DEMS
Dipartimento di Economia, Metodi Quantitativi e Strategie di Impresa

The third oil price shock: Origins and its real effects

Based on:
The oil price-macroeconomy relationship since the mid-1980s: A global perspective (The Energy Journal, Vol. 34 (2013) 153-189)
Oil price dynamics, macro-finance interactions and the role of financial speculation (Journal of Banking & Finance 37 (2013) 206–226)

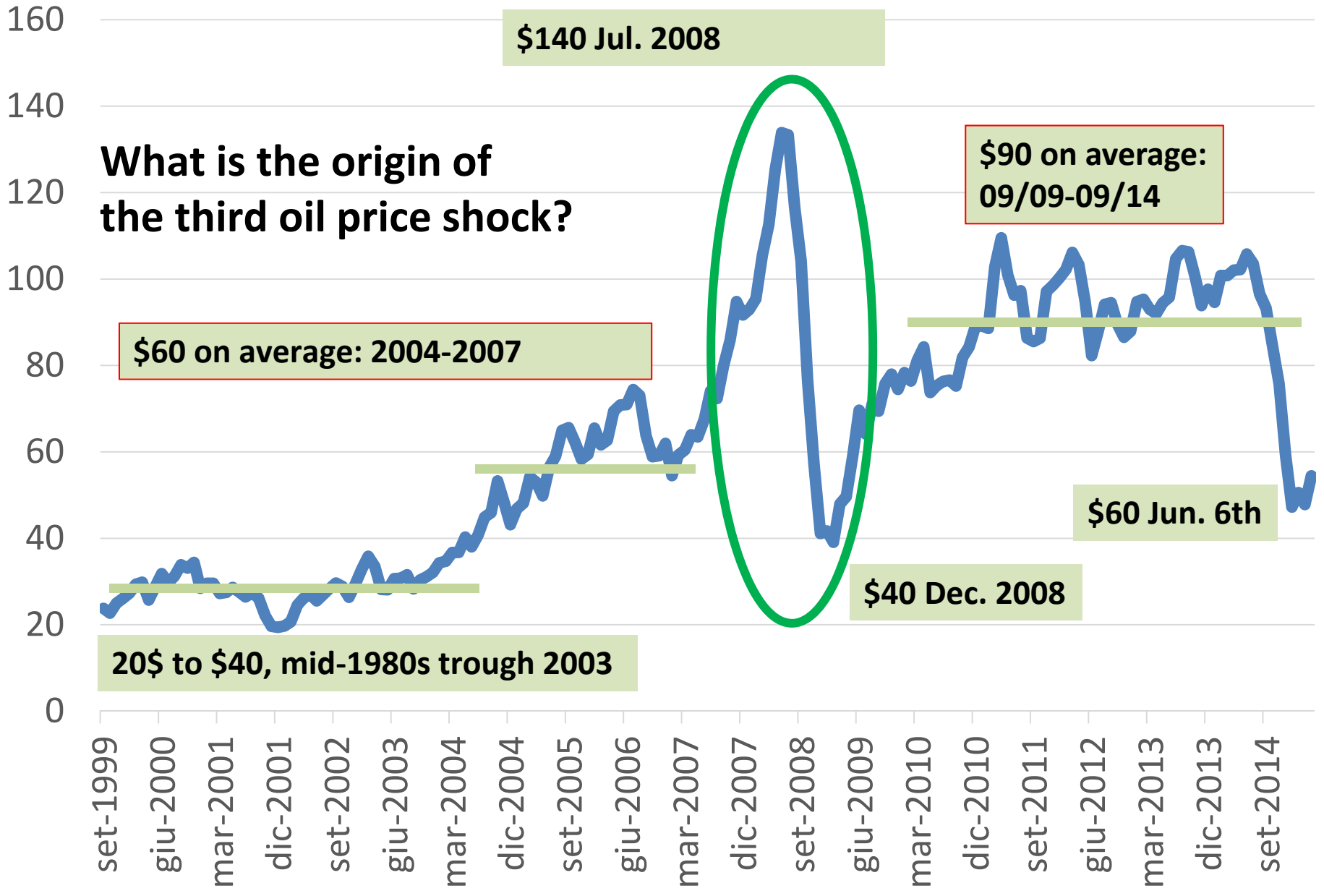
Claudio Morana

Università di Milano - Bicocca (Milano, Italy),

CeRP-Collegio Carlo Alberto (Moncalieri, Italy)

RAstaNEWS
Macro-Risk Assessment and Stabilization Policies with New Early Warning Signals

Oil price (US$/b)



Motivations of the paper

- Understanding the **origin of the third oil price shock** is important in order to account for its **potential recessionary effects**. Two competing views:

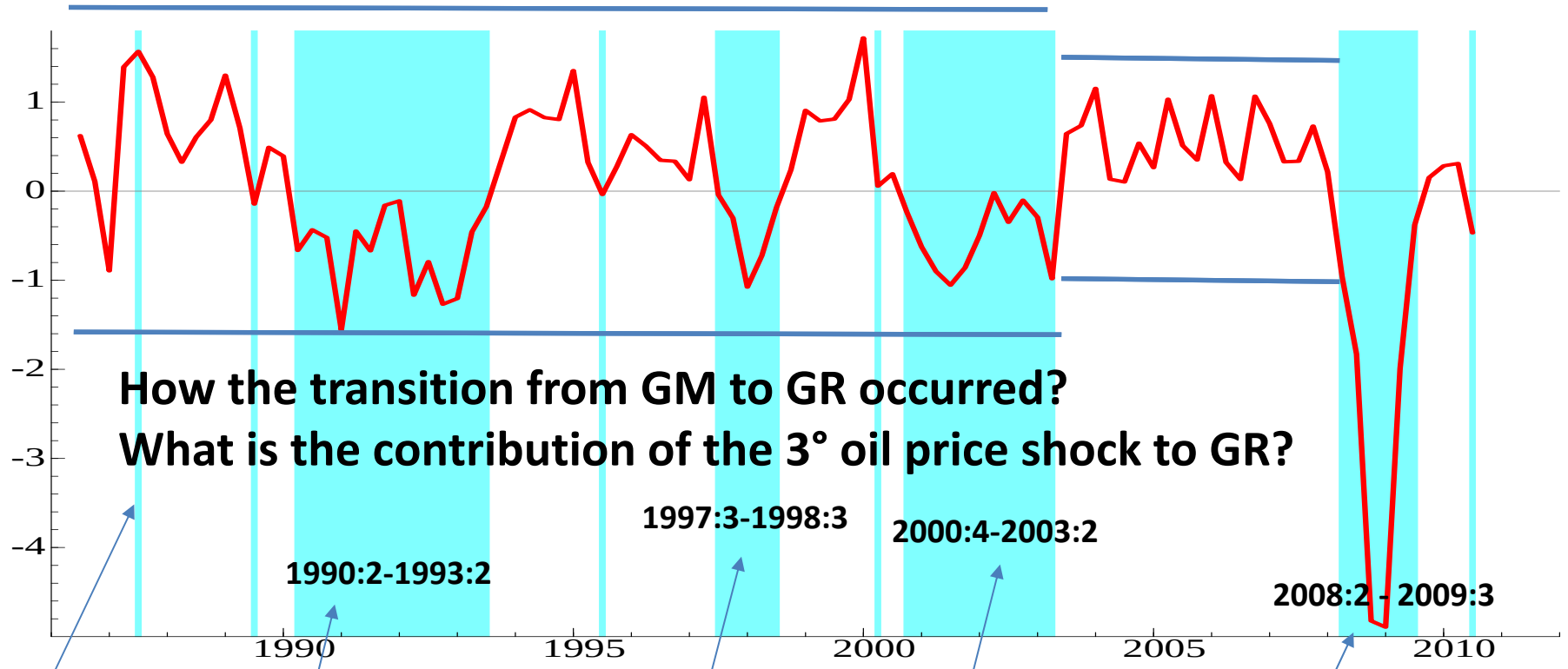
- **Hamilton (2011)**: To date, 10 out 11 postwar US recessions were preceded by sharp increases in oil prices.

- **Kilian (2009)**: Recessionary effects should stem from supply driven oil price shocks only.

- **The global economy looked fairly resilient to the shock. Had this to do with the origin of the shock? Hence, where the third oil price shock came from and what was its contribution to the Great recession?**
- **Is there any linkage with the financial crisis?**

The origin of the third oil price shock

Global real activity dynamics since the mid-1980s through 2010



October 1987 stock market crash

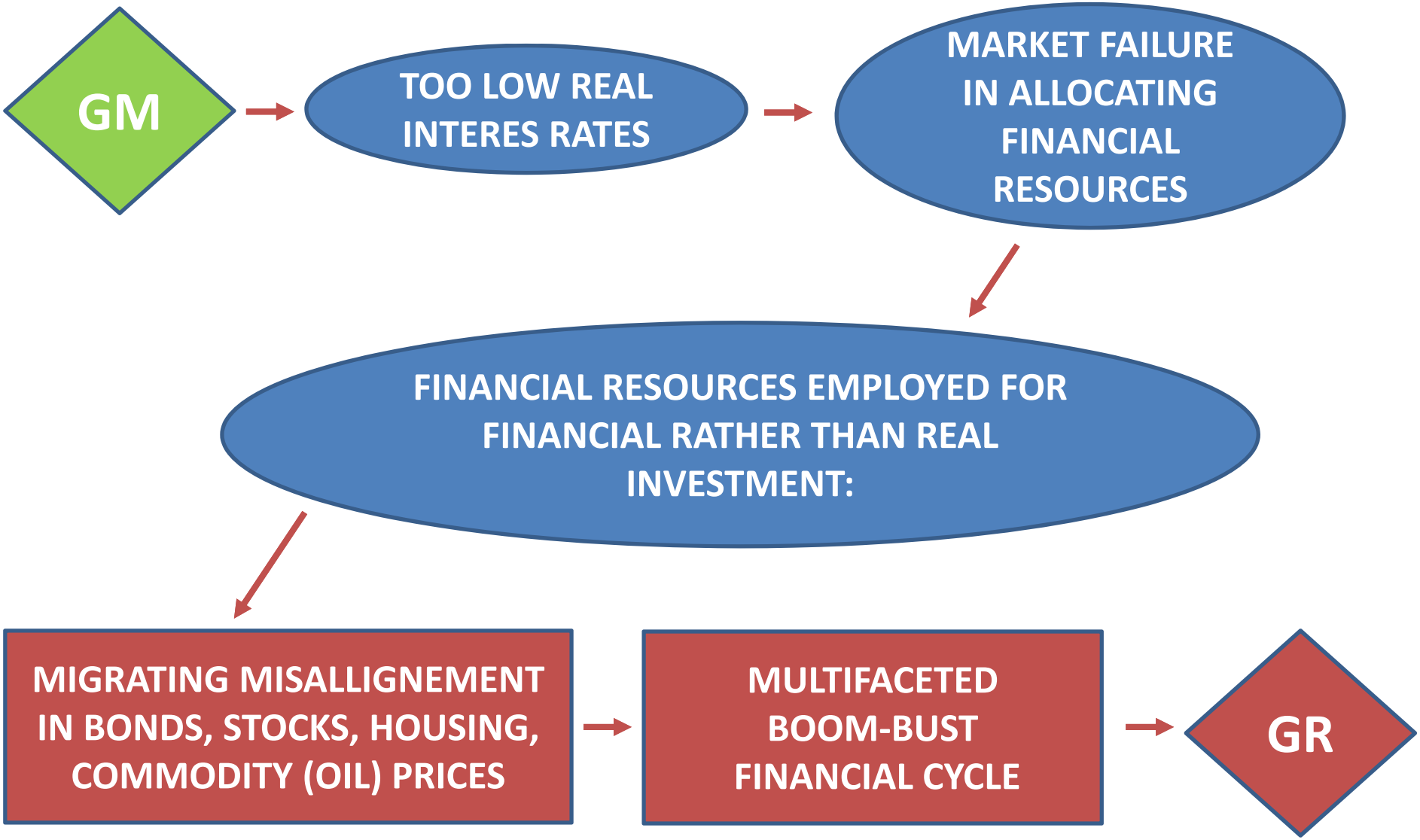
Subprime financial crisis (2007-2009); third oil price shock (2007-2008)

Collapse of the high-yield market (1989-1990) and the **Savings & Loans crisis** (1986-1995) in the US; the collapse of the real estate bubble in Japan (1989-1991); the economic crisis in India (1991); the banking crisis in Finland and Sweden (1991-1993); **the first Persian Gulf War and ensuing oil price shock** (1990).

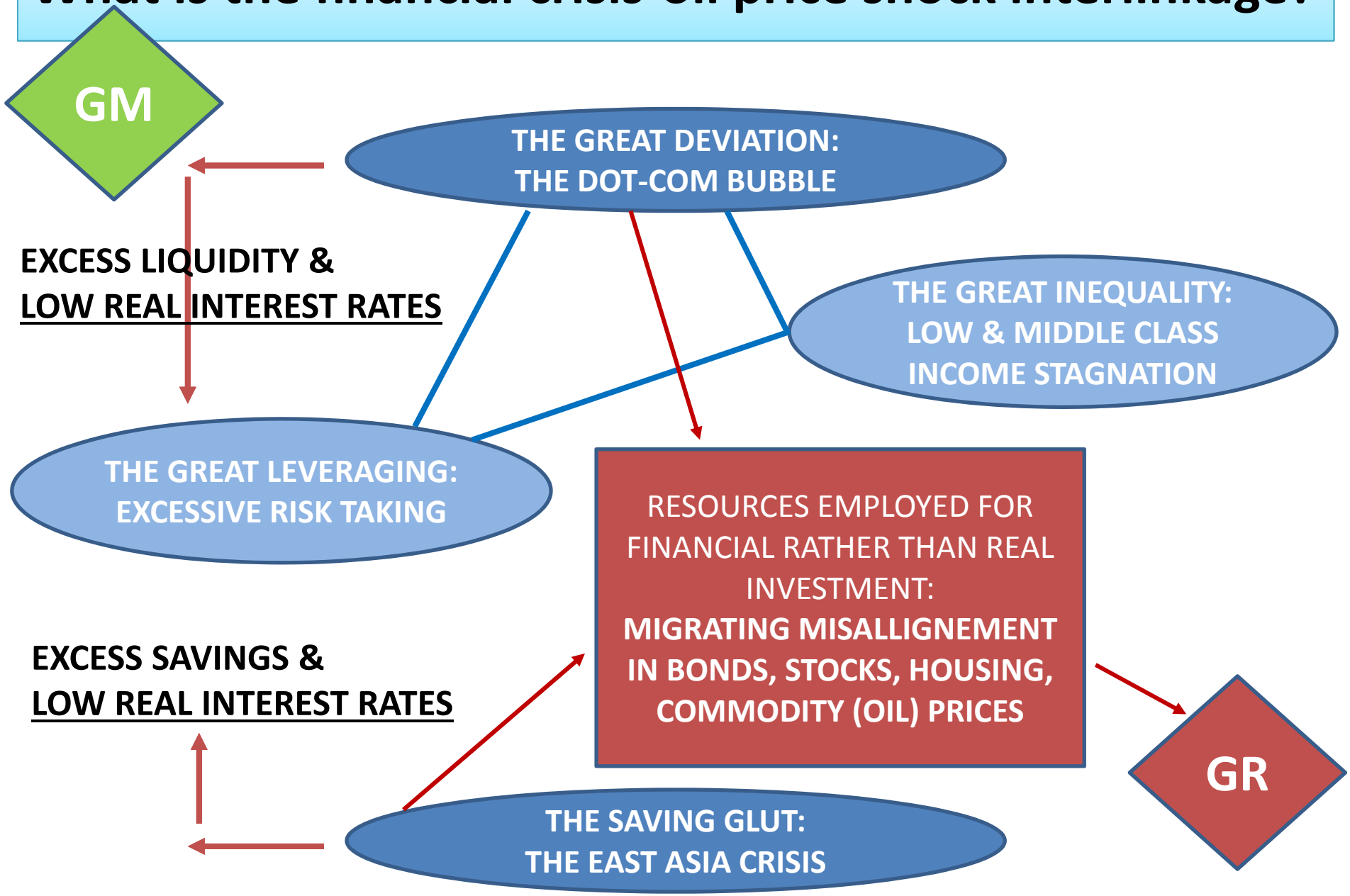
Financial crisis in East-Asia and in Russia (1998-1998)

The collapse of the **dot-com bubble**, September 11th terrorist attack and accounting scandals in the US (2000), the economic crisis in Argentina (1999-2002) and the **second Persian Gulf War (2003) and related oil price shock**

What is the financial crisis-oil price shock interlinkage?



What is the financial crisis-oil price shock interlinkage?



The excess speculation hypothesis

The excess speculation hypothesis:

The 3rd oil price shock was triggered by **the large-scale entry into markets for derivatives based on oil and other commodities of institutional investors, pensions and sovereign funds**, following the financial liberalization provisions contained in the 2000 U.S. Commodity Futures Modernization Act (CFMA) (as profits opportunities were fading away in other financial markets).

The excess speculation hypothesis

Supporting evidence:

- **hedging-pressure theory** (Cootner, 1960): Hamilton and Wu (2011), Melolinna (2011), Acharya et al. (2012), Mou (2011) and Etula (2010), Singleton (2011), Henderson et al. (2012), Hong and Yogo (2011);

- **fundamentalist and noise traders operating in the futures market**: Vansteenkiste (2011), Reitz and Slopek (2008), ter-Ellen and Zwinkles (2010), Ciffarelli and Paladino (2010);

- **oil price bubble**: Frankel and Rose (2010), Lombardi and Van Robays (2011), Juvenal and Petrella (2011), Caballero et al., (2008a,b), Phillips and Yu (2011), Gilbert (2010).

Non supporting evidence:

Buyuksahin and Harris (2009), Boyd et al. (2009), Brunetti et al. (2010), Buyuksahin et al. (2008), Kilian and Murphy (2010), Alquist and Gervais (2011), Irwin and Sanders (2012), Fattohu et al. (2012).

The excess liquidity hypothesis

- **The Excess liquidity hypothesis: The third oil price shock would have originated from the Great Deviation** (Frankel, 2007; Frankel and Rose, 2010).

- Excess liquidity may ***directly*** **affect the real oil price** through
  - portfolio rebalancing (*inv*)
  - depreciation of the US$ (OPEC price management)

  and ***indirectly*** **by lowering the real interest rate** through

- portfolio shift (*inv*) (Frankel, 2007; Calvo, 2008)
- Dornbusch-type monetarist overshooting mechanism (*inv)* (Frankel, 2007)
- convenience yield/net present value mechanism (*inv*) (Pindyck, 1993);
- optimal extraction policies (Hotelling, 1931) and *oil in the ground* policies (flow oil supply; Davidson, 2008);

Economic growth hypothesis

- **The economic growth hypothesis:** increasing **flow oil demand**, due to rapid growth in emerging countries, in the face of stable OECD demand and ***stagnant oil production would have driven*** the real oil price upward since the mid-2000s (Kilian, 2009; Kilian and Murphy, 2010; Hamilton, 2009, 2011).

