Does the Commodity Super Cycle Matter?

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Motivation

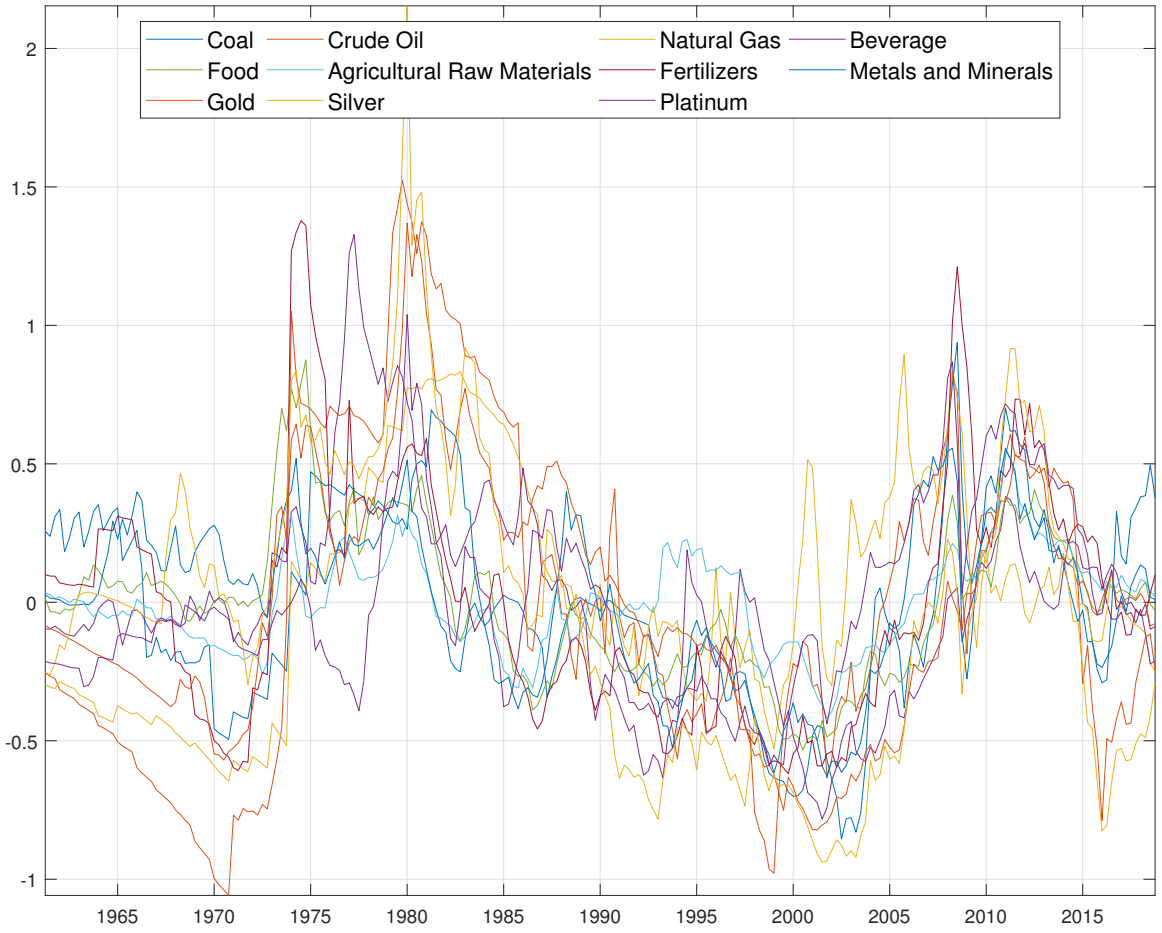
• World commodity prices display long cycles known as super cycles.

• Much of the existing literature on commodity price super cycles focuses on documenting their frequency, amplitude, and turning points.

• Less work has been devoted to estimating the importance of commodity price super cycles for economic activity.

• This paper investigates empirically the importance of the shock responsible for the commodity price super cycle as a driver of aggregate activity in emerging and developed economies.

Eleven Commodity Prices



Identification of the Commodity Price Super Cycle

• The present paper identifies the commodity super cycle as the common permanent component in all commodity prices.

