Using rule-based updating procedures to improve the performance of composite indicators*

Klaus Abberger,[a,b] Michael Graff,[a] Boriss Siliverstovs[a] and Jan-Egbert Sturm[a,b]

June 2017

Abstract: Ideally, the set of variables underlying composite indicators is checked and updated when needed on a regular basis. In practise, the timing and procedures of these updates are usually chosen *ad hoc*. We suggest a rule-based indicator selection updating procedure, performed at regular intervals, which reduces the arbitrariness of this process. We apply this procedure to one of the most prominent targeted composite leading indicator for Switzerland, which is based on bivariate associations of potential variables with a reference series reflecting the Swiss growth rate cycle. We show that in a simulated real-time analysis the targeted indicator selection procedure outperforms the widely used approach to combine as many potential variables as possible. Furthermore, the regular updating procedure preserves the leading properties of the composite indicator with respect to the reference time series, as compared to the same composite indicator without such updates.

JEL classification: E32; E37

Keywords: Composite leading indicators; indicator selection; real-time analyses

Highlights

- Composite indicators regularly need overhauling – this is often done *ad hoc*.
- We propose a rule-based approach, increasing transparency and reducing arbitrariness.
- We apply this to a targeted composite leading indicator for Switzerland.
- The targeted indicator outperforms others that combine as many variables as possible.
- Our updating procedure preserves the leading properties of the composite indicator.

* The paper benefited from suggestions by Jan Jacobs and comments of participants at the KOF Brown Bag research seminar, research seminars at the DIW Berlin and the University of Hamburg, the Joint EU/OECD Business and Consumer Surveys Workshop in Brussels, Workshop on Panel Survey Data and Business Cycle Analysis in Berlin, the 7th International Conference on Computational and Financial Econometrics (CFE2013) in London, the 7th Beyond Basic Questions Workshop in Heidelberg, the 20th International Conference on Computing in Economics and Finance (CEF2014) in Oslo, the 34th International Symposium on Forecasting (ISF2014) in Rotterdam, the 14th OxMetrics User Conference in Washington DC, the International Association for Applied Econometrics (IAAE2014) Annual Conference in London, the Econometric Society Australasian Meeting (ESAM 2015) in Hobart and − last but not least − the 2nd Henan University/International Network for Economic Research (INFERS) Workshop on Applied Macroeconomics in Kaifeng (China) in March 2016. We are also deeply indebted to two anonymous referees for their valuable comments and suggestions. The usual disclaimer applies.

[a] KOF Swiss Economic Institute, ETH Zürich, Switzerland.

[b] CESifo Munich, Germany.

1. Introduction

Composite leading indicators are based on either the assumption or else empirical evidence that they outperform single variable indicators in which respect whatsoever.

There are numerous composite leading indicators to help assess the current and near-term business cycle stance, released for example by the OECD and the Conference Board. Whilst the latter concentrates on publishing so-called Leading Economic Indices for 12 countries and, in addition, the euro area, the OECD nowadays produces Composite Leading Indicators for 47 countries and regions all around the world.

For many countries, national institutes and central banks construct and publish other leading indicators, like the euro area-wide leading indicator proposed by de Bondt and Hahn (2014), or the (new) Eurocoin for the euro area, published by the Centre for Economic Policy Research (CEPR) and the Banca d'Italia (Altissimo et al., 2010). For Germany, the Ifo institute provides a series of economic indicators capturing economic tendencies in Germany and worldwide. In Switzerland, the KOF Economic Barometer is the most prominent leading composite indicator as measured by media attention and financial market impact. This paper focusses on the objectives and the innovative features that were introduced in the 2014 revision of this composite indicator.

Composite leading indicators usually have in common that variables are selected to enter the final indicator by their fit to a reference series. However, over time economic relationships, data availability and sometimes even historical data change. Hence, the variables that were selected at a certain moment may later turn out to be no longer optimal in reflecting the new data points or the latest vintages of a reference series, and their periodical overhaul is required. This is important to maintain the reliability of composite indicators. The need for such overhauls is widely acknowledged. As the OECD methodology guidelines regarding its system of composite leading indicators (CLI) put it: "Once these various factors and series have been selected the CLI specification is fixed until they are next reviewed, which occurs periodically to ensure the CLI retains its relevance" (OECD, 2012, p. 4). Likewise, Levanon et al. (2011) provide a description of the latest comprehensive benchmark revision of the Leading Economic Index released by the Conference Board for the United States. However, the timing and the exact procedure are in all of these indicators not fixed in advance.

