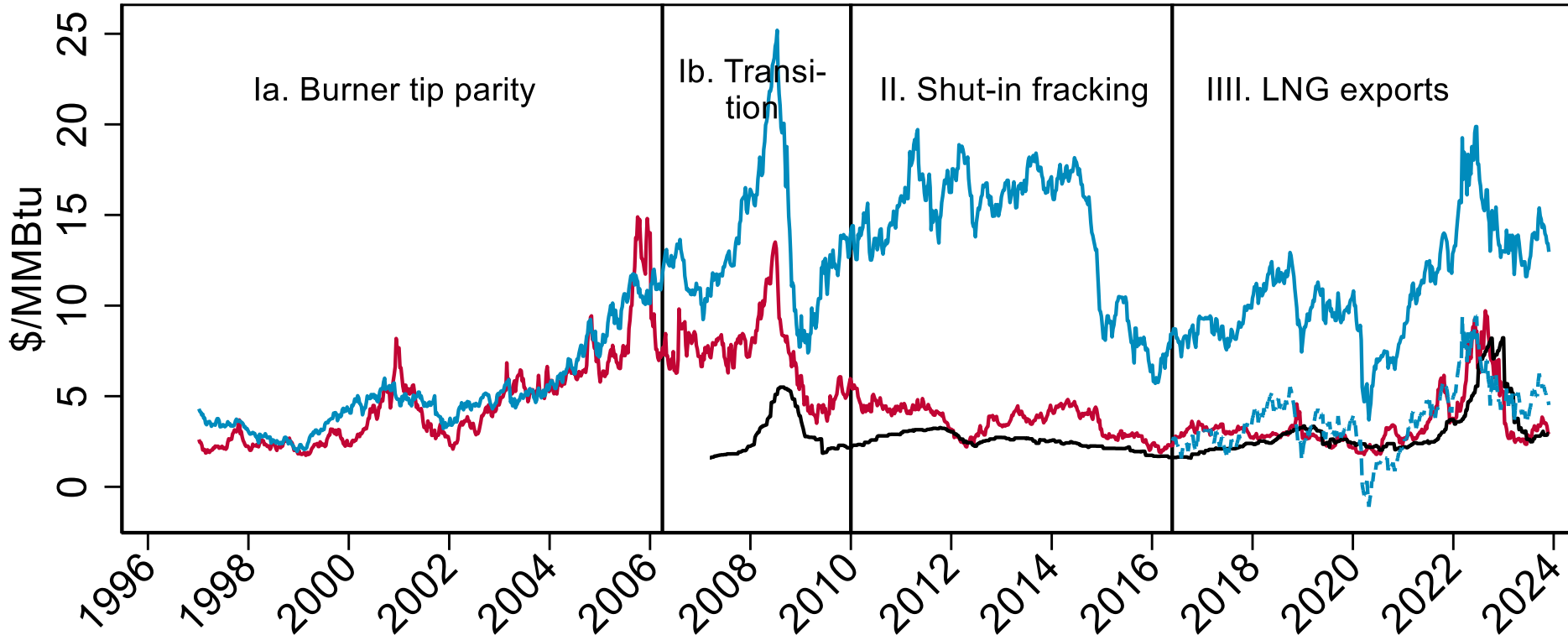
- Plot is cumulative coefficients
 - Monthly data
 - Inflation: PCE-xfe
 - Energy: PCE-energy
-
- **Pass-through from energy to core is greater during the current episode than since 1984 – but less than in the 1970s**
 - XFE has energy-sensitive components, e.g.:
 - Air travel services
 - Freight delivery services
 - Mechanically, working through the supply chain results in long and increasing CIRF (Minton 2022)

Energy price pass-through to pce_xfe
Cumulative IRF and +/- 1 SE for 1% increase in pce_nrg



Distributed lag regression of monthly pce_xfe inflation on monthly pce_nrg inflation

3a. Energy transition and inflation: recent trends in fossil fuel prices



Source: Stock and Zaragosa-Watkins (NBER wp 32228, March 2024)

Analysts' estimate of liquefaction, transportation, and regasification (LTR) cost in 2019

In the U.S., the prices of oil, natural gas, and coal now move together.

