

€-coin: spillovers to India?

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1 Introducing €coin

2 Defining €coin

3 The method

4 Evaluating €coin

5 In India?

6 Conclusions



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€coin: Bank of Italy-CEPR project

€coin is a tool to assess (*monitor*) the current state of the economy in *real-time* summarizing it in a *single number linked to GDP growth*

This assessment, to be valuable, needs to be:

- Comprehensive and non-subjective
- Timely
- Free of short run fluctuations (smooth)



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Monitoring the economy: GDP

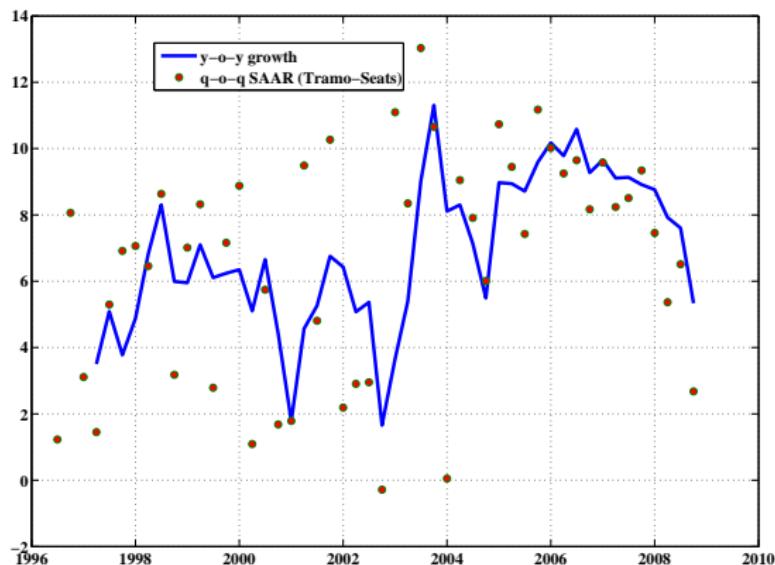
The most comprehensive measure of overall economic activity is GDP but:

- it is available only at quarterly frequency
- it is available with delay
- it is noisy: short run volatility and revisions



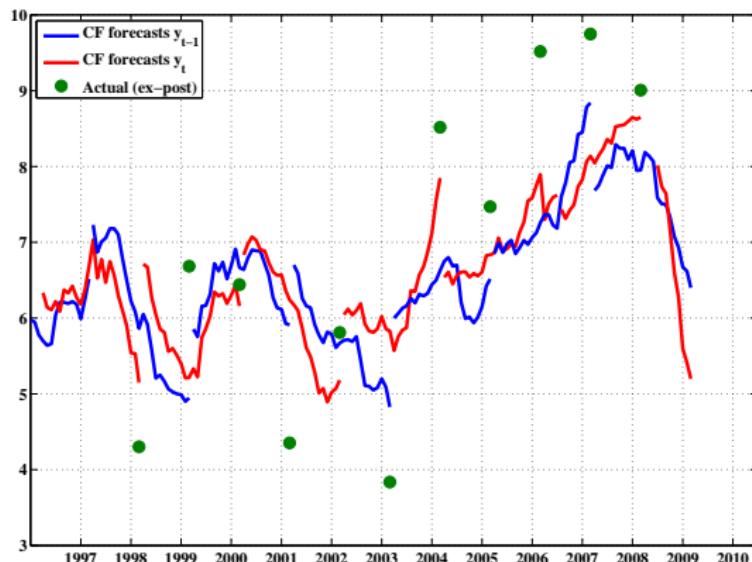
Jump to India

In s.a. terms India current slowdown is more pronounced than what we *hear*



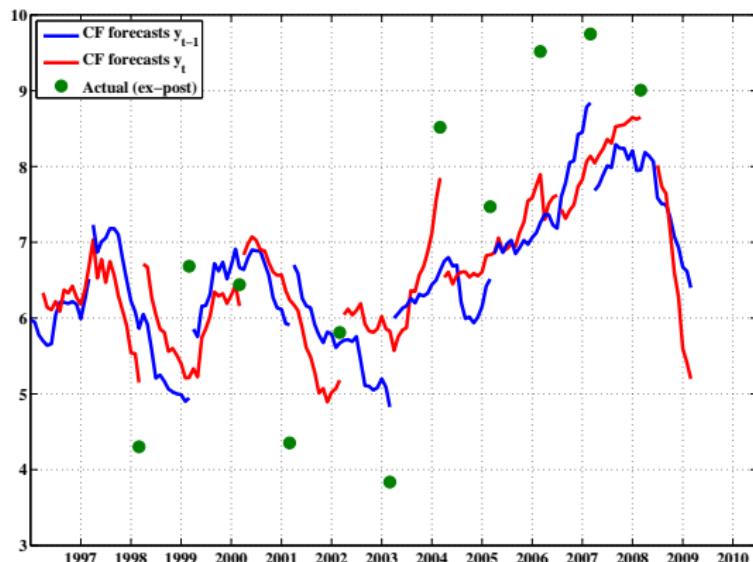
Coming to terms with the crisis in India (1)

Real time assessment (*Consensus Forecasts*) on growth: rapid downgrading of India's growth



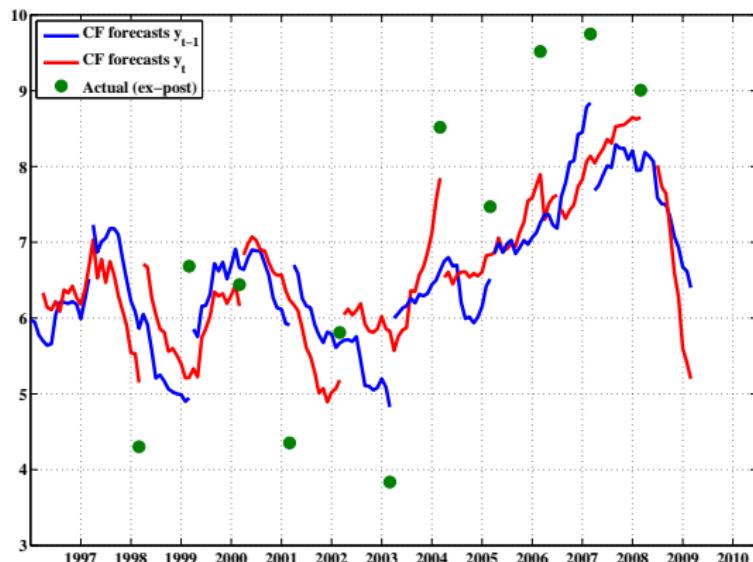
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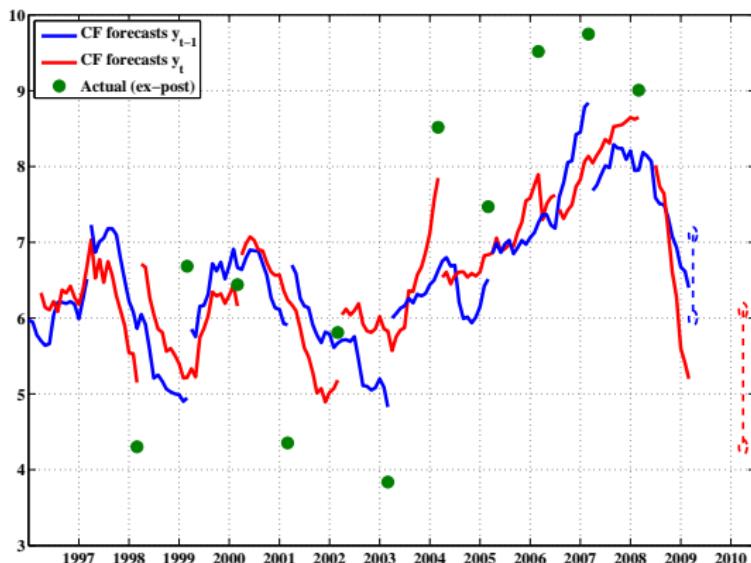
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Real time assessment (*Consensus Forecasts*) on growth: rapid downgrading of India's growth



Coming to terms with the current crisis (2)

Where do we go from here: min-max range from *CF March 2009*



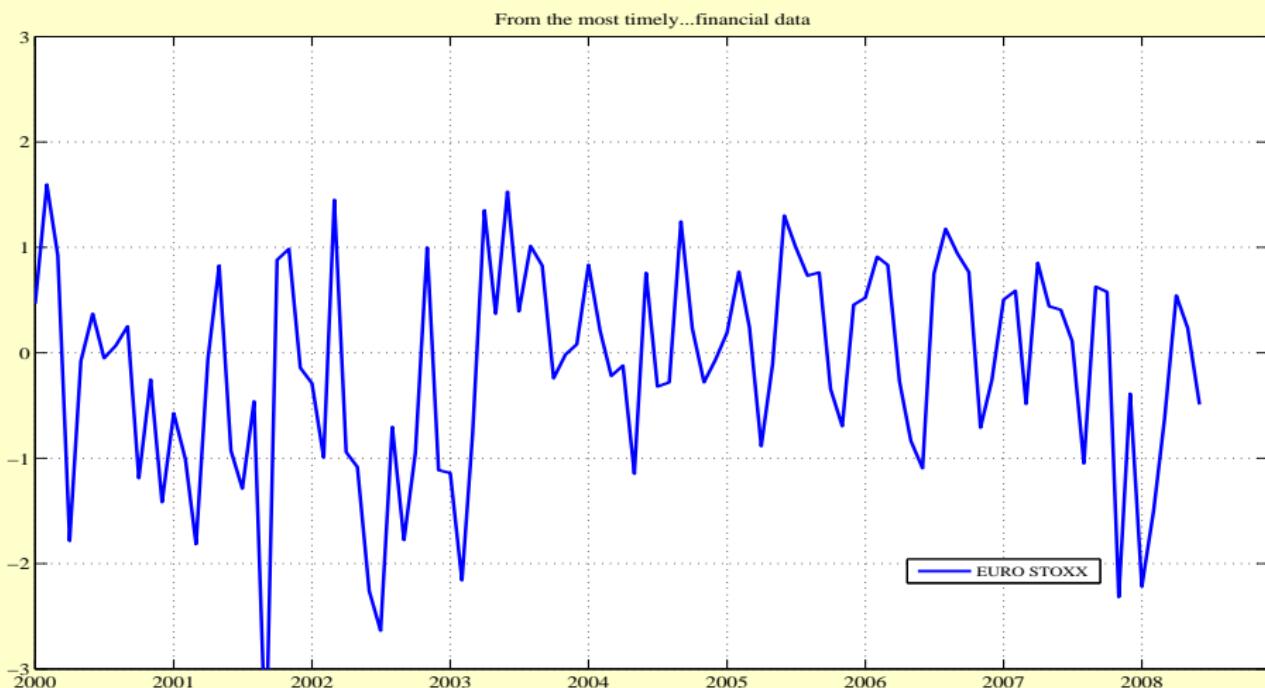
Back to Europe: monitoring the economy in real time

Economy watchers collect PMIs, surveys, IP,... to update their forecasts, however:

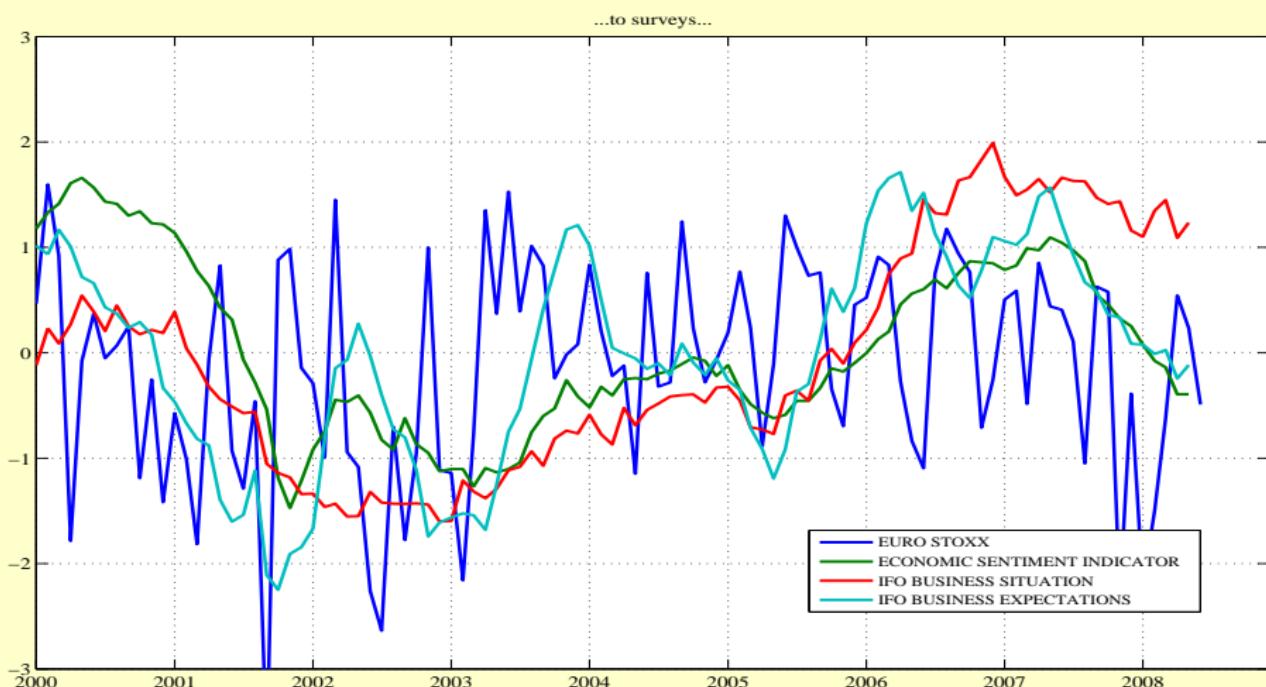
- there is no “best” indicator
- contradictory signals emerge from a priori equally reliable indicators
- there is no clear way to synthesize disparate sources of information
- yet we know they might contain valuable information



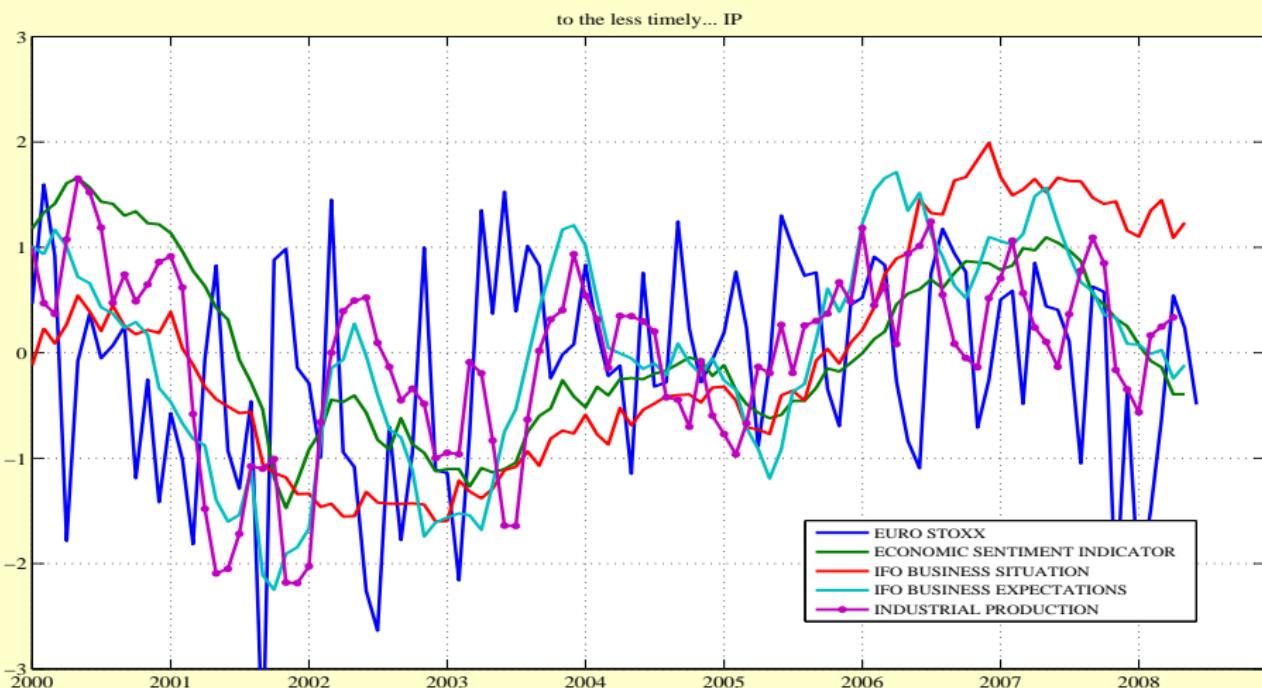
Monitoring the economy: higher frequency data



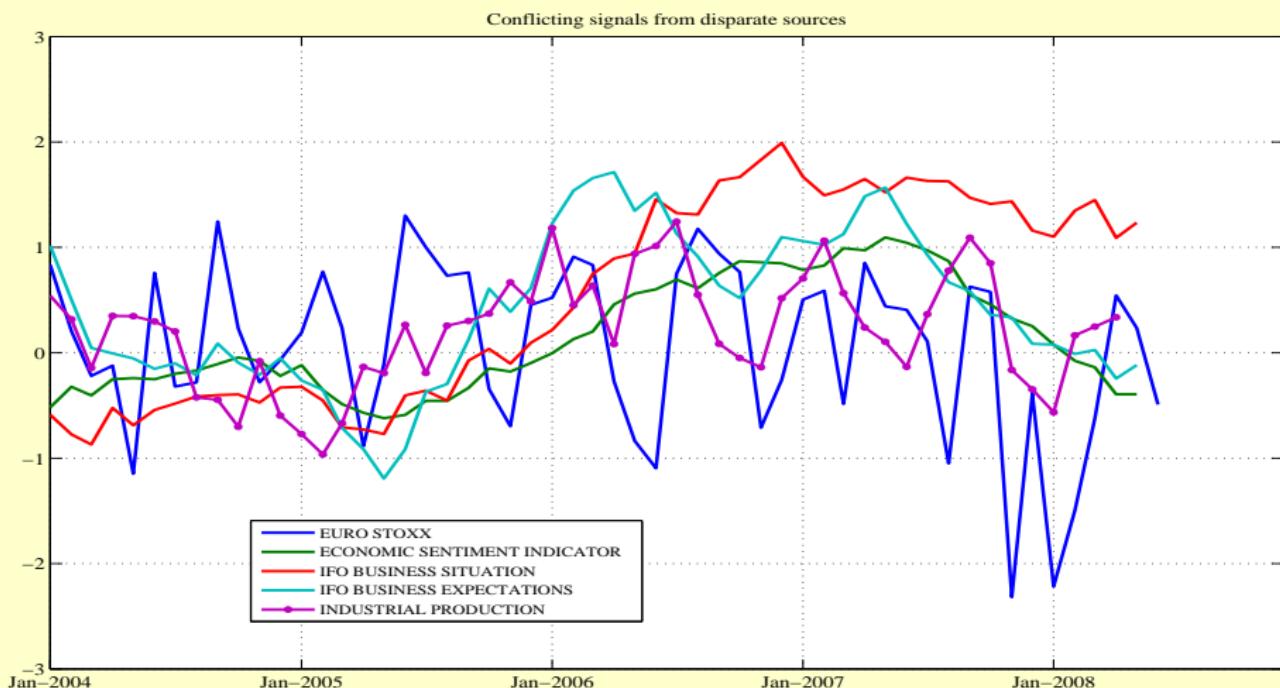
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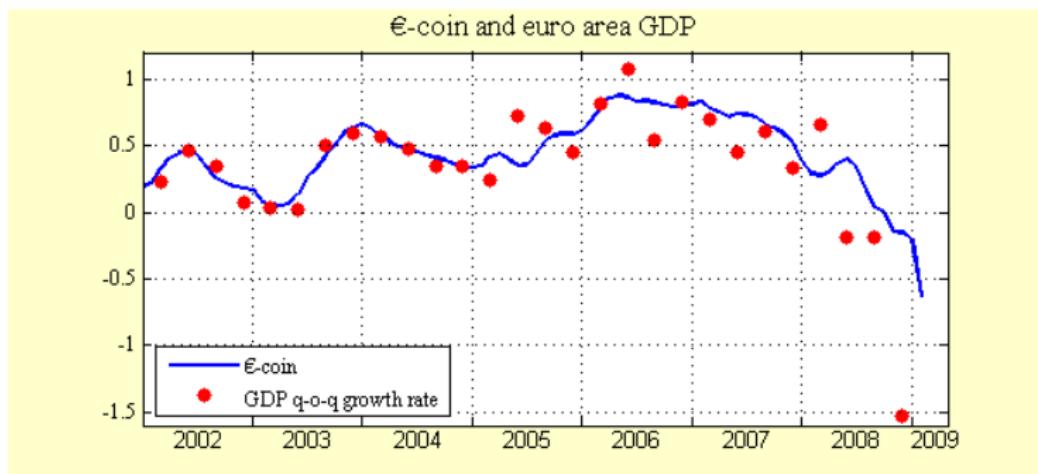
Monitoring the economy: €-coin in a nutshell

The intuition behind €-coin is straightforward and follows from what economy watchers and forecasters normally do:

- collect a wide range of relevant statistics
- extract and synthetize the information contained in them
- obtain an estimate of GDP growth (at T for T) smoothing out short run fluctuations



€-coin and GDP growth, 24 February 2009



visit <http://eurocoin.cepr.org>

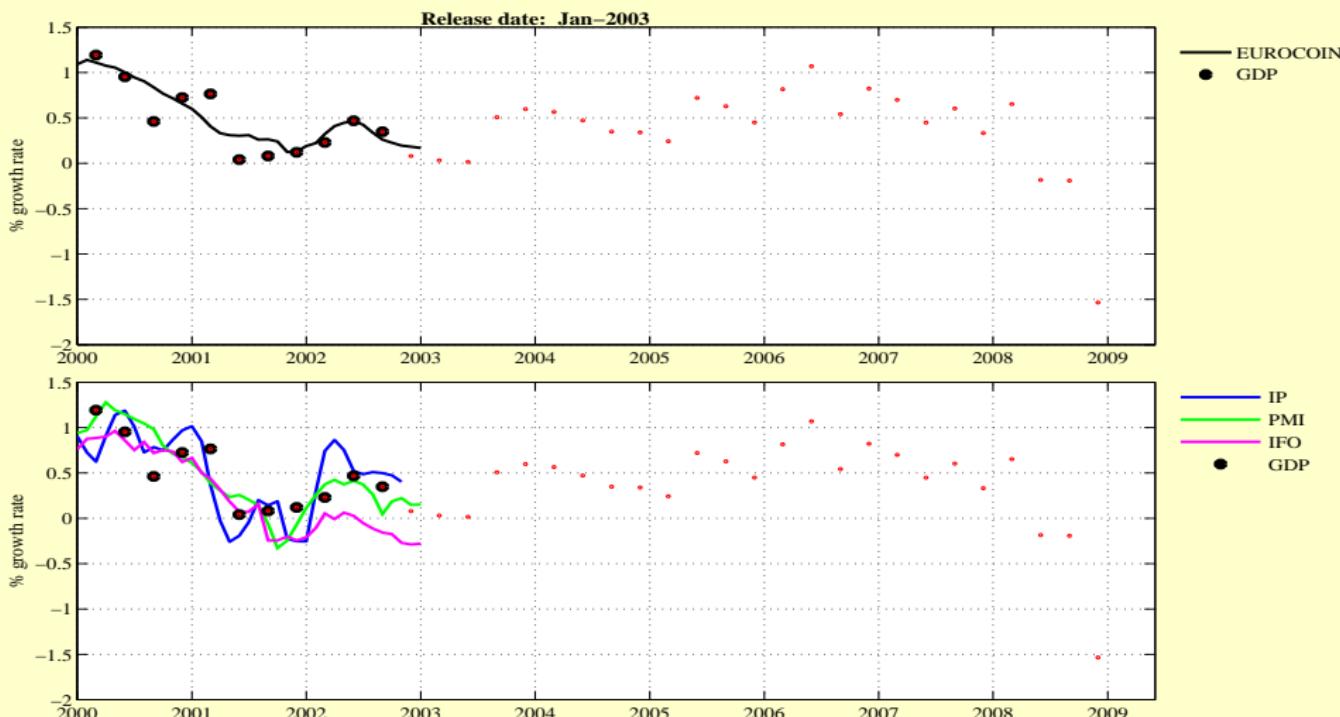


Monitoring the economy: €-coin in real time

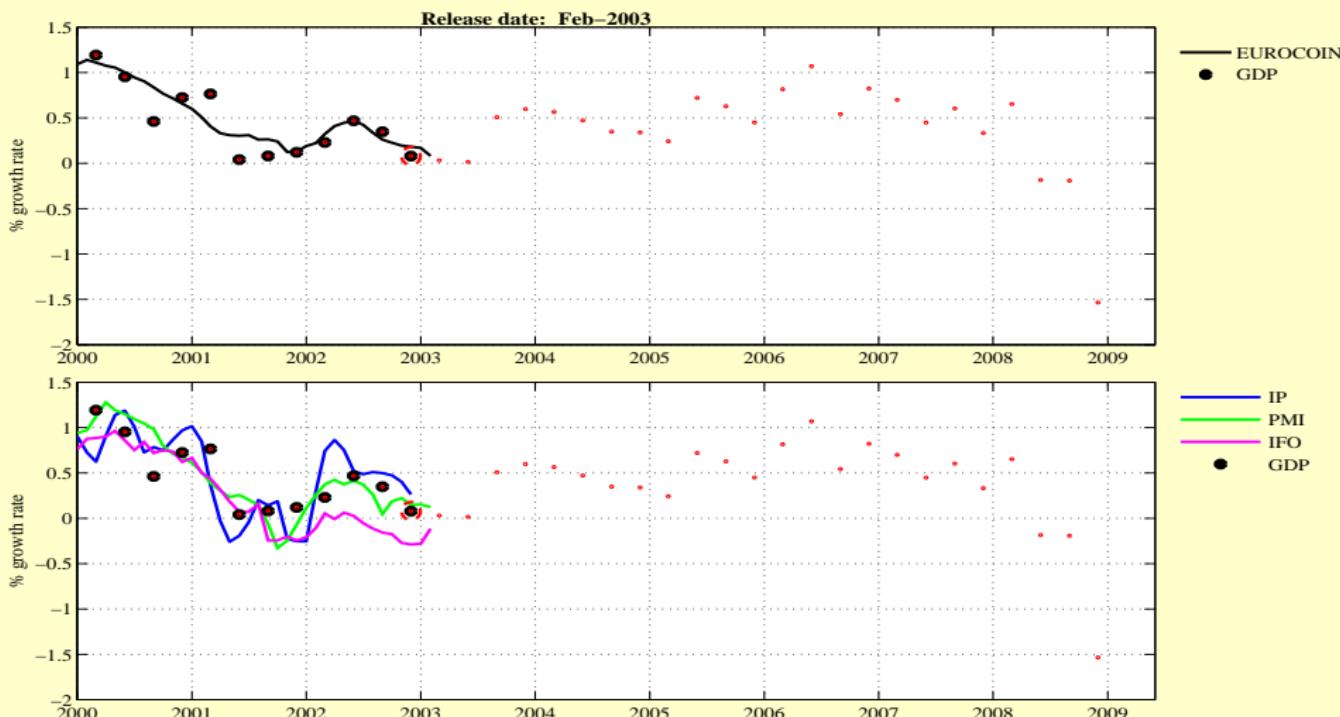
- €-coin is a monthly measure of the Euro area economic outlook available without delay.
- Here is how it tracks GDP growth in comparison with other important indicators:



