

Inflation and monetary policy: Recent developments

Ivan Werning, MIT

Inflation: Old and New Perspectives

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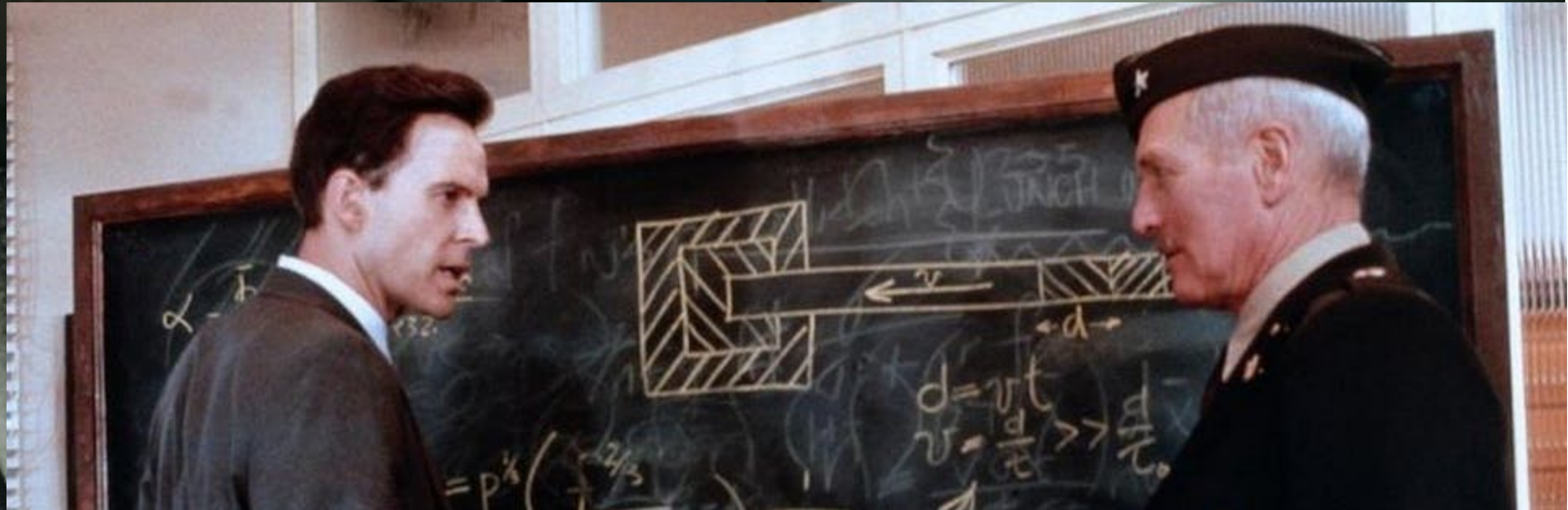
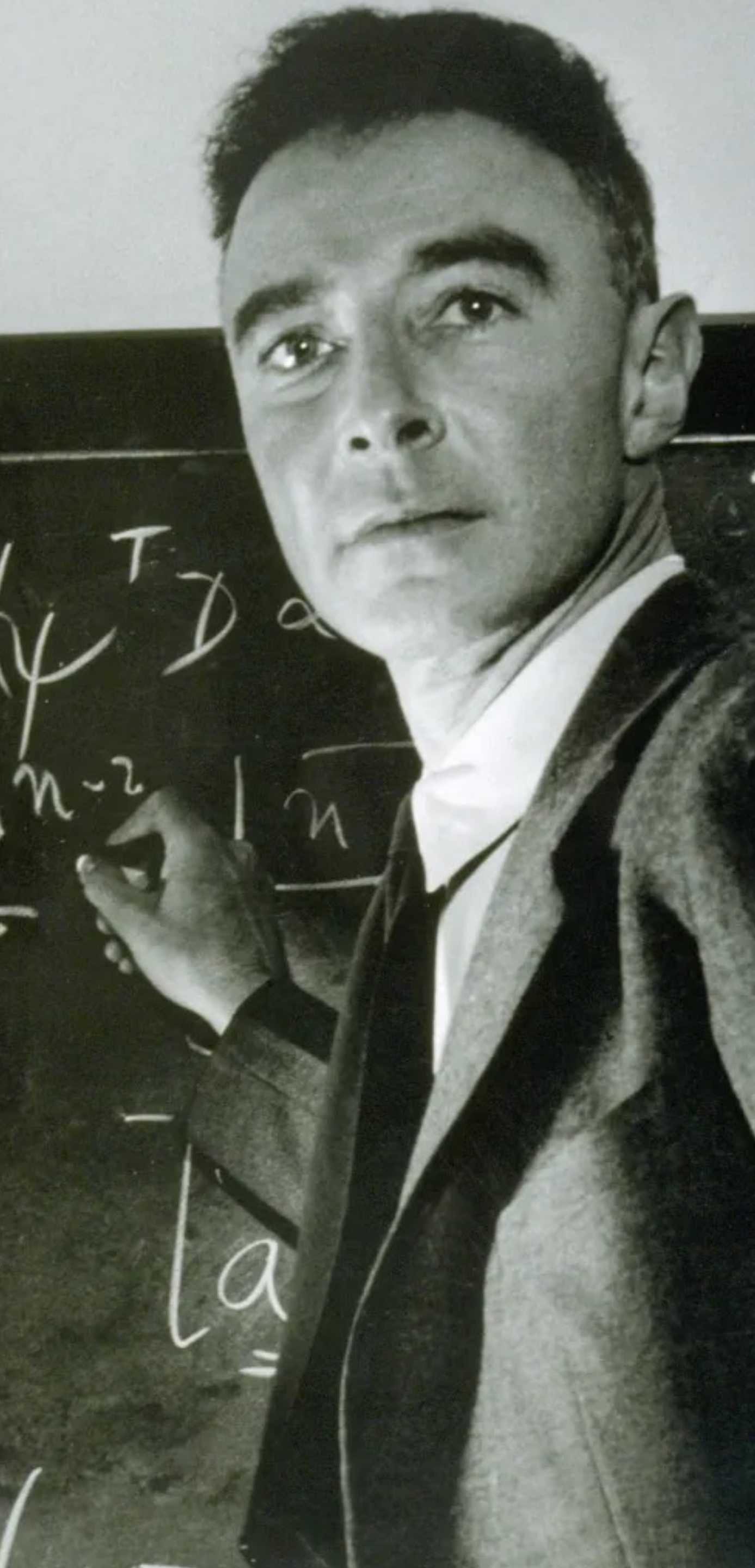
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**Challenge some
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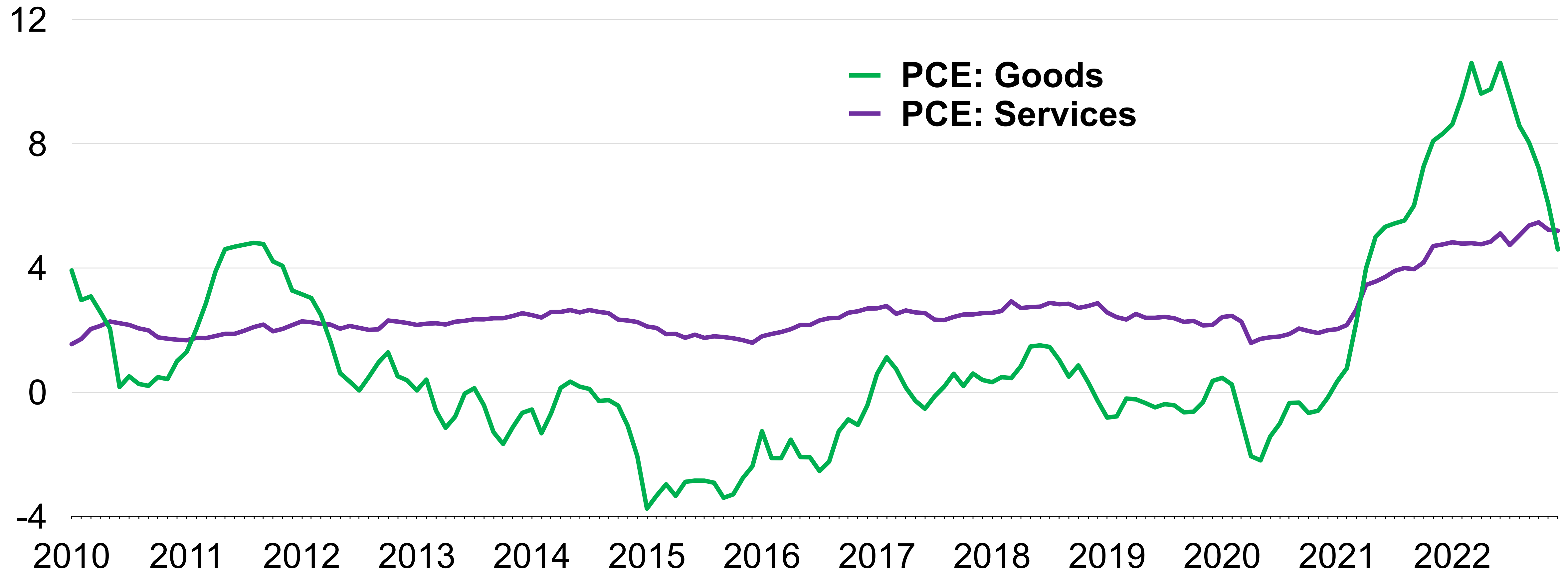
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US Inflation: Goods vs Services

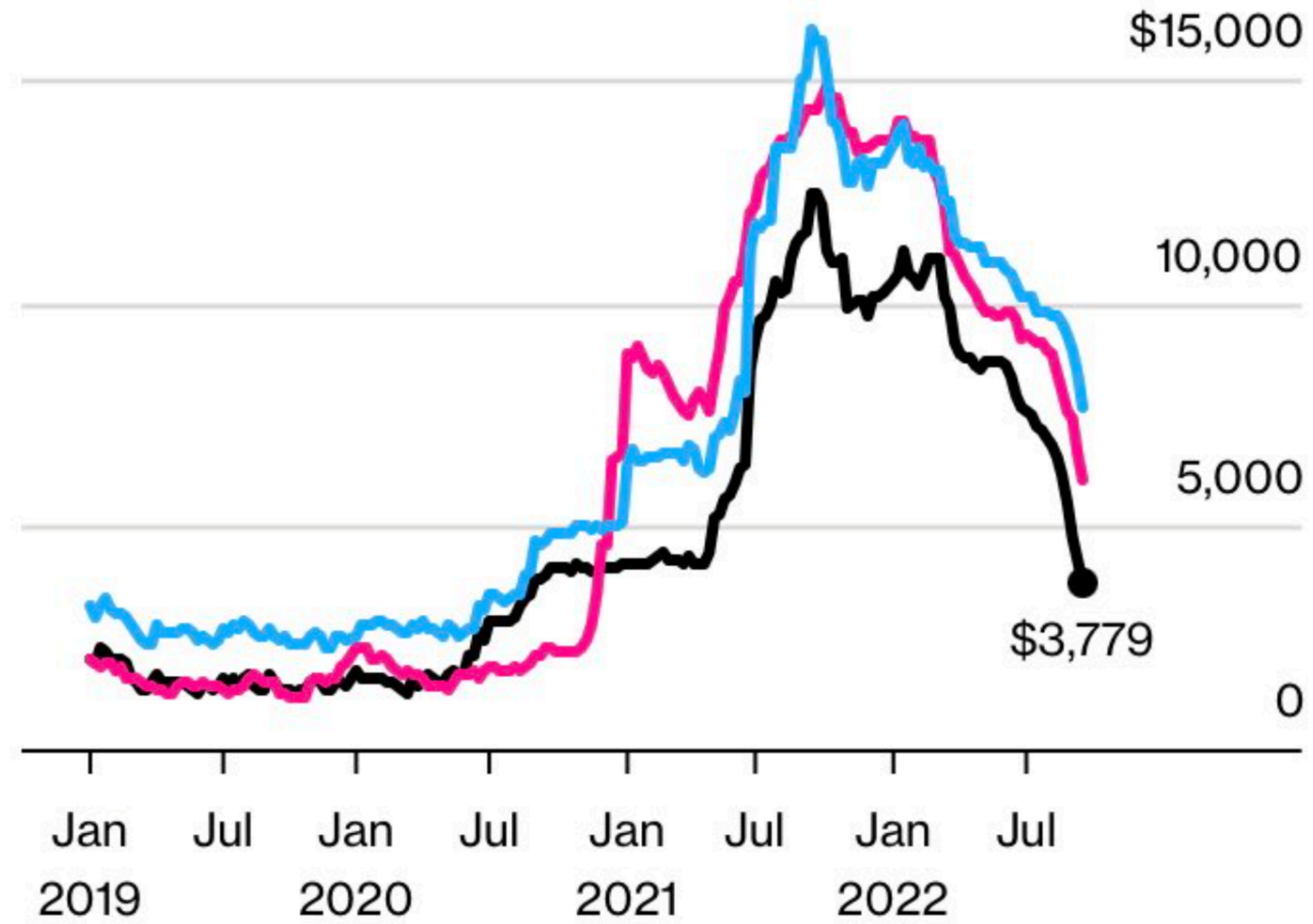
Year-over-year percentage change



Supply Shortages

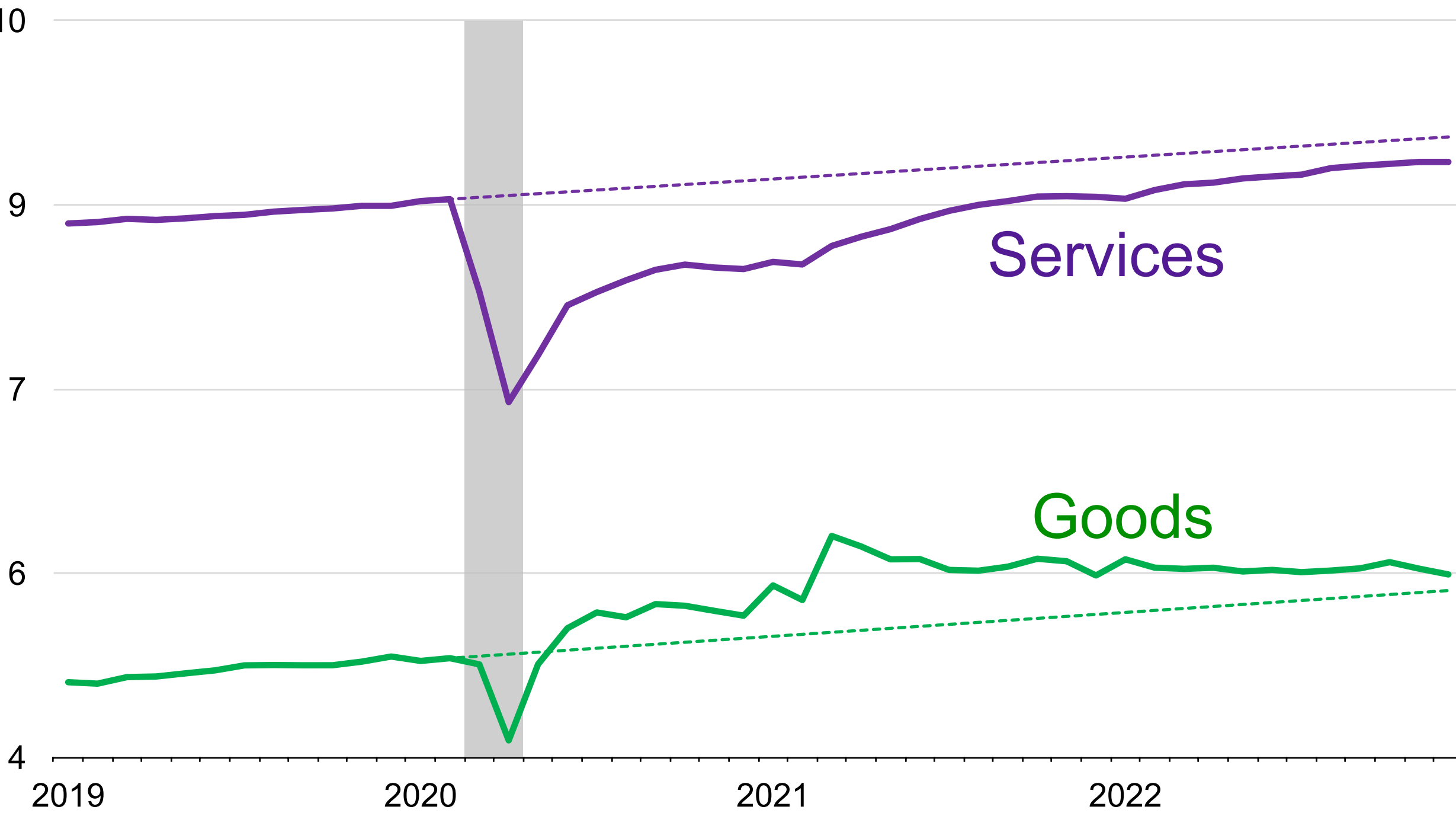
Cost to send a 40-foot container from Shanghai to Los Angeles has halved in last three months

— Shanghai to Los Angeles — Shanghai to Rotterdam
— Shanghai to New York

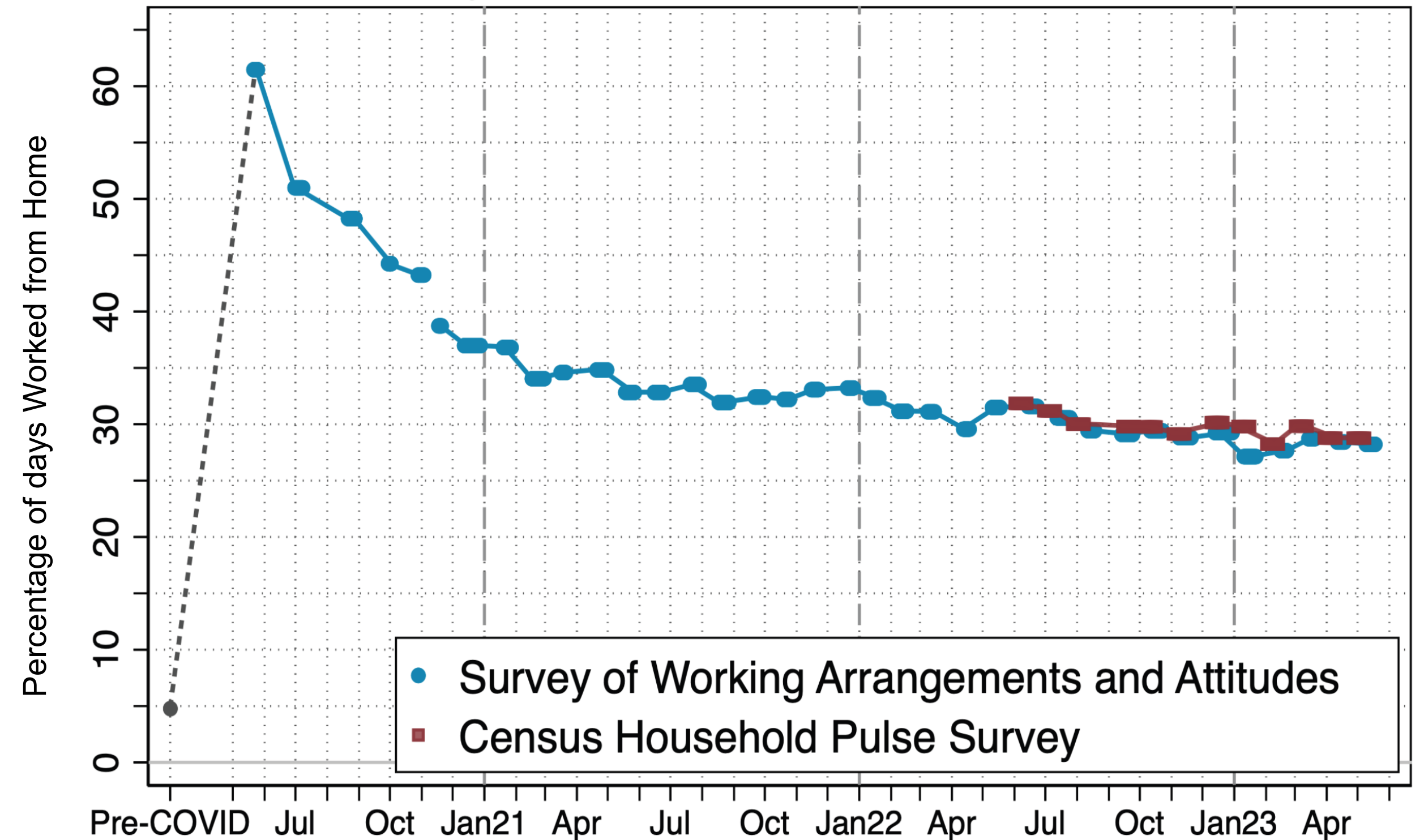


Big Shocks and Restructuring

Goods vs Services
Trillions of chain-weighted 2012 dollars



Work from Home is here to stay



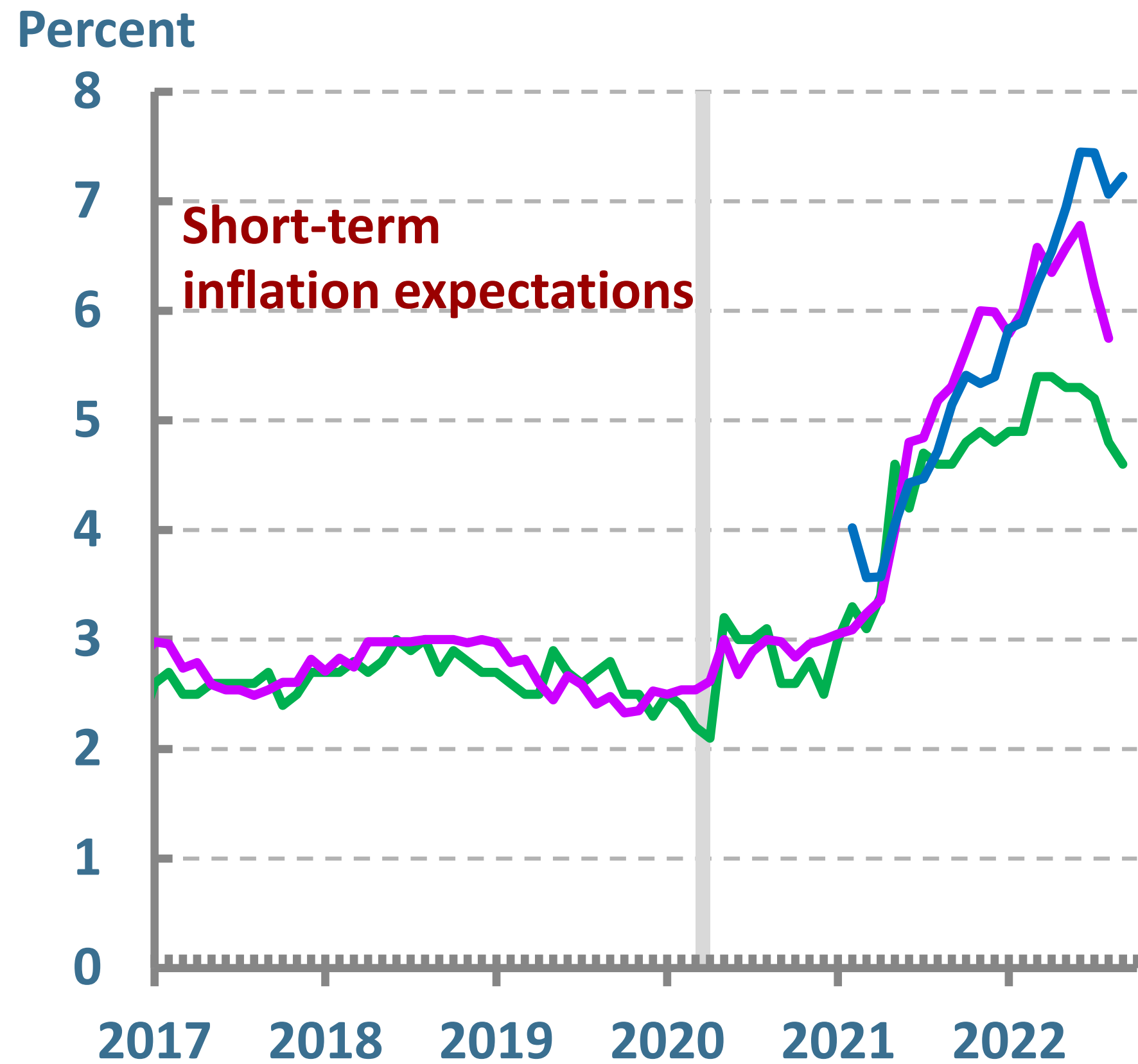
Source: Barrero-Bloom-Davis (2023)

Inflation Expectations

NY Fed Survey of Consumer Exp, Infl exp over next yr

U Michigan Consumer Infl Exp, over next yr

Clev Fed Indirect Consumer Infl Exp, over next yr



NY Fed Survey of Consumer Exp, Infl exp over next 3 yrs

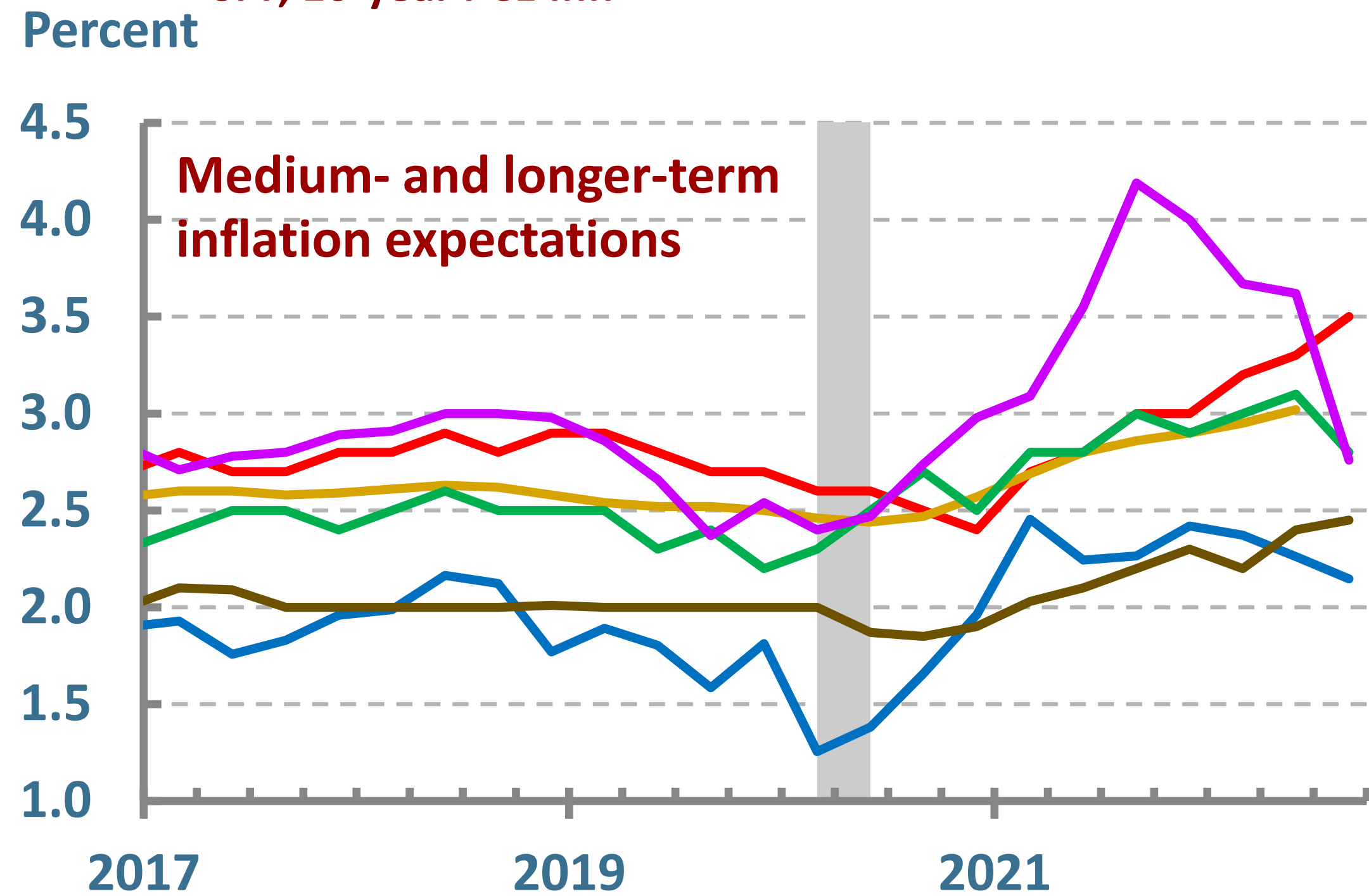
Atlanta Fed Business Infl Exp, over next 5-10 yrs

U Michigan Consumer Infl Exp, over next 5-10 yrs

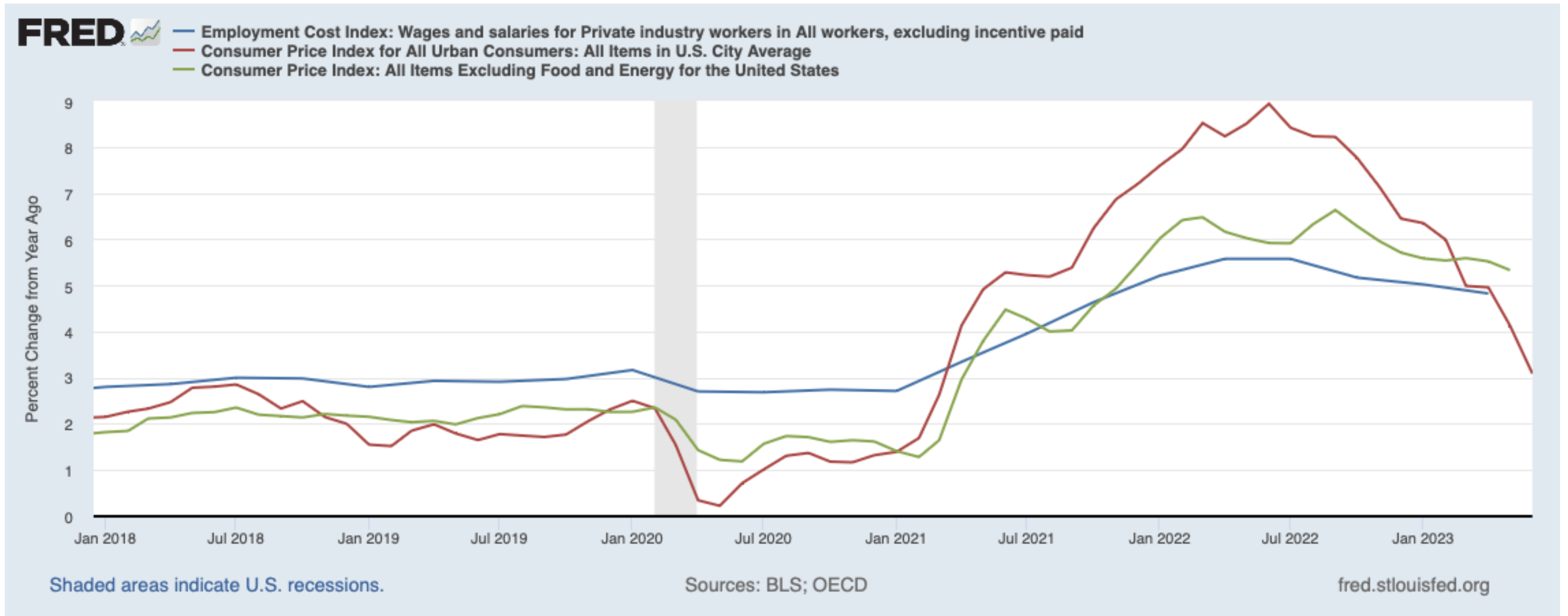
BOG Common Infl Exp, scaled by U Mich, over next 5-10 yrs

Infl Comp: 5-yr/5-yr forward

SPF, 10-year PCE Infl



US Inflation: Prices and Wages



Policy Narratives 2020-2023

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 - ◆ Recent: price inflation moderating, but worry about **wage-price spiral**

Stylized Standard Model

$$\pi = \kappa(y^d - y^s) + \pi^e + c$$

demand relative to supply

cost-push shifter

sensitivity

expectations

The diagram shows the equation $\pi = \kappa(y^d - y^s) + \pi^e + c$ with four annotations and arrows pointing to specific parts of the equation: 'demand relative to supply' points to the term $(y^d - y^s)$; 'cost-push shifter' points to the term c ; 'sensitivity' points to the coefficient κ ; and 'expectations' points to the term π^e .

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- Where does cost-push shifter c come from? (coming up)

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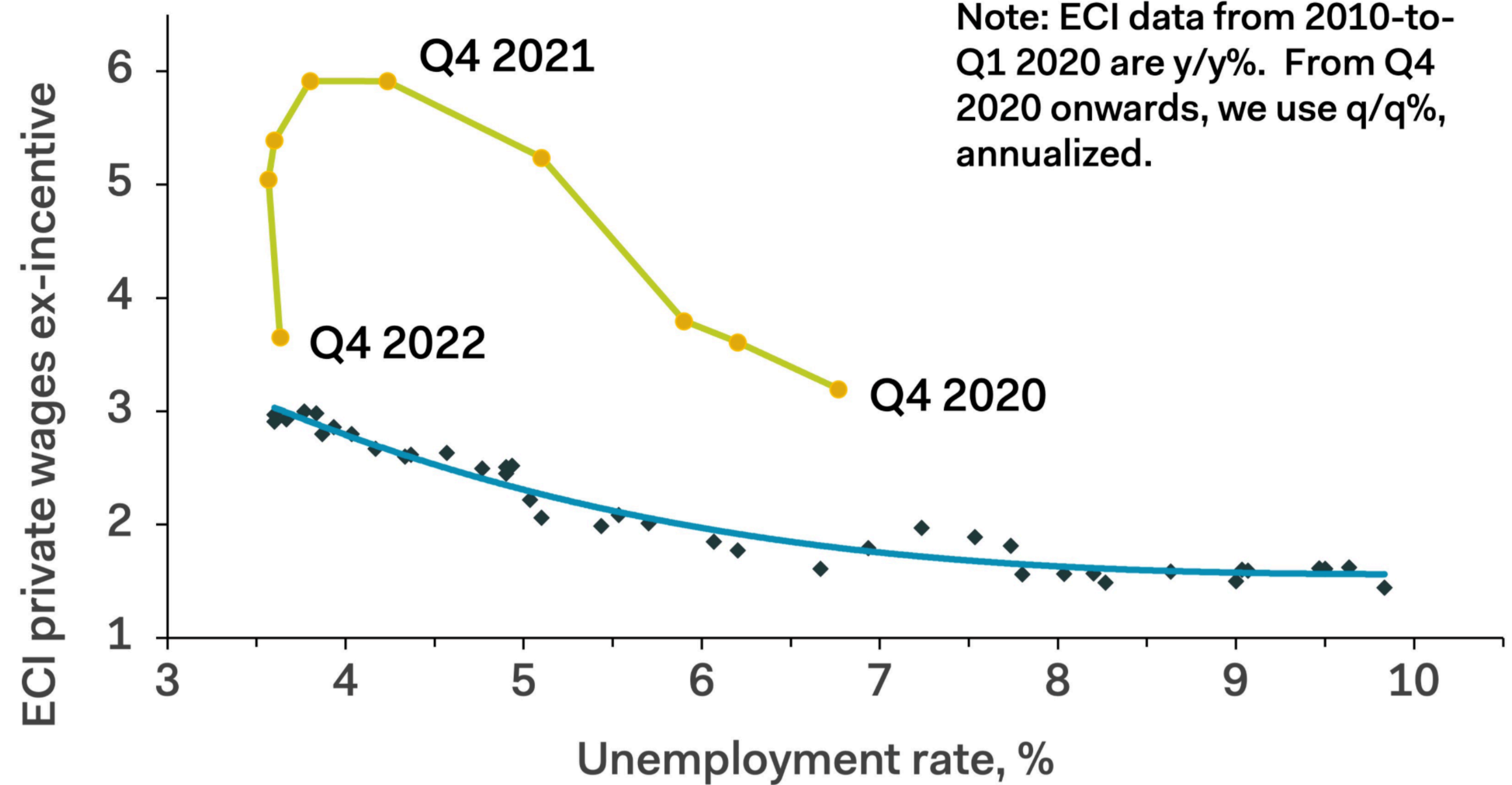
← **Now**

Covid and Cost Push Shock

- What about a cost push shock?

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U.S. Wages Phillips Curves, diamonds are data from 2010-to-Q1 2020; circles from Q4 2020 onwards



Source: Ian Shepherdson

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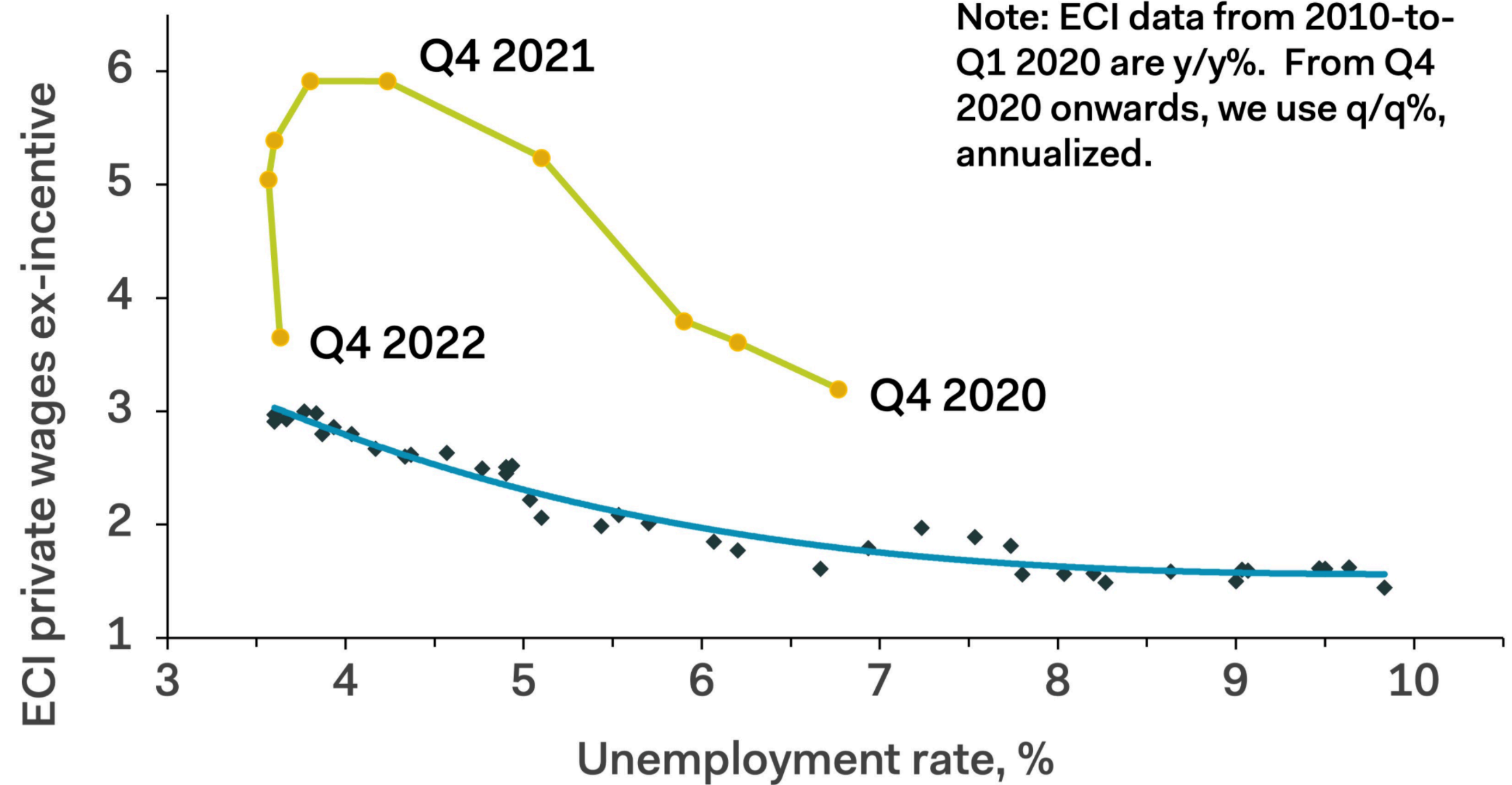
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■ **Guerrieri Lorenzoni Straub**
Werning (Jackson Hole 2021);

- Asymmetric shocks can produce a cost push shock c
- How much inflation to allow? More, because tradeoff is bad
- Contractionary monetary policy can hurt needed reallocation

■ Tobin (1972) vs Friedman (1968)

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$$\pi = \pi^e + \kappa(y - y^*)$$

$$\pi = \phi \pi^e + \kappa(y - y^*)$$

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- But what do we really know?
- This paper... $\pi = \phi\pi^e + \text{other stuff}$
 - passthrough ϕ may be small
 - short-run vs long-run expectations
 - allow general expectations π^e (**important conceptual separation**)

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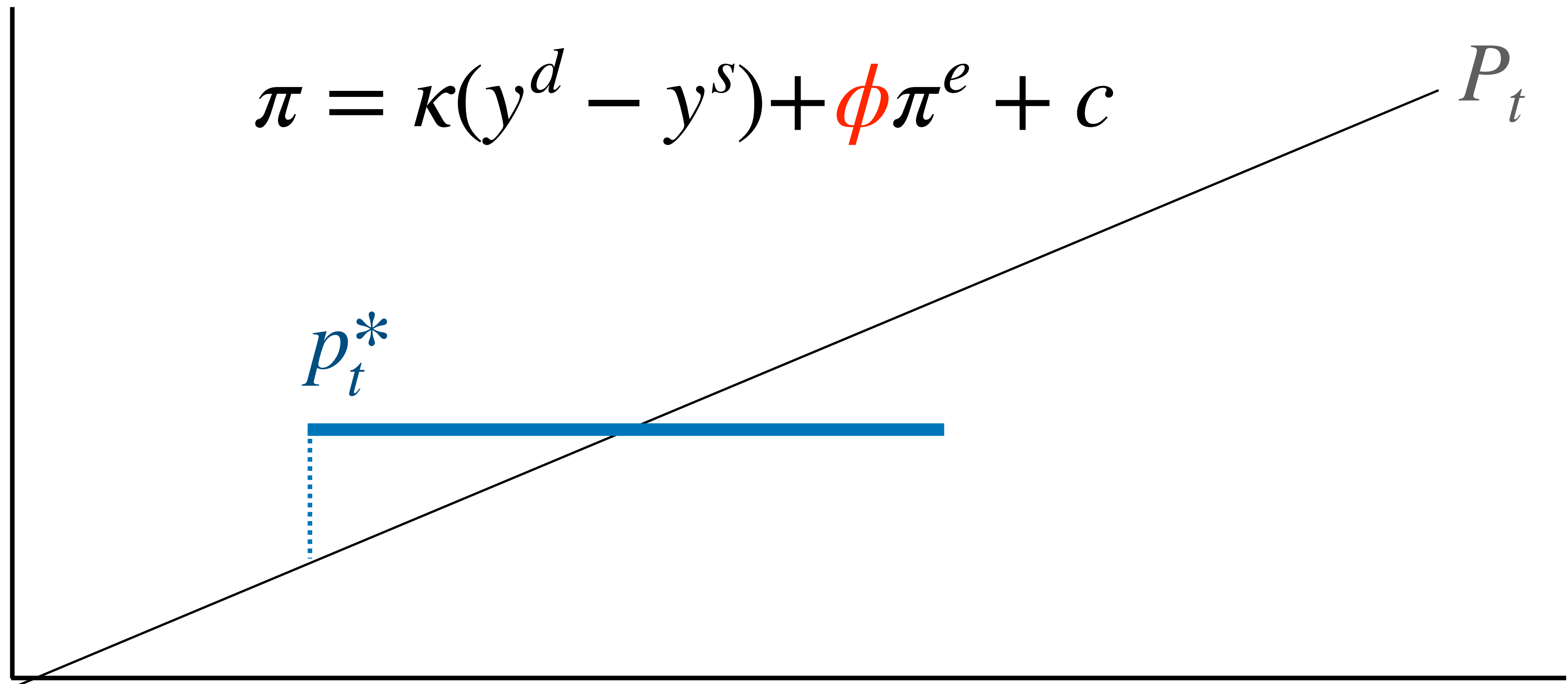
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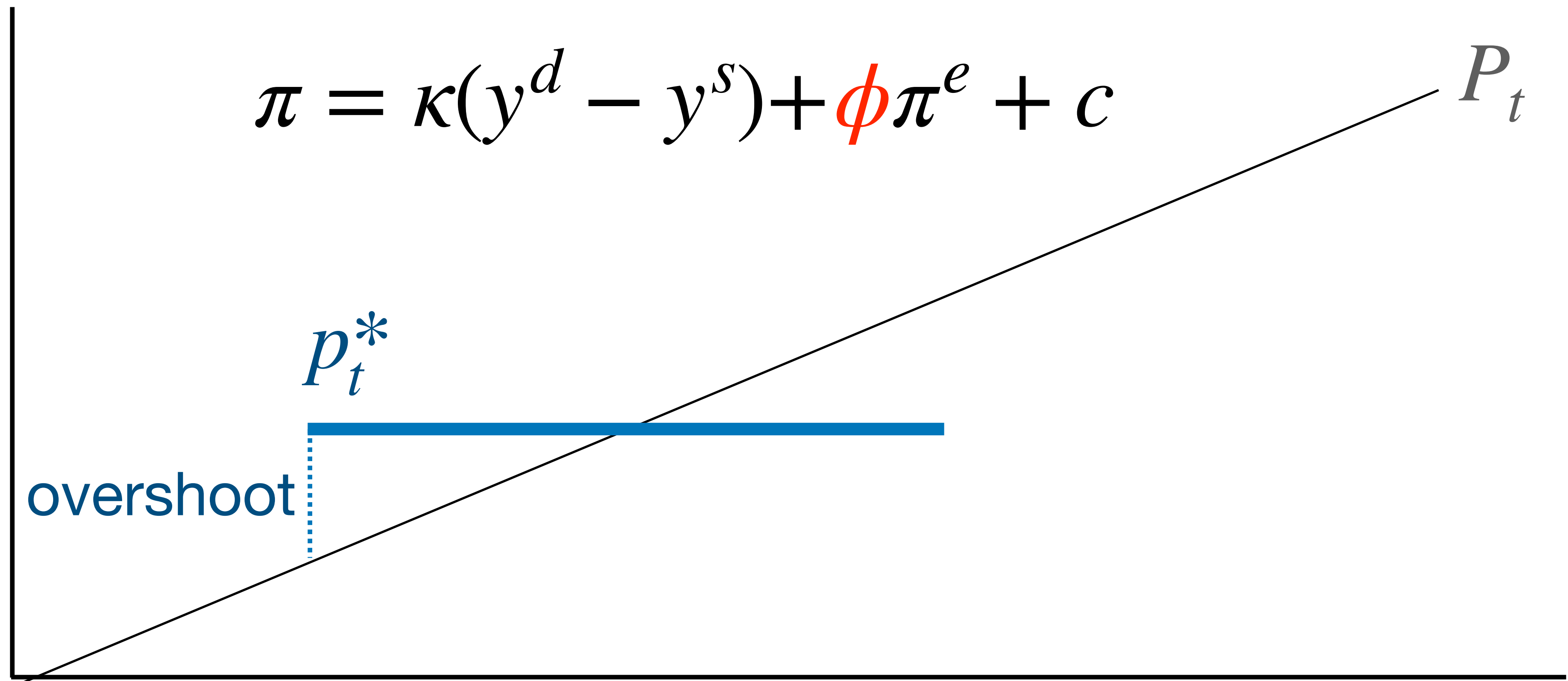
- **Time series (Phillips Curves):** imposes rational expectations (co-movement + missing variables) Gali-Gertler: $\phi \approx 0.65$ vs Rudd: $\phi \approx 0$
- **Experimental evidence:** Bank of Italy survey of businesses, randomly treat subset with Bank forecasts, study firm outcome...
 - Coibion-Gorodnichenko-Kamdar: $\phi \approx 0.2$ (Rosolia: $\phi \approx 0$)

