

Discussion  
Optimal monetary policy in  
production networks  
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The views expressed are those of the presenter and do not necessarily reflect those of the ECB.

# Summary

- In a production network economy with nominal rigidities, stabilising conventional CPI-based inflation bears a significant welfare cost
  - Optimal monetary policy stabilizes a price index with **higher weights** assigned to **larger, stickier, and more upstream** industries, as well as industries with less sticky upstream suppliers, but stickier downstream customers.
  - Optimal policy is close to stabilising the output gap, defined as the sectoral sales weighted output gap.
- Basic intuition: minimise inefficient reallocation of resources across and within sectors by i) letting flexible price sectors adjust thereby facilitating efficient relative price changes across sectors and ii) stabilising prices of sticky sectors or sectors that provide input to sticky sectors thereby minimising inefficient relative price changes within sectors.
- No divine coincidence as there is only one instrument and many sectors.
- Very similar findings in “Networks, Phillips Curves and Monetary Policy” by Elisa Rubbo.

# Highly policy-relevant research (1)

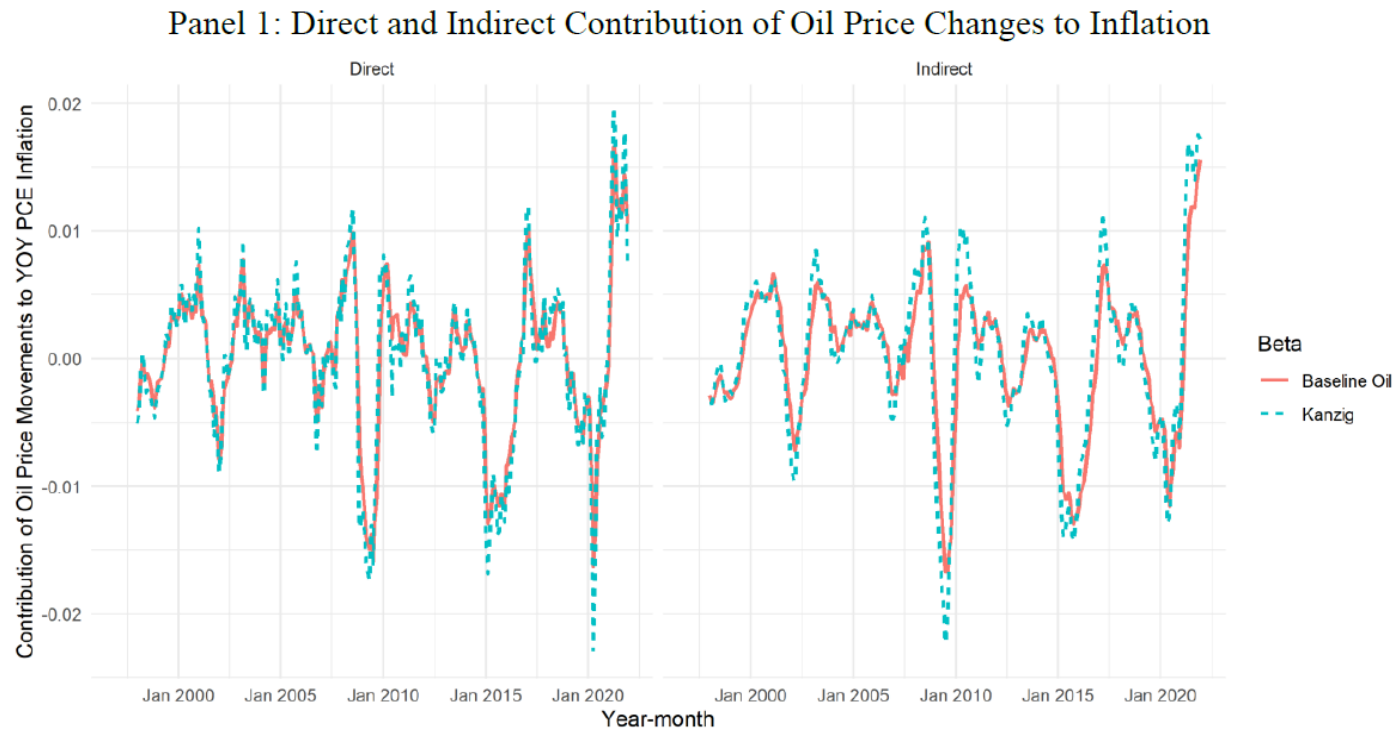
- From a **positive perspective**, it is important to move away from simple one-sector models and account for the heterogeneity in the production sector.
- Explicitly modelling the input/output structure of production is essential to capture the fact that sector-specific shocks may propagate through the input/output network of the economy and have persistent effects on aggregate output and inflation.
- This allows for a better account of the sources of inflation, their persistence and the appropriate policy response.

