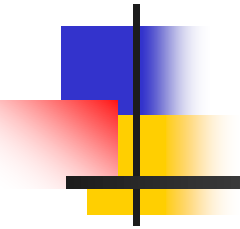


1. If it's cyclical, draw the cycle

Drawing your cycle, quick look: see pp. 8-9

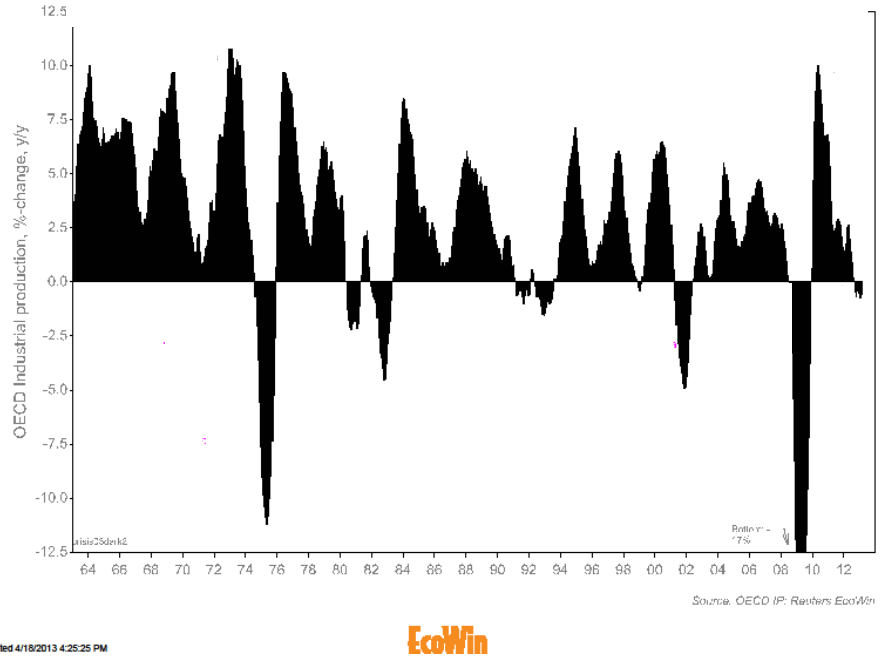
The Cycles

You look at the business cycle of industry or of a cyclical branch over five decades and ask:

- Can you explain the historical *growth variation* ?
  Can you show with precision where you are now in the cycle and explain why?
  Yes.
- Can you predict what's ahead?
  In some cases yes, in some cases to some extent. And at the beginning of a downturn, it is possible to tell which case it handles about.
- What about GDP and my cyclical branch?
  GDP, Industrial production and *most* cyclical industries are synchronous in the cycle. Branches with the highest amplitude lead the way. Major exception can occasionally be construction and its suppliers.

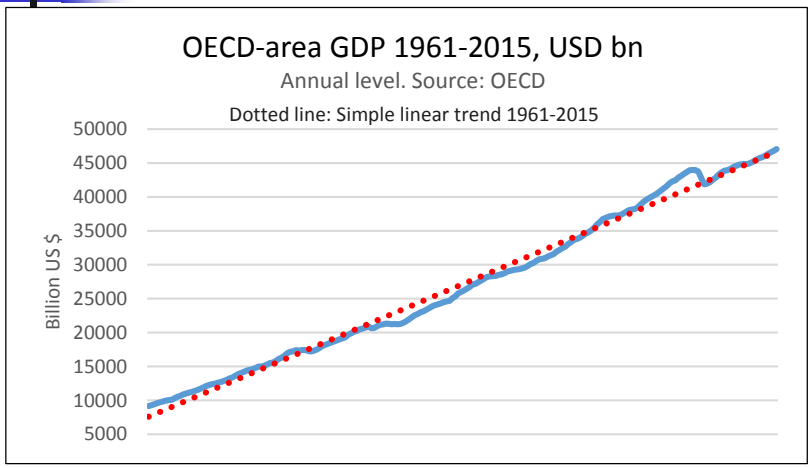
  For individual cyclical branches, variation is up to 5-7-fold compared to total industry, the stronger the further upstream the producer is in supply chain.

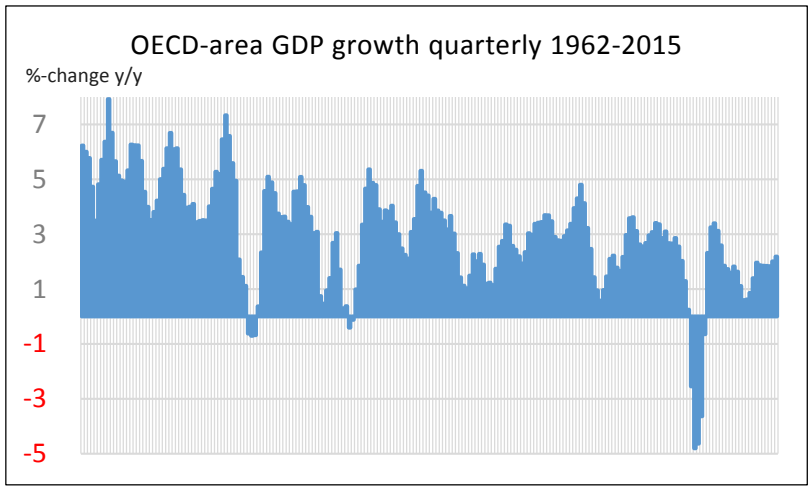
OECD Industrial production, %-change, y/y