... **caveat: change expectations of inflation + expectations of output?**

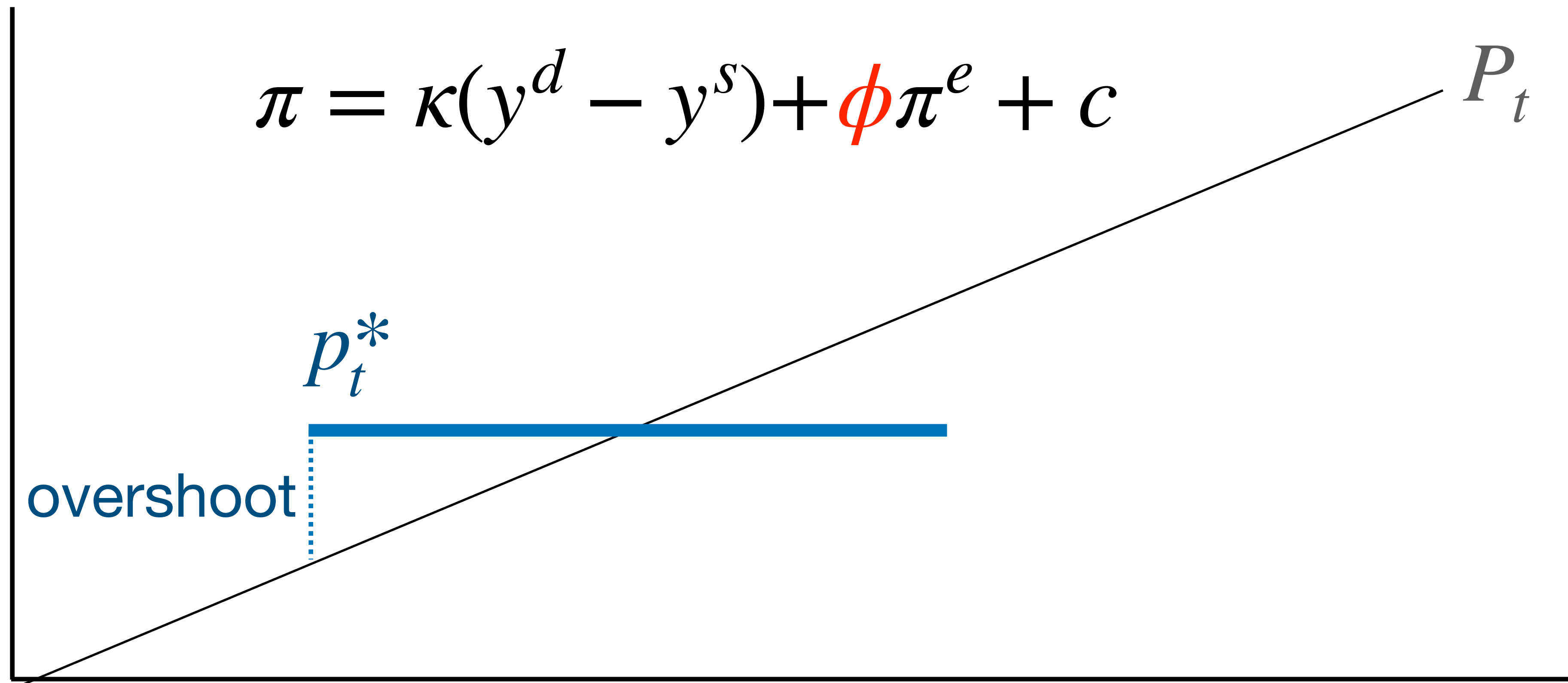
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$$\phi = 1/2$$

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- General time dependent model (e.g. allows complementarities across firms)
- General hazard rate of price changes (e.g. Calvo = constant hazard)...
 - average **completed duration** price spell (1/frequency)
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- Expectations + Past = 1 → i.e. vertical Phillips curve

$$\sum_{s=0}^{\infty} \phi_s + \sum_{s=-\infty}^{-1} \phi_s = 1$$

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- Steady State...
 - menu cost c of changing price
 - constant inflation π
 - idiosyncratic uncertainty
 - bands for $x = p - P$

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Sheshinski-Weiss

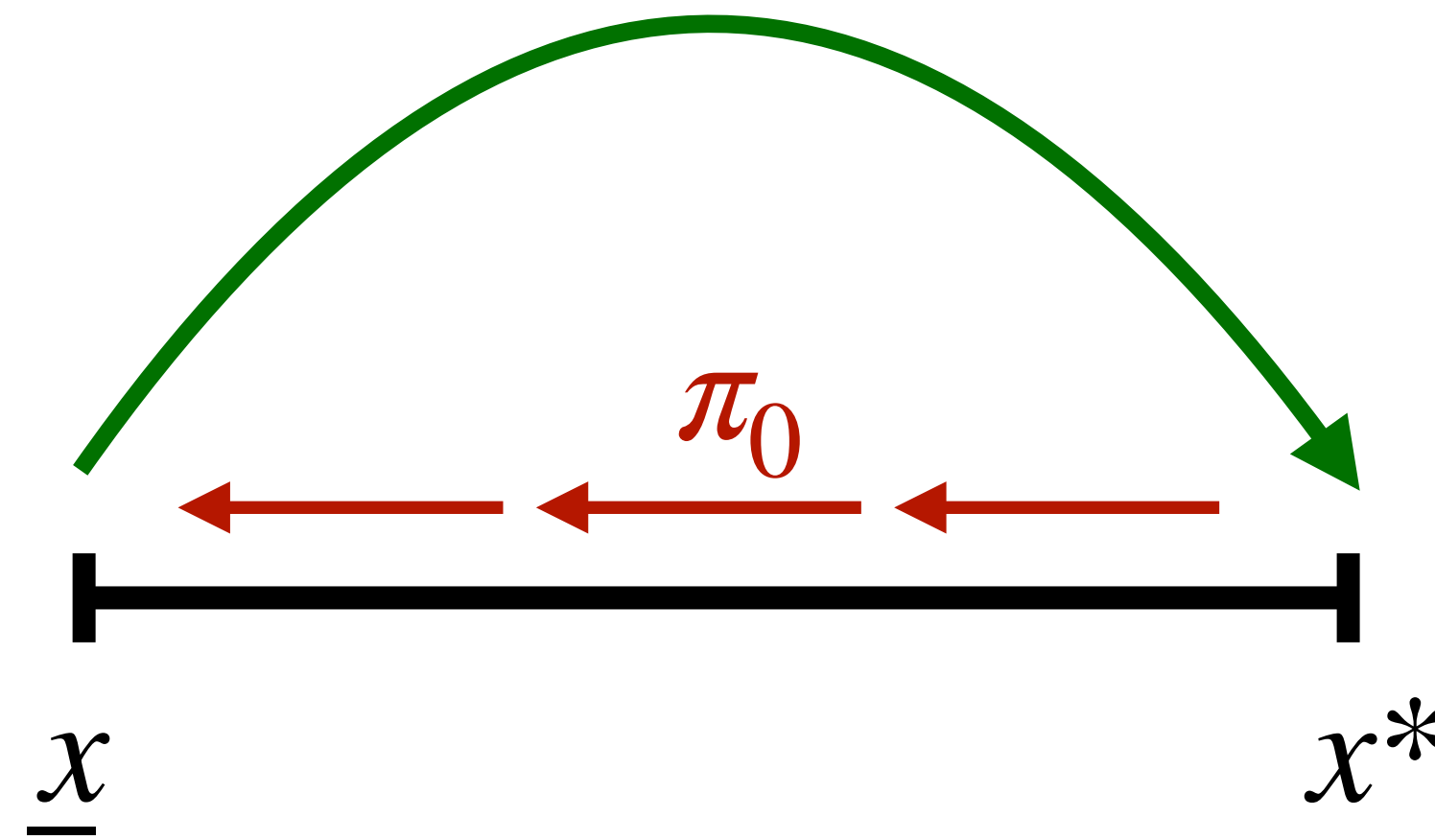
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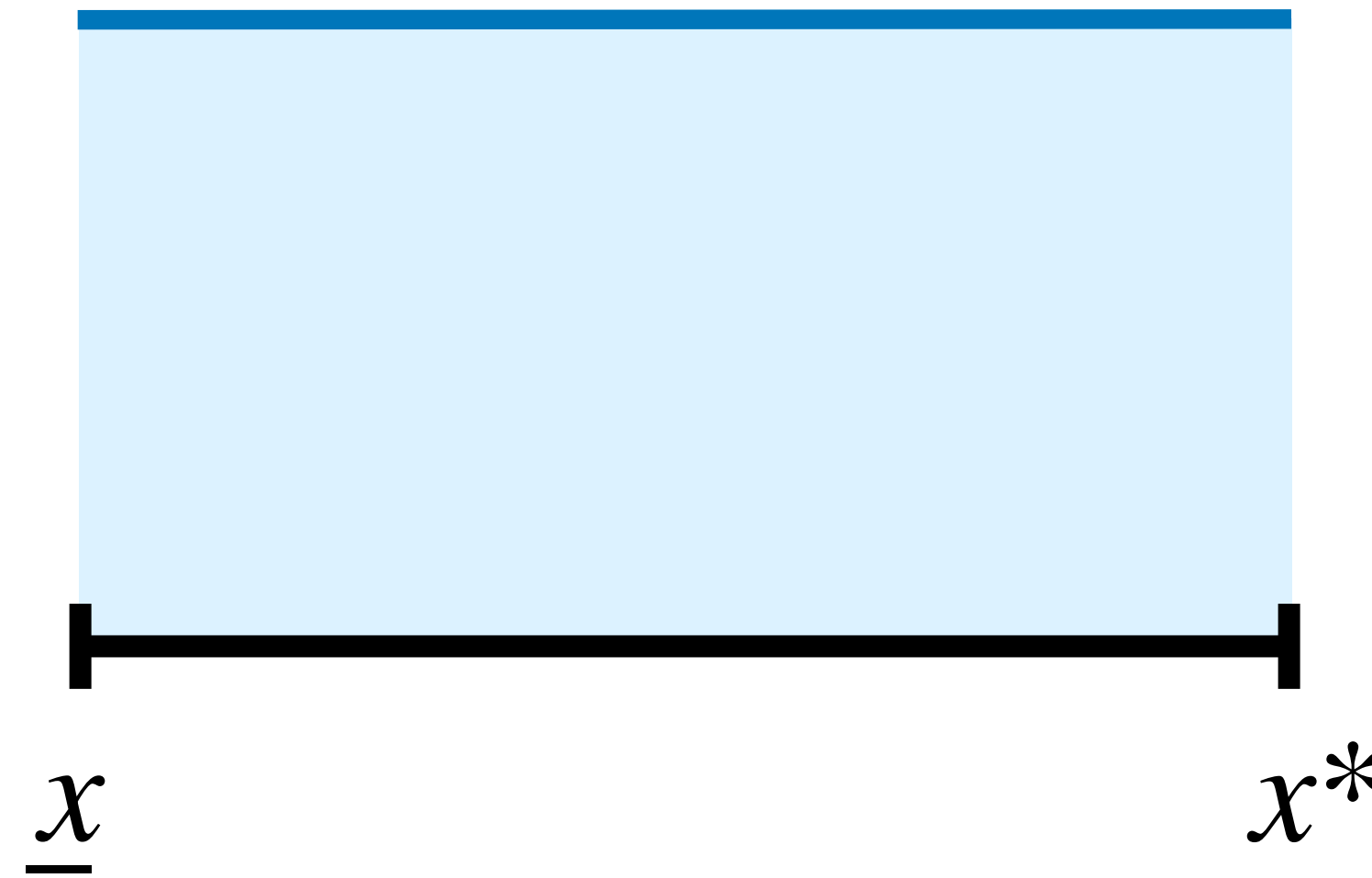
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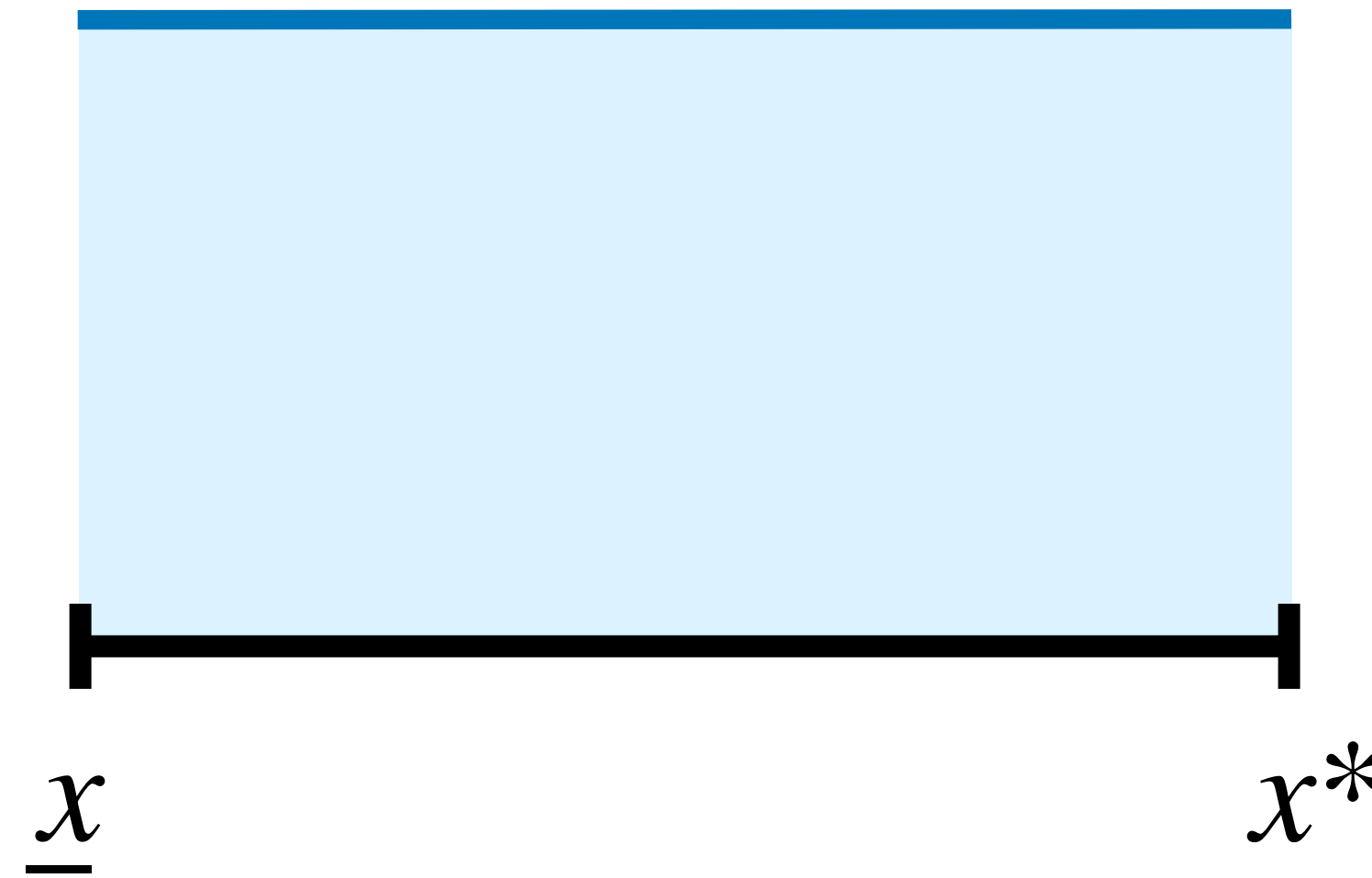
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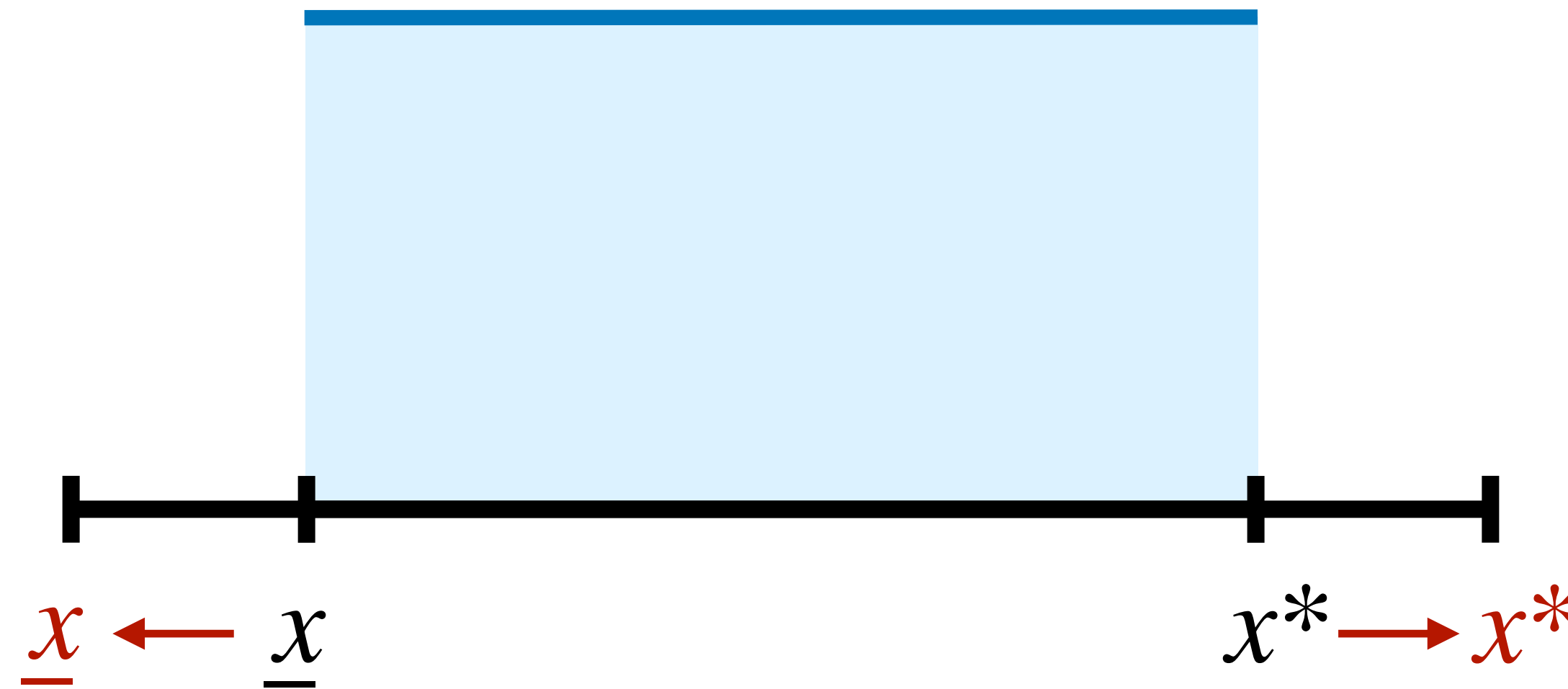
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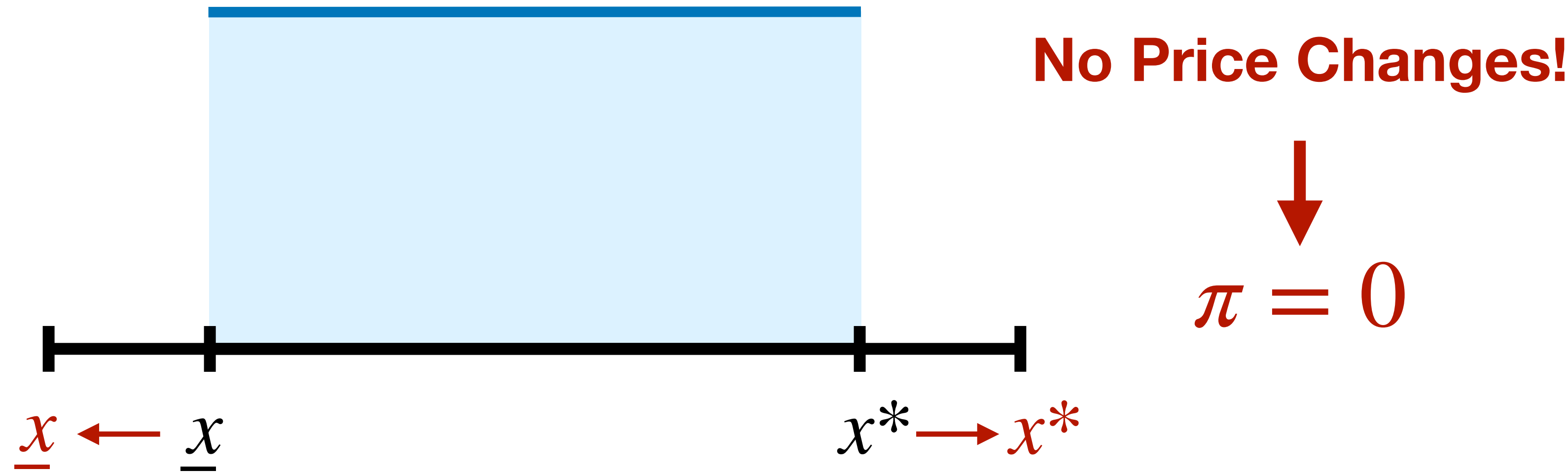
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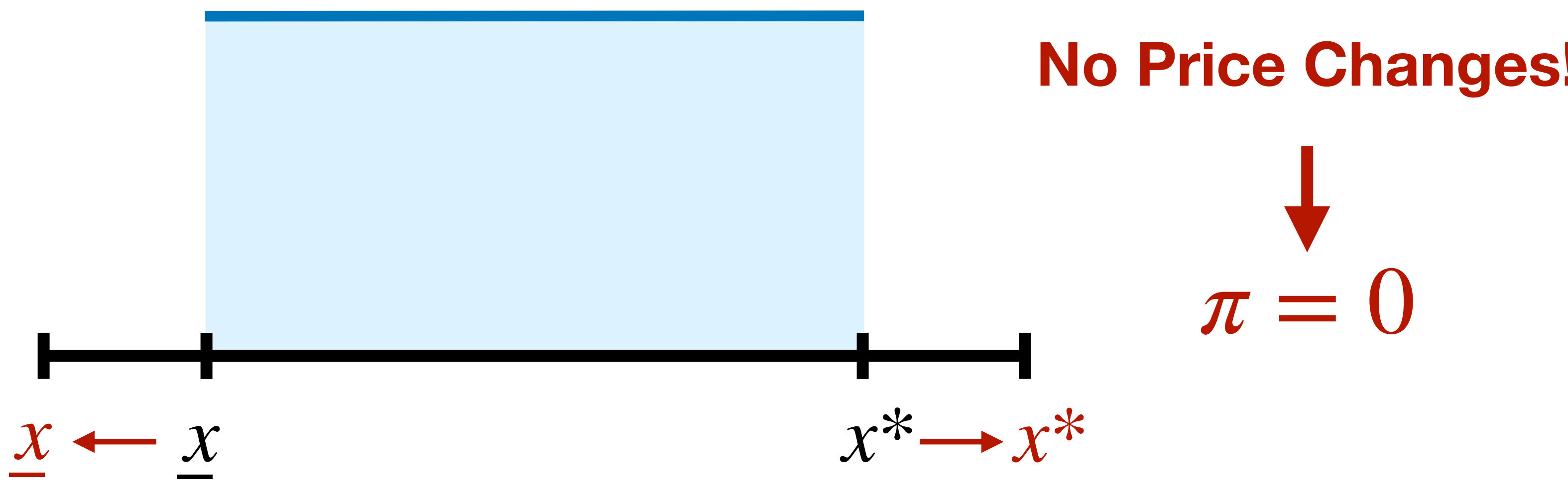
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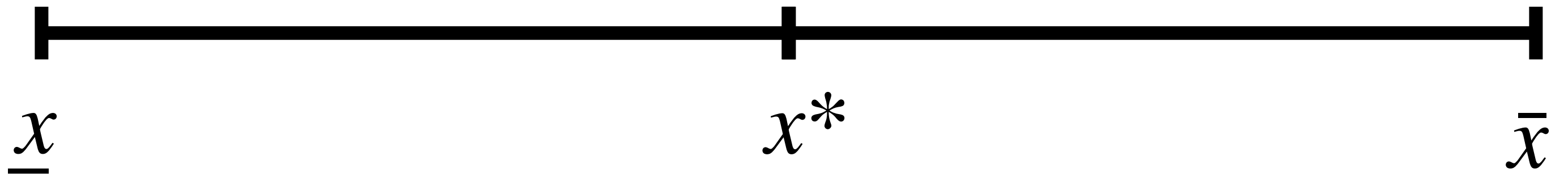
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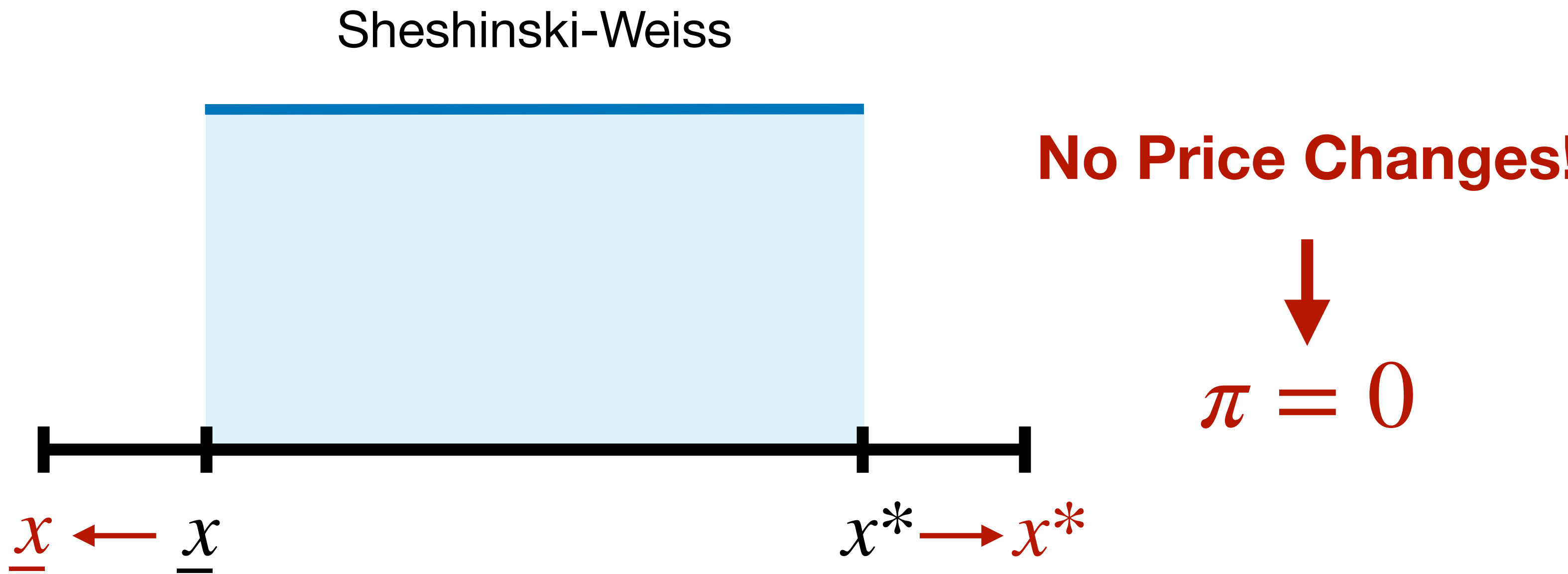