# Smets, Tielens and Van Hove (2018)

- Pipeline pressures (indirect network effects) coming from sector-specific shocks explain 21% and 28% of headline PPI and PCE inflation respectively.
  - Importance is generally larger for consumer prices than for producer prices
  - Larger for downstream than upstream sectors
  - Example: 40% for Healthcare; 0.87% for Agriculture
- Sectoral shocks also contribute to the persistence of inflation due to the propagation through the production network:
  - Pipeline pressures have an estimated mean persistence of 0.63 and 0.86 for PPI and PCE items respectively, which is very comparable with the persistence of inflation driven by aggregate shocks

# Minton and Wheaton (2022)

Indirect network contribution of oil price changes to US PCE inflation is of the same magnitude as the direct effect



... and can explain most of the initial rise in core PCE inflation in 2021 in the US.

# Highly policy-relevant research (2)

- From a **normative perspective**, the paper extends previous work on optimal monetary policy in multi-sector sticky-price models to models with a general input/output production structure.
- Earlier research highlighted that central banks should put more weight on sticky-price sectors. This rationalises a central bank focus on:
  - **Core inflation** given the high volatility and flexibility of energy and food prices compared to other goods and services (Aoki, 2001).
  - **Domestic inflation** given the higher stickiness of domestically produced goods prices compared to imported goods (Benigno, 2004).
  - **Wage inflation** given prevalence of wage stickiness (Erceg, Henderson and Levin, 2000 and Mankiw and Reis, 2003)
- Extending this analysis to a general input/output structure gives a richer and more general picture: in addition to stickiness, the position of the sector in the network (downstream versus upstream) matters.

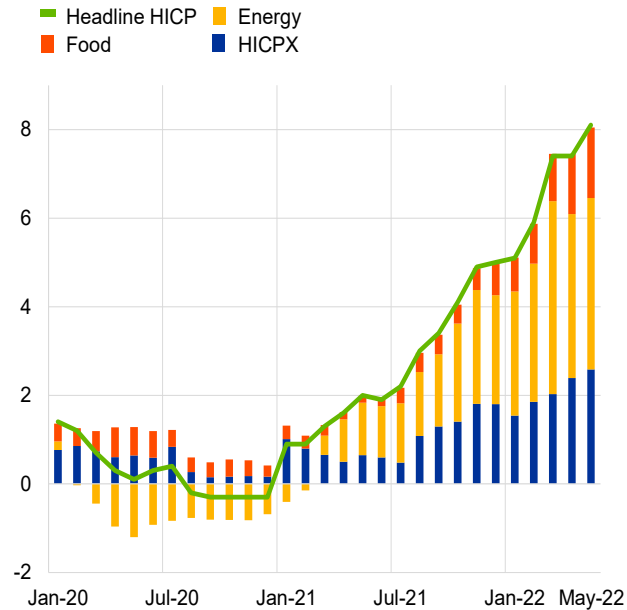
# Highly policy relevant in the current context

- Current high inflation is to an important extent driven by **sector-specific shocks**: energy prices, food and commodity prices, and supply chain bottlenecks related to the pandemic.
- Important policy question: **To what extent should central banks look through these sector-specific shocks?** The paper gives an answer.
- Mining (e.g. oil and gas) and Utilities (e.g. electricity) have a small weight in the optimal target price index (partly due to being relatively flexible-price sectors). This contrasts with the relatively large weight in the CPI.
- Services (e.g. health care, real estate, rental and leasing) have a relatively large weight, as in the CPI.
- But the greatest weight in the optimal target price index is on nominal wages (50%). This reflects the facts that labor has the largest Domar weight and nominal wages are stickier than most industry prices. This contrasts with a zero weight in the conventional CPI.

# EA vs US: High inflation; different composition

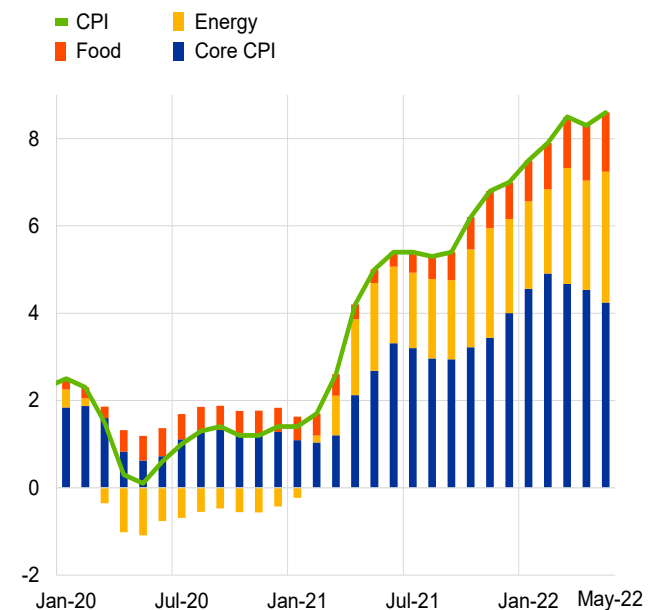
## Euro area

(annual percentage changes and pp contributions)



## United States

(annual percentage changes and pp contributions)



Sources: Eurostat, Haver and ECB staff calculations.

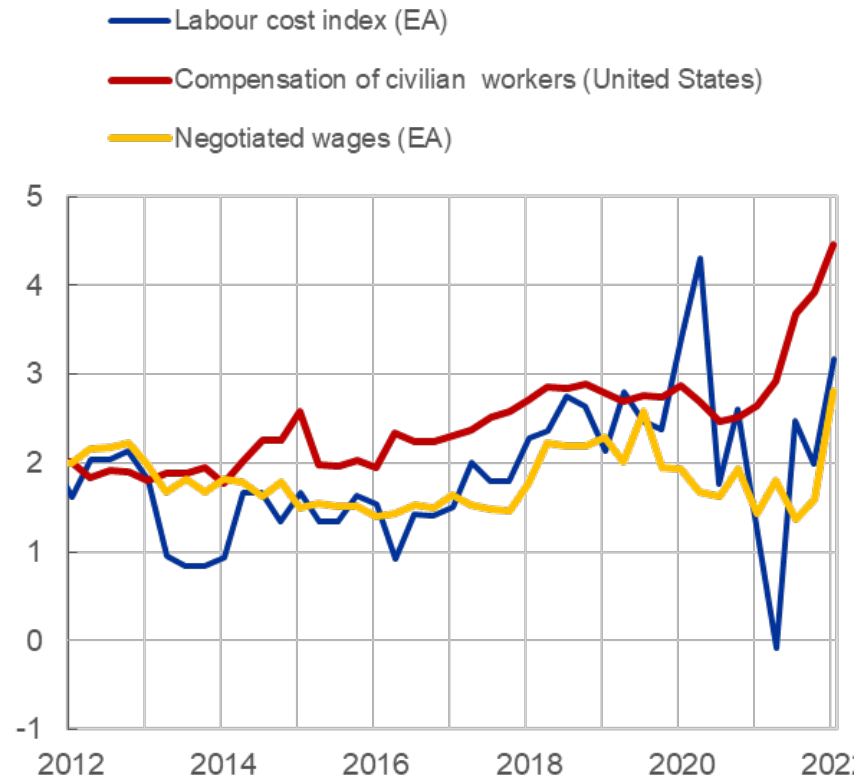
Notes: For the euro area, the panel shows the HICP excluding food and energy, as well as the contributions to it. For the United States the panel shows the CPI excluding food and energy, as well as the contributions to it. Items affected by bottlenecks include new motor cars, second-hand motor cars, spare parts and accessories for personal transport equipment, and furnishings and household equipment. Items affected by reopening include clothing and footwear, recreation and culture, recreation United States also imputed rents for owner-occupied housing. Latest observations: May 2022.