Business cycle according to GDP

GDP: Gross Domestic Product. Total production of goods and services in the economy.
Recession: Bad times - widespread contractions in many sectors in the economy. Technically: at least two *consecutive* quarters with *falling* GDP. Average recession: lasts 4-6 quarters, GDP falls totally 1-2%.
Downturn: Below trend GDP *growth*. Mainly cyclical branches are affected. May occur without recession.

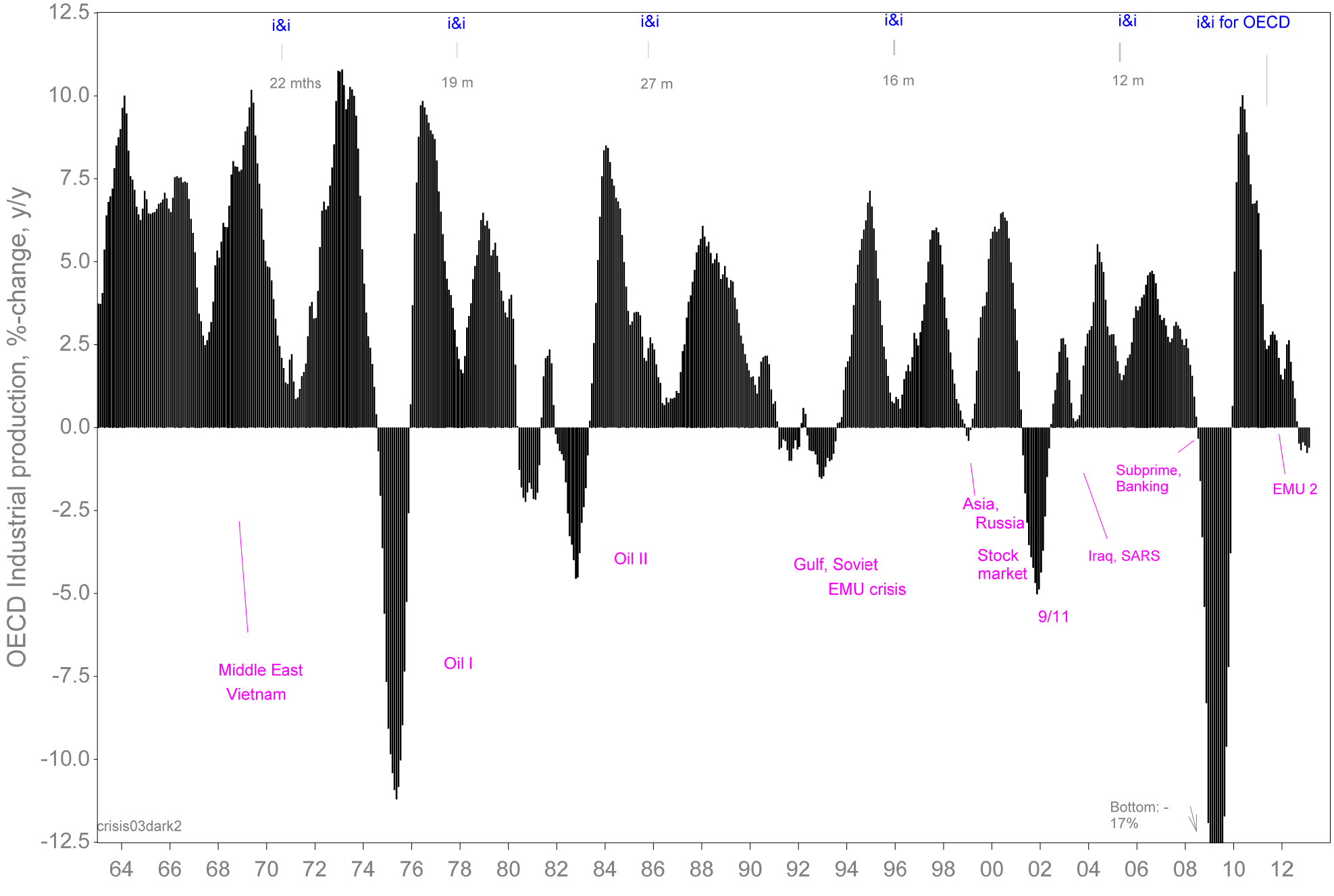




- *Business cycle* is short term variation (blue) around the long term GDP trend (red). In decades long history - before recent crisis - business cycles appear as less severe, passing incidents. You have to take year-on-year *growth* in order to see the cycles (chart below).
- Since 50's, recessions in advanced economies, even the worst, have ended within 2-3 years. Theories speak, when looking back, on economy's built-in 'bouncing back' property.
- Still, business cycle gets most attention. Important basic questions remain secondary. Right now: is the historical trend growth rate in advanced economies given in the future?
- Data in Chapter 5 shows that *long upturns*, rather than occasional downturns, seem to be the cause of worry.
- Industrial production reveals better the behavior of economy's cycle. When all connections are included, industry makes up 2/3 of advanced economies' GDP (Chapter 8). It is obviously a key source of GDP's oscillation.

