# Price and Transaction Volume in the Dutch Housing Market

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# Price-quantity correlation

- Downpayment constraints
  - Stein (QJE, 1995), Ortalo-Magné and Rady (RES, 2006)
- Search and matching
  - Wheaton (JPE, 1990), Berkovec and Goodman (REE,1996), Krainer (JUE, 2001), Novy-Marx (REE, 2009)
- Loss aversion
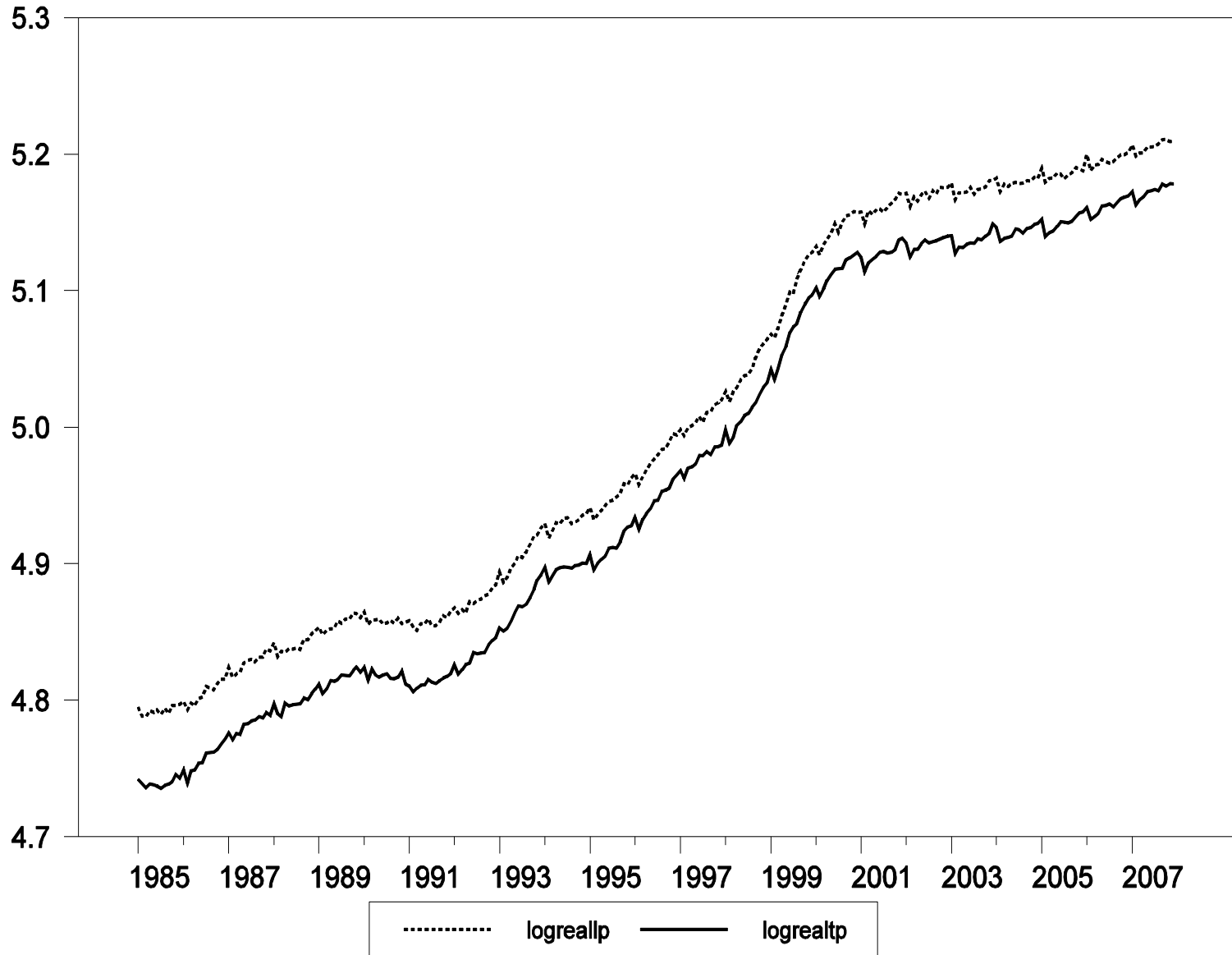  - Genesove and Mayer (QJE, 2001), Engelhardt (JUE, 2003)