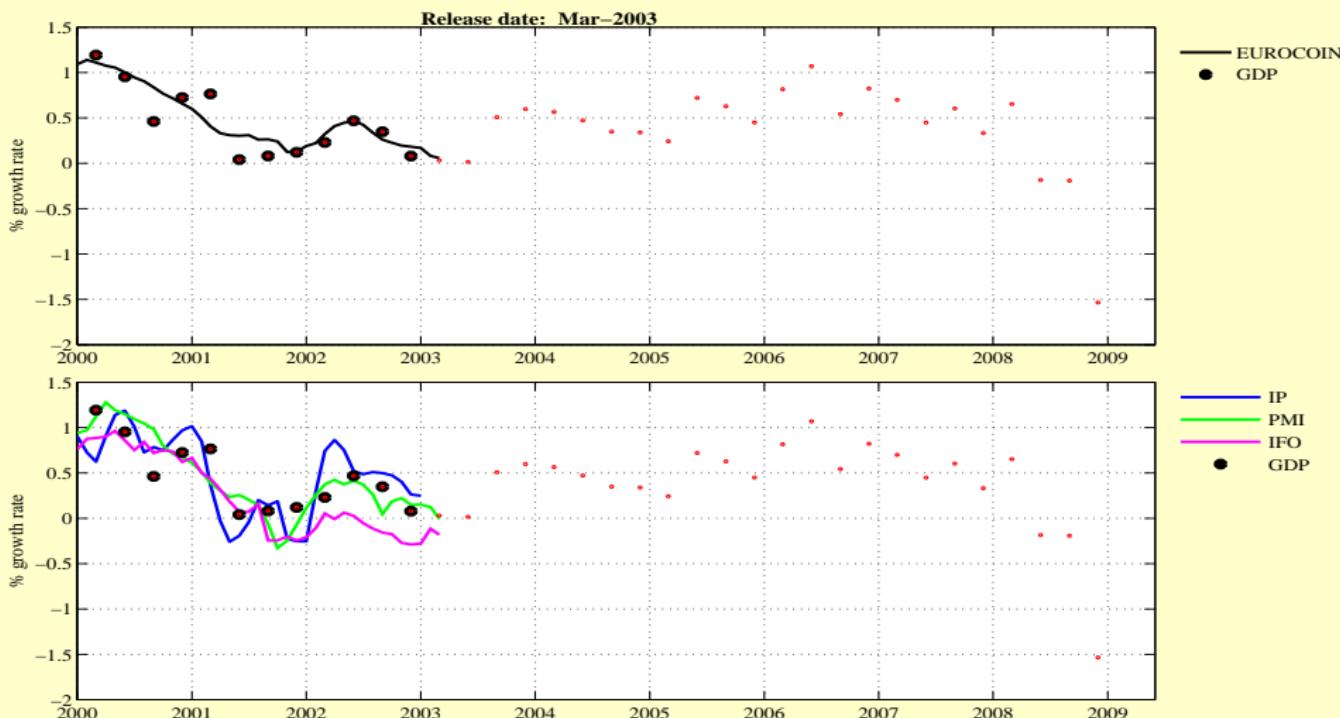
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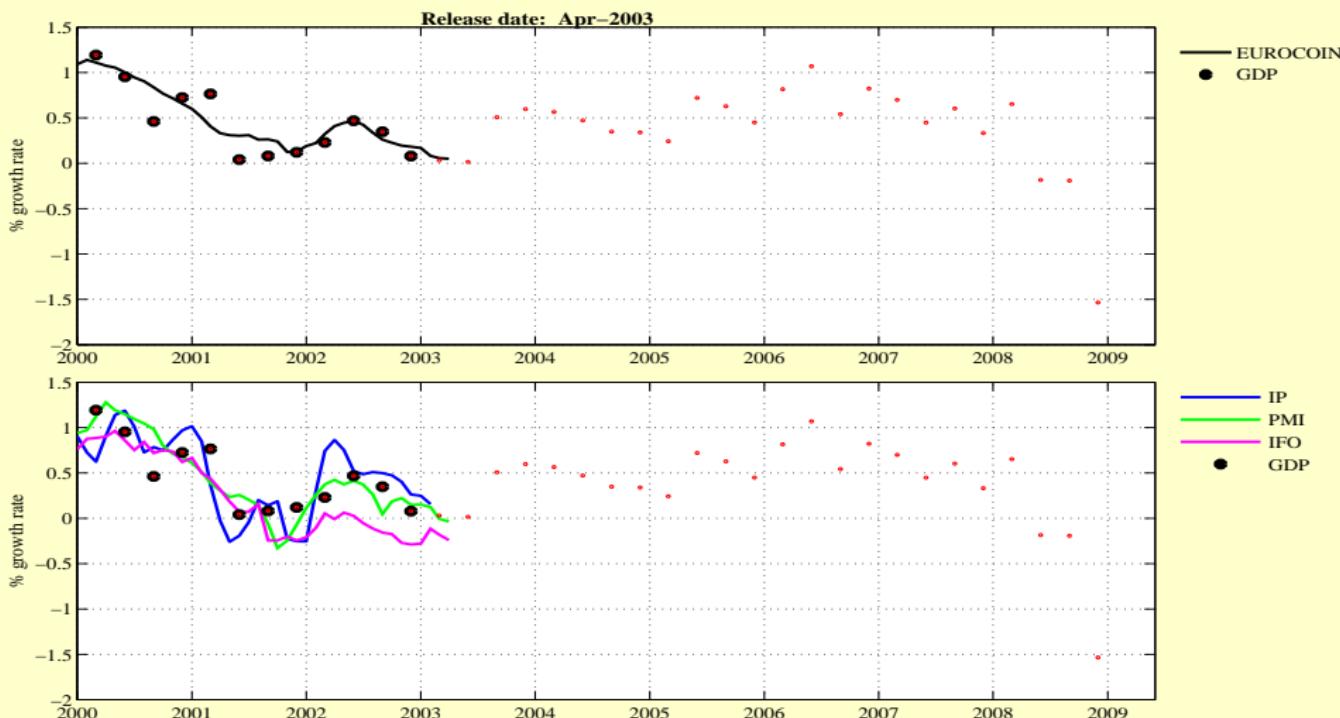
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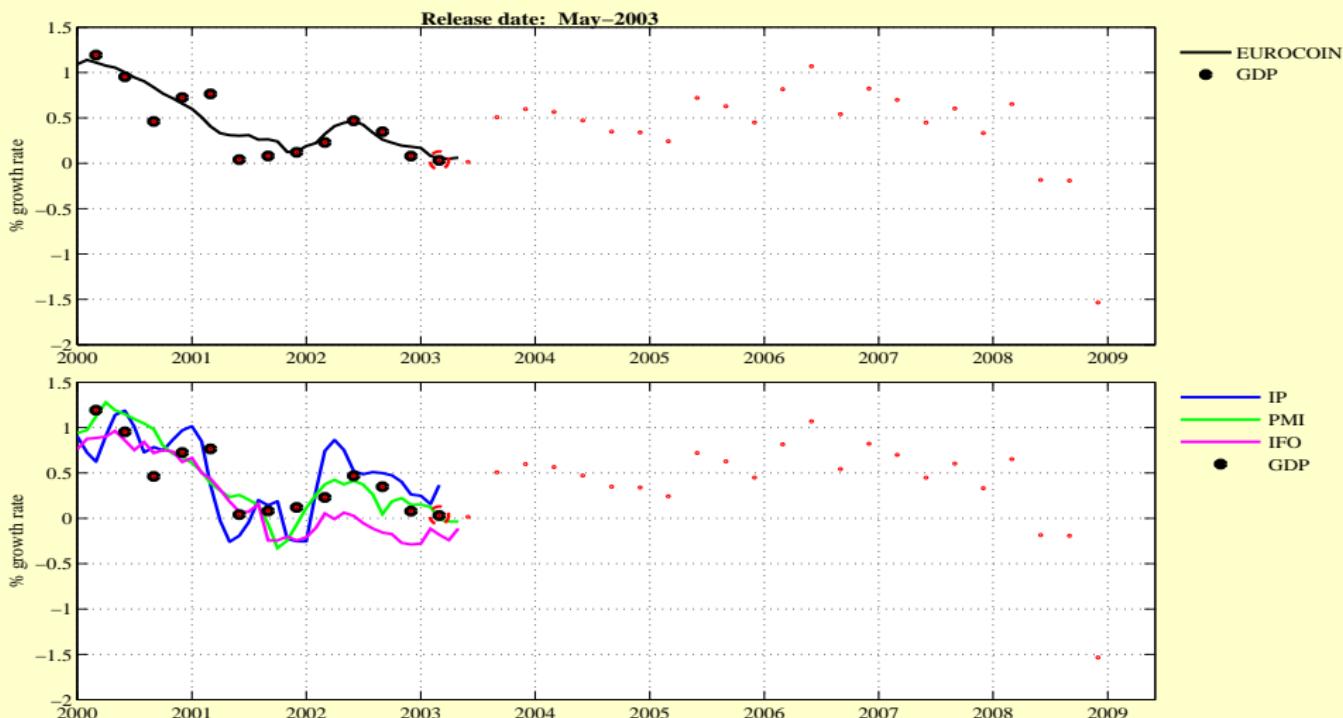
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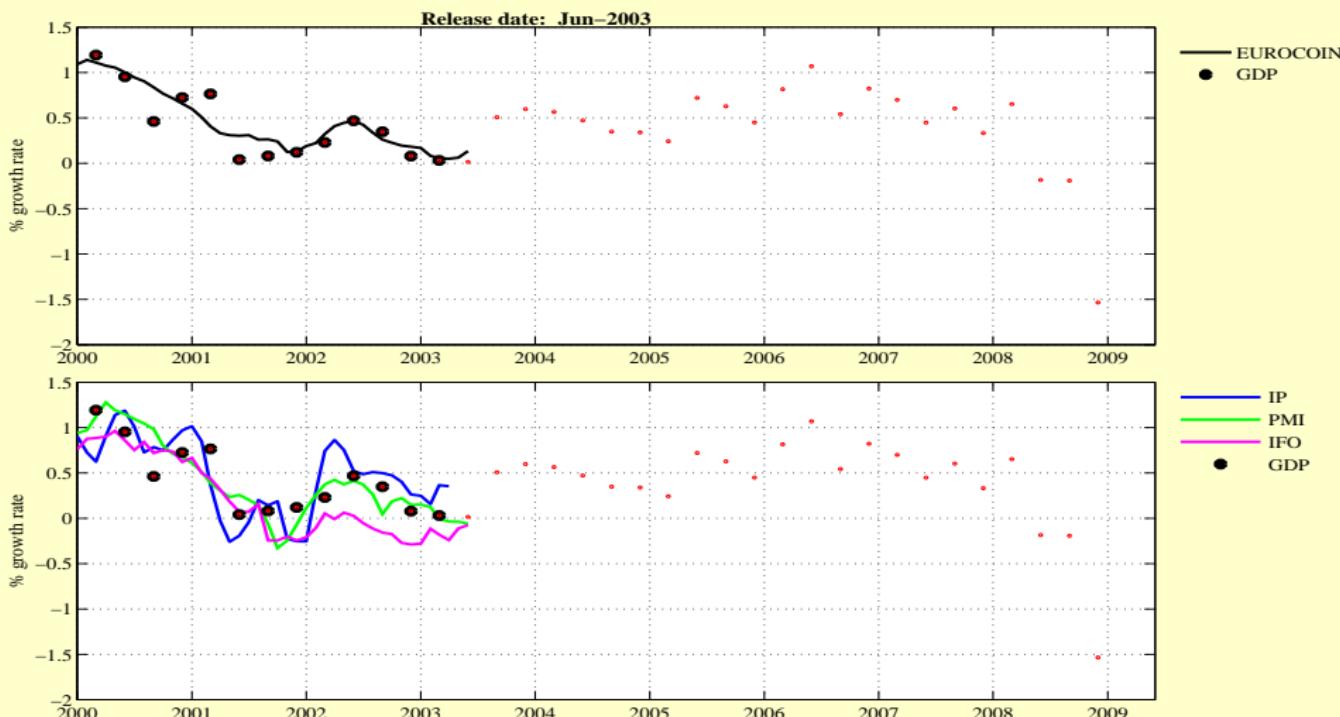
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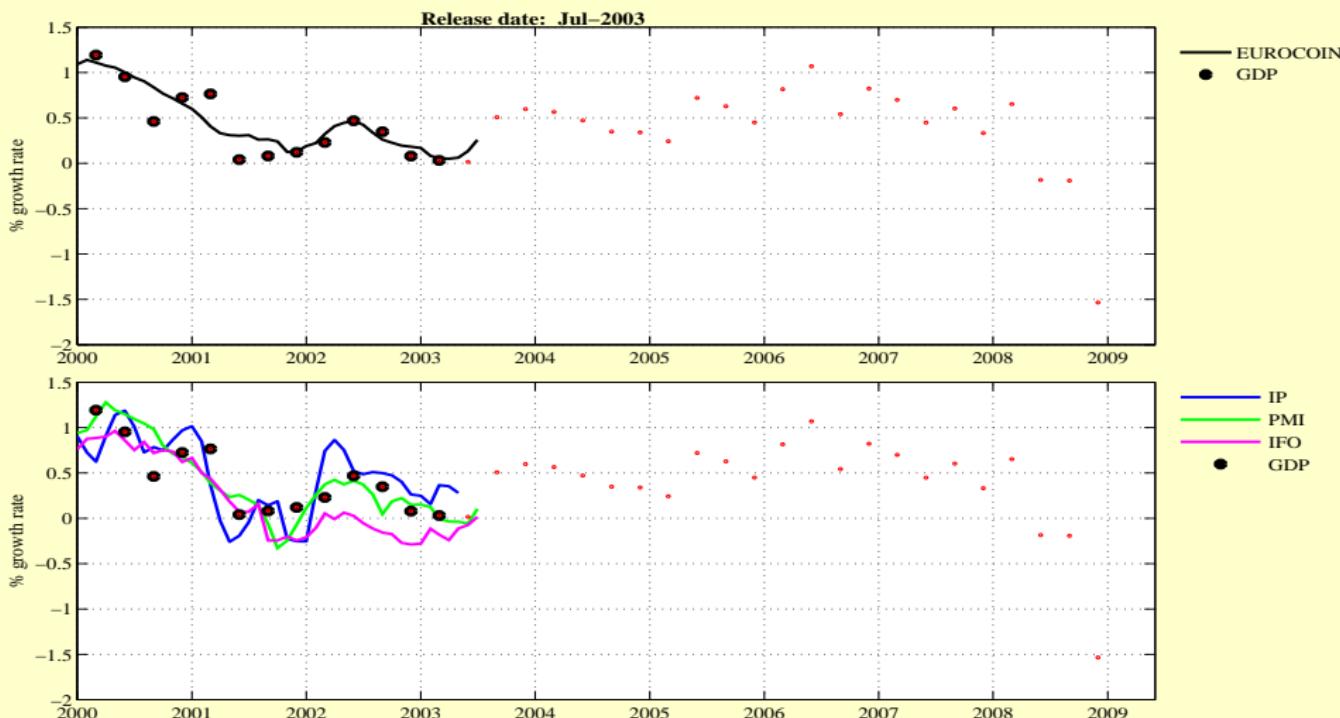
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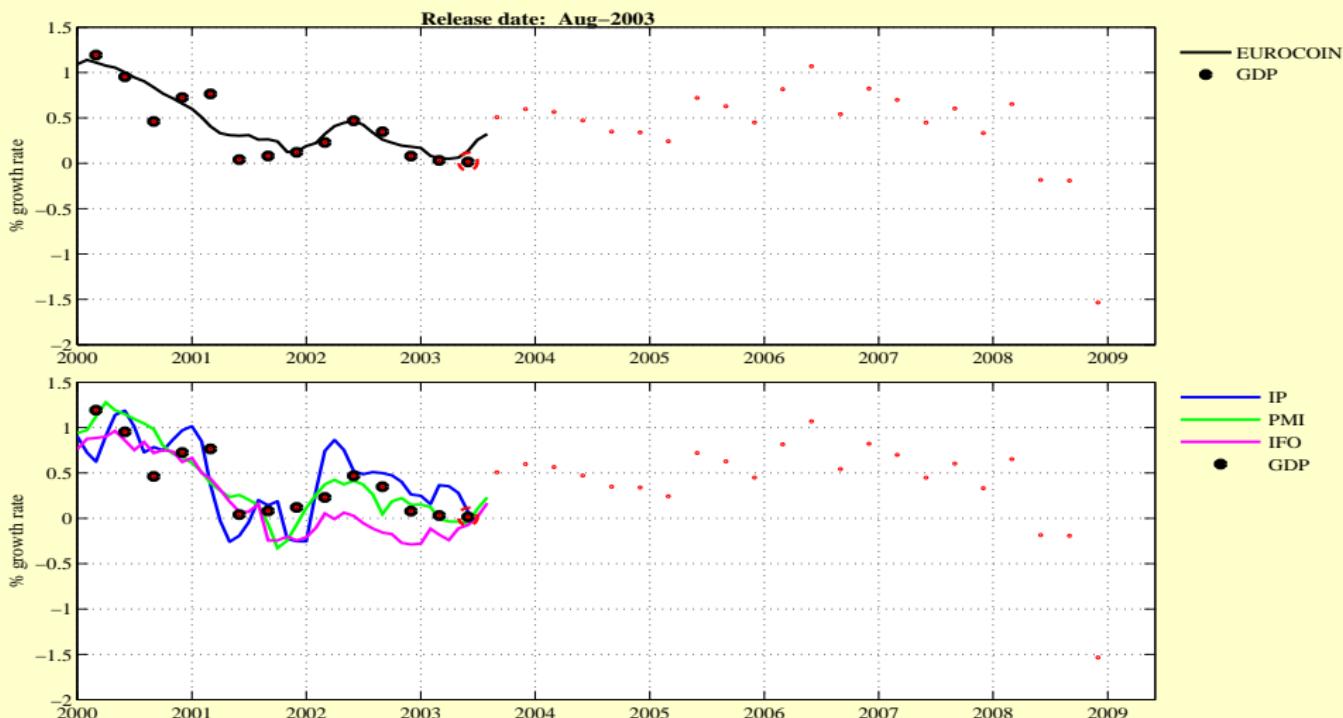
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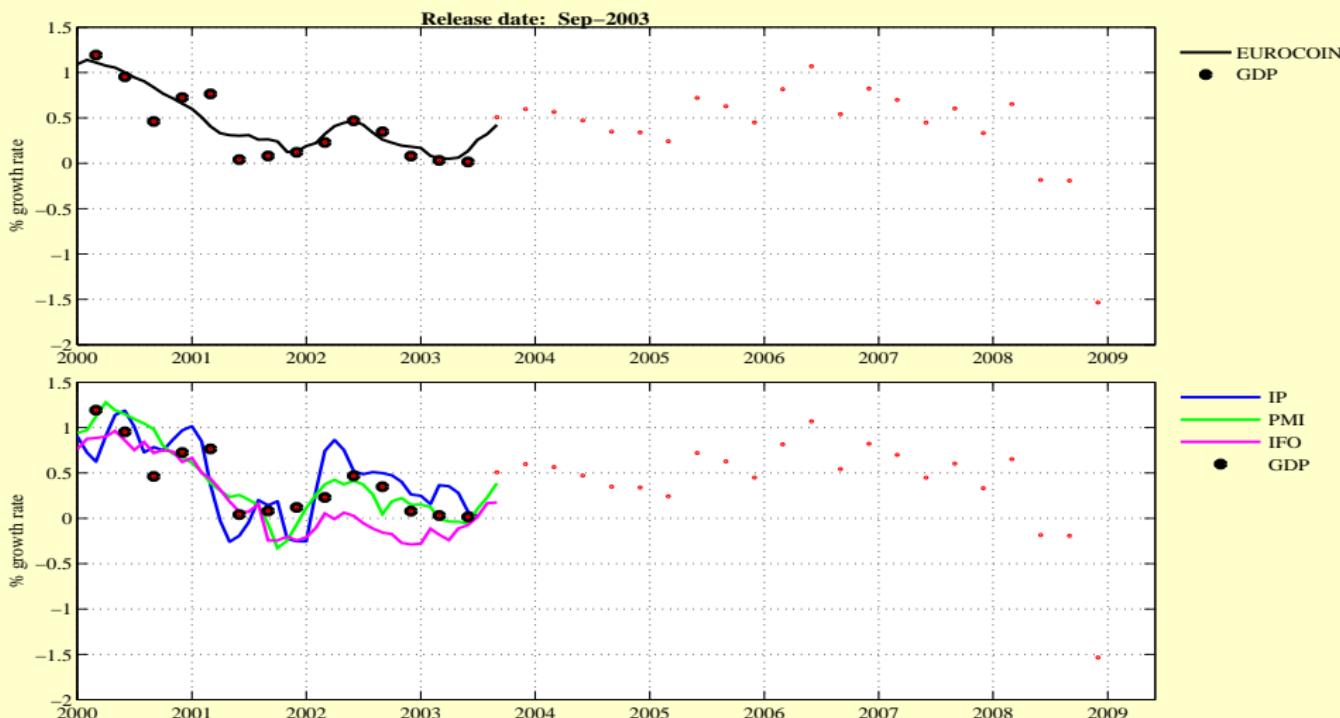
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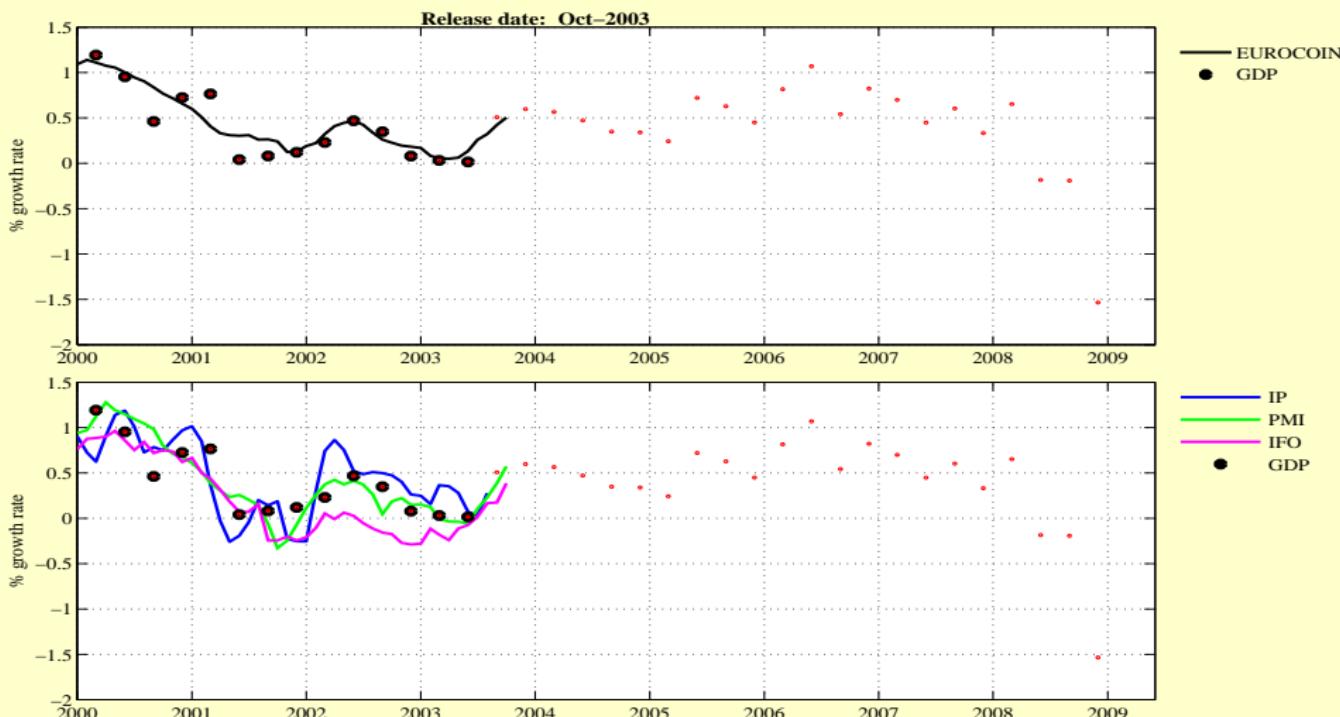
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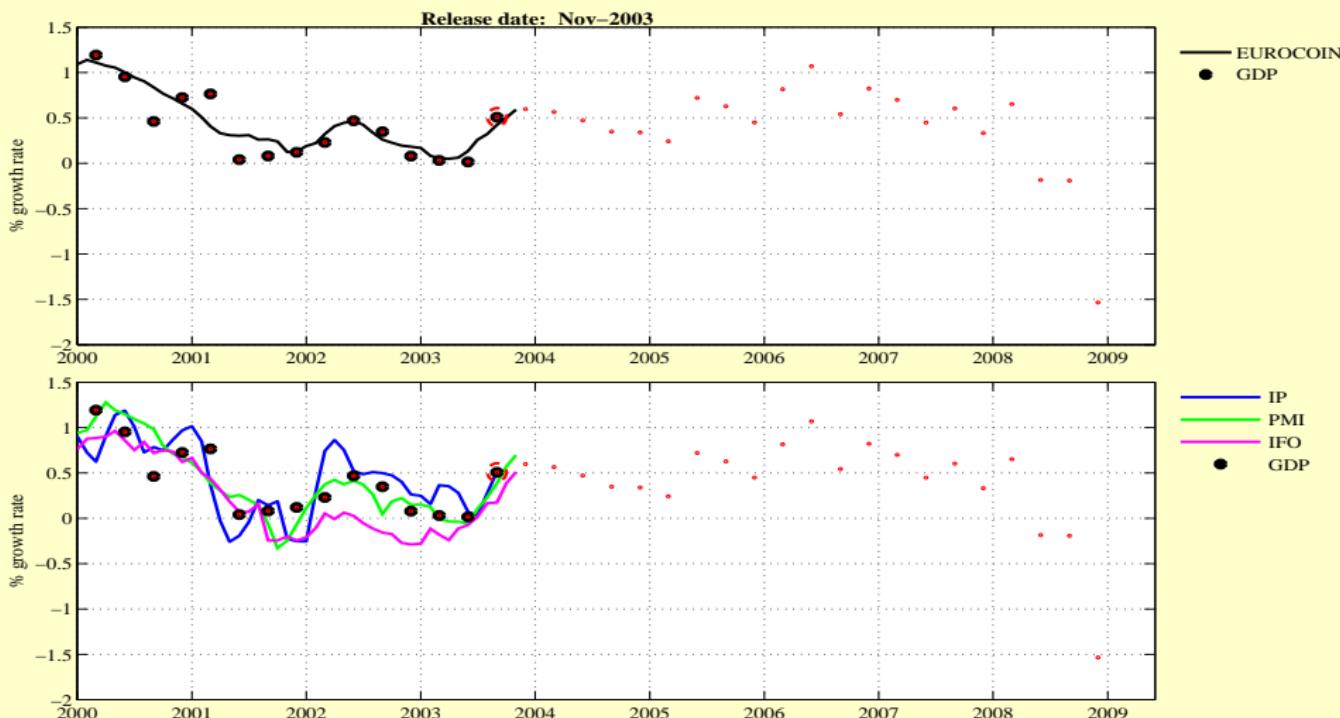
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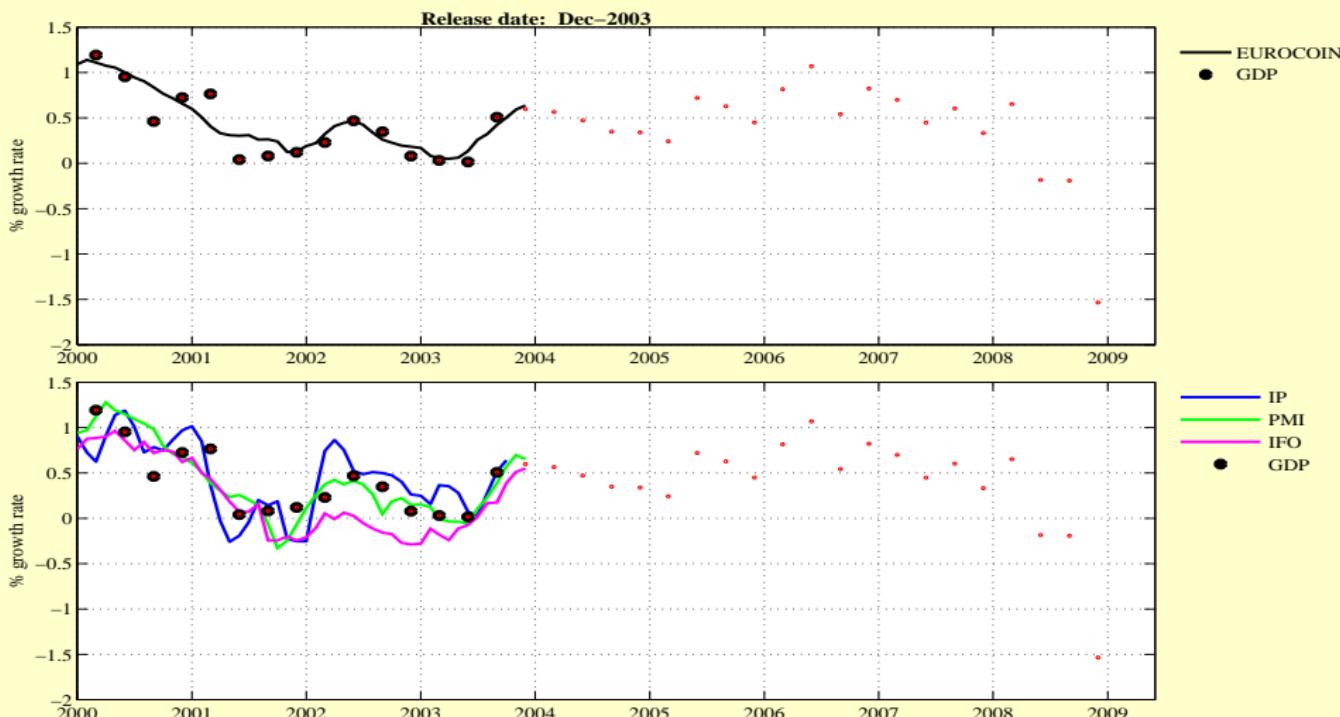
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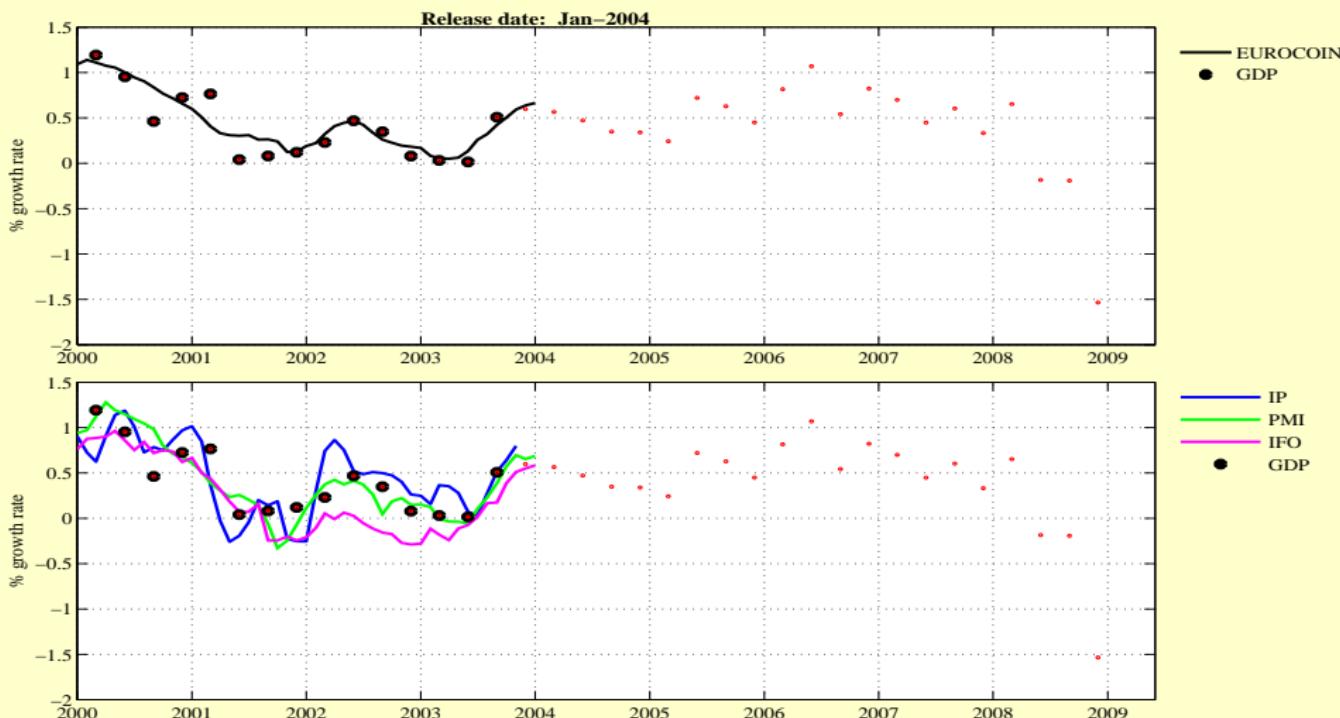
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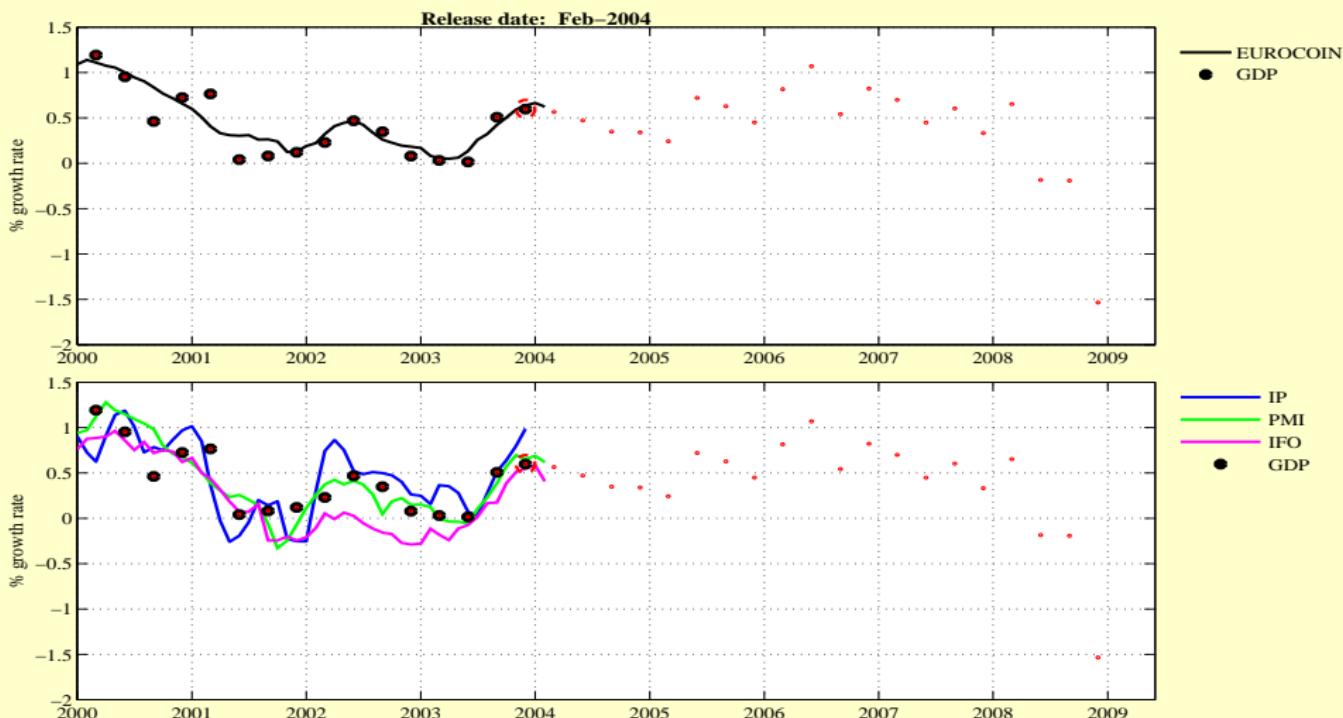
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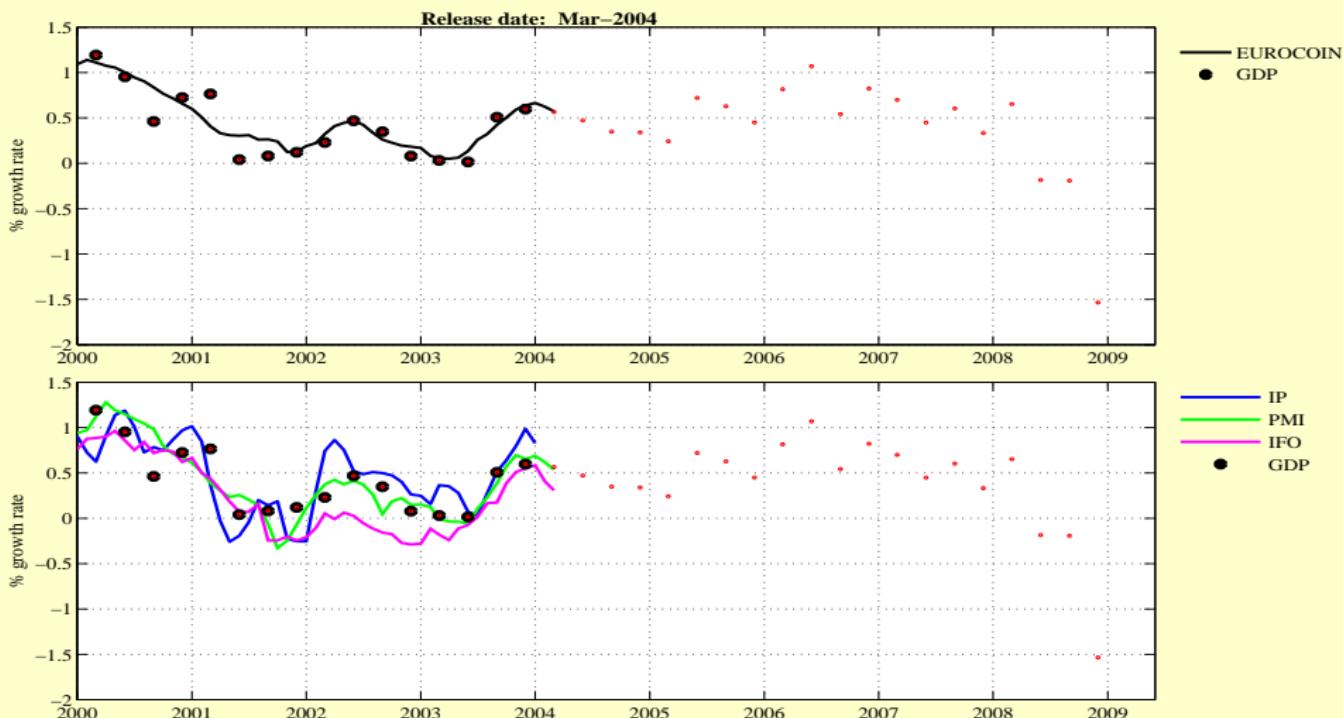
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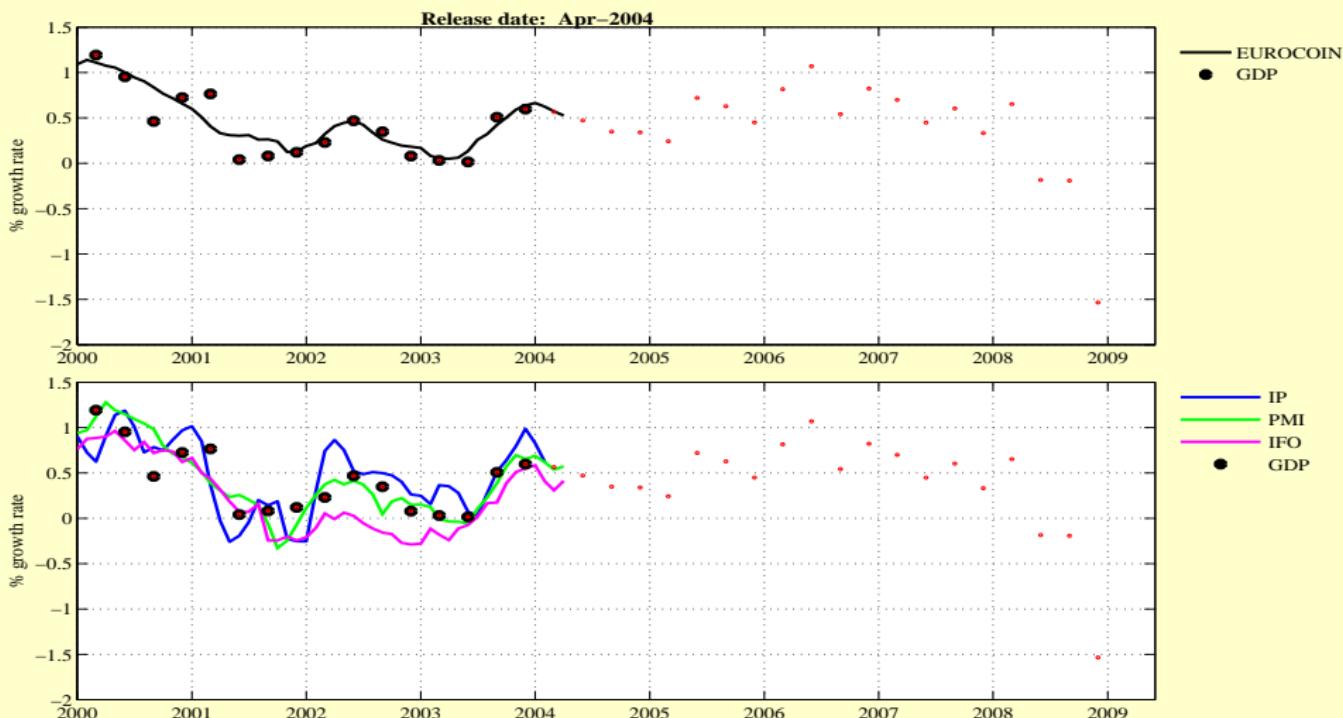