The real effects of oil price shocks

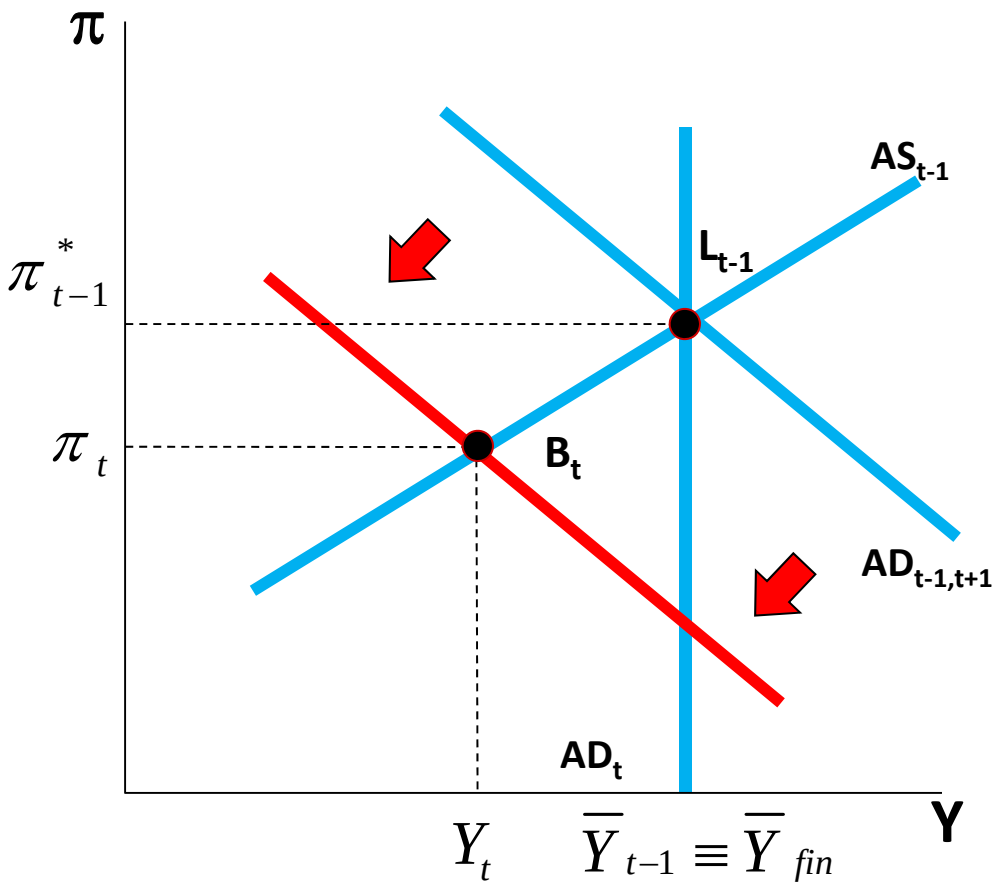
The real effects of oil price shocks

- **The real effects of an oil price shock are exercised by depressing both aggregate demand and supply**.

- **DEMAND SIDE**: $op \uparrow \rightarrow \mathrm{AD} \downarrow \rightarrow \mathrm{Y}, \pi \downarrow$
  i) discretionary income and precautionary savings $\left(\mathrm{C} \downarrow\right)$
  ii) uncertainty $\left(\mathrm{I}, \mathrm{C} \downarrow\right)$
  iii) (pre-emptive) monetary policy, real balances and oil price drag $\left(\mathrm{I}, \mathrm{C} \downarrow\right)$

- **SUPPLY SIDE**: $op \uparrow \rightarrow \mathrm{AS} \downarrow \rightarrow Y \downarrow, \pi \uparrow$
  i) operating costs $\left(\mathrm{MC} \uparrow\right)$
  ii) sectorial reallocation $\left(\mathrm{u} \uparrow\right)$

The real effects of an oil price shock: AD case



DEMAND SIDE:

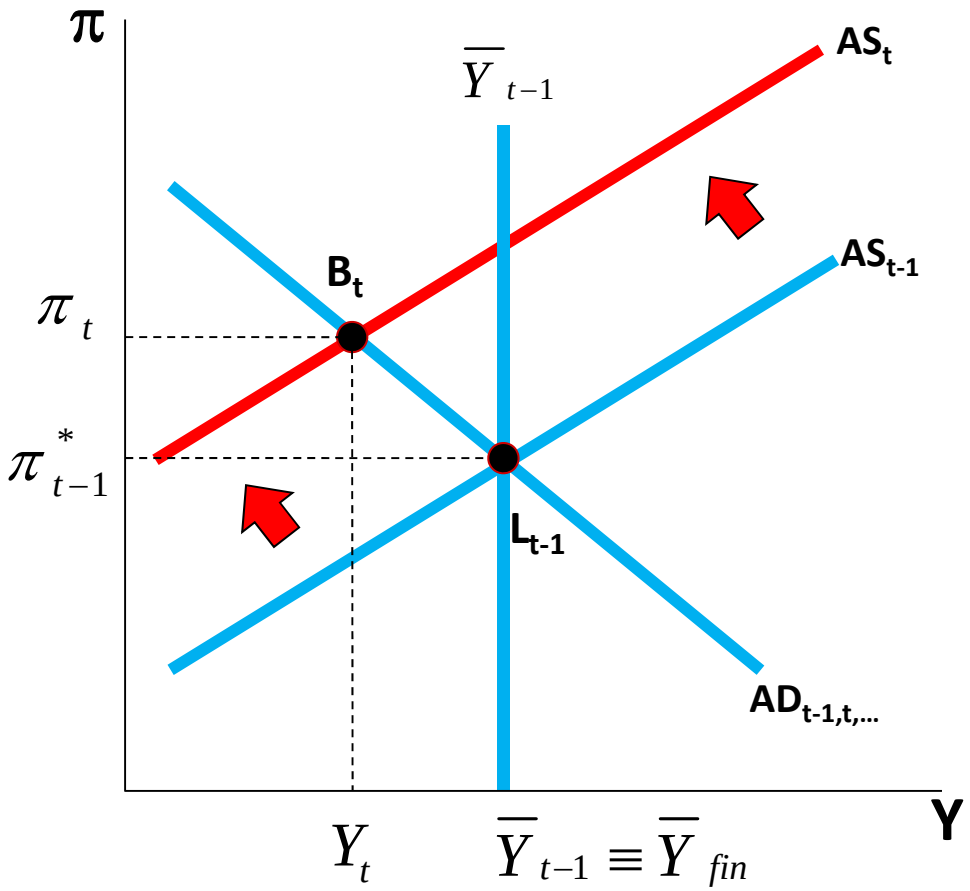
$$op \uparrow \rightarrow \mathrm{AD} \downarrow \rightarrow \mathrm{Y}, \pi \downarrow$$

i) discretionary income and precautionary savings $\left(\mathrm{C} \downarrow\right)$

ii) uncertainty, monetary policy, real balances and oil price drag $\left(\mathrm{I}, \mathrm{C} \downarrow\right)$

An oil price shock, by depressing aggregate demand leads to recession and lower inflation in the short term, without long lasting effects.

The real effects of an oil price shock: AS case



SUPPLY SIDE:

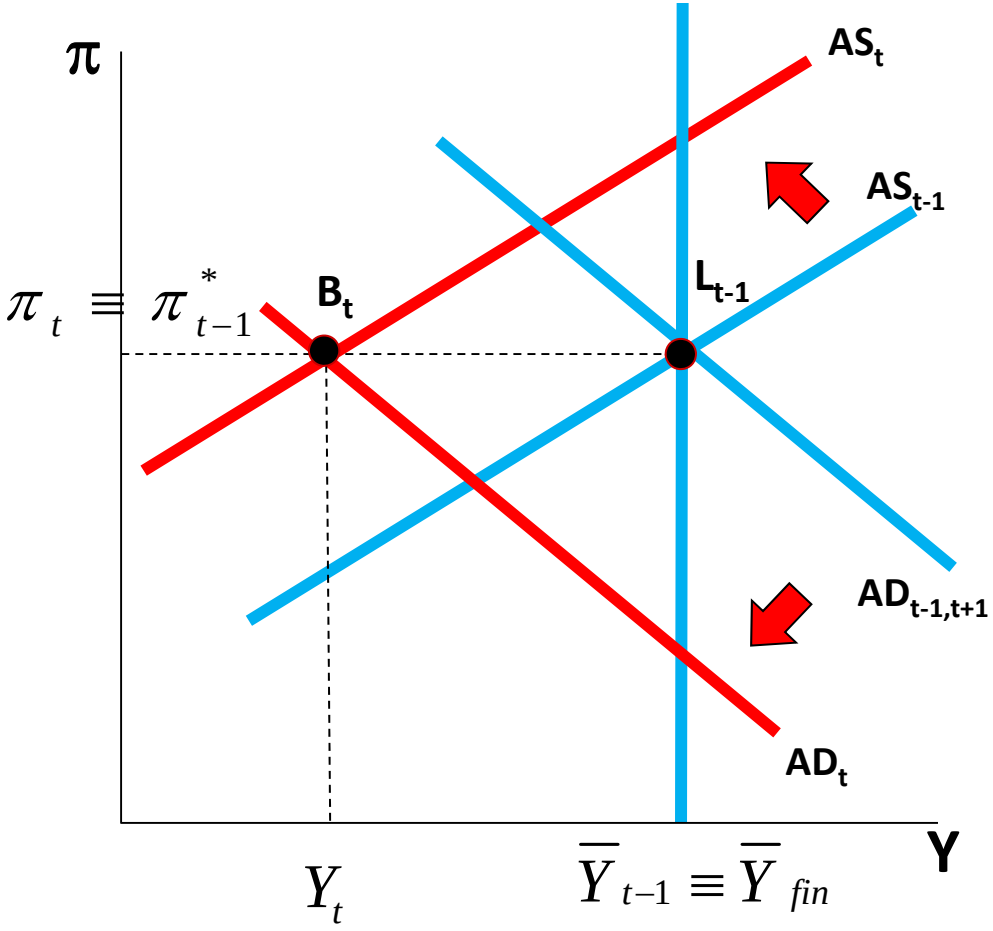
$$op \uparrow \rightarrow \text{AS} \downarrow \rightarrow Y \downarrow, \pi \uparrow$$

i) operating costs $(\text{MC} \uparrow)$

ii) sectorial reallocation $(\text{u} \uparrow)$

An oil price shock, by increasing production costs, would lead to stagflation in the short-term, without long lasting effects.

The real effects of an oil price shock: the case of stable inflation



An oil price shock, by depressing aggregate demand and supply leads to recession in the short-term, yet without affecting inflation.

Empirical evidence

The empirical evidence is not clear-cut.

- **Asymmetric effects** (Mork, 1989):

- oil price shocks are more likely to **affect real activity** when they occur **in an environment of low oil price volatility or when they are not compensating previous price decreases** (Lee et al., 1995; Hamilton, 1996, 2003; Ferder, 1996; Elder and Serletis (2010), Lee et al. (2010) and Miller and Ni (2011)).

- oil price shocks affect differently and more strongly job destruction than job creation, and energy intensive sectors (automobile, chemicals, rubber and plastic) **than other sectors** (generating supply rather than demand shortages) (Engeman et al., 2011; Davis and Haltinwanger, 1999; Lee and Ni, 2002; Herrera et al., 2010; Ramey and Vine, 2012).

Empirical evidence

- **Symmetric effects**

- **The response of US consumption, investment, and GDP to positive and negative energy price shocks is symmetric**, consistent with discretionary income, precautionary savings and operating costs mechanisms (Edelstein and Kilian, 2007, 2009; Kilian and Vigfusson, 2011a,b).

- **Monetary policy deepening** (Bernanke et al., 1997): **systematic monetary policy response to oil price shocks is unlikely to have worsened US recessions** since the 1970s (Hamilton and Herrera, 2004; Herrera and Pesavento, 2009; Kilian and Lewis, 2011)

- **Recessionary effects should stem from supply driven oil price shocks only** (Kilian, 2009).

The resilience to the 3° oil price shock

- Different **explanations for the resilience of the global (world) economy to the recent oil price episode** have been provided:

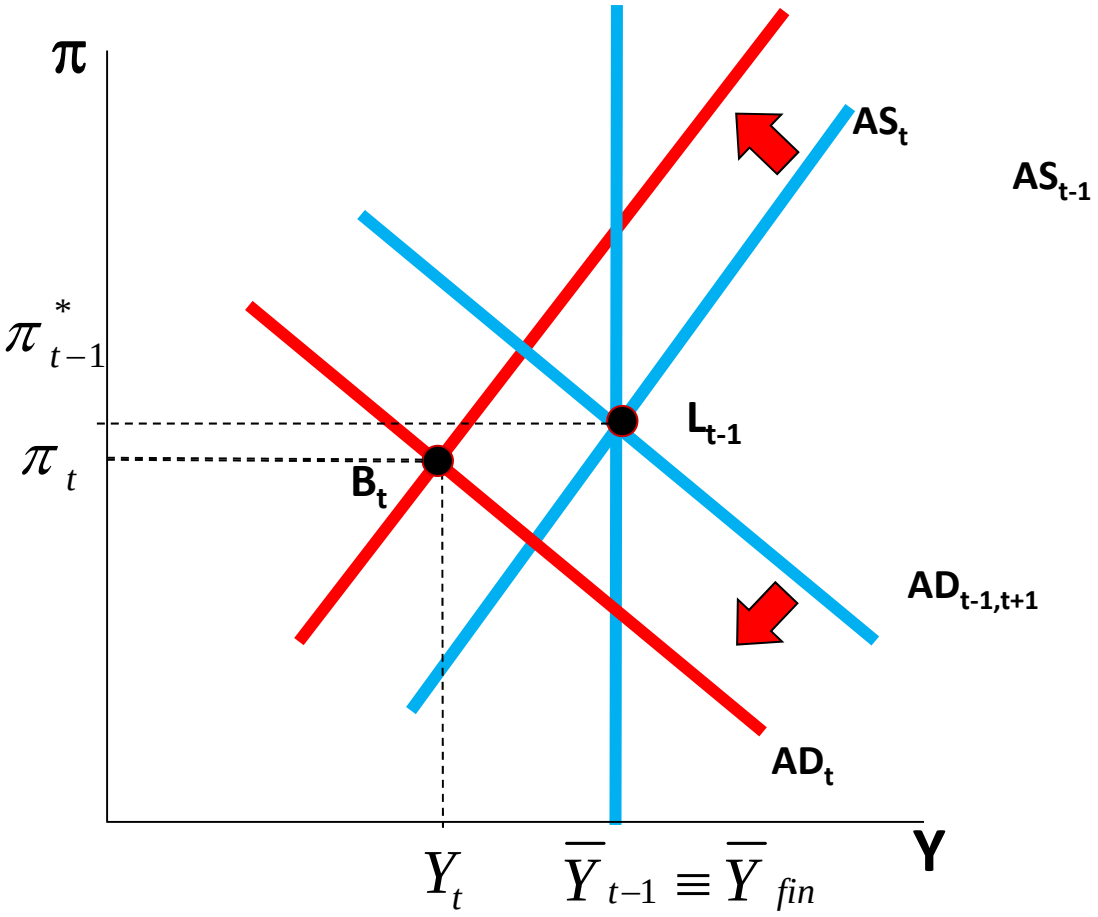
- **declining oil share** (Nakov and Pescatori, 2010) and **increasing productivity of energy inputs** (Vasconez et al., 2014): **AS** less sensitive to oil price changes;

- **lower real wage rigidity** (Blanchard and Galí, 2010; Blanchard and Riggi, 2009): **AS** steeper;

- **lower volatility of oil demand and supply shocks** (Baumeister and Peersman, 2009): **AD** less sensitive to oil price changes;

- **better anchoring of inflation expectations, in the face of demand driven oil price shocks** (Kilian, 2010): inflation less inertial.

The real effects of an oil price shock: the case of stable inflation



The negative impact on output is smaller than in the previous cases (the adjustment process would also be faster)

Aim & contributions of the paper

- The aim of the research is then **assessing the origin of the third oil price shock and its recessionary effects**, using:

- a **large-scale** macroeconometric framework;
- a detailed description of **global oil market-macro-finance interactions**.

- **Original contributions:**

- **Oil price dynamics and the oil price-macroeconomy relationship are investigated from a global economy perspective, conditioning on macro-financial information for 50 countries.**

- **Detailed modeling of physical and financial oil market conditions**: global oil reserves, production, consumption, (OECD) inventories, refineries margins, and proxies for oil price uncertainty and excess speculation in the oil futures market.

Contributions of the paper

- **Original contributions:**

- Proxy variables (risk factors) for **expectations about future global fundamentals and economic/financial fragility conditions are directly considered**.

- To our knowledge this is the **first paper** in the oil price and oil price-macroeconomy literature **to directly modeling market expectations about future fundamentals and the global macro-financial effects of oil price shocks from a broad empirical perspective, within a joint assessment of real activity, fiscal/monetary policy responses, as well as labor and financial markets developments.**

- Within this framework we provide **novel evidence** on determinants of oil price dynamics and the oil price-macroeconomy relationship.

Data

- **(17) Macro-financial variables** (quarterly)**:**

  23 advanced countries, 1980(1)-2010(3);

  27 emerging countries, 1995(1)-2010(3).

- Labor market; real activity; fiscal and monetary policy stance; interest rates; exchange rates; housing and stock prices.

  12 unobserved global factors (*f*) are estimated from the above I.S., reflecting global macro-financial conditions.

- **Global (US) macro-financial observed factors (*g*; 11 variables):**

  Commodity prices; risk factors (size, value, momentum, stock market liquidity and volatility, financial leverage and fragility), global imbalance measures.

- **Oil market variables (1986(1)-2010(3); *o*; 10 variables):**

  Oil market supply and (flow and financial) demand conditions.

The econometric model

- **Two blocks:**

1) Local macro-finance block: about 800 equations

$$\left(I - C(L)\right)\left(x_t - \mu - \Lambda_f f_t - \Lambda_* \begin{bmatrix} g_t \\ o_t \end{bmatrix}\right) = v_t \qquad v_t \sim iid(0, \Sigma_v)$$

QML estimation (Morana, 2014) $\rightarrow$

12 global macro-financial UF f_t

2) Global macro-finance & oil market block: 33 equations in the observed and unobserved factors $y_t = \left[\hat{f}_t' \;\; g_t' \;\; o_t'\right]'$

$$\left(I - P(L)\right)(y_t - \rho) = \eta_t \qquad \eta_t \sim iid(0, \Sigma_\eta)$$

PC-VAR estimation (Morana, 2012), yielding **impulse responses, forecast error variance decomposition, historical decomposition.**

Structural shocks

33 global structural shocks are identified by means of the Choleski decomposition, with ordering selected according to speed of adjustment and economic theory assumptions, and supported by pairwise weak exogeneity testing.

Two broad categories of shocks are then identified:

a) **SUPPLY SIDE SHOCKS (SS)**:

- **oil market** shocks (**oil market supply side** (**SUP**); other oil market shocks (OTHER)); **labor market** shocks (**LM**: labor demand (**LD**) and supply (**LS**), core inflation/unit labor costs (**CI**)); **productivity** shocks (**PR**).

b) **DEMAND SIDE and FINANCIAL SHOCKS (DS) :**

- **aggregate demand** shocks (AD); **saving rates** shocks (SAV: global (GFI), US (GDI) and ex-US global (GTI) saving rate); **monetary policy** shocks (excess liquidity (EL); term structure level (TL) and slope (TS)); **US terms of trade** shocks (TT); **portfolio allocation** shocks (stocks (PF) and housing (PH) preference); **risk factor** shocks (RF: size (SZ)).

The oil market

- *i*) **The oil market supply side is constrained by geophysical conditions**, and therefore **exogenous relatively to macro-financial conditions driving oil demand.**

- *ii*) **Oil consumption (flow oil demand) is contemporaneously determined by world business cycle conditions.**

- *iii*) **Inventories are contemporaneously affected by oil market supply and demand (flow and financial) conditions. Financial oil demand is driven by both fundamental** (liquidity/interest rates, portfolio diversification opportunities, and expectations about future fundamentals) **and non fundamental factors** (excess speculation measures).

- *iv*) **Real oil price and nominal oil price volatility are contemporaneously determined by oil market supply side, flow and financial oil demand conditions, and inventories.**

The oil market

- **Ten oil market structural disturbances** are identified:

- Oil market supply-side shocks (SUP: R, OPR, RM)

- oil reserves (R)

- net positive and negative oil production (OPR)

- refineries margins (RM)

- oil consumption and inventories preferences (C, INV)

- *other* real oil price and nominal oil price volatility (OP, OV)

- speculative (market-pressure (Working-T); *other* futures basis) **(SPC)**

The oil market

Consistent with economic theory we expect (and find):

- a) **A positive (negative) flow oil supply shock driving the real oil price downward (upward)**, consistent with the effects of a downward (upward shift) in the flow oil supply schedule *ceteris paribus*. This shock is akin to the oil supply shocks in Kilian (2009) and Baumeister and Peersman (2008, 2009).

- b) **A positive refineries margins shock driving the real oil price downward**, consistent with a shift in the production mix favoring (relatively less expensive) medium and heavy sour crudes.

- c) **A positive oil reserves shock**, by signaling a future slack in supply conditions, **driving the futures and spot oil prices downward**.

The oil market

- d1) **A positive oil market speculative (market-pressure) shock driving the futures and spot oil price upward.**

- **the futures price increases with traders positions**
- **then, the futures price shock is transmitted to the spot price** through:
  - **price discovery effect** (the spot price is an **assessed** price);
  - **inventories hoarding** (above ground & underground);
  - **price inelasticity of oil consumption** (Hamilton, 2009).

- d2) **A residual/*other* speculative/futures basis shock**, net of the contemporaneous effect of traders positions (as measured by the Working-T index).

The oil market

- The **oil market speculative shocks are** then **different** from those in Kilian and Murphy (2010), as well as in Juvenal and Petrella (2011) and Lombardi and Van Robays (2011):

- **disentangling between fundamental and non fundamental financial oil demand components** is carried out and **market expectations about future fundamentals and the role of trader positions are *directly* accounted for**.

- Relatively to Juvenal and Petrella (2011) and Lombardi and Van Robays (2011), **disentangling is more accurate** as, by conditioning on risk factors, liquidity and interest rates, and portfolio's diversification opportunities, **speculative shocks unrelated to fundamentalist behavior can be identified**.

The oil market

- e) **Being** the former **net of the contemporaneous effect of** the **macroeconomic** variables driving flow oil demand, **and** the latter also of the effect of the **financial variables** driving financial oil demand, **the own oil consumption and inventories shocks bear the interpretation of preference shocks**.

- f) **Similarly for the real oil price and nominal oil price volatility own shocks,** which are referred to as ***other*** **real oil price and nominal oil price volatility shocks, without** seeking **economic interpretation**. The oil consumption preference shock and the other real oil price shock are then akin to the oil-specific demand shock and the other oil supply shock, respectively, in Kilian (2009).

Determinants of oil price fluctuations: Empirical results

Determinants of oil price fluctuations

Assessed with reference to the contribution of various categories of shocks:

- Macroeconomic (supply- and demand-side) shocks: MAC

labor market shocks (**LM**: labor demand (**LD**) and supply (**LS**), core inflation/unit labor costs (**CI**)); **productivity** shocks (**PR**); **aggregate demand** shocks (AD); **saving rates** shocks (**SAV**: global (GFI), US (GDI) and ex-US global (GTI) saving rate).

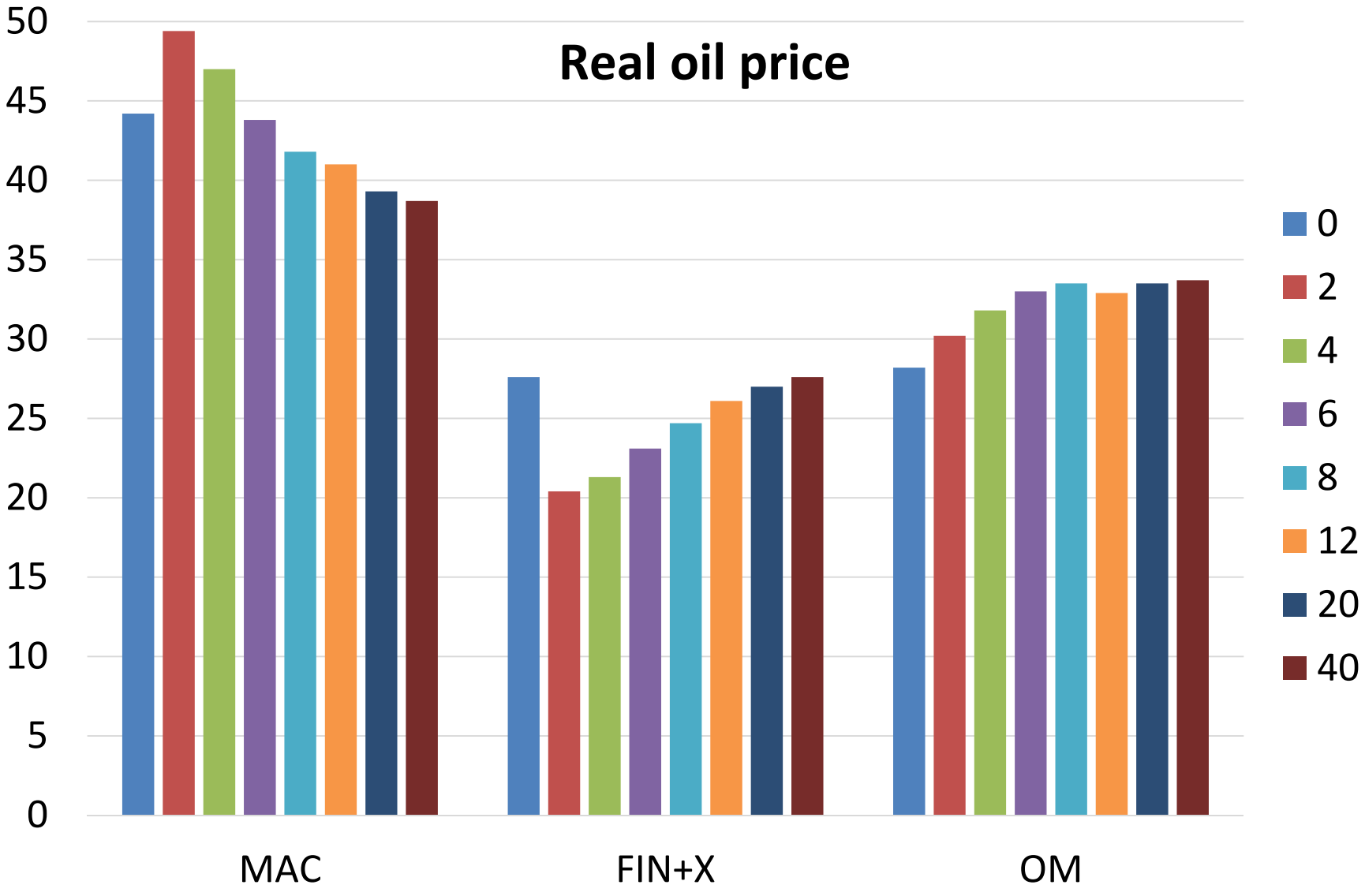
- Financial shocks: FIN + US$/terms of trade shocks (X)

monetary policy shocks (excess liquidity (**EL**); term structure level (**TL**) and slope (**TS**)); **portfolio allocation** shocks (**PA**; stocks, housing, gold and non energy-commodity preference); **risk factor** shocks (**RF**: size, value, momentum, leverage, stock market liquidity, fragility).

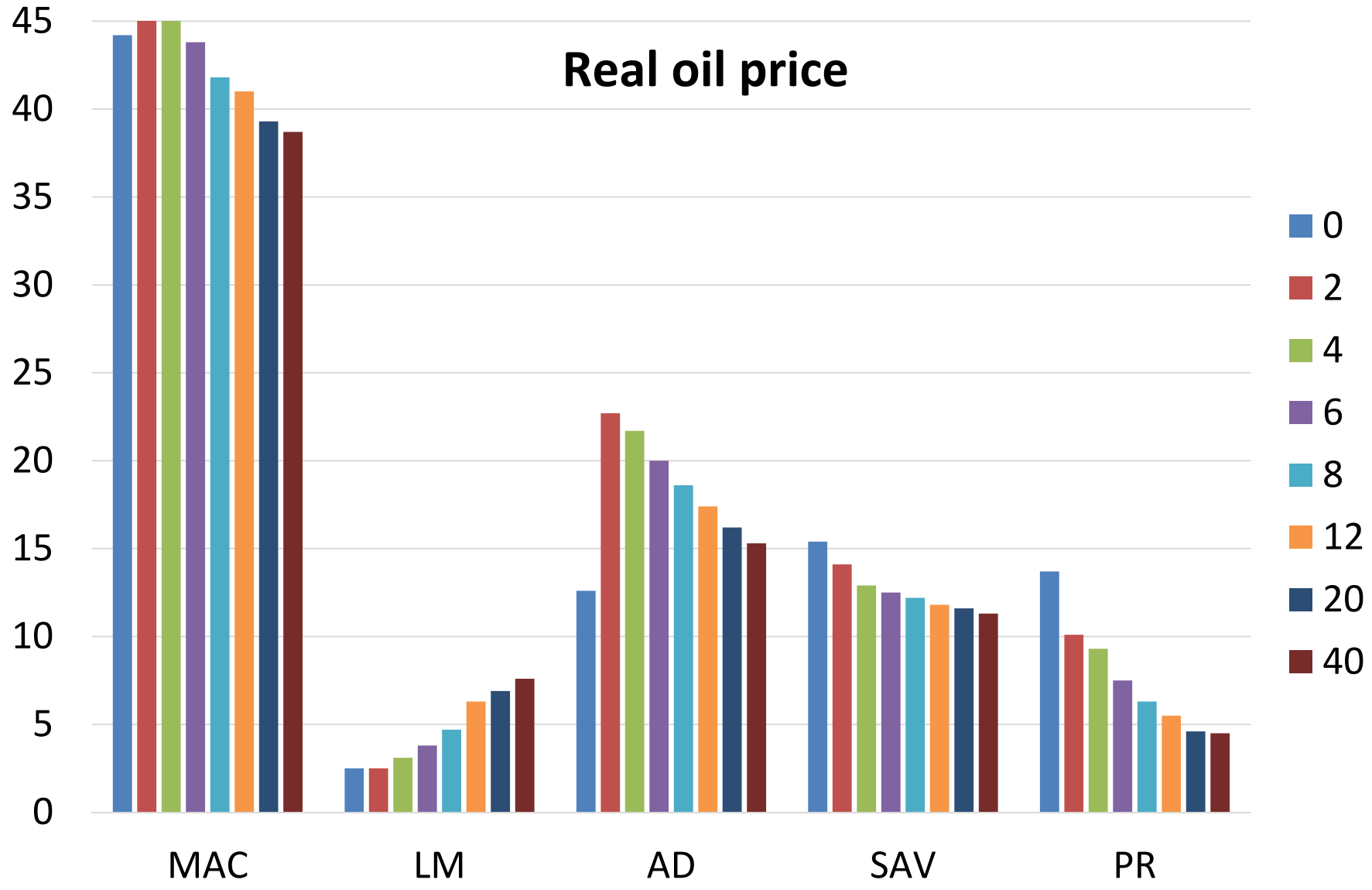
- Oil market shocks: OM

oil market supply-side shocks (**SUP**: reserves, oil production, refineries margins); oil consumption (**C**) and inventories (**INV**) preference shocks; oil market speculative shocks (market pressure (**WT**); other futures market (**FSP**)); other oil market shocks (oil price (**OP**) and volatility (**OV**) own shocks).