# Our contribution

- Go beyond simple price-quantity correlations
- Distinguish list price and sales price
- Identify flows in and out of the market
  - Rates of entry, withdrawal, sale
- Model dynamic adjustment process
  - Vector error-correction model
  - Market reaction to fundamentals (interest and unemployment)
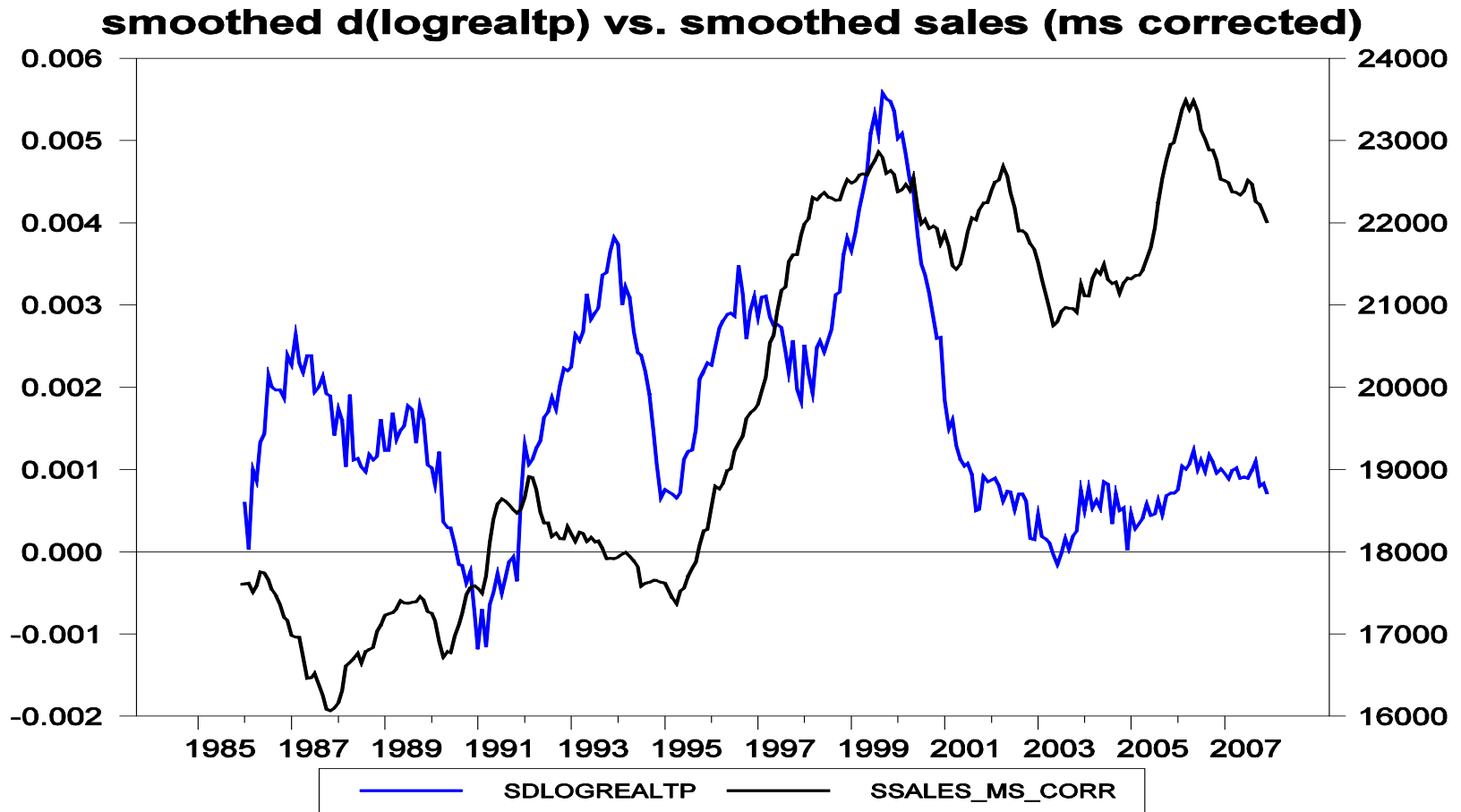  - Hort (RSUE, 2000), Andrew and Meen (REE, 2003)

# Data

- NVM (Dutch Real Estate Agents Association)
  - 3,074,368 observations 1985-2007
  - Rich hedonic characteristics, list price, sales price, exact dating
  - Nationwide market share: 25% 1985, 60% 2007
- Variables for econometric model (monthly)
  - List price index (in logs)
  - Sales price index (in logs)
  - Rate of entry (# new dwellings for sale/all dwellings)
  - Rate of sale (#  dwellings sold/ dwellings for sale)
  - Unemployment rate (in logs)
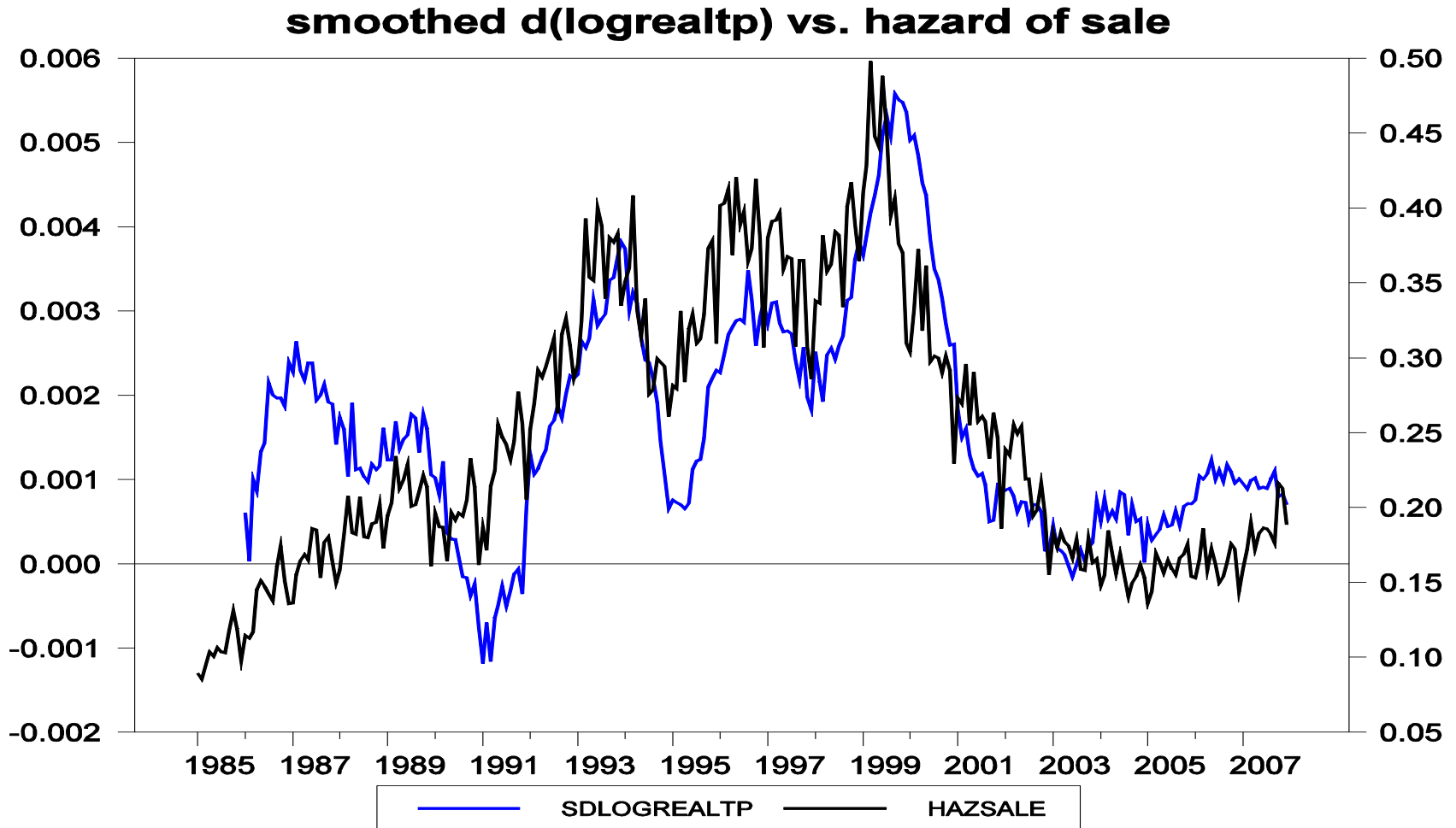  - Mortgage interest rate (in logs)

# log of real listprice and saleprice indices



Legend: logreallp (dotted), logrealtp (solid)

# Price change versus number of sales



**smoothed d(logrealtp) vs. smoothed sales (ms corrected)**

Legend: SDLOGREALTP, SSALES_MS_CORR

# Price change versus rate of sale



smoothed d(logrealtp) vs. hazard of sale

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# Data analysis

- Five series I(1)
- Rate of entry I(0)
- Three cointegrating vectors
- Exactly identified restrictions on the cointegrating vectors

# Equilibrium (cointegrating) relations

- Transaction prices determined by fundamentals (unemployment and interest)

  $tp = - 0.212u - 0.312i + 0.003t$
  
        (13.1)      (6.3)      (13.6)

- Ratio of list price to sales price determined by fundamentals

  $lp - tp = - 0.0013u + 0.029i - 0.000t$
  
        (2.21)      (3.99)      (6.29)

- Rate of sales related to transaction price and interest
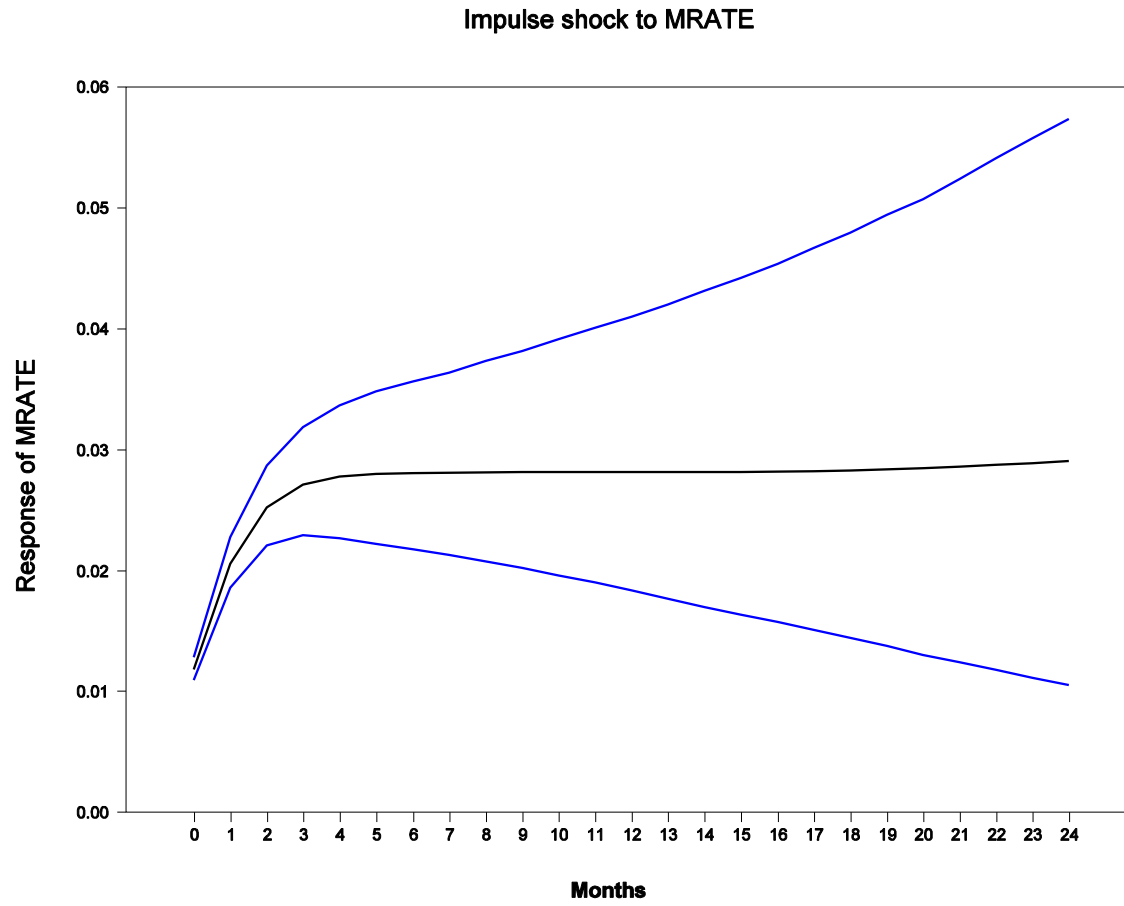
  $tp = 0.492i - 1.982s + 0.005t$
  
