# What Can Stockouts Tell Us About Inflation? Evidence from Online Micro Data

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# Summarize

- Are supply disruptions inflationary?
- Evidence on comovement inflation and stockouts in online retailers
  - significant but gradual response of inflation to increase in stockouts
- Model of inventories and stockouts to help interpret evidence

# Broader Comments

- Impressive and timely paper
  - careful work with micro data
  - combined with model to alleviate endogeneity concerns
- Inventories, costs and markups closely related in macro models
  - so using data on stockouts informative about drivers of inflation

# Comments

- Inflation vs. relative price changes
- Model of inventory adjustment
- Questions and suggestions

# Inflation vs. Relative Price Changes

- Paper convincingly documents link stockouts and relative price inflation
- But changes in relative prices per se not inflationary
- With asymmetries sectoral shocks act like cost-push shocks
  - Ball-Mankiw (1995), Guerrieri et al. (2021)
- Nevertheless, aggregate inflation dynamics determined by monetary policy

# Model of Inventory Adjustment

- Study inventory choice of retailer. Order inventories to ensure

  Prob. stockout (inventories) = fn (markup, user cost)

  - user cost: $\Omega_t - \frac{1-\delta}{1+r_t}\Omega_{t+1}$
  - tradeoff: inventory holding cost vs. unable to meet consumer demand

- Transitory increase in replacement cost increases user cost

  - so firm buys less inventories, more likely to stockout

- Increase in markups leads to more inventories, fewer stockouts

- So comovement prices, stockouts suggests increase in costs, not markups

# Mechanism in Paper

- Paper describes following mechanism
  - ordering larger batch of inventories more costly on the margin
  - so firms that stockout have larger replacement cost, set higher prices
  - perhaps less relevant for smaller individual retailer

- Alternative: linear ordering cost and estimate persistence of costs?

- Model assumes firms know the distribution of $v$ and no delivery lags
  - unexpected increase in mean $v$ will lead to stockouts
  - more so if larger delivery lags
  - larger orders by all firms in the sector increase production costs

- Data on inventories and sales + full info estimation can tell these apart

# Alternative Model

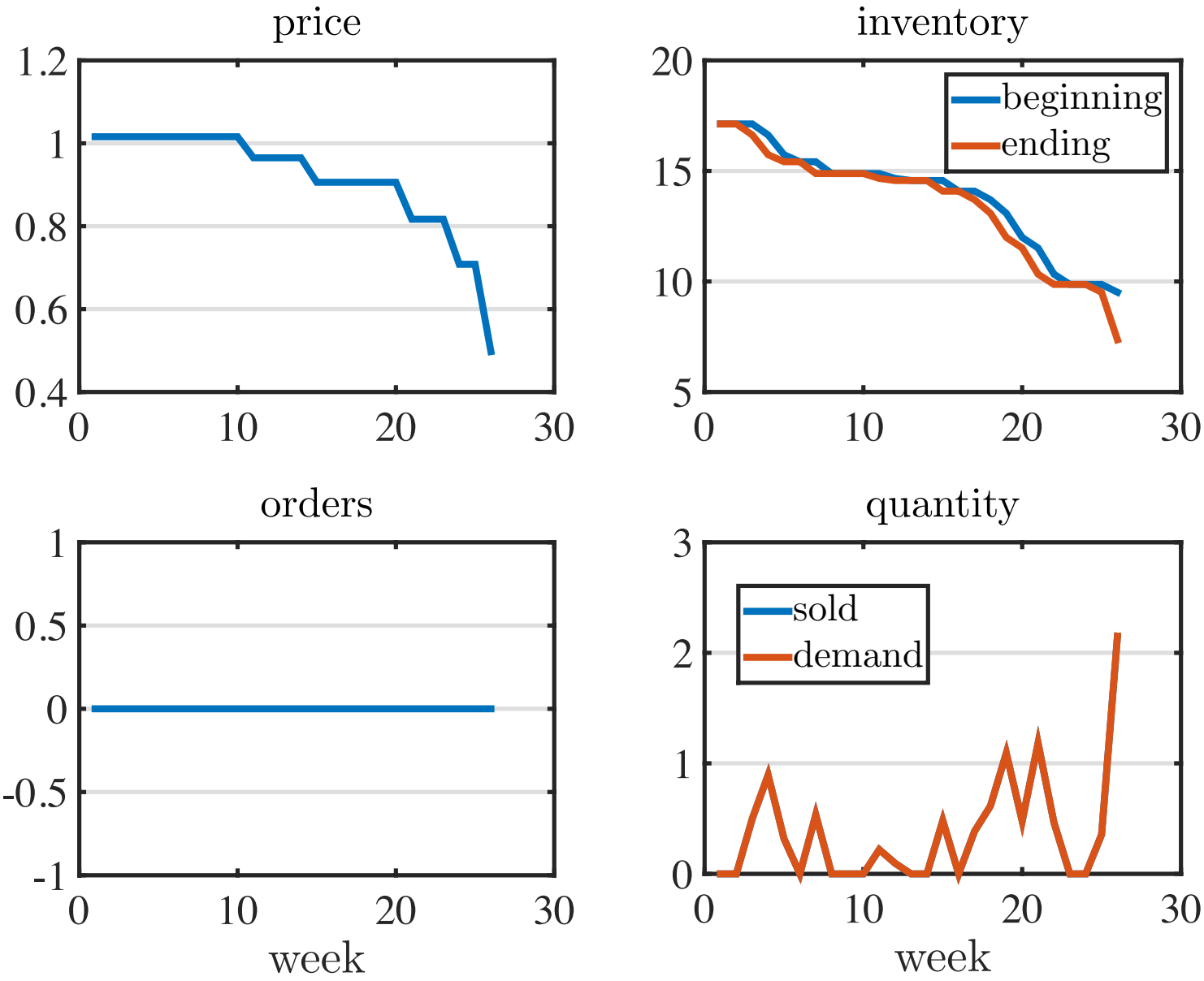
- Permanent stockouts suggest model of frequent product replacement
  - decide initial stock at beginning of product life-cycle
  - if demand low, reduce price since lower shadow valuation of goods
  - if demand high, raise price