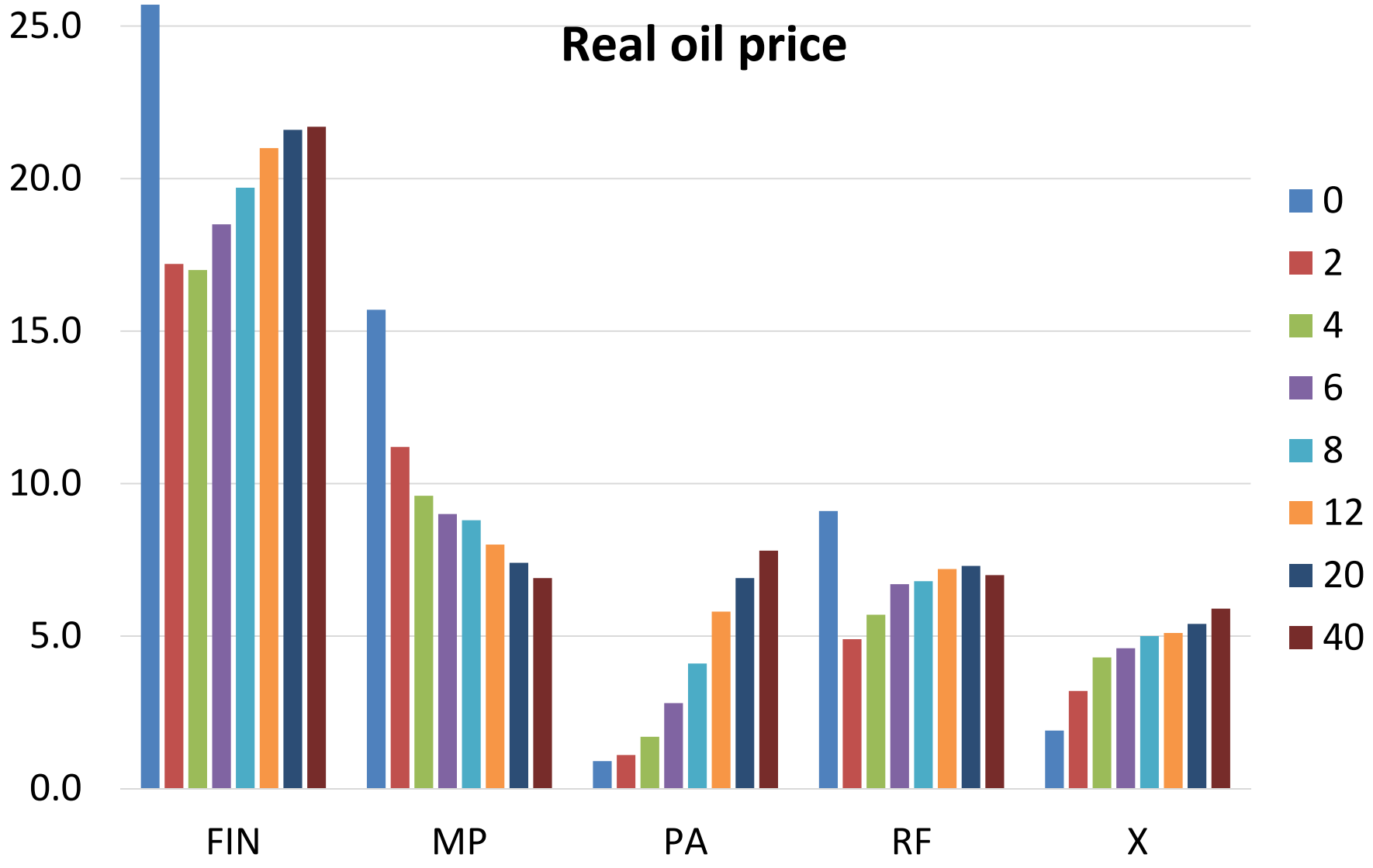
Forecast error variance decomposition



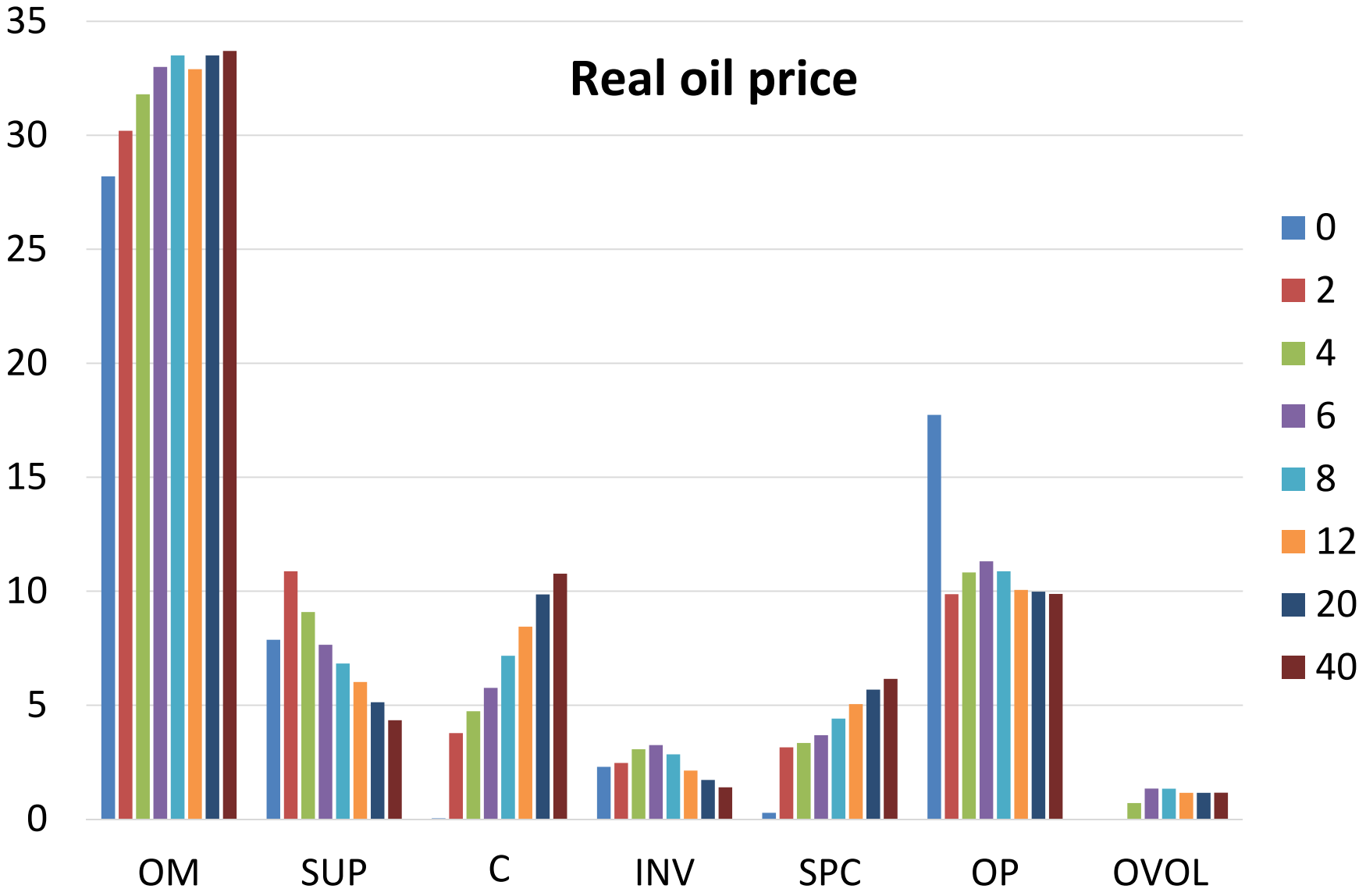
Contribution of macroeconomic shocks



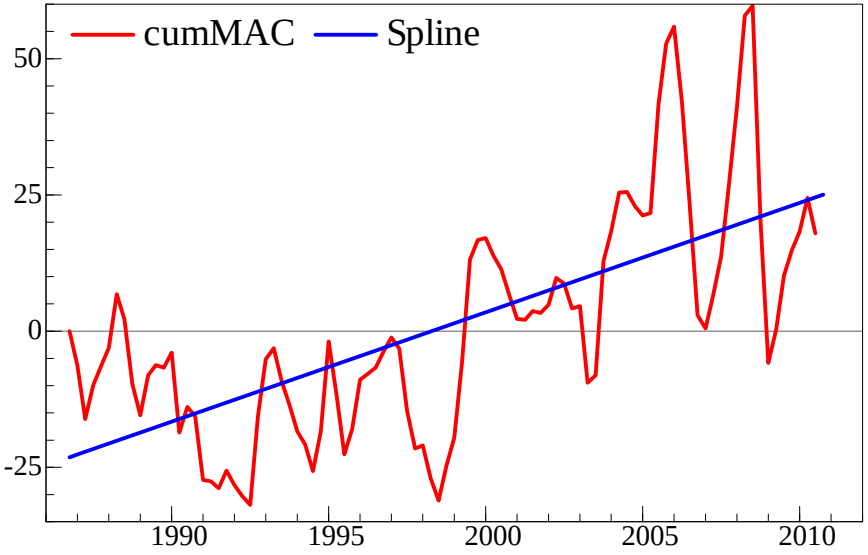
Contribution of financial shocks

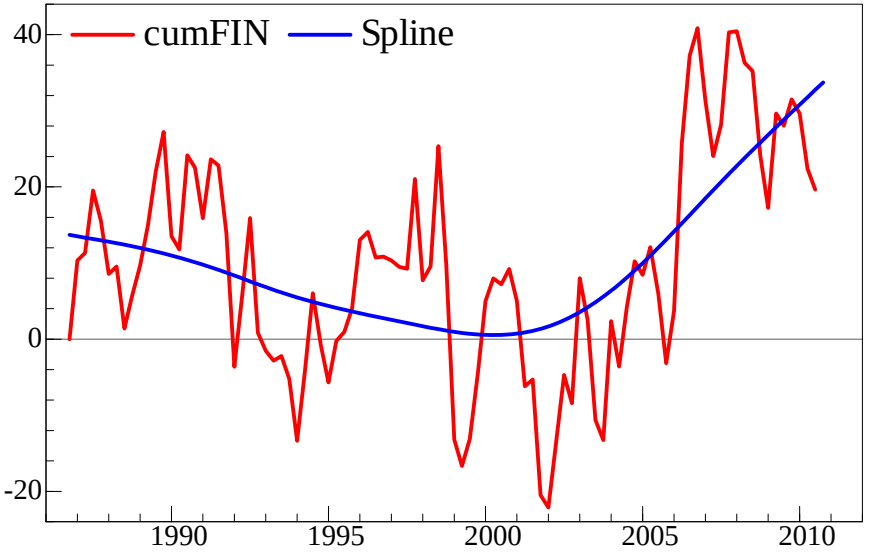


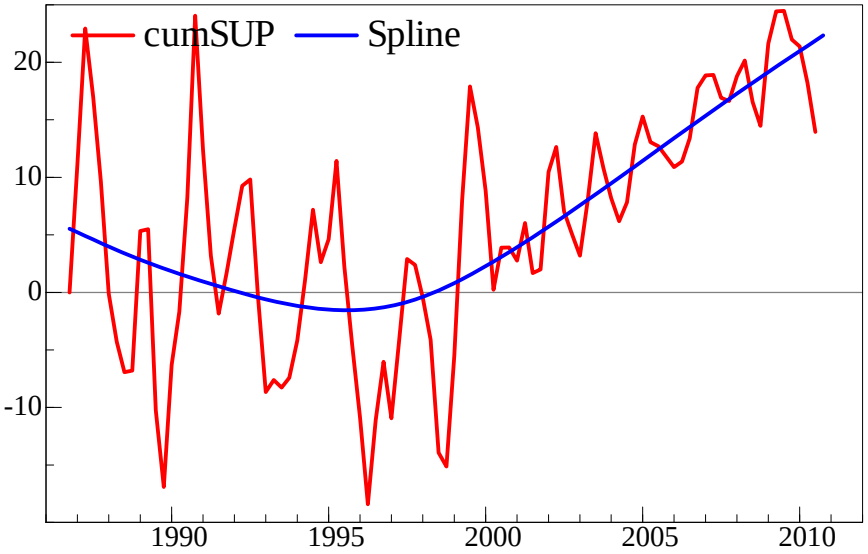
Contribution of oil market shocks

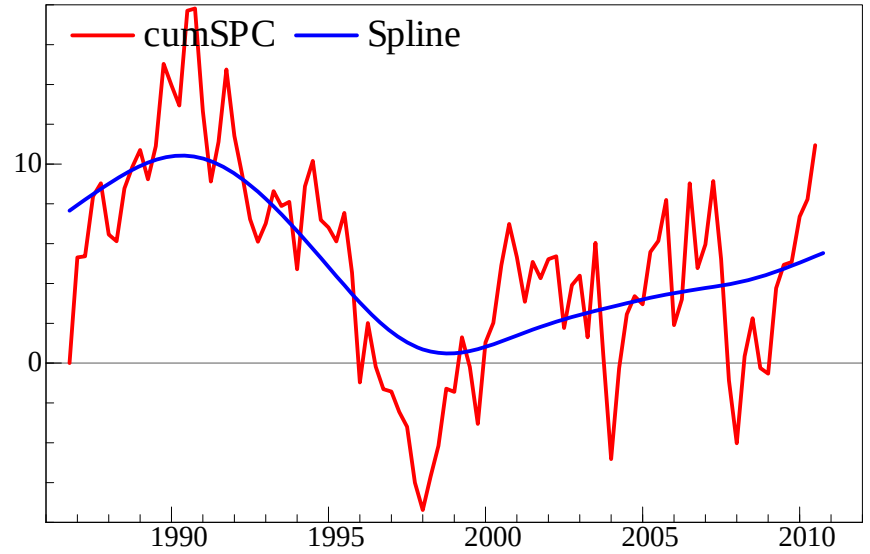


Real oil price: historical decomposition I

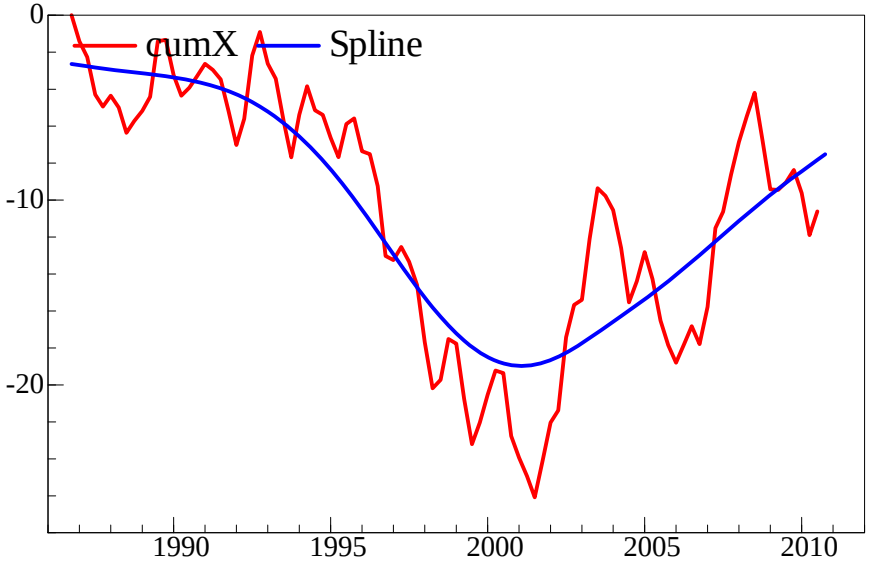


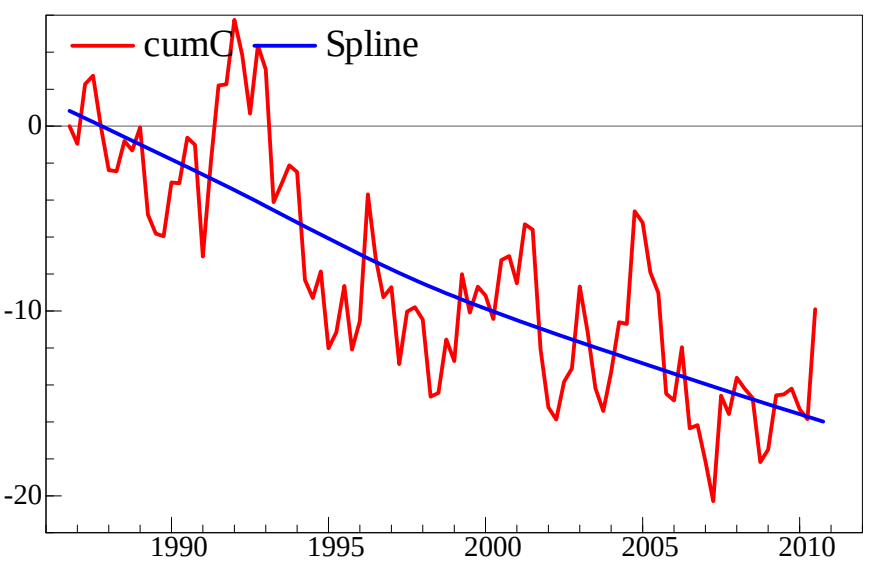


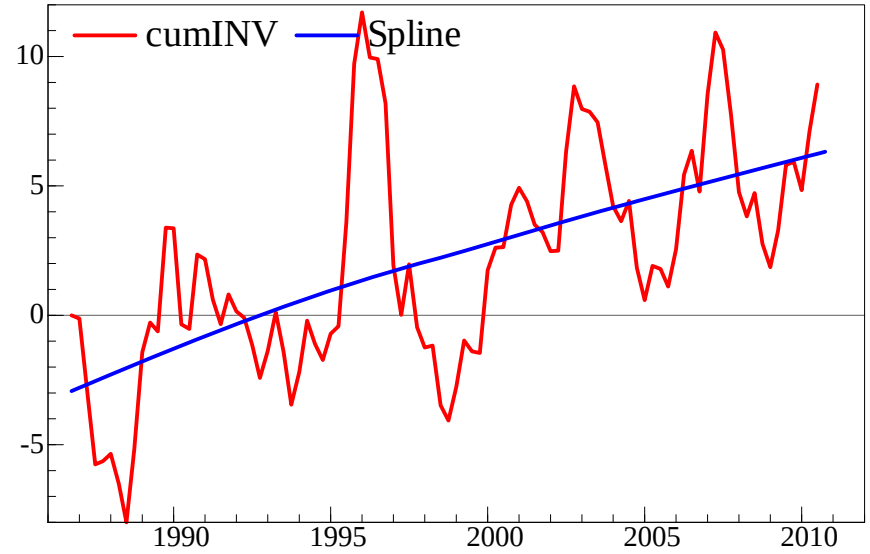


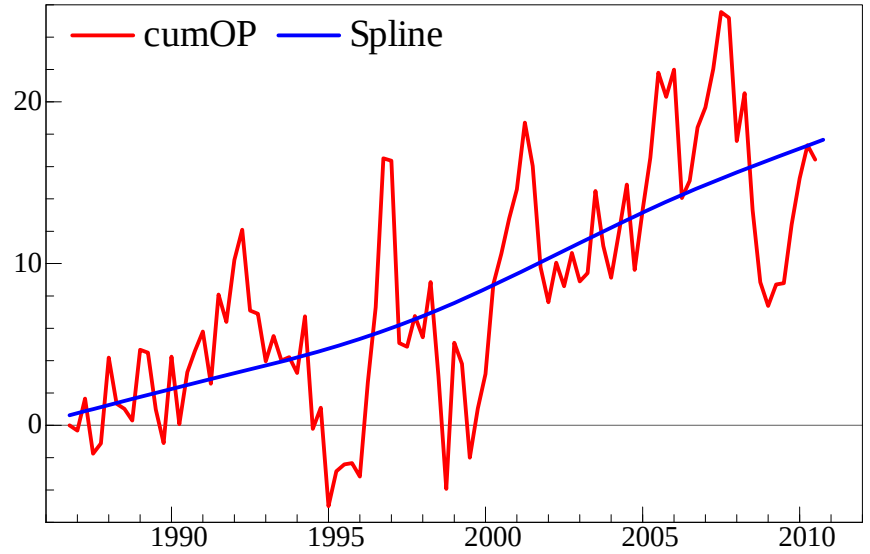


Real oil price: historical decomposition II









Historical decomposition: 2004:1-2010:3

REAL OIL PRICE

SUP	C	INV	MAC	X	FIN	SPC	OP	WTI
3.2	5.5	3.1	5.1	-0.8	32.9	10.5	5.5	65.0

- **Are financial shocks the major real oil price driver over the 2004-2010 period, and, actually, the key determinant of the 2008 episode?**

Historical decomposition: the 2007-2009 episode

	SUP	C	INV	MAC	X	FIN	SPC	OP	WTI
07(1)	1.1	-1.9	3.8	-2.4	2.0	-9.5	1.2	1.3	-4.6
07(2)	0.0	-2.2	2.4	6.3	4.3	-7.3	3.2	2.4	9.1
07(3)	-2.0	5.7	-0.7	6.9	0.9	4.1	-3.9	3.5	14.6
07(4)	-0.3	-1.0	-2.6	13.5	2.0	12.1	-6.1	-0.4	17.3
08(1)	2.2	2.0	-3.0	14.0	1.8	0.2	-3.2	-7.6	6.3
08(2)	1.4	-0.6	-0.9	16.7	1.4	-4.1	4.4	3.0	21.1
08(3)	-3.6	-0.5	0.9	1.8	1.3	-1.1	1.9	-7.2	-6.5
08(4)	-2.1	-3.5	-2.0	-39.3	-2.6	-11.1	-2.5	-4.5	-67.4
09(1)	7.2	0.7	-0.9	-26.3	-2.7	-6.9	-0.3	-1.5	-30.6
09(2)	2.8	2.9	1.4	6.1	0.0	12.4	4.3	1.3	31.3
09(3)	0.0	0.0	2.5	9.9	0.4	-1.6	1.2	0.1	12.6
09(4)	-2.5	0.3	0.1	4.6	0.7	3.5	0.1	3.6	10.5

Summary of the findings

- While we then confirm that, at least since the mid-1980s, **macroeconomic shocks have been the major upward driver of the real oil price,** we also find a **sizable contribution of oil market supply side and financial shocks since early 2000s.**

- **The contribution of financial shocks** to real oil price fluctuations **has been particularly remarkable since mid-2000s**: **44% out of the 65%** real oil price increase over the period 2004 through 2010.

-

- The evidence is then **consistent with the potential effects of the large-scale entry into markets for derivatives based on oil and other commodities of institutional investors, pensions and sovereign funds**, following the financial liberalization provisions contained in the 2000 U.S. Commodity Futures Modernization Act (CFMA), **as well as with the potential portfolio (and other) effects triggered by liquidity/interest rates**.

Summary of the findings

- Yet, **the third oil price shock was a macro-finance episode**:

- **MAC shocks accounted for 58% out of the 68% real oil price run up over the 2007(2)-2008 (2) period**; FIN shocks 6% in 2007(4);

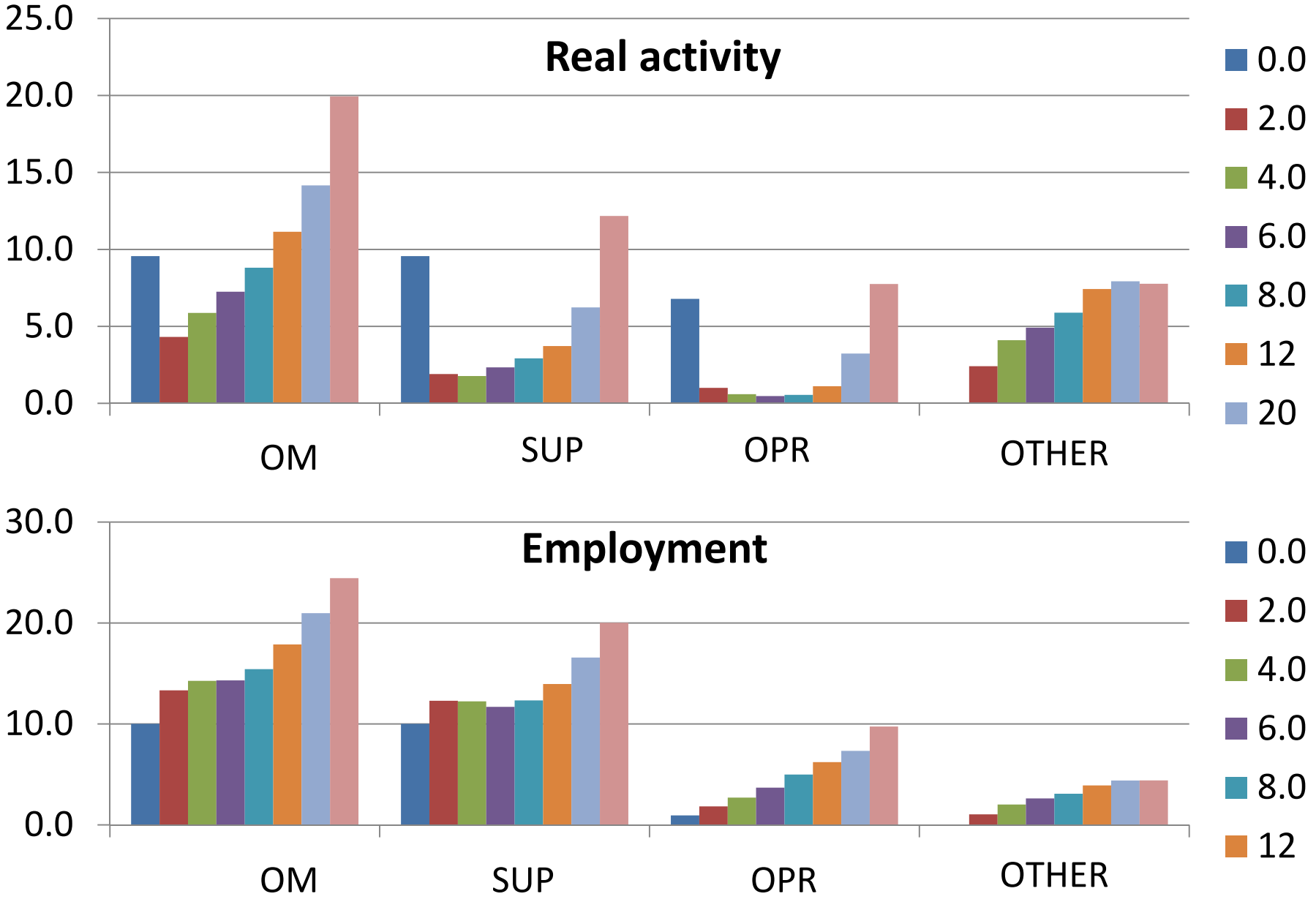
- **the -67% and -31% contractions in 2008(4) and 2009(1) are also largely accounted for by MAC shocks** (-40% and -26%; FIN shocks: -14% and -7%, respectively);

- **the 54% real oil price increase over the 2009(2) through 2009(4)** period is however **equally accounted for by MAC (21%) and FIN (20%) shocks**.