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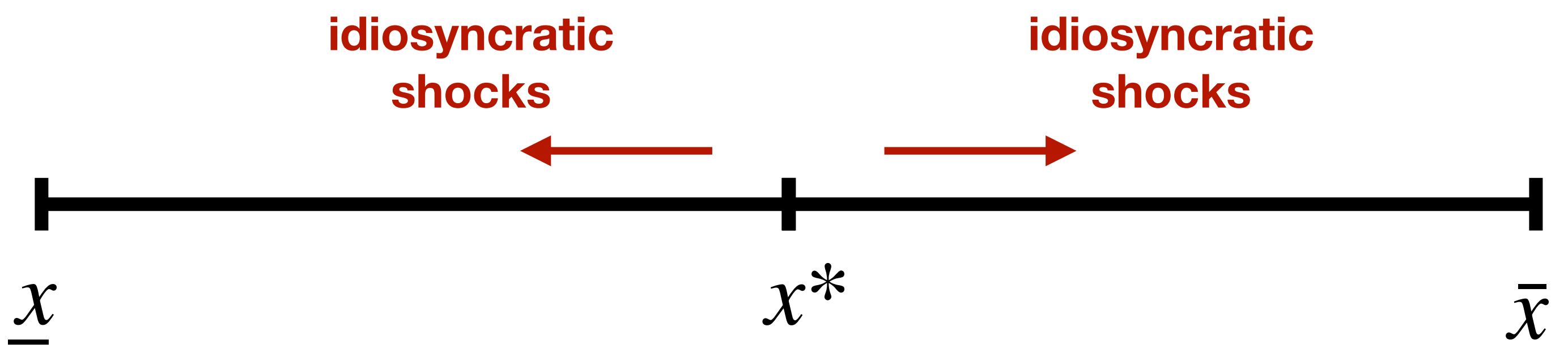


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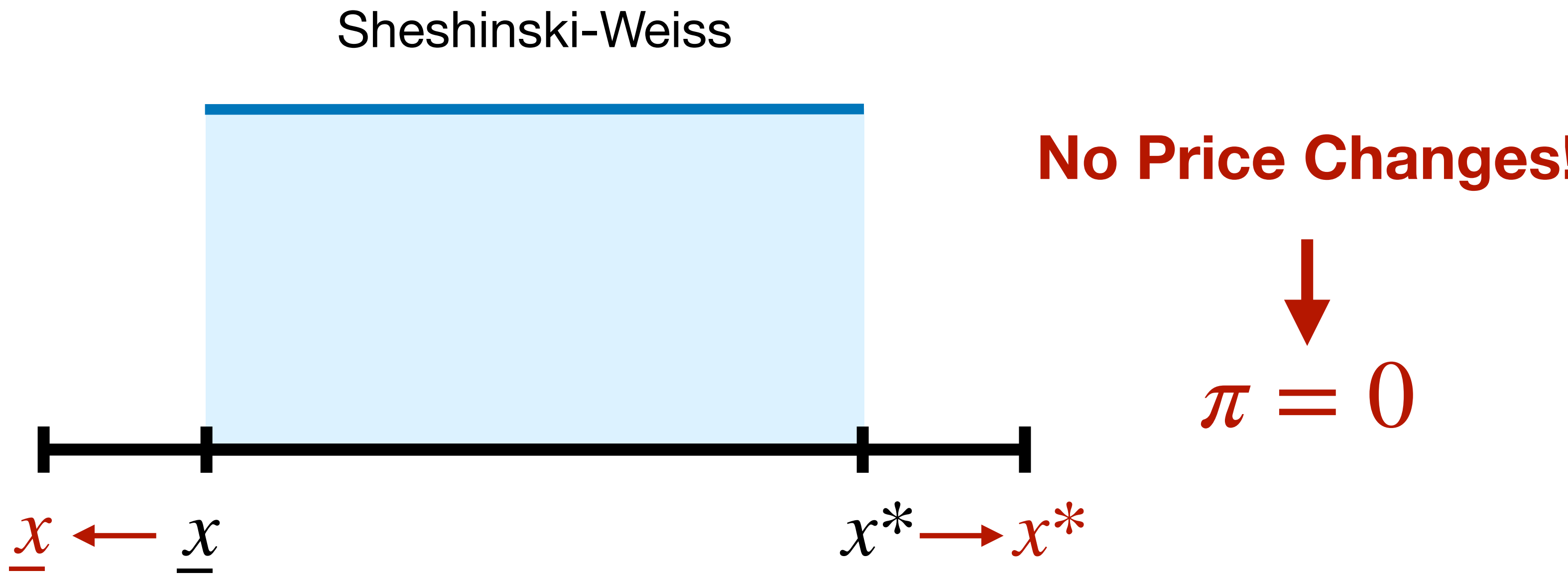


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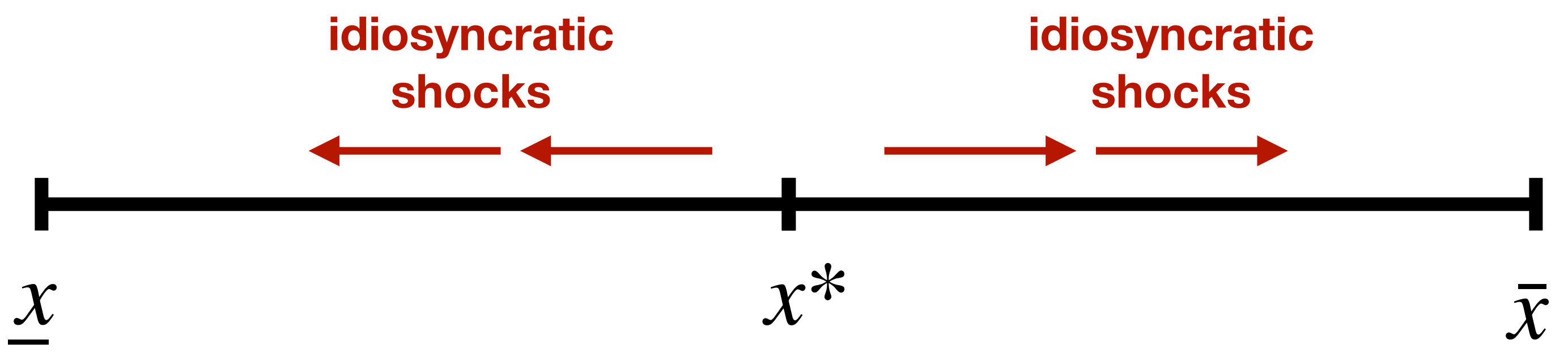


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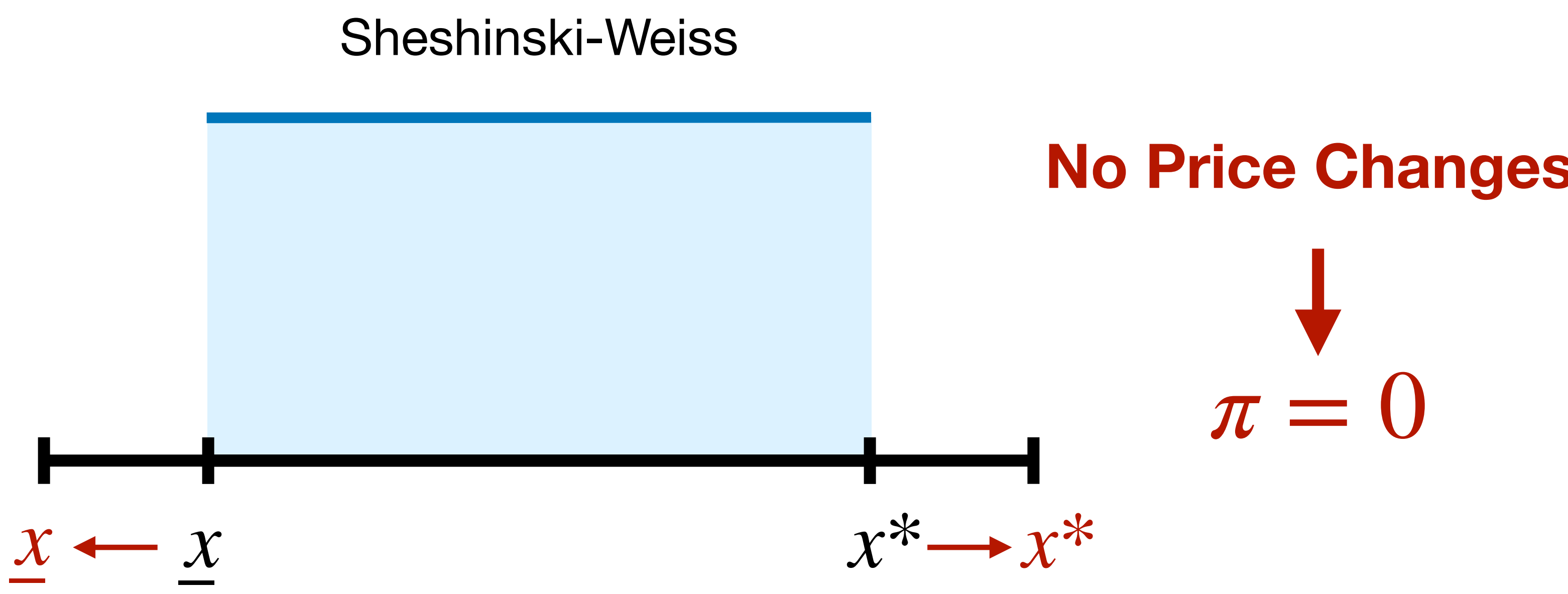


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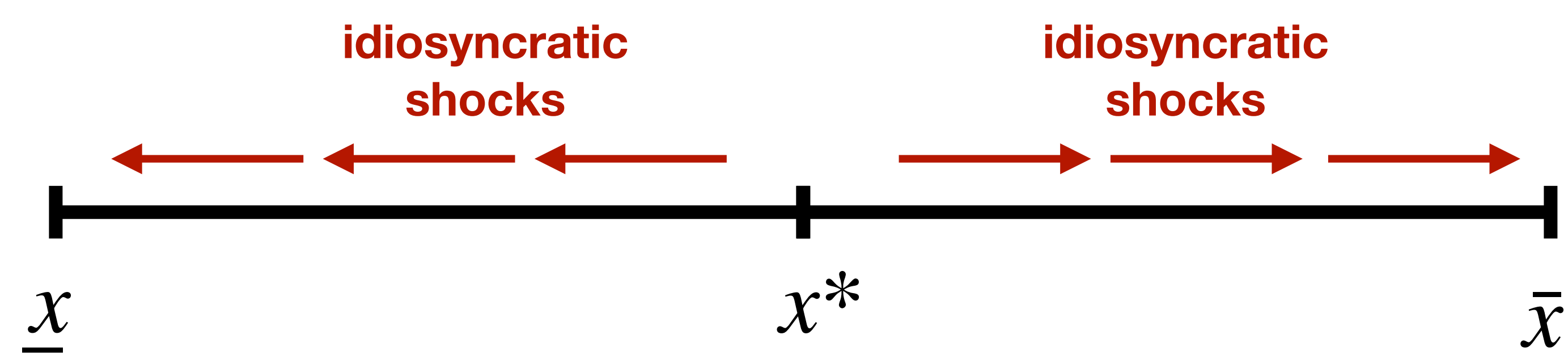


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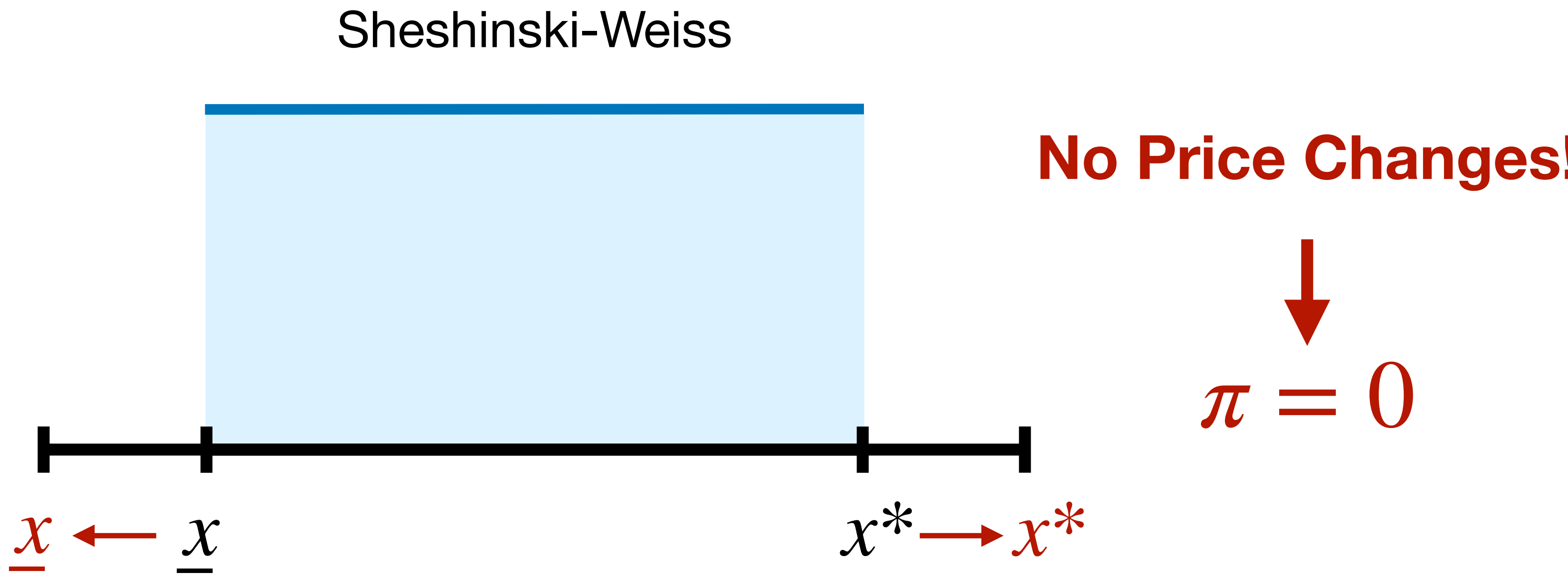


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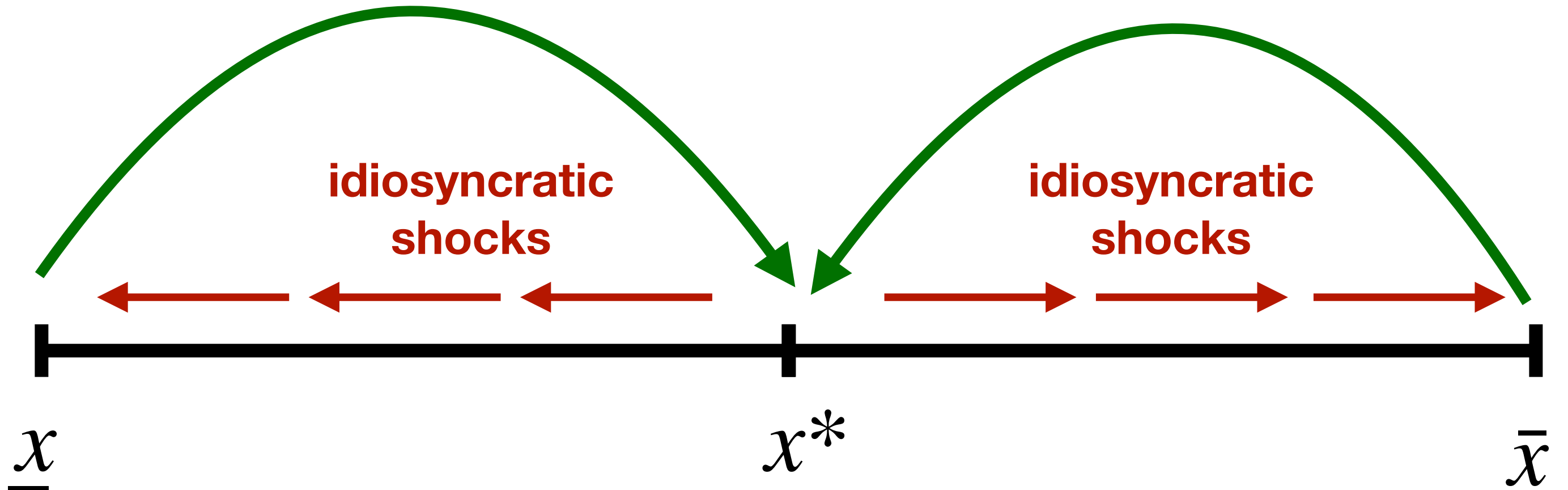


State Dependent “Menu Costs”