        (4.08)      (20.3)      (13.5)
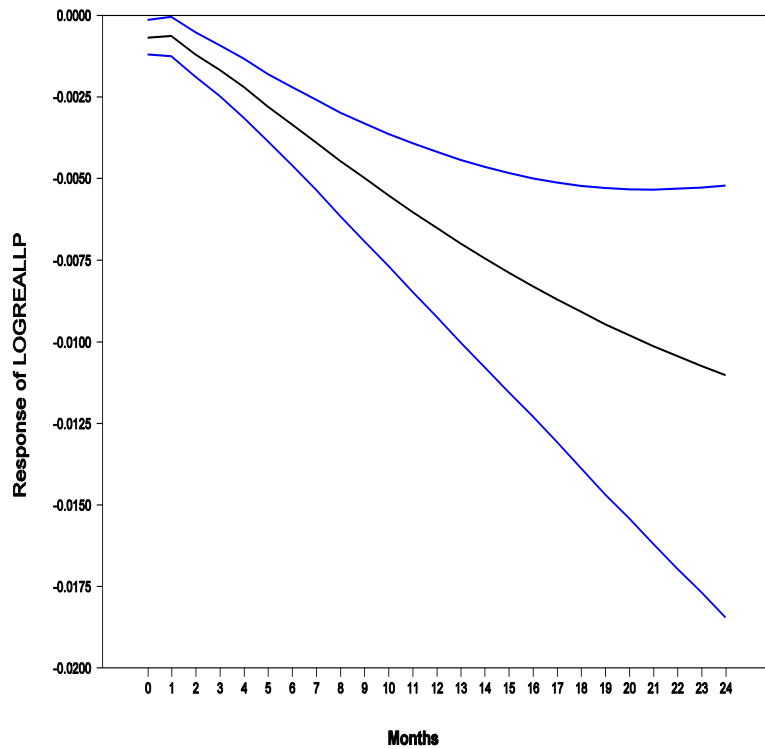
# Impulse response functions

- Predicted dynamic responses to one-standard deviation shocks.

- Shocks identified by assuming contemporaneous structure to be recursive (Choleski decomposition).

- Recursive ordering: unemployment, interest, rate of entry, rate of sale, list price, sales price.

- Results robust to
  - Changes in ordering
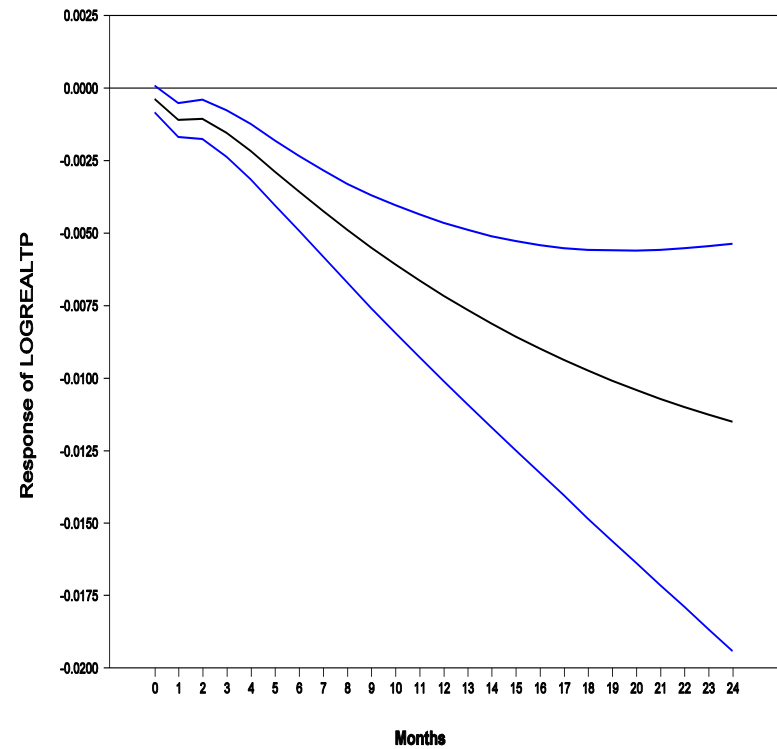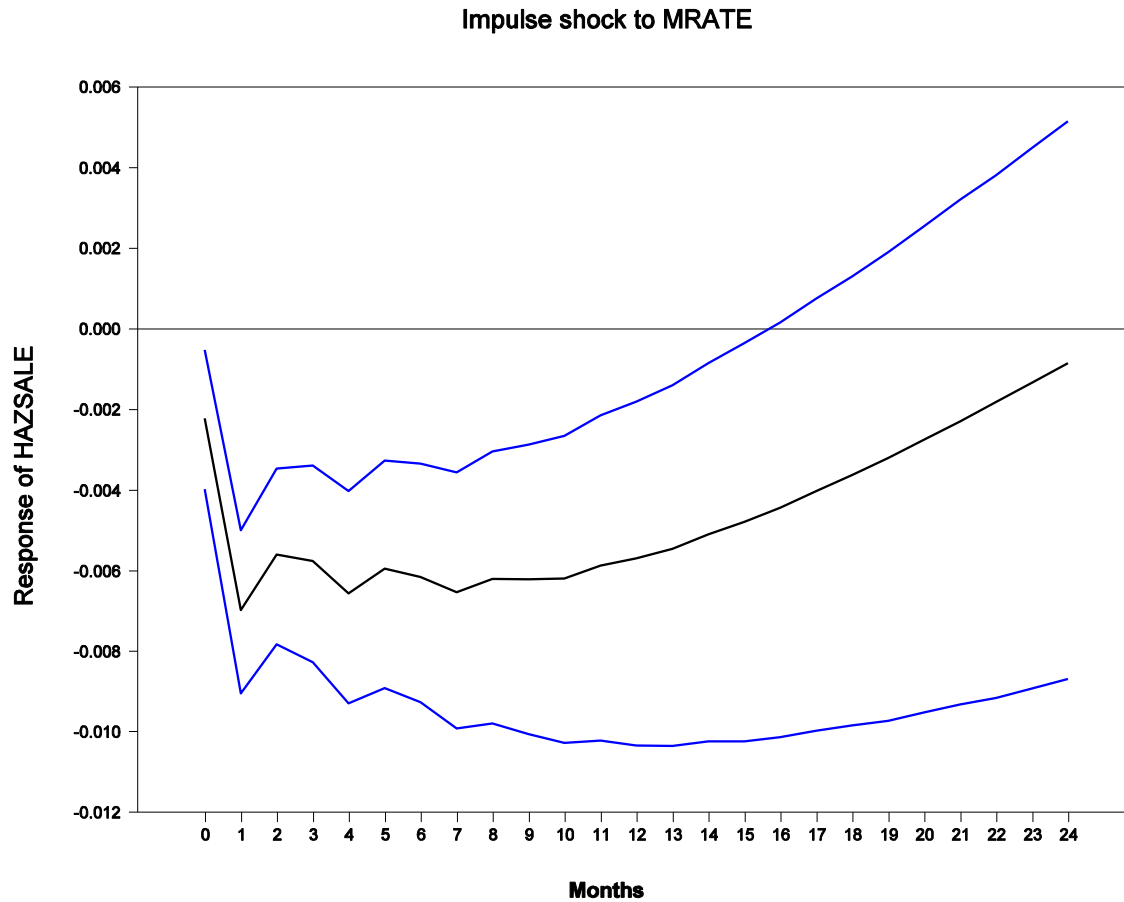  - Restrictions on cointegrating vectors.