Generally, it is difficult to determine when it is time to carry out such an overhaul. Usually, the need for a comprehensive benchmark revision becomes evident only after substantial deterioration in forecasting performance (Bujosa et al., 2013, p. 487). Furthermore, experience shows that an update of this kind can be quite time consuming, as the underlying procedures are often not clearly defined, leaving substantial room for discussion and interpretation. Hence, in this paper we propose not to wait until the first warning lights start blinking, but rather to have updates and routine maintenance taking place in a pre-defined manner at pre-set intervals. This allows such a leading indicator to adapt to a changing environment.

This paper's main contribution is to show how the typical ad hoc overhaul of composite leading indicators can be replaced by a rule-based procedure. In particular, we present a pseudo real-

time evaluation of such a procedure for a real-world indicator, the aforementioned leading composite economic indicator for Switzerland (KOF Economic Barometer), published monthly by the KOF Swiss Economic Institute at ETH Zurich.[1] The selection algorithms for this composite leading indicator are determined *ex ante*, so that subsequent subjective judgement is largely eliminated. Such a transparent strategy can increase the trustworthiness into the published indicators substantially.

We show that the targeted indicator selection procedure outperforms the widely used approach to combine as many potential variables as possible. Furthermore, the regular updating procedure preserves the leading properties of the composite indicator with respect to the reference time series, as compared to the same composite indicator without such updates.

The rest of the paper is structured as follows. Section 2 provides a review of the literature and places our approach in its context. In Section 3, we describe the data set for the construction of our composite indicator. Section 4 provides a detailed description of the procedure. We document the computation of the latest version of the composite indicator and of its historical vintages in real and pseudo-real time. By constructing three alternative versions of the composite indicator, we are able to check the usefulness of our proposed regular rule-based indicator selection procedure in Section 5. Using real and pseudo-real time vintages, we carry out an out-of-sample analysis and find evidence supporting the value added of our approach. Section 6 concludes.

2. Literature review

Following the seminal contributions of Stock and Watson (2002a, 2002b), large-scale factor models have become popular in composite indicator construction. Estimates of approximate factor models with (static) principal components are also documented in Bai and Ng (2002) and Bai (2003). Another type of dynamic factor approach was developed by Forni et al. (2000, 2001, 2005 and 2010). Factor models were used for example by Giannone et al. (2008) or Luciani (2014) to construct business cycle indicators.

However, for composite leading indicators, a more widespread approach is to select a handful of underlying indicators. For example, the leading composite indicators of the Conference Board for the United States and the euro area consist of ten and seven variables, respectively. The business conditions index for the United States presented by Aruoba et al. (2009) is based on six variables, including quarterly GDP. The euro area-wide leading indicator (ALI) proposed by de Bondt and Hahn (2014) is composed of nine variables. The composite leading indicator for the Spanish economy of Bujosa et al. (2013) consists of four monthly indicators, to which

[1] The KOF Economic Barometer, a composite indicator resulting from the procedure suggested in this paper, is published monthly since April 2014. For details and all data vintages, see http://www.kof.ethz.ch/en/forecasts-and-indicators/indicators/kof-economic-barometer.html. For a detailed documentation of this composite indicator, see Abberger et al. (2014); for earlier versions, see Graff (2010). A brief history of the KOF Economic Barometer from the first version in 1976 is given in Appendix 1 of this paper.

they refer as "cycle drivers". The EURO-STING indicator of Camacho and Perez-Quiros (2010) is based on ten variables. The composite short- and long-term leading indicators for the euro area constructed by Rua and Nunes (2005) are based on eight and ten variables, respectively. The OECD composite leading indicator for Switzerland currently consists of six variables (OECD, 2012).

A noticeable exception to the practise of only including a relatively limited set of variables is the Eurocoin indicator published by the CEPR and the Banca d'Italia. The first generation of the Eurocoin indicator, described in Altissimo et al. (2001), is based on 246 variables, selected from a much larger initial data set comprising 951 time series. The second generation Eurocoin was introduced in 2007 (Altissimo et al., 2010). Apart from changes in computational methodology and redefinition of the reference time series, the new version is based on a smaller data set of 145 variables, which nevertheless still by far exceeds the typical number of variables combined into composite indicators.

The focus of this paper is on the KOF Economic indicator. The objective of this indicator has always been to provide early signals regarding the Swiss economy. For this, it targets a reference series derived from official GDP data using various sources of information (variables). In its construction, revisions of past values of the leading indicator are avoided to the extent possible. Not only the current fourth version follows these principles, also the previous three versions of the KOF Economic Barometer are rooted in this tradition. The first two versions, released in 1976 and 1998, were based on six variables. The third and previous version [released in 2006, Graff (2010)] increased the number of variables to 25, but the selection was still ad hoc.