Two Advantages of the Common-Component Approach:

• The common-component approach delivers one common commodity super cycle, as opposed to one per commodity. This is desirable, because commodity prices move in tandem over the long run.

• It allows for the simultaneous estimation of the contribution of permanent and transitory, world and domestic disturbances to aggregate activity at the country level.

The Foreign Block

p_t = vector of 11 real commodity prices and the gross world real interest rate in quarter t (all in logs).

X_t^p = permanent component common to all commodity prices (the super cycle).

z_t^p vector of 12 stationary world shocks (regular cycles)

Define the stationary variable

$$\widehat{p}_t \equiv \begin{bmatrix} p_t^1 - X_t^p \\ \vdots \\ p_t^{11} - X_t^p \\ r_t \end{bmatrix}.$$

The vector $\widehat{p}_t$ is assumed to evolve according to the law of motion

$$\widehat{p}_t = \sum_{i=1}^{4} B^i \, \widehat{p}_{t-i} + C_1 \Delta X_t^p + C_2 z_t^p,$$

Variables $\widehat{p}_t$, ΔX_t^p, and z_t^p are unobservable.

The Domestic Block

y_t^i = log of real output in country i.

X_t^i = domestic permanent component of output in country i.

z_t^i = domestic stationary component of output in country i.

Define the stationary variable

$$\widehat{y}_t \equiv \begin{bmatrix} y_t^1 - X_t^1 - \alpha^1 X_t^p \\ \vdots \\ y_t^{24} - X_t^{24} - \alpha^{24} X_t^p \end{bmatrix}.$$

The vector $\widehat{y}_t$ is assumed to evolve according to

$$\widehat{y}_t = \sum_{i=1}^{4} F^i \widehat{p}_{t-i} + \sum_{i=1}^{4} G^i \widehat{y}_{t-i} + H_1 \Delta X_t^p + H_2 z_t^p + H_3 \Delta X_t + z_t,$$

Variables $\widehat{y}_t$, ΔX_t, and z_t are unobservable.

The Exogenous Driving Forces

$$u_t \equiv \begin{bmatrix} \Delta X_t^p \\ \Delta X_t \\ z_t^p \\ z_t \end{bmatrix},$$

is assumed to be AR(1)

$$u_t = \rho u_{t-1} + \psi \nu_t,$$

Observables

$\Delta p_t^i =$ growth rate of commodity price $i = 1, \ldots, 11$.
$\Delta y_t^i =$ growth rate of output in country $i = 1, \ldots, 24$.
$r_t =$ world interest rate.

The observation equations linking unobservable and observable variables are

$$\begin{aligned} \Delta p_t^i &= \widehat{p}_t^i - \widehat{p}_{t-1}^i + \Delta X_t^p; \quad i = 1, \ldots, 11, \\ \Delta y_t^i &= \widehat{y}_t^i - \widehat{y}_{t-1}^i + \Delta X_t^i + \alpha^i \Delta X_t^p; \quad i = 1, \ldots, 24, \end{aligned}$$

These equations make it possible to calculate the likelihood of the data, which can be used to estimate all parameters of the model.
Estimation Approach: Bayesian, with Minnesota-type priors.

OECD Countries

Quarterly Data

- **Sample period:** 1960.Q1 to 2018.Q4.

- **Country coverage:** 24 small open OECD economies.

- **World Variables:**

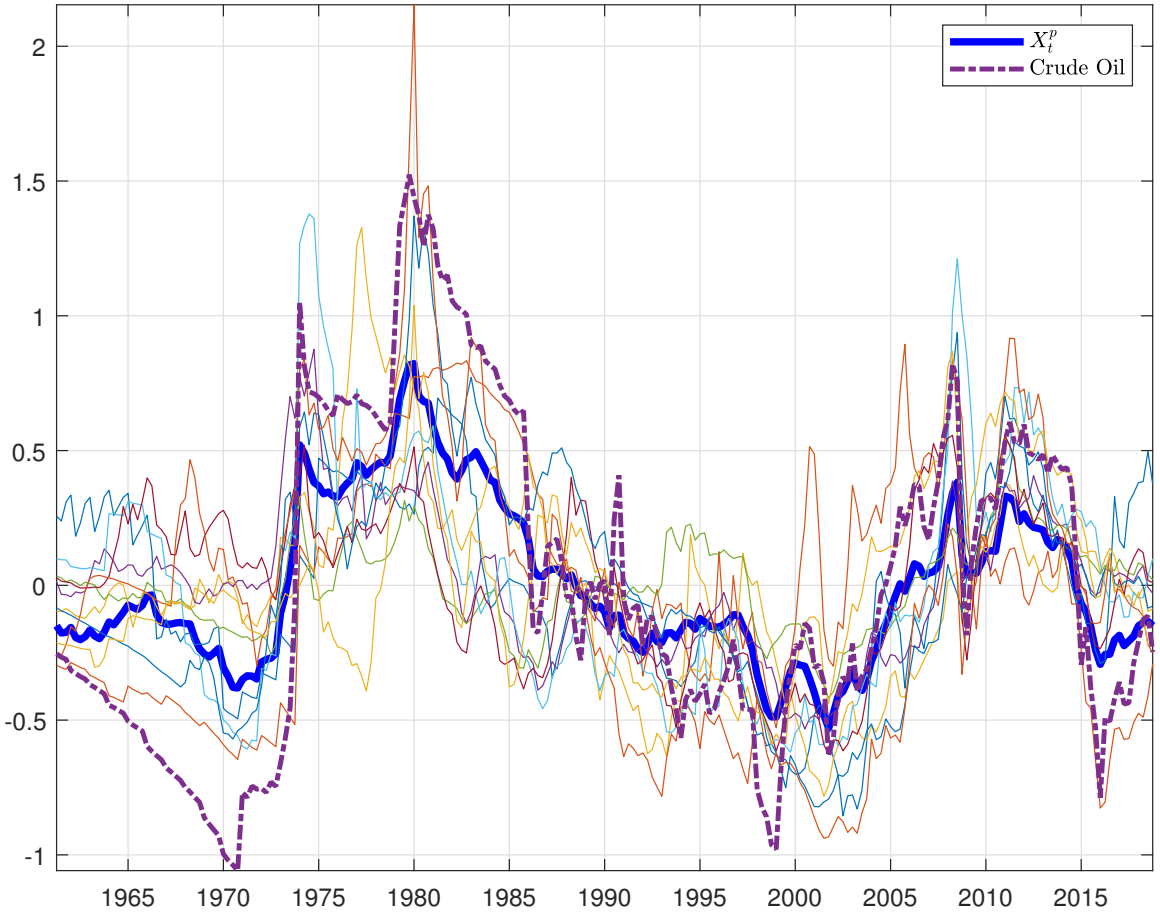
— 11 commodity prices deflated by the US CPI

— the world real interest rate

- **Country Variables:**

— Growth rate of real GDP

The Commodity Price Super Cycle



Note. The permanent component of the eleven real commodity prices, X_t^p is computed by Kalman smoothing.

Variance Decomposi of Output Growth

	Shock			
Country	ΔX_t^p	z_t^p	ΔX_t^i	z_t^i
Mean	8	62	12	19

Emerging Countries

Annual Data

• Long quarterly time series for output are available mostly for developed countries. To increase the participation of emerging countries, the present analysis is based on annual data.