OECD Industry downturns by cause, Cyclical internal + External / Feb

i&i: Investment&Inventory cyclical downturn. Origins internal to economy.



Pekka Laukkanen Apr 2013

The origins of the swings

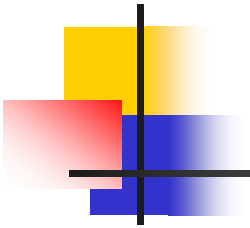
Note: Distinguish between the *triggering cause* of a downturn and the forces in action *during downturn* – even though they might be the same.

Economy's *growth rate* is never stable. Periods of increases and subsequent decreases form growth cycles with peak-to-peak duration of 3-5 years.

There are two types of downturns: caused by well known *external crises* and those without a name. The latter, *cyclical* downturns, are result of workings of the economic system and its actors only. These are denoted by 'i&i' - Inventory&Investment - after the key acting forces during downturn. Until late 90's, the notation should have been i&i&i – the first i for *interest rate*. Rate hikes by several %-points and simultaneous credit tightening used to trigger the downturn and then strengthened the effects of the other i's.
After 1-2 years in downturn, economy mysteriously starts to grow again.

Why does growth weaken or end?

1) Due to saturation in the availability of labor or physical recourses: a situation where no party can have it better without some other having it worse. In practice, before equilibrium is reached, excesses in some sectors lead economy to downturn and eventually to recession.
2) Built-in instabilities in supply chains. In *cyclical industries*, cyclical downturns have predefined duration, within a range: average 16 months +-6 months. This is due to *bullwhip*, amplifying of demand changes in long supply chains (Chapter 3). The effect consists of technical part - coordination problems in supply chains -, and human part - speculation, impatience and forecasting bias. Bullwhip's existence in cyclical industries is a documented fact, it most likely exists in total industry but economists can not agree on its effects on GDP.
3) Financial market built-in properties. When times improve, mania appears. Consumers, producers, lenders and investors want to have more of the good times. They start to overshoot the limits of sustainable debt development, overheating begins and risks increase. Central bank responds with higher interest rates and credits are tightened. Spending by consumers and corporations is dampened.



4) ‘Occasional events’. All external crises belong to this group. Excluding these, economists usually can not agree on the ‘real cause’ of a downturn or recession. Suspects are many - from technology to expectations - and a convincing proof difficult to establish. When economists dispute, non-economists are allowed to make own judgements. Economists generally are more interested in the development *after* the turning points.

Whatever the triggering cause of downturn, inventory de-stocking begins and private investments slow down immediately.

In upturn, a hidden momentum starts to work. A bleak outlook suddenly brightens. There is research based evidence inventories is a pendulum-type transmission mechanism from downturn to upturn. A list of other factors can be found in Chapter 2. In any case, hardest hit cyclical branches will have the highest growth rates, structural issues excluded. At some stage, government’s and central bank’s actions as well as financial markets start to contribute.

External crises break the cycle pattern. Amplitude in downturns becomes steeper and duration unpredictable. But even these events show regularity - over a longer period of time. See Chapter 5.

Putting cycle’s boosting and dampening forces against each other, it seems economy rather grows than stays depressed.
In past century, advanced economies’ GDP *trend growth* in 20-year periods has varied between 1-3% p.a. Roughly half of the growth is estimated to come from sheer volume - increased input of labor and capital - the other half from technological innovations and progress in soft factors: education, specialisation, social stability etc. Economists argue for and against whether technological factors contribute also to *business cycle*. Neither here can their methods solve the dispute.

OECD area industry downturns1966-2013 (p 4)

Explaining and predicting business cycles is the most prestigious part of economics. If you success constantly in predictions with controllable methods, you would be the most celebrated economist of all times.
Below, schematic description of past downturns, not a new a doctrine. There is already three economic theories with sophisticated models commonly in use + a half dozen in the periphery.

OECD Industry downturns by obvious cause and sequence of events

(GDP is connected to industrial production with a correlation of 0.90-0.95.)

1. Mainly Inventories/Supply chain (1995-96, 2004-05)
2. Interest rate -> Inventories -> Investments (1970-72, 1977-78, 1984-86)
3. Crisis, Financial: Financial market -> Inventories/Supply chain -> Investments -> Consumer sales (1989-93, 2000-01, 2007-09, 2010-12; 1998-99 Asia&Russia crisis had little effect in OECD)
4. Crisis, Consumer demand: Consumer sales -> Industry orders -> Inventories/Supply chain -> Investments (1974-76, 1980-83, 1989-93, 2002-03)

From all these, advanced economies have bounced back. From 3. and 4., growth resumed often on a lower trend level. Permanent damage was done to the economy.
For companies in cyclical industries, it is crucial to know

- Where you are in the cycle and why; categories 1-4 above
- What's ahead in near future

i&i and Keynes: In *General Theory (1936),* Keynes makes notes on the causes of business cycle*: ..mainly due to the way marginal efficiency of capital fluctuates*. Meaning incentives to invest: either there is idle capacity (gives zero or negative investment yield) or expected shortage (yields more than interest rate). Because of this and *the carrying-costs of surplus stocks… the duration of downward movement should have an order of magnitude which shows some regularity of habit.*

Drawing the cycle

If you do not monitor the cycle with right methods, you only react to events. You do not see in your data the critical phase of *beginning* downturn and in upturns you are a half year late instead of one quarter ahead.