The modelling framework suggested in this paper is related to the approaches of Altissimo et al. (2001, 2010), Bair and Tibshirani (2004) and Bair et al. (2006). We start with a large number of variables; and rather than extracting one or more common factors from all available variables at hand, we first perform a preselection based on well-specified statistical criteria ("supervised principal components"). Extracting common factors from a pre-selected subset of indicators has also been labelled as "targeted predictors" approach (Boivin and Ng, 2006; Bai and Ng, 2008). The rationale for "targeted" or "supervised" common factors is that extending a data set with more and more variables that bear little information about the targeted reference series does not necessarily improve the in- or out-of-sample fit. On the contrary, leaving out irrelevant data and the associated false signals produces a composite indicator that is focussed on the reference series rather than purely on the common variance of a large data set, where the latter may be ill defined from an economic observer's perspective.

Principal components are usually extracted in data rich environments. The availability of many predictors was the reason for Stock and Watson to apply principal components in forecasting (Stock and Watson 2002a). The method also belongs to the standard toolkit for the construction of composite indicators (OECD 2008). However, as the principal component procedure exclusively addresses the covariance of the indicators, it is not guided by a target. That is why principal component analysis is often classified as an "unsupervised" approach (James et al. 2013, p. 375). Thus, for composite indicators, some implicit selection or screening process is

often performed in advance. This screening is in data rich environments important, because a bulk of unsuited indicators could shift the first principal component away from measuring the business cycle. To avoid such a shift away from the target the individual indicators should be clearly related to the target. We therefore first assess the variables individually and only include variables, which are deemed "useful" in the first principal components analysis. This is what differentiates this approach from model or variable selection approaches like sequential testing (see e.g. Hendry 1995, 1997) or shrinkage methods like Lasso (Tibshirani 1996). In contrast to what is common practise, our approach makes the pre-selection explicit.

A formalisation of this process is in our view important when composite economic indicators are published and regularly modified to adapt to changing data availability and economic conditions and are used as a guidance by economic policy makers, financial market analysts and the broader public. In these cases, the selection and the revision process should be transparent, preventing any suspicion of subjectivity or manipulation. In our view, this is so far not sufficiently reflected in research and applications in this field. Moreover, the formalisation of the initial variable selection process can at the same time provide the blueprint for subsequent revisions. This is exactly the approach followed here

Resorting to a large-scale factor model in tandem with an updating procedure repeated at regular intervals carries the following implications. First, once the procedure is defined, the variable selection is transparent and non-subjective. Second, it allows capitalising on the ever-increasing number of time series that are potentially helpful in explaining cyclical developments. During the last years, data availability and accessibility has increased substantially because more and more institutions collect data and publish them. In the case of Switzerland, the KOF Swiss Economic Institute has for example widened the scope of its business tendency surveys to cover even more economic sector than in the past.

Taken together, our method to calculate the composite indicator is an extension of the proposals of Stock and Watson (2002a and 2002b), where this paper documents a formalised pre-selection process that we suggest to be conducted at regular intervals. For indicators that are actually published at a regular basis for the public and for business cycle analysts, we believe that such a procedure increases transparency considerably and keeps the composite indicator timely.

Apart from this, we directly address the fact that no forecasting tool works optimal all of the time. Forecasters more often than not face combinations of structural shifts and breaks (see Castle et al. 2016), which may lead to locations shifts in any of the time series in the forecaster's bag and make past correlations between them break down, whilst no correlations are establishing itself. Our composite indicator reflects this situation with an automated updating procedure designed to minimise the resulting negative impacts on the forecasting performance and at the same time to preserve the essential characteristics of the tool.

3. Data

This section describes the reference series for the composite indicator and the way in which variables are selected into the initial pool of indicator variables that are allowed into the automated selection procedure, which will be described in Section 4.1.

3.1 Business cycle measurement: The reference time series

There are several options regarding a reference time series representing business cycle dynamics. For example, the OECD composite leading indicators focus on "deviation cycles". To isolate this cycle, the trend is removed by applying a Hodrick-Prescott filter (Hodrick and Prescott, 1997). On the other hand, the Leading Economic Indices of the Conference Board target economic expansions and contractions at the level of aggregate output, i.e. according to the "classical business cycle" concept. The new Eurocoin of Altissimo et al. (2010) refers to the GDP "growth rate cycle" to generate the reference series, obtained by filtering short-term fluctuations out of a GDP growth rate series.

We opt for the growth rate cycle. It circumvents the need to estimate trends and is in general quicker in detecting turning points. The obvious candidate series is seasonally adjusted (real) GDP growth, available for Switzerland at a quarterly frequency. The composite leading indicator we have in mind, however, is a monthly indicator, so that a monