

# Rapidly Rising Energy Prices: Does the Driver of the Energy Market Imbalance Matter?

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# Key Issues

- Impact on economic activity
- Direct effect on headline inflation
- Mechanism that can lead to persistently high inflation
- Does the cause of rising energy prices matter?

# Outline

- Overview of GEM and the integration of energy
- Cross-country comparison of energy price increase similar to that seen since end-2003
- Impact on UK of alternative responses of monetary authority and labor suppliers
- Impact on Euro area of energy price increases driven by different factors in the rest of the world

# Global Economy Model - GEM

- New open economy DSGE model
- Complete choice-theoretic framework
- Representative agent model
  - Households
  - Firms
  - Government

# GEM

- Multiple-good framework
- Rational expectations
- Real rigidities
  - Habits and adjustment costs
- Nominal rigidities
  - Adjustment costs in wages and prices

# GEM

- Monopolistic competition
  - wages contain a markup over the marginal rate of substitution between consumption and leisure
  - prices contain a markup over marginal cost
- Two-country/region structure
  - U.K./RoW, Euro Area/RoW, U.S./RoW, Japan/RoW, Canada/RoW

# Household Consumption Bundle

$$A = f(N, Q, M, Q_E, M_E),$$

- Where
  - $N$  is nontradables
  - $Q$  is domestically produced tradable non-energy
  - $M$  is imported non-energy tradable
  - $Q_E$  is domestically produced tradable energy
  - $M_E$  is imported tradable energy
  - $f$  is a nested CES aggregator

# Goods Production

$$Y = f(K, L, Q_E, M_E),$$

- Where
  - $Y$  represents nontradable and tradable goods
  - $K$  is the capital input
  - $L$  is the labor input
  - $Q_E$  is the domestically produced energy input
  - $M_E$  is the imported energy input
  - $f$  represents CES production technology



# Energy Production

$$Q_E = f(K, L, Land),$$

- Where
  - $Q_E$  is domestically produced energy
  - $K$  is the capital input
  - $L$  is the labor input
  - $Land$  is the know available reserve of energy
  - $f$  represents CES production technology

# Calibration of Energy Prices

- Key energy price properties
  - home and foreign prices move together
  - energy prices more volatile over cycle
- Calibration of elasticities of substitution and importance of *Land* in energy production yield desired properties

# Calibration of Energy Intensities

## Oil and Natural Gas as Shares of GDP

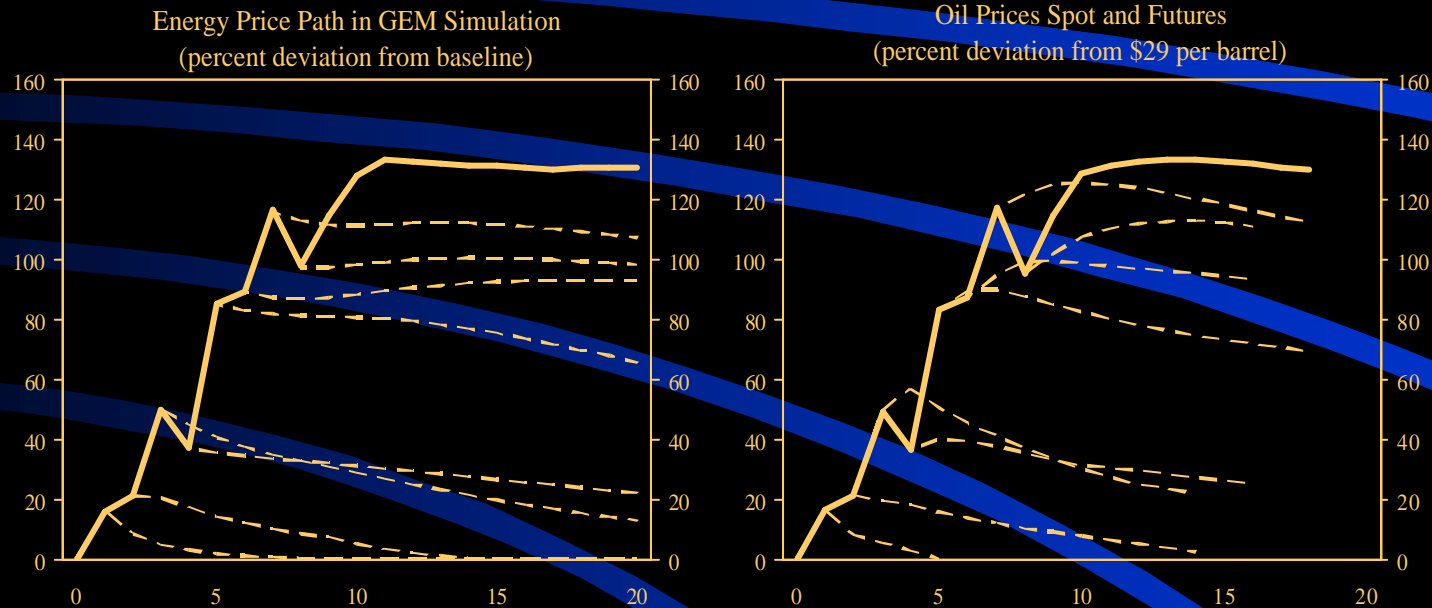
	<i>United Kingdom</i>	<i>Euro Area</i>	<i>United States</i>	<i>Canada</i>	<i>Japan</i>
Production	2.23	0.16	1.50	6.80	0.02
Imports	0.71	1.60	1.26	1.22	1.38
Total Available	2.94	1.76	2.76	8.02	1.40
Total Use	1.94	1.76	2.72	4.05	1.40
Input	1.15	1.02	1.23	2.23	0.70
Consumption	0.79	0.73	1.49	1.82	0.70
Net Exports	0.29	-1.60	-1.22	2.75	-1.38