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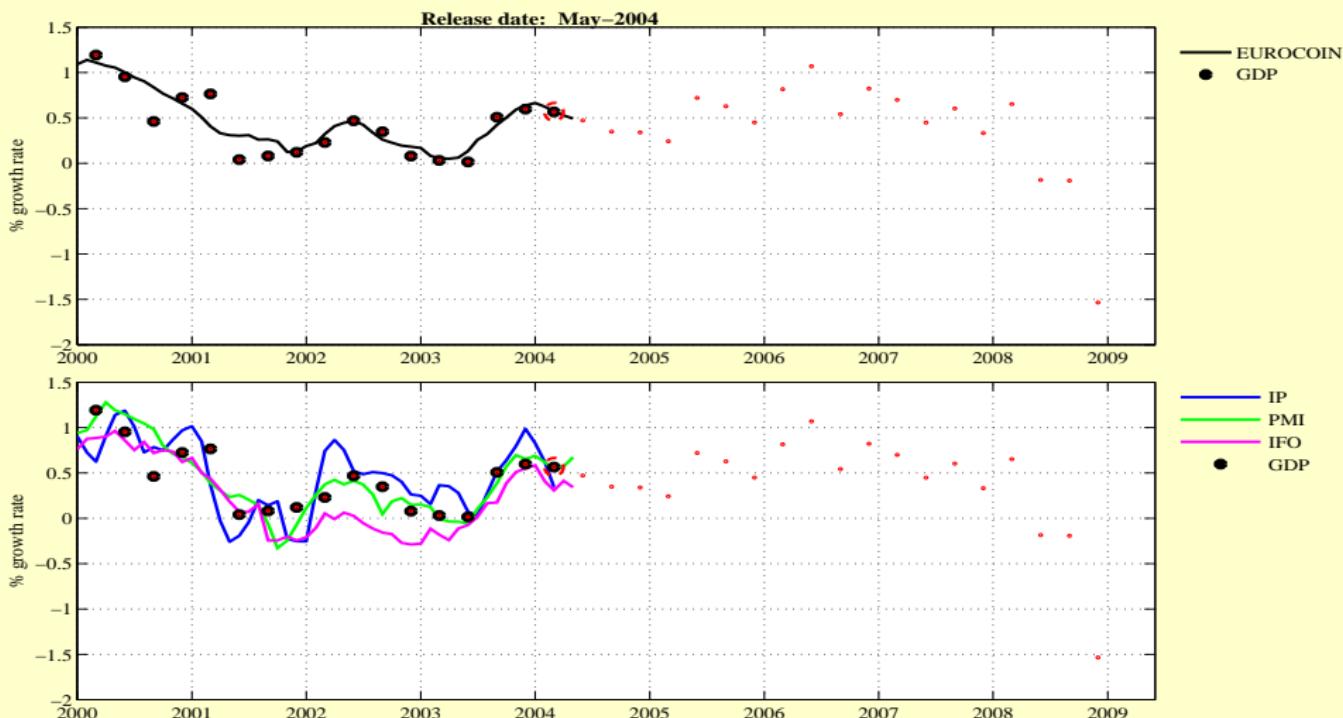
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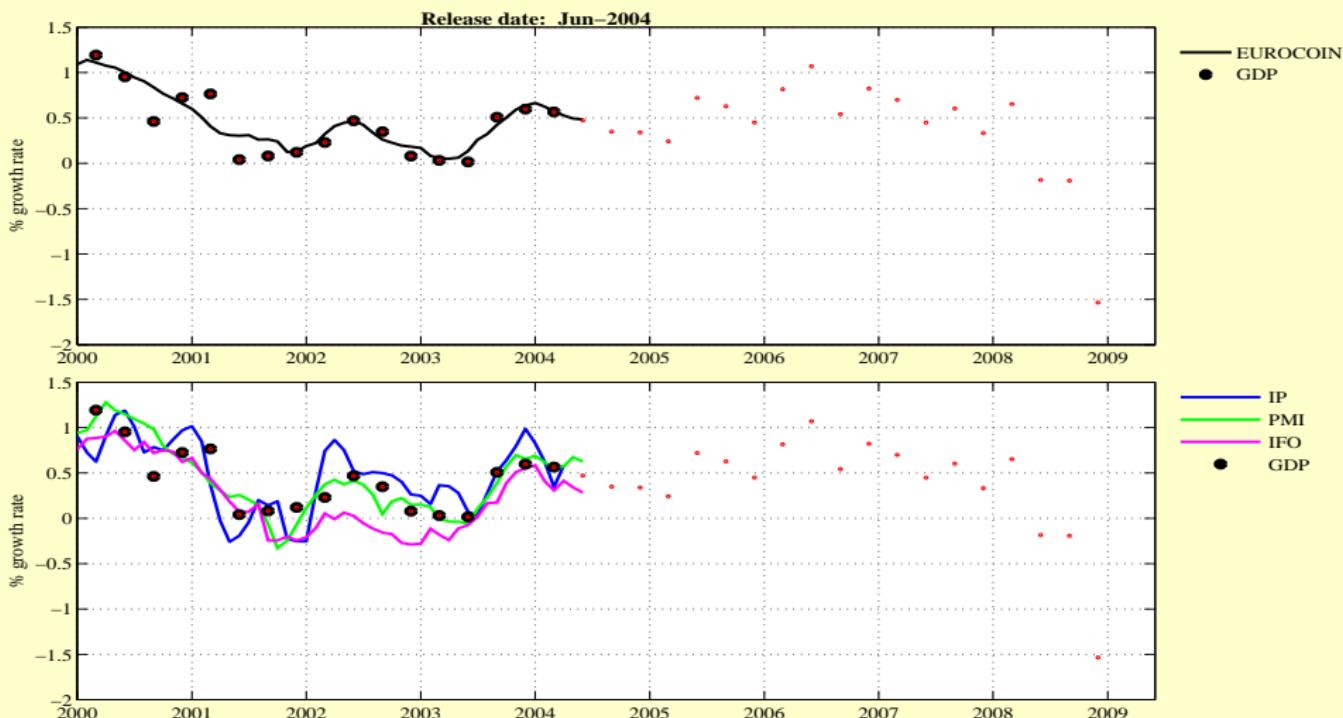
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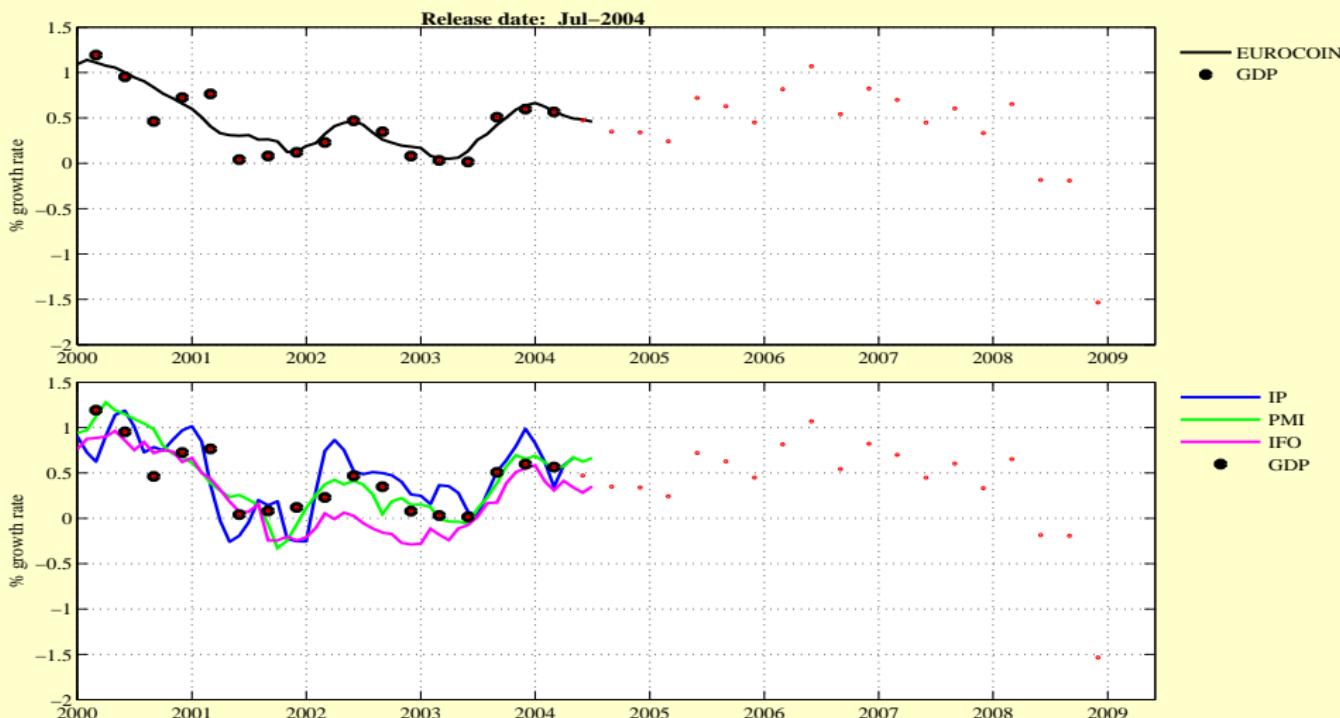
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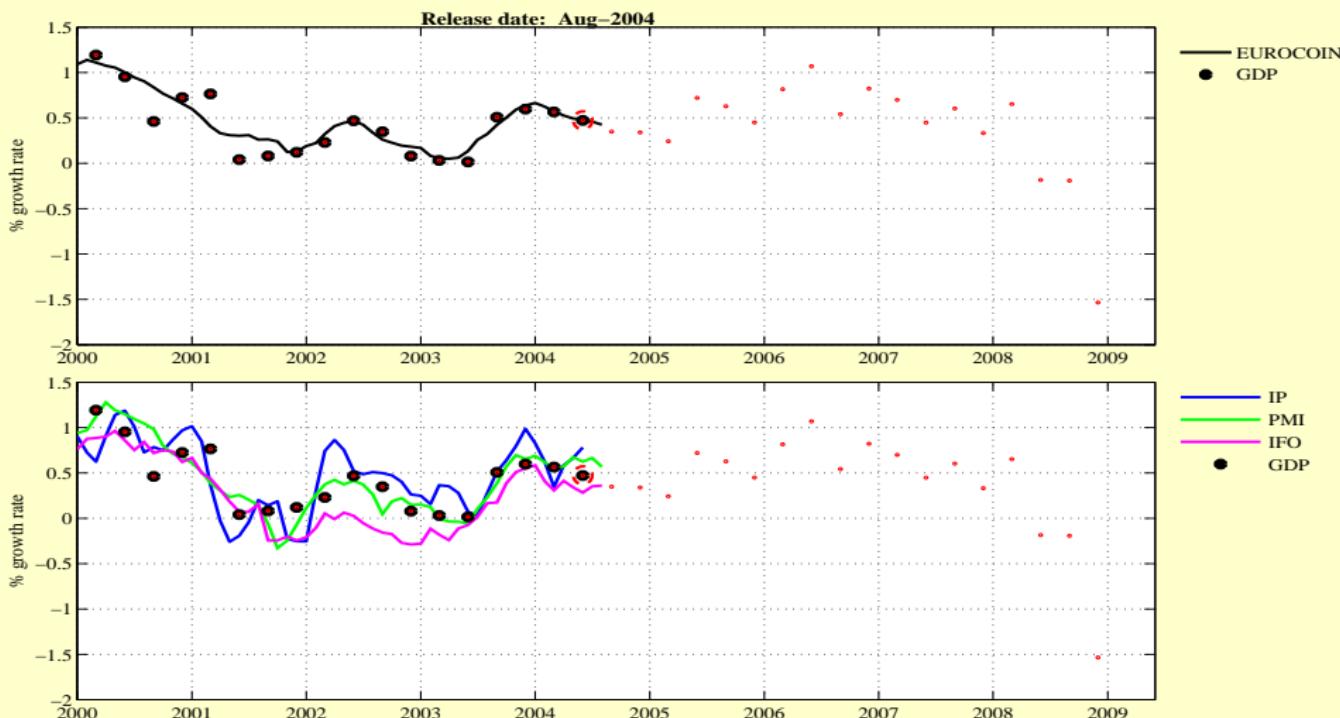
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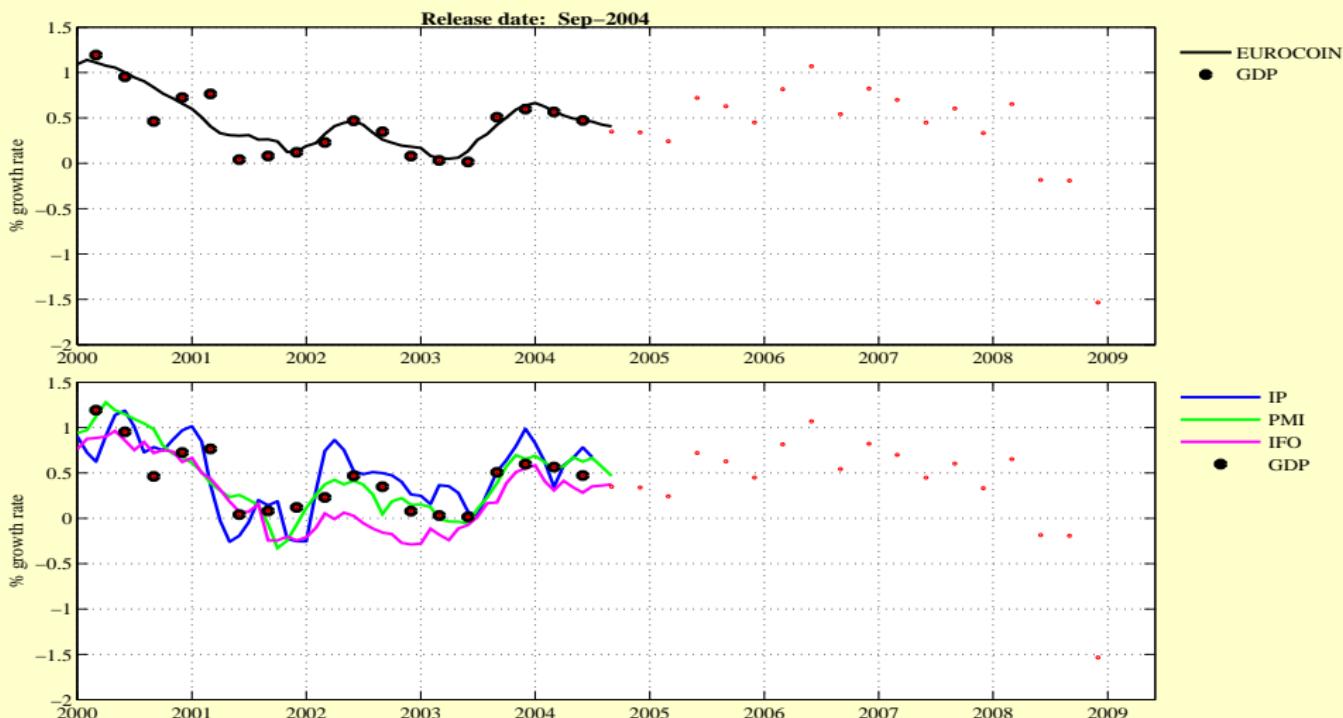
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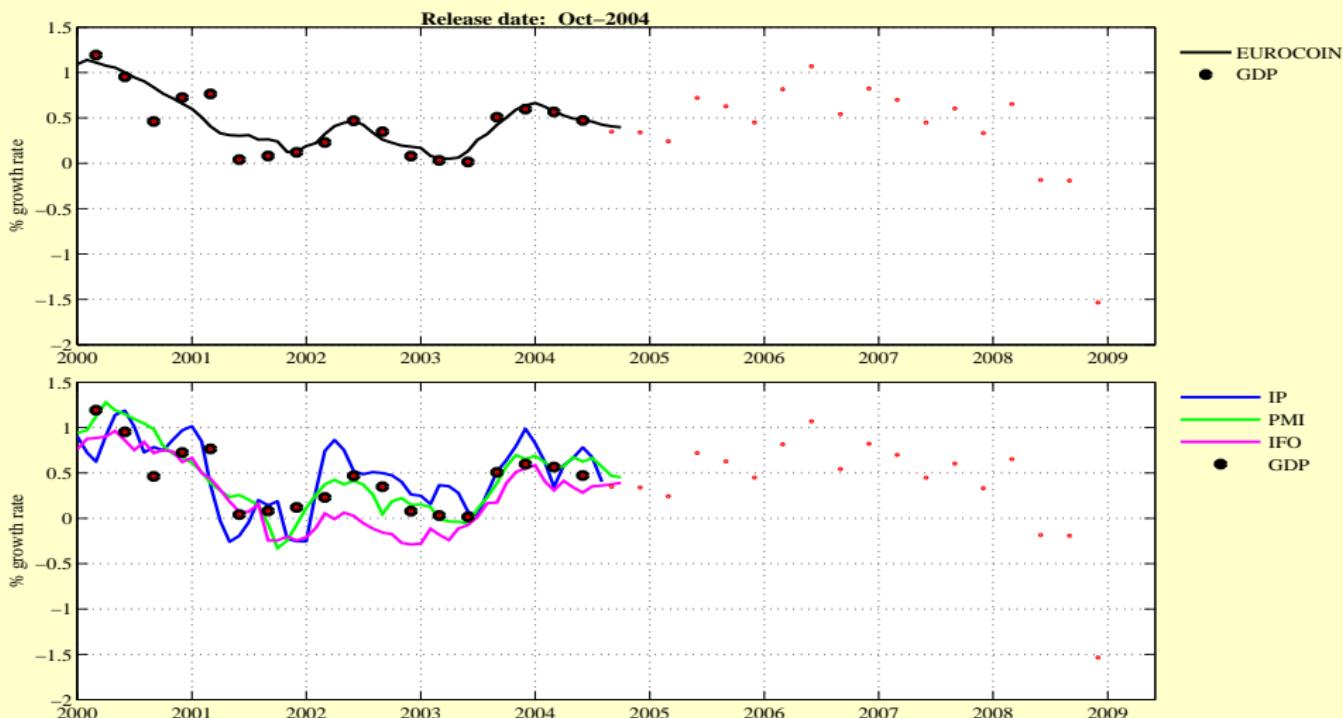
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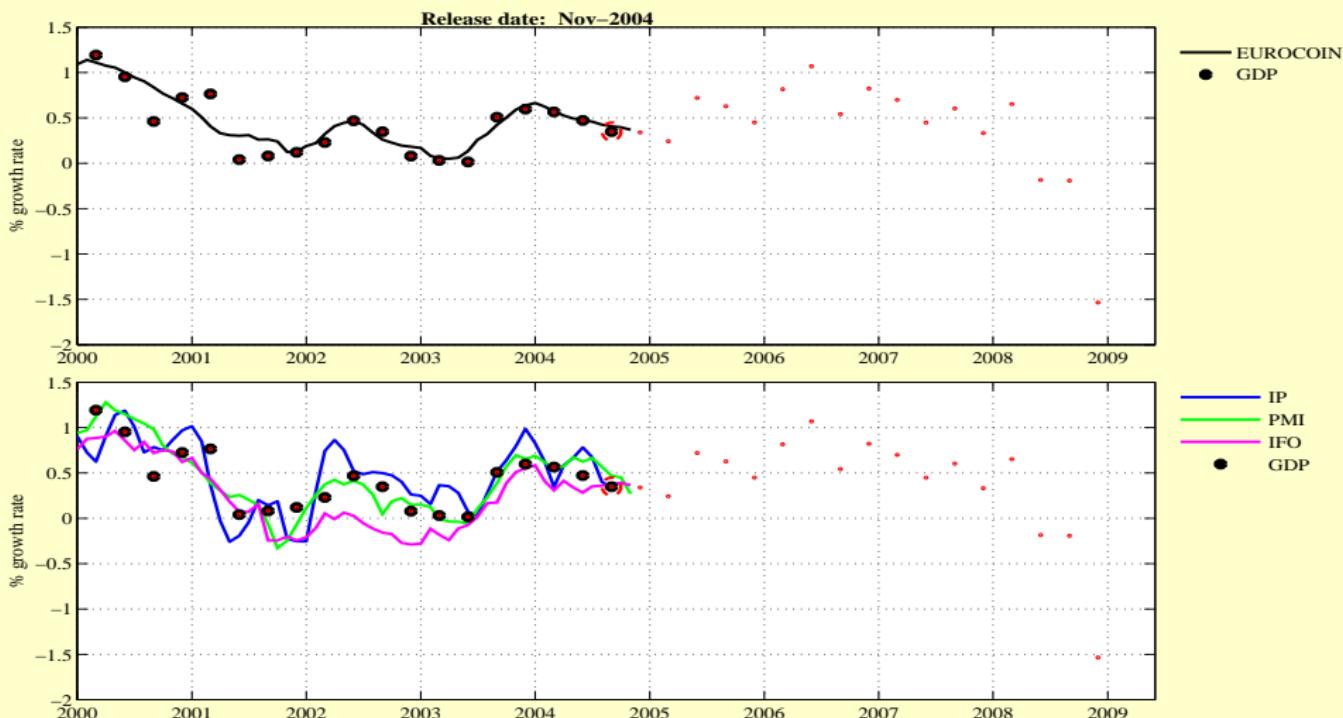
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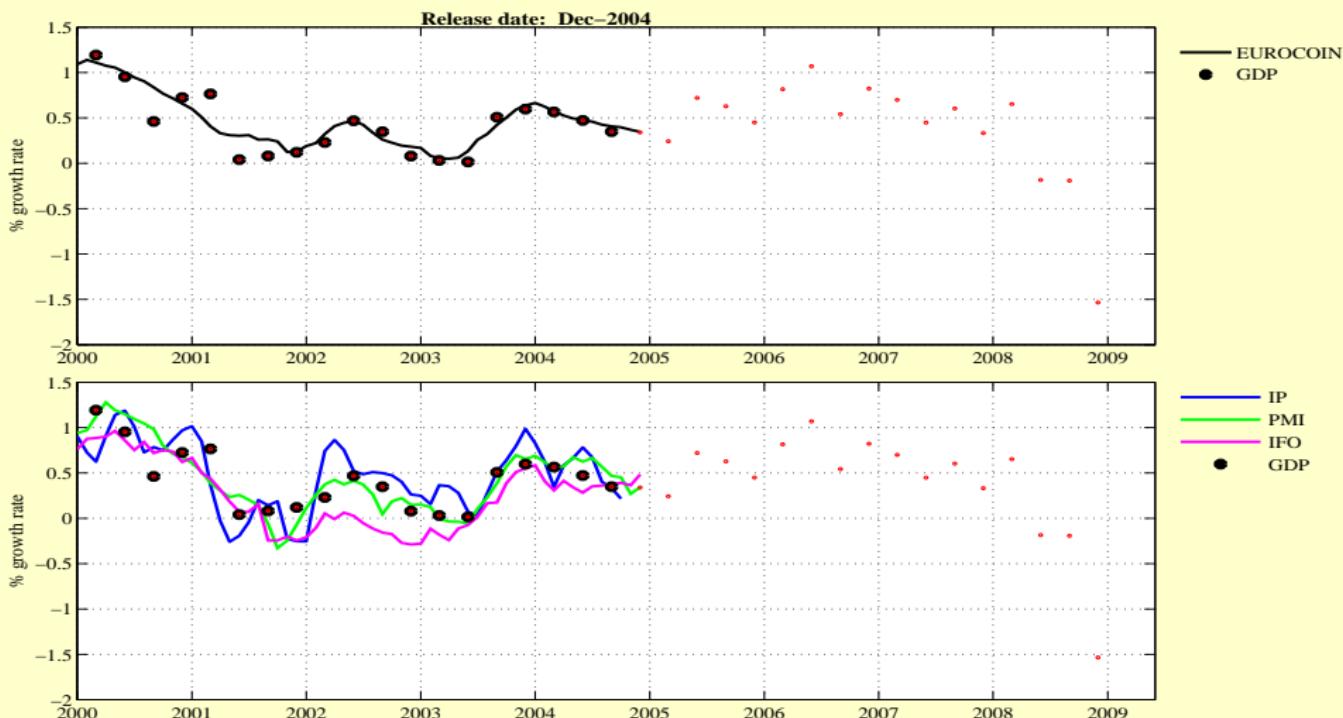
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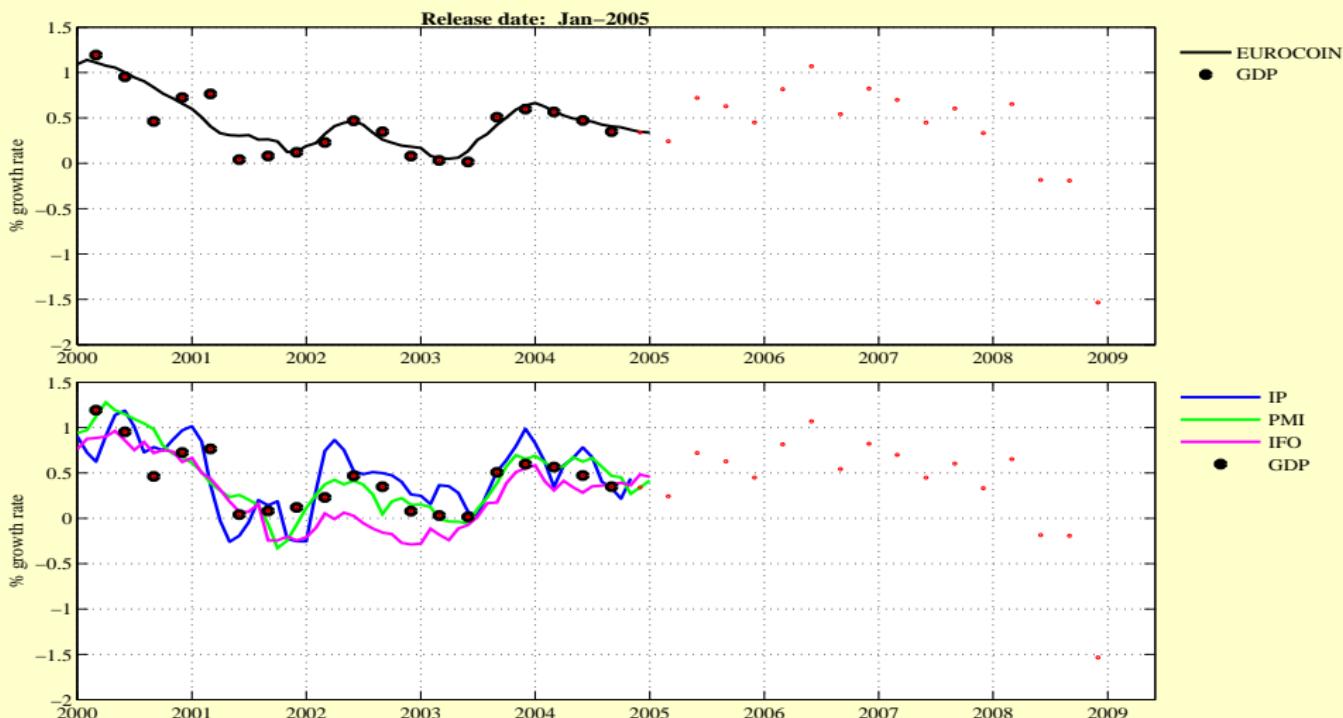
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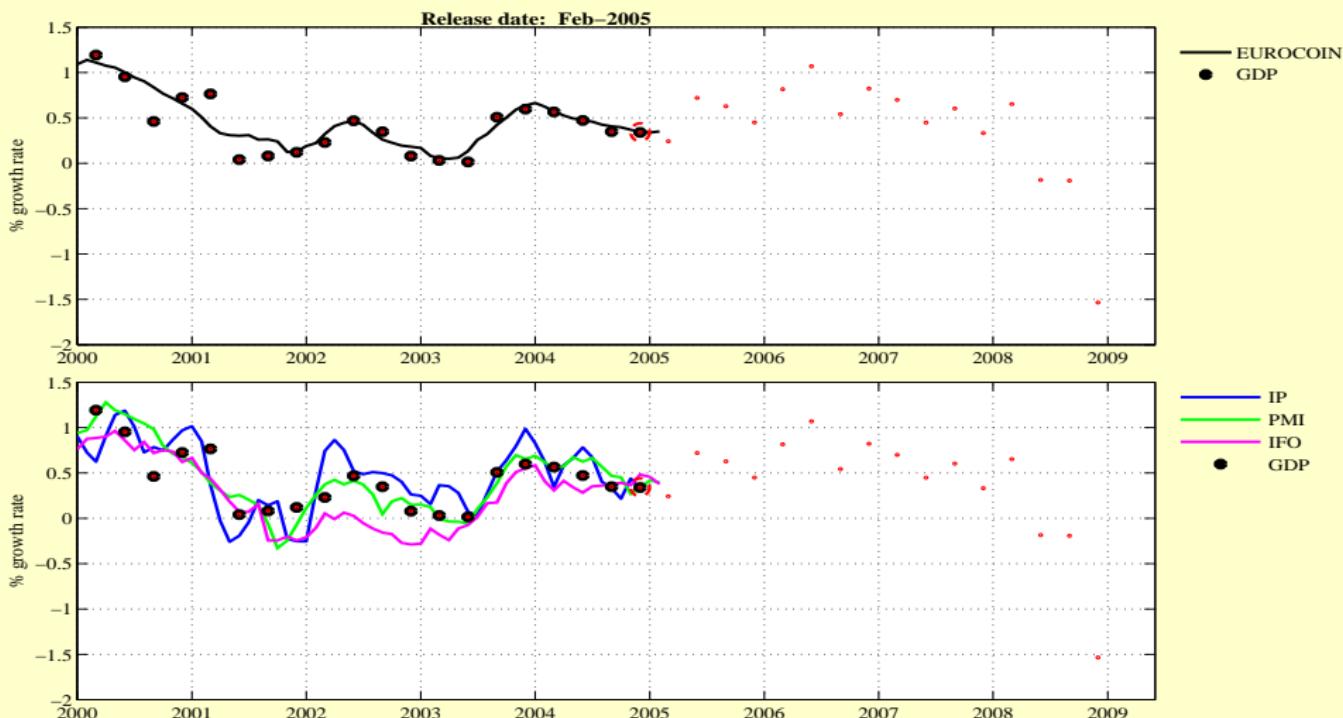
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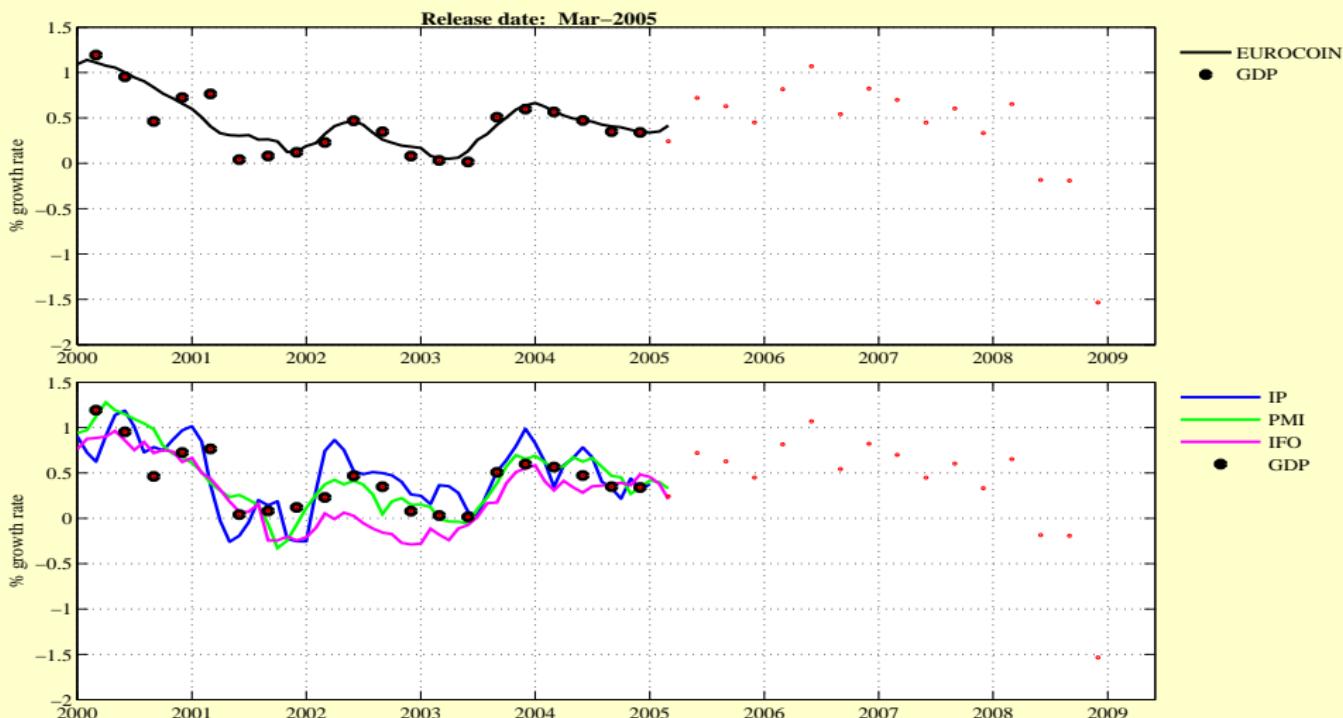
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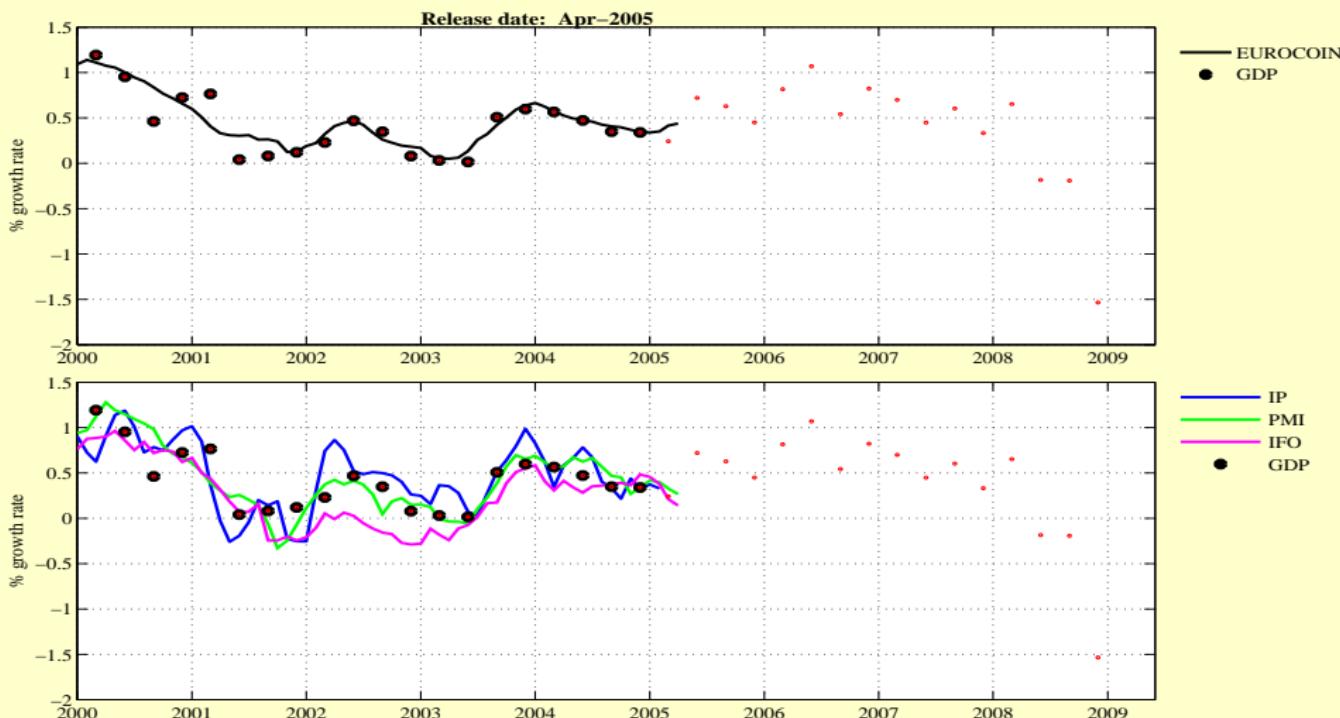
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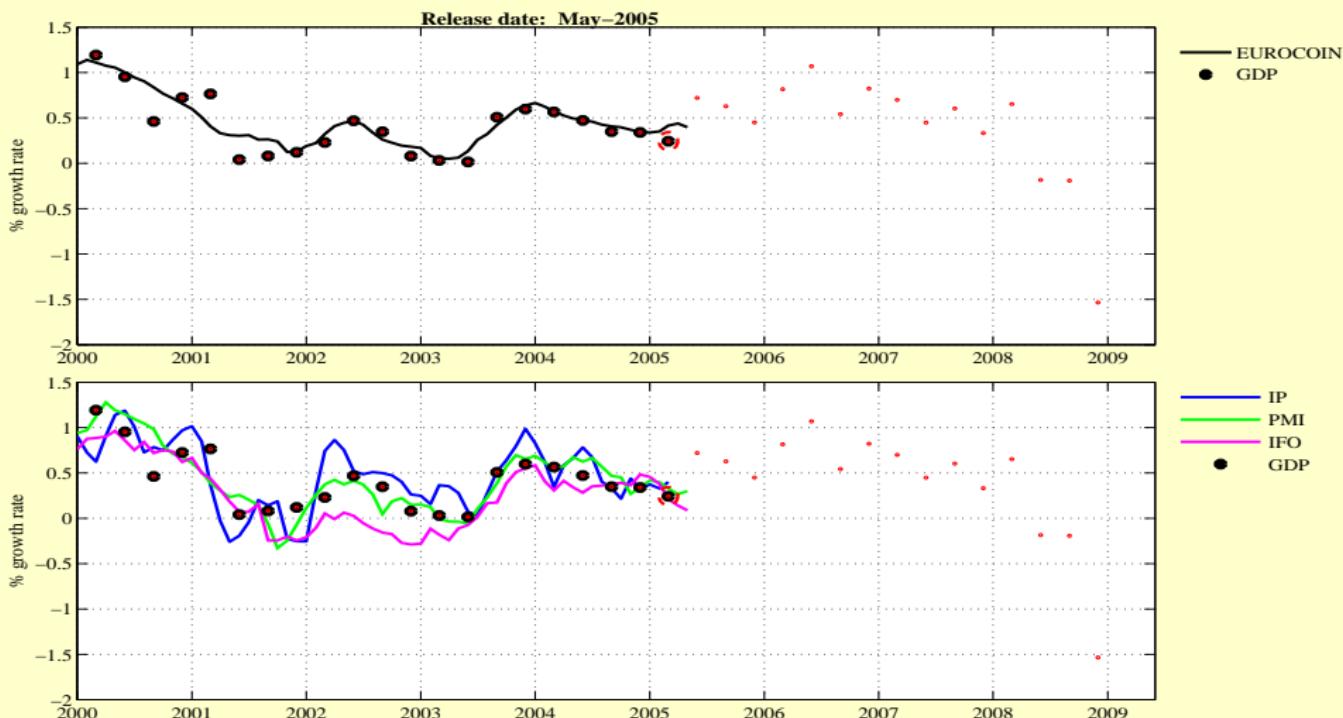
