Data Revisions and Macroecomics

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National Account Data

Macroeconomic aggregates: consumption, investment, GDP, trade balance.

They are crucial elements of macroeconomic modelling.

Central bankers and fiscal policy makers rely heavily on current values of GDP.

GDP is the best measure of current aggregate economic conditions and also denominator of targets such as government deficit/GDP.

Earlier Releases of Macro Aggregates

Earlier estimates even if based on incomplete datasets are better than no estimates since GDP information is crucial for policy decision making.

GDP releases are "market-moving" data releases (Bloomberg) including releases of revisions (if published in a month that no new observation is released).

Earlier Releases of Macro Aggregates

We can measure what we learned from the new data release by comparing the accuracy of consensus forecasts obtained few days before the release. Accuracy is measured by root mean squared errors.

The table in the next slide is for predictions of US GDP growth over 2001-2013 computed by Clements and Galvão (2015).

Consensus and US GDP Releases

RMSEs

	All (N=52)	Contractions (N=9)	Expansions (N=43)
Advance Estimate			
No-Change Forecast	2.220	2.221	2.219
Survey Median	**0.711**	0.912	0.437
Second Estimate			
No-Change Forecast	0.671	1.077	0.549
Survey Median	**0.310**	0.413	0.284
Third Estimate			
No-Change Forecast	0.279	0.237	0.287
Survey Median	**0.268**	0.275	0.266

Data Revisions and sources of Business Cycles Variations

Business Cycles, which are fluctuations in macroeconomic aggregates such as output (GDP), consumption and investment, are normally modelled as caused by exogenous structural shocks.

The academic literature suggests many different types of structural shocks as possible source of business cycles.

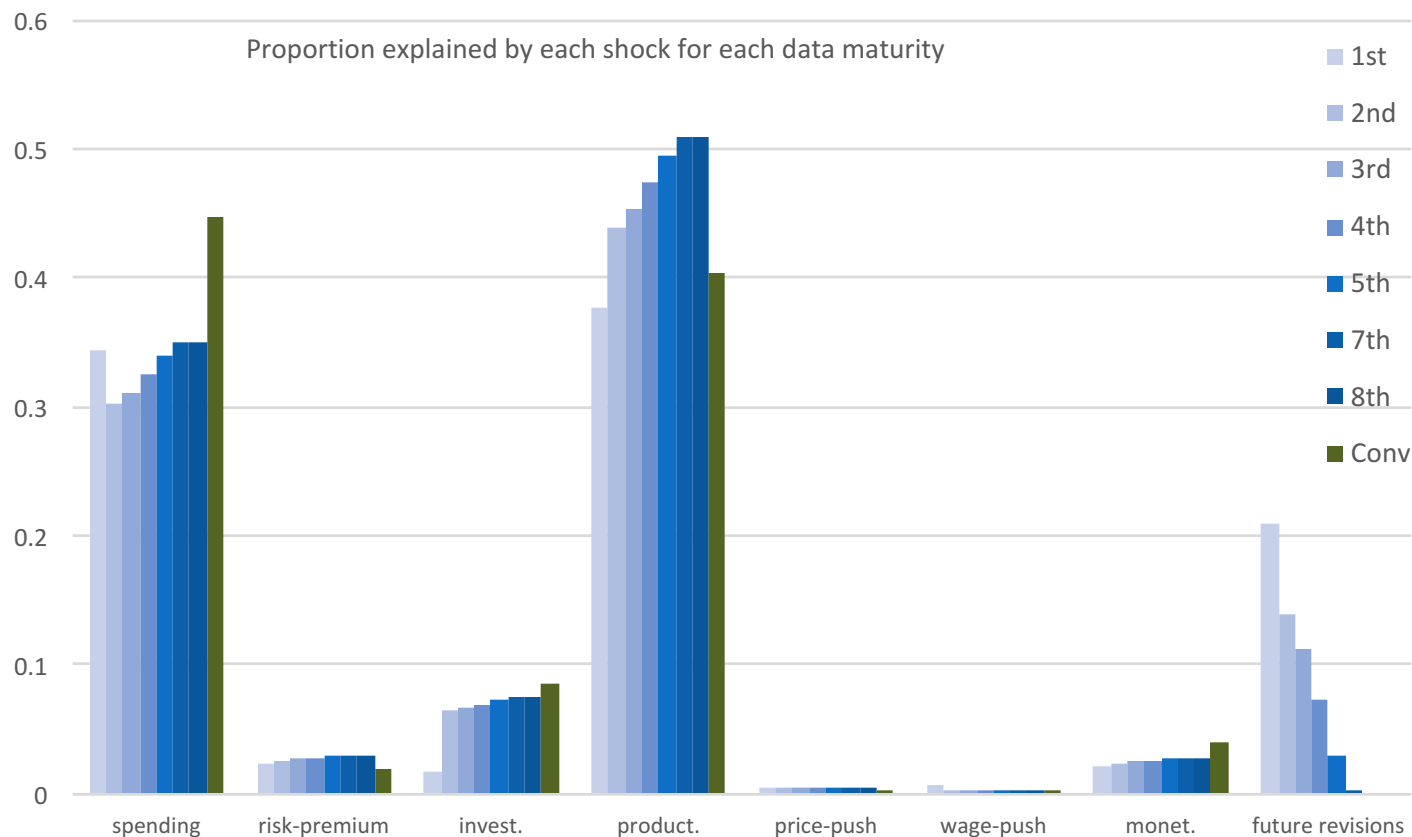# Data Revisions and sources of Business Cycles Variations