# Energy Prices Since End-2003

- Simulation done iteratively
- Energy prices and expected future path based on data and futures markets for oil prices
- Interest rates held at baseline for first nine quarters of simulation

# Energy Prices Since End-2003

Solid Line - represents actual path and expected path beyond quarter 9.  
Dashed Line - represents expected path at each quarter prior to quarter 9.



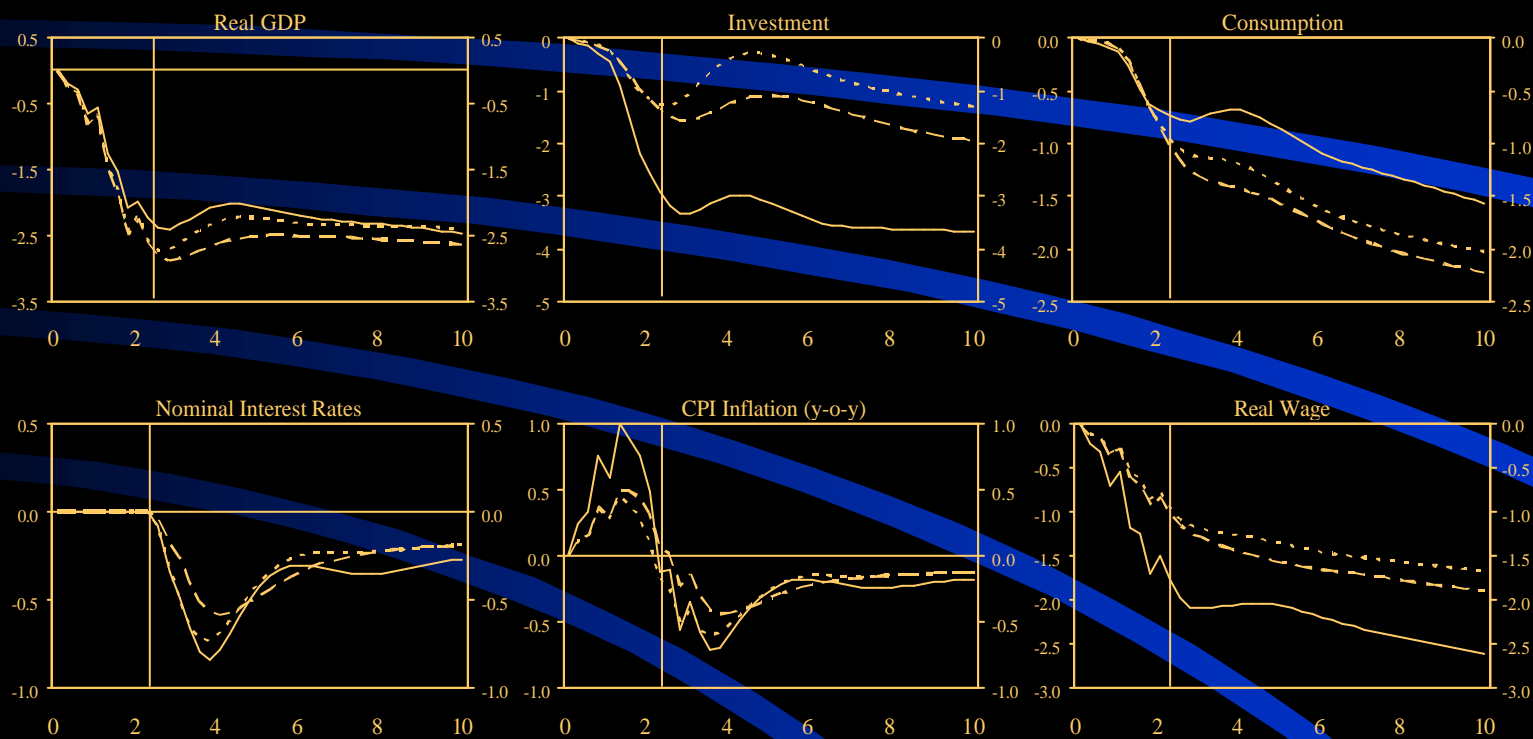
Source: Bloomberg and GEM Simulations.