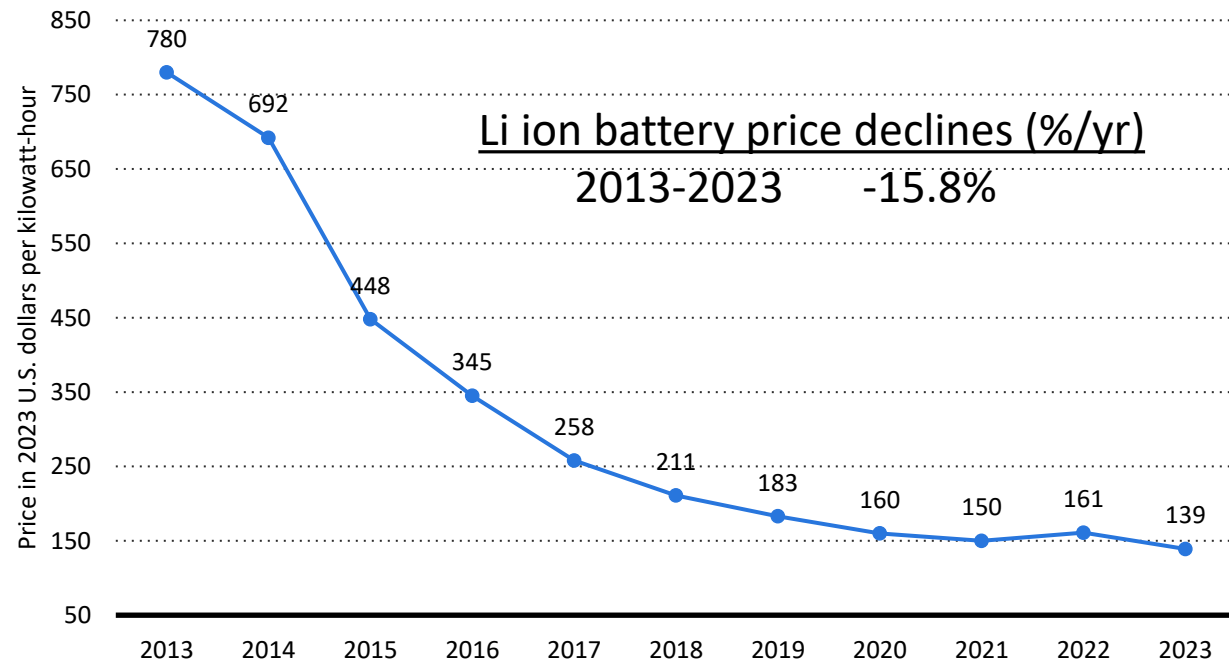
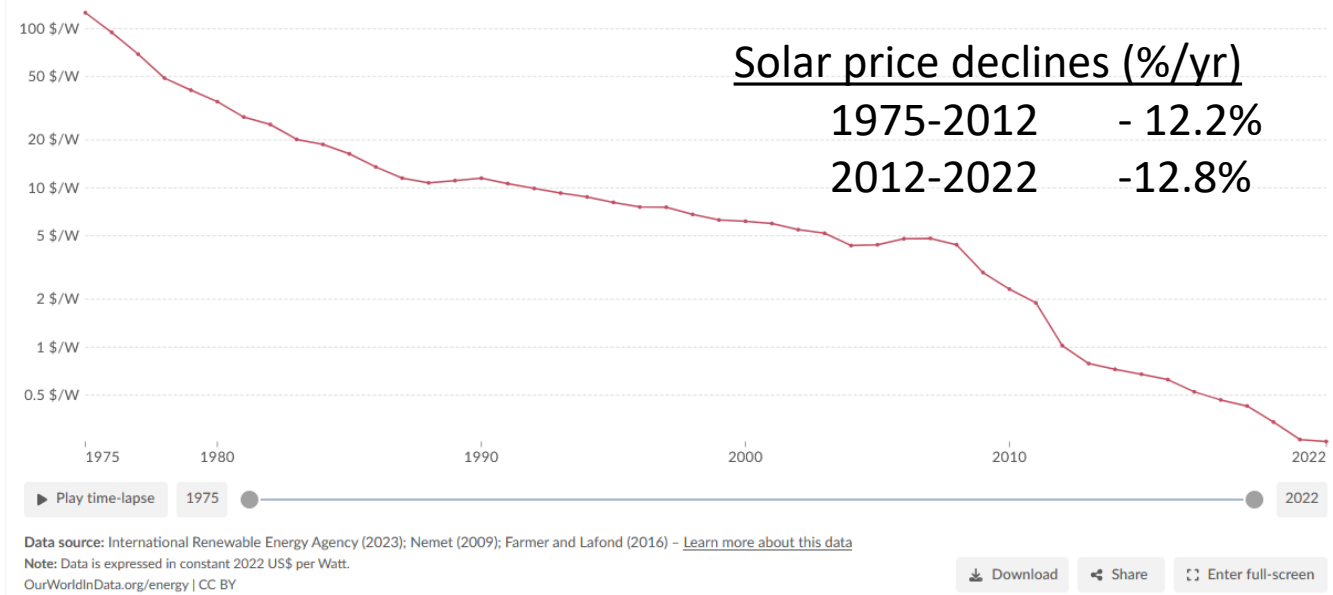
- Liquefied natural gas (LNG) exports have connected U.S. to world gas prices, which are largely indexed to oil
- Coal and gas compete on the margin in U.S. power generation
- Implication: greater volatility – and higher levels – of home heating and electricity prices
- Gas & oil will be important over (at least) the next 10 years
- Will geopolitics of the energy transition be tranquil?

