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The KOF Barometer, version 2014

A composite leading indicator for the Swiss business cycle

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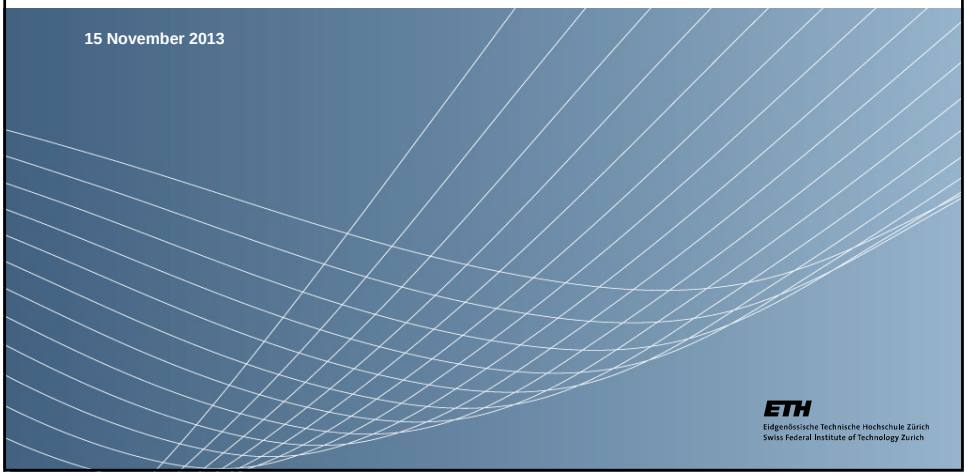
15 November 2013



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Introduction

- The 2006 version of KOF Barometer was largely calibrated on data covering the Great Moderation period
- Availability of data relevant for the Swiss business cycle has increased substantially since the last major revision
- Demand for receiving timely information on economic developments with a substantial news value and a high degree of transparency has increased

- Objectives of the revision
  - No longer use a filter for smoothing
  - Broaden the set of underlying time series
  - Define a standardized procedure to select variables
    - Automatize and regularly apply the variable selection procedure

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Short historical overview

- Overall: variables selected by cross-correlation analyses and expert judgement
- 1976 Version
  - Reference series: de-trended real GDP
  - Number of variables selected: 6 (construction, manufacturing (2x), labour, money, stocks)
- 1998 Version
  - Reference series: real y-o-y growth in GDP
  - Number of variables selected: 6 (all from Business Tendency and Consumer surveys)
  - Variables were low-pass filtered and then the first principal component was extracted
- 2006 Version
  - Reference series: real y-o-y growth in financial, construction and core gdp (3 modules)
  - Number of variables selected: 25
  - For each module the first principle component was extracted
  - Aggregate is filtered using end-point stable Direct Filter Approach (DFA) of Wildi (2008)
- Motivations to revise:
  - Changing leading characteristics of underlying variables
  - Changing availability of underlying variables
  - (No value added of modulare structure)

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Construction of the 2014 version

- Objectives
  - No longer use a filter for smoothing
  - Broaden the set of underlying time series
  - Define a standardized procedure to select variables
    - Automatize and regularly apply the variable selection procedure
- Two production stages
  - Variable selection procedure
    - Choose business cycle concept
    - Define reference series
    - Pre-select the pool of potential variables
    - Fix the automated selection procedure
  - Construction of the leading indicator
    - Extract the first principle component from the selected variables

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Reference series

- The KOF Barometer is an indicator published monthly
- The reference series ideally also has a monthly frequency
- Seasonally adjusted real GDP is interpolated using the Denton additive method
- M-o-m growth rates are calculated out of this and subsequently smoothened using a symmetric 13 months moving average
  - High frequency current growth rate are highly volatile, reflecting measurement errors, weather effects, working day effects, and alike
  - The aim of the KOF Barometer is to signal the underlying business cycle – not high frequency fluctuations

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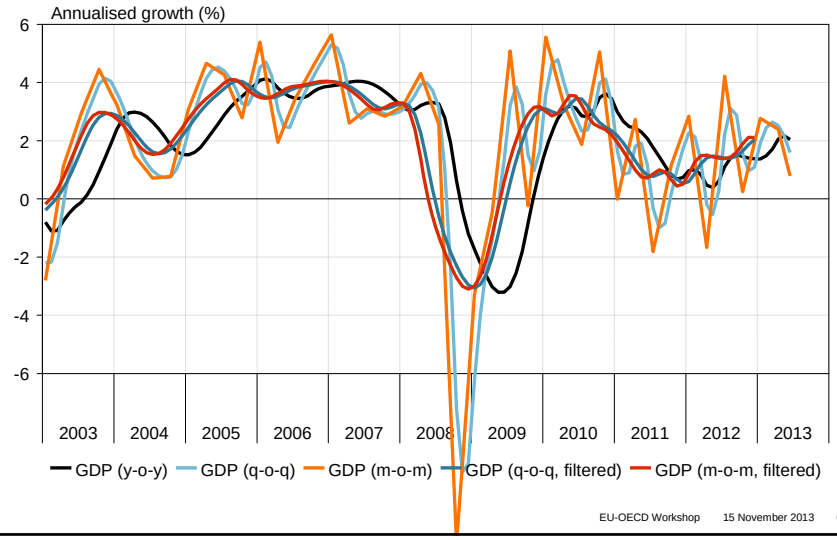
Potential reference series



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Pre-selection of potential variables

- International variables: currently 32 variables
  - Concentrate on the 11 most important trading partners
    - 1 Business tendency & 1 consumer survey question per country
  - Ifo World Economic Survey, assessment and expectations for 5 regions
- National variables: currently 445 variables
  - KOF Business Tendency Surveys (418)
  - SECO Consumer Survey (9)
  - BFS, SECO, OZD, SNB (18)
- For each of these variables we determine all
  - sensible transformation (level, log level, quarterly difference, monthly difference, annual difference, balance, positive, negative) (2666)
  - theoretically expected sign of the correlation with the reference series
- The automated selection makes sure that only one transformation of the variable will ultimately be selected

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Automated selection procedure

- A 10-year window is used to carry out cross-correlation analyses
  - For the 2013 vintage, the reference series covers 2003-2012
- Allow for a lead of up to 6 months
  - h = [0, 1, 2, 3, 4, 5, 6]
- For each transformation, determine lead associated to maximum cross-correlation with reference (h^{max})
- This correlation needs to surpass a threshold
  - r(h) ~ AN, r(h^{max}) needs to be significantly different from zero
  - Estimated variance takes the autocorrelation into account
- When comparing different transformations, we realise that there is a trade-off between the correlation and the lead, and take that transformation that optimizes
  - max U(h^{max}_i) = |r(h^{max}_i)| x sqrt(h^{max}_i + 1)
- Finally, the variance of these variables is collapsed into a composite indicator as the first principal component

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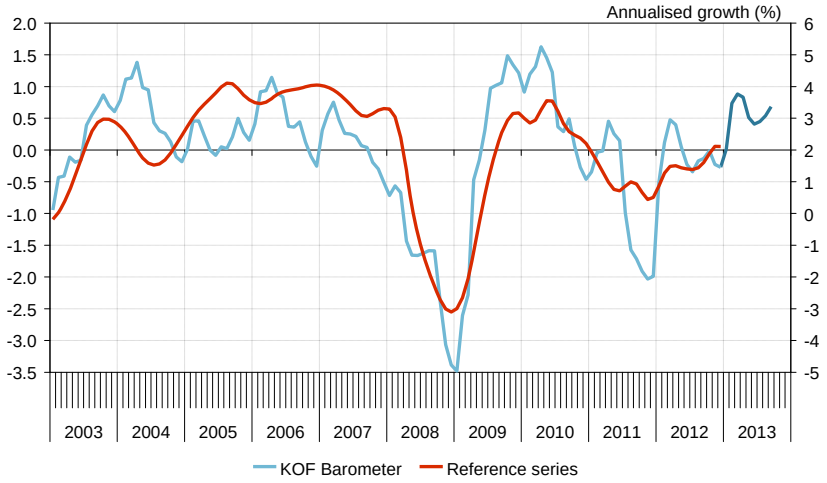
Reference series and KOF Barometer



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Yearly updates in September

- Swiss quarterly SNA is published by SECO
- Swiss annual SNA is published by SFSO
  - Every summer a new vintage is released
  - This vintage contains the first release of previous year's growth by the SFSO
- The subsequent quarterly release of SECO incorporates this annual information