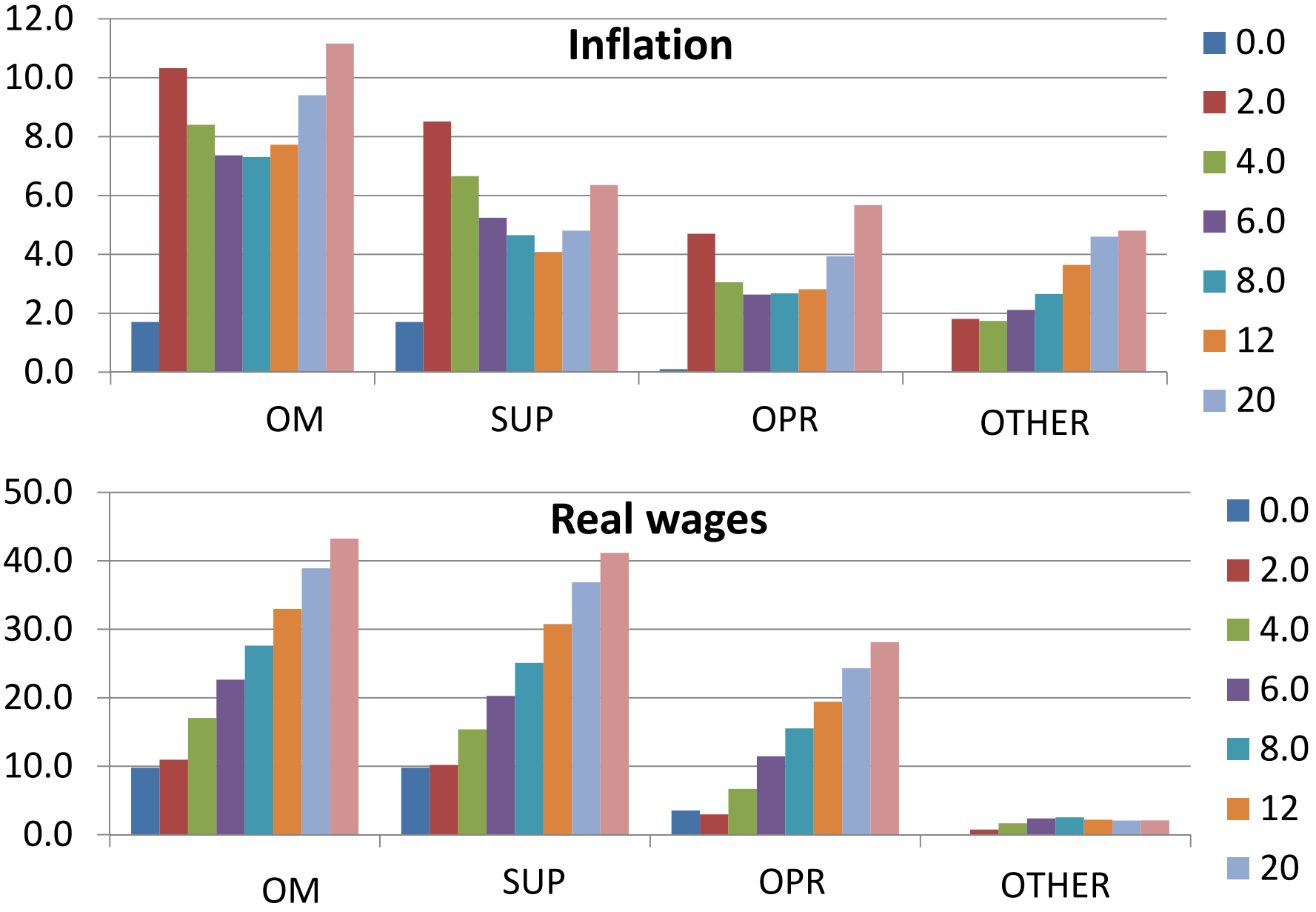
- Hence, **the results are not be consistent with an explanation of the third oil price episode neglecting the contribution of macroeconomic developments**, i.e., a purely financial explanation.

Macro-financial effects of oil market shocks

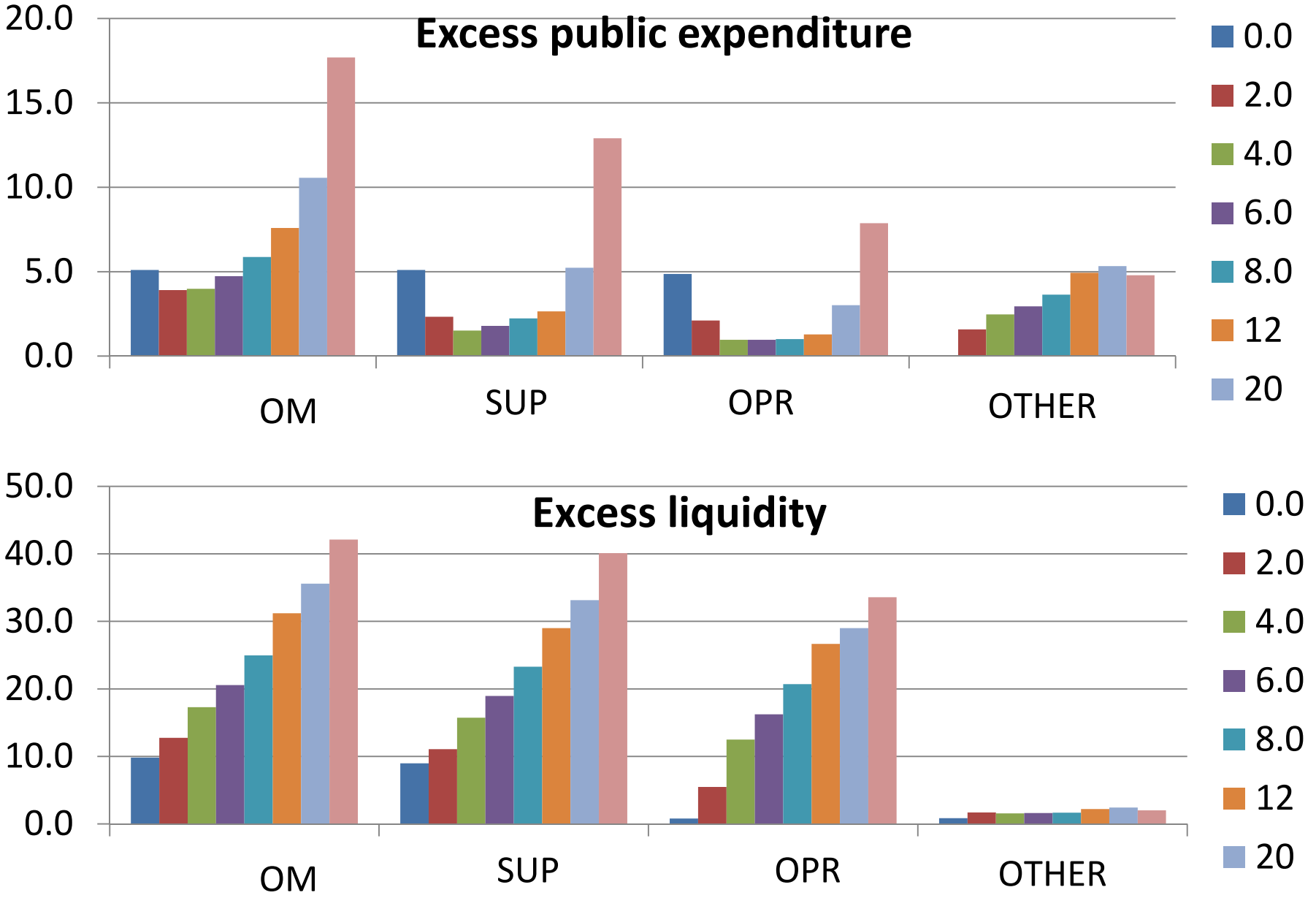
Forecast error variance decomposition



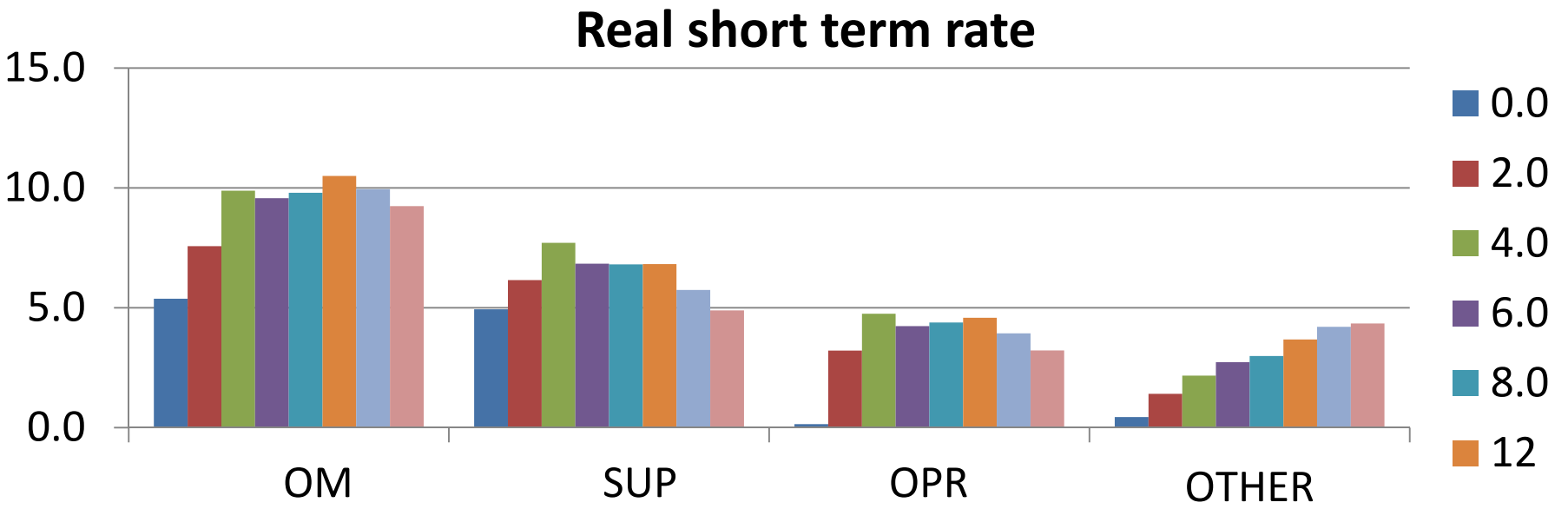
Forecast error variance decomposition



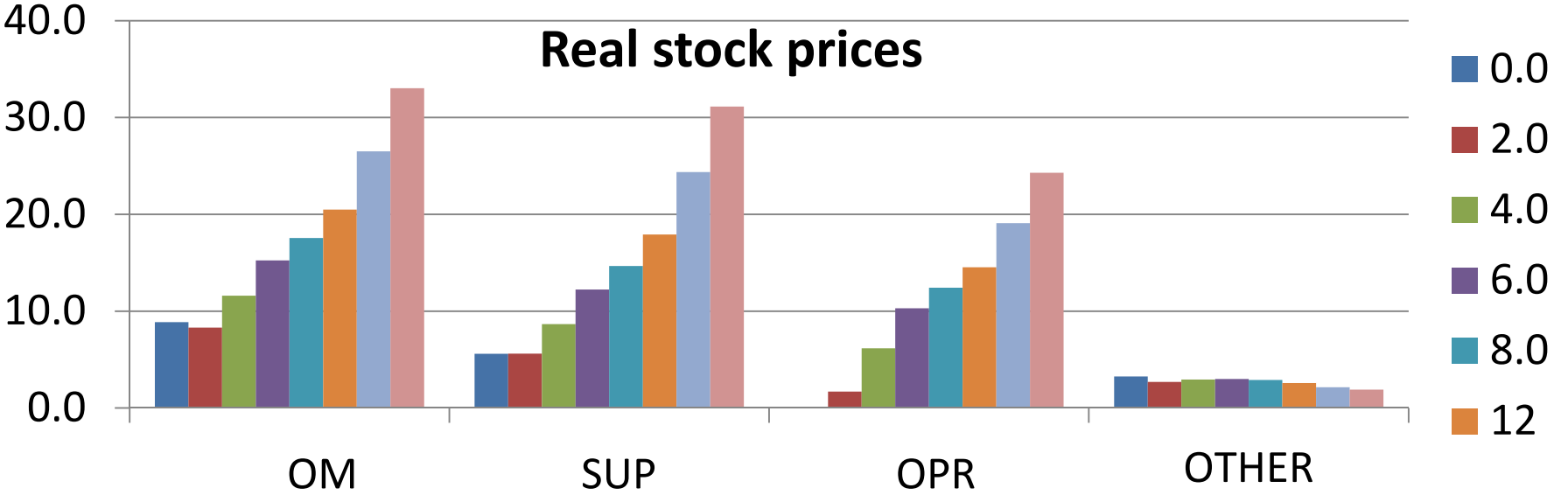
Forecast error variance decomposition

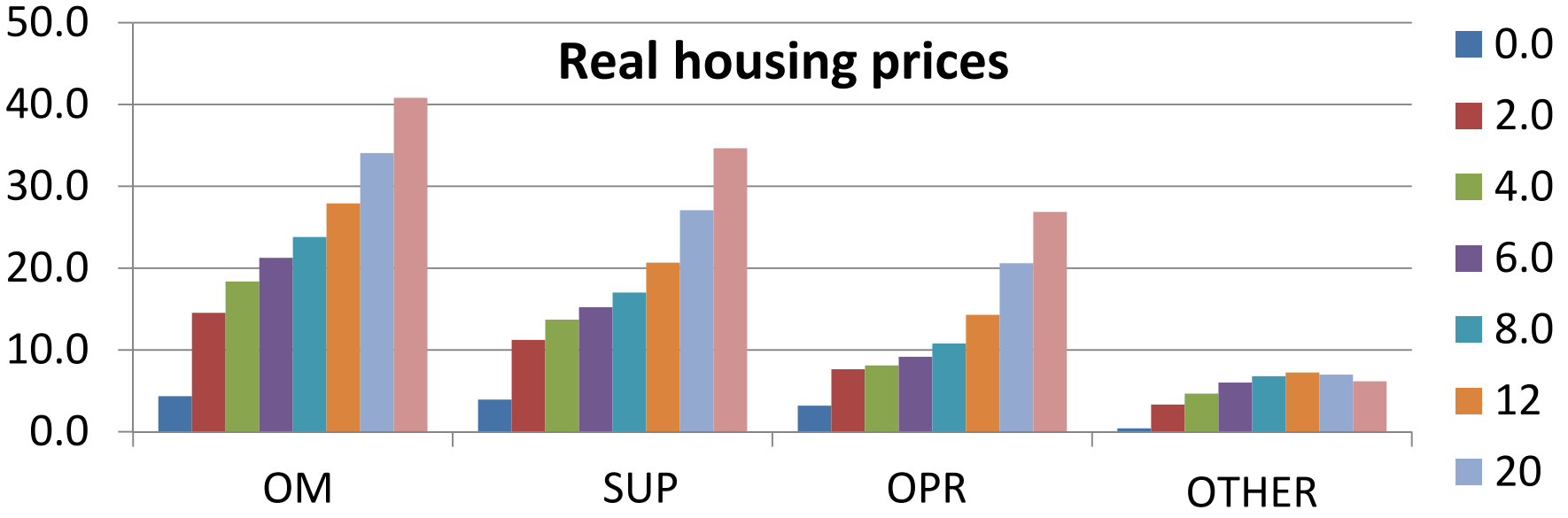


Forecast error variance decomposition



Forecast error variance decomposition





Summary of the results

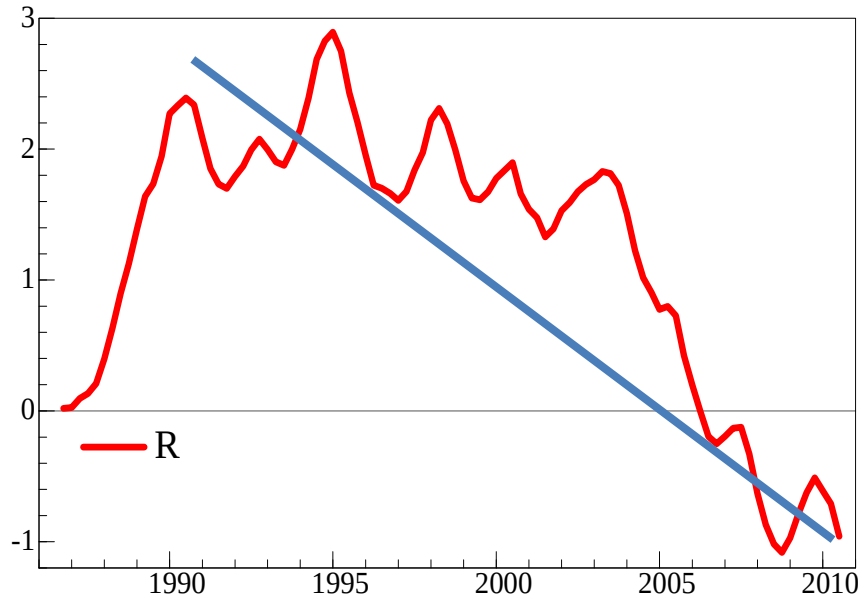
- **Oil market shocks contribute more strongly to macro-financial fluctuations in the long- than in the short-term** (real activity: 20% and 10%, respectively).