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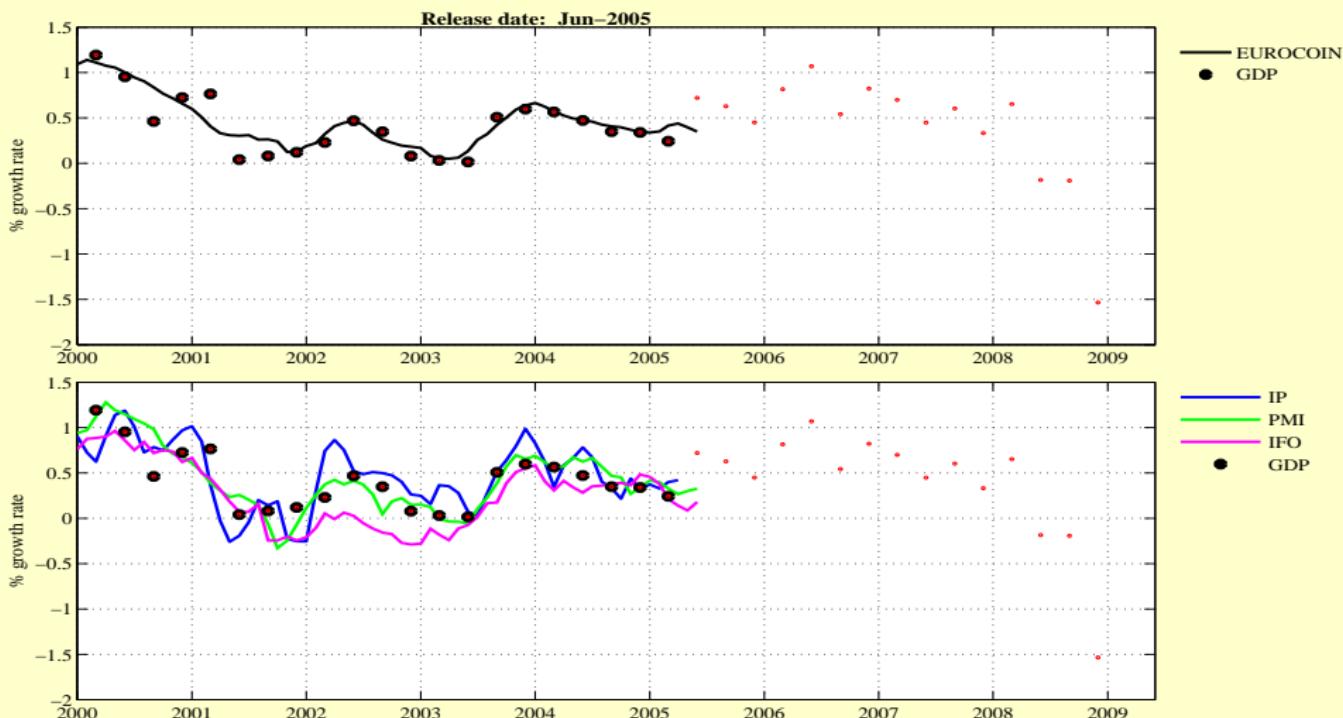
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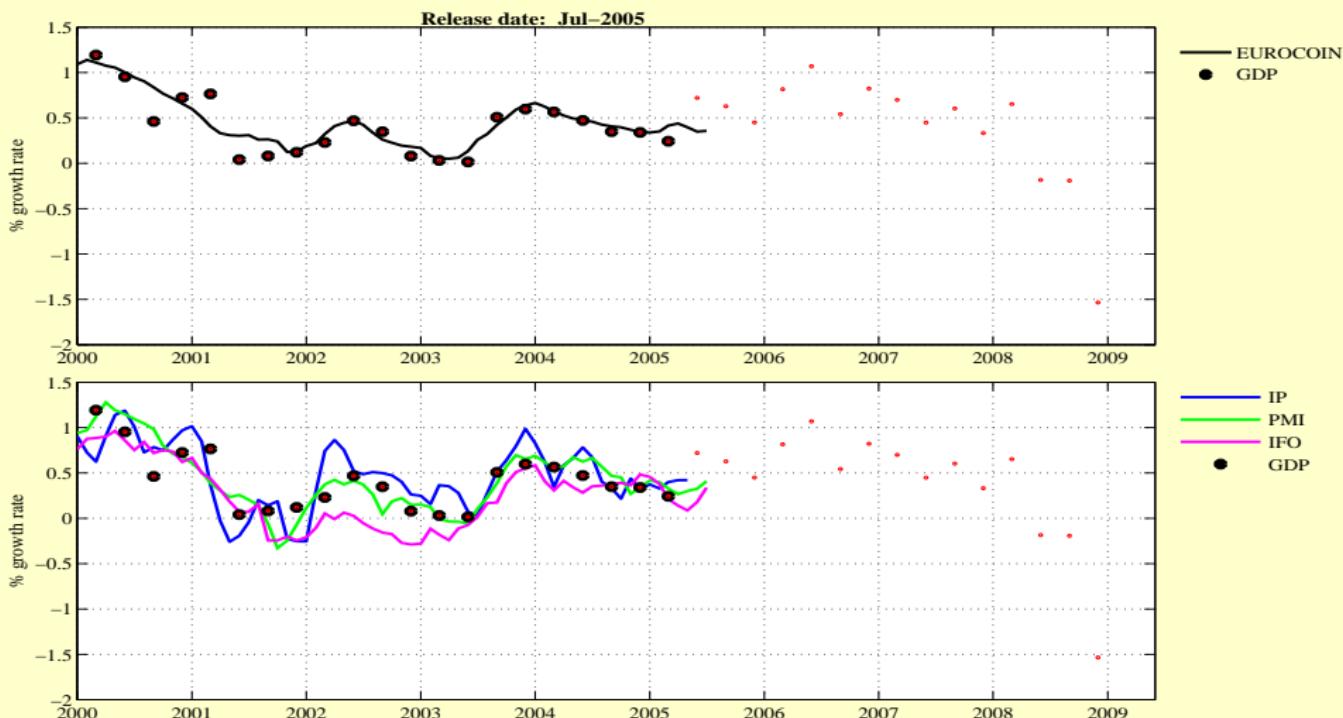
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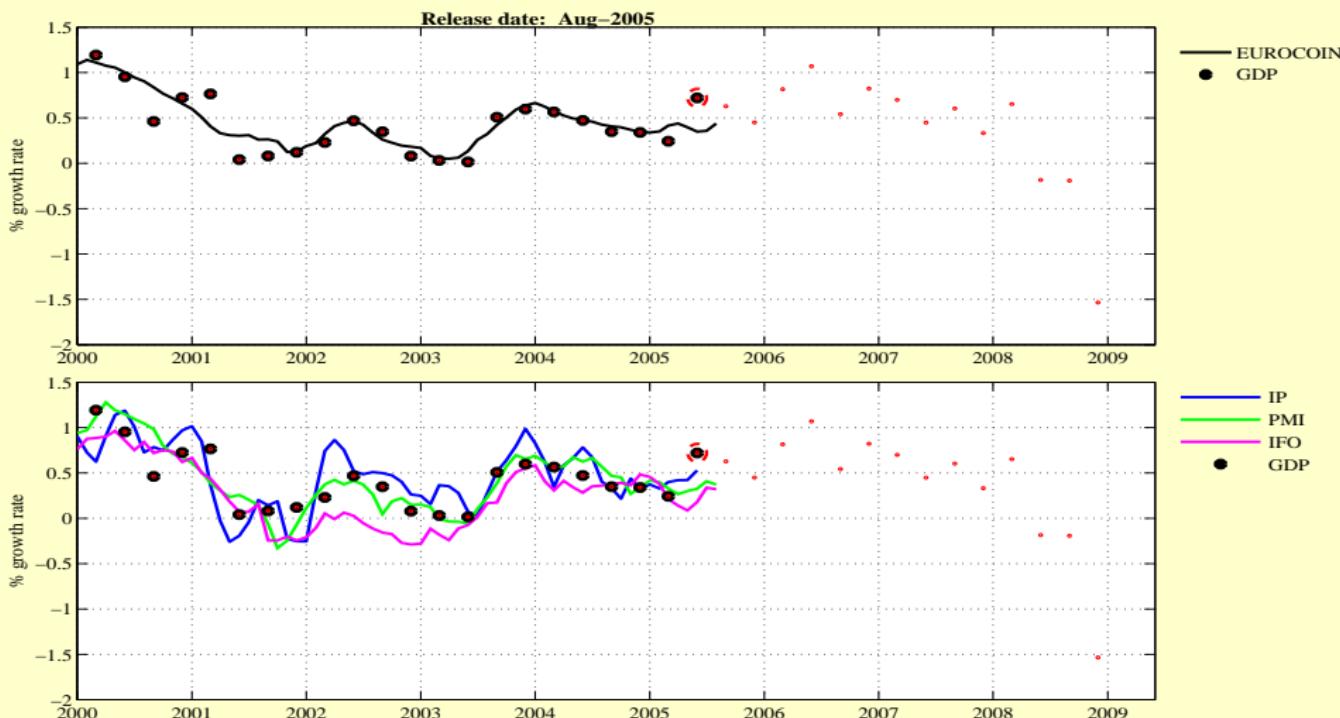
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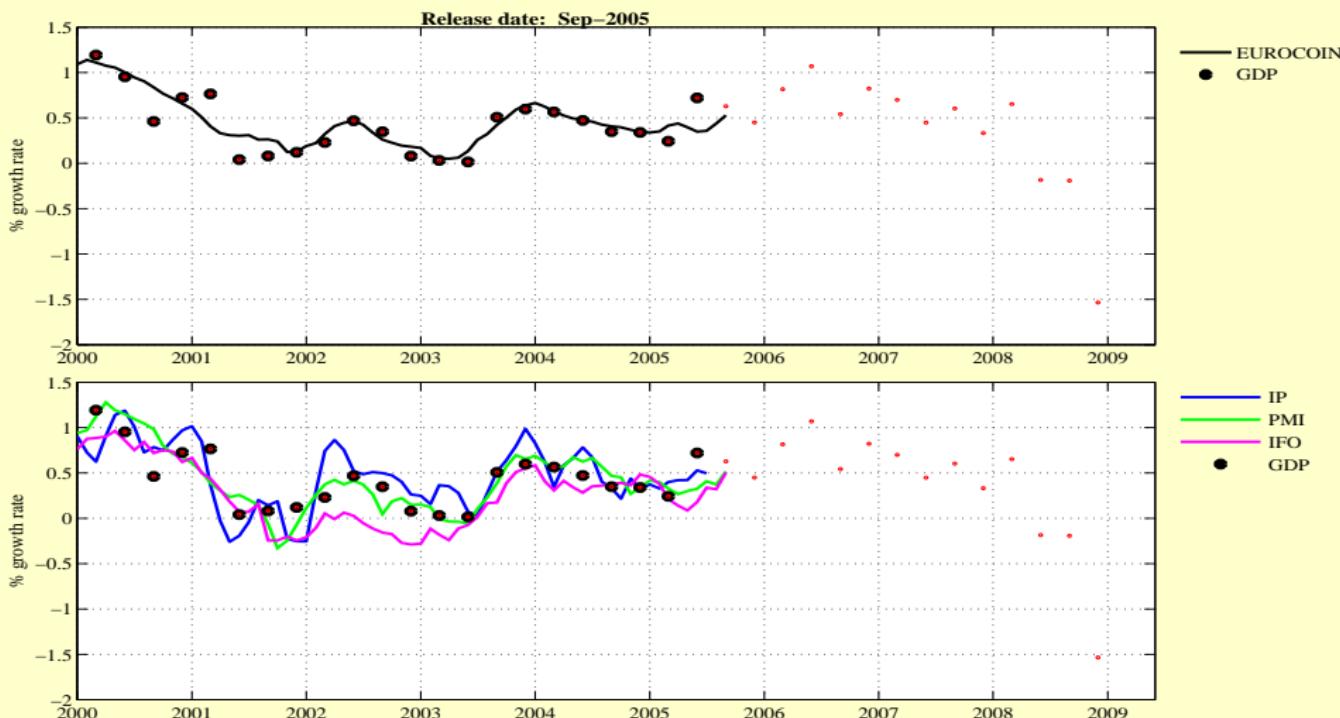
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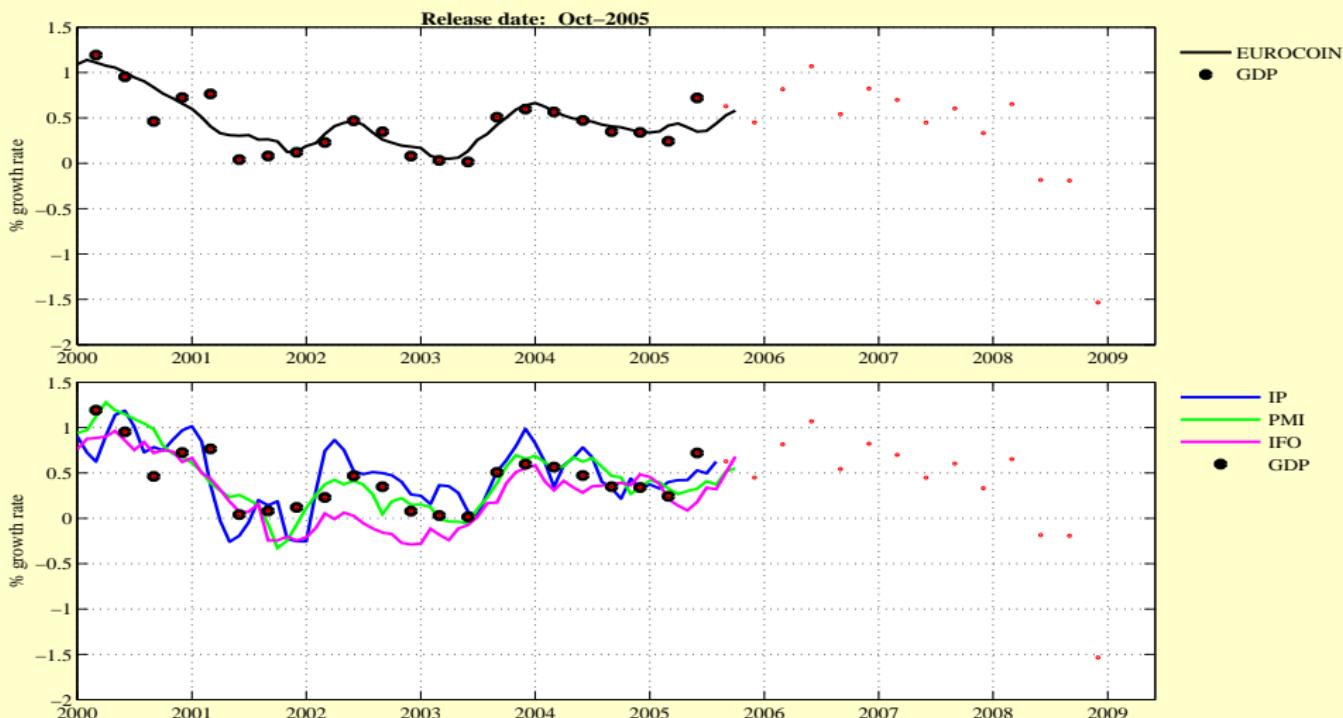
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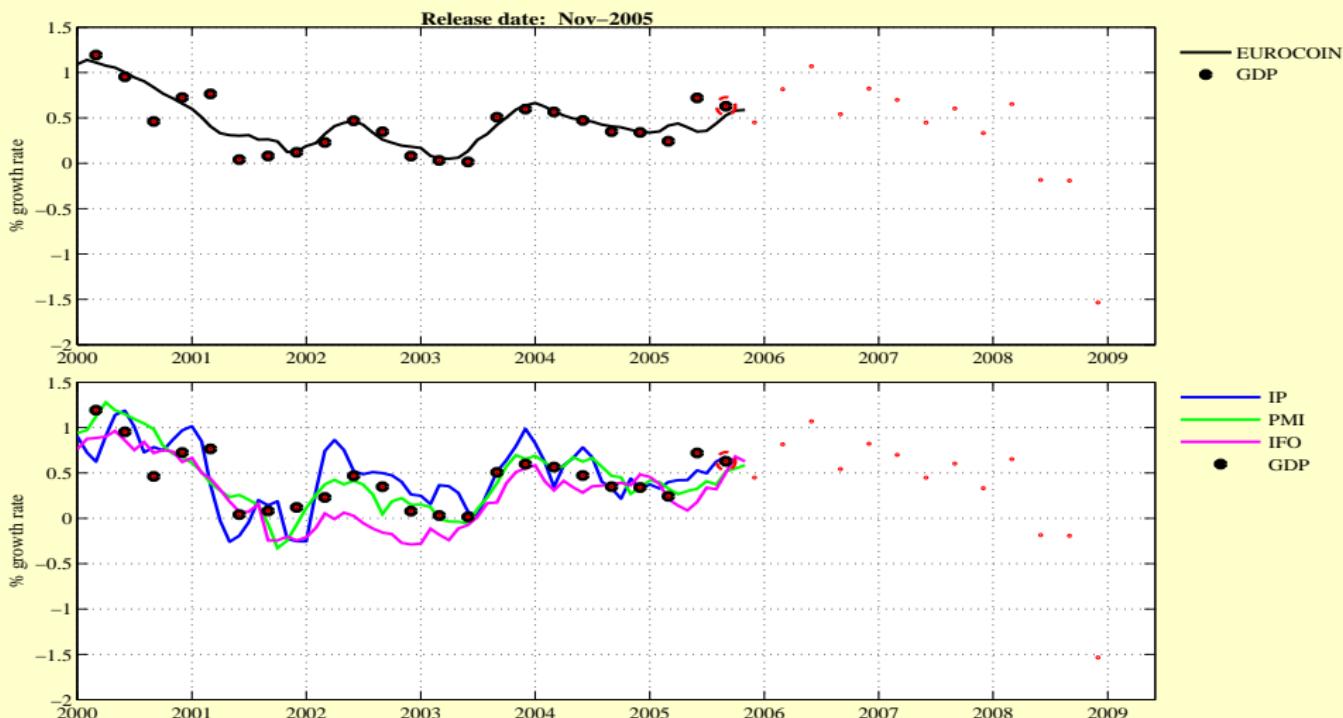
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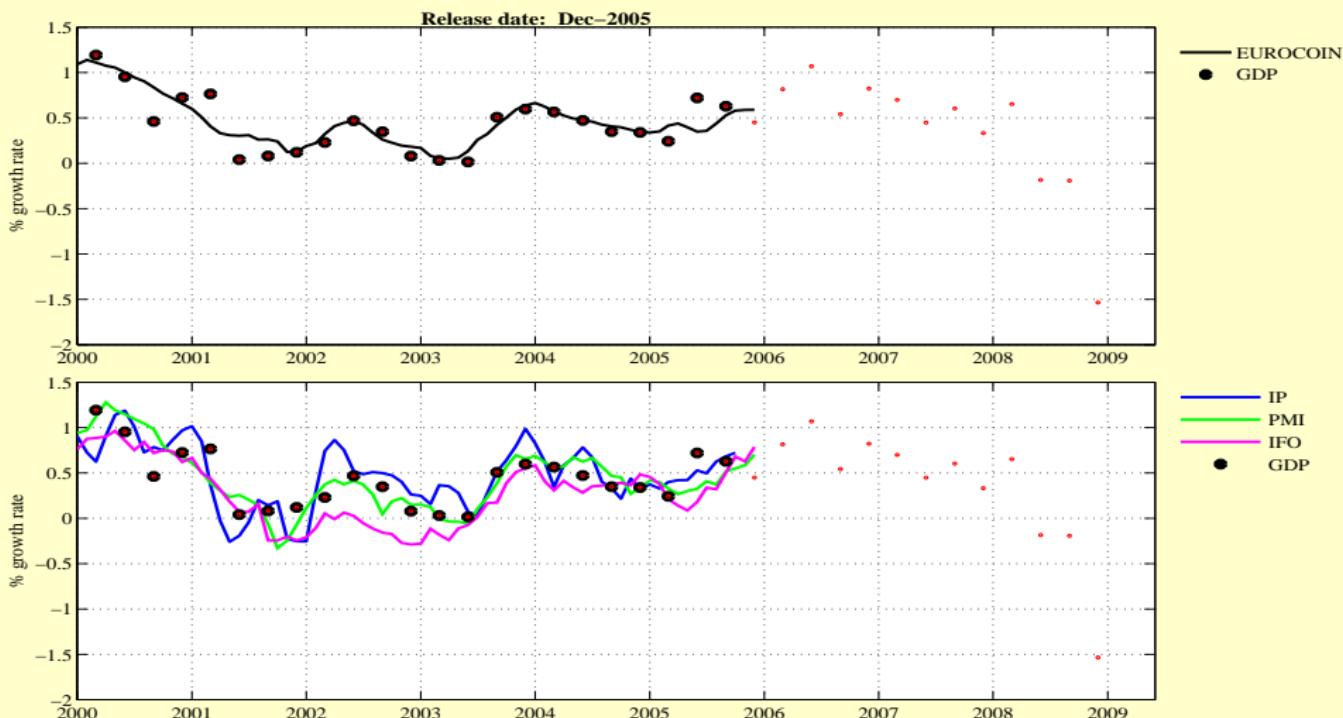
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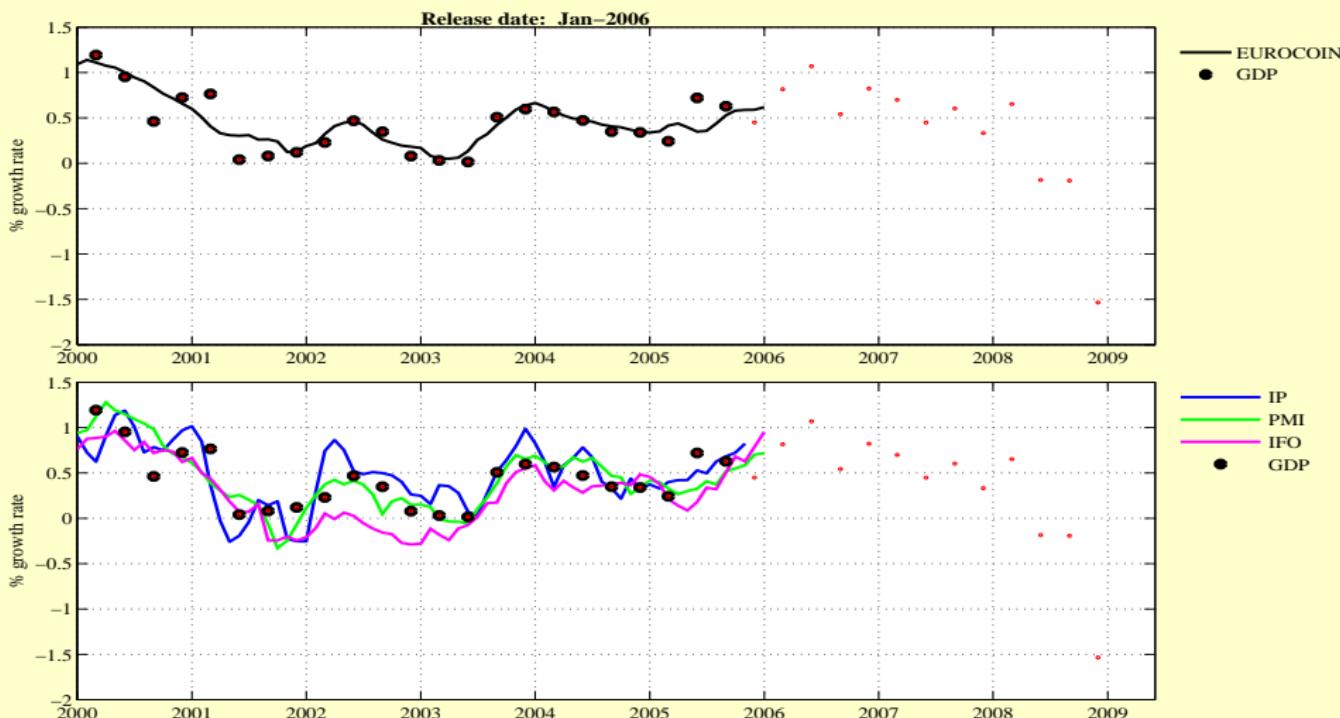
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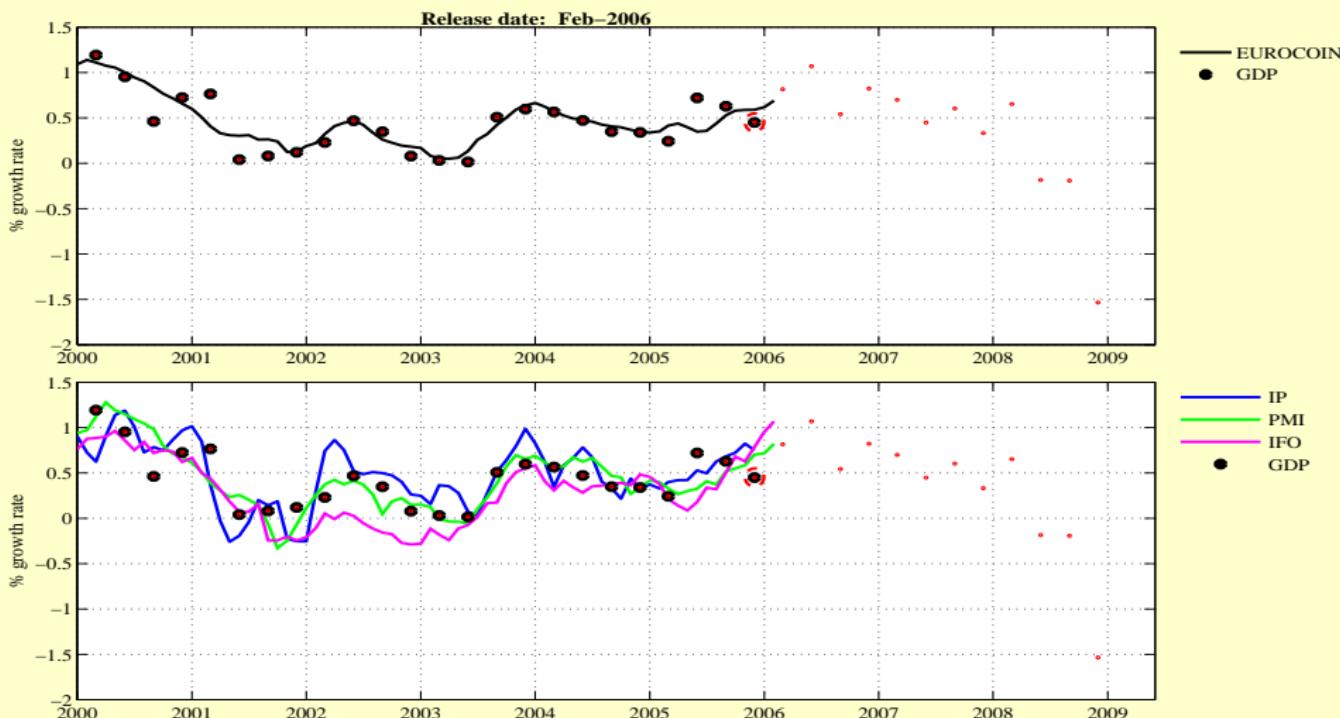
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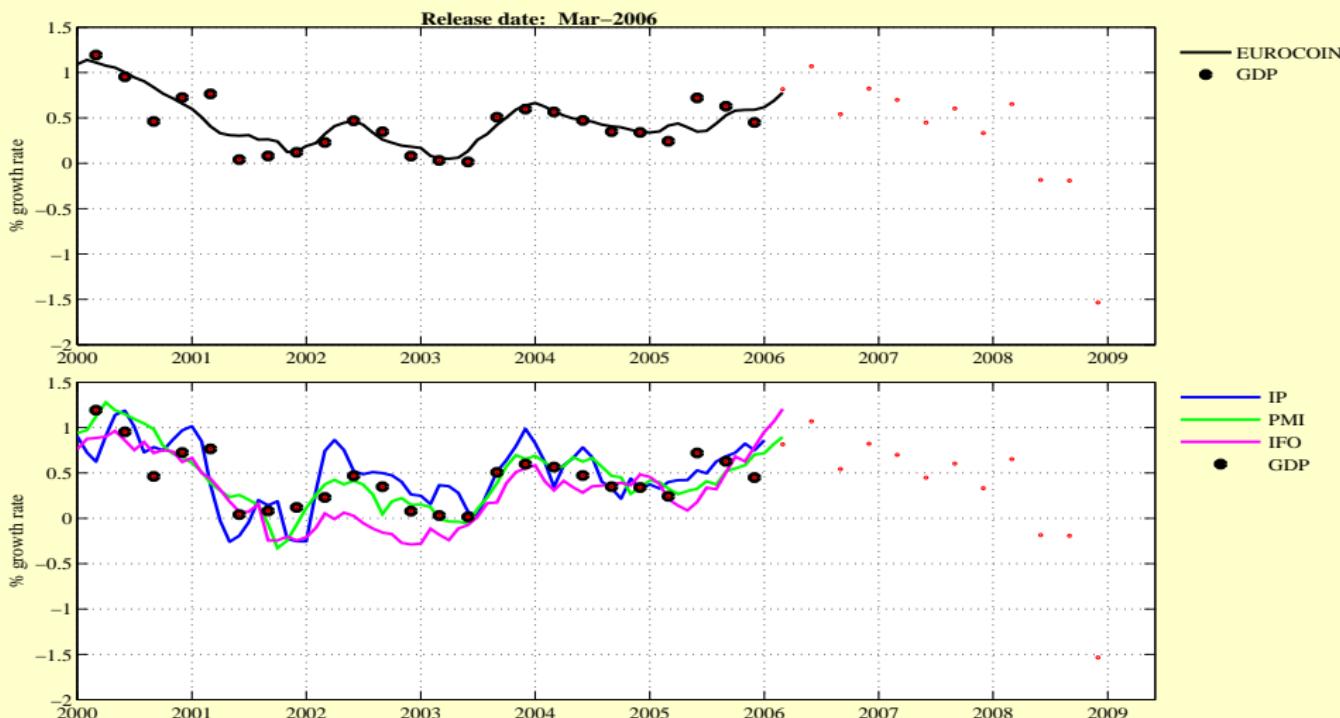
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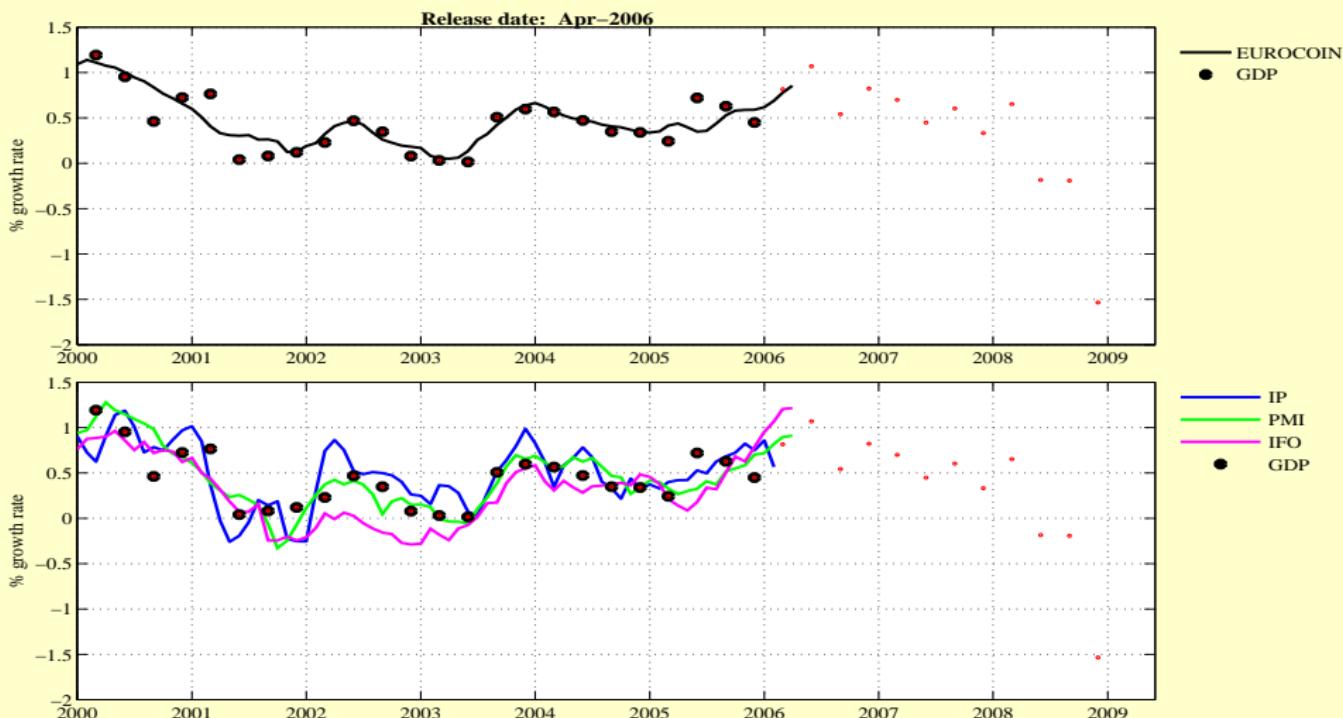
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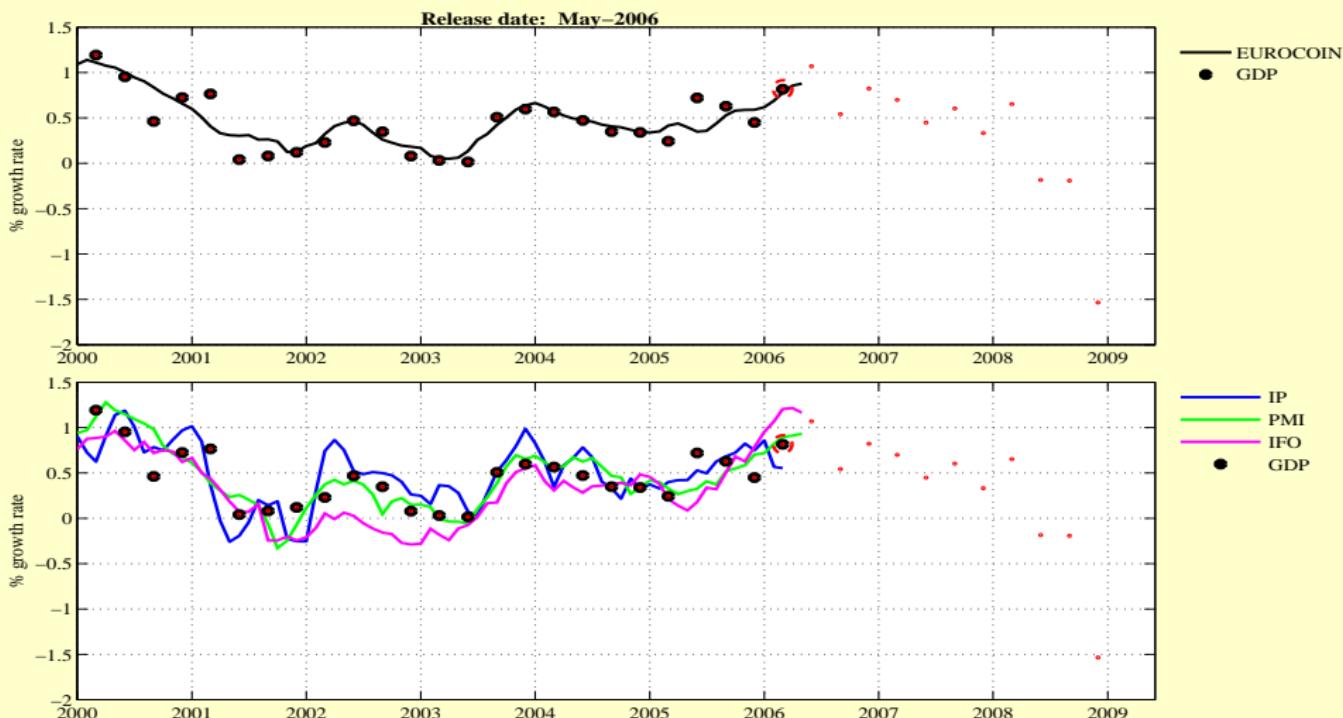
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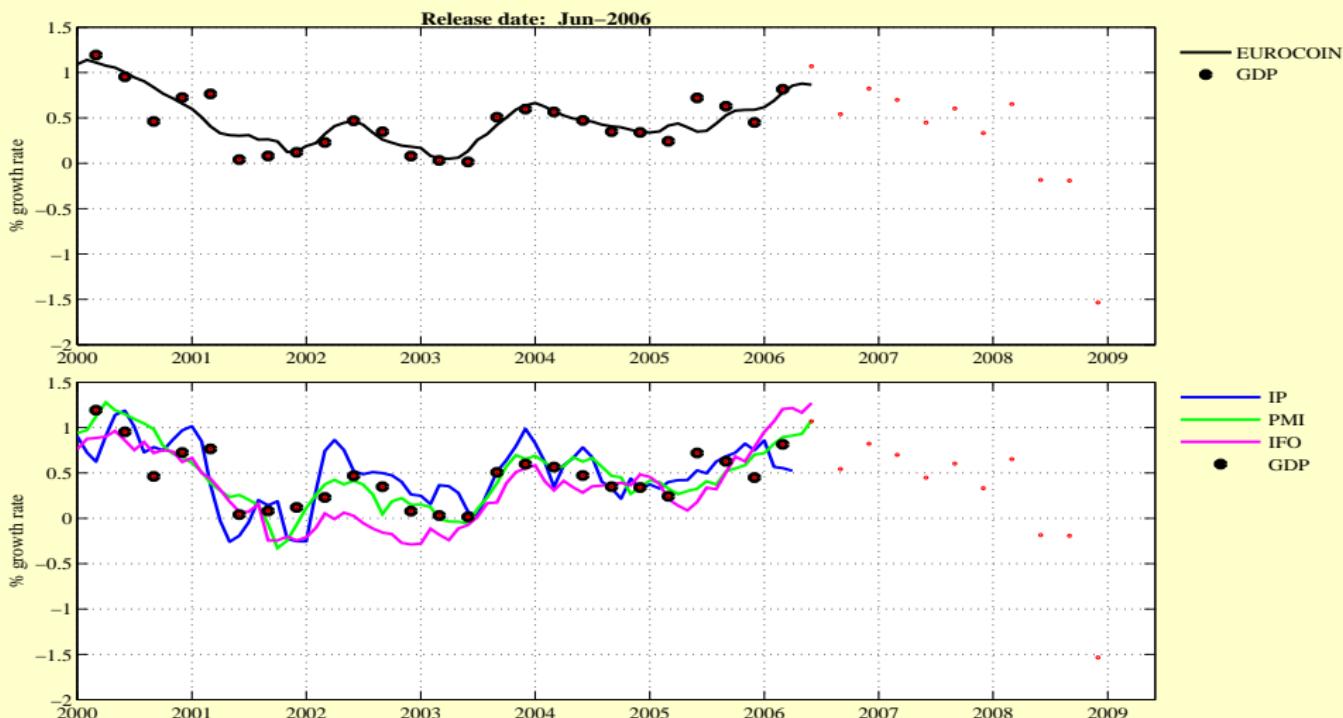
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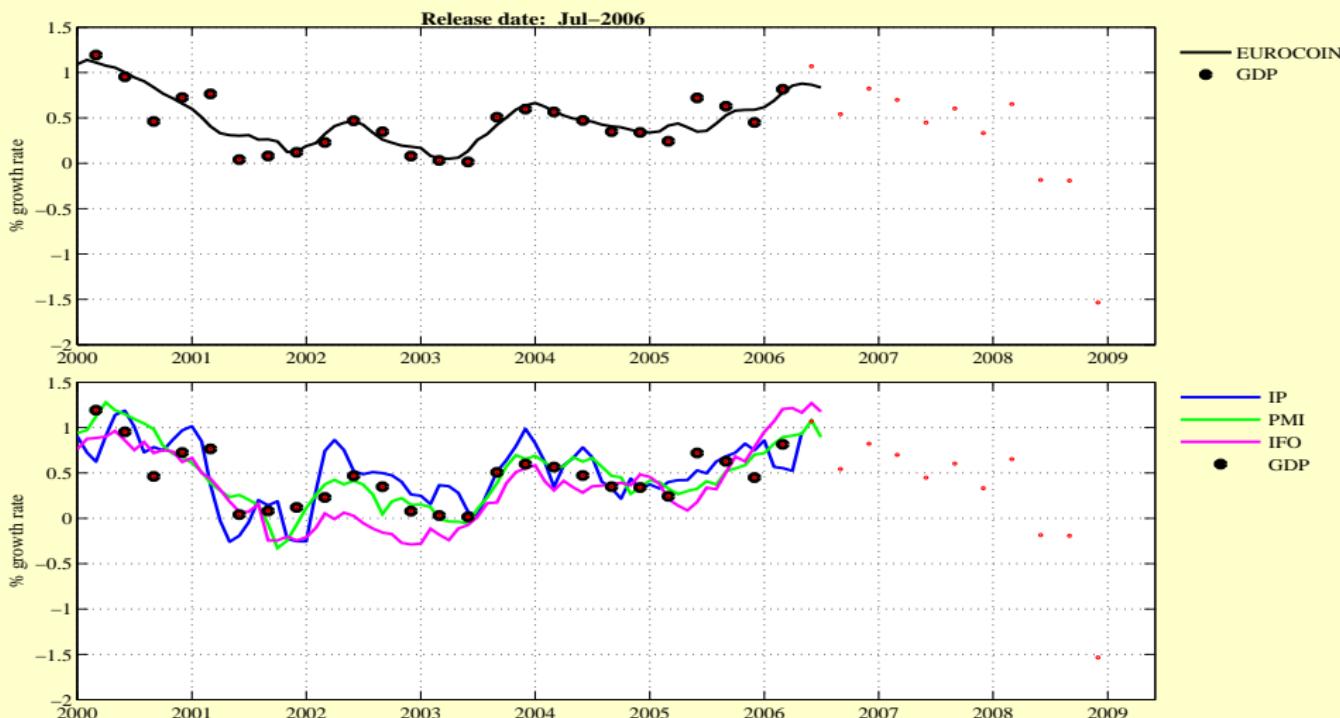