- Based on dormant work with Golosov-Rodnyansky
  - inventories evolve according to

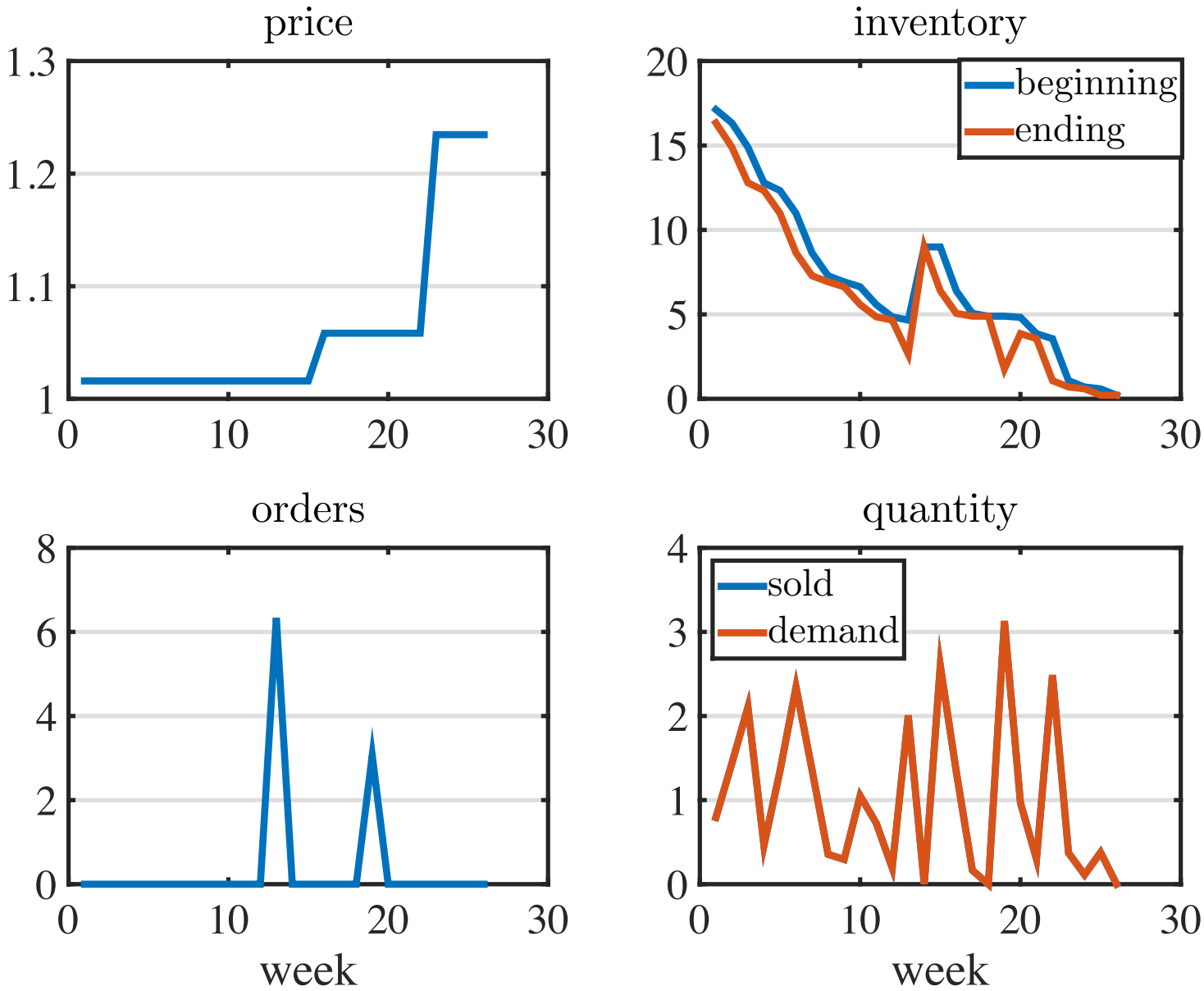
$$k_{t+1} = k_t - \min\left[v_t q(p_t), \quad k_t\right] + x_t$$

  - fixed costs of changing prices $p_t$ and ordering $x_t$
  - irreversibility $x_t \geq 0$
  - good discontinued after $T$ periods

# Firm with Low Demand



# Firm with High Demand



# Questions and Suggestions

- Do inventory frictions change dynamics of inflation?
  - typically inflation depends on current and expected real marginal costs
  - how do inventories/stockouts change inflation response to sectoral shocks?
- Implication for COL measurement (love-for-variety effects)?
- Why are transitory shortages associated w/ permanent changes in prices?

# Conclusions

- Very impressive paper!
- Future work: extend to multi-sector, international setting?
  - use likelihood methods to back out sectoral cost/demand shocks
  - bring in data on inventories, orders, sales
  - understand dynamics of sectoral inflation and implications for aggregate?