3b. Renewables and EVs: disinflationary and – in the long run – lower volatility

Renewables and EVs will reduce dependency on fossil fuels, total fossil fuel share of GDP, and – in the long run – will reduce volatility.

But:

- In wholesale energy markets, the marginal generator will be gas for ~15 years – so marginal wholesale electricity price volatility will remain.
- U.S. gasoline consumption peaked in 2019, but it will take 2-3 decades to phase out internal combustion engines.
- Ongoing vulnerability to geopolitical energy transition risks



4. Climate change and inflation

Climate change risks - jargon:

- **Physical risks:**
 - direct effects (hurricanes, etc.)
 - institutionally intermediated effects (e.g., increasing wildfires + insurance carrier/regulator problems = insurance market failure)
- **Transition risks:** policy vicissitude, energy transition, political risk, geopolitics

There is a lot of current work on macro risks/consequences of climate change.

- NGFS, BIS
- FSOC-CFRAC
- NASM climate round table

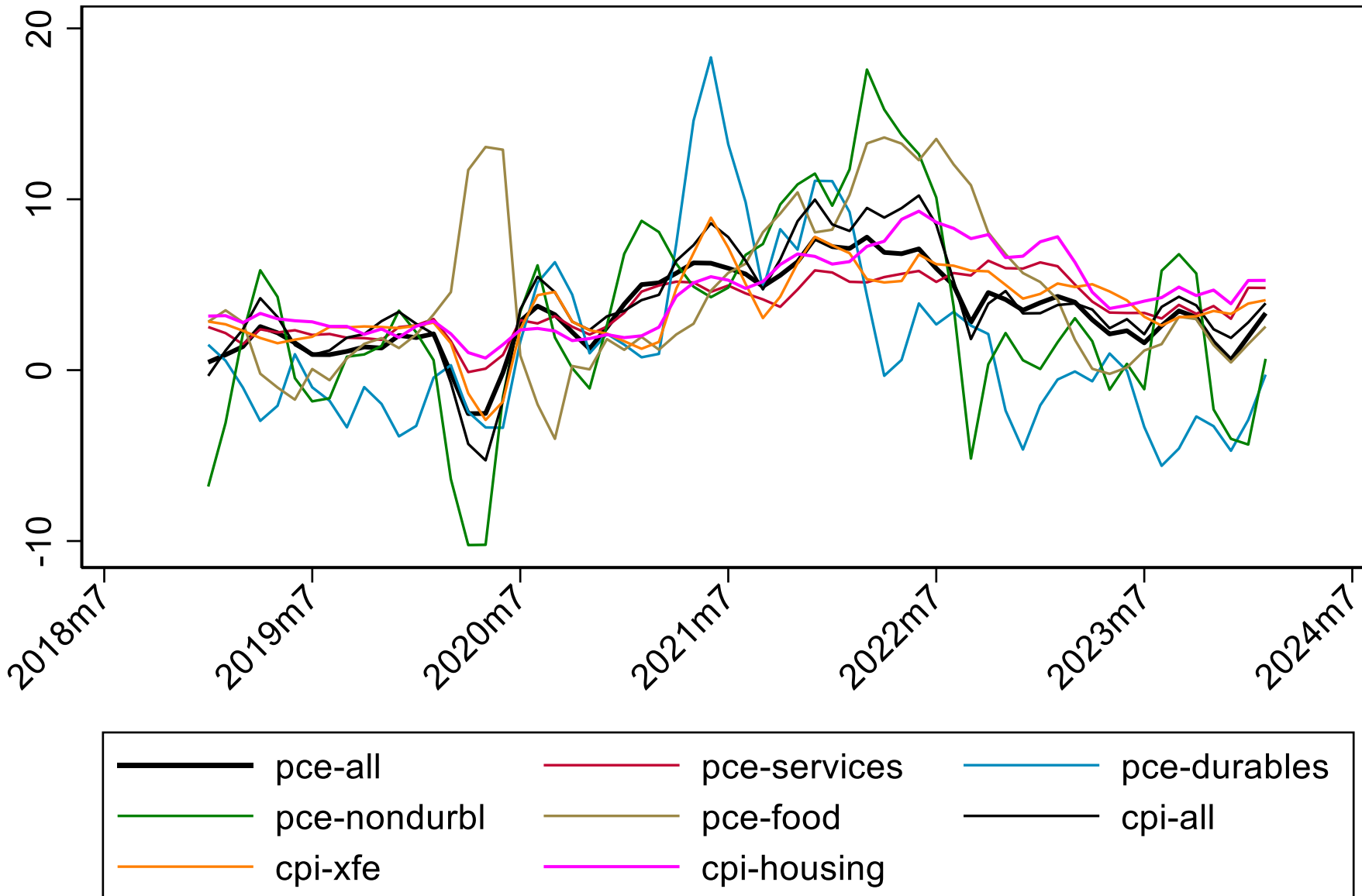
Over the time frame relevant for monetary policy and planning (decade?) (my take):