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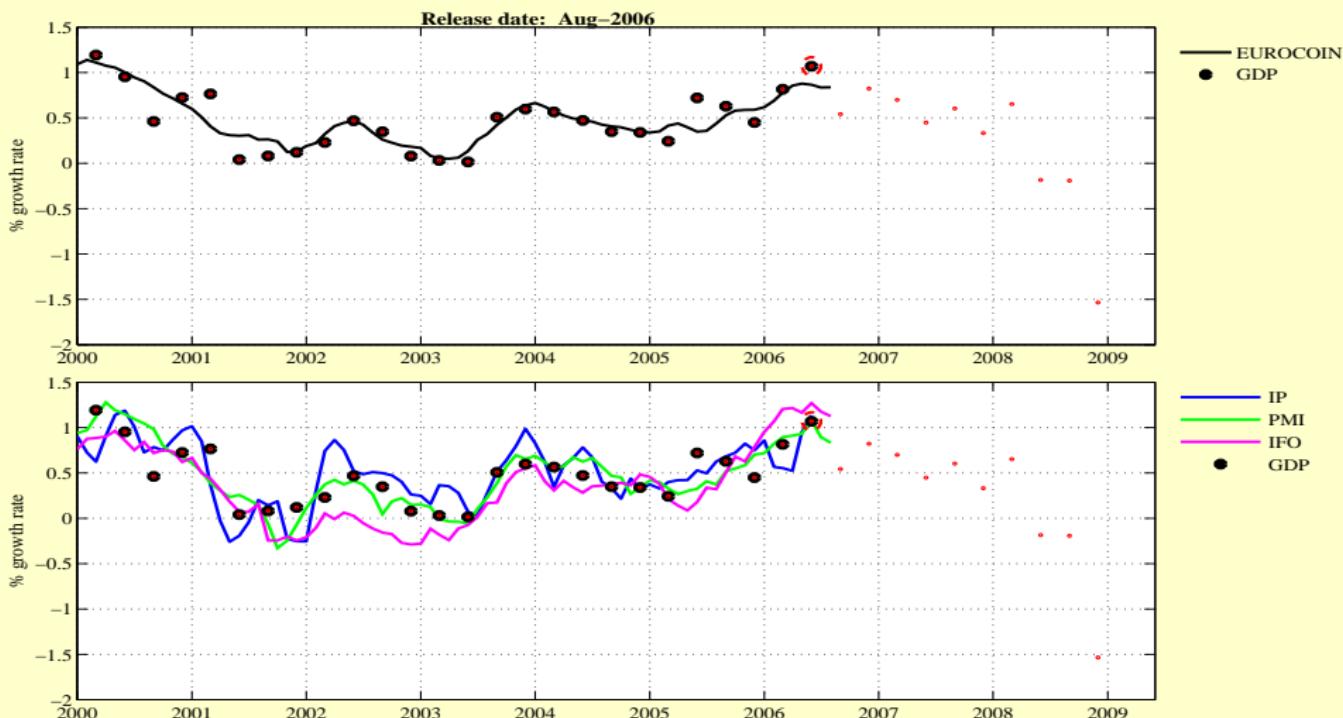
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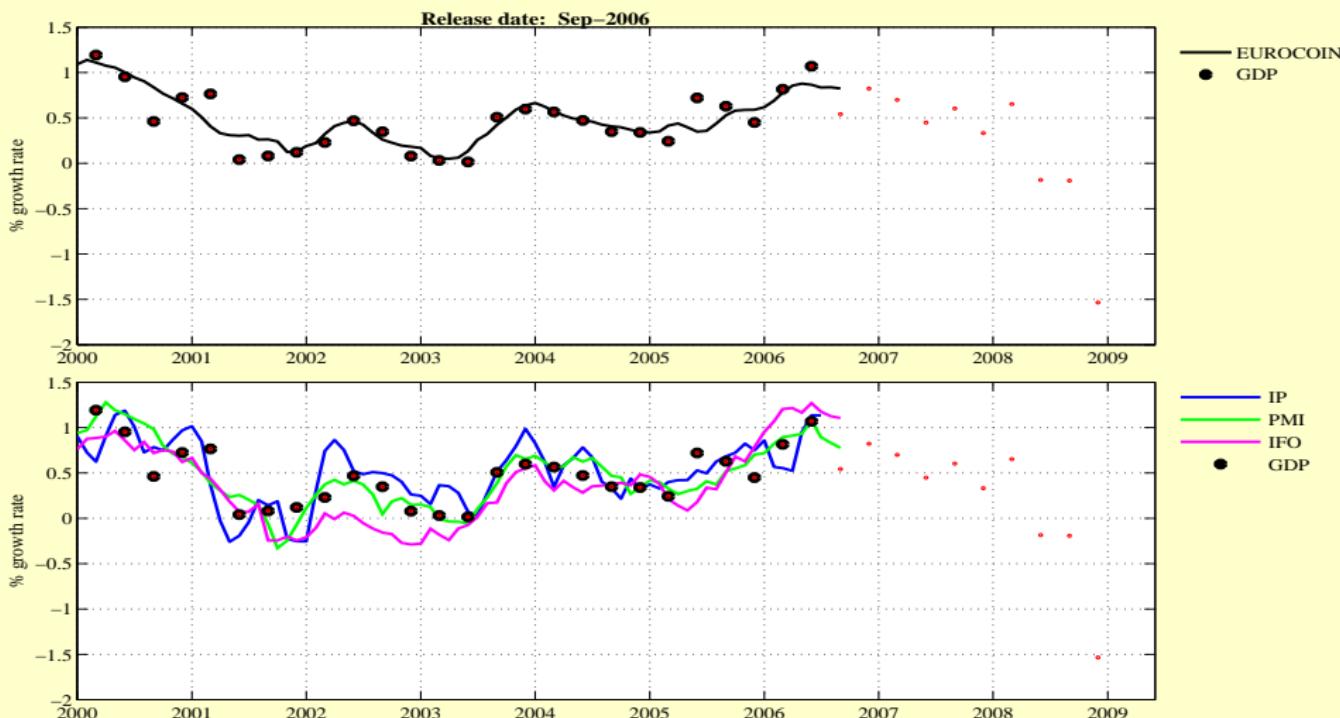
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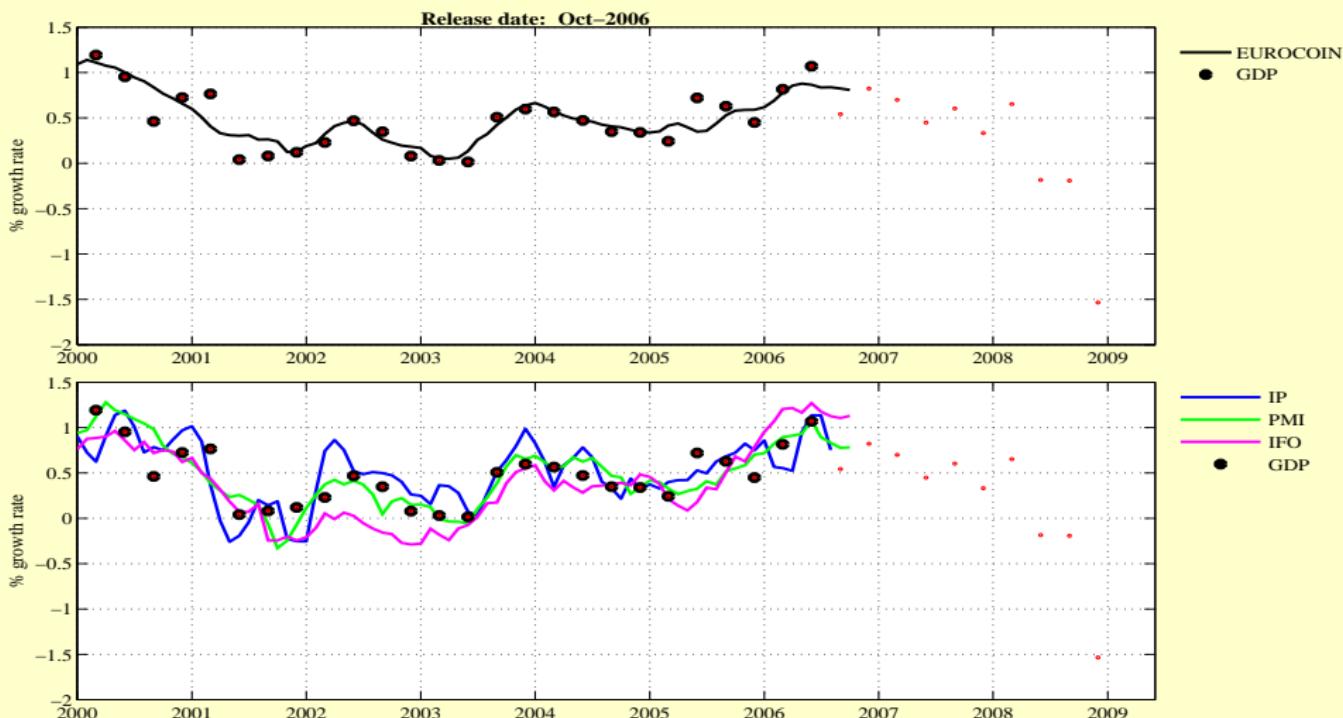
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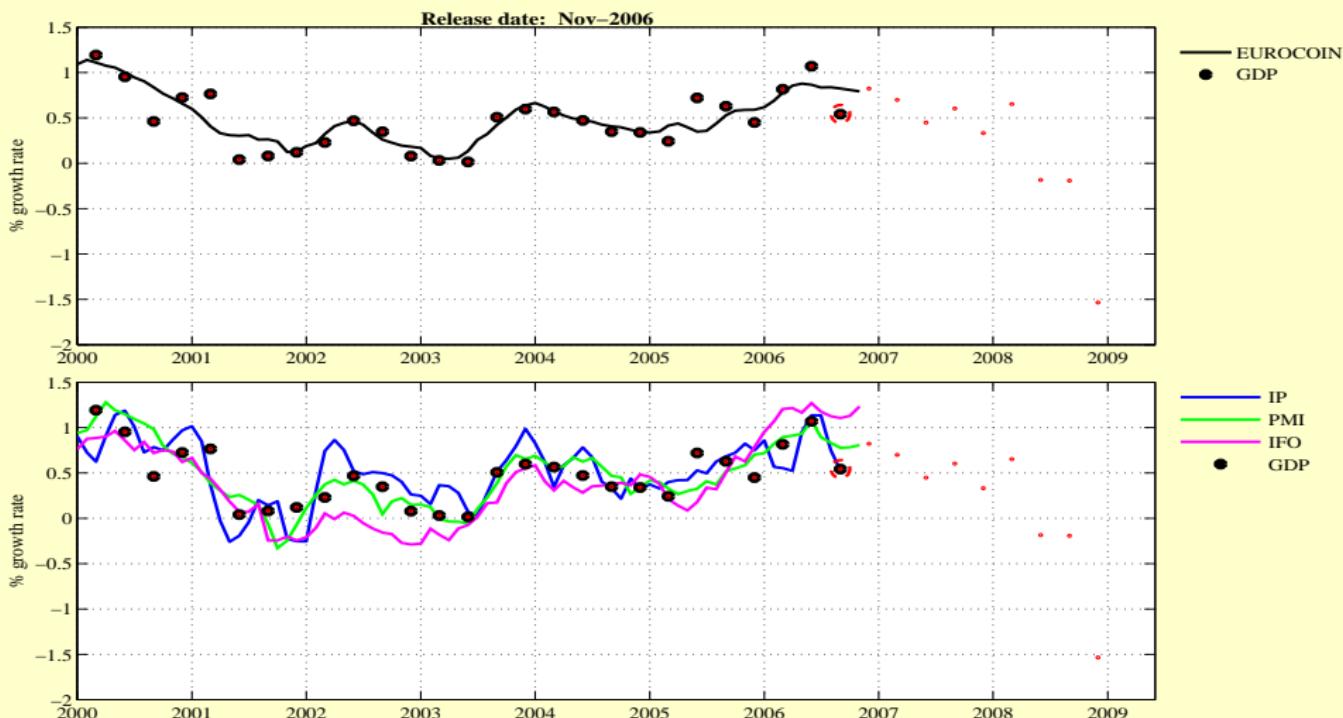
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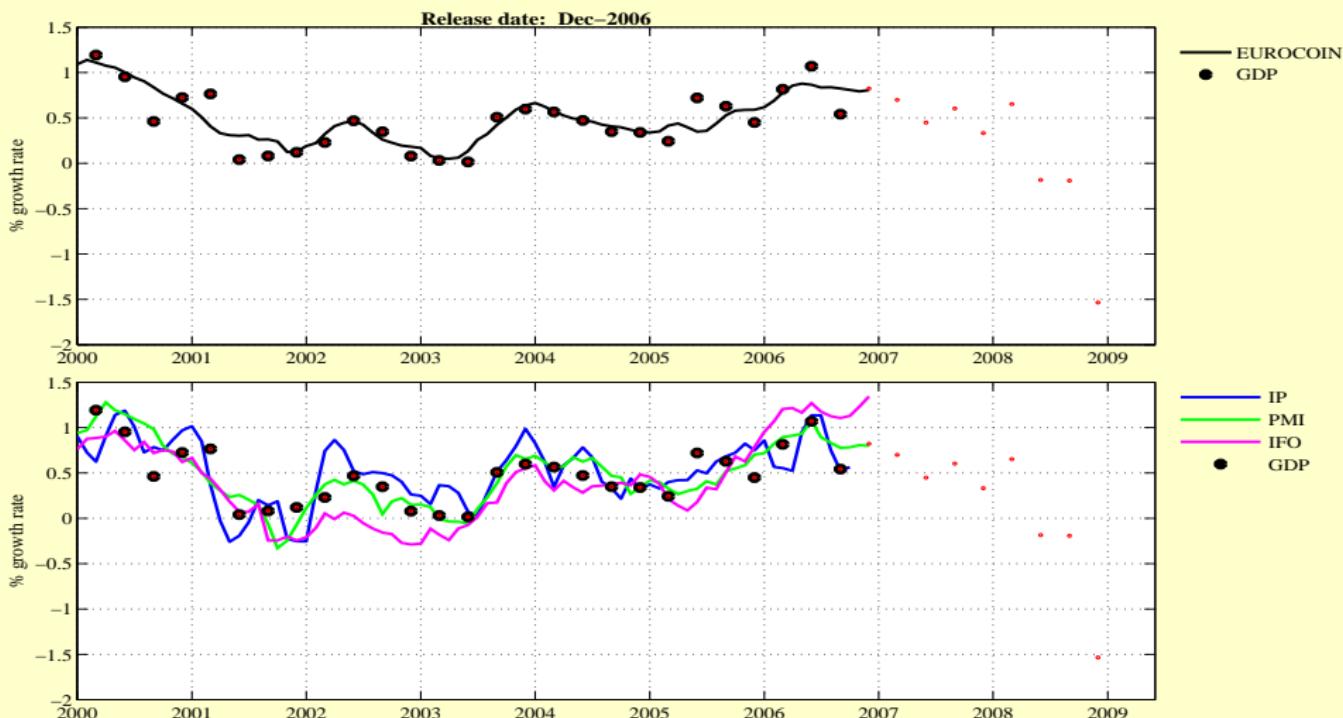
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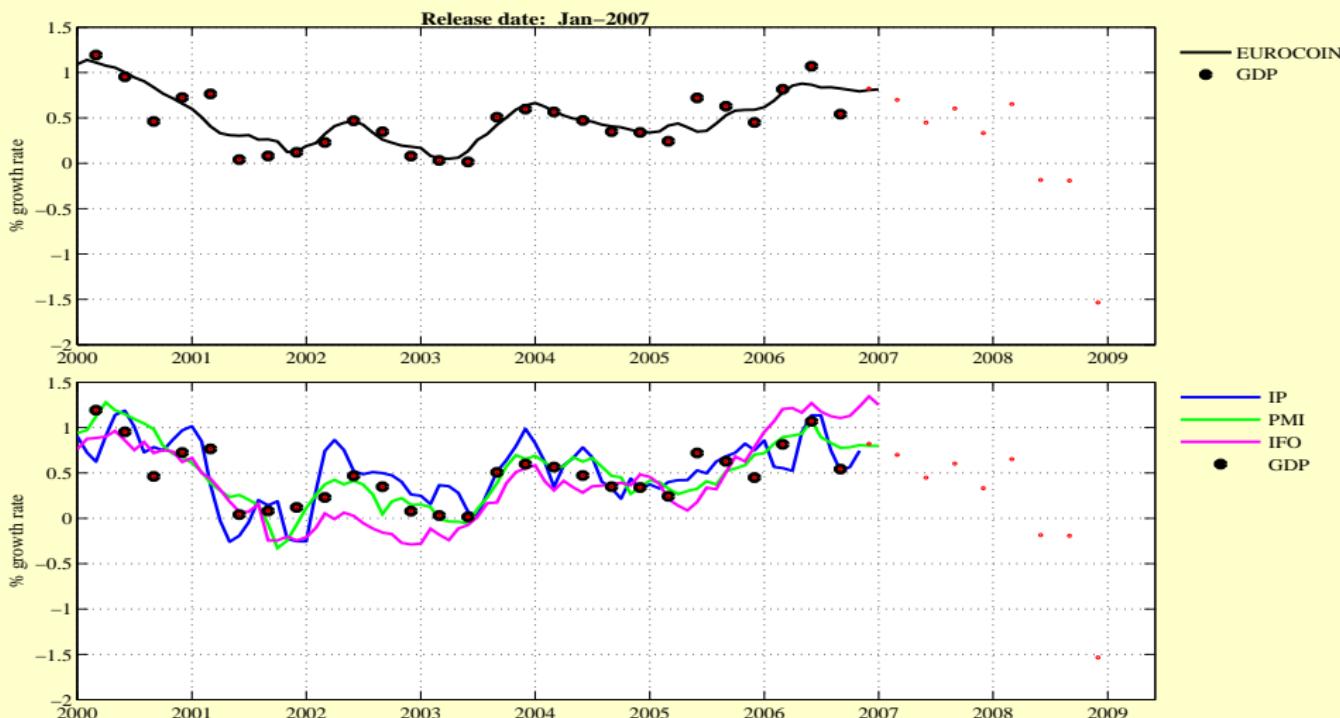
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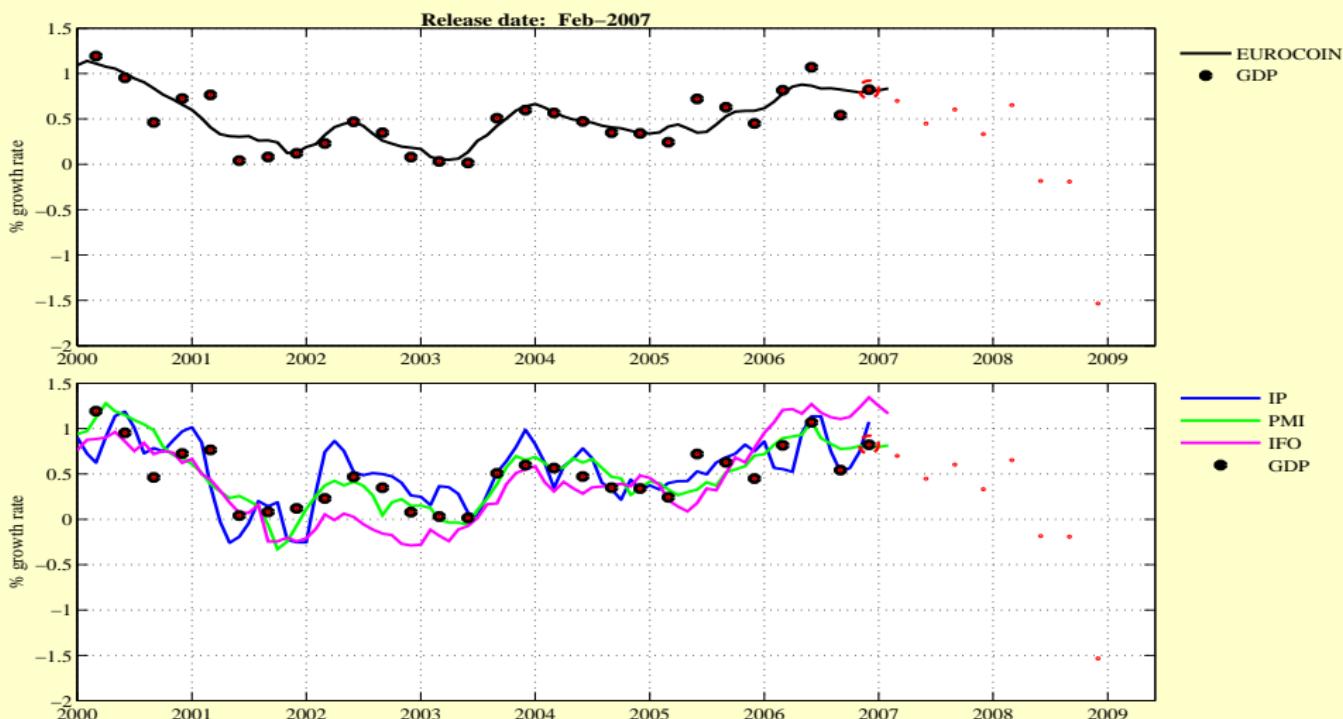
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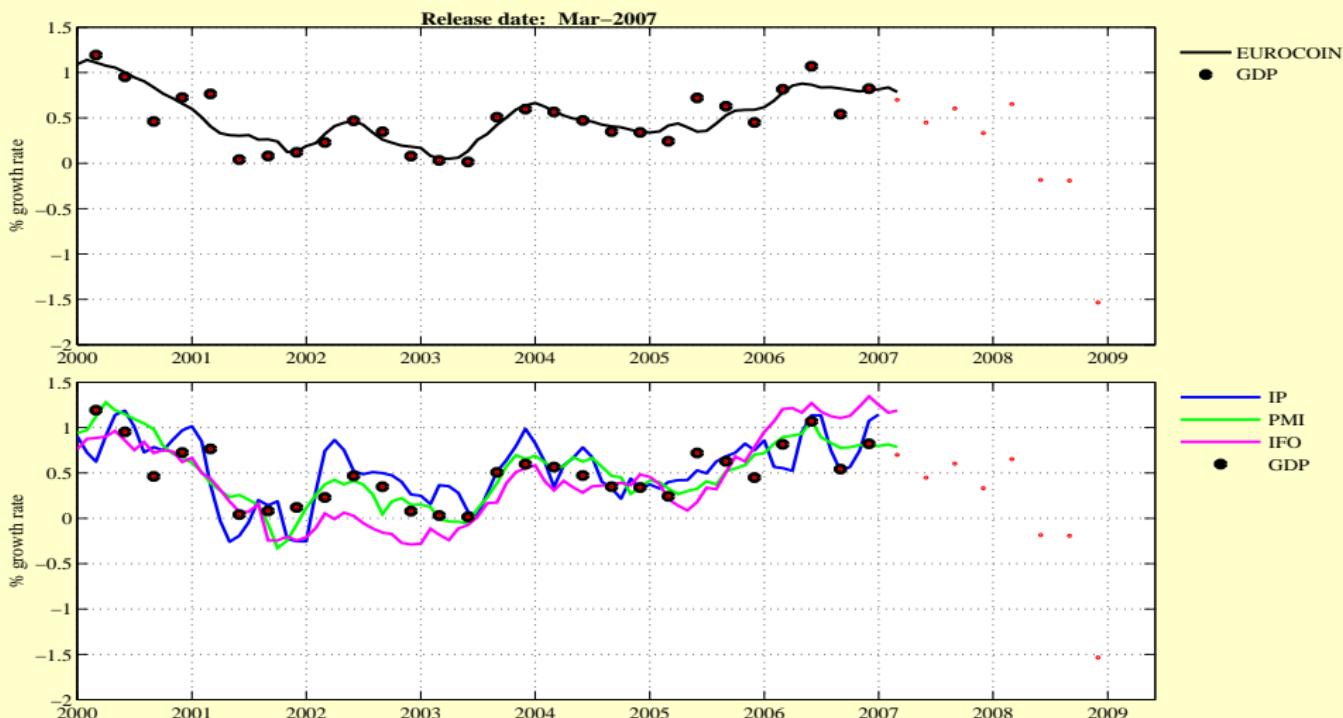
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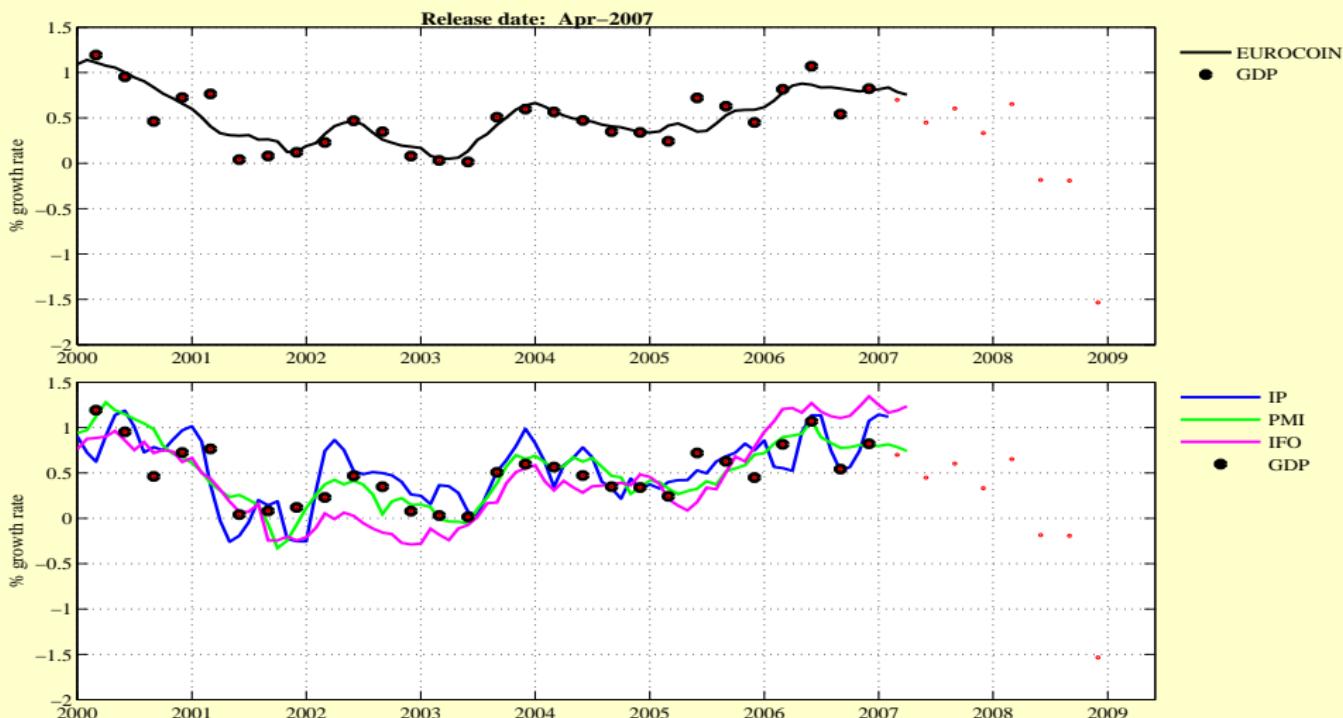
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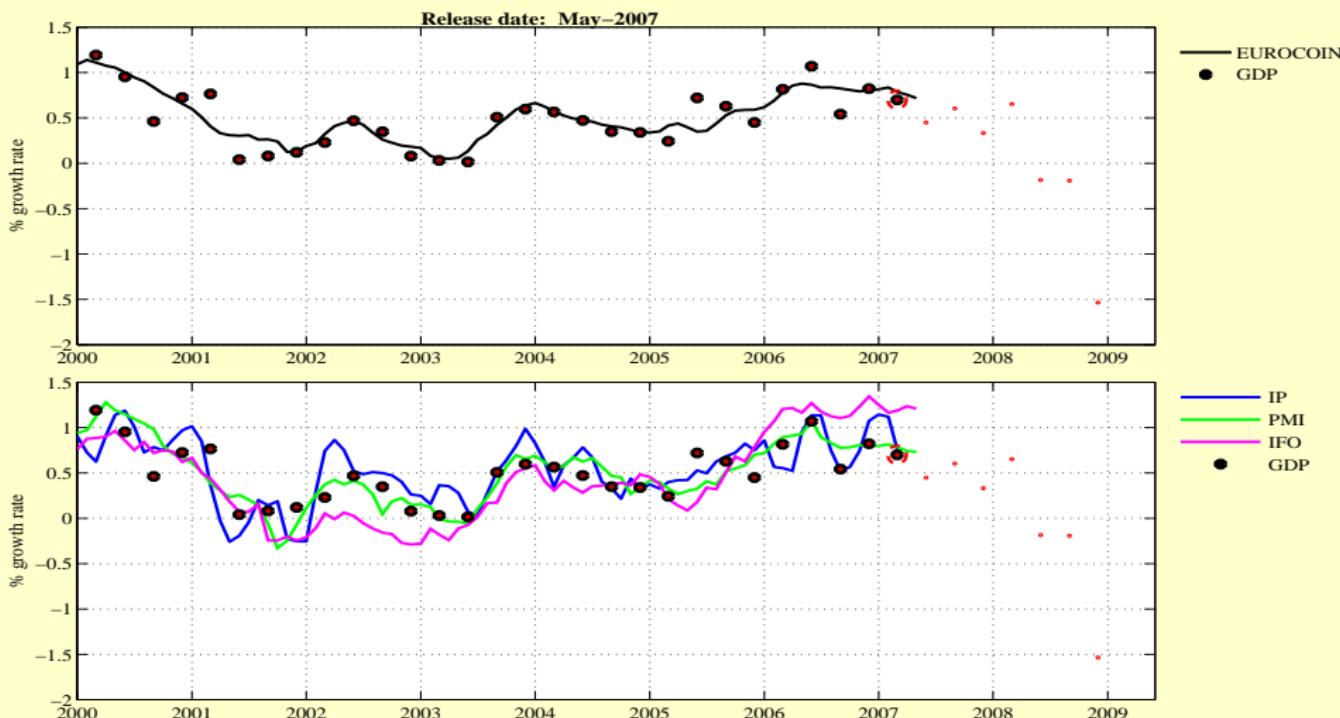
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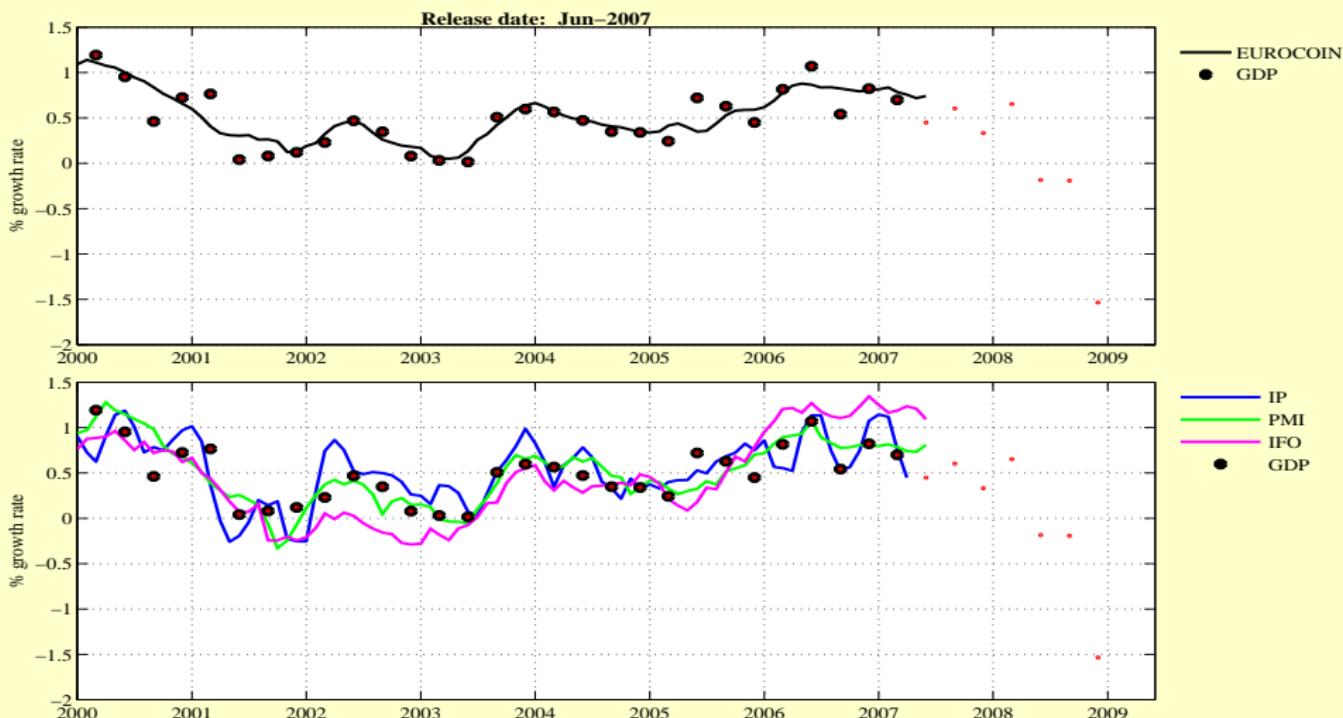
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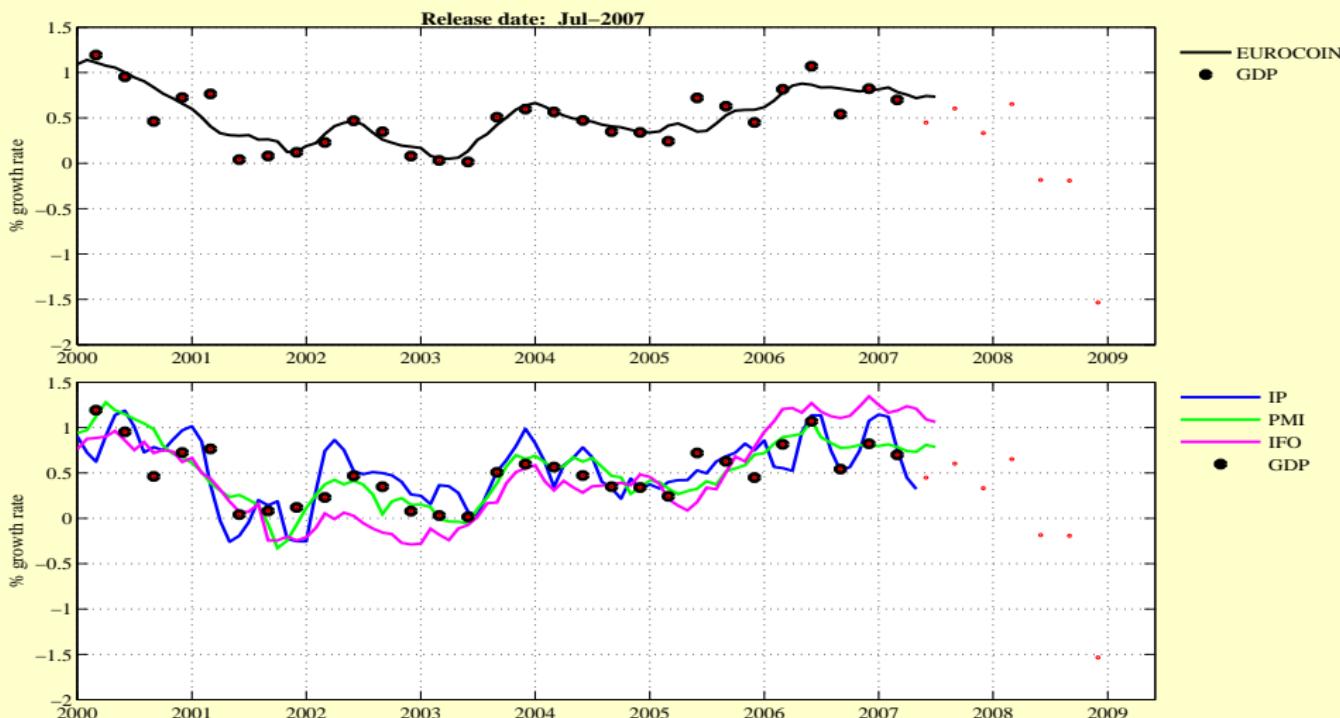
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Theoretical construct we want to track: MLRG

What we want to estimate is the euro area *underlying or Medium to Long run growth* (c_t)
defined as the **band-pass filter** of GDP growth:

$$\begin{aligned} GDP_t^{qoq} &= c_t + s_t \\ &= \beta(L)GDP_t^{qoq} + [1 - \beta(L)]GDP_t^{qoq} \end{aligned}$$

where...

$$\beta(L) = \sum_{j=-K}^K \beta_j L^j$$



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Why is MLRG our target?

- MLRG does not lag current GDP^{qoq} and it is smoother. 
- MLRG is "close" to y-o-y growth
 - but ...
- retains all medium run info 
- leads y-o-y growth by several months 



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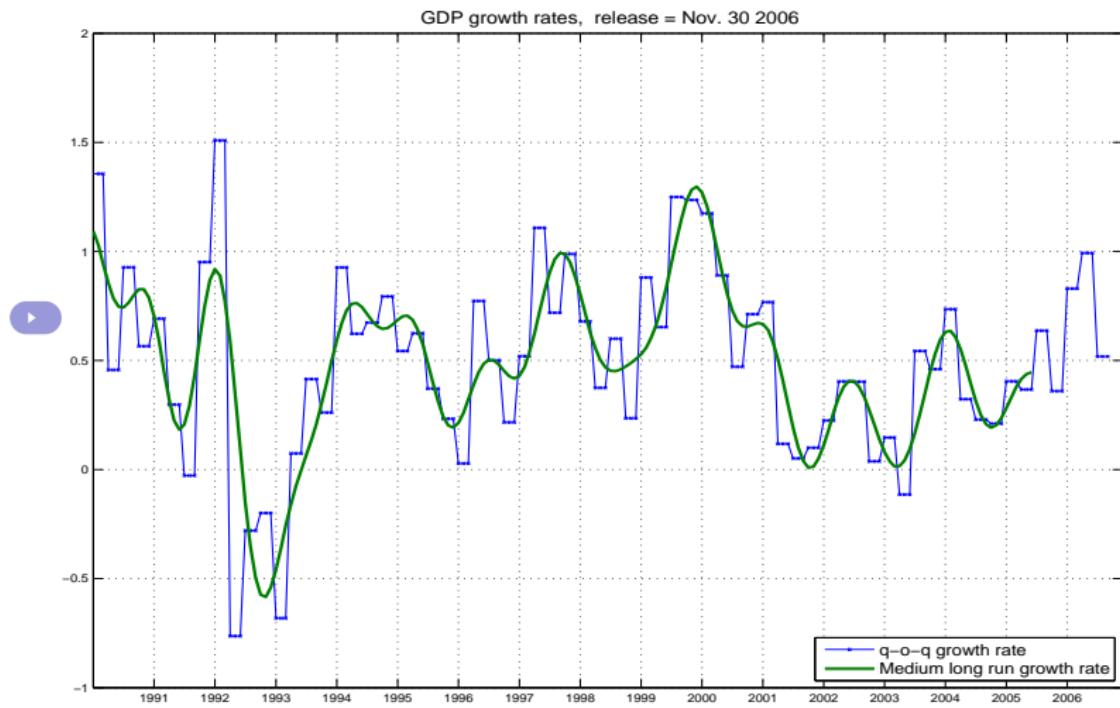


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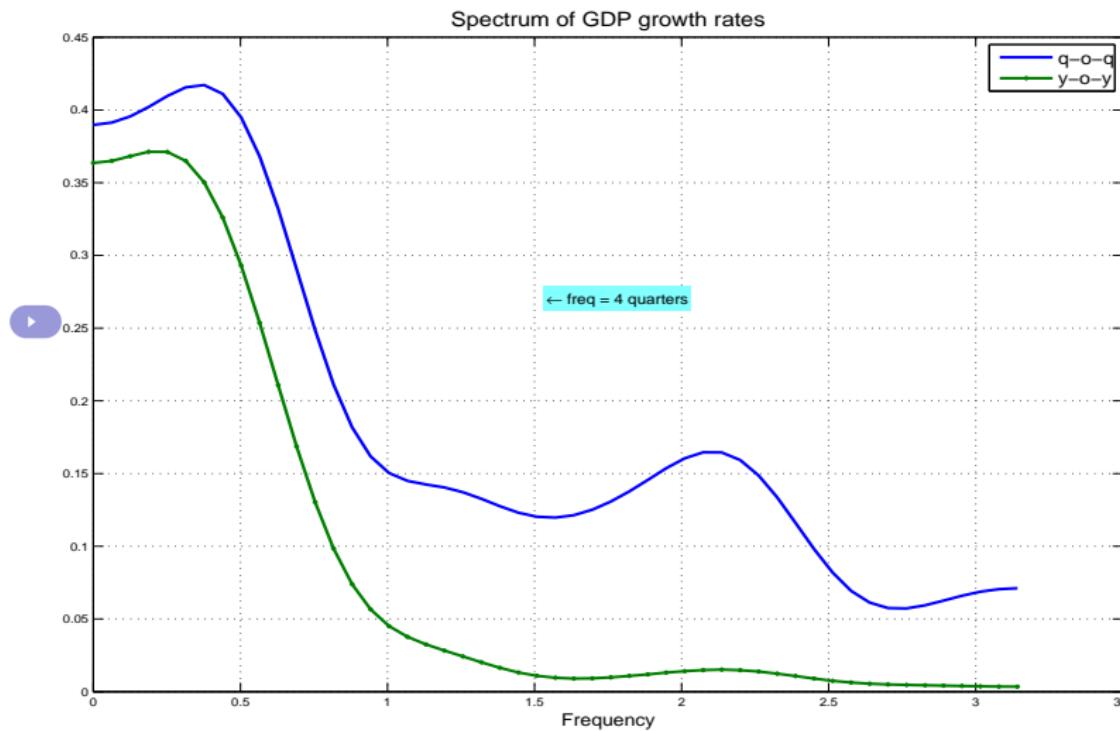
- MLRG does not lag current GDP^{qoq} and it is smoother. 
- MLRG is "close" to y-o-y growth
but ...
- retains all medium run info 
- leads y-o-y growth by several months 



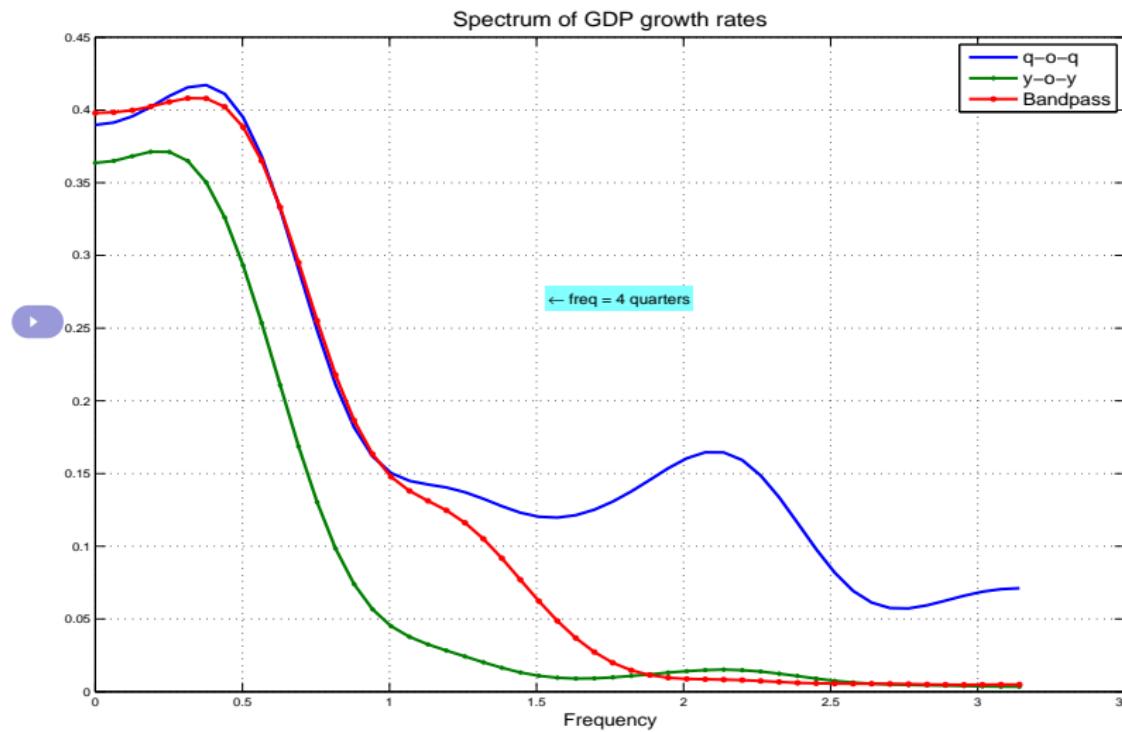
GDP: q-o-q and MLRG



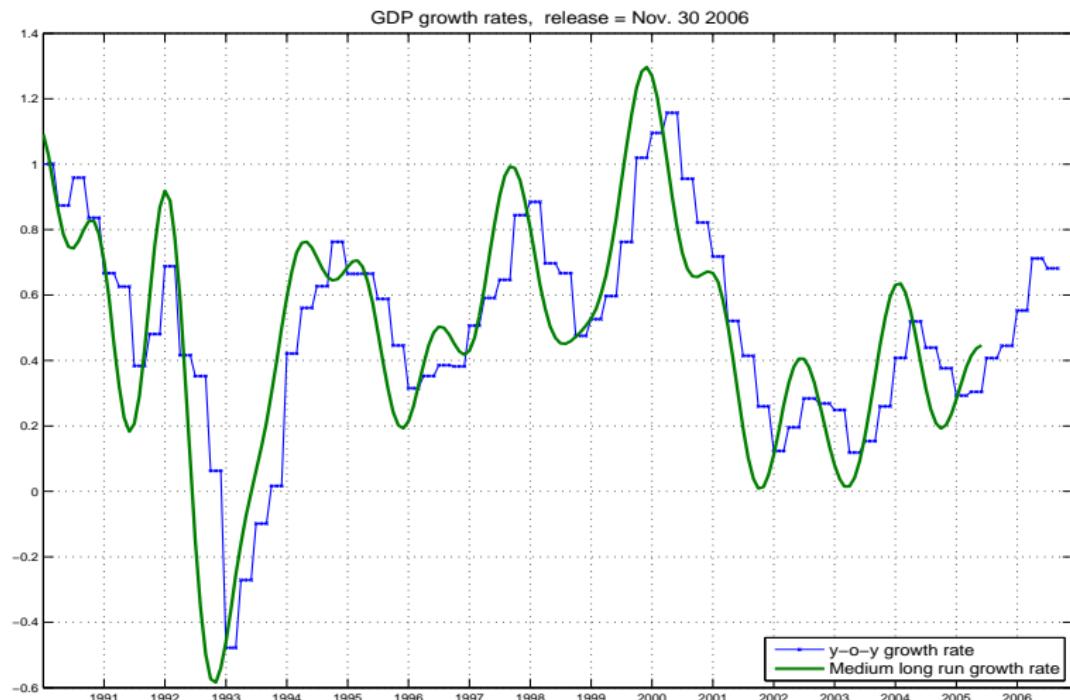
In the frequency domain



Why MLRG is better



GDP: y-o-y and MLRG



Technical problems

Recall $c_t = \beta(L) GDP_t^{q_{0q}} \dots$ so we need to address 3 problems:

- 1 How to reach the *end of the sample*, as $\beta(L)$ is two-sided
- 2 How to solve the *end-of-sample unbalancing* due to the varying timeliness of data releases
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This is where €coin comes in!

use a large panel to obtain a reliable (monthly) estimate of MLRG at the end of the sample



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The solution: a brief description

- 1 choose and collect a large panel of *monthly* and *daily* macroeconomic series
- 2 solve the data staggering problem at the end of sample (EM, AR, re-aligning)
- 3 construct a set of *monthly* regressors w_t as particular linear combinations of the series in our panel
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The projection: obtaining a monthly smooth indicator

The projection of c_t on the linear space spanned by w_t is:

$$\text{€coin} = \text{Proj}(c_t | w_t) = \boxed{\Sigma_{c,w}} \quad \Sigma_w^{-1} w_t$$

where $\Sigma_{c,w}$ is $\text{Cov}(c_t, w_t)$ and Σ_w is $\text{Var}(w_t)$.

The estimation of $\Sigma_{c,w}$ is not trivial as c_t is not observed, but the cross-spectrum of GDP_t^{qoq} and w_t can be estimated.

$\Sigma_{c,w}$ is obtained by integrating it over the relevant frequency band
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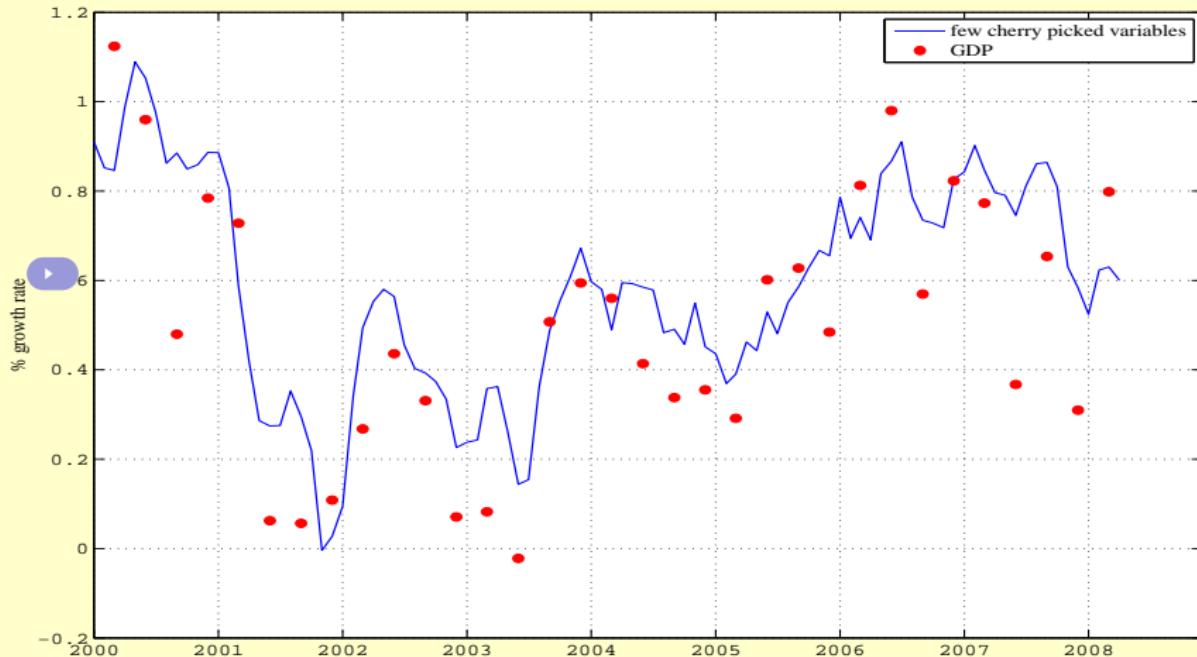


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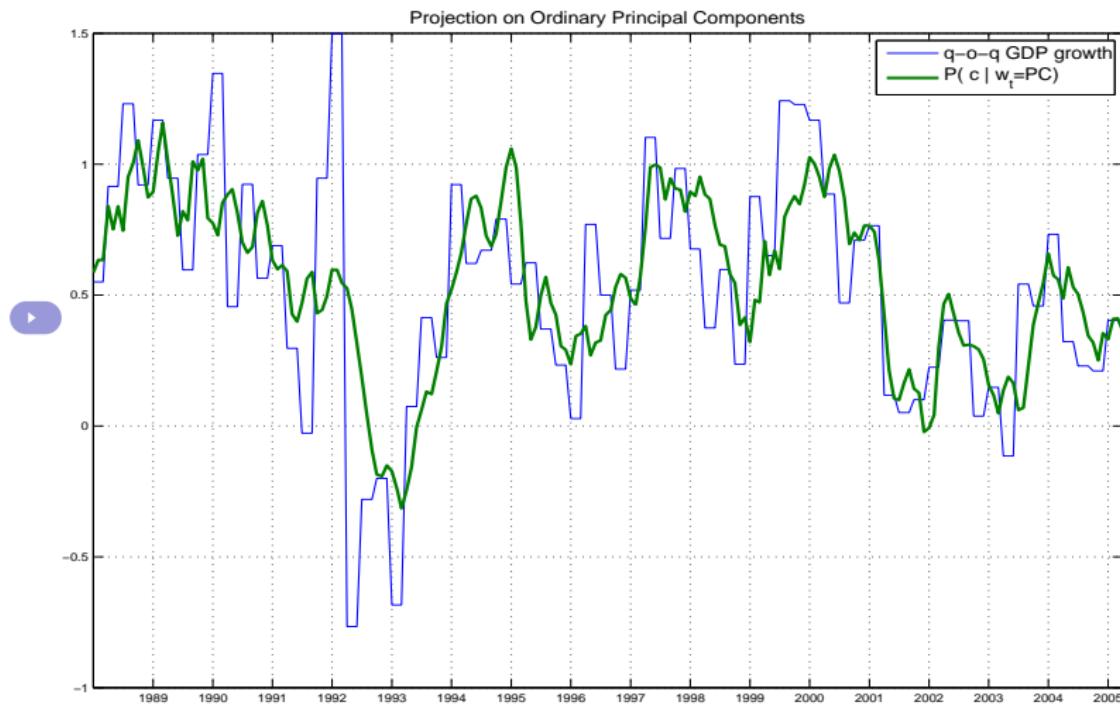
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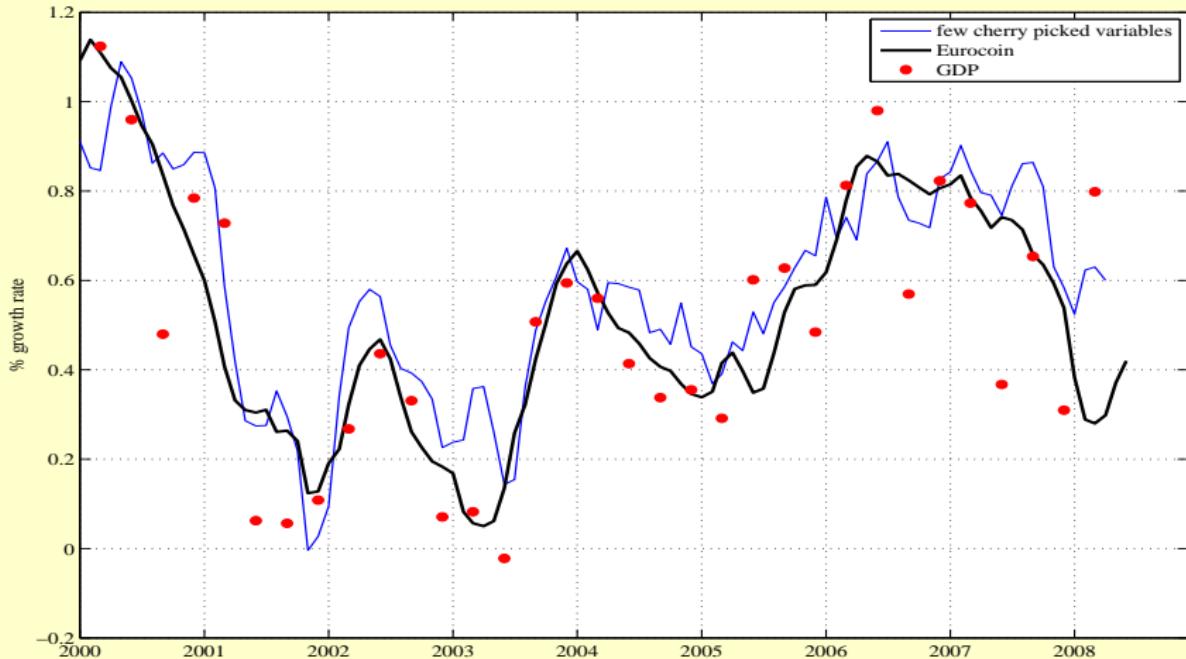
Projection on cherry picked variables: euro area IP and Ifo



Projection on the ordinary principal components



Using cherry picked variables, or a large dataset (€-coin)



How to construct the w_t : use a factor model

- 1 assume each variable can be expressed as: $x_{i,t} = \chi_{i,t} + \xi_{i,t}$
- 2 recover varcov matrices Σ_χ and Σ_ξ (FHLR 2000) and split Σ_χ into medium-long run Σ_χ^{ml} and short run Σ_χ^s
- 3 define $w_{kt} = \sum_{i=1}^N v_{ki} x_{it}$ where the vectors v_k solve the *generalized eigenvalue problem*:

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easy issues

- ≈ 150 monthly variables
- Source: Thompson-Datastream
- Data treatment: Datastream \longleftarrow Matlab time series objects
- Seasonal adjustment, outlier detection, stationarization

and tricky issues

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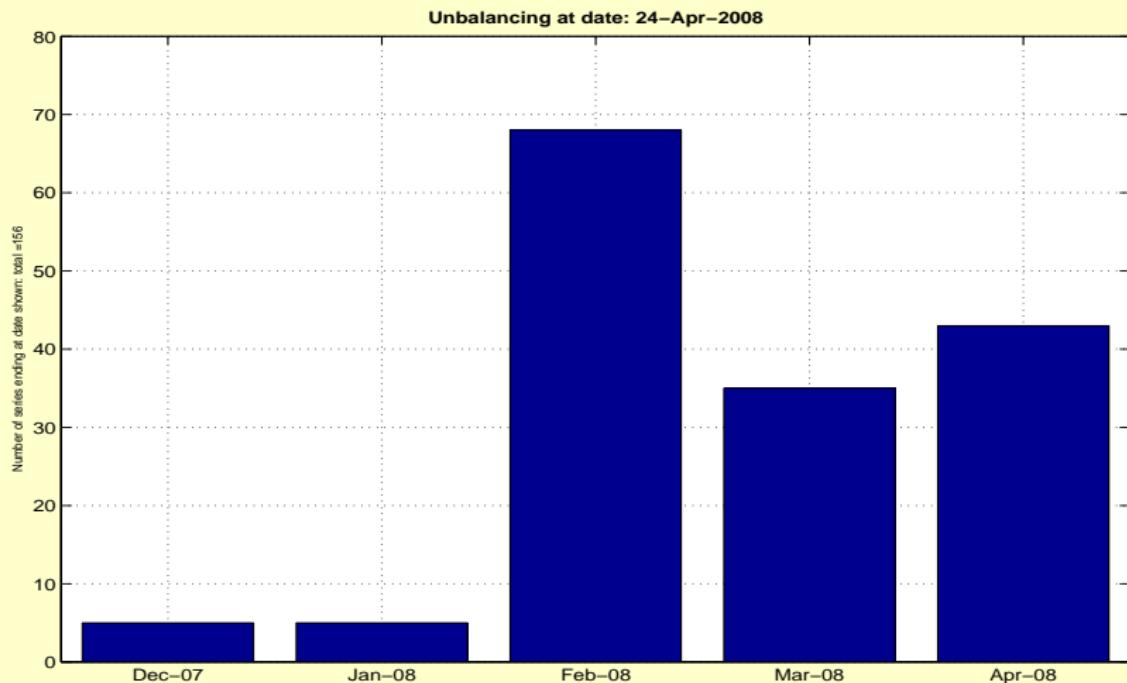
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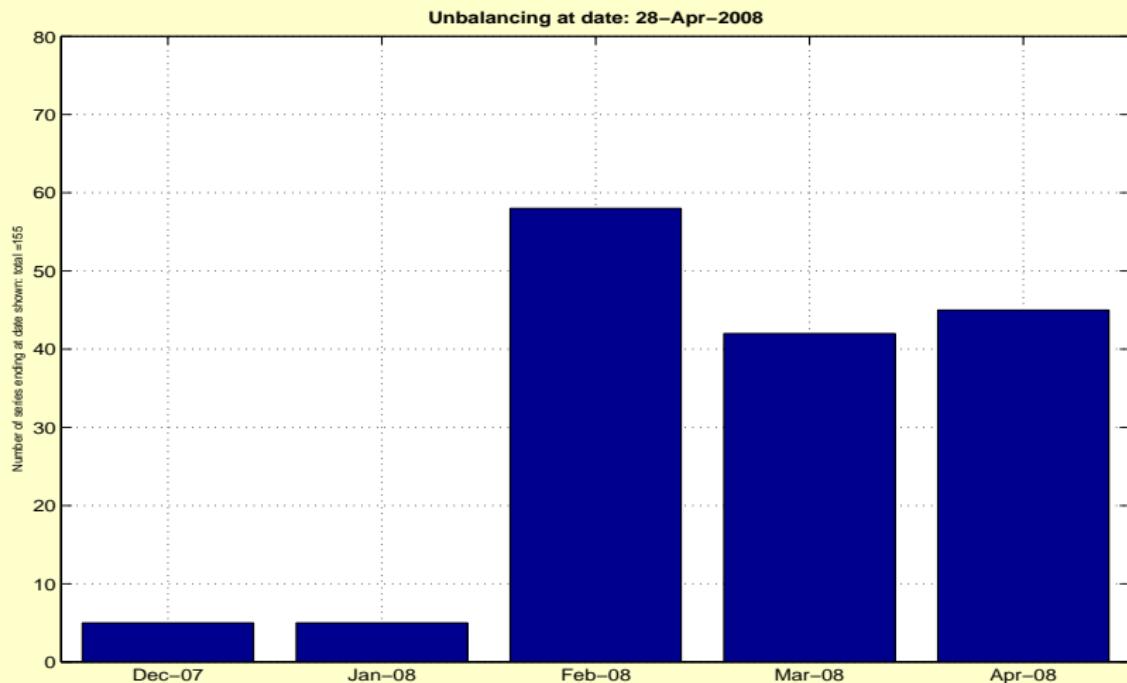
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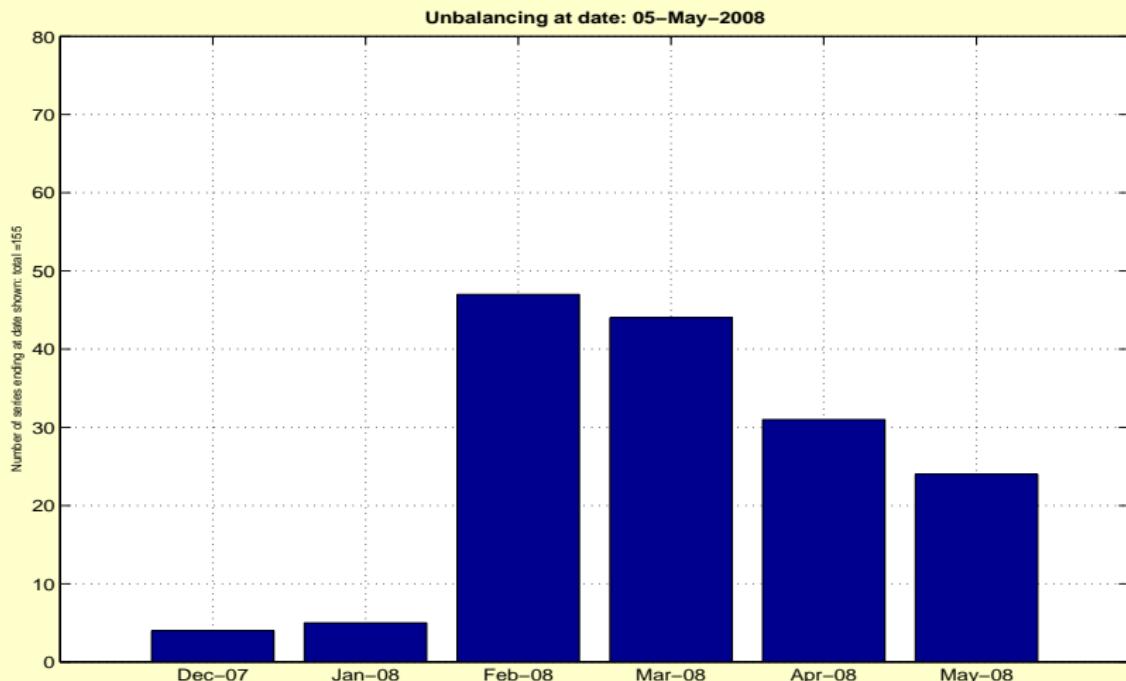
Information set unbalancing