First, you have to make the cycle visible. In cyclical branches, you can see the cycle already in level development – no need to use y/y-growth presentation as for GDP.

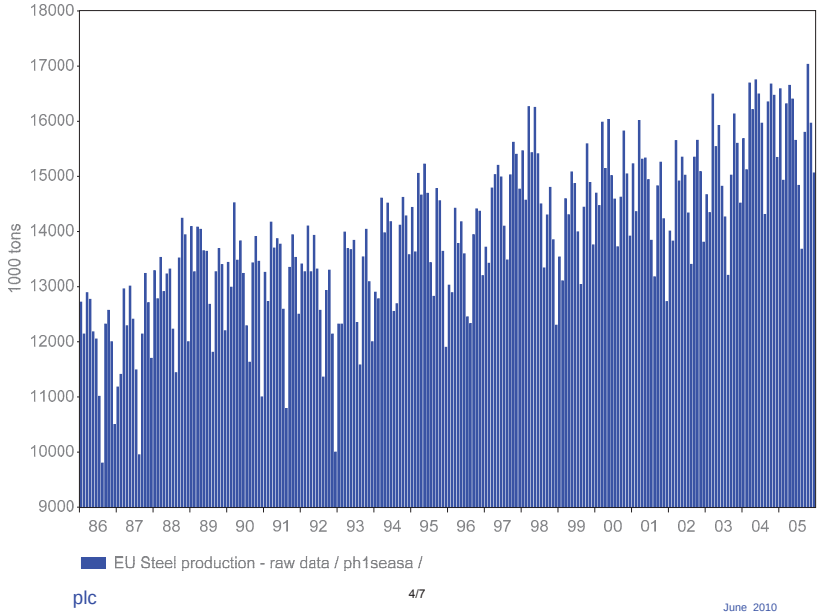
Seasonal adjustment and smoothing of monthly raw data reveal the cycle (next page). Seasonal adjustment removes the systematic variation that appears regularly in year's seasons: holidays, short/long months, summer/winter, year-end practices, seasonal production schedules, etc. It makes the months comparable. Smoothing reveals longer term tendencies. More on methods in Chapter 7.

Using statistical methods and long enough historical data you can draw the cycle month-by-month for your business, your customers and industrial end-users. You can identify the factors behind the changes, whether it is growing imbalance in supply chain, weakening end-user demand or loss of market share. Moreover, there is a connection between the cycles of total economy and cyclical branches.

Combine above with forward indicators (Chapters 6 and 7) and you can be 1-2 quarters ahead of the events in most cycles – see last pages.

EU Steel production: raw data

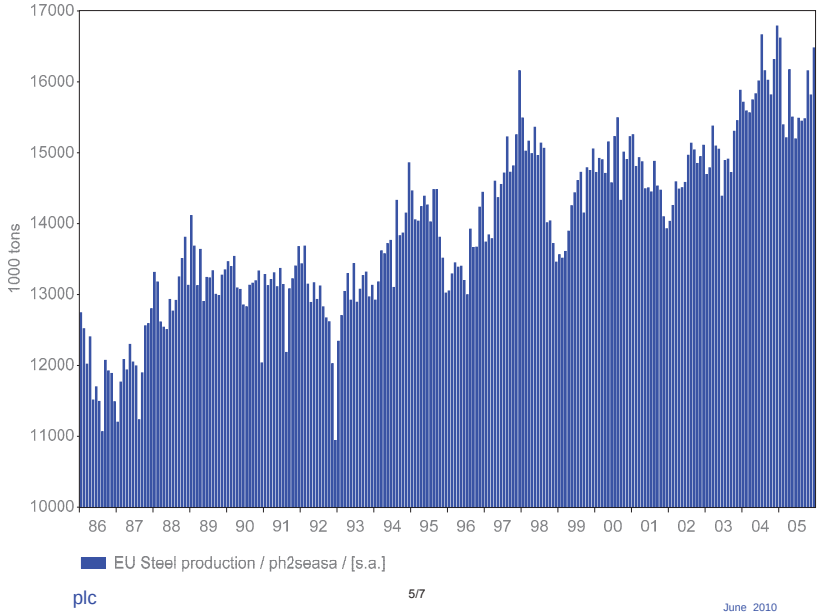
1 Raw Data - Originally reported monthly values



plc 4/7 June 2010

EU Steel production: seasonally adjusted (s.a.)