The importance of each specific structural shock in explaining business cycle variation requires an empirical analysis using national account data.

Depending on the maturity (number of rounds of revisions) of the data, the relative importance of different shocks changes (Galvao, 2016).

Data Revisions and US Business Cycles' Sources

Variance decomposition for output growth

Proportion explained by each shock for each data maturity

Legend:
- 1st
- 2nd
- 3rd
- 4th
- 5th
- 7th
- 8th
- Conv

X-axis categories: spending, risk-premium, invest., product., price-push, wage-push, monet., future revisions

Y-axis: 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6

What is going on?

Initial data revisions, which are mainly caused by adding more information to the computation of the estimate, are correlated with structural shocks.

Data revisions may be caused by not being able to fully observe the impact of structural shocks at the time of initial releases.

(I am assuming that structural shocks are correctly estimated with heavily revised data).

Implications

Economists need to be carefully when making decisions based in models that are not fully estimated with revised data, that is, when some observations are still subject to many rounds of revision.

Data Revisions and Forecasting

Macroeconomic forecasting, in particularly at short-horizons, is mainly based on statistical time series models.

When forecasting in real-time, the last observations are initial releases subject to many rounds of revision, while the majority of the observations employed for estimation have already being heavily revised.

Data Revisions and Forecasting

Clements and Galvao (2013) show that if we reorganise the data employed to estimate the forecasting model using real-time data vintages, forecasts computed with autoregressive models will be more accurate.

To apply the results above, we need real-time data vintages covering a large number of observations, that is, we need access to real-time datasets spanning a large number of data releases.

Data Revisions and Forecasting

Recently, Clements (2015) and Clements and Galvao (2016) show that if we want to predict the first release, but estimate a model with mainly heavily revised, prediction intervals and/or full density forecasts will be badly calibrated [95% intervals won't cover the outcomes 95% of the time].

Data revisions and Interval Forecasting

An one-step-ahead point forecast is an estimate of the conditional mean of the one-step-ahead predictive density: $\widehat{\mu_{t+1}}$

If the predictive density is normal, a 95% predictive interval is:

$$\widehat{\mu_{t+1}} \mp \widehat{\sigma_{t+1}} * 1.96$$

But $\widehat{\sigma_{t+1}}$ is estimated with mainly revised data. This implies that $\widehat{\sigma_{t+1}}$ will over- or under-estimate σ_{t+1} (the correct value for a first release) depending on whether data revisions are news or noise.

# Data revisions and Interval Forecasting

If data revisions are news, that is, they add new information, the unconditional variance of revised data is larger than the variance of the first release, so $\widehat{\sigma_{t+1}} > \sigma_{t+1}$.