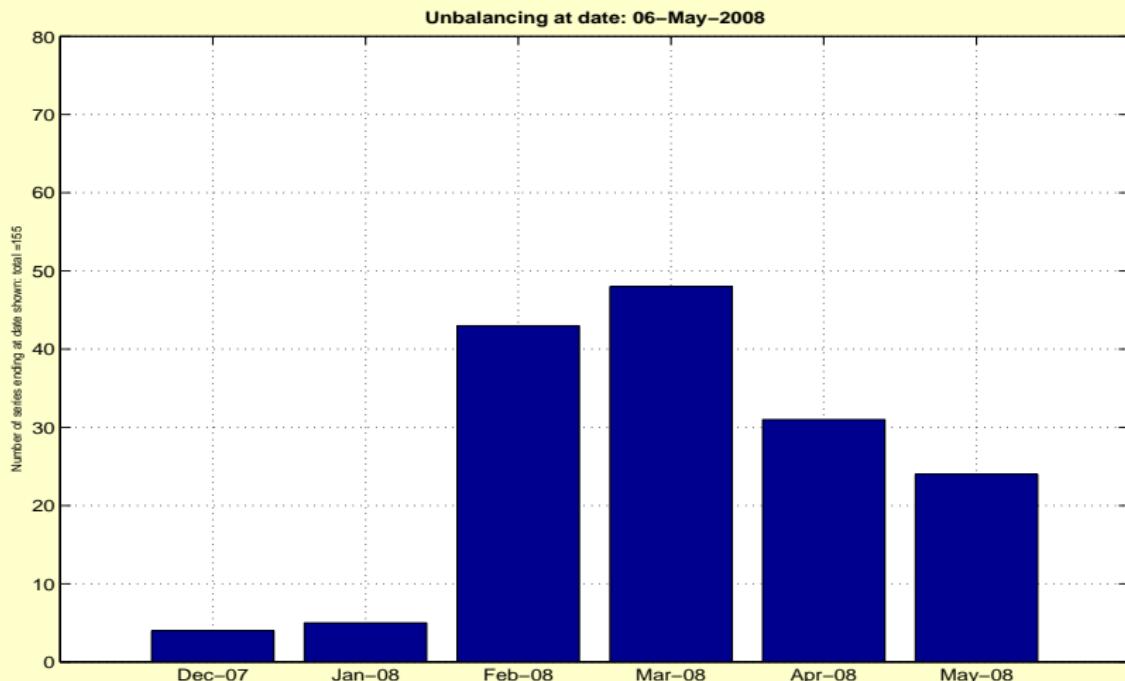
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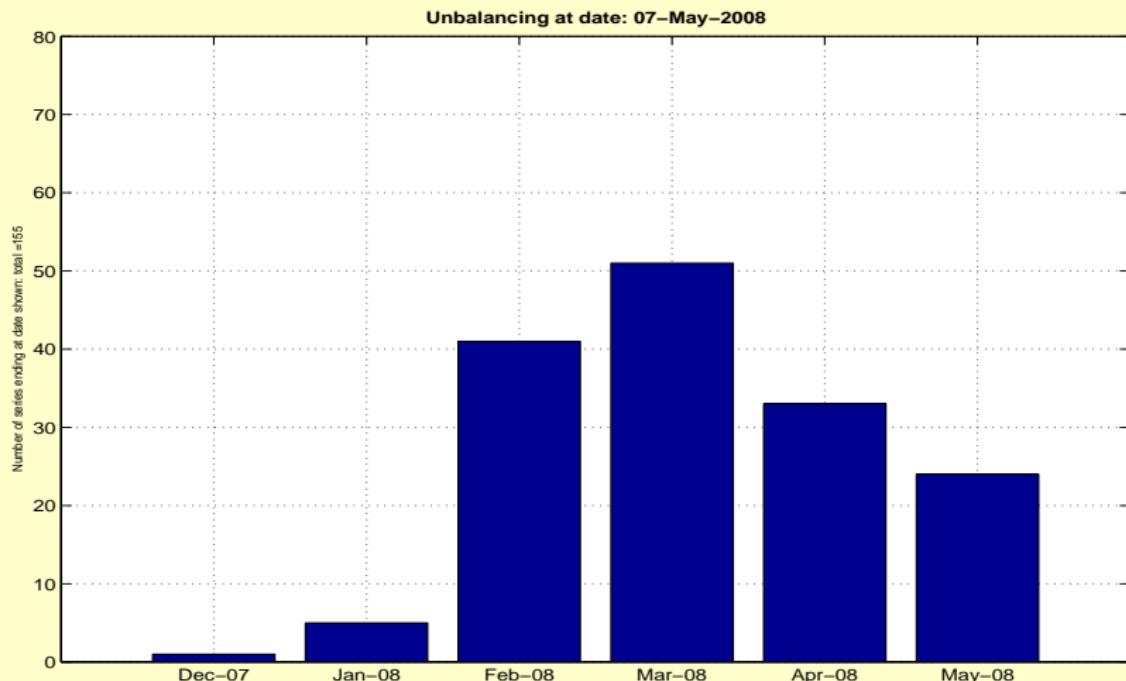
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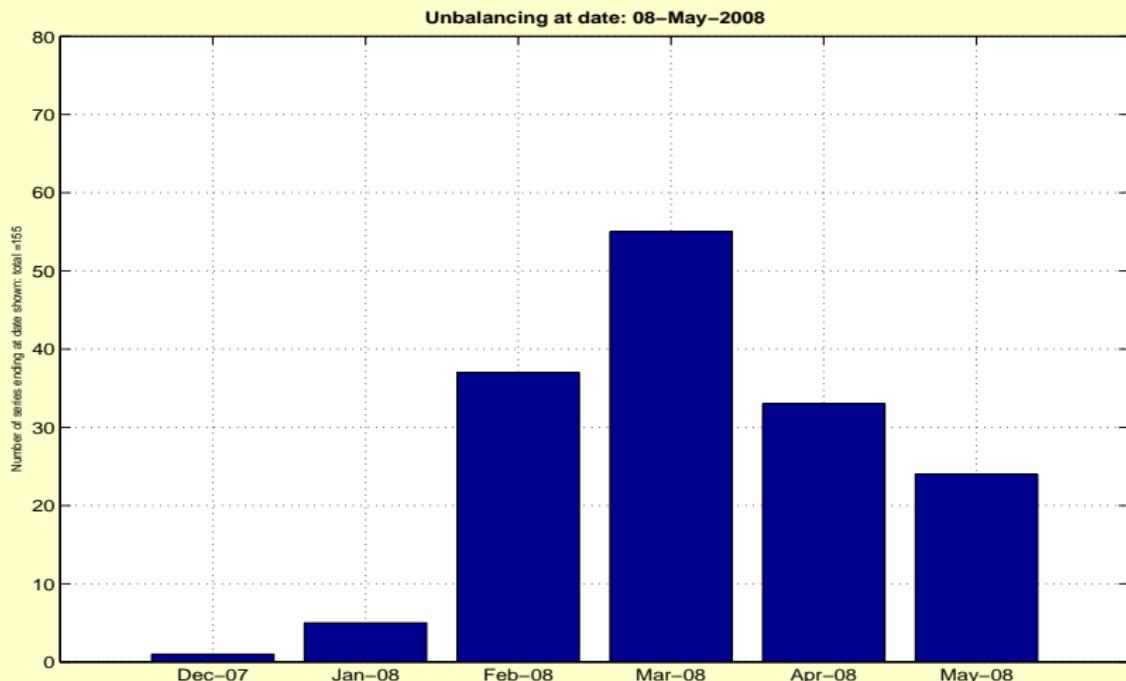
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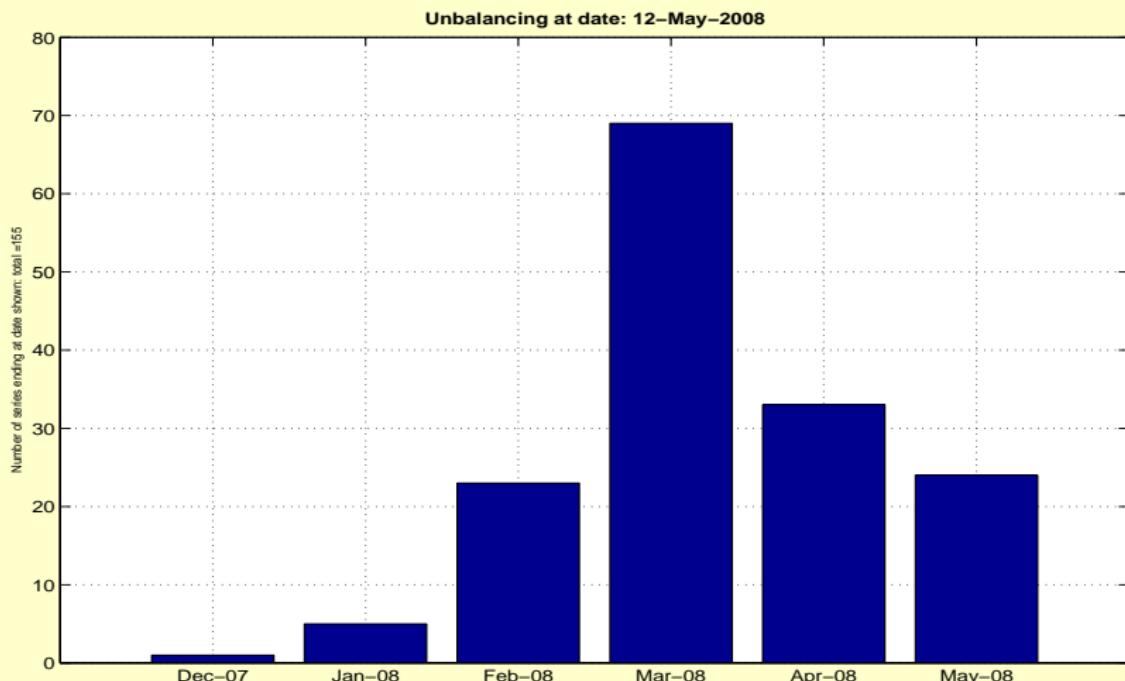
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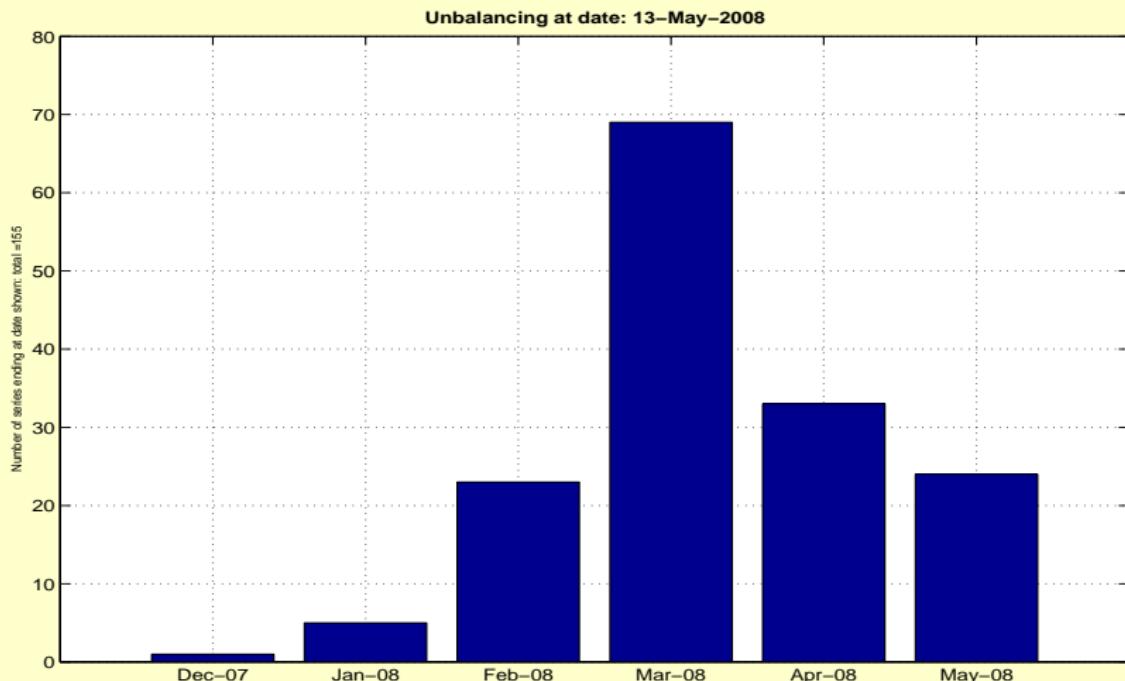
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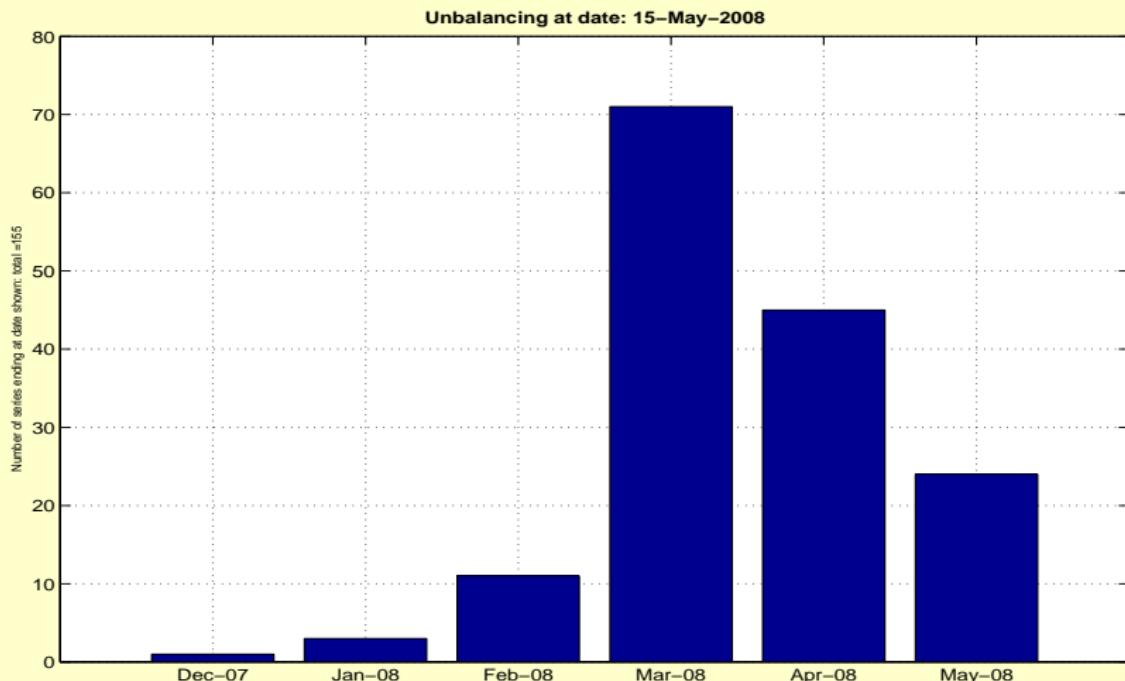
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Our solution to unbalanced panel

We realign the monthly series so that the last available figure is indexed with the last time period.

Precisely, let $x_{i,t}^*$ be our monthly variable. Suppose that the $i - th$ variable is released with k months of delay, i.e. the last available observation is $x_{i,t-k}^*$, then:

$$x_{i,t} = x_{i,t-k}^* \quad \text{for } i = 1, \dots, N$$

Implicitly, we use the correlation structure of the data to handle the end of the sample unbalancedness (other methods are available: Evans, 2005; Giannone, Reichlin, Snaw, 2006).



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We compare the real-time performance of €coin vs:

- the two sided band-pass filter (BP)
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using $MLRG = c_{t|T} = \beta(L)GDP_t^{qoq}$ as the benchmark...

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Detection of turning points

Target	TP signals	Correct	% correct	% missed
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€Coin	8	6	6/8	0
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Model	Target growth rates (%)		
	quarter-on-quarter current quarter	year-on-year current quarter	year-on-year 1 quarter ahead
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PC	0.21	0.17	0.15
CFBP	0.32	0.23	0.23
AR (AIC)	0.29	0.16	0.17
AR (BIC)	0.29	0.16	0.17
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Performance (2): the acid test

Life not easy when it comes to really real time

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September 8 2001

September 20 2007

We will look at how it behaved since then, and compare it to bridge-style methods



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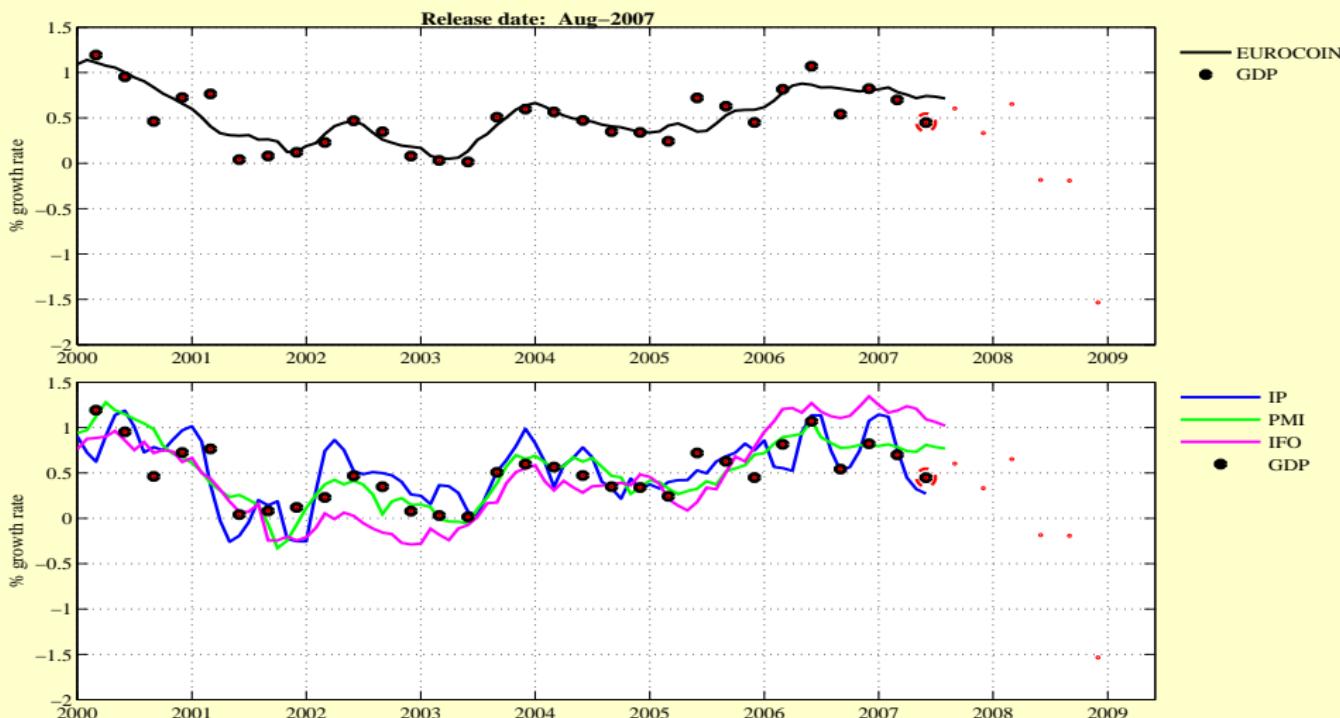
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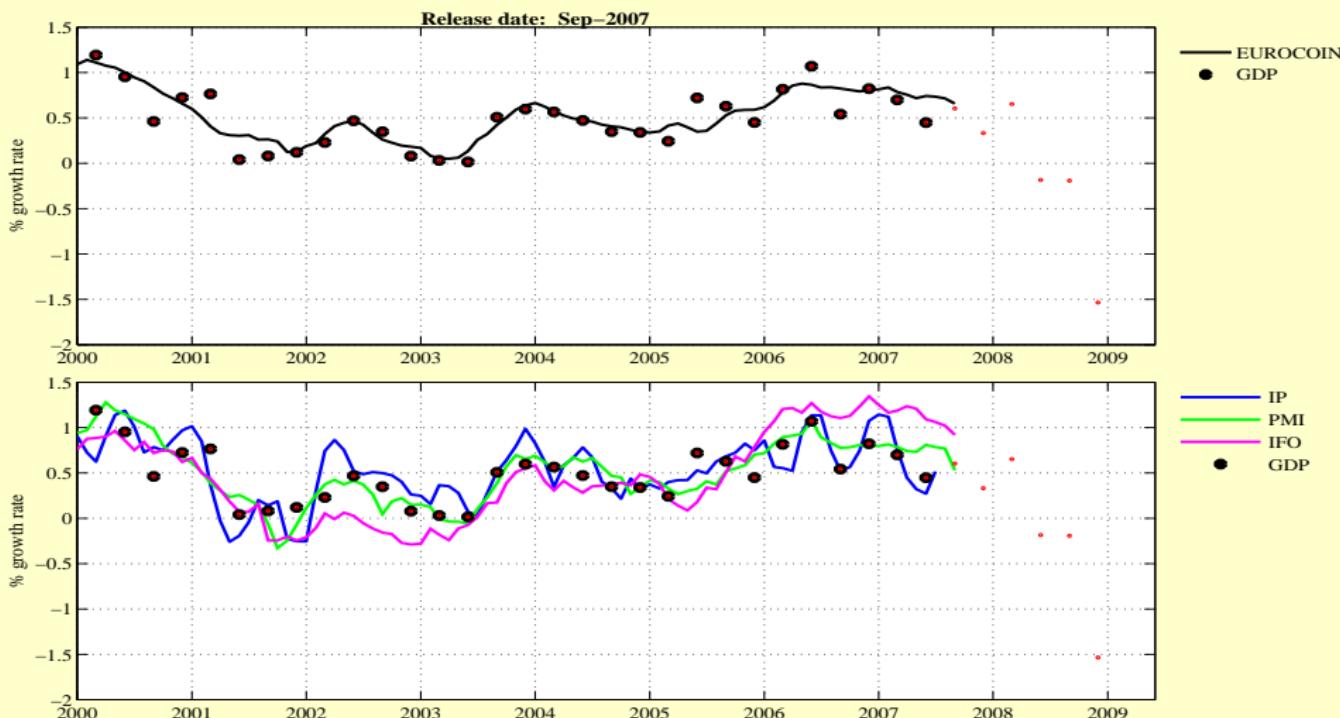
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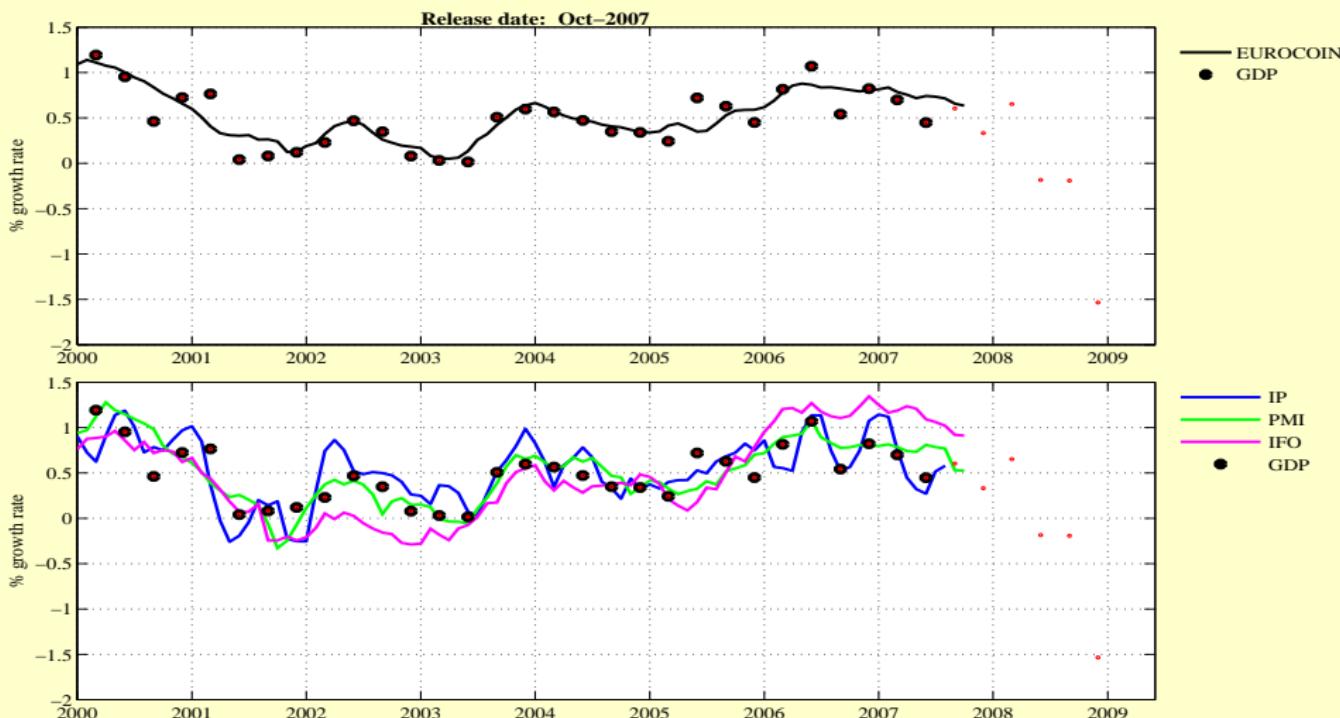
Real time: Eurocoin, IP, PMI, IFO