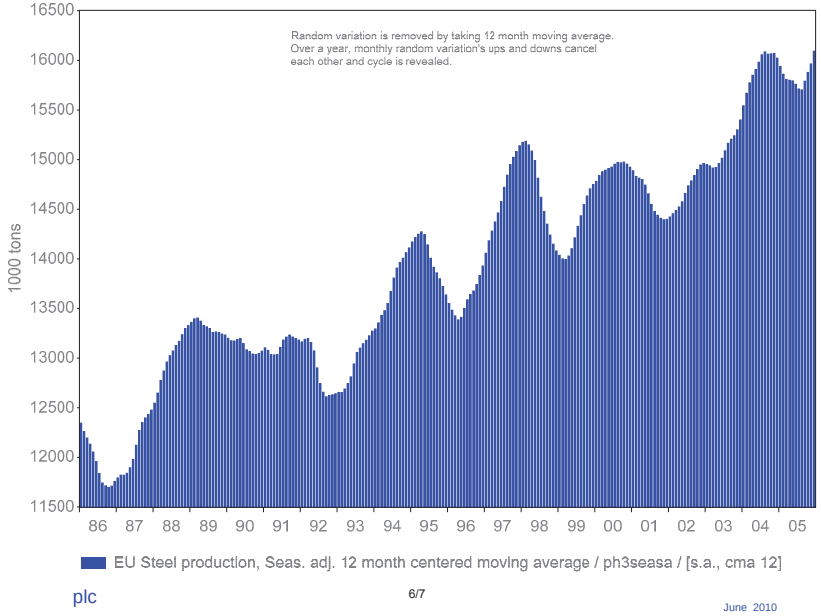
2. Seasonal variation removed - Random variation left



plc 5/7 June 2010

EU Steel production: cycle (s.a., cma 12)

3. Cycle: Seasonal and random variation removed



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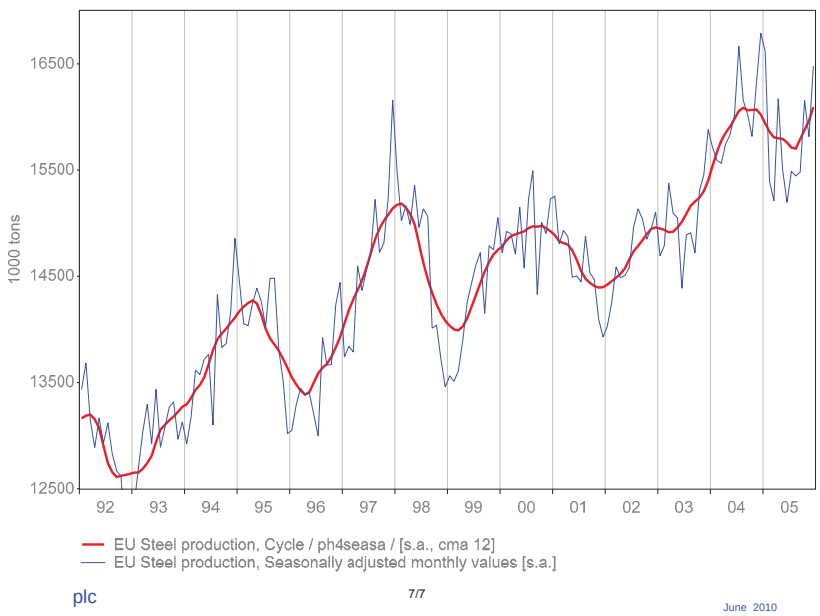
EU Steel Production: s.a., cma12 + s.a.

4. Standard presentation form: Cycle + Seas. adj. monthly values



plc 7/7 June 2010

What downturns are made of

93 macro cycles in 21 OECD economies 1973-2000:

Sources: IMF (2002), NBER working papers, IIE, Own estimates

Note: The following are the acting factors *during* the downturn, not necessarily the *triggering* factors.

Contribution to downturn, whole duration (average of all)