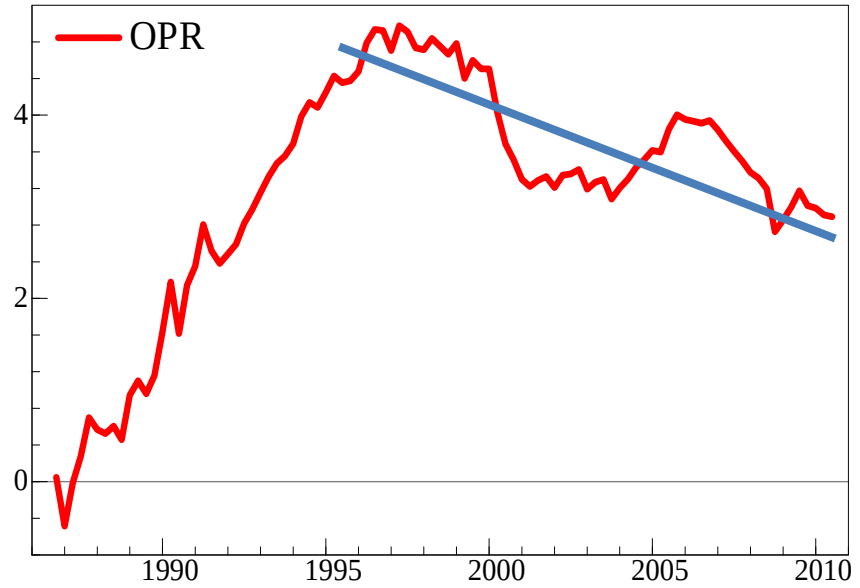
- **Supply side disturbances (joint) yield the largest contribution**: (up to) 10% for real activity and (core) inflation, 30% to 35% for real stock and housing prices.

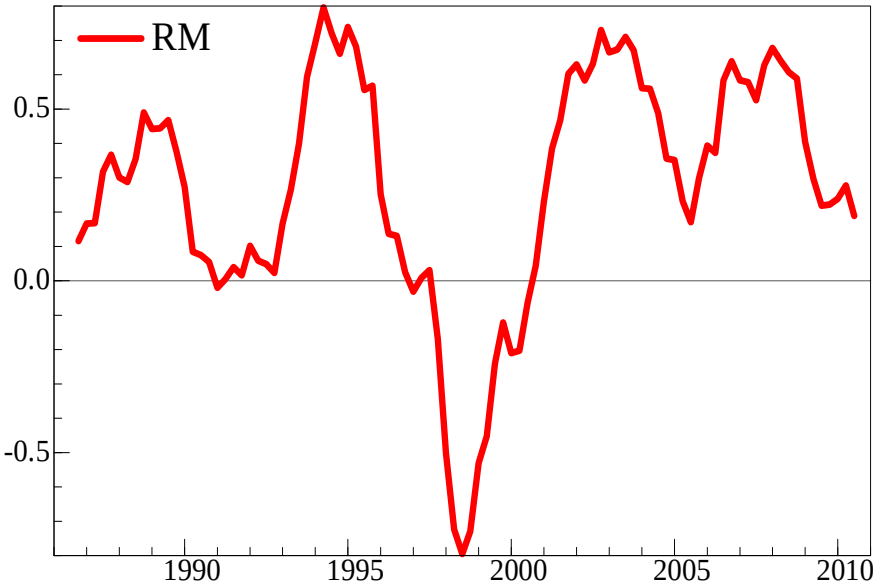
- T**he latter shocks also sizably account for fluctuations in the policy variables**, i.e., public expenditure (10%), liquidity (40%), and the real interest rate (10%).

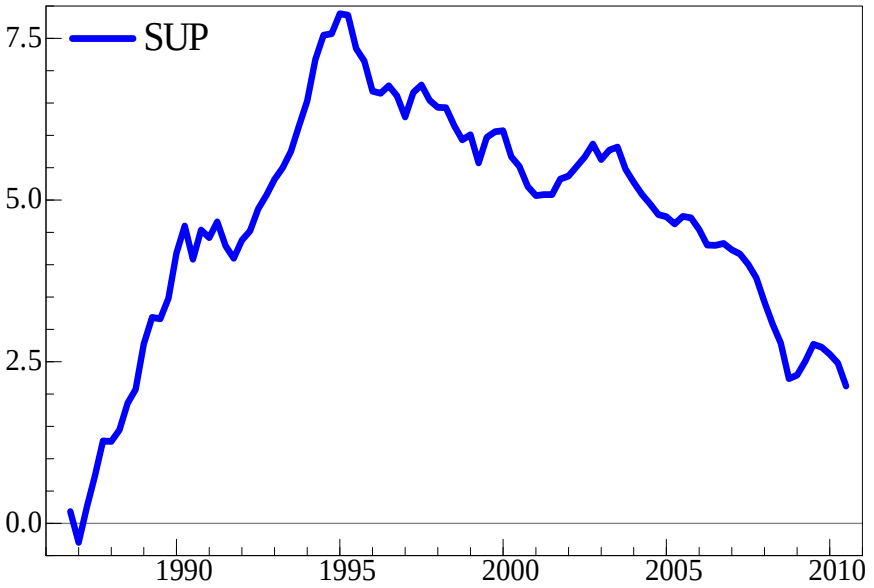
- **Real effects of oil market speculative and consumption/inventories preferences shocks** are however also found.

The real effects of oil price shocks (real activity)

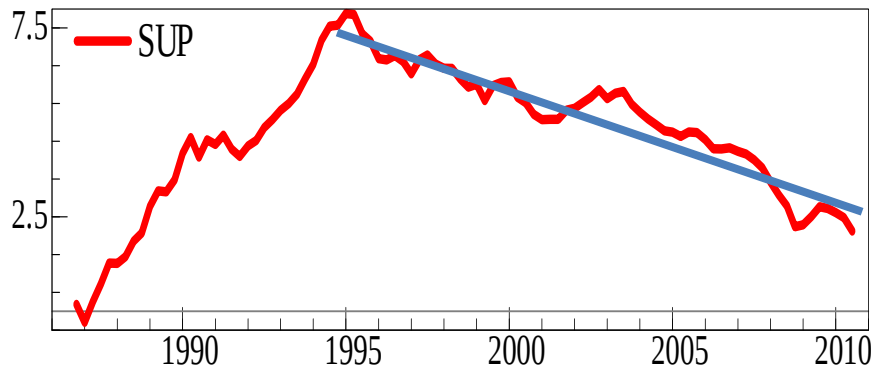


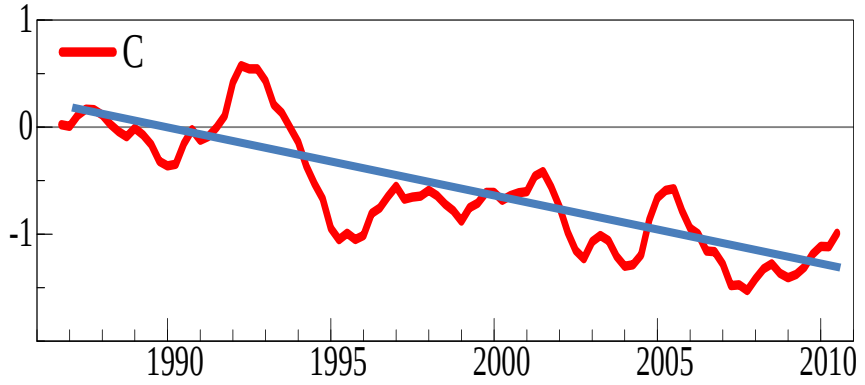


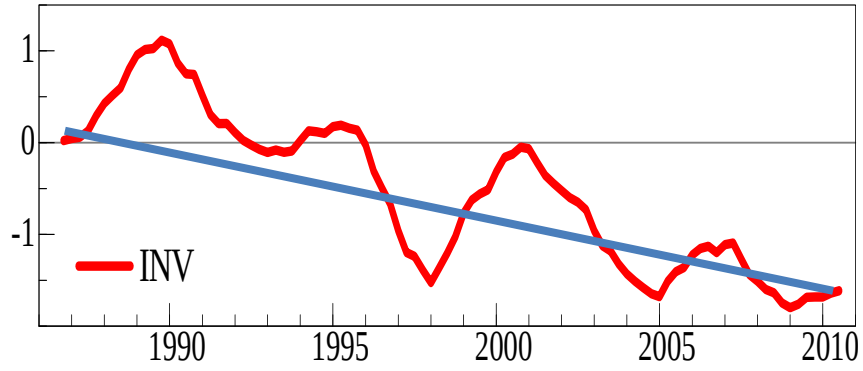


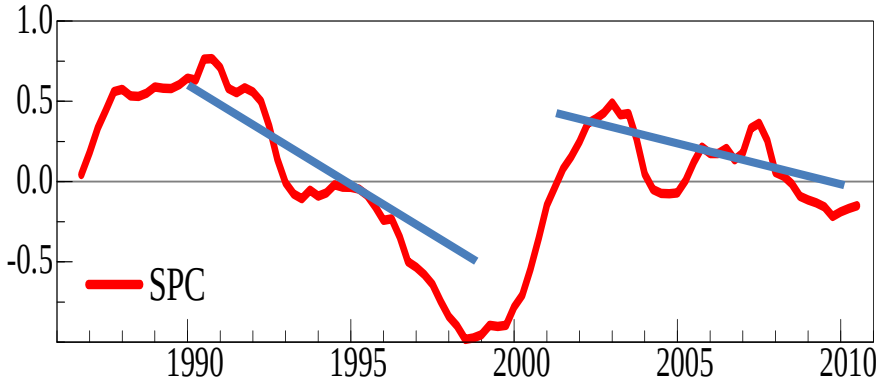


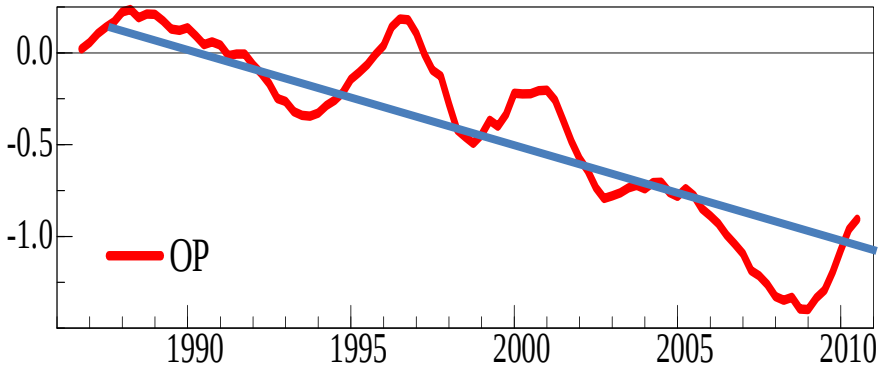
The real effects of oil price shocks (real activity)

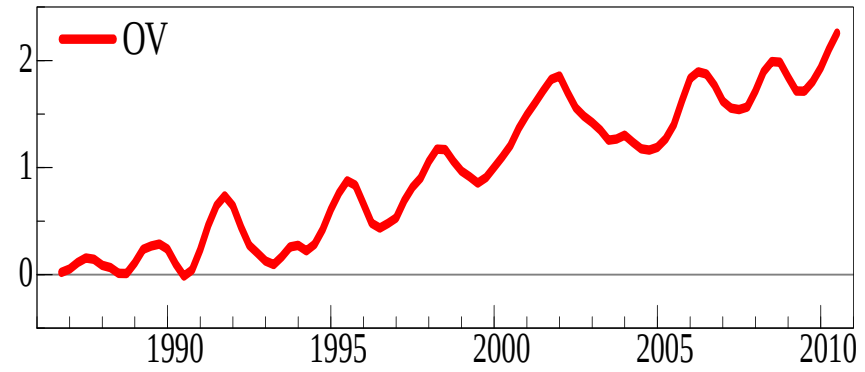




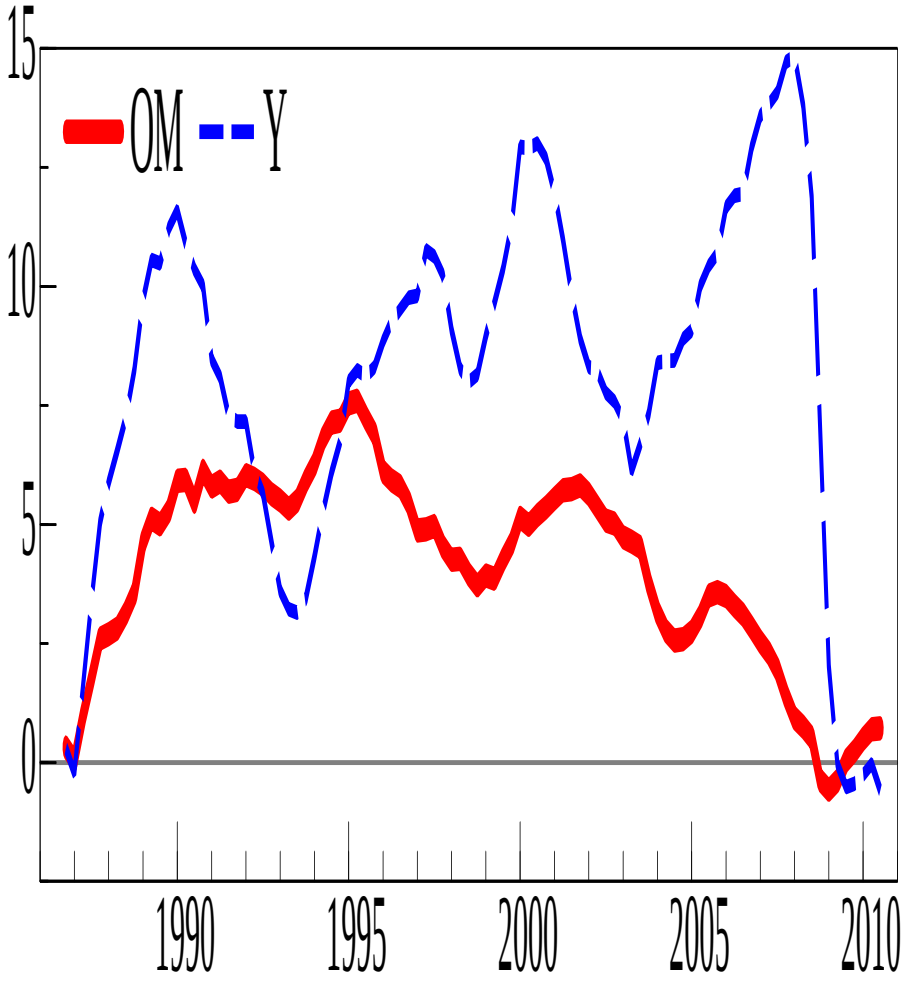


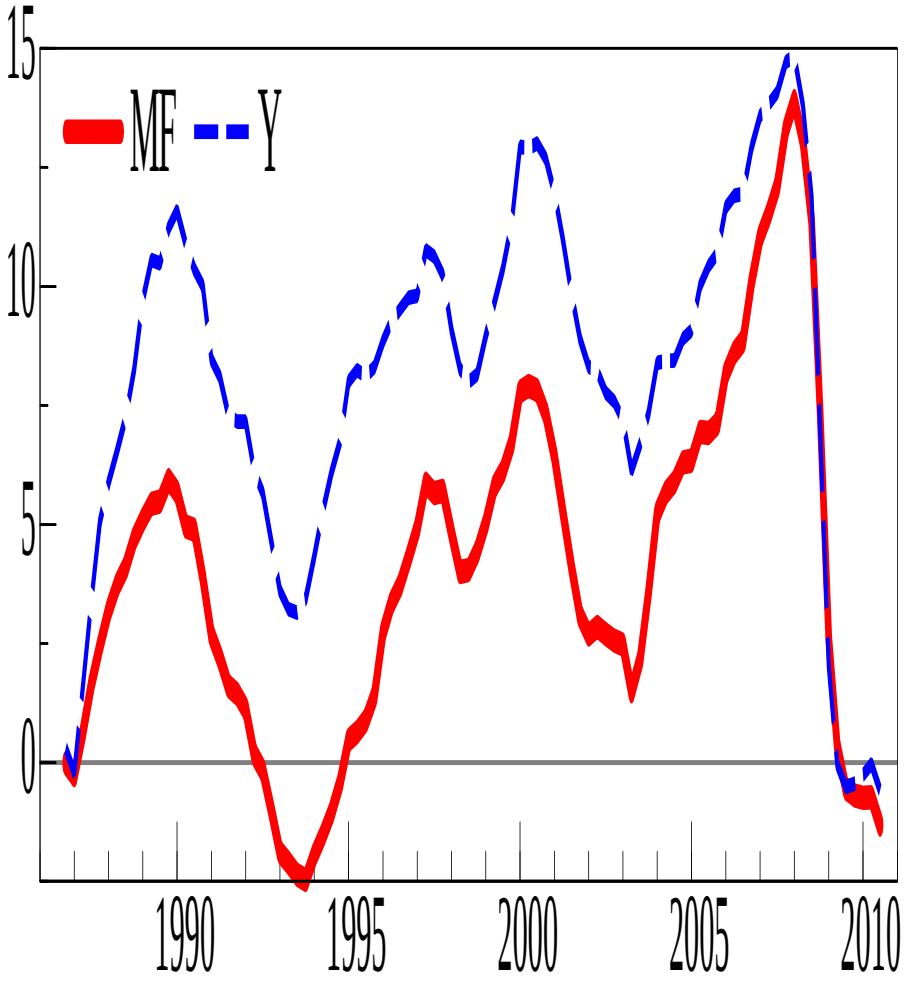






The real effects of oil price shocks (real activity)





Summary of the results

- **A recessionary bias, exercised by oil market shocks since the mid-1990s, following the first Persian Gulf War episode**, can be noted:

- **oil market supply side shocks** have in general exercised recessionary effects **since the mid-1990s**, with both oil reserves and production shocks **determining a hump-shaped trend profile**.

- **oil futures market speculative shocks** have mainly **contributed to slowing down cyclical real activity** over the 1990s, as well as during the second Persian Gulf War (2003) and the 2008 oil price shock episodes.