# Simulated Recent Energy Shock

Solid - United States

Dotted - Japan

Dashed - Euro area

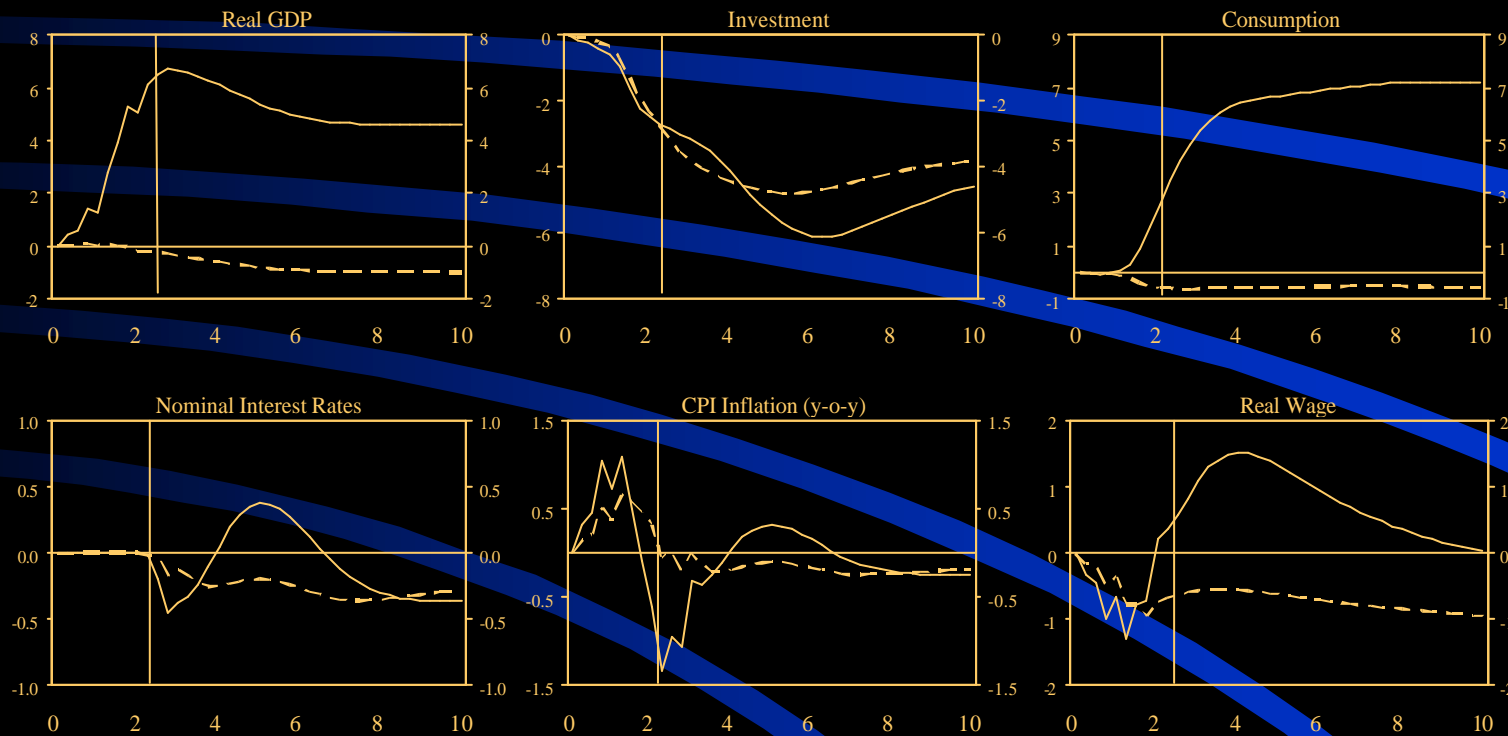


Source: GEM Simulations.