- 50% inventories
- 50% private investments
- Consumers and Government, net: 0%

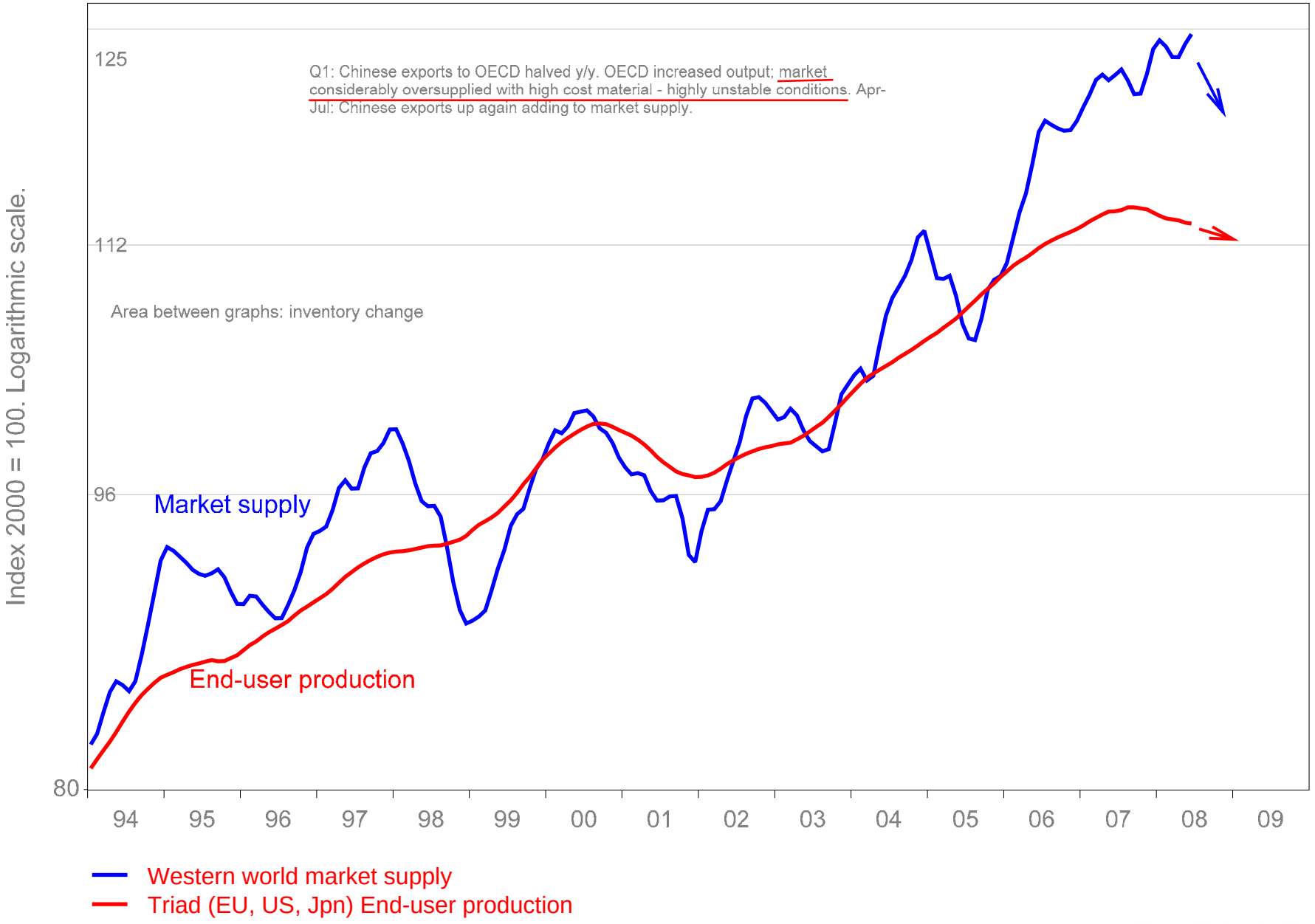
In a typical non-crisis downturn, inventories and fixed investments more than fully accounted for the decrease of GDP growth.

When external crisis hits, sales and orders fall instantly and effects in industry are dramatic – like in 2008-09 crisis. Most discretionary products are hit at the same time: investment goods and related intermediate goods as well as consumer durables like cars, white goods, etc. Steep production cuts follow immediately. As consumer sales projections are revised down, inventory reductions in *retail sales* and in industry take place simultaneously.

See proxies for 'OECD' at the bottom.