# Interest shock



Impulse shock to MRATE

# Interest shock: price responses



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# Interest shock: quantity response



Impulse shock to MRATE

# Rate of sale (mobility) shock

- Impact on sales

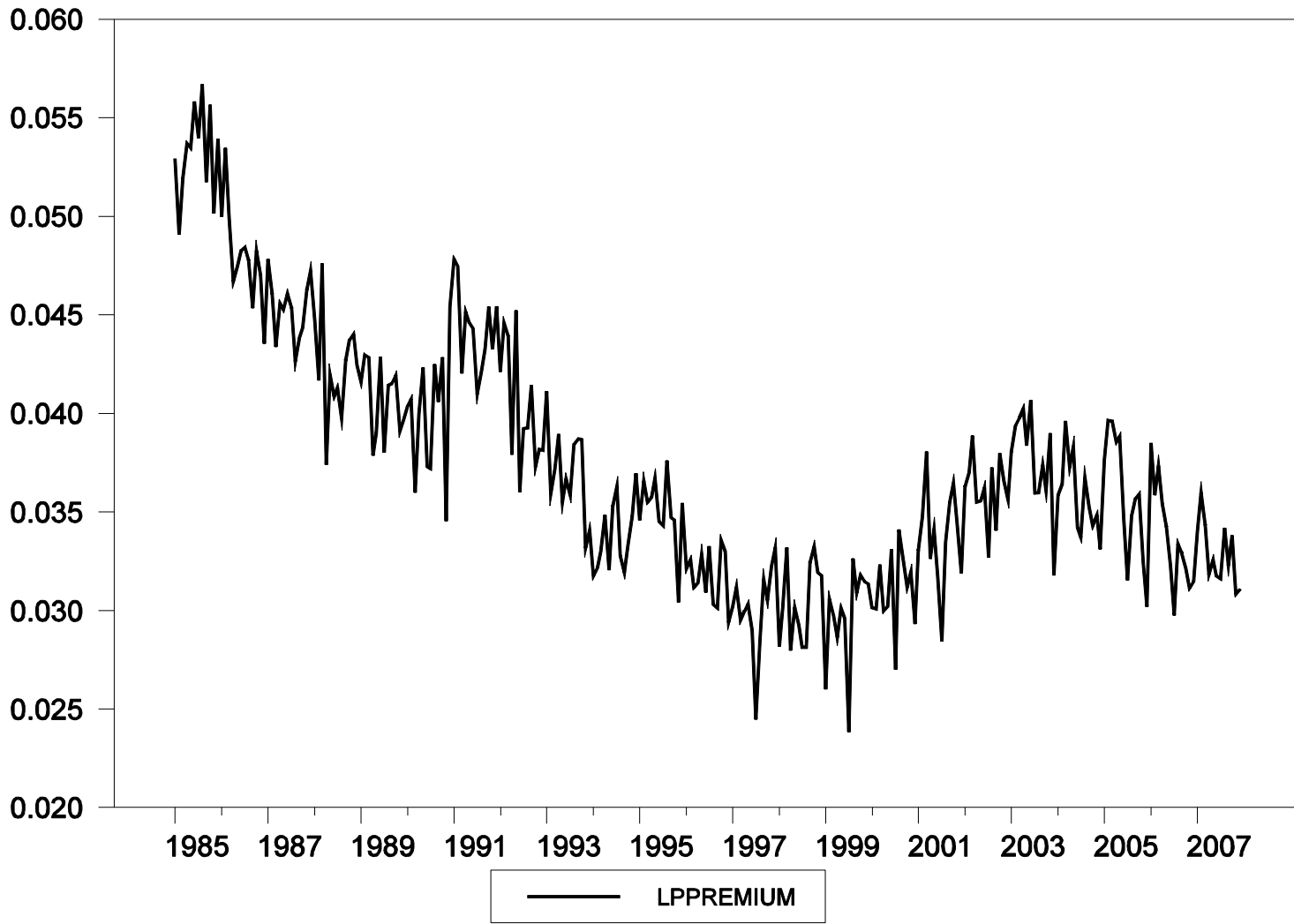- Impact on price



Impulse shock to HAZSALE