# Simulated Recent Energy Shock

Solid - Canada

Dashed - United Kingdom



Source: GEM Simulations.

# Benign Inflation Outcome

- Monetary authority fully understands supply-side implications
- Labor suppliers accept decline in their real consumption wages
- Alternatives
  - Policymakers may only slowly learn about impact on potential output
  - Workers could temporarily recover some of the real wage decline

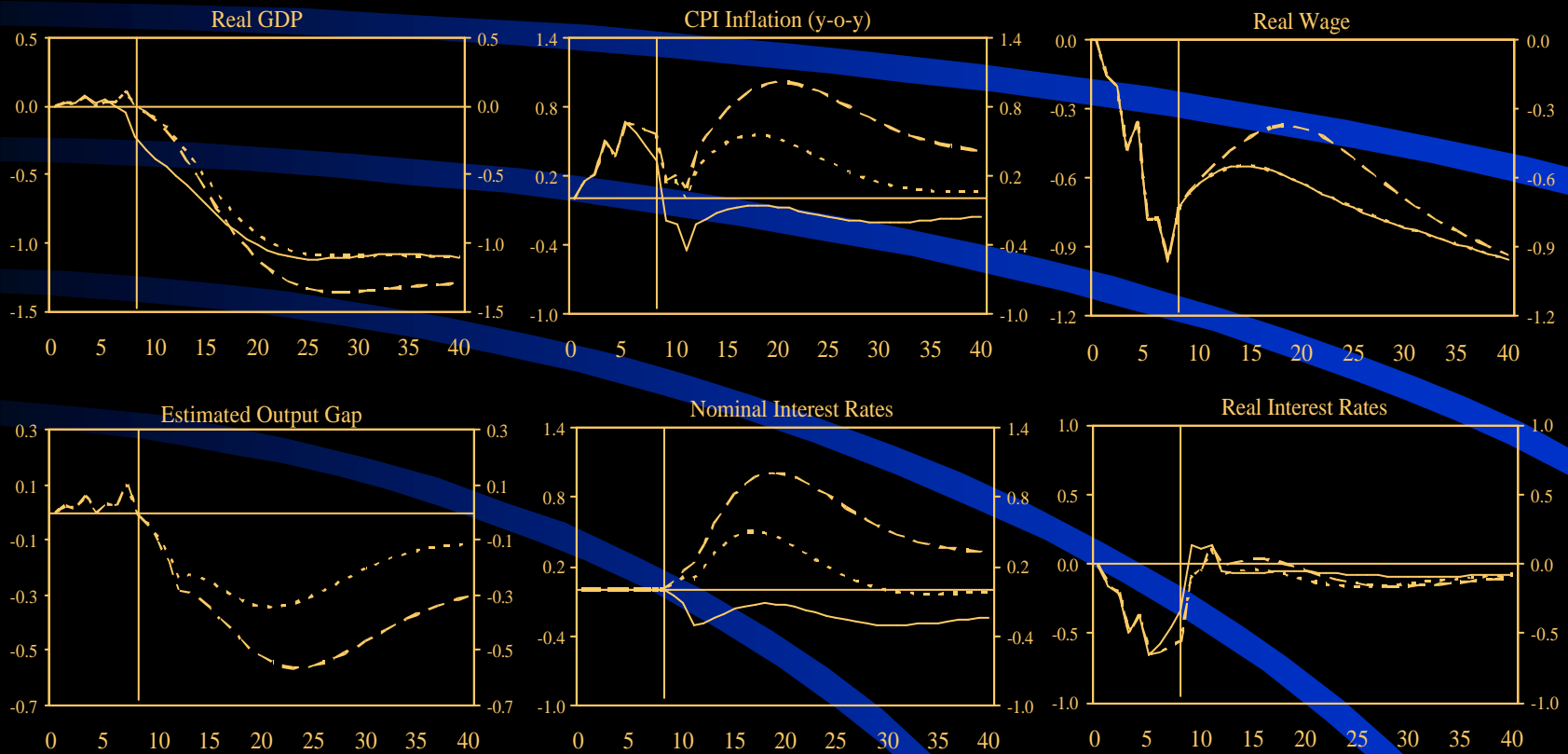


# Alternative Responses – U.K.

Solid - base case.