The contribution of OM to GR

	Y		E		W		P		G		L	
	OM	ACT	OM	ACT	OM	ACT	OM	ACT	OM	ACT	OM	ACT
08(2)	-0.19	-1.04	0.24	0.49	-0.44	-1.60	0.01	0.01	0.29	1.84	0.14	1.32
08(3)	-0.23	-1.91	0.18	-0.34	-0.62	-0.73	-0.04	0.05	0.29	2.23	0.46	2.27
08(4)	-0.89	-4.90	-0.01	-1.69	0.06	2.05	-0.05	-0.18	0.60	4.47	0.73	4.39
09(1)	-0.21	-4.97	-0.18	-3.82	-0.04	1.57	-0.04	-0.28	0.40	4.66	0.54	3.61
09(2)	0.21	-2.07	-0.14	-3.32	-0.30	-0.60	0.07	0.23	0.01	1.95	-0.07	0.52
09(3)	0.42	-0.47	0.06	-1.95	-0.07	-1.25	-0.02	-0.20	-0.14	0.31	-0.26	-1.55
TOT	-0.89	-15.4	0.15	-10.6	-1.41	-0.56	-0.07	-0.37	1.45	15.5	1.54	10.6

The contribution of OM to GR

	R		H		F	
	OM	ACT	OM	ACT	OM	ACT
08(2)	0.01	0.41	-0.31	-3.18	-0.36	0.08
08(3)	-0.09	0.33	-0.23	-2.73	-1.51	-1.80
08(4)	0.37	1.80	0.17	-2.12	-3.73	-4.07
09(1)	-0.44	-0.68	0.31	-1.94	-0.81	-0.67
09(2)	-0.17	-1.03	0.52	-1.58	1.24	1.85
09(3)	0.01	-0.53	0.40	-1.12	1.73	1.79
TOT	-0.31	0.3	0.86	-12.7	-3.44	-2.82

The contribution of SUP, SPC & OV to GR

		Y				P		
	SUP	SPC	OV	ACT	SUP	SPC	OV	ACT
08(2)	**-0.34**	**-0.02**	0.18	**-1.04**	**-0.02**	0.01	0.01	**-0.20**
08(3)	**-0.30**	**-0.05**	0.09	**-1.91**	**-0.01**	0.05	0.05	**-0.16**
08(4)	**-0.55**	**-0.08**	0.00	**-4.90**	**-0.04**	**-0.18**	**-0.18**	**-0.04**
09(1)	0.05	**-0.02**	**-0.14**	**-4.97**	0.03	**-0.28**	**-0.28**	0.11
09(2)	0.22	**-0.02**	**-0.13**	**-2.07**	0.04	0.23	0.23	0.11
09(3)	0.26	**-0.03**	0.00	**-0.47**	**-0.02**	**-0.20**	**-0.20**	0.03
TOT	**-0.66**	**-0.22**	0.00	**-15.4**	**-0.02**	**-0.37**	**-0.37**	**-0.15**

Summary of the results

- **The resilience of the global economy to the 2008 oil price shock** may then be related to both an endogenous **contraction in real wages and the implementation of expansionary stabilization policies,** in the face of a **mostly demand (macro)-driven oil price shock**.

- The contribution of **oil market supply-side shocks** was however sizable, **exacerbating the recessionary effects of the subprime financial crisis in 2008 (-1.19%).**

- **Oil market speculative, preferences and volatility shocks also sizably contributed** to slowing down real activity over the episode.

- A **deflationary rather than stagflationary transmission mechanism** appear to be coherent with the empirical evidence.

Additional results

- **Symmetric transmission mechanisms**, as described by the discretionary income, precautionary savings and operating costs channels, **are supported by the empirical evidence**; similarly for the uncertainty channel, which, within the framework considered, is not necessarily asymmetric.

- Indeed, by comparing the effects of positive and negative net production shocks, **weak evidence of asymmetric impacts on real activity can be found**, the latter responding more strongly to negative than positive shocks **in the very short-term only**.

Additional results

- The above mechanisms might account for the **recessionary effects associated with some recent oil price shock episodes**.
- During the first Persian Gulf War, **oil market supply side shocks contributed to the 1990:2-1993:3 recession** (-1.2%), **as well as** during the second Persian Gulf War, **to the 2000:4-2003:2 recession** (-0.24%).
- **Oil market supply side conditions also exacerbated the recessionary effects of the subprime financial crisis in 2008 (-1.19%).**
- **Oil market speculative, preferences and volatility shocks also contributed** to slowing down real activity over the three episodes investigated.

Policy implications

The results provide empirical support to the regulatory changes proposed and implemented since 2010 in both the US and EU:

- US: H.R. 4173: **Dodd-Frank Wall Street Reform** and Consumer Protection Act, signed by US President Obama in July, 21, 2010;

- EU: **Proposal for a Regulation** of the European Parliament and of the Council **on OTC derivatives**, central counterparties and trade repositories COM(2010) 484 final 2010/0250 (COD), approved by the European Parliament on March, 29, 2012.

- With reference to the commodity derivatives market, among other provisions, the proposals ***reintroduced*** **limits on concentration and holding for physical quantities and futures of commodities for commercial and non commercial traders**, which were **removed** **by the U.S. Commodity Futures Modernization Act (CFMA) passed in 2000**.

- H.R. 5660: Commodity Futures Modernization Act, included in H.R. 4577: Consolidated Appropriations Act for FY 2001, signed by US President Clinton in December, 21, 2000.

Policy implications

- **The results also suggest that the current slack in the oil market is likely to exercise an expansionary effect on aggregate demand and supply, possibly reversing the recessionary trend imparted by oil market supply side shocks since the mid 1990s, helping recovery in the euro area, as well as in other oil importing countries.**

- **The expansionary effect for the euro area might however weakened by a further depreciation of the currency, as well as insofar as the oil price will be kept artificially high or volatile by manipulative practices and speculative forces.**

Appendix

Data I

- Frequency: quarterly data.
- Type: seasonally adjusted; interpolated if needed.
- Sample:

Macro-financial variables:

23 advanced countries, 1980(1)-2010(3) (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, South Korea, Spain, Sweden, Switzerland, United Kingdom, United States);

27 advanced/emerging countries, 1995(1)-2010(3) (Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hong Kong, Hungary, Iceland, India, Indonesia, Israel, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, Singapore, Slovakia, Slovenia, South Africa, Taiwan, Thailand, Turkey);

Data II

Macro-financial variables (17 variables, 50 countries):

- unemployment rate, civilian employment, real GDP, private consumption and investment; public consumption/GDP ratio, CPI all items index, M3(M2)/GDP ratio, M3(M2), loans to private sector/GDP ratio, real wages, 3-month Treasury Bills real rate or real interbank rate, 10-year Federal government securities real rate, real house and share prices, nominal bilateral exchange rate against the US/$, real effective exchange rates.

Global macro-financial unobserved factors (*f;* 12 variables):

- unemployment rate, employment, real activity (GDP, private consumption, investment), nominal factor (inflation, nominal short and long interest rates, nominal M3(M2), public consumption/GDP, real wages, excess liquidity (M3(M2)/GDP, loans to the private sector/GDP), real short term rate, term spread, real housing prices, real stock prices, nominal bilateral exchange rate against the US/$.

Data III

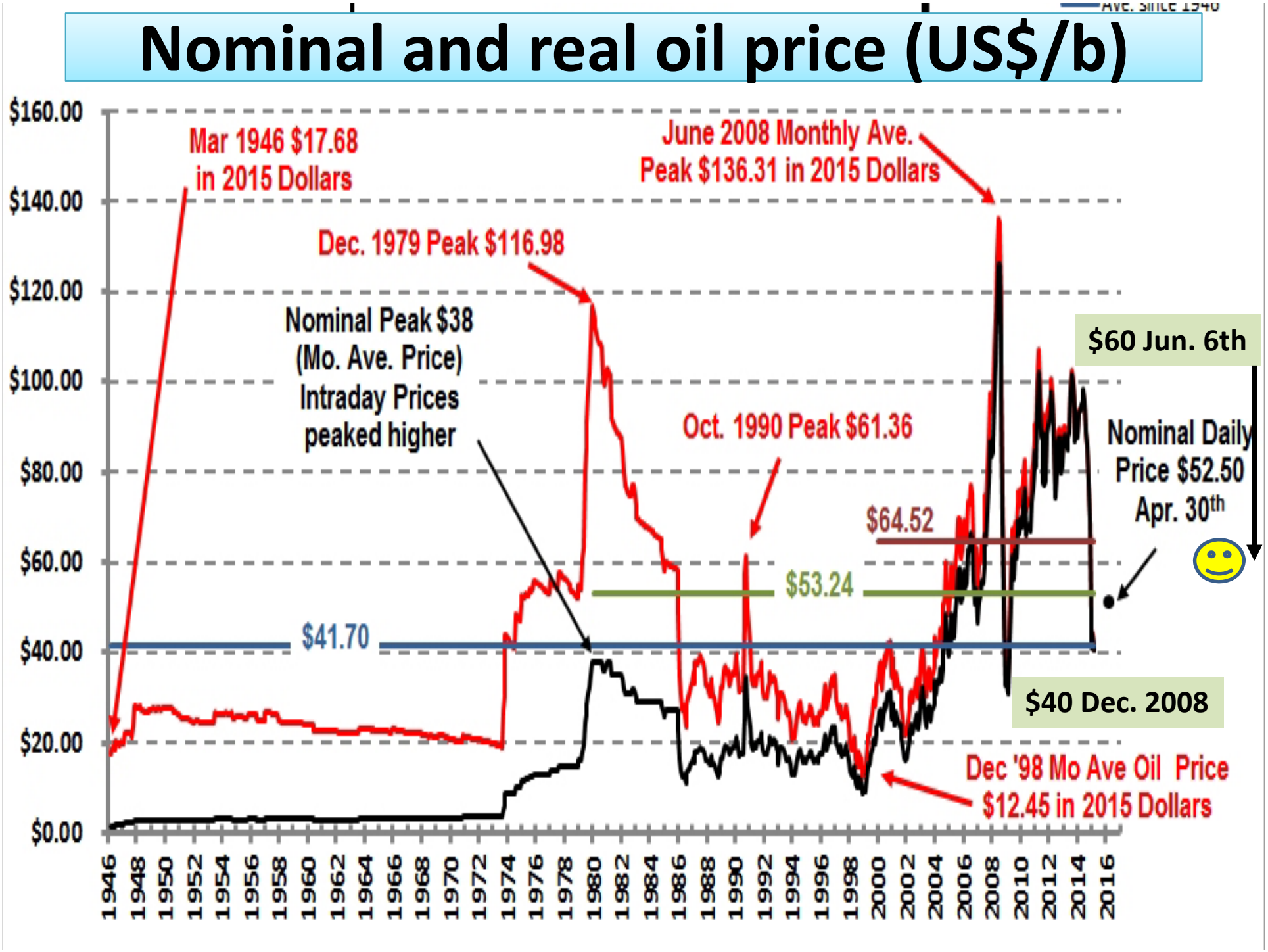
Global (US) macro-financial observed factors (*g*; 11 variables):

- Gold price, size, value, momentum, stock's liquidity, leverage, economic/financial fragility (TED, AGENCY, BAA-AAA spread) US fiscal and trade deficit/GDP, non-energy commodities price index, US S&P500 volatility.

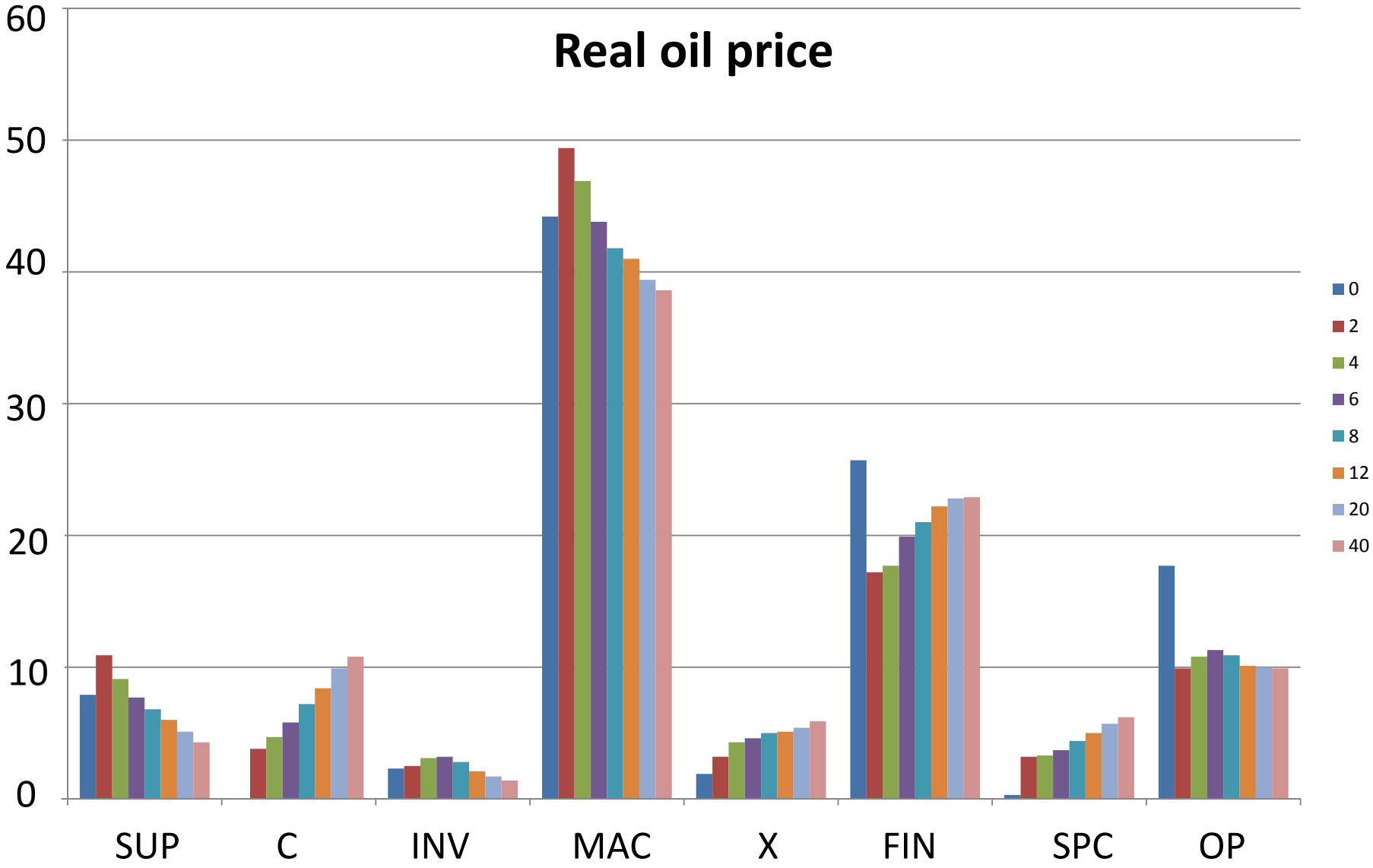
- **Oil market variables (1986(1)-2010(3); *o*; 10 variables):**

- world net oil supply changes (+/-), oil consumption, oil reserves, (OECD) inventories and refinery margins, Working-T index, 12-month futures basis (12MF-spot/spot), real oil price and nominal oil price volatility.

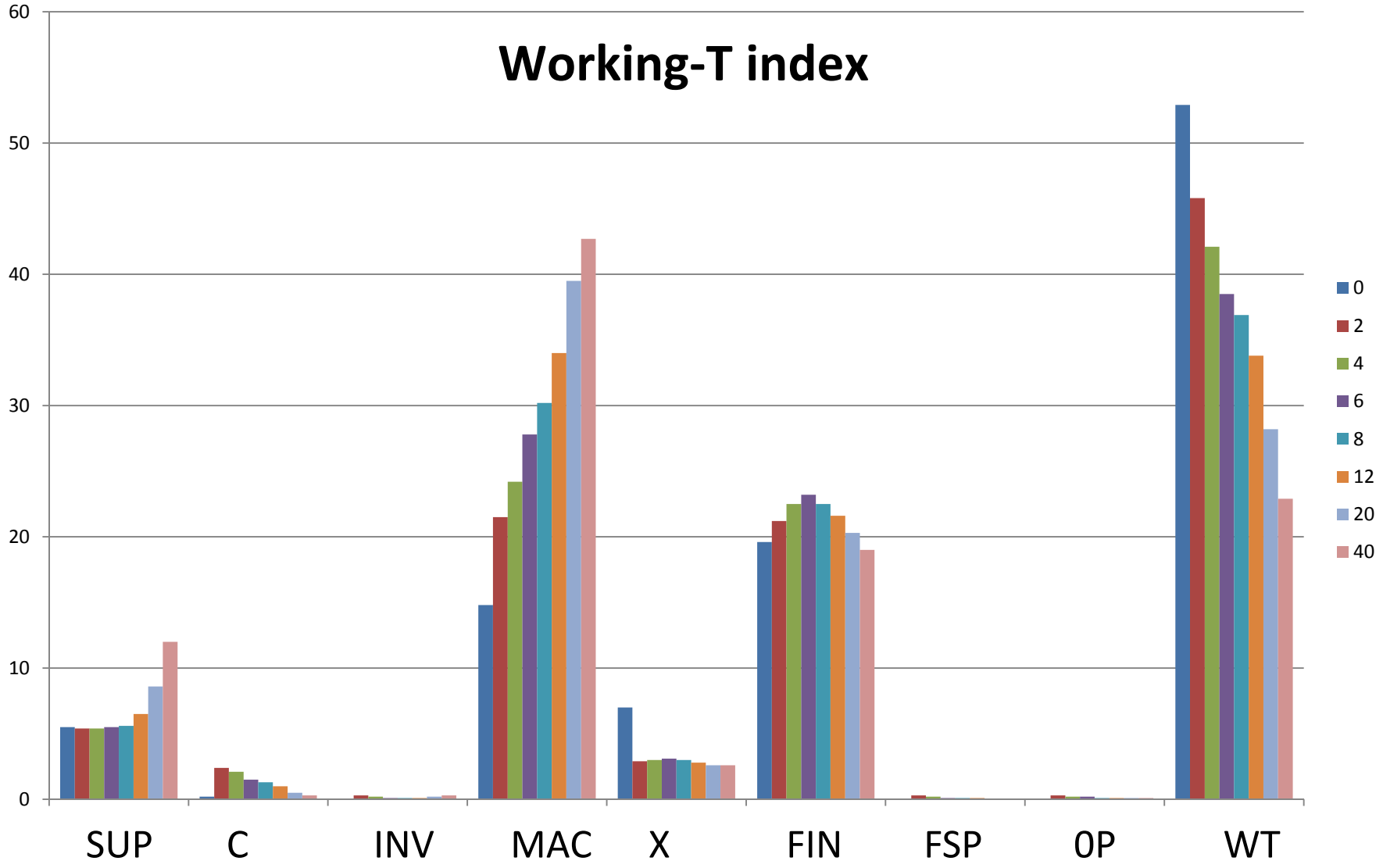
Nominal and real oil price (US$/b)