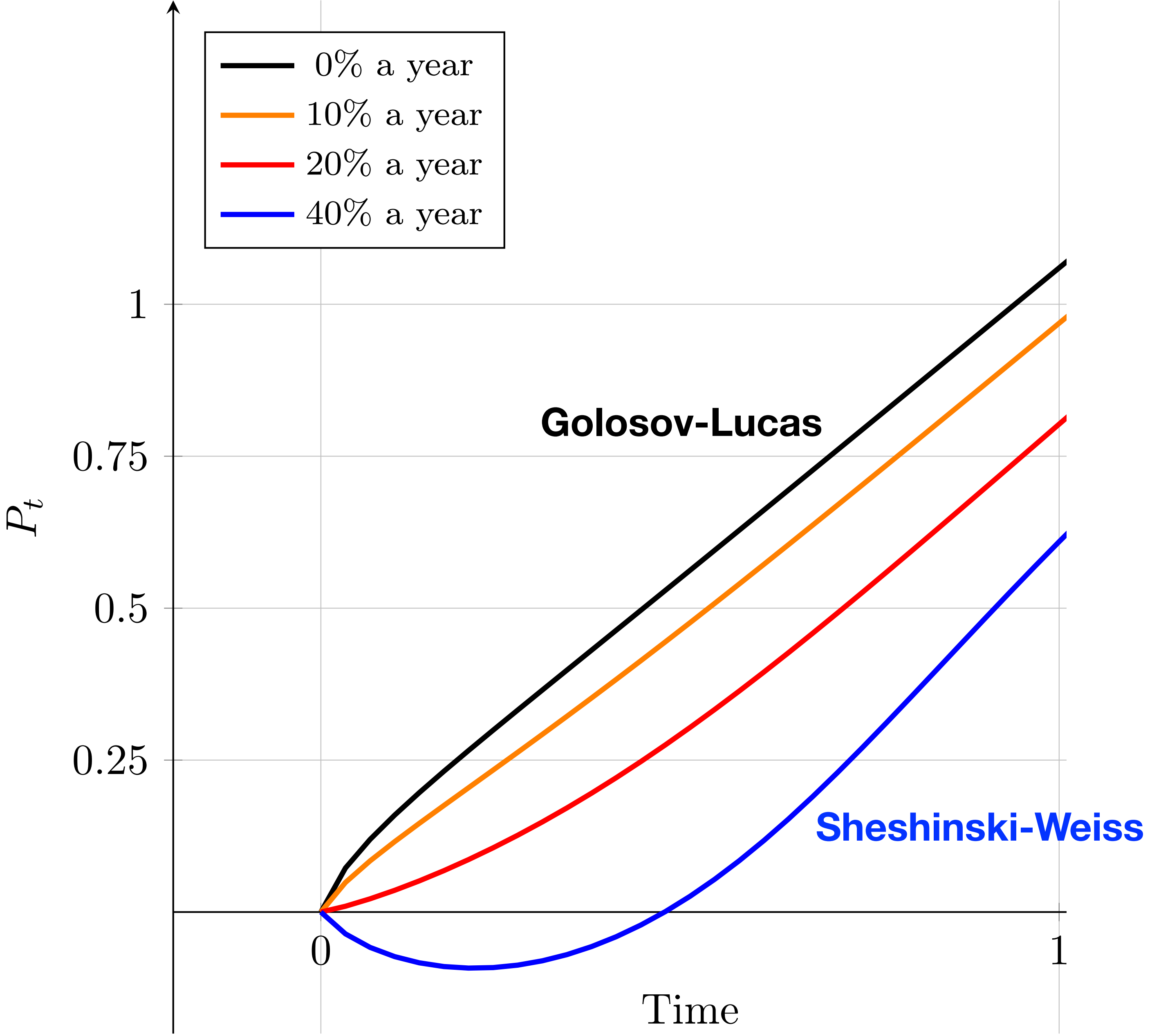
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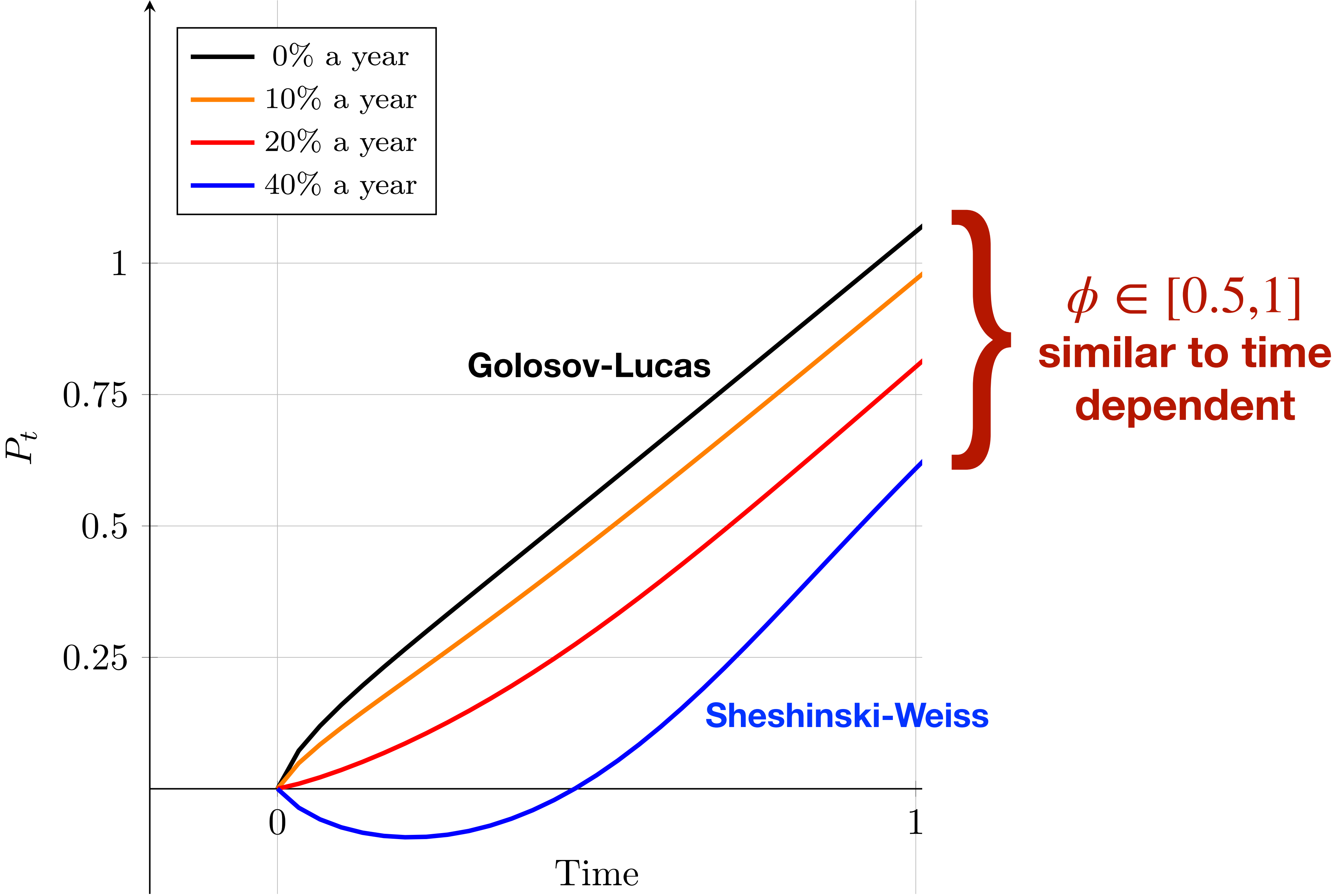
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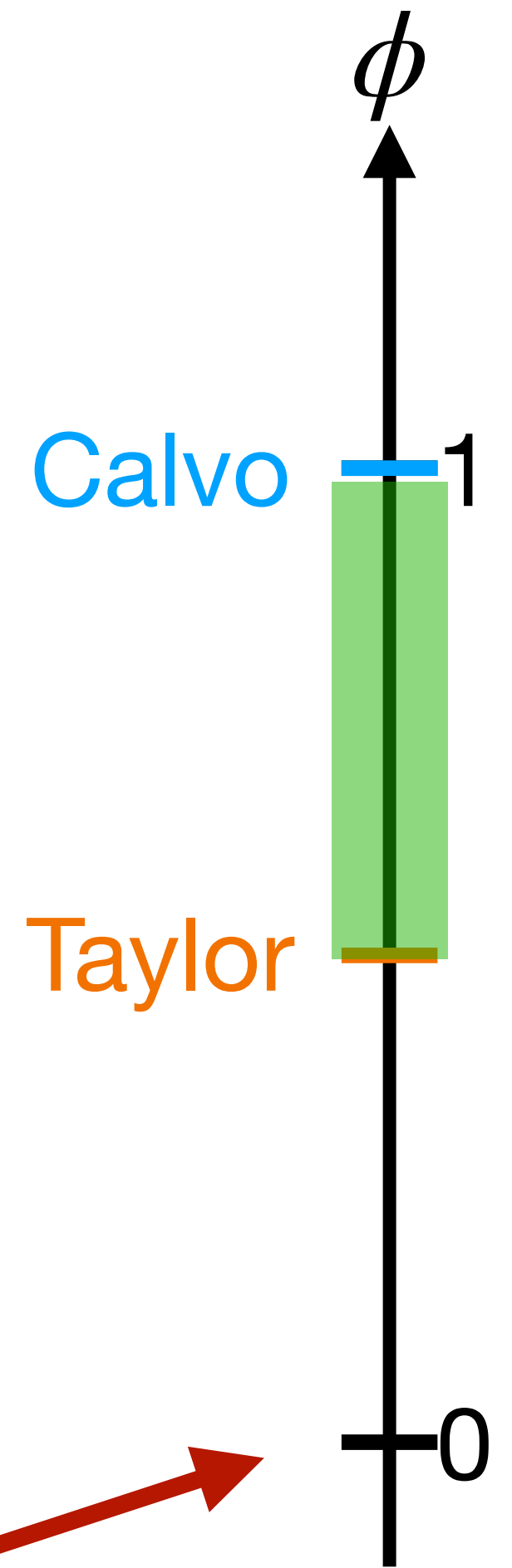
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- Overall: optimistic perspective, wage-price spiral but inflation falling, soft landing!

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- Our model: focus on the interaction between P and W (absent in the above)

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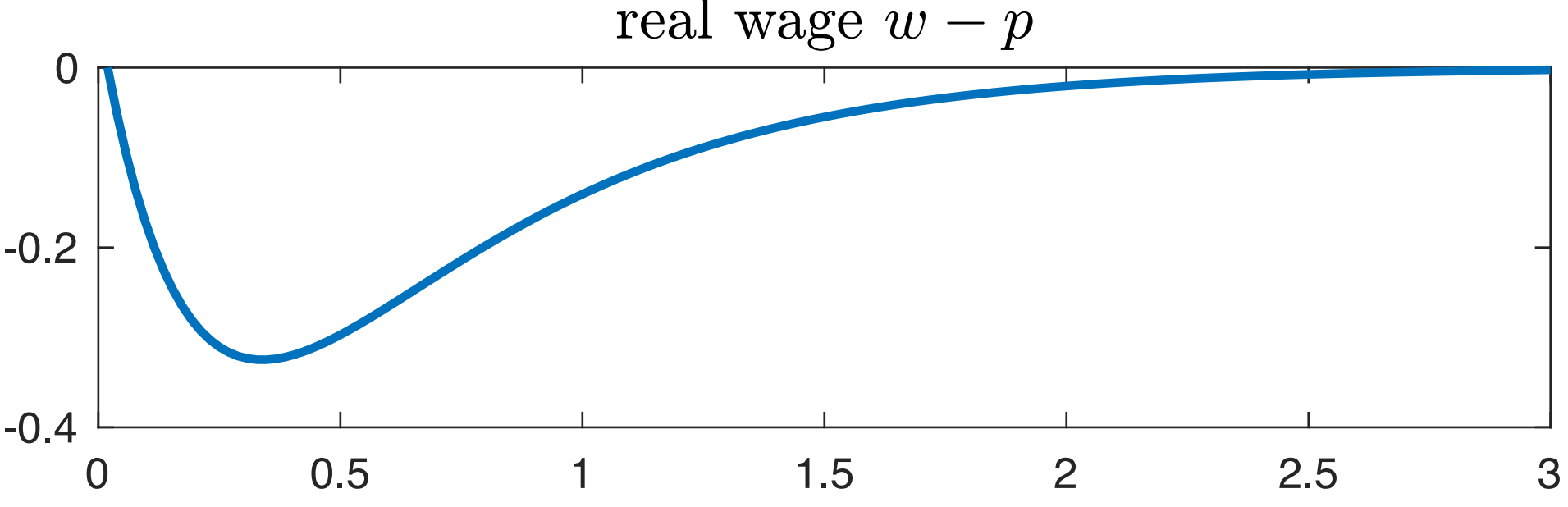
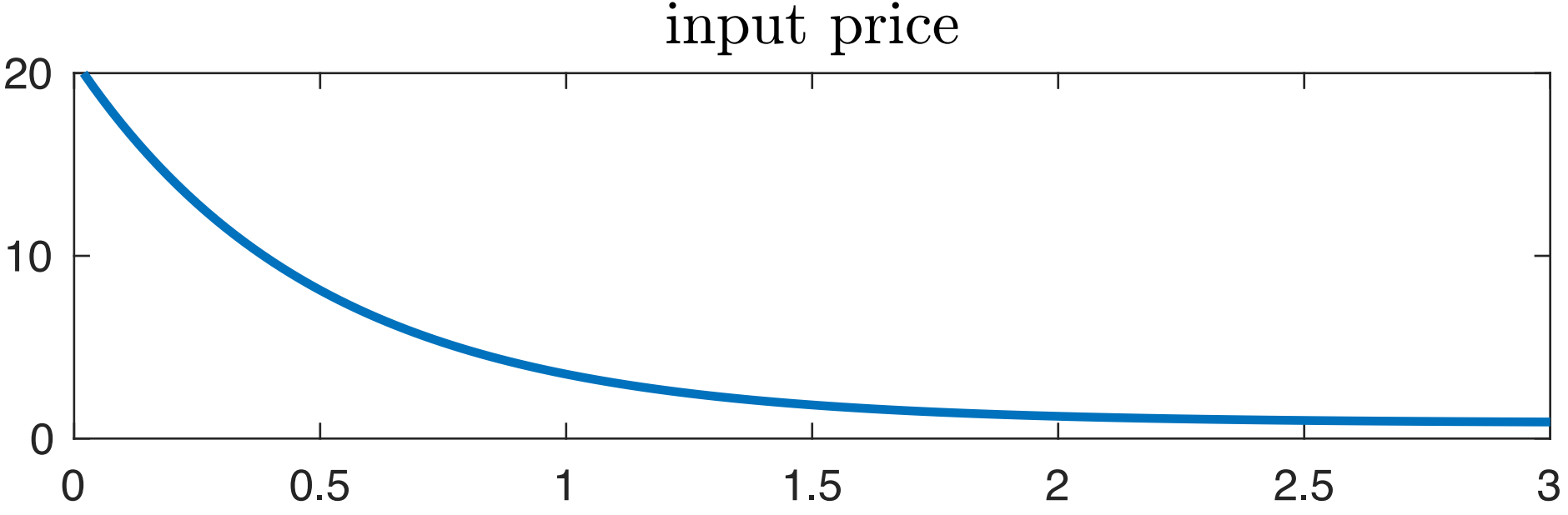
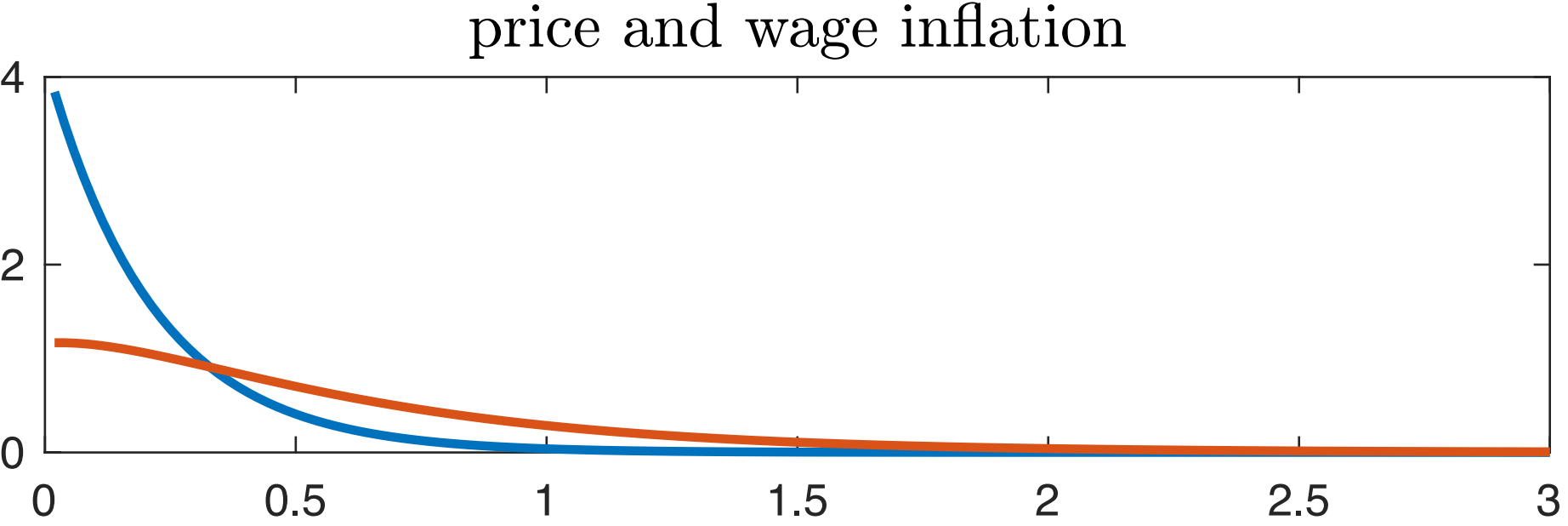
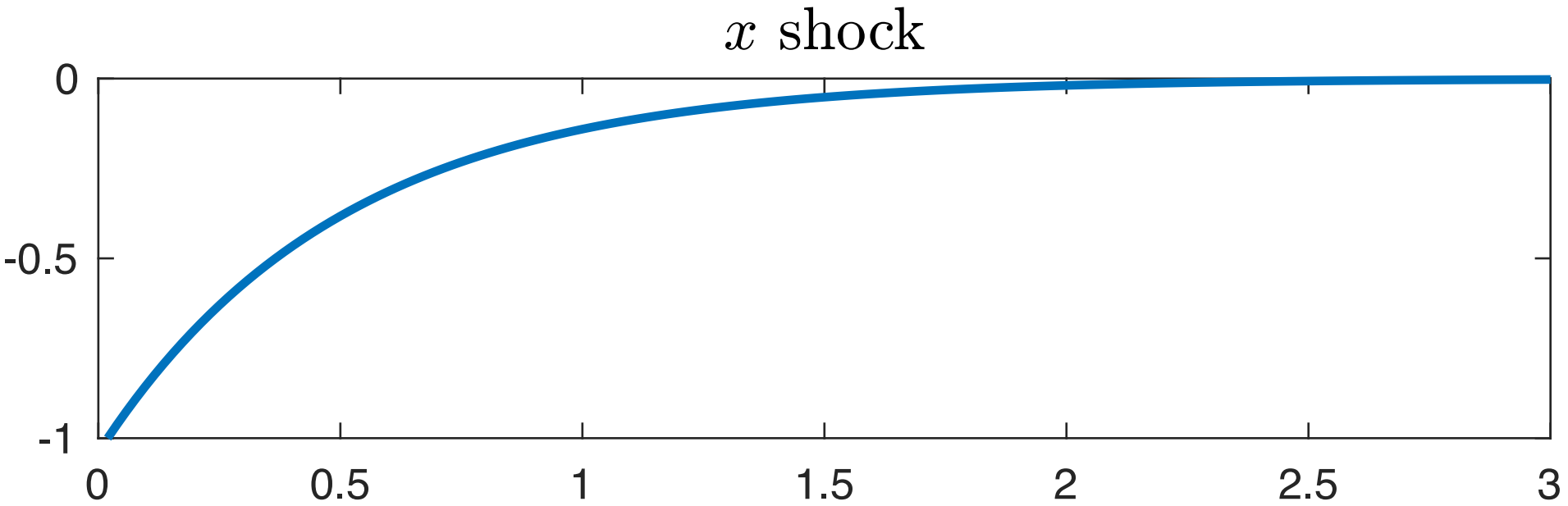
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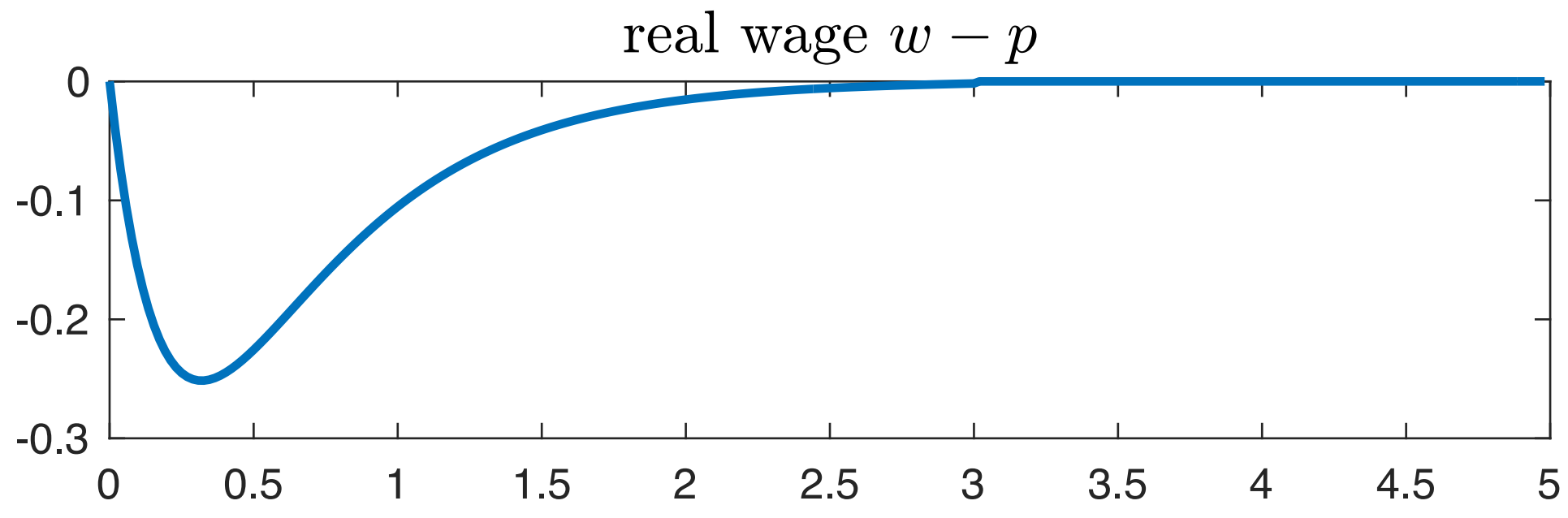
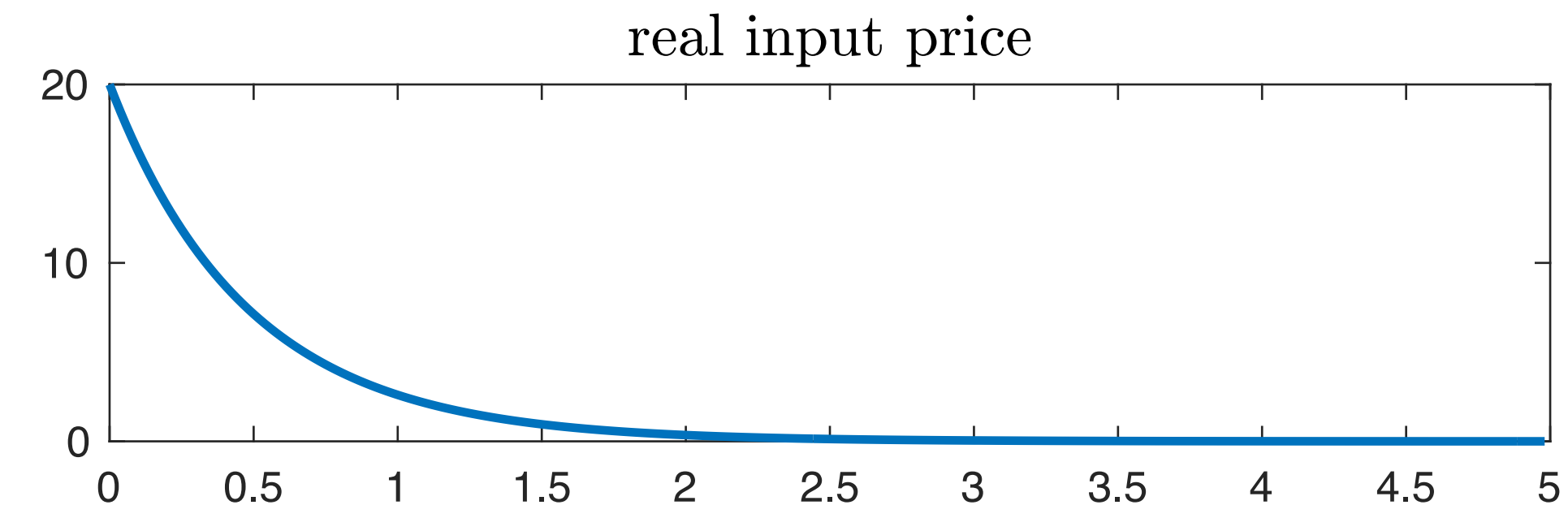
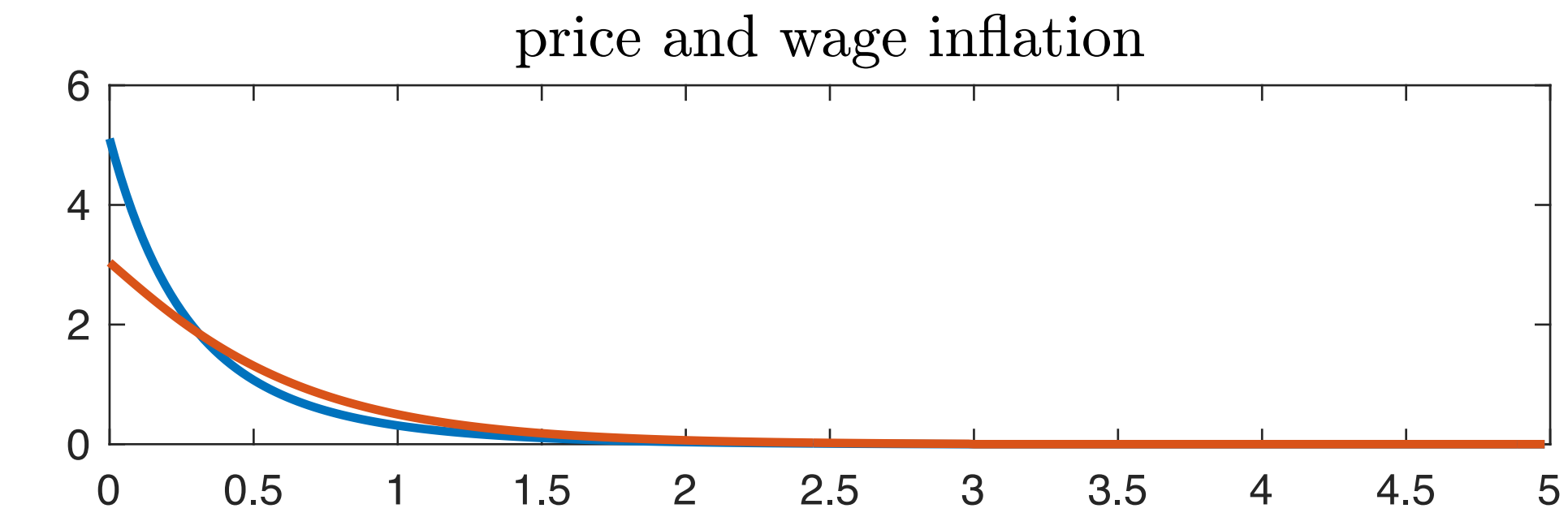
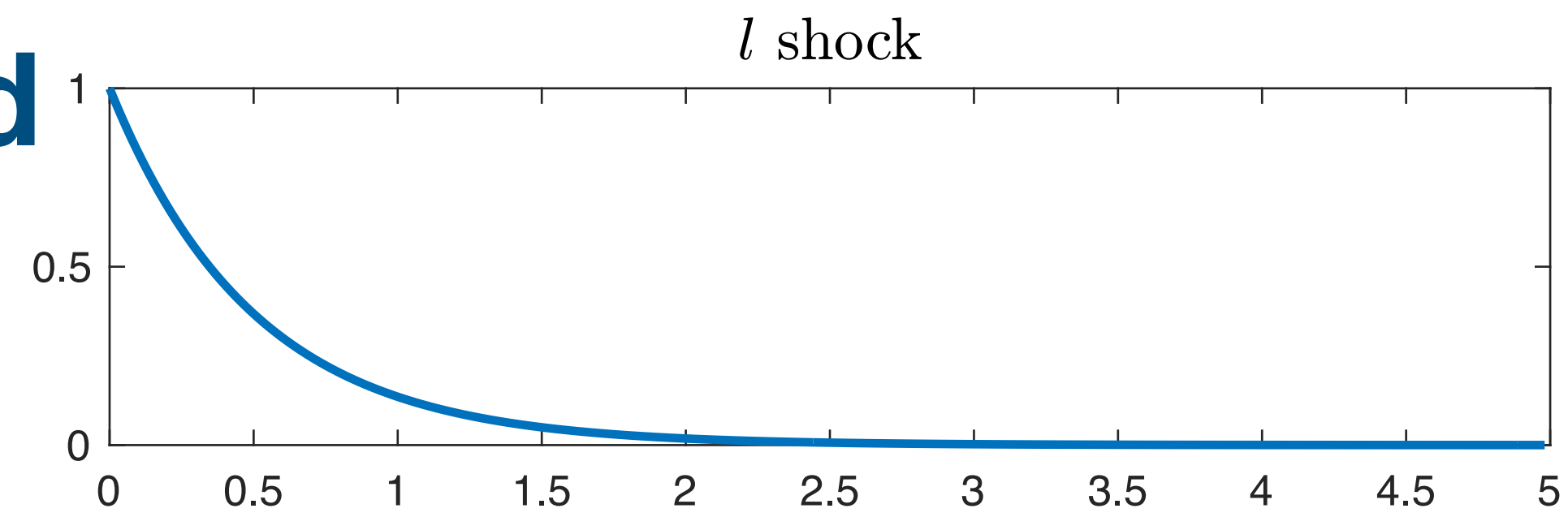
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- Study: demand and supply shocks, impulse response