- Direct physical risks are unlikely to have macro stability consequences on their own
- Inflation risks – sectoral shocks (mainly bad) – ag prices, supply chain disruptions, etc. (how large though?)
- Indirect physical + institutional? Maybe, in the context of correlated compound risks with accelerators
 - Housing price vulnerability to climate change (hurricanes, sea level rise, wildfires) + insurance market failures + misperceptions
- Energy transition risks?
 - Efficient policy and smooth transition? Limited macro impacts.
 - The actual energy transition? Potentially substantial, through multiple channels.

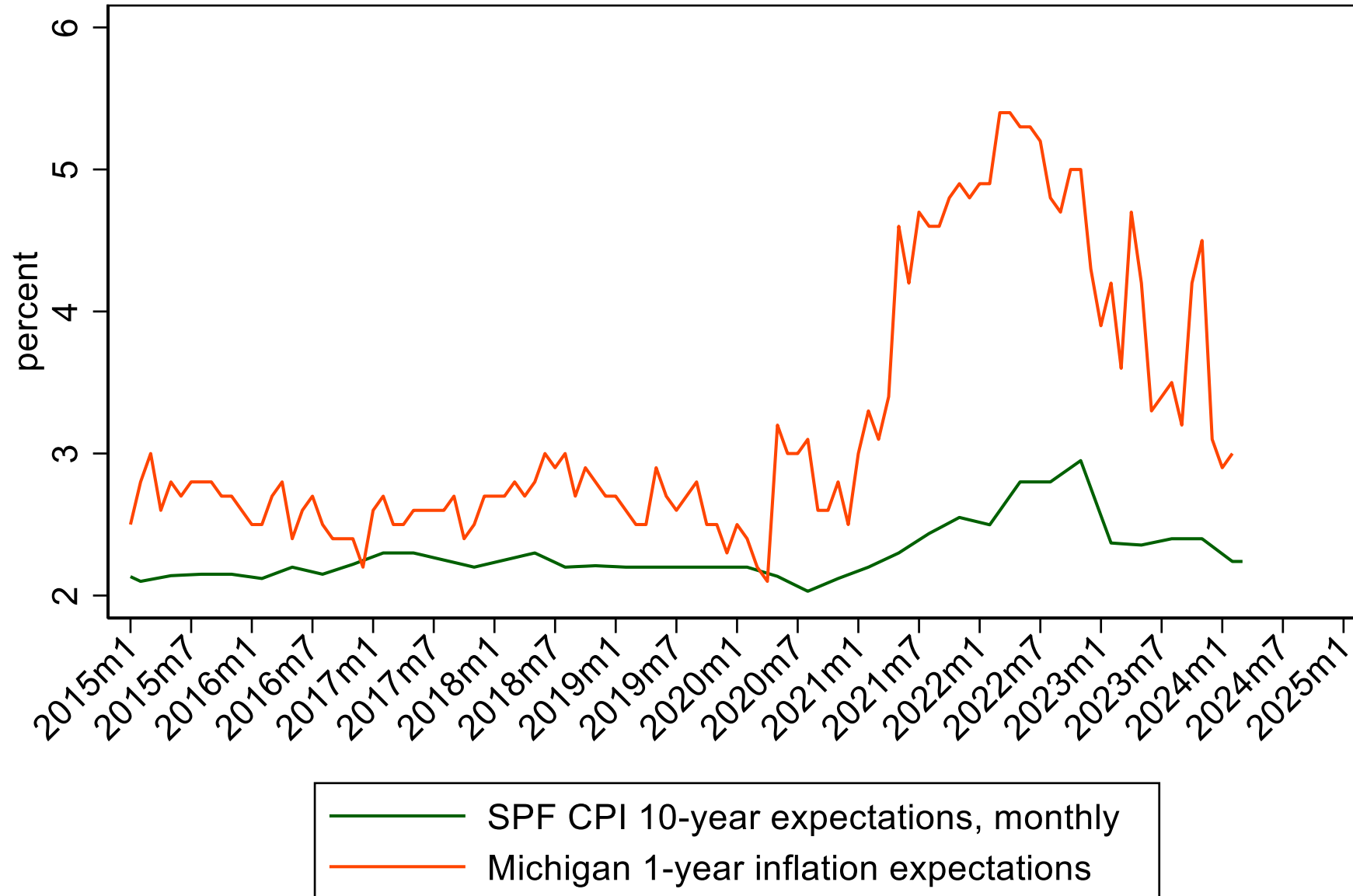
Ref: Acharya presentation to CFRAC (3/8/24)