Dotted - output gap in reaction function.

Dashed - output gap in policy rule and temporary increase in labor suppliers' market power.



Source: GEM Simulations.

# Alternative Drivers of Energy Prices

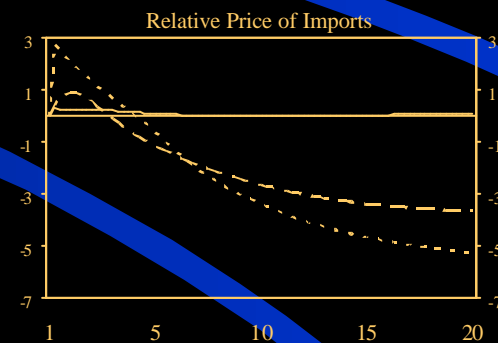
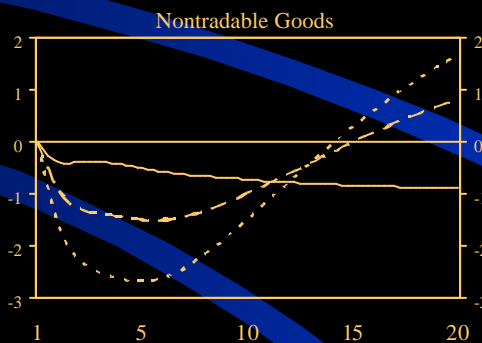
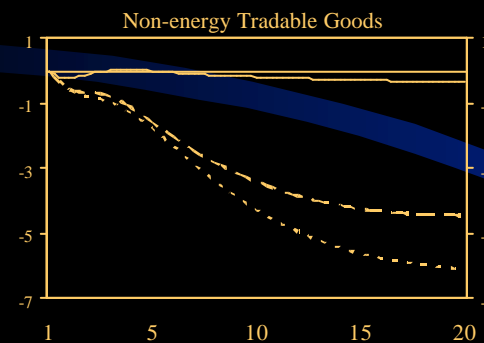
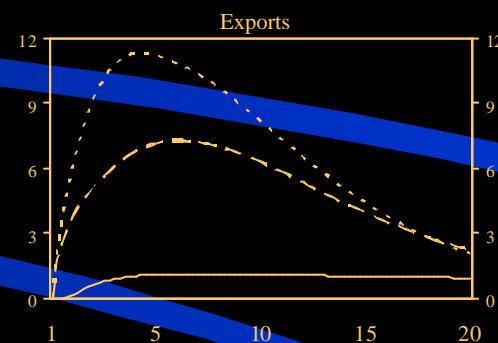
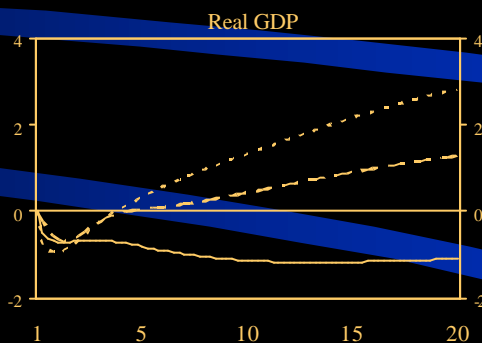
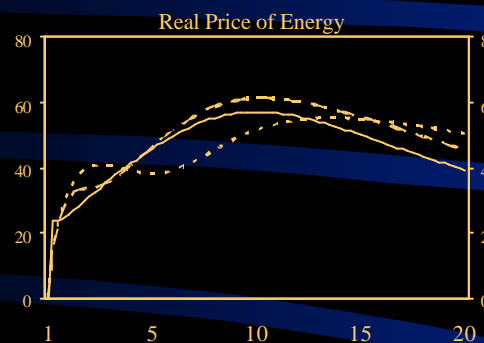
- Increase in labor supply in emerging Asia (reduction in wage markup in the rest-of-world)
- Increase in tradable sector productivity in emerging Asia (increase in tradable sector productivity in rest of world)

# Alternative Drivers of Energy Prices Euro Area

Solid - Energy Sector

Dotted - Productivity

Dashed - Labor



Source: GEM Simulations.