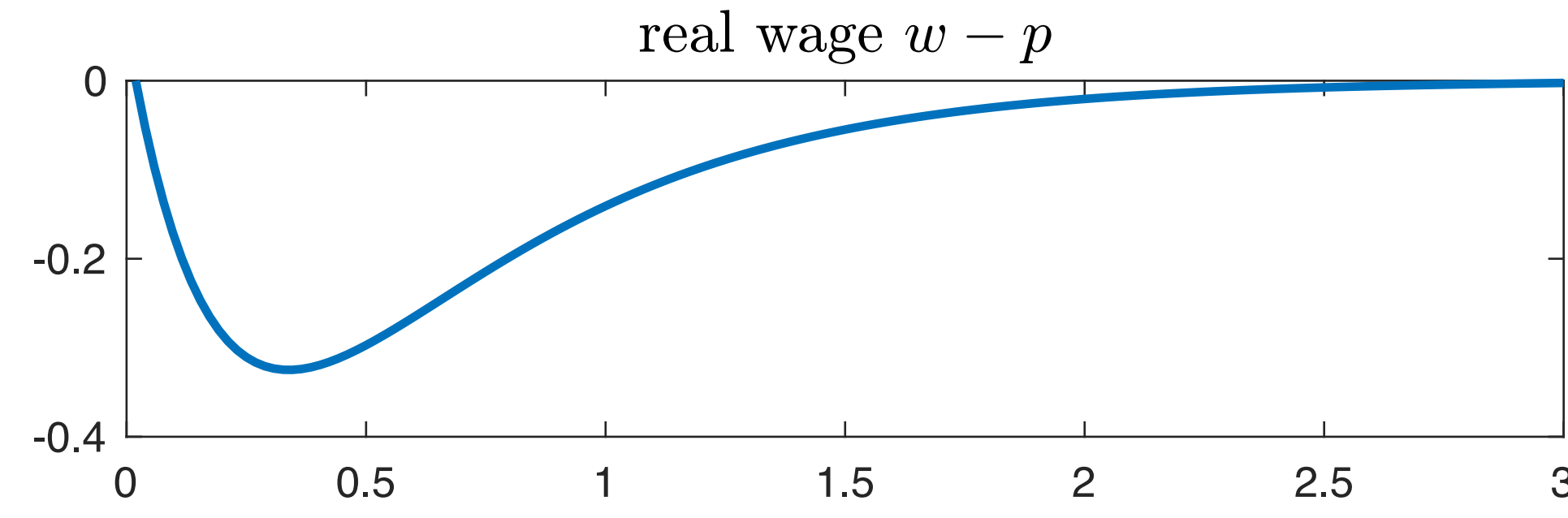
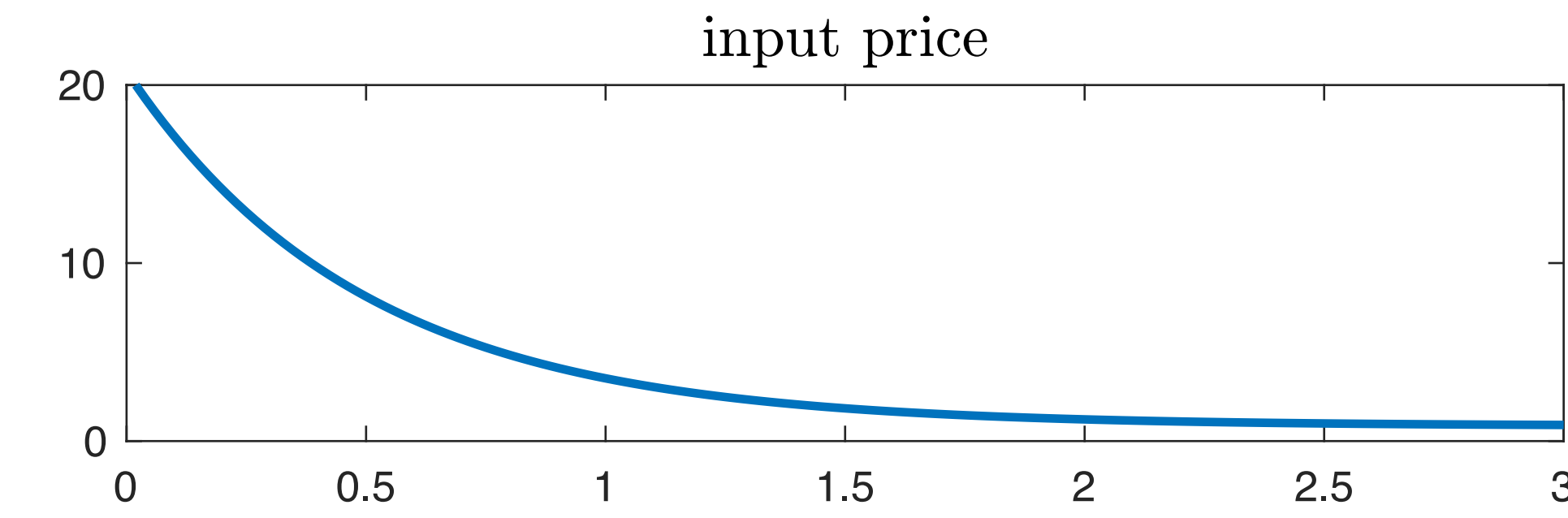
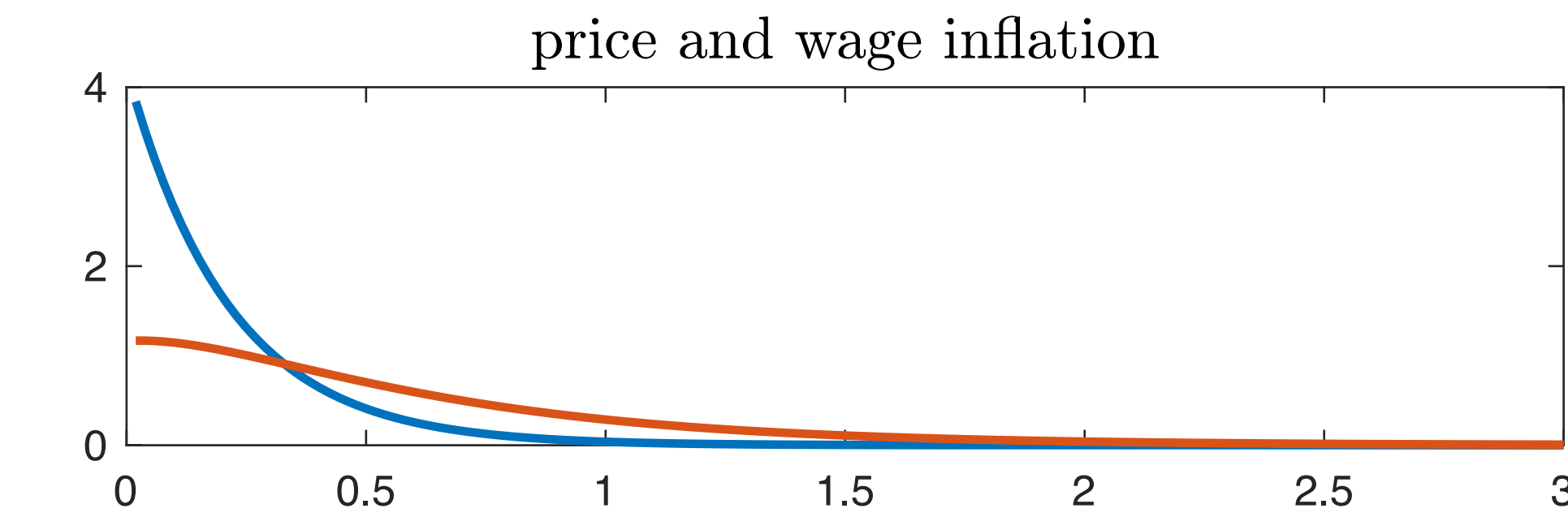
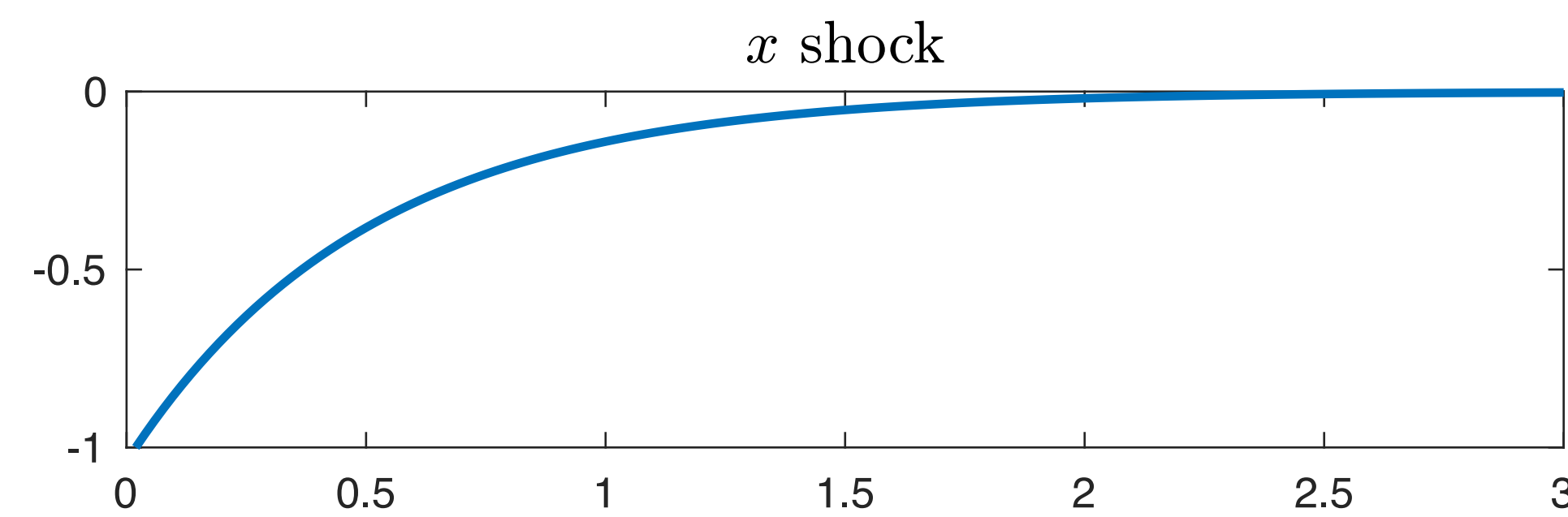
Supply Shock



Demand Shock



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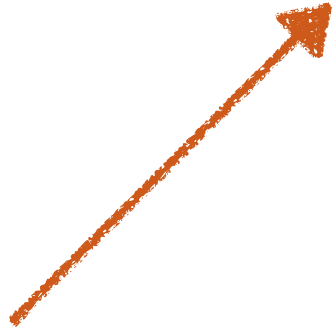


Real Wage Falls When...


A supply-constrained demand shock

$$\frac{\Lambda_p s_X}{\Lambda_w \epsilon} > \sigma s_L + \eta$$


Prices
relatively
less sticky
than wages



Scarce
input has
high share
and low
elasticity of
substitution
with labor



Relatively weak
response of real
wage demands to
hot labor market



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- ## ■ Extensions and caveats: non-rational expectations, other rigidities

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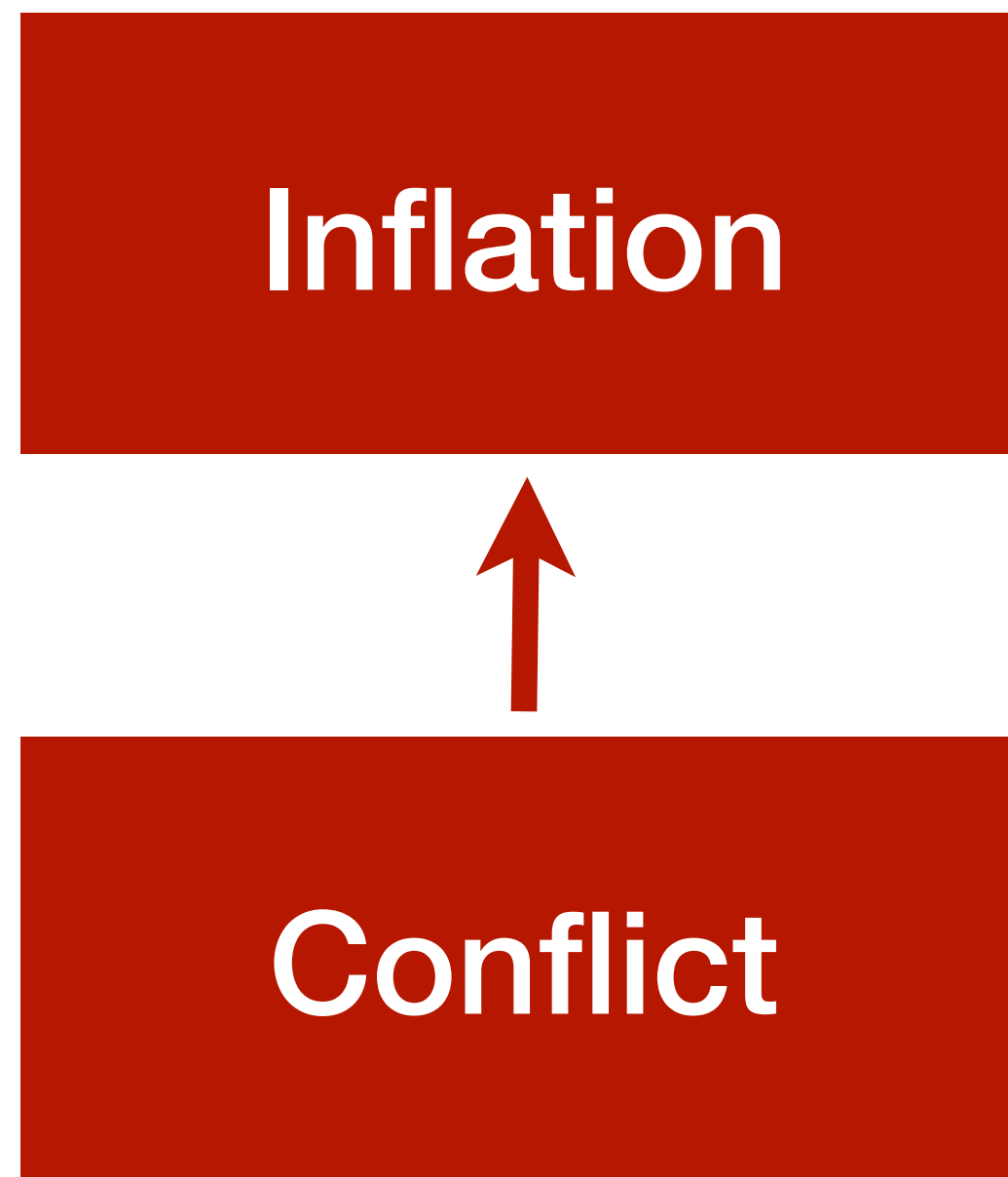
■ Our answer: two ingredients...

- Conflict = Disagreement on relative prices
- Staggered prices (distill best of NK models!)