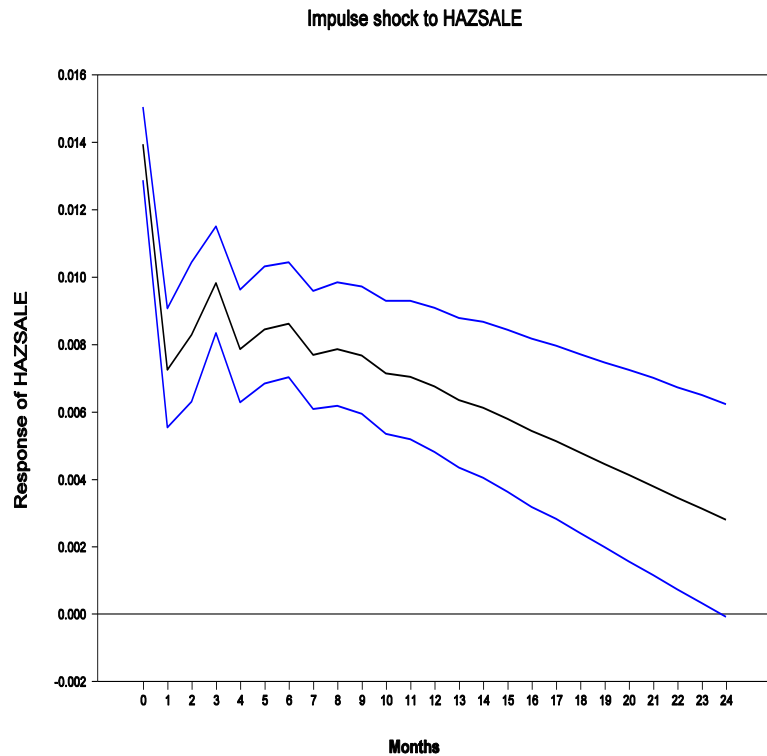


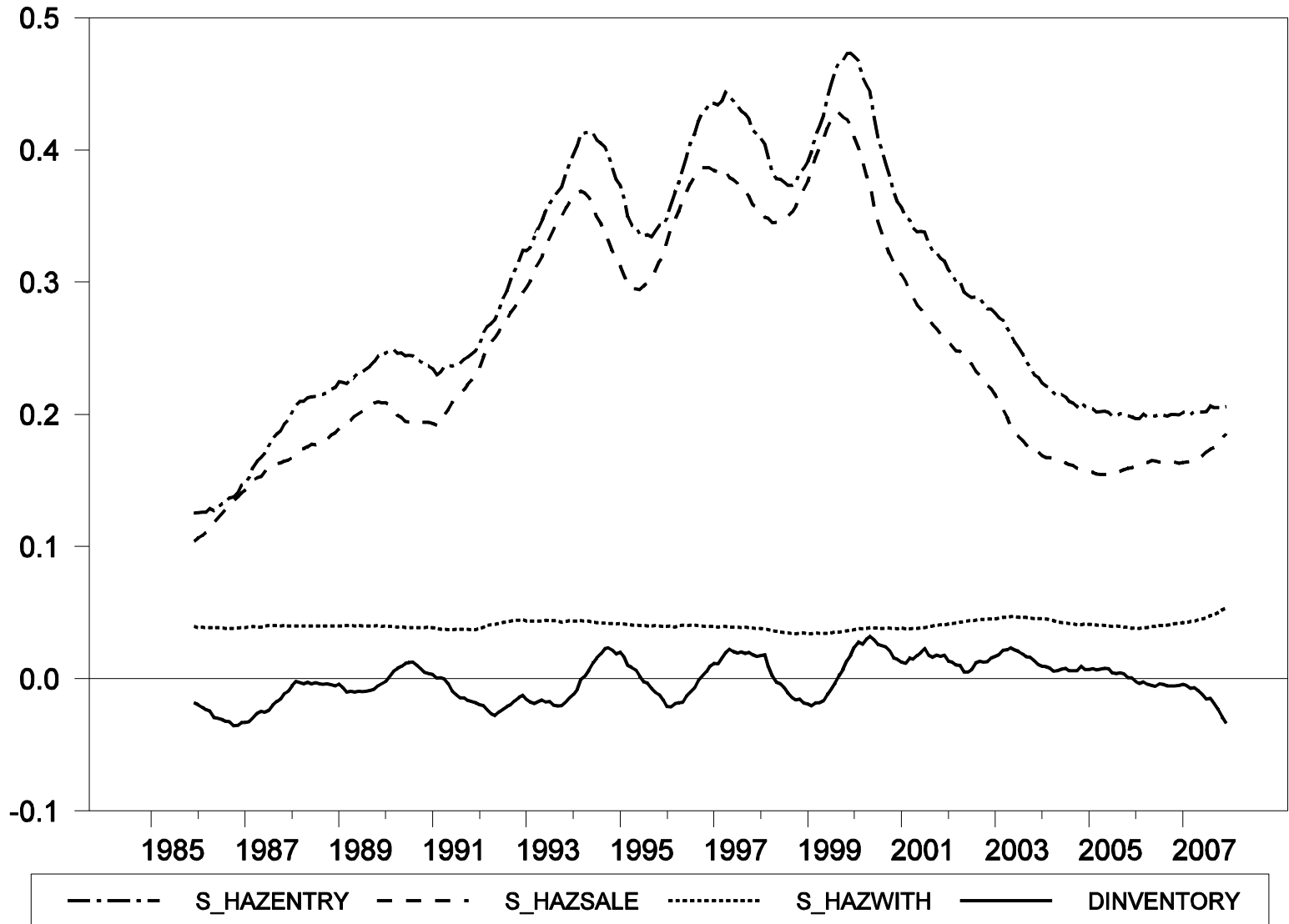Impulse shock to HAZSALE
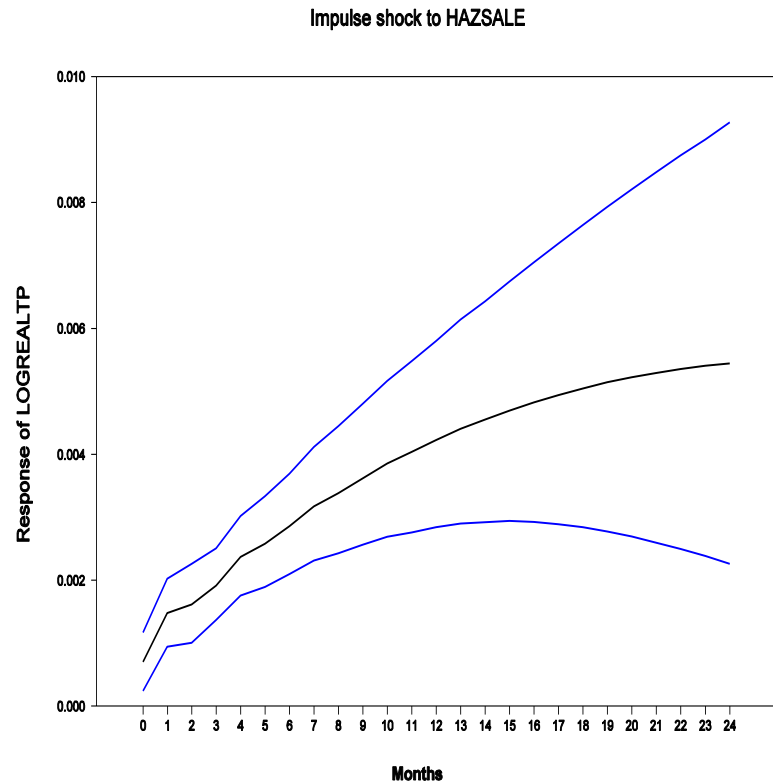
# Main conclusion

- Quantity leads price. Positive correlation quantity - price change during transition to new equilibrium.

  – Consistent with search and gradual dissemination of info about new equilibrium price.