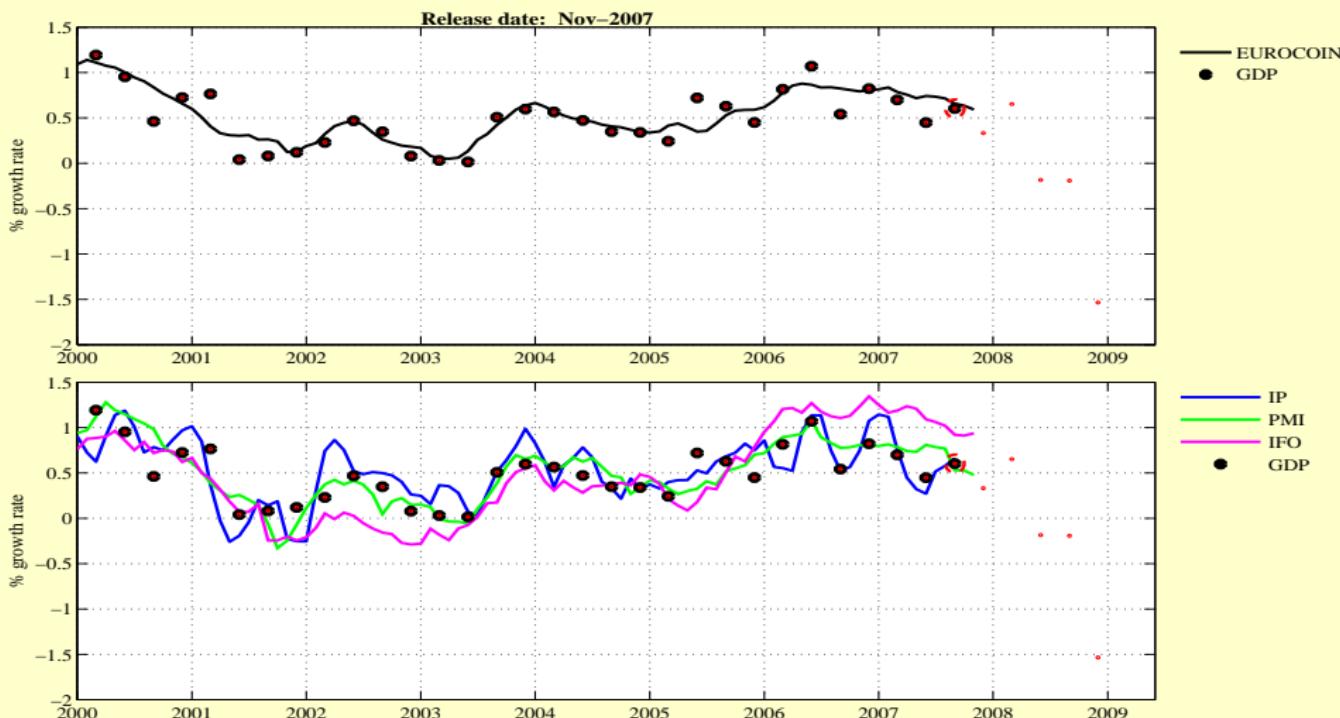
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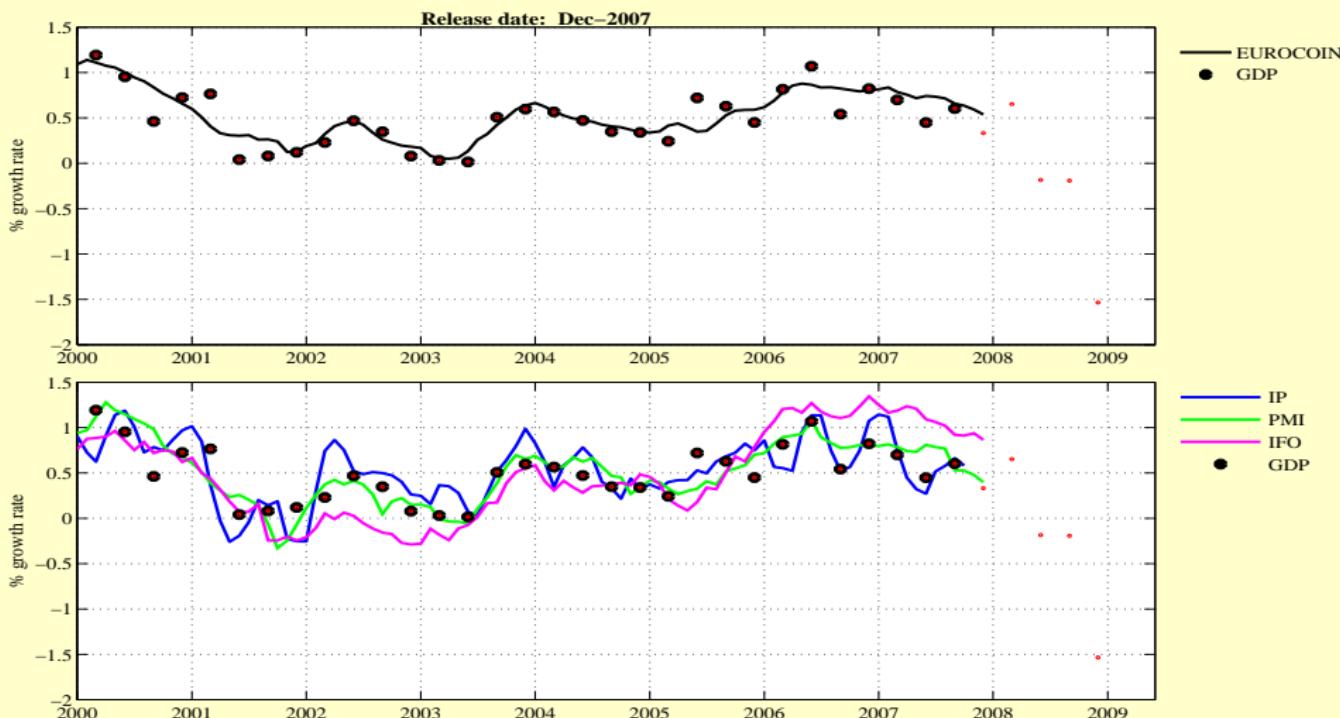
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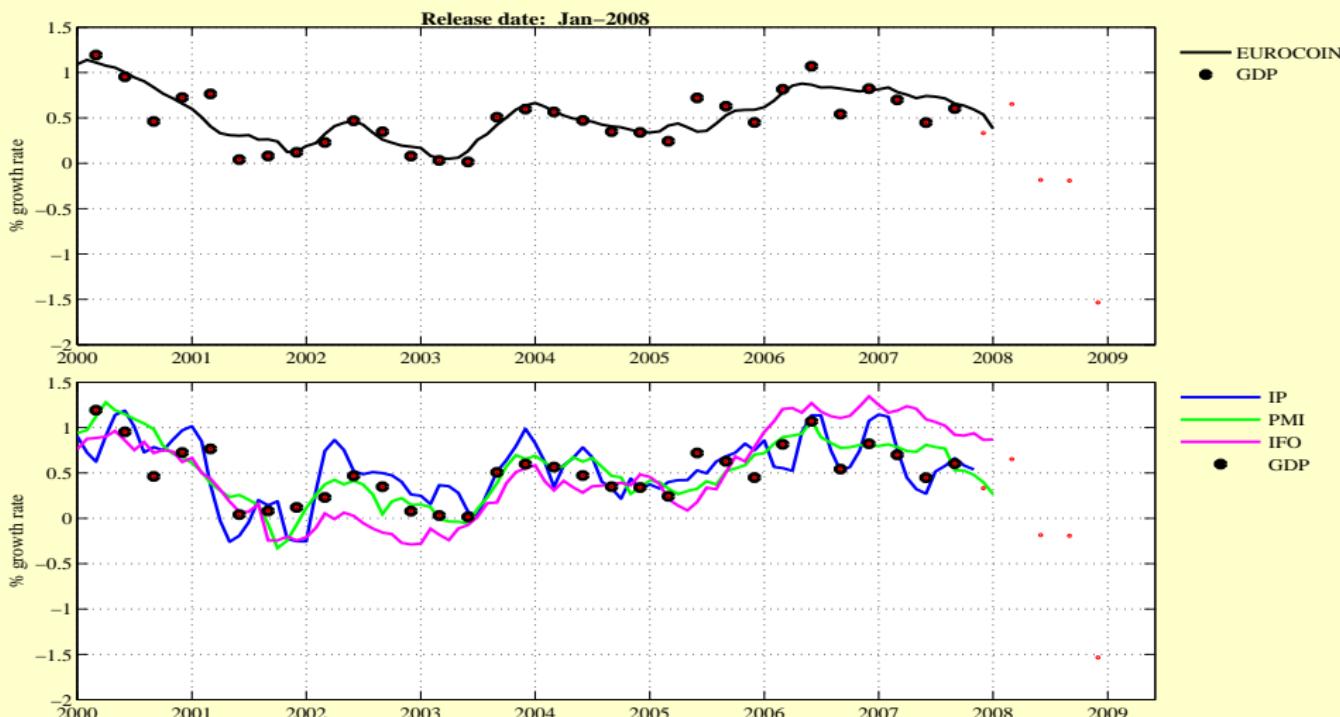
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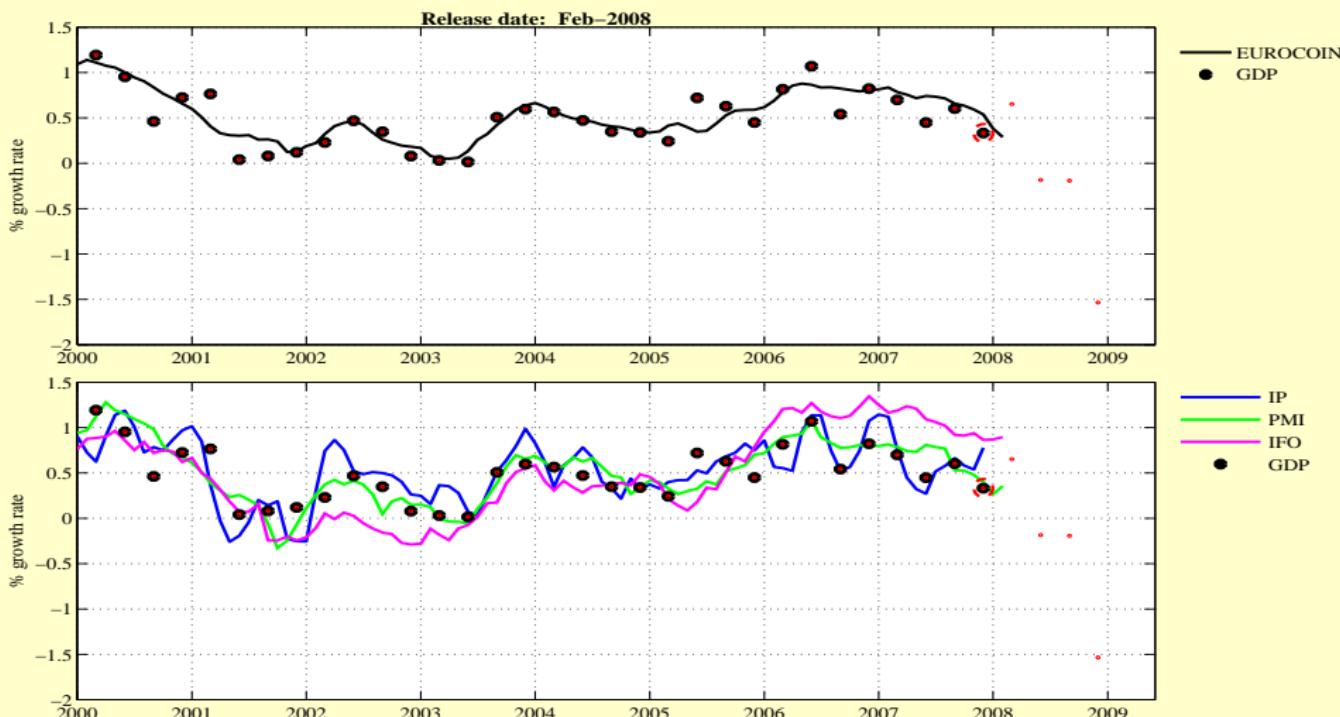
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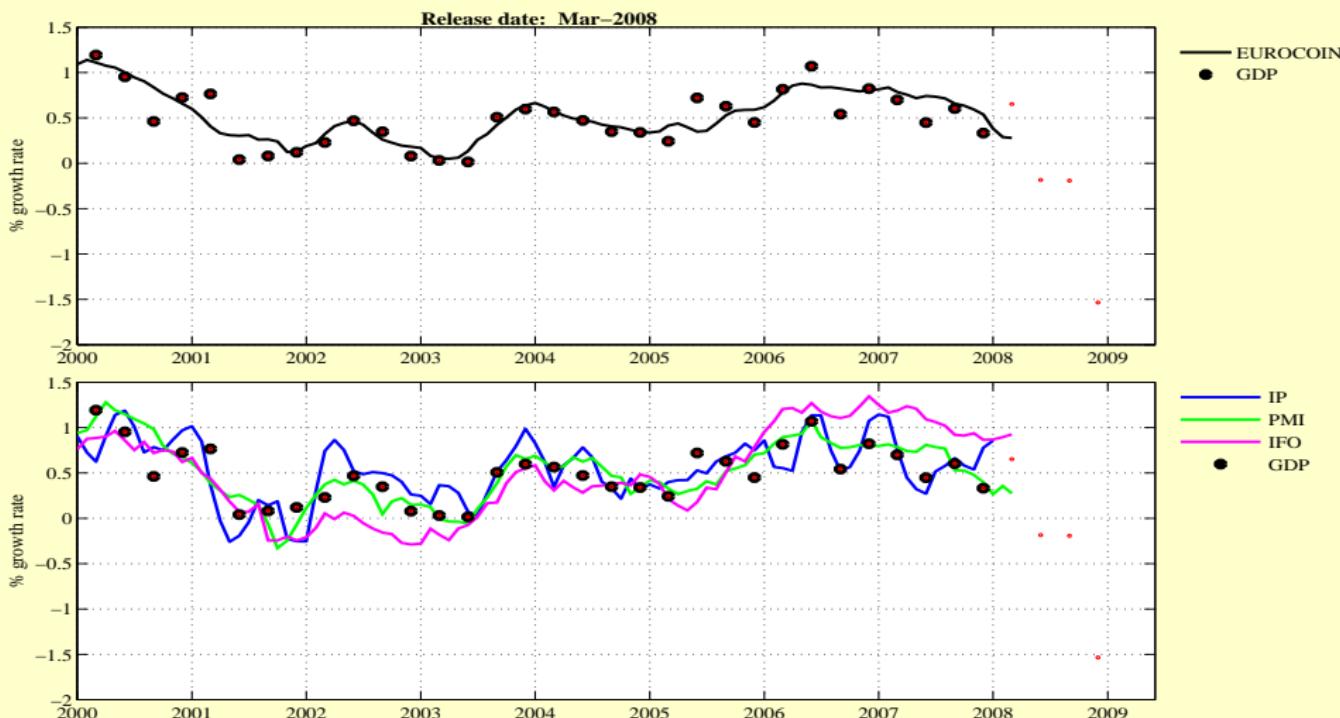
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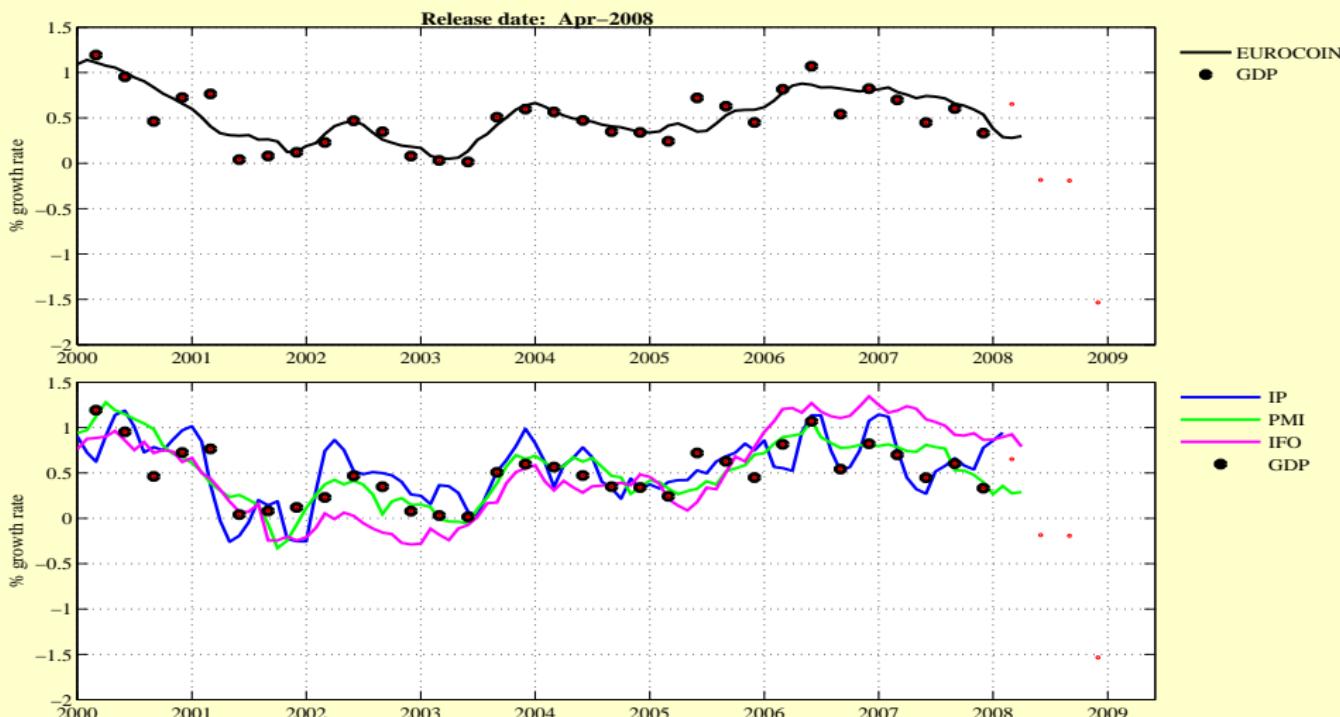
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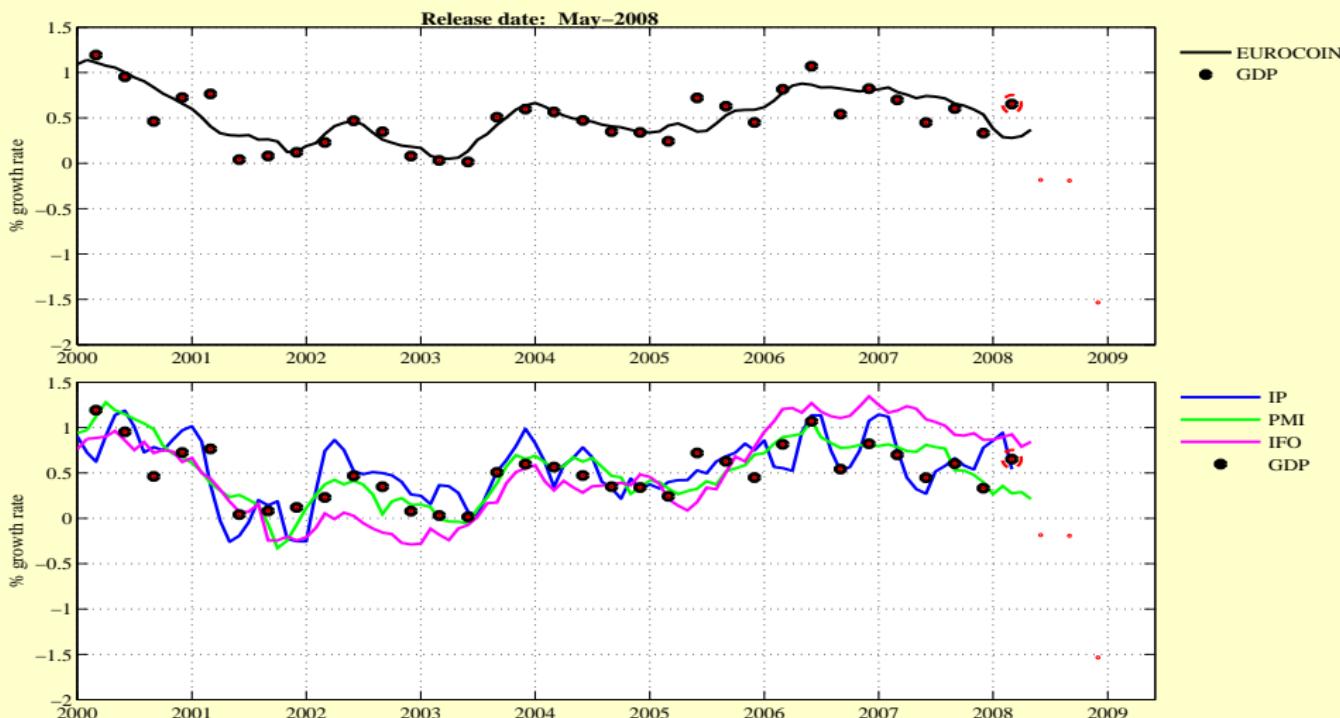
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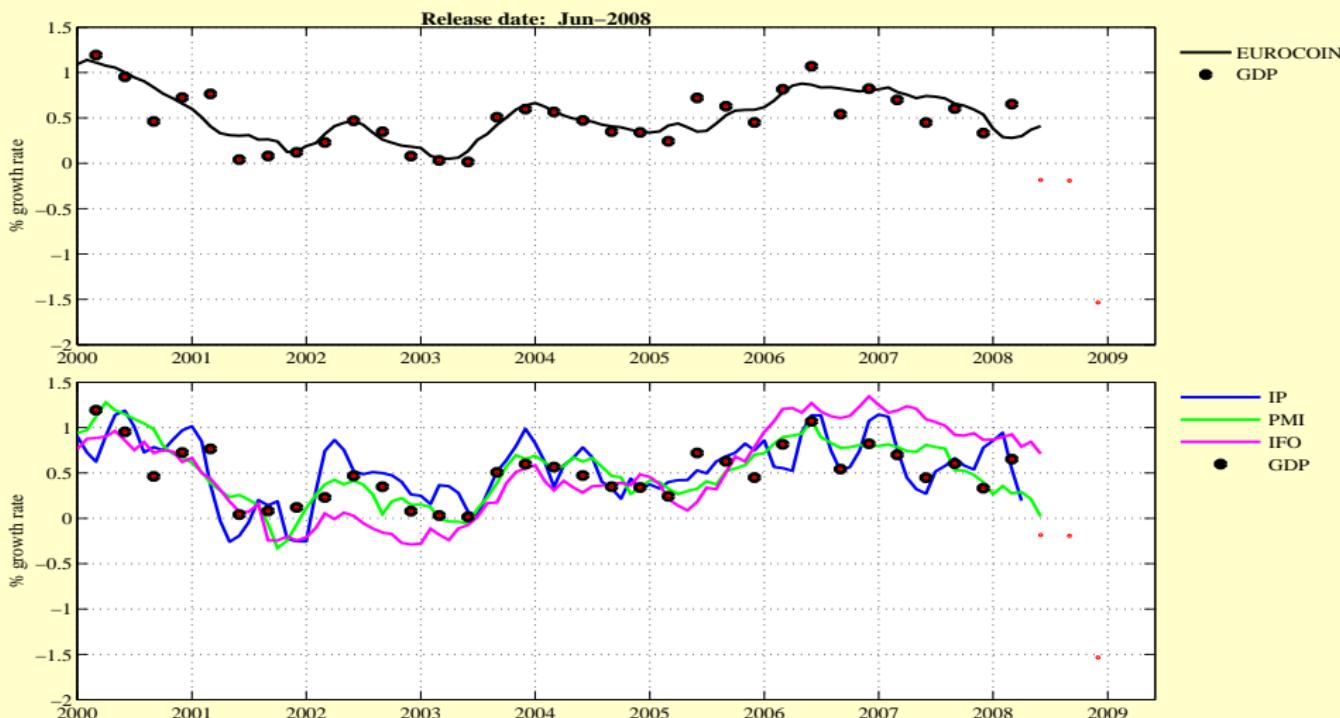
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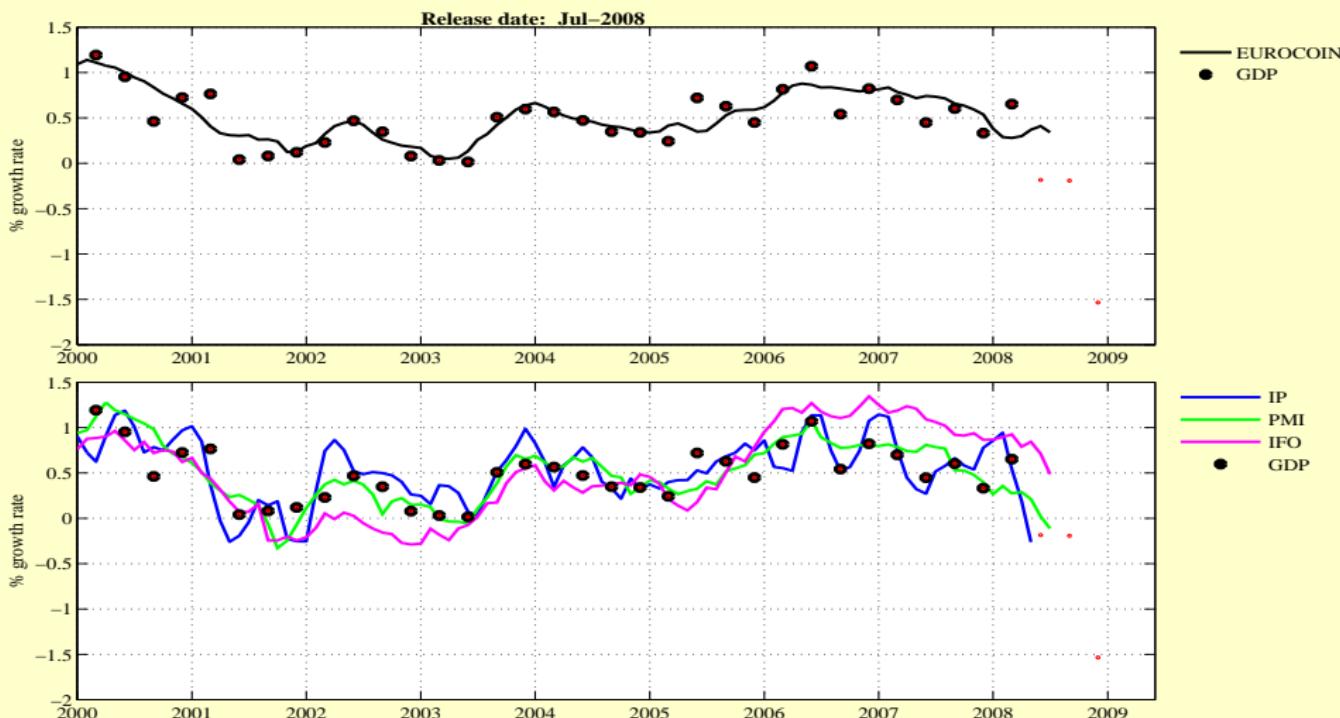
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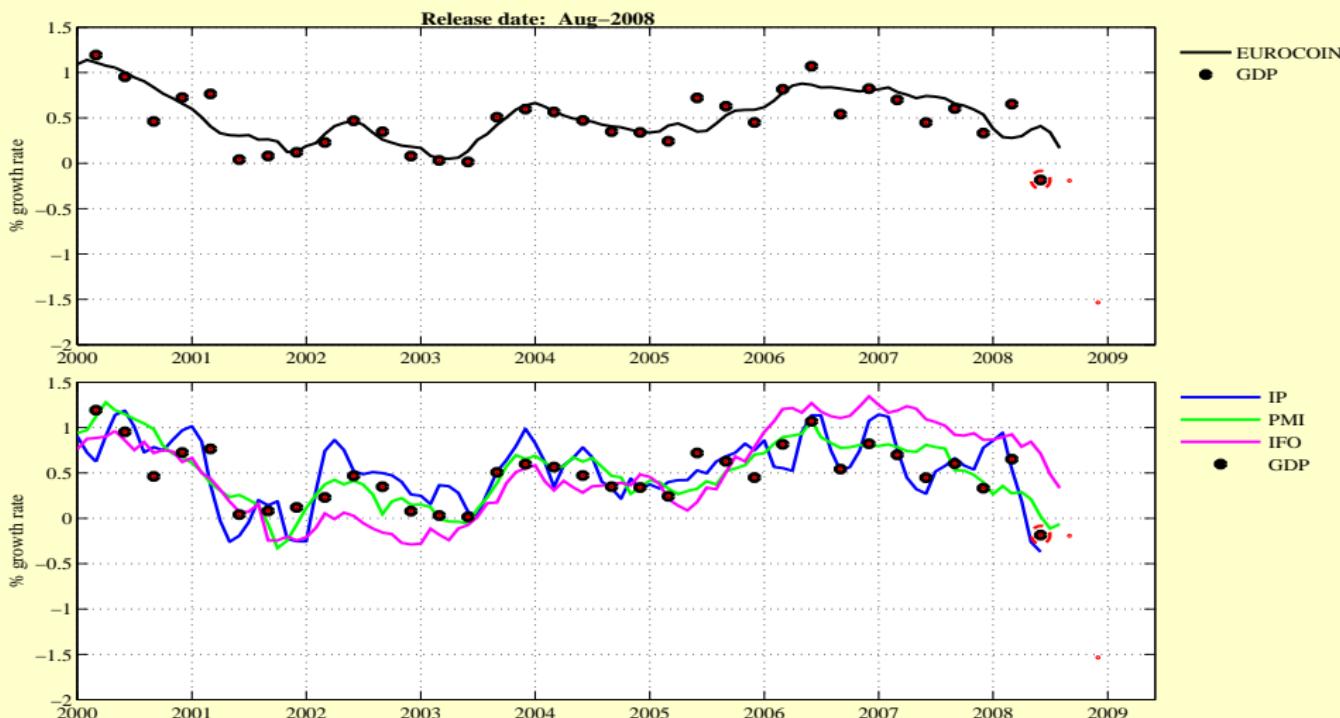
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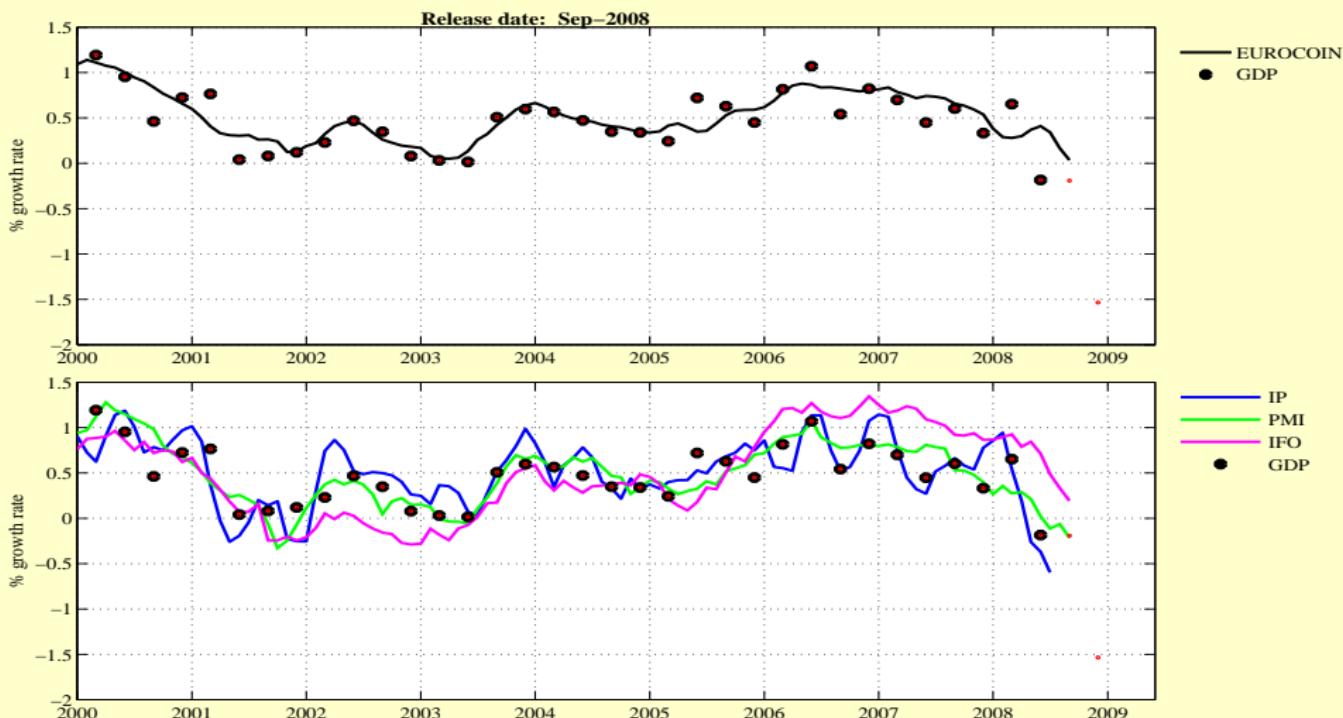
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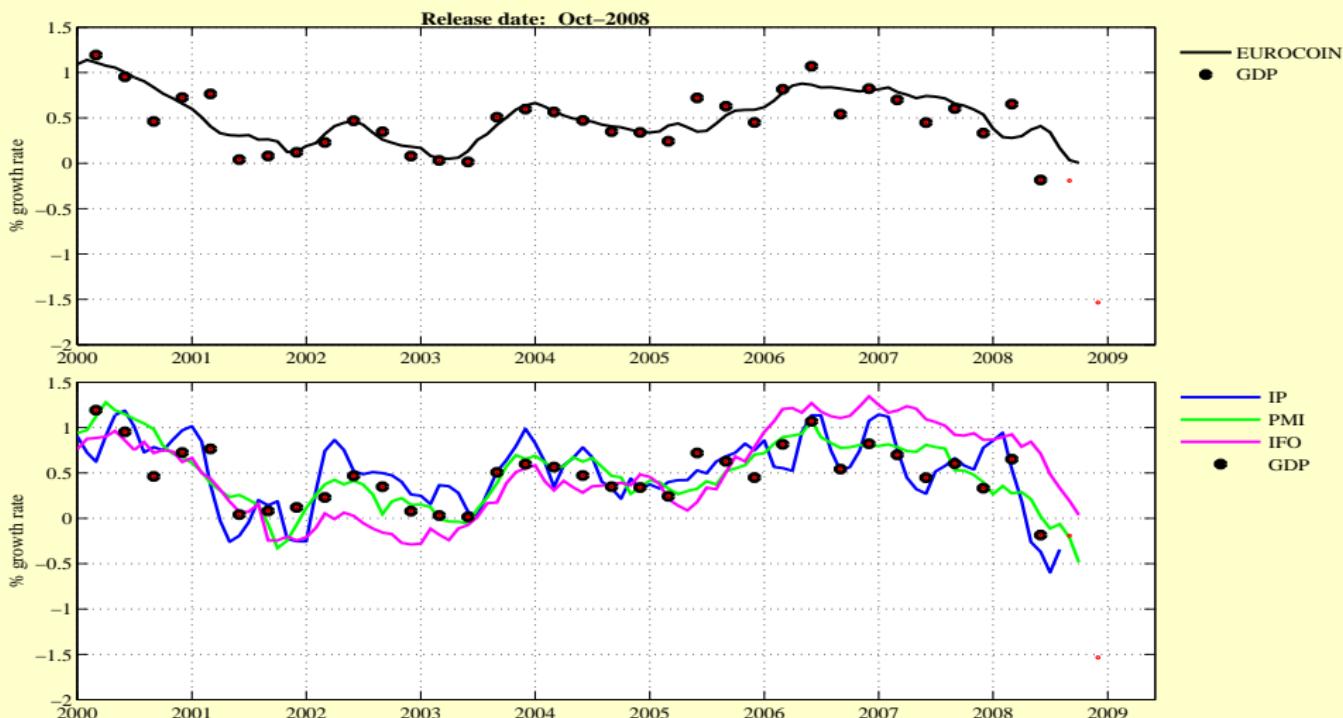
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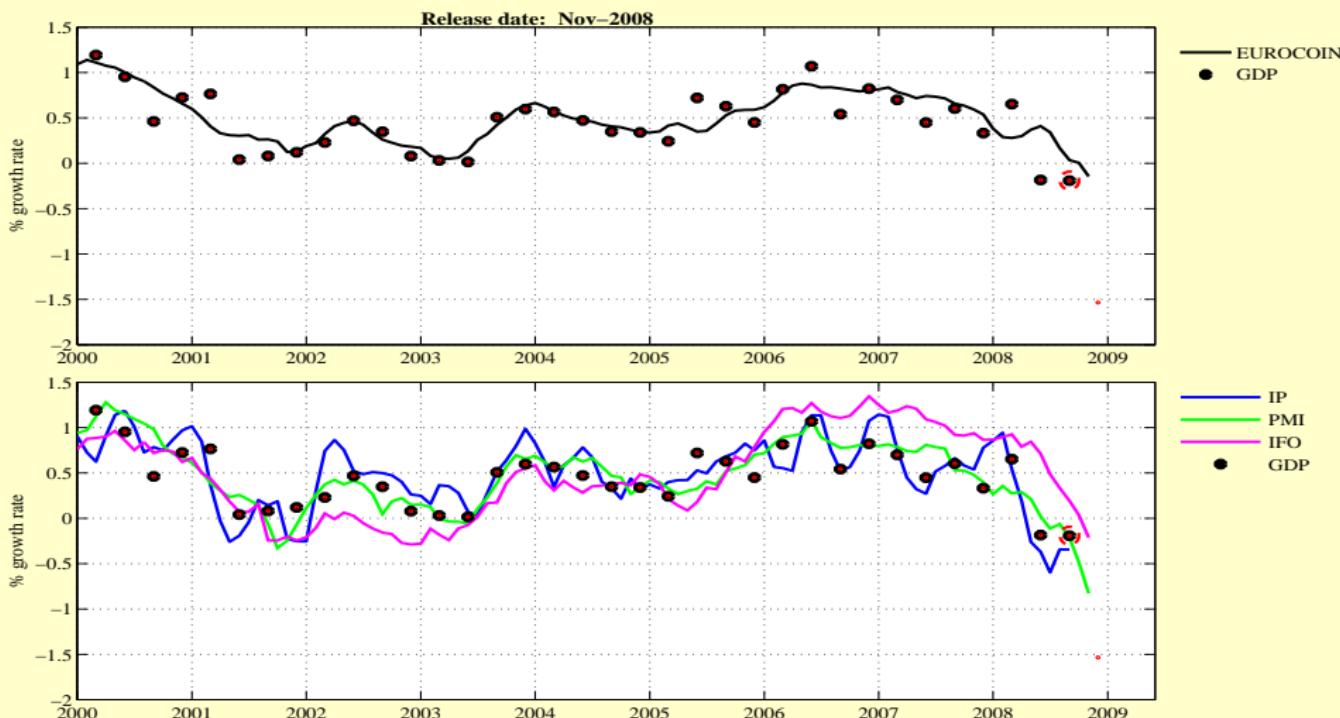
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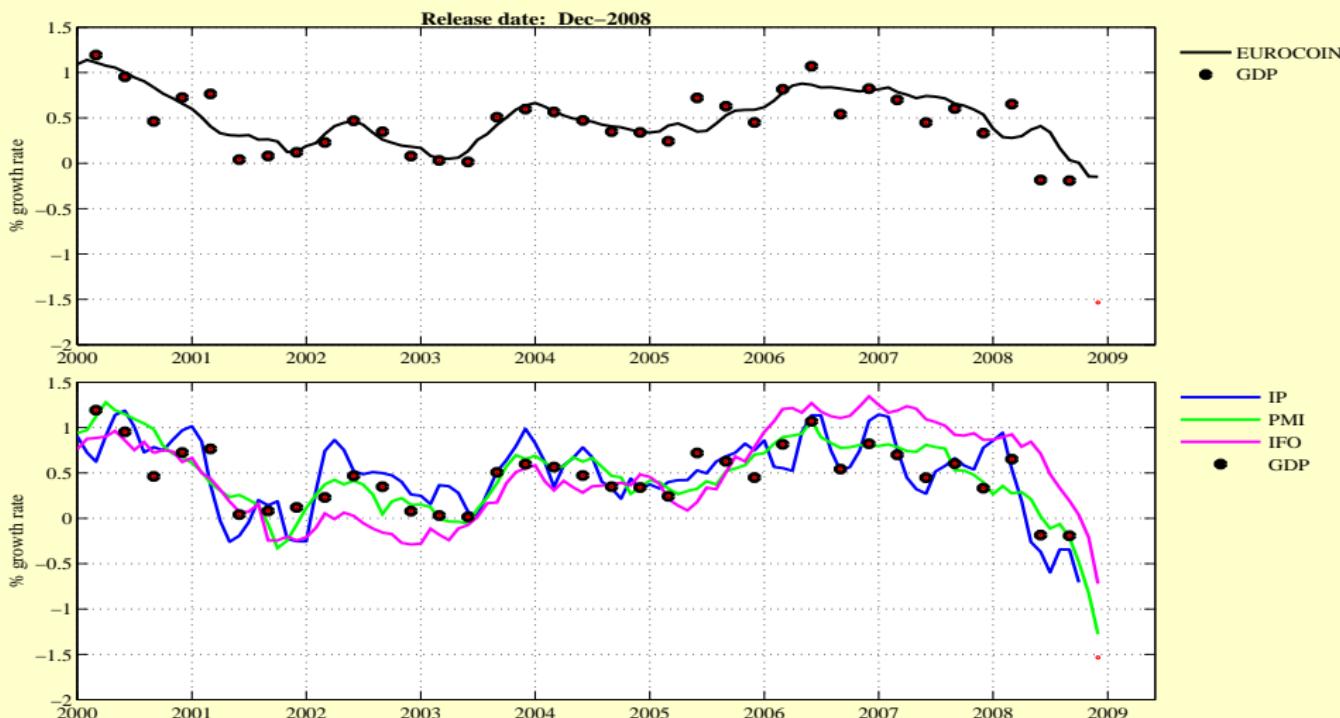
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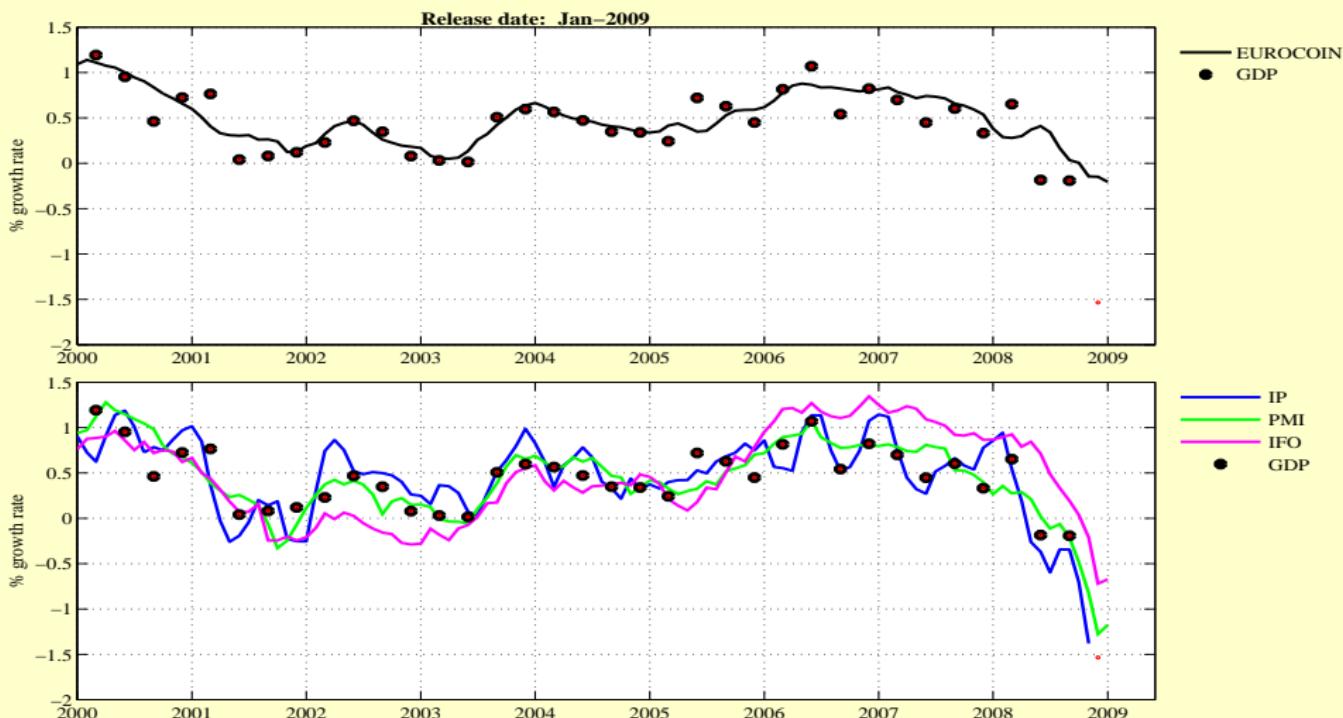
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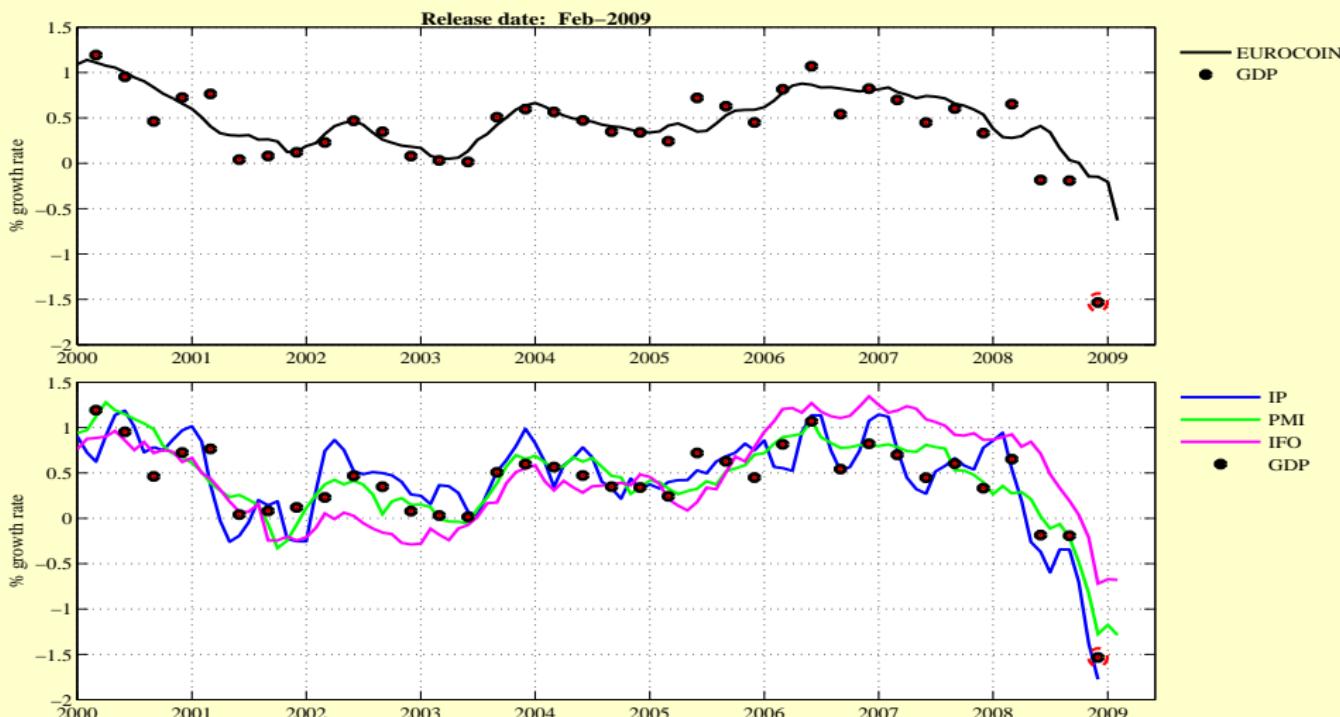
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Some spillovers to India

A bird's eye view:

- GDP: quarterly from 1996
- not seasonally and working days adjusted from CSO
- official jargon: only year-on-year, uncommon to report q-o-q growth rates

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? develop *Indiacoin* ? could be a positive contagion/collaboration!



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- €coin has been “produced” at Bofl and published by CEPR at the end of every month for the last 6 years
- €coin provides a real time assessment of growth prospects within the euro area obtained filtering all relevant info to produce a smooth and reliable indicator
- €coin has an in-sample observable counterpart on the basis of which it can be evaluated
- €coin is not a forecast of q-o-q GDP (even though the RMSFE is small), rather it provides a way of interpreting flash estimates separating noise from signal
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Lessons for next endeavours

- Get to know the data. Explore international linkages. US variables.
- Start simple: bridge-style methods
- Try other techniques: Azevedo, Koopmans, Valle (SSM), Otrok Prasad (BVAR)



Revisions of €area GDP growth rates (2001 to 2006)