Extra slides

Inflation measures, 3-month pct chg (ar)

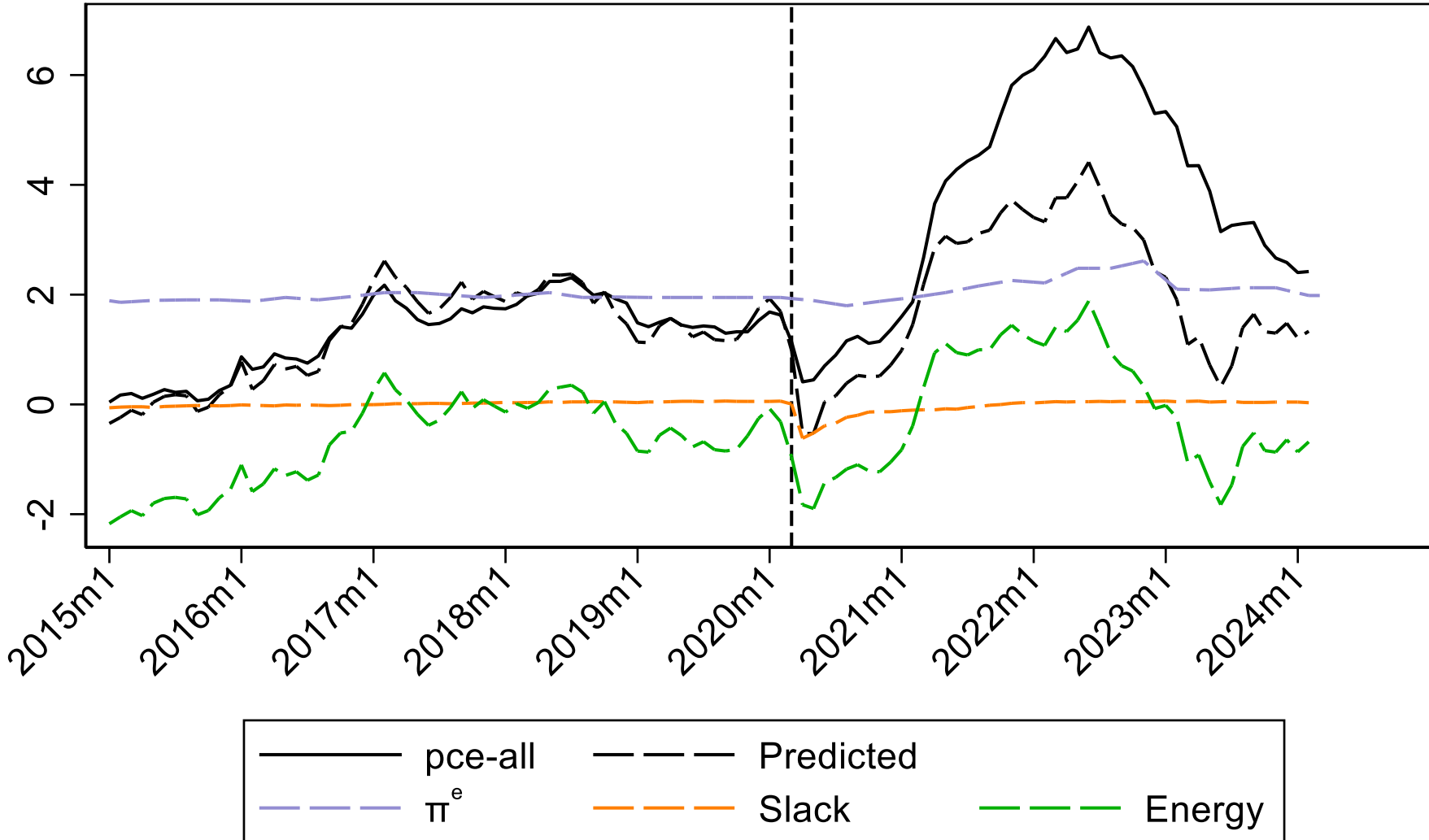


Expected inflation series