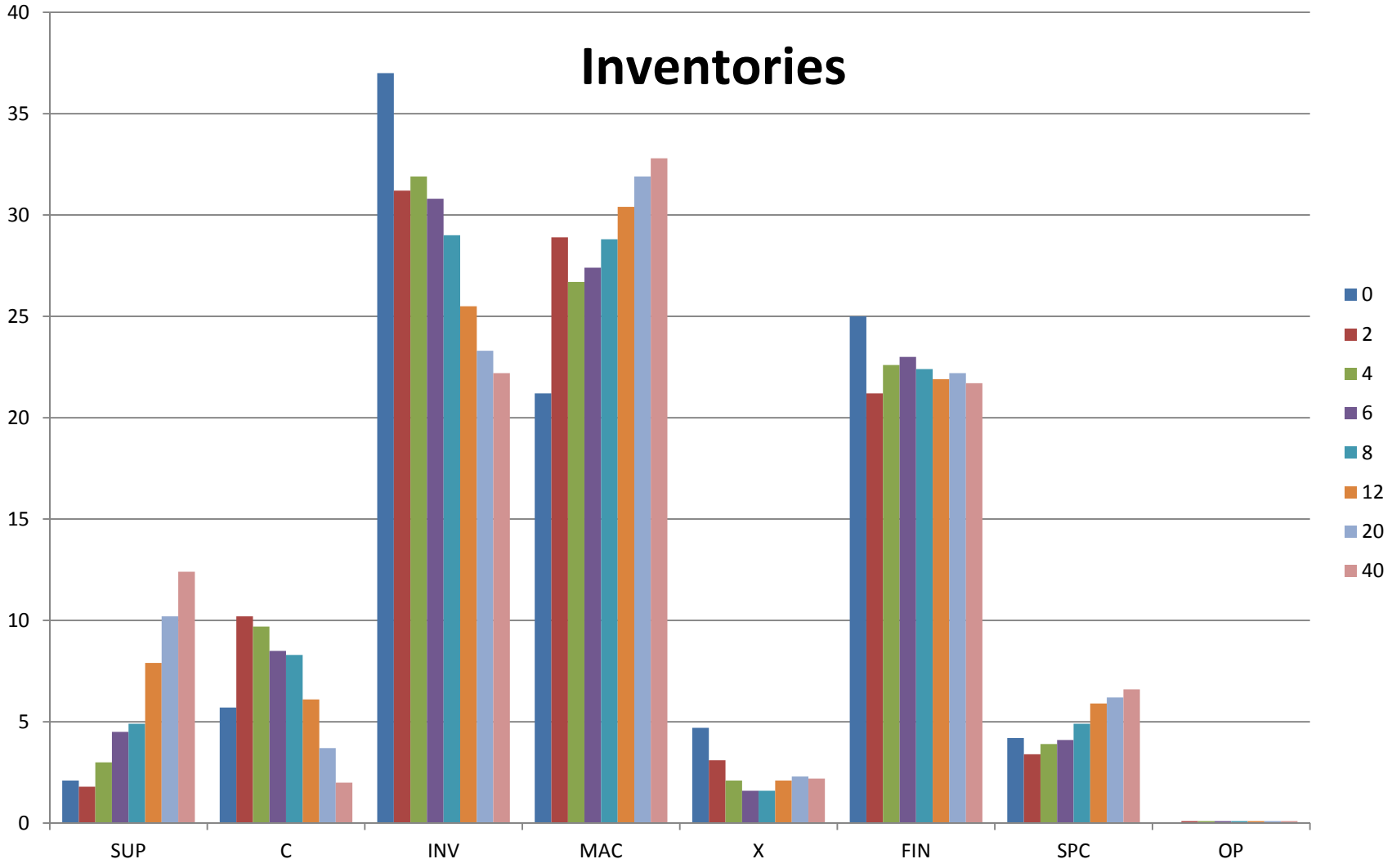
Forecast error variance decomposition



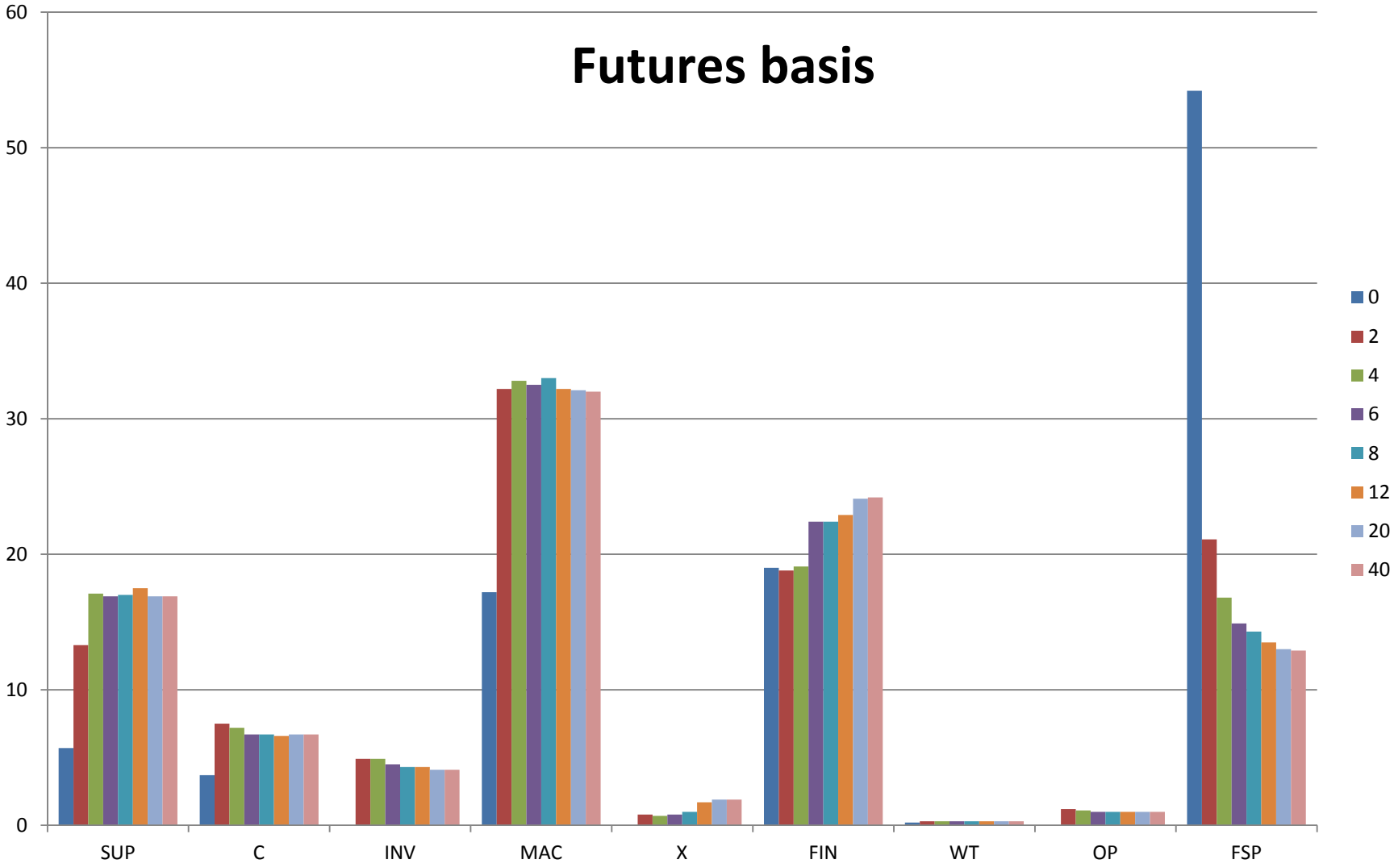
Forecast error variance decomposition



Forecast error variance decomposition

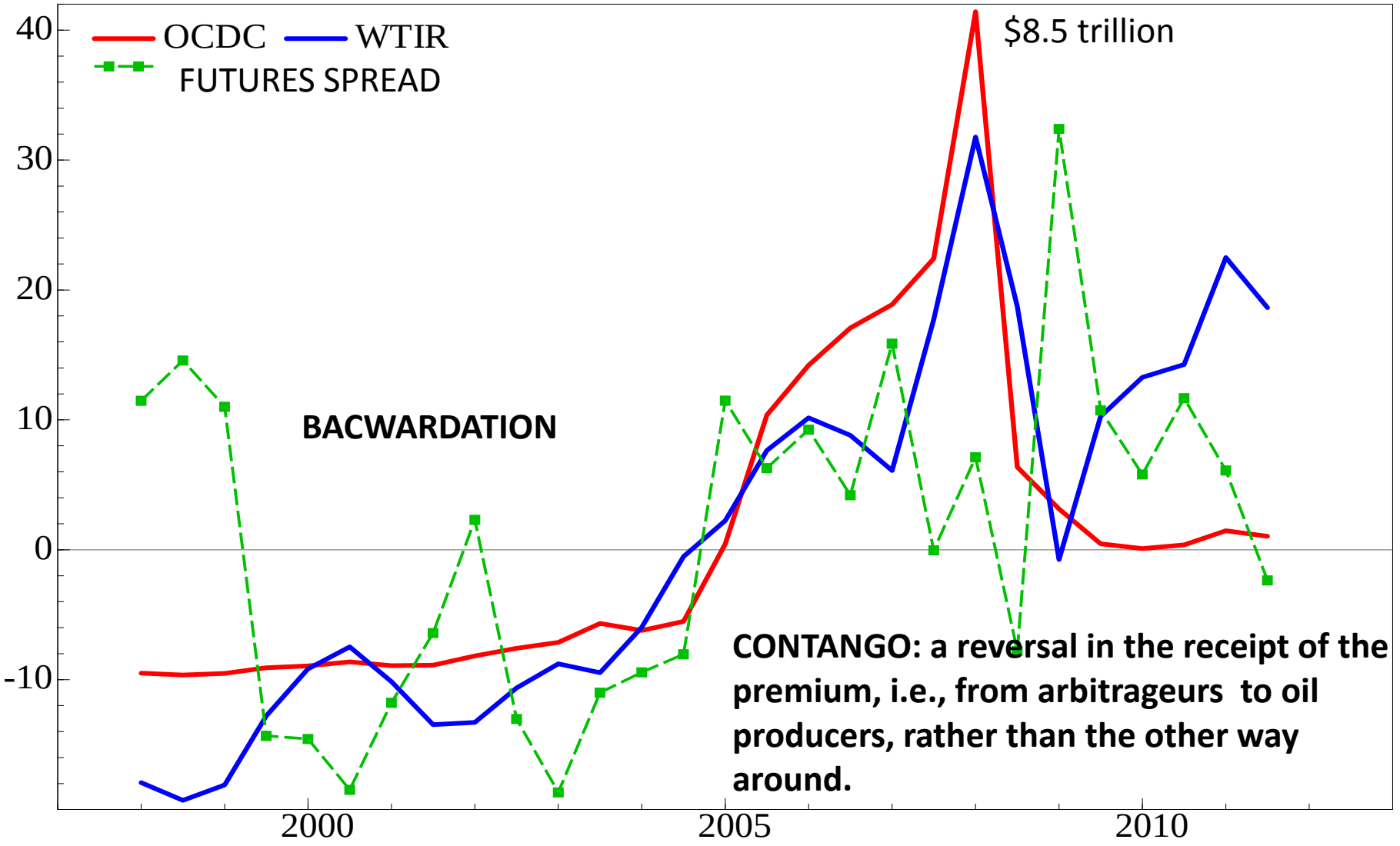


Forecast error variance decomposition



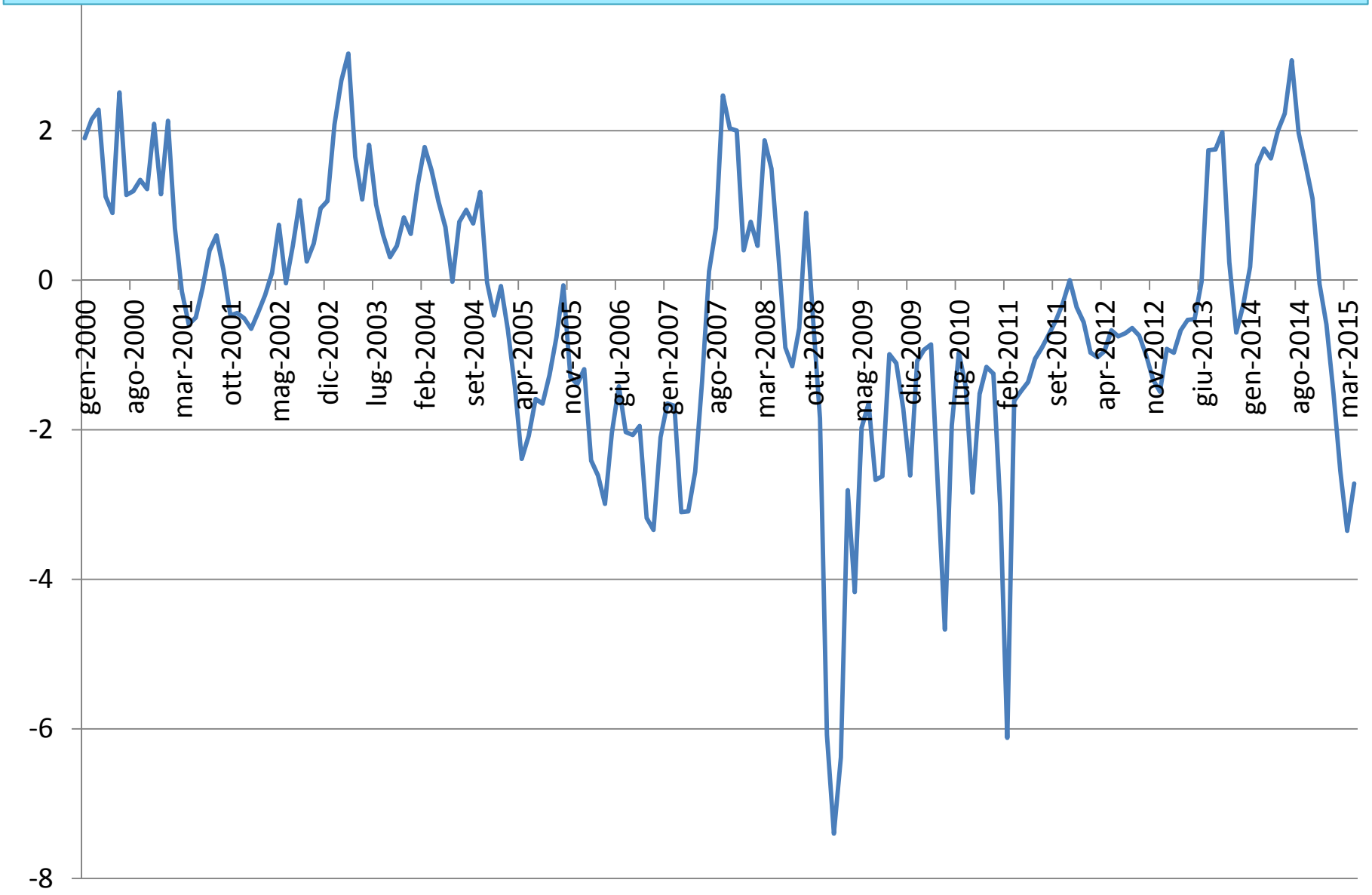
The excess speculation hypothesis

The real oil price against the total value of outstading commodities derivatives contracts and the futures spread (12-month)

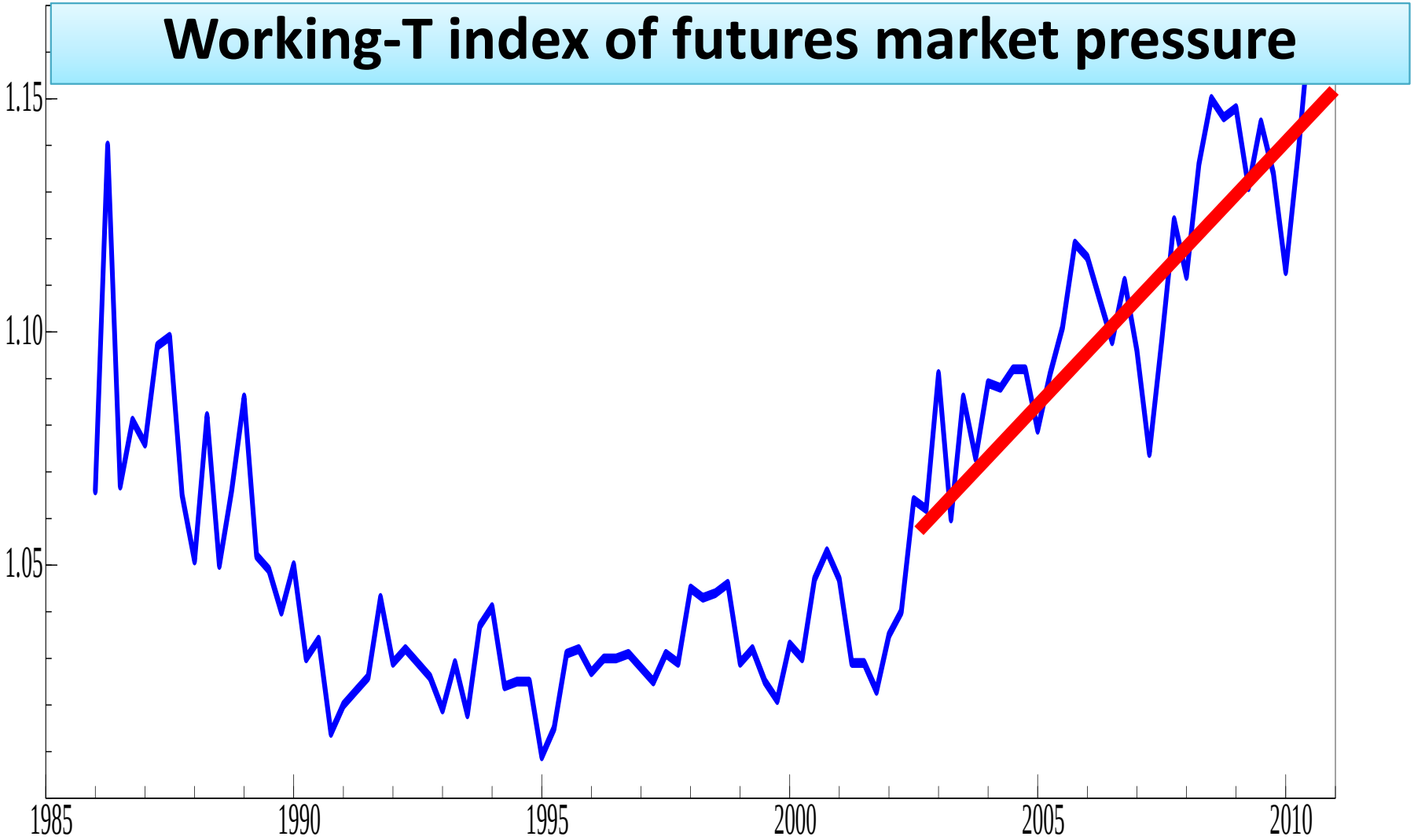


The excess speculation hypothesis

The futures basis (3-month)



Working-T index of futures market pressure



The Working's T index is calculated as the ratio of speculative open interest to total open interest resulting from hedging activity, i.e., as 1 + SS/(HS + HL) if HS>HL and 1 + SL/(HS + HL) if HS < HL, where open interest held by speculators (non-commercials) and hedgers (commercials) is denoted as follows: SS = Speculation, Short; HL = Hedging, Long; SL = Speculation, Long; HS = Hedging, Short.