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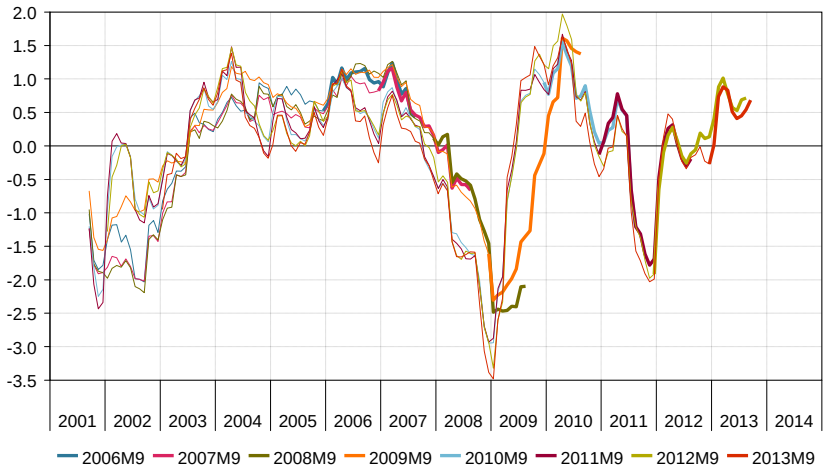
Pseudo real-time vintages of the new KOF Barometer



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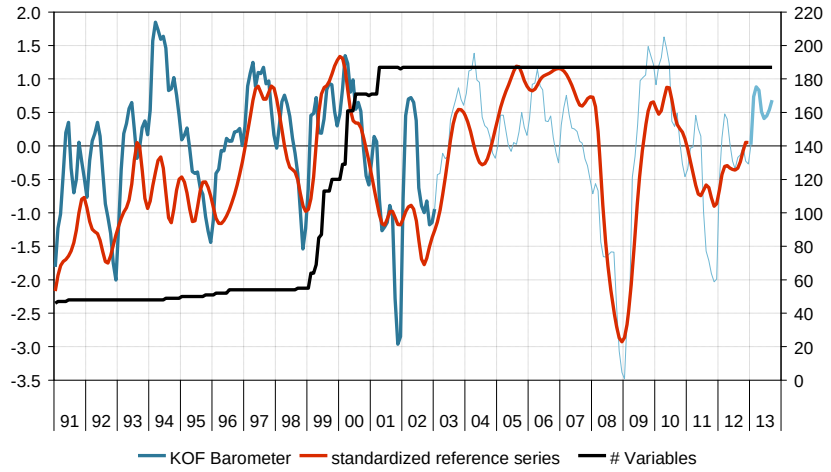
The construction of new KOF Barometer values before the start of the reference period

- The variable selection procedure is based upon a 10-years window
- To extrapolate a KOF Barometer vintage backwards, the problem of missing data is encountered
  - Both level and variance of the KOF Barometer are distorted
- To deal with this, the Stock and Watson (2002) Expectation Maximisation (EM) procedure is applied
  - Missing observations are estimated based on PC
  - New PC is estimated using these estimates
  - Procedure is repeated until convergence
- (Same procedure is used in real-time when data are missing due to unforeseen circumstances – this removes a potential bias)

Backward extrapolation of the current KOF Barometer



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KOF Barometer in pseudo real time

- Variables can be grouped in many ways
  - KOF vs non-KOF
  - International vs. national
  - Demand vs. supply
  - Along sectors
  - ...
- This allows us to analyse what is causing changes in the KOF Barometer

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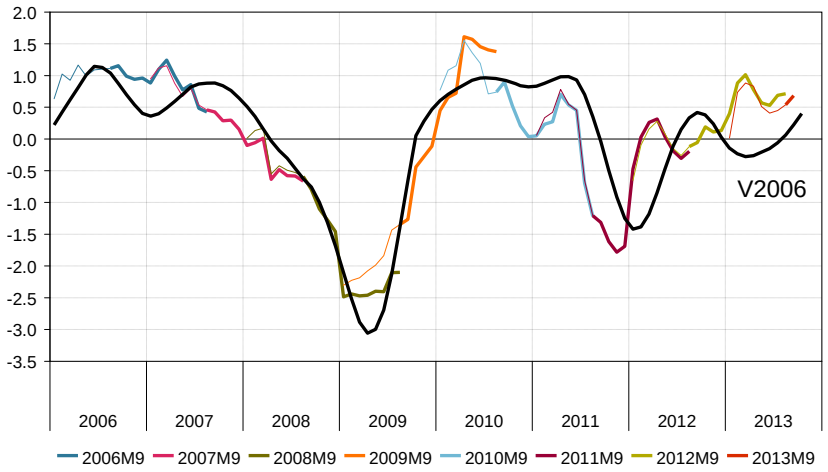
Pseudo real-time data to analyse