Out-of-sample Phillips curve inflation decomposition

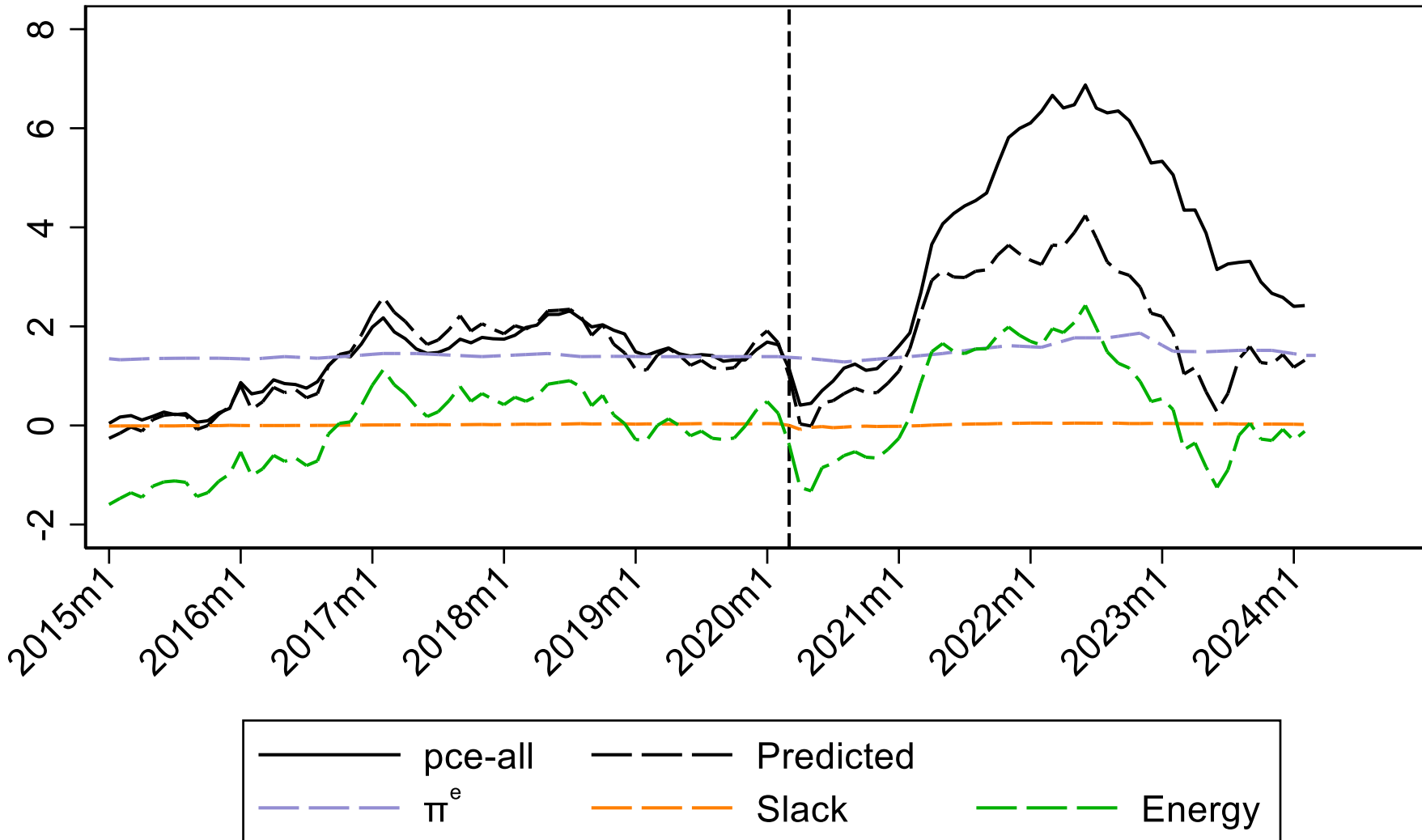
Actual, predicted, and contributions of π^e , slack, and energy