# EA vs US: Higher wage growth in US

## Wage developments

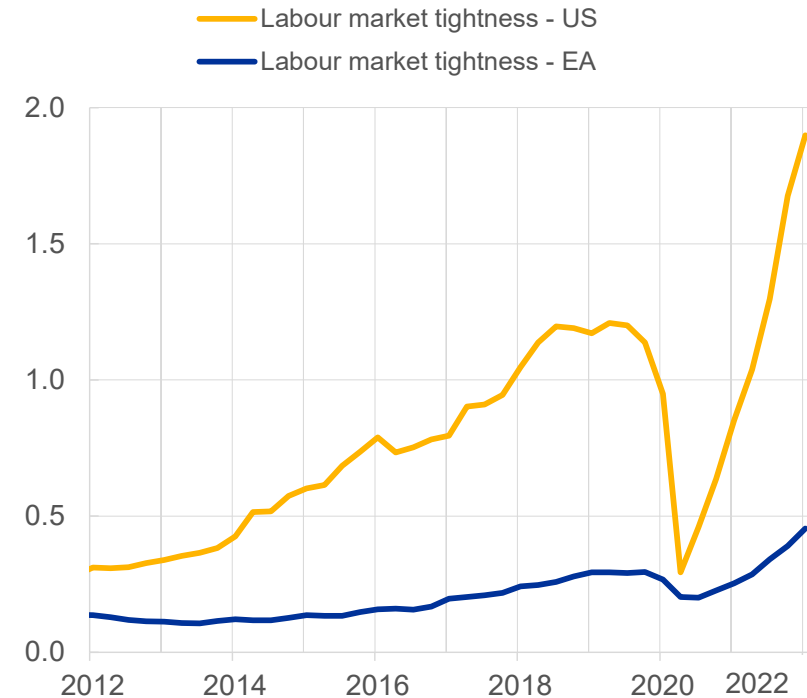
(annual % changes)



Sources: Eurostat, Bureau of Labor Statistics and ECB calculations.  
Latest observation: 22Q1.

## Labour market tightness

(job vacancy rate divided by the unemployment rate)



Sources: Eurostat, Bureau of Labor Statistics and ECB calculations.  
Latest observation: 22Q1.

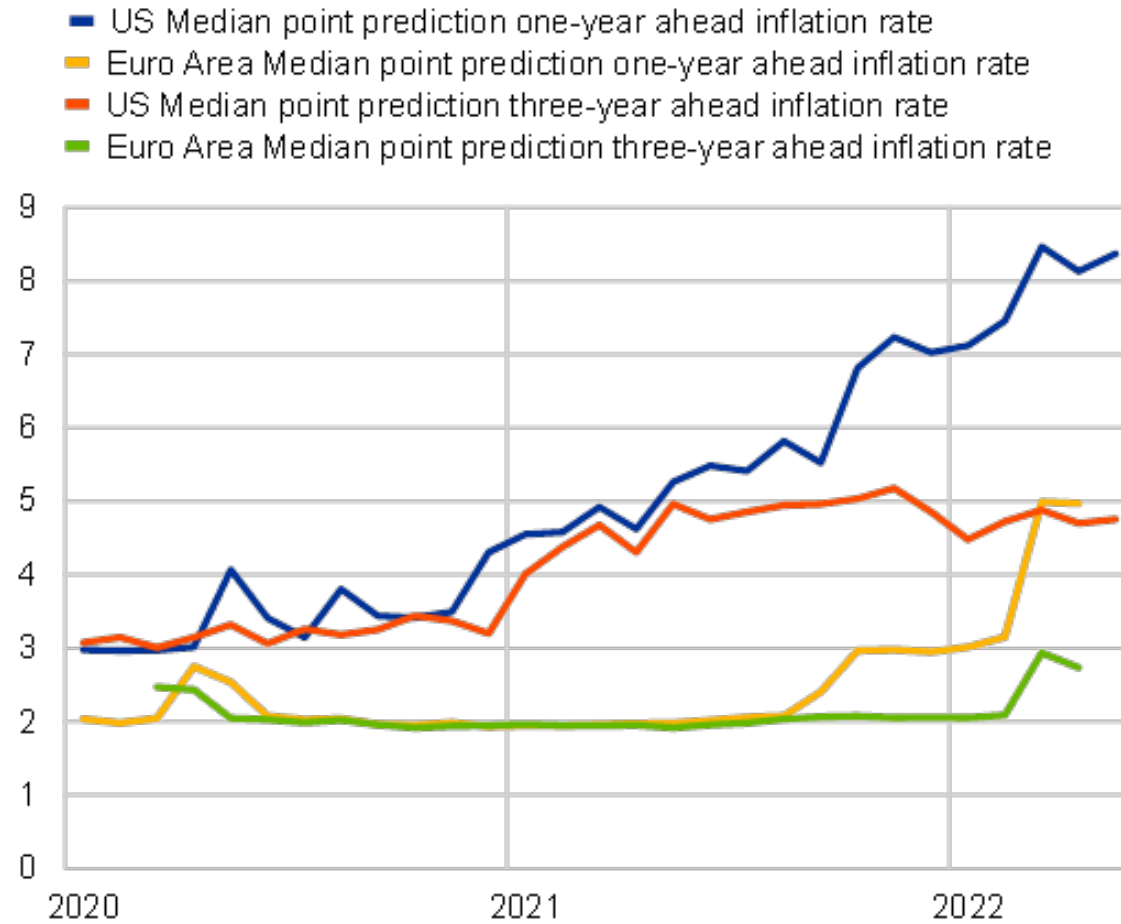
# Should central banks change their targets?