If data revisions are noise, that is, they remove measurement error in earlier estimates, then the unconditional variance of revised data is smaller than the variance of the first release, so $\widehat{\sigma_{t+1}} < \sigma_{t+1}$.

Clements (2015) show that we can reorganise the data in real-time vintages and get unbiased estimates of σ_{t+1}. Clements and Galvao (2016) show that this will always produce improved logscores.
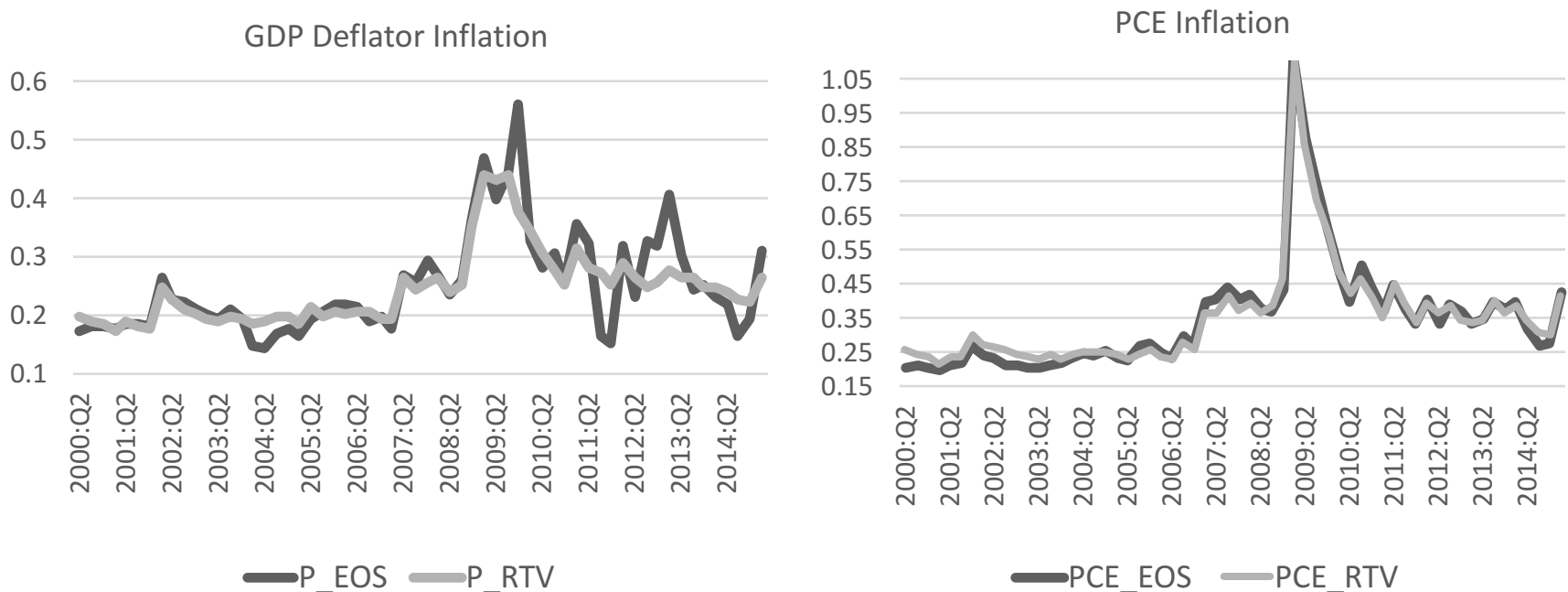
Estimates of Predictive SE with stochastic volatility models (US)
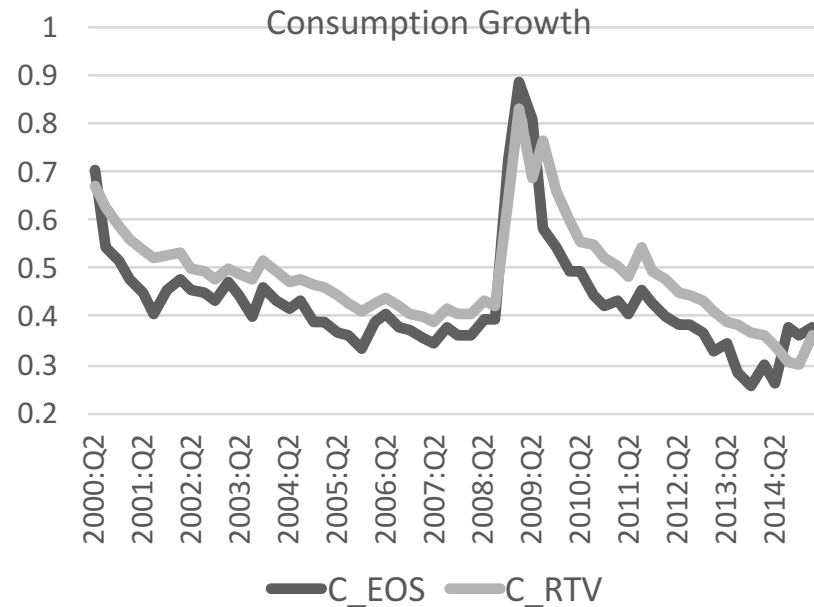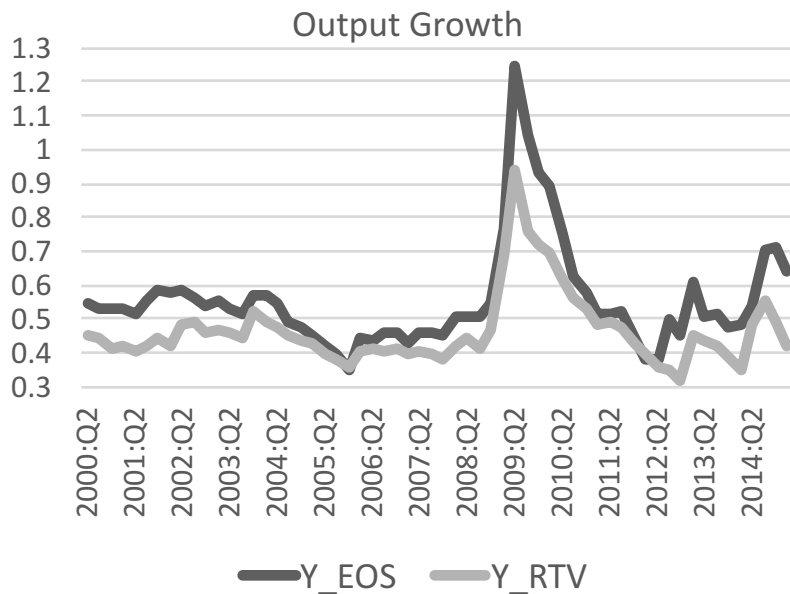
EOS is the usual approach to deal with the data; RTV reorganises past published real-time dataset.

Estimates of Predictive SE with stochastic volatility models (US)

GDP Deflator Inflation

PCE Inflation

P_EOS   P_RTV

PCE_EOS   PCE_RTV

EOS is the usual approach to deal with the data; RTV reorganises past published real-time dataset.

Data Revisions and Macroeconomics

Macroeconomists need to be careful when doing structural analysis and forecasting with data subject to revision, in particularly if using national account data.

From the point of view of users of national account data, timely release is important: data revisions are a fact of life if initial releases were based on incomplete data in order to be timely. However availability of datasets with all past vintages (releases) organised by released date is also essential!

Data Revisions and Macroeconomics

If users find patterns in historical data that allow them to predict data revisions, this will be exploited when computing forecasts in particularly if the target is to predict revised data, which are likely better estimates of the underlying macroeconomic variables.

References:

Clements and Galvao (2013) "Real-time Forecasting of Inflation and Output Growth with Autoregressive Models in the Presence of Data Revisions" **Journal of Applied Econometrics.** 28: 458-477.

Clements and Galvao (2015) "Predicting Early Data Revisions to US GDP and the Effects of Releases on Equity Markets" **Journal of Business and Economic Statistics**. Forthcoming.

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