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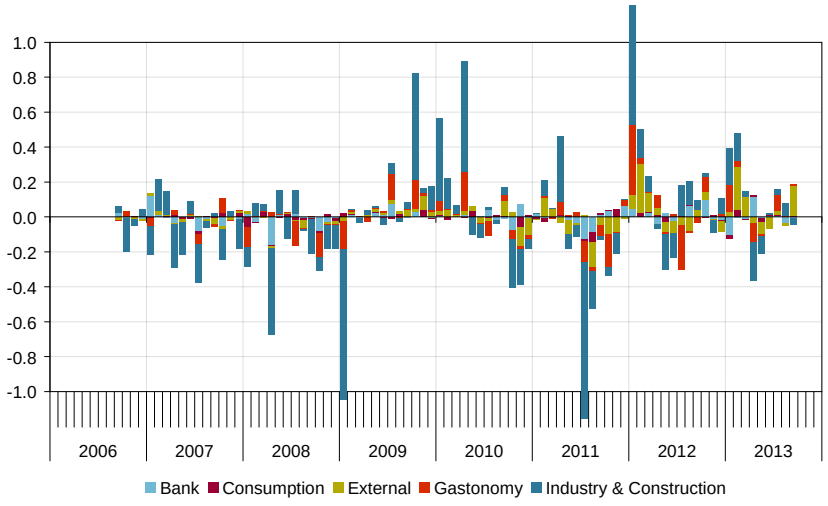
Month-to-month changes in pseudo real-time



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Comparing the new KOF Barometer with other major composite leading indicator in the world

- OECD composite leading indicator for Switzerland
  - Business cycle concept: growth cycles
  - 5 variables: 3x KOF BTS, 1x SECO Consumer Survey, share price, silver price
- The Conference Board leading indicators for the United States and the euro area consist of respectively ten and 7 variables using the classical business cycle concept
- CEPR Eurocoin selects 145 variables according to three main criteria:
  - a sufficient time series span (at least starting in 1987)
  - a high correlation and lead using growth rate cycle concept
  - released in timely manner by statistical agencies

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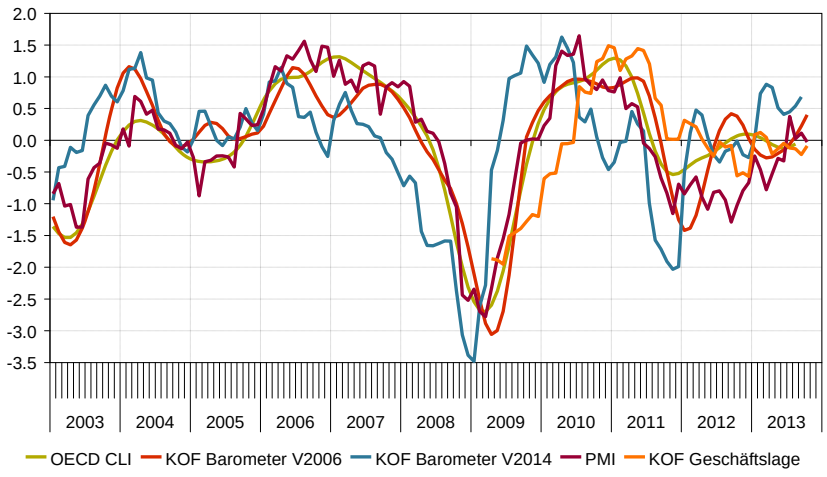
Current vintages of alternative indicators



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To do list

- Further analyses of the new KOF Barometer in (pseudo) real-time
  - Compare 2014 & 2006 Barometers to m-o-m and y-o-y GDP growth
    - Show lead characteristics relative to these reference series
  - Analyses of real-time revisions
    - How (un)important are revisions within a vintage, i.e. year?
- Robustness checks
  - The lack of a modular structure
  - The relevance of higher order principal components
  - The consequences of using a different reference series
  - Dynamic factor analysis as alternative for the second stage
  - The influence of the Great Recession

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Conclusions

- Composite leading indicator for the Swiss growth rate cycle
- Principle building blocks
  - Identification of theoretically valid variables with empirically established leads to the reference series
  - Aggregation of these variables into a composite indicator.
- After the release of the annual SNA the KOF Barometer will be updated
  - Reflecting revisions in the reference series
  - Reflecting one additional year of information