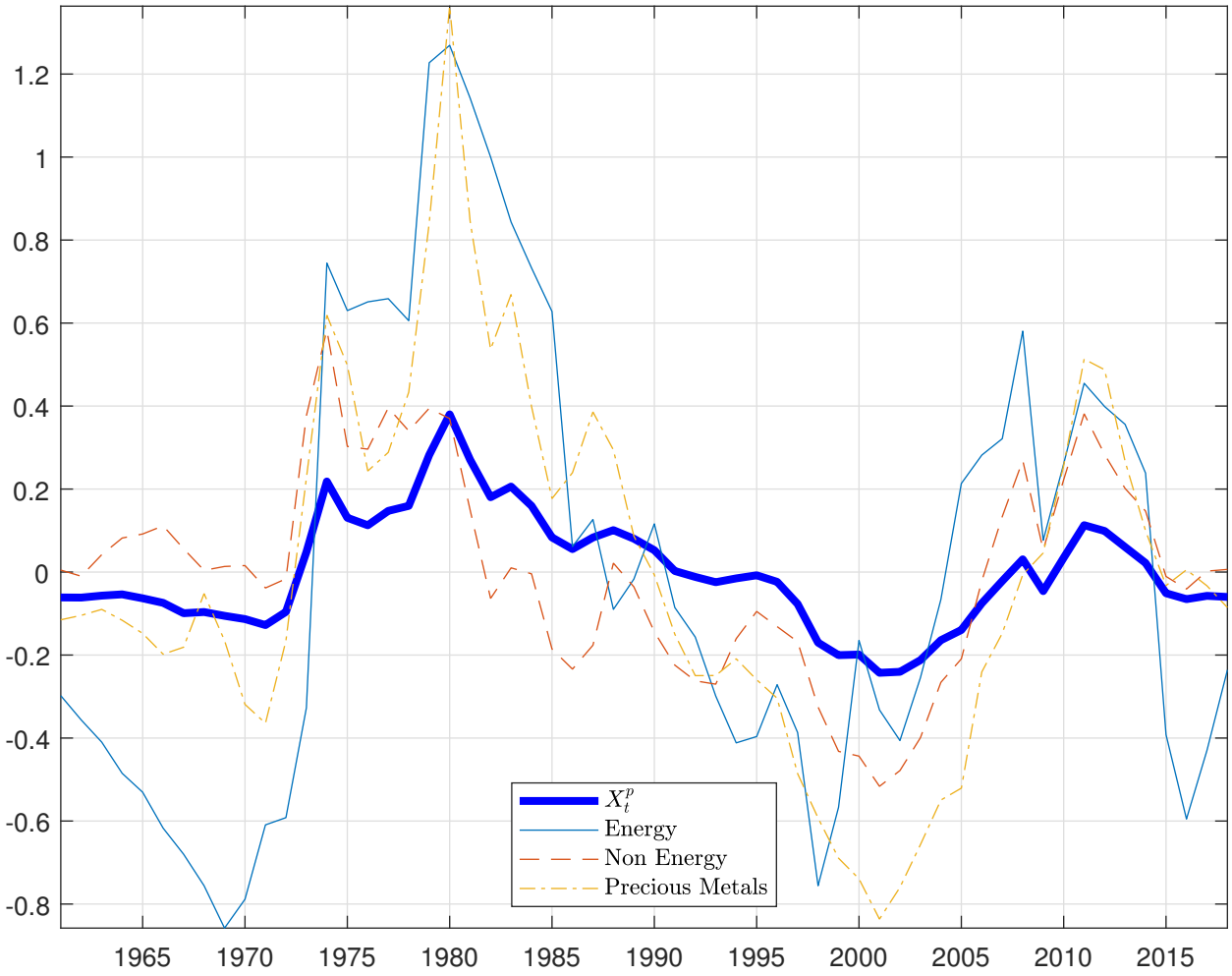
• Sample: 1960 to 2018, 24 emerging countries, 17 developed countries.

• Same empirical model.

• 1 time lag.

• Three commodity-price indices: energy, non energy, and precious metals, following the World Bank's Pink Sheet aggregation scheme.

The Commodity Price Super Cycle in Annual Data



Observation: Annual super cycle similar to its quarterly counterpart: A smooth stochastic trend of the underlying prices with peaks in 1980 and 2012.

Variance Decomposition of Annual Output Growth

	Shock			
Country	ΔX_t^p	z_t^p	ΔX_t^i	z_t^i
Mean Emerging	18	32	24	25

Conclusion

• This paper investigates empirically the importance of the shock responsible for the commodity price super cycle in driving aggregate activity in emerging and developed economies.

• The commodity price super cycle is defined as a common permanent component in real commodity prices.

• Estimates indicate that world shocks are an important source of aggregate fluctuations at the country level explaining more than half of the variance of output growth on average across countries.

• However, more than two thirds of this contribution stems from stationary world shocks, not from the super commodity cycle.

• This result suggests that the commodity price super cycle plays a significant but not dominant role in driving fluctuations in aggregate activity.