  – Not obviously consistent with models driven by downpayment constraints.
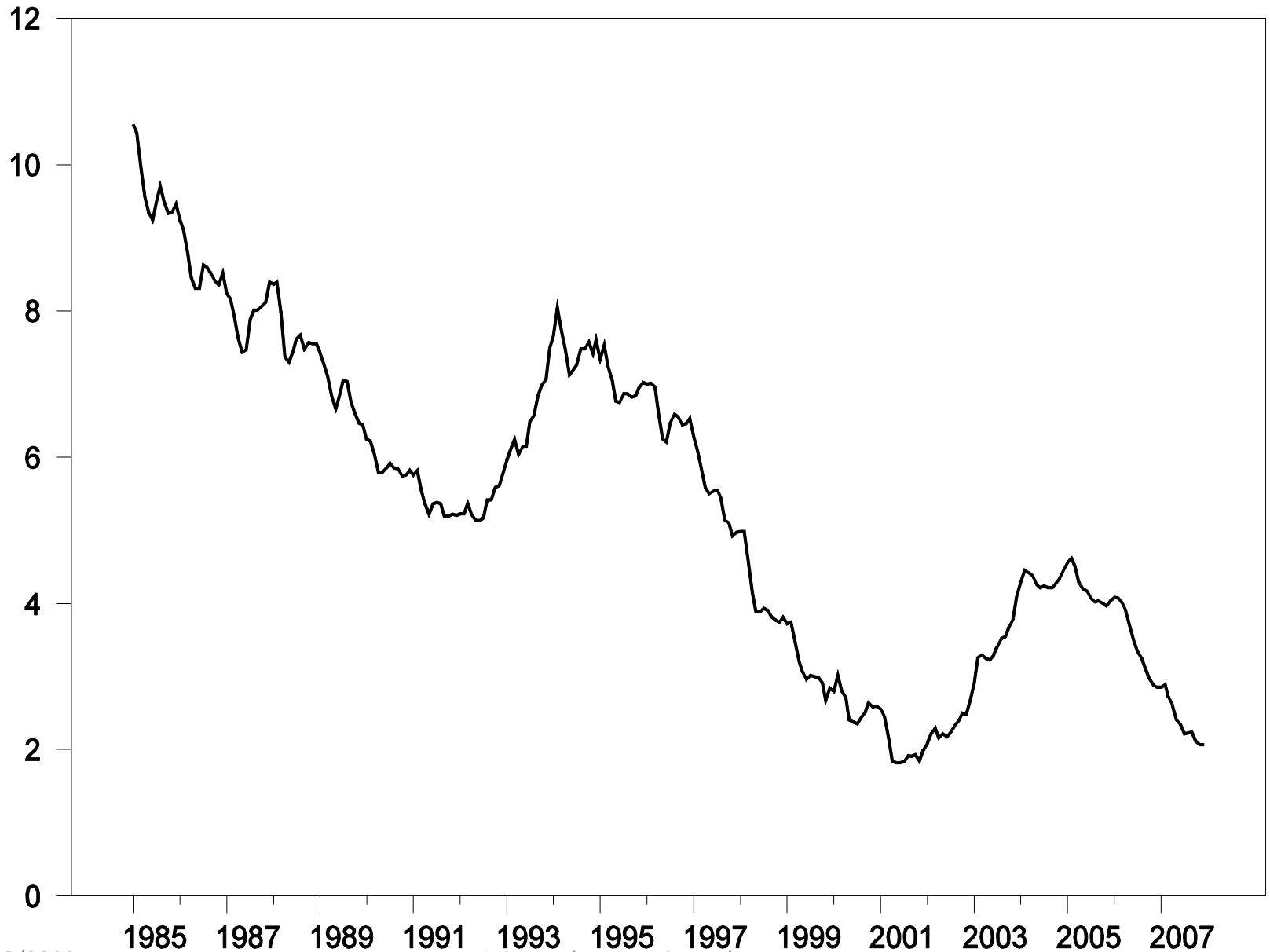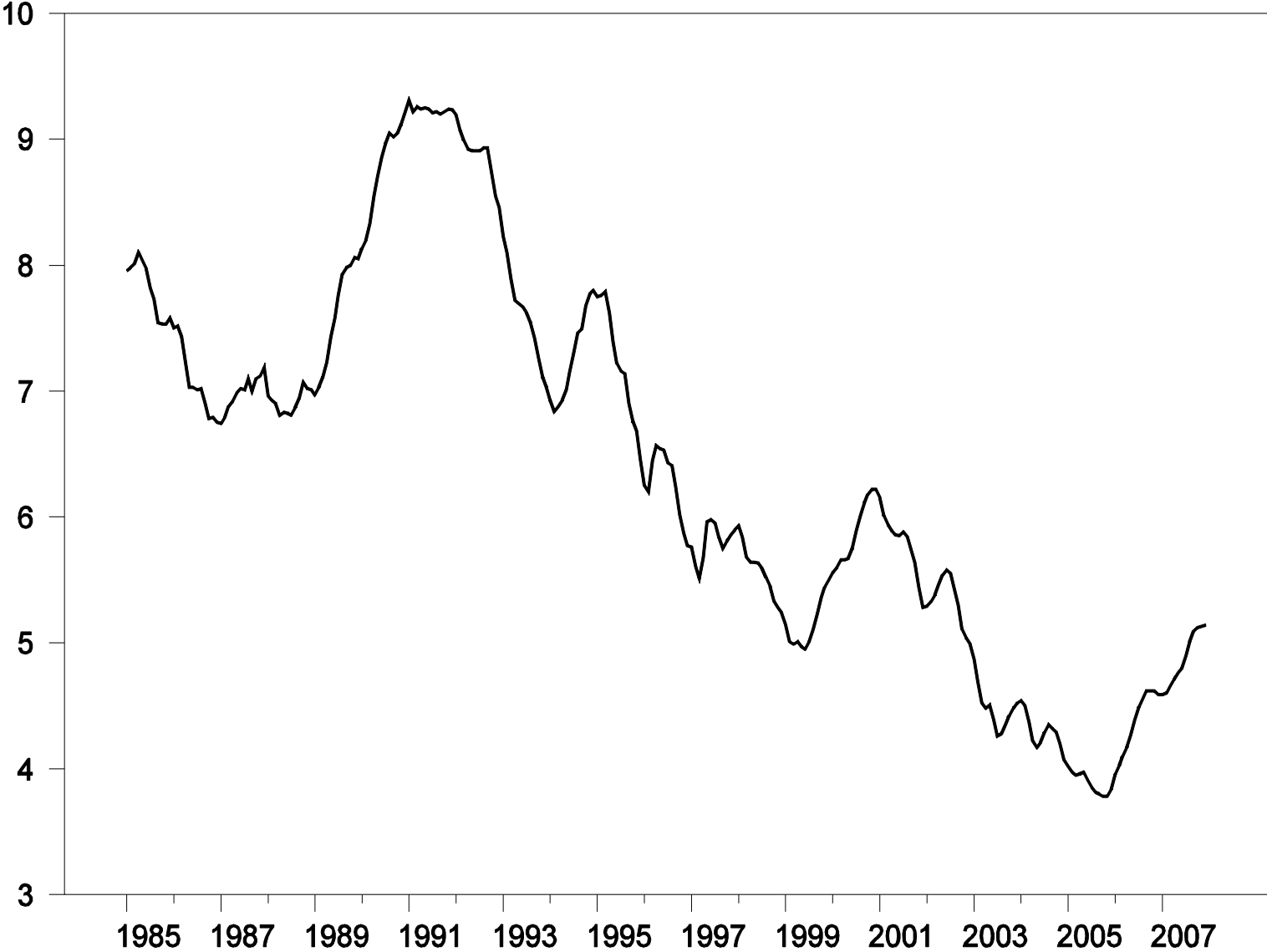
# listprice premium over salesprice



LPPREMIUM

**hazard rates of entry, sale and withdrawal, and inventory change**

Legend: — · — S_HAZENTRY    – – – S_HAZSALE    ········· S_HAZWITH    ——— DINVENTORY

## unemployment

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# mortgage rate



Price and transaction volume

# Impulse responses