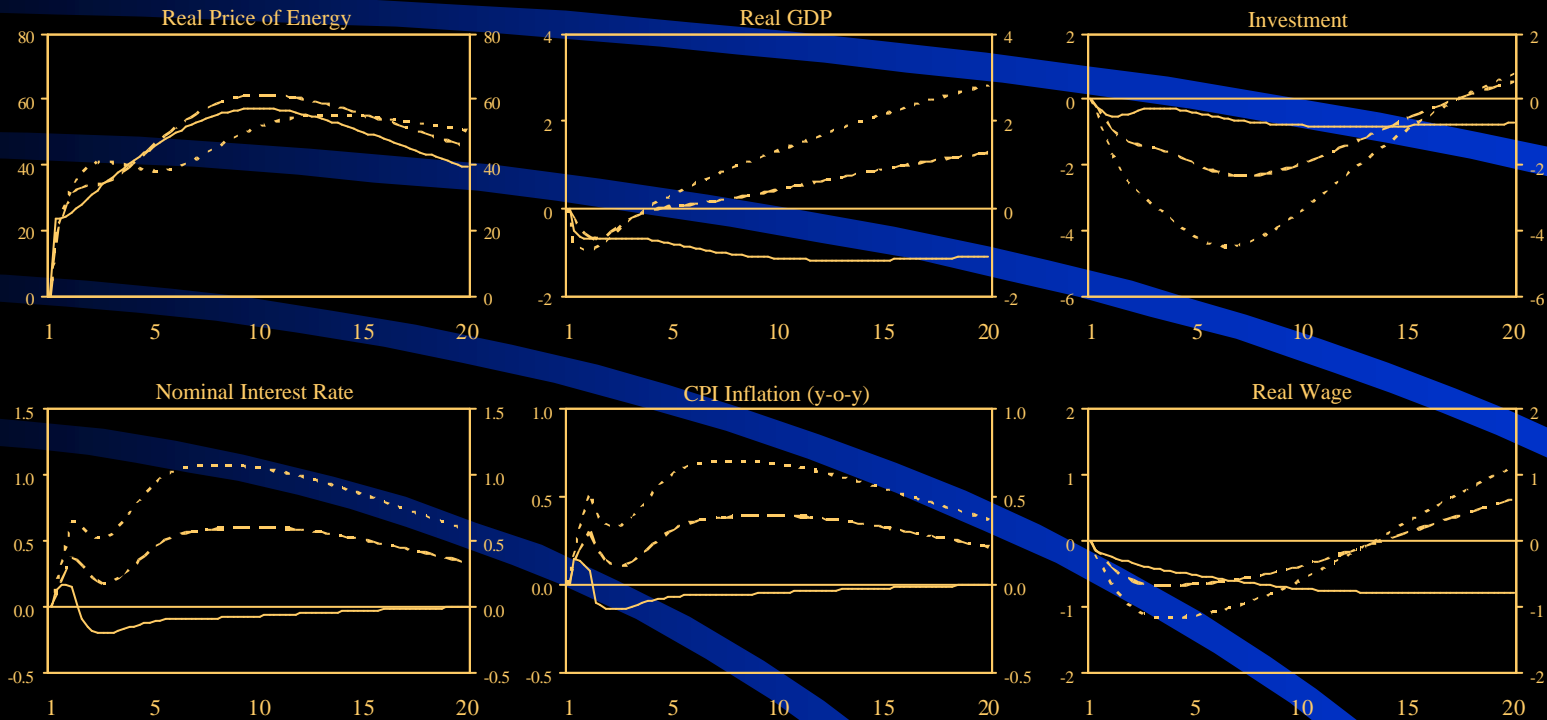
# Alternative Drivers of Energy Prices

## Euro Area

Solid - Energy Sector

Dotted - Productivity

Dashed - Labor



Source: GEM Simulations.

# Conclusions

- In the short-run, higher energy price will likely have a negative impact on activity in most industrial countries
- The long-run impact on economic activity will depend on the source of the energy market imbalance
- If faster than expected growth in Emerging Asia is the source, the stronger are the industrial countries' trade ties with them, the larger will be the positive terms-of-trade effect

# Conclusions

Under the pure energy sector shock persistent inflation effects may emerge if

- supply-side implications are not fully integrated into the monetary authority's response and
- workers are able to temporarily resist the declines in real wages

# Conclusions

- Persistent inflation effects may also emerge if non-energy sector supply factors in emerging Asia are driving energy prices