pce_all/spf10/ugap/pce_nrg (linear) est8420

Out-of-sample Phillips curve inflation decomposition

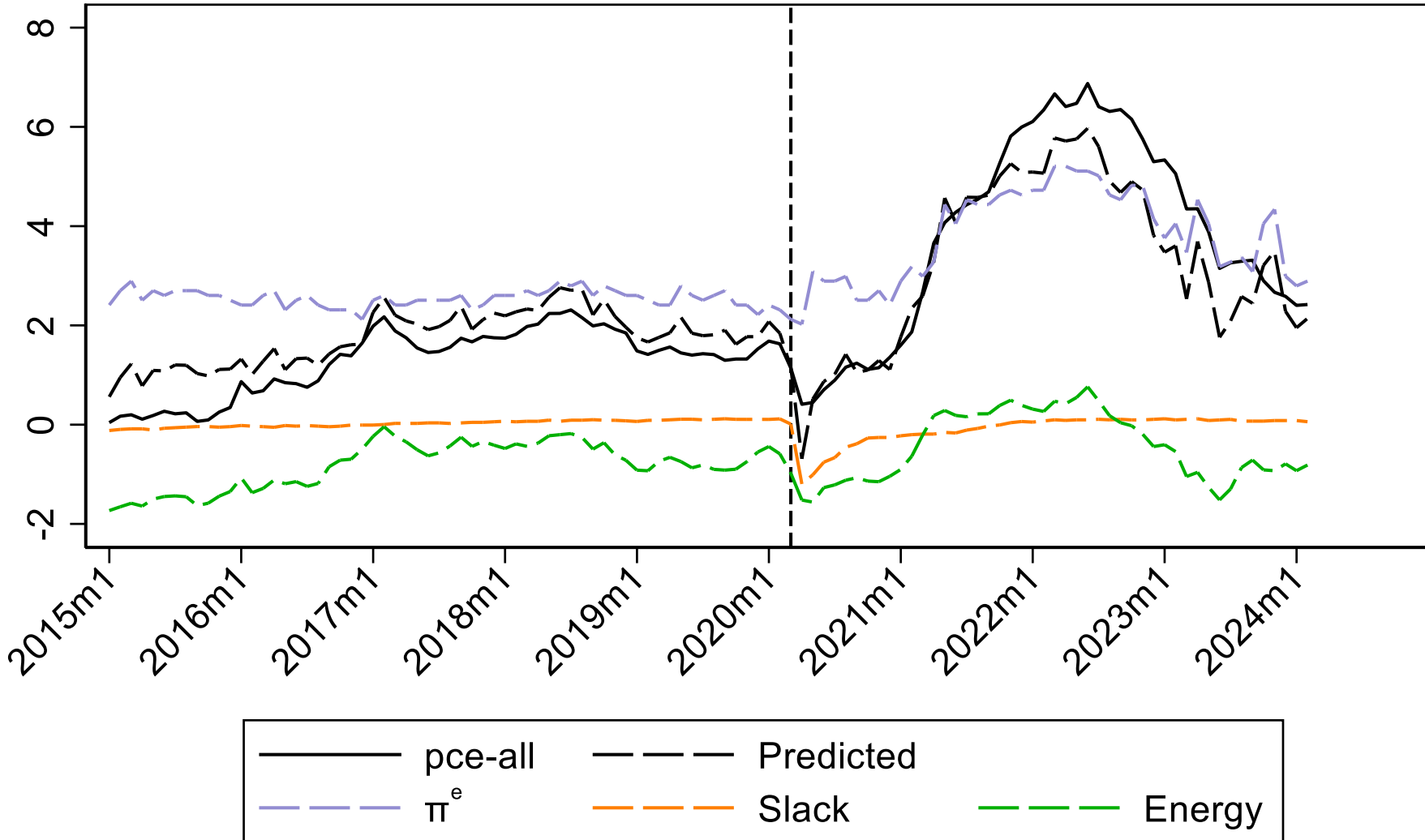
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