OECD Steel Market supply vs End-User Production / Jun 2008

Construction 30%, Machinery 25, Vehicles 20, Metal goods etc 25



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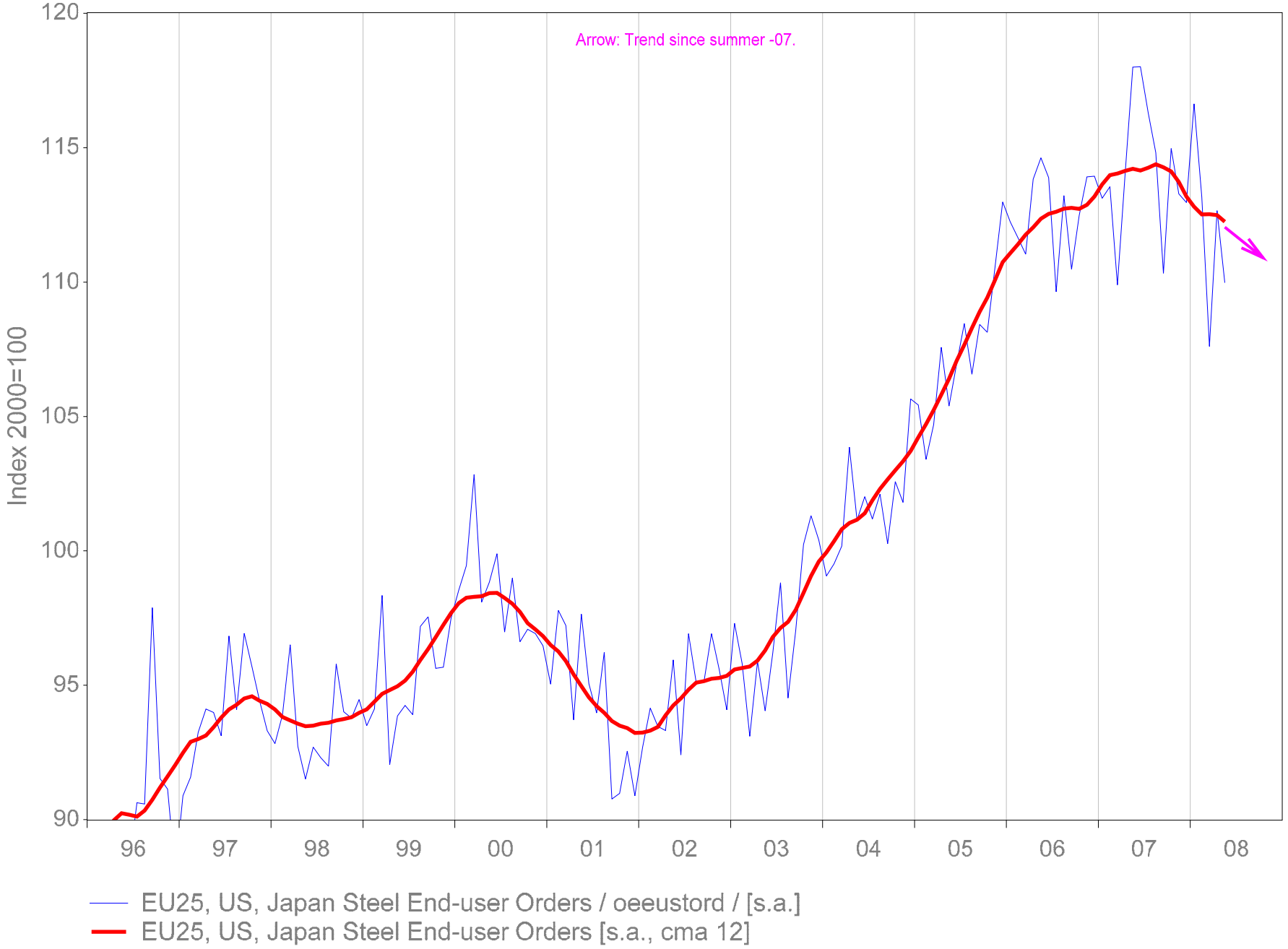
OECD Steel End-user Orders / May 2008



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OECD Steel Market supply vs End-User Production / Nov

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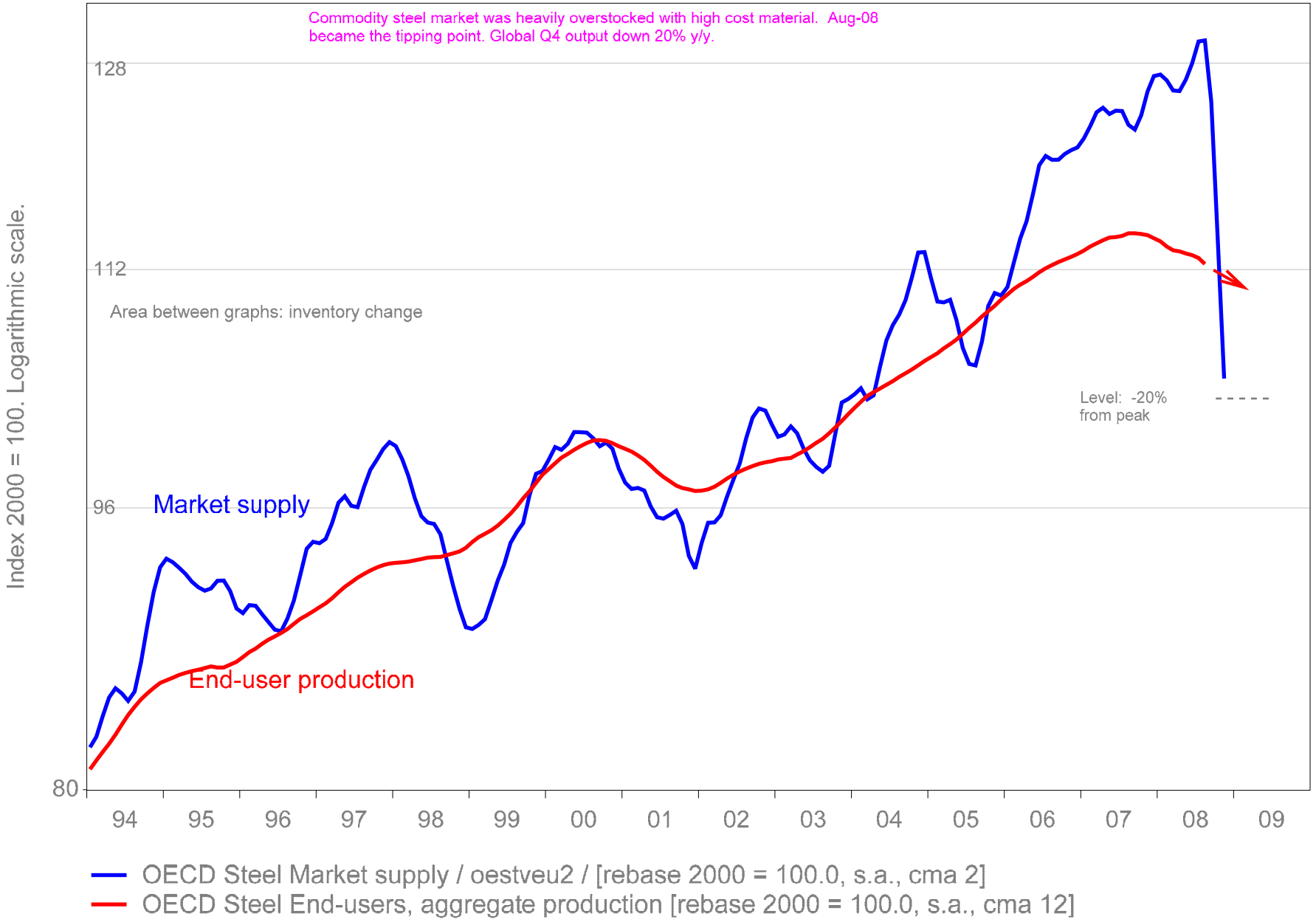