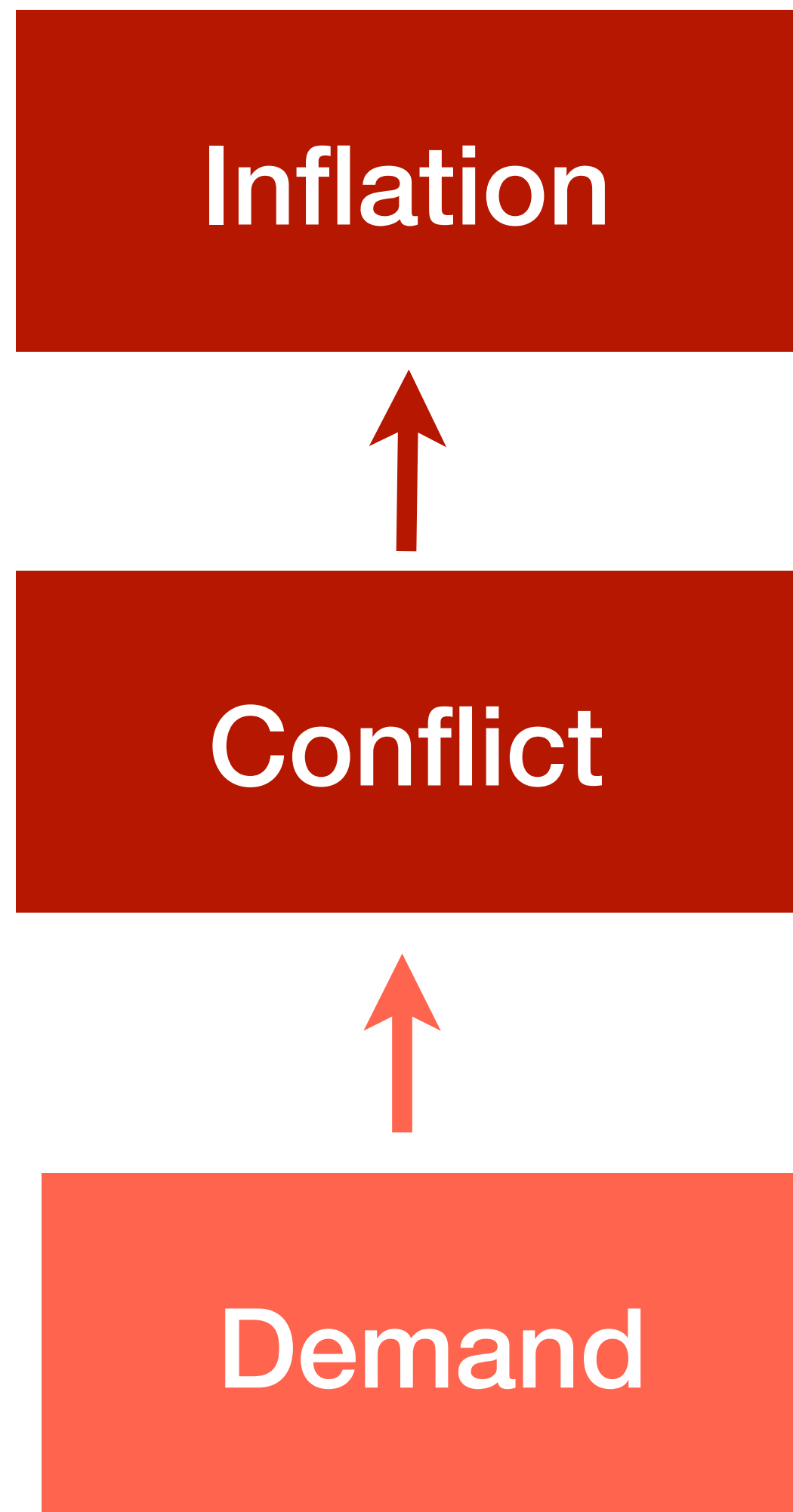
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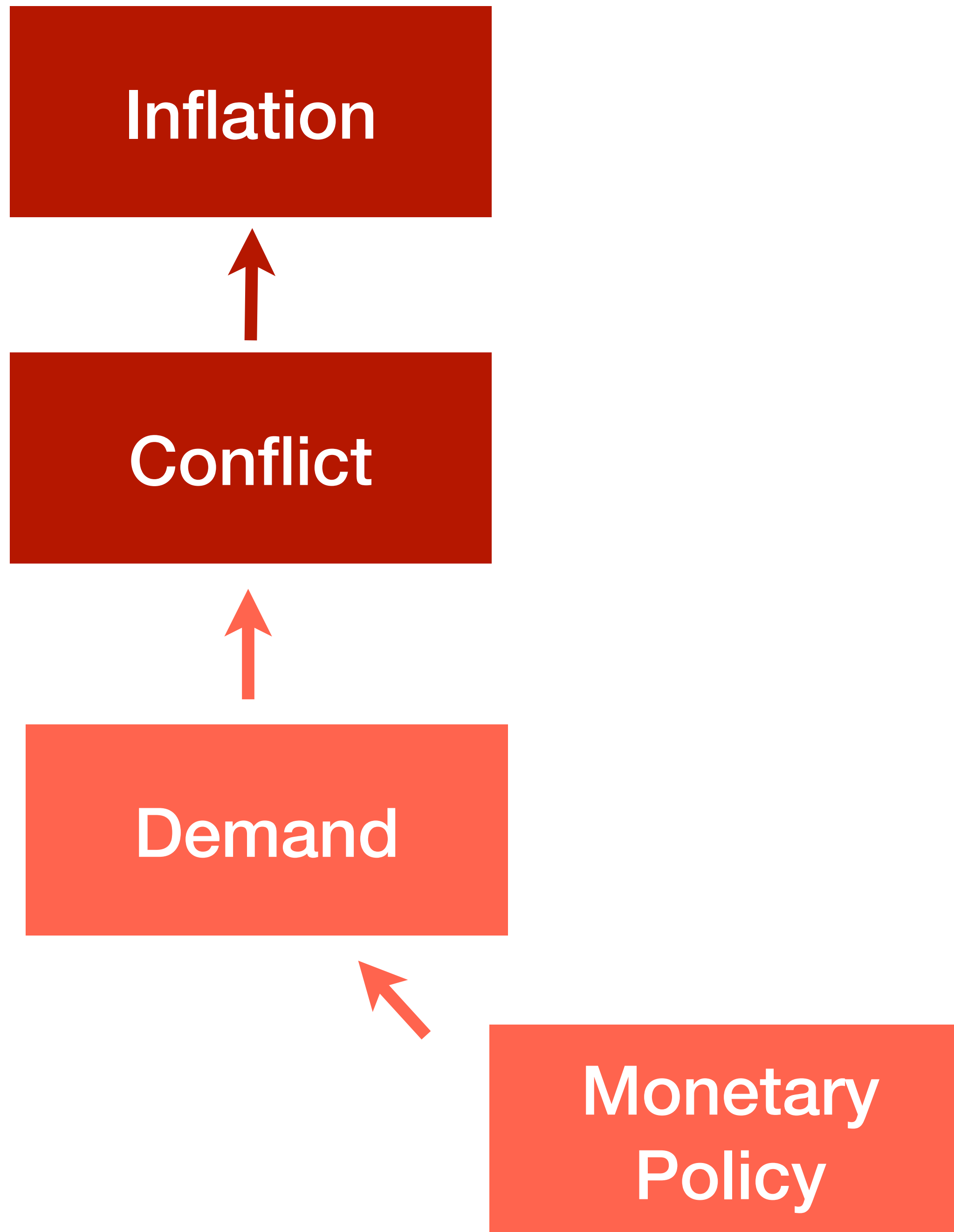
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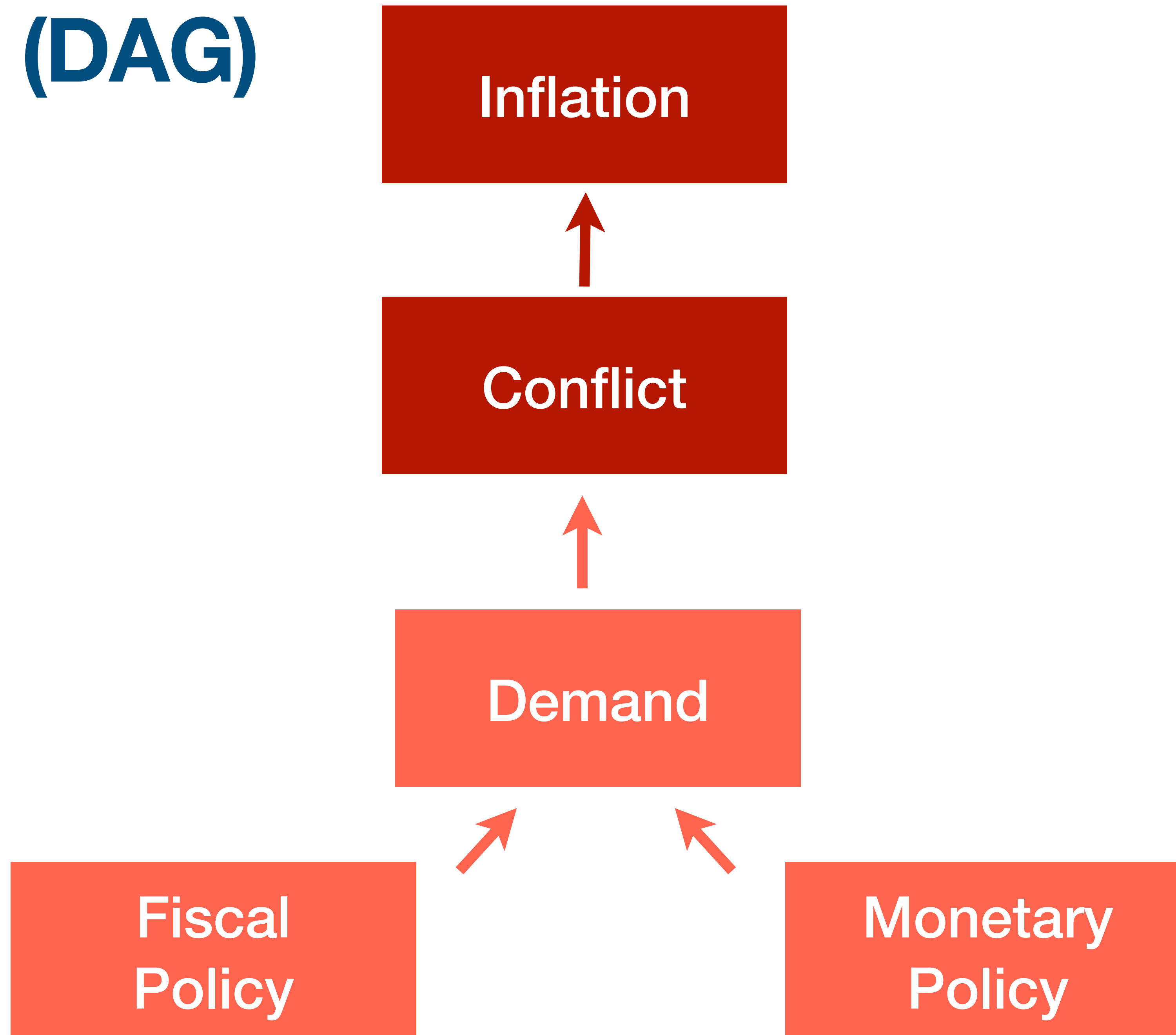
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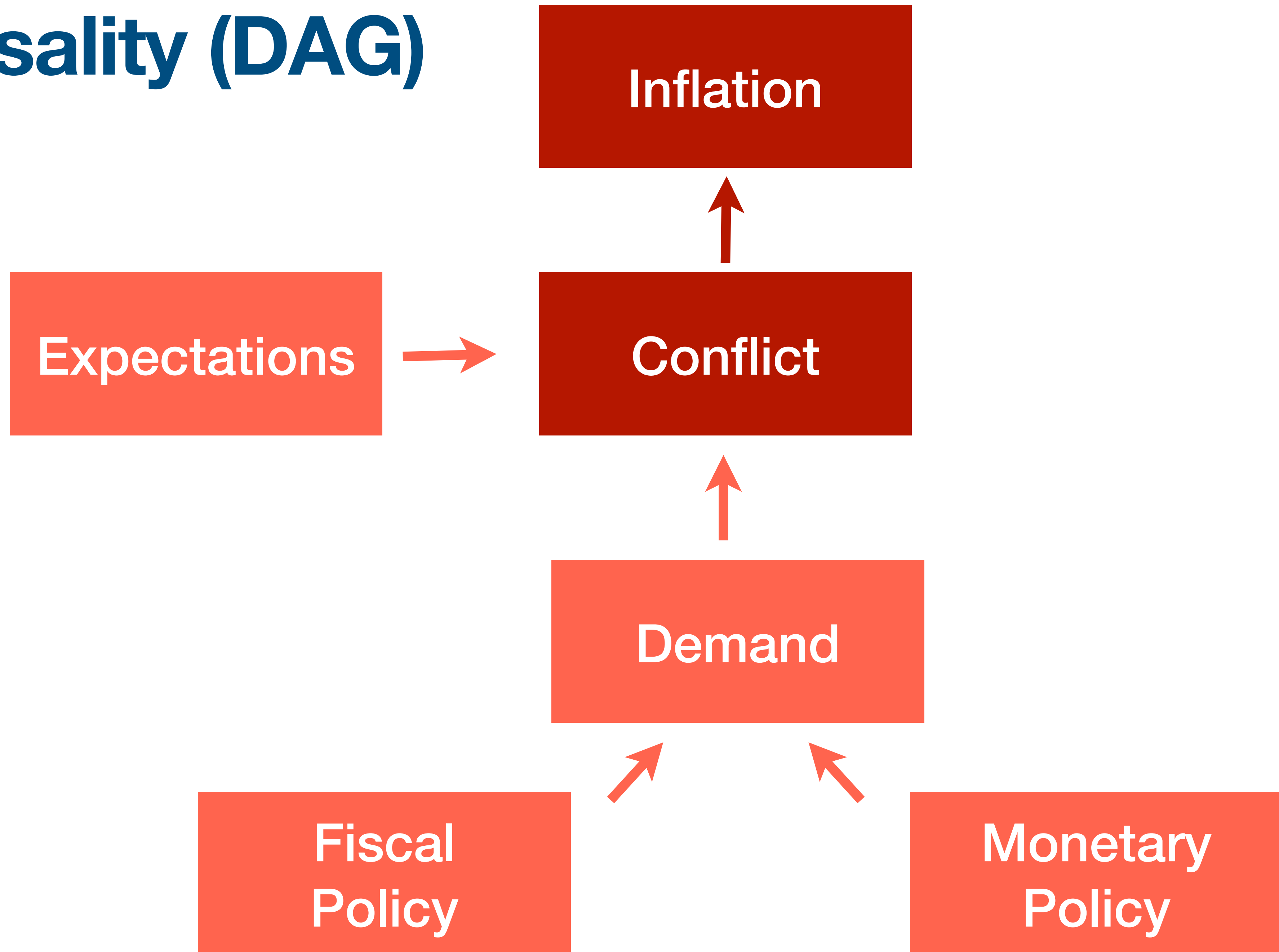
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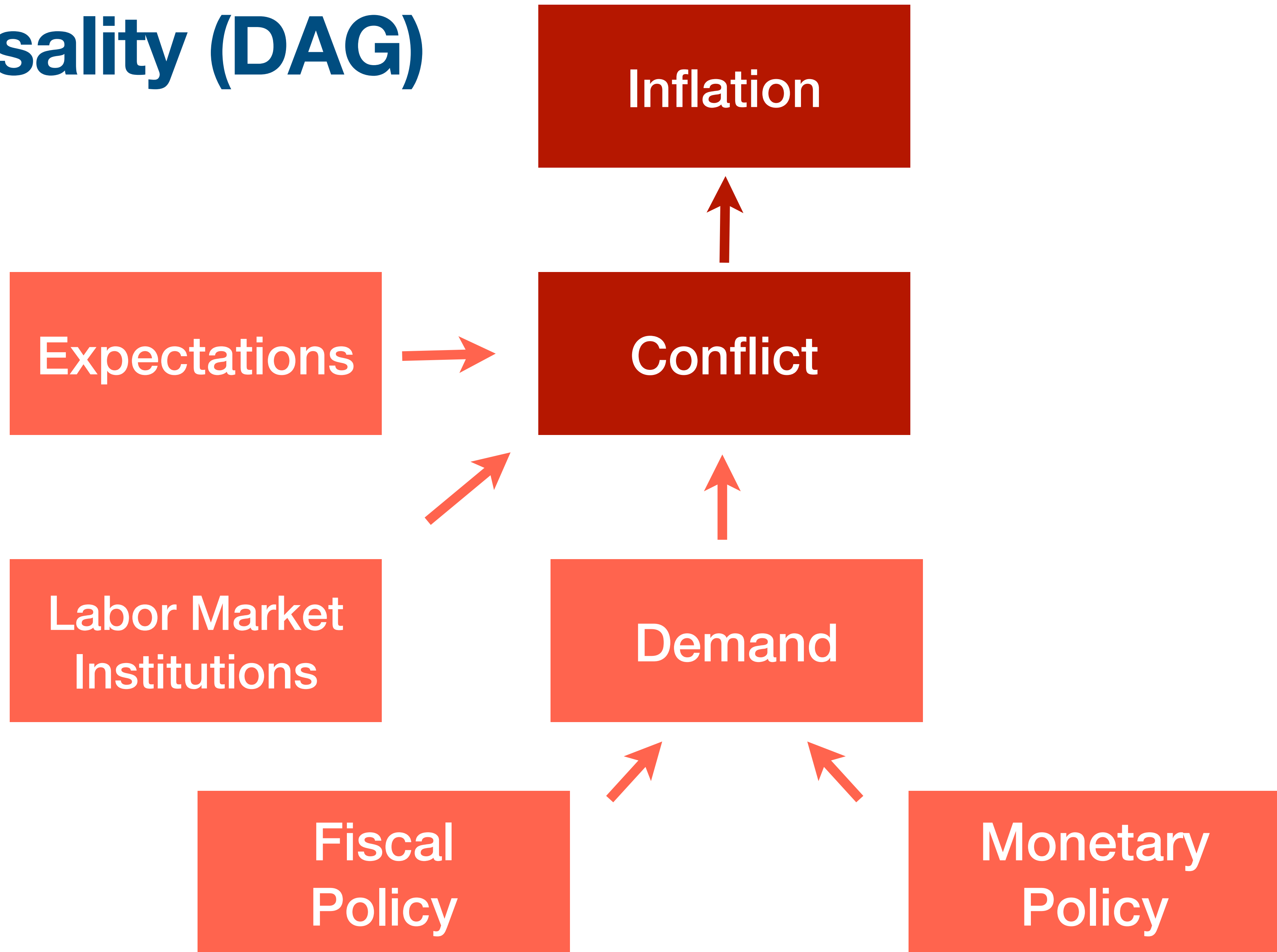
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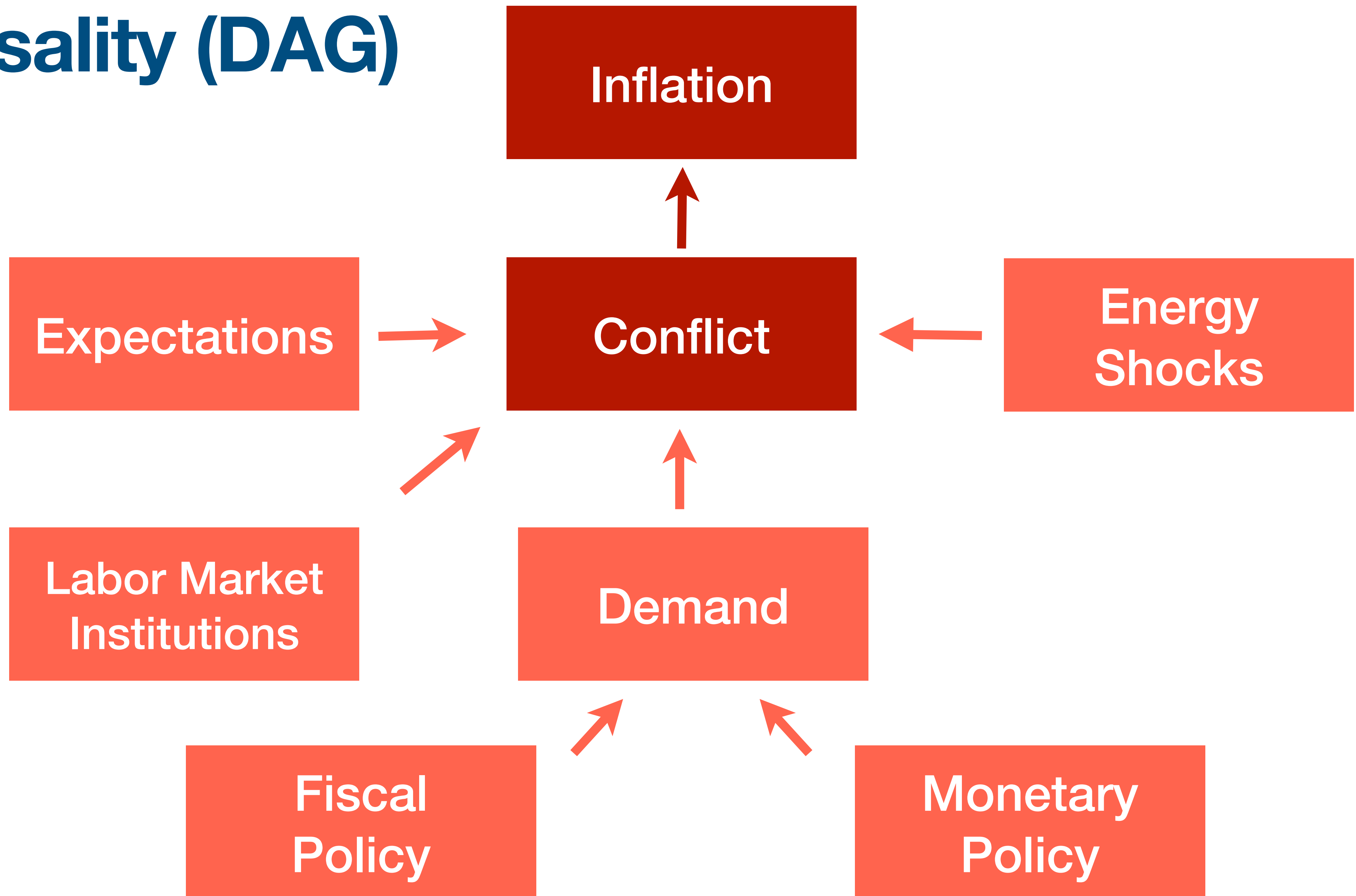
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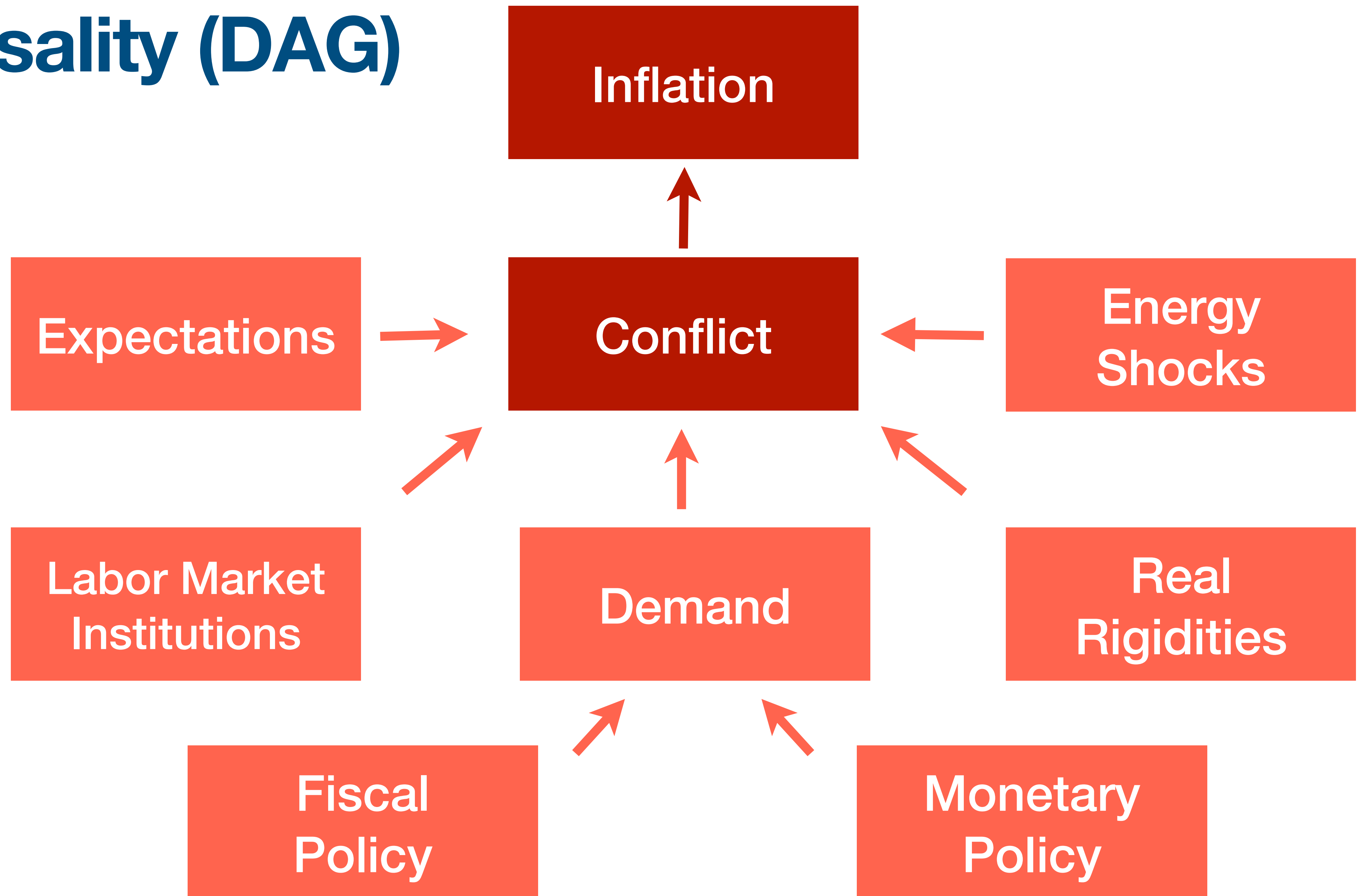
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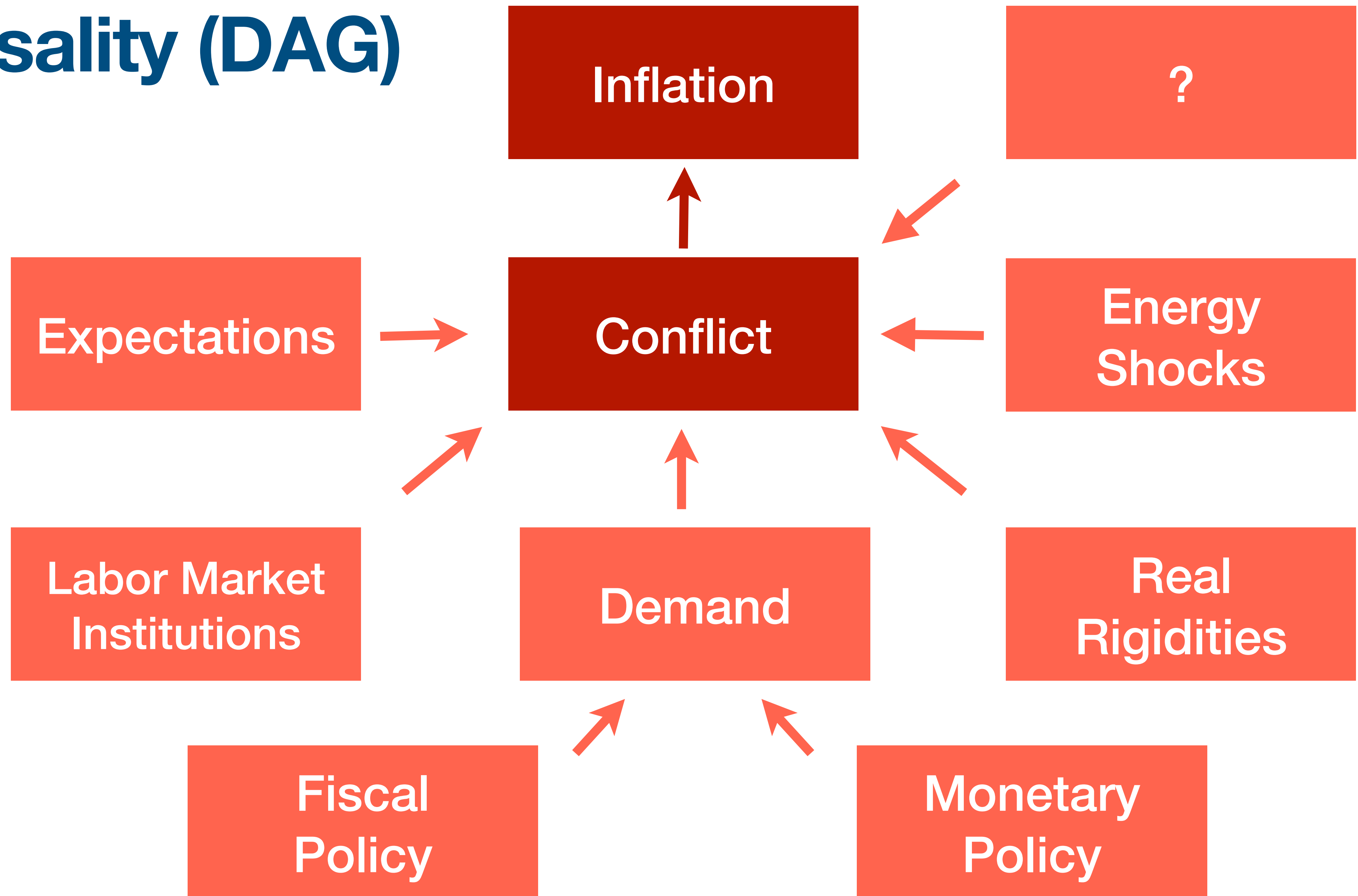
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- stylized, simple, conceptual, “intuition pump”, “shock to the system”
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■ #2 General Framework...