- **Mandates** are in terms of maintaining price stability. A broad-based consumer price index best captures the purchasing power of money in the eyes of the general public.
- Maintaining price stability requires **anchoring medium-term inflation expectations**. Household expectations are key given the important role of nominal wage inflation. Those expectations are **mostly determined by headline inflation** and the more salient prices in the consumer basket such as gas and food prices.
- Conceptually, the reweighting of sectors is based on the notion that monetary policy can address the cost of nominal rigidities; the central bank gets **a role in resource allocation**. This raises questions of **overreach/overburdening** and **why stop there**:
  - For example, should the central bank also reweight sectors based on their carbon intensity given the negative externalities involved? Should one devise a carbon adjusted price index (Rey, 2019).
- Finally, the analysis is very sophisticated and gives important insights, but it still misses a number of important elements:
  - For example, a more elaborate retail sector, misallocation of investment goods, state-contingency of nominal rigidities.

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# Consumer inflation expectations in the US and EA



Sources: ECB CES and New York Fed consumer survey.

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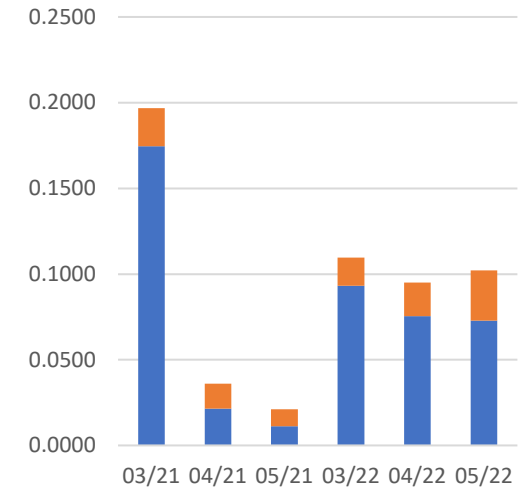
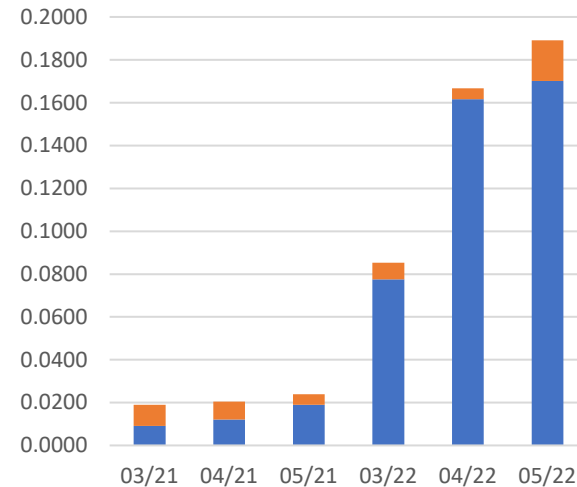
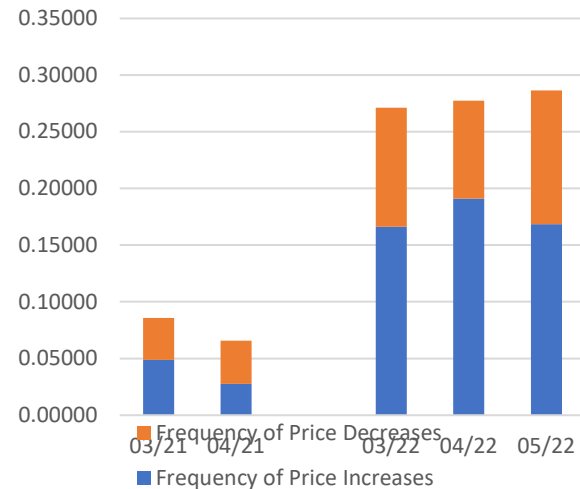
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# Time variation in price stickiness