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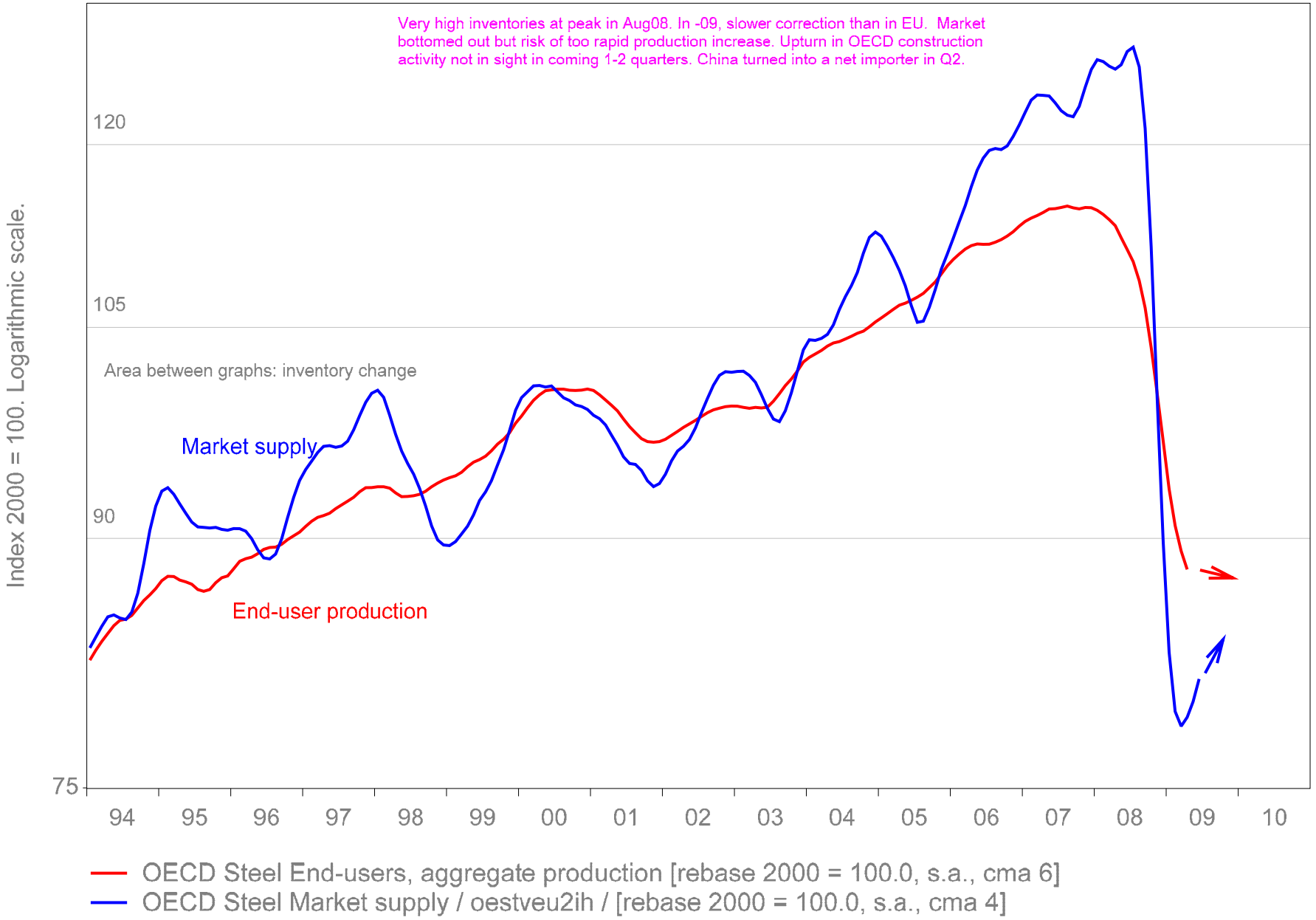
OECD Steel Market supply (Jun) vs End-User Production (May)

Construction 30%, Machinery 15, Vehicles 20, Cons. durables, Metal goods, Energy 35



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