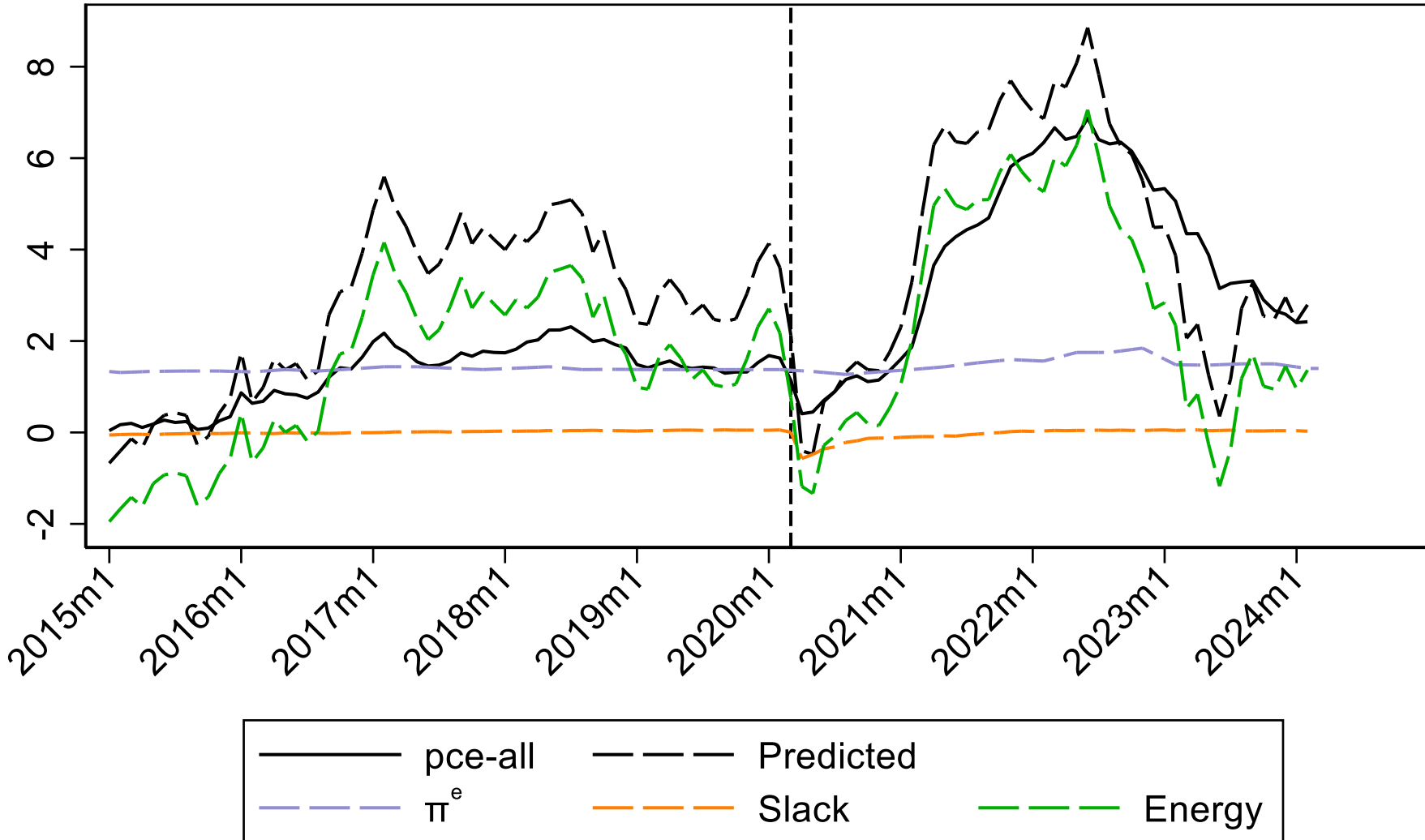
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Phillips curve out of sample fit (12-month inflation)