## Frequency of price adjustment: Evidence from 3 German supermarkets



Sources: DPD data set of daily prices

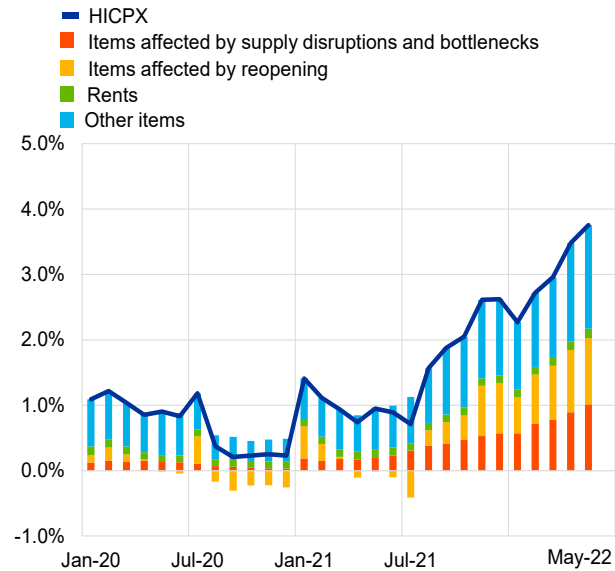
Thank you



# EA vs US: Rents and items affected by supply disruptions more important in US

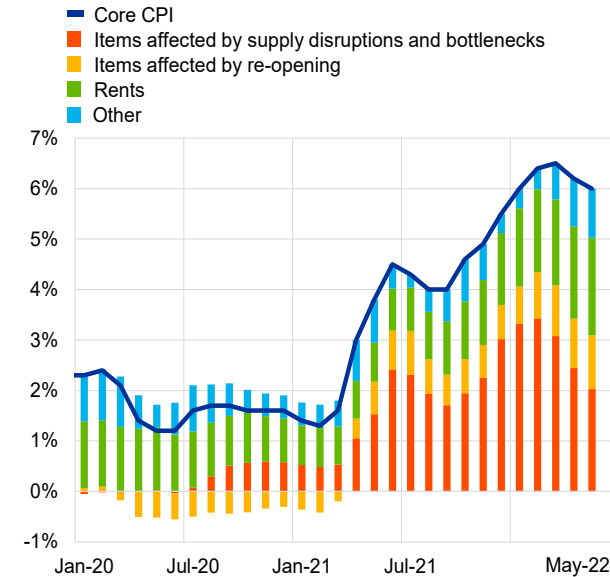
## Euro area

(annual percentage changes and percentage point contributions)



## United States

(annual percentage changes and percentage point contributions)



Sources: ECB and ECB staff calculations.

Notes: Items affected by supply disruptions and bottlenecks comprise new motor cars, second-hand motor cars, spare parts and accessories for personal transport equipment, and household furnishings and equipment (including electronics). Items affected by the reopening of the economy comprise clothing and footwear; recreation and culture; recreation services; hotels/motels; and domestic and international flight prices. Rents comprise actual rents paid by tenants – and for the United States also imputed rents for owner-occupied housing.

Latest observations: May 2022.

# Salient prices and FROOP