- nests standard macro models... (but more general; fewer special assumptions)
- General N sector network
- result: define conflict and show key role for inflation
- Bridge: conflict → standard modern macro

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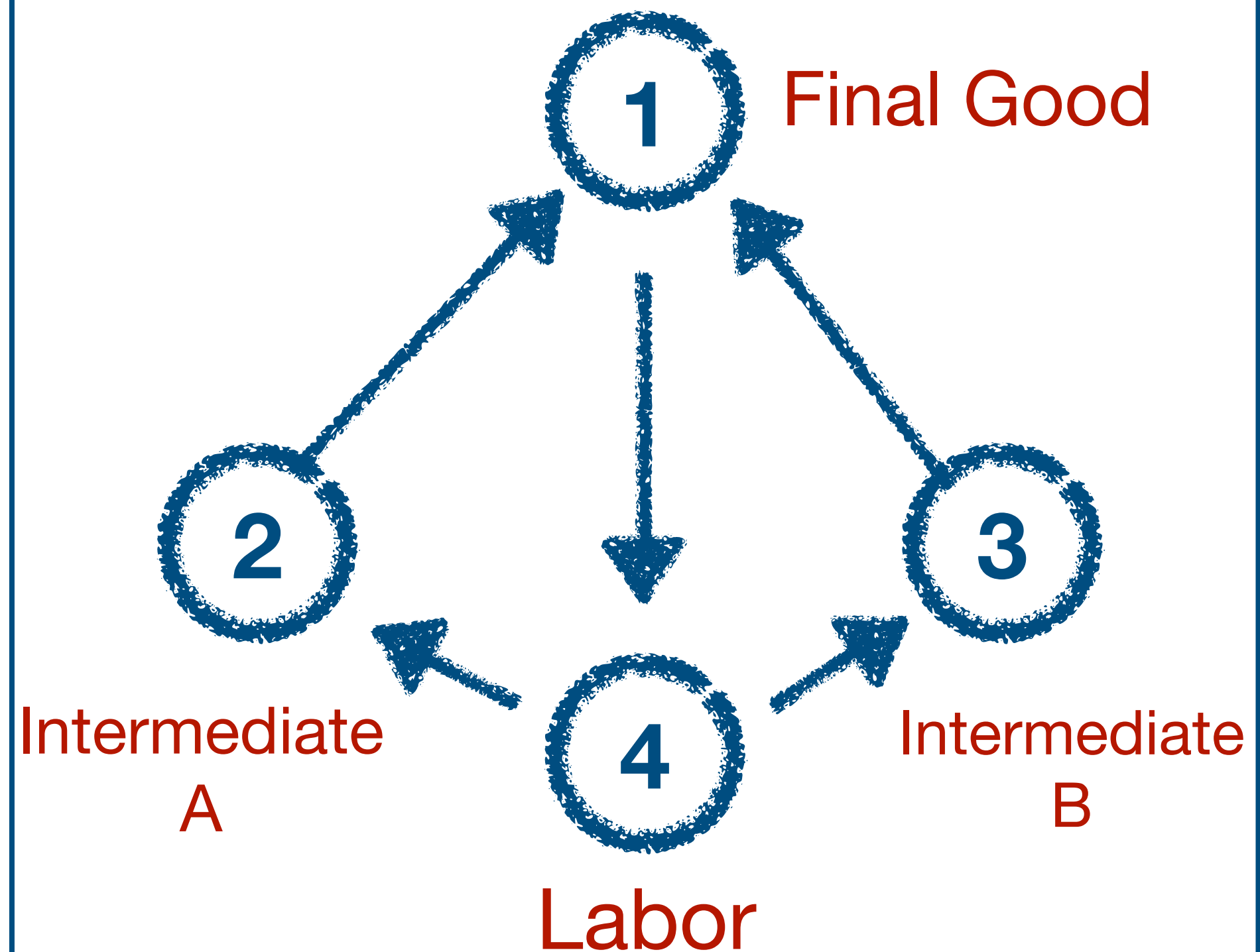
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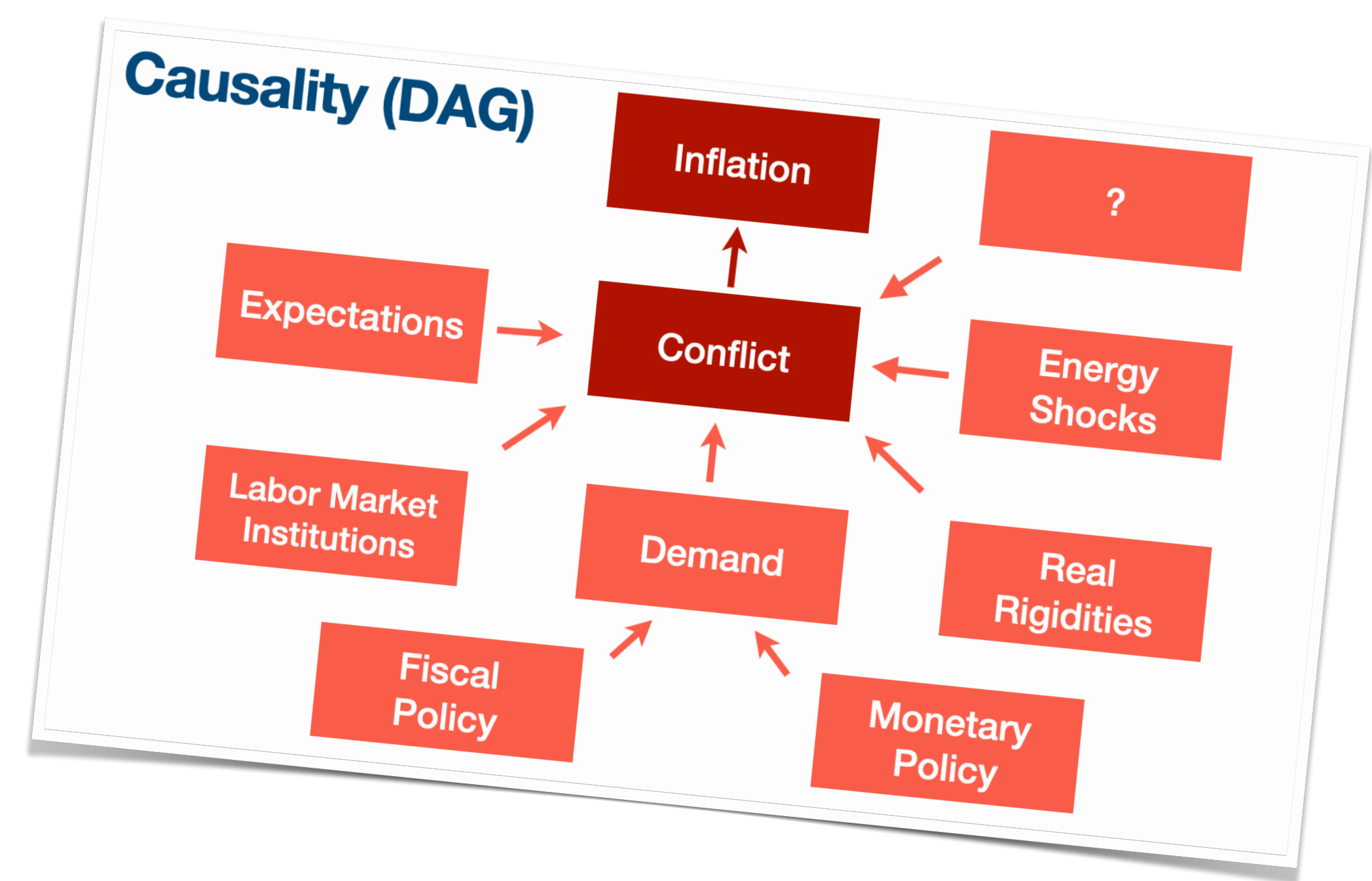
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- We take $\{a_t\}$ as given...
- exogenous? No!...
- ... determined by full model

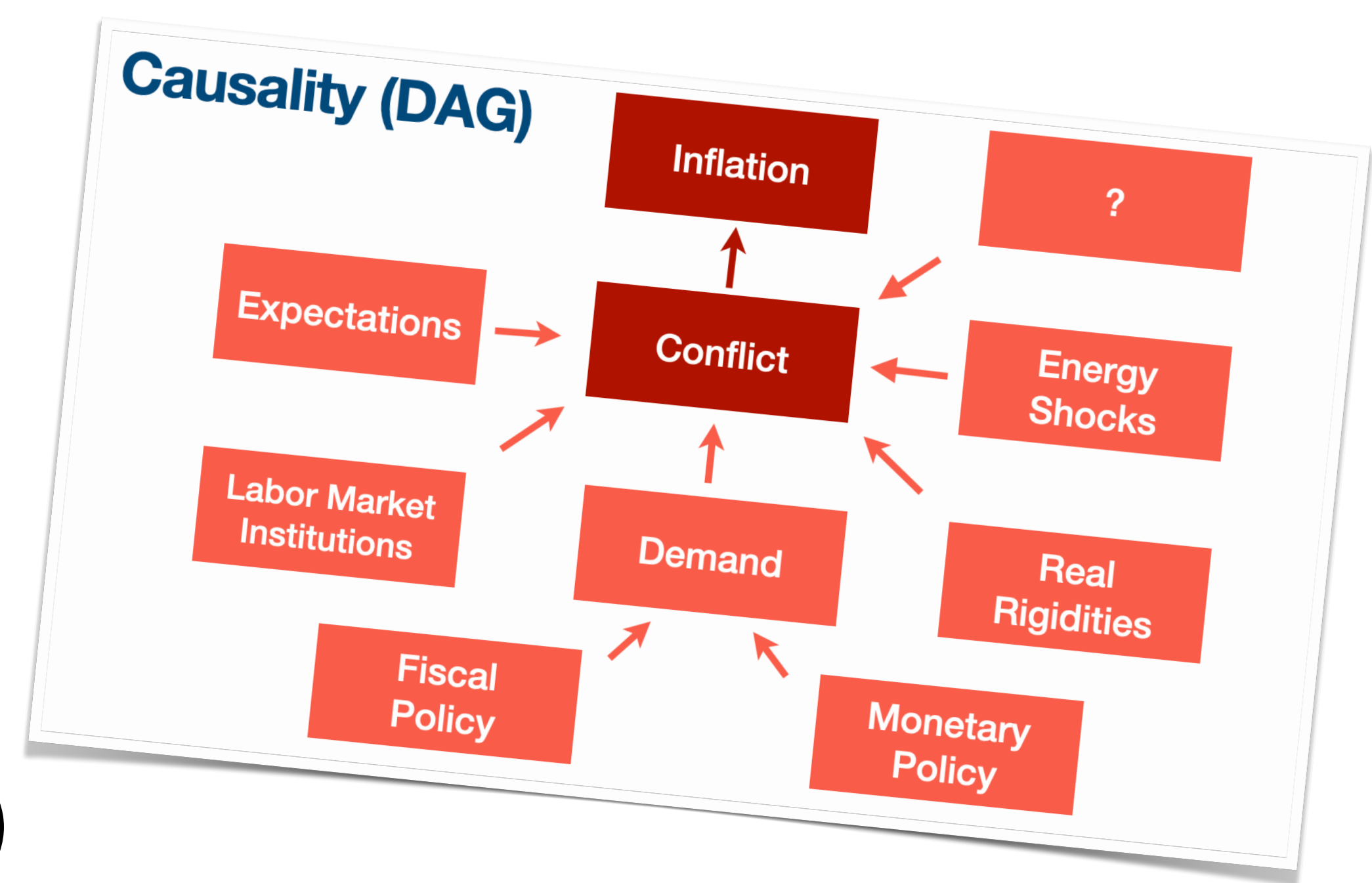


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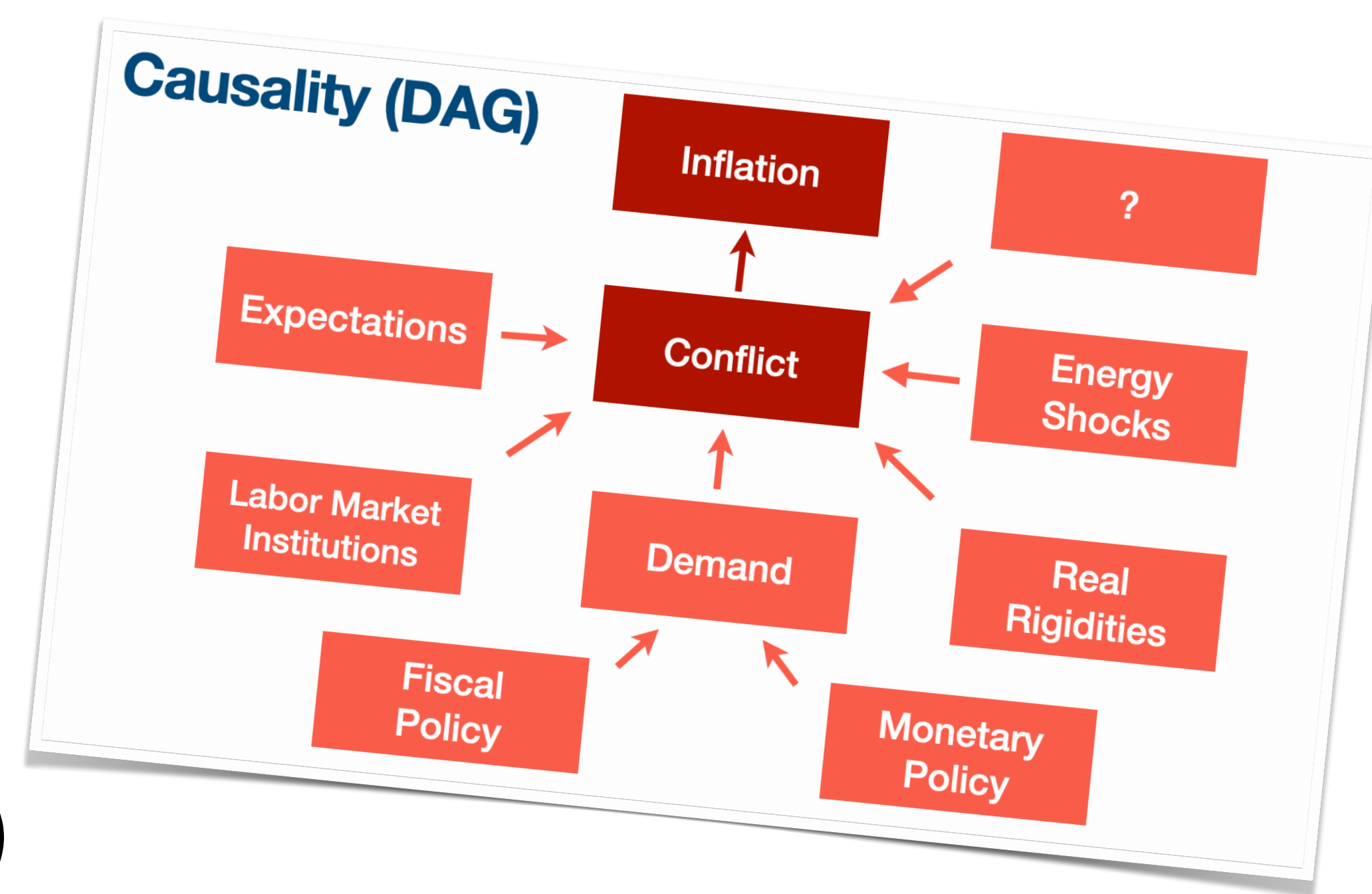
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- Other possibilities?
 - real wage rigidities (Blanchard-Gali)
 - ... ?



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 - propagation (often irrational expectations, easy money)

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Appendix: Some Links

- Irina Werning in The Guardian “How much?! The Absurdity of Inflation in Argentina”
- Loretta Mester “Inflation, Inflation Expectations and Monetary Policy Strategy”
- Furman “Why Did (Almost) No One See the Inflation Coming?”
- Barnichon “What If? Monetary Policy in Hindsight”
- IMF WEO Oct 2022 “Chapter 2: Wage Dynamics Post Covid and Wage-Price Spirals”
- Guerrieri-Lorenzoni-Straub-Werning “Macroeconomic Implications of COVID-19: Can Negative Supply Shocks Cause Demand Shortages?”
- Wang-Werning “Dynamic Oligopoly and Price Stickiness”
- Guerrieri-Lorenzoni-Straub-Werning “Monetary Policy in Times of Structural Change” (2021)
- Werning “Inflation Expectations and the Rate of Inflation” (2022)
- Lorenzoni-Werning “Wage Price Spirals” (BPEA; 2023)
- Lorenzoni-Werning “Inflation is Conflict” (2023)
- The Economist “Even super-tight policy is not bringing down inflation”

Facts

Early monetary policy hikers: Chile, Brazil, New Zealand, Norway, S Korea Poland...



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... but inflation rose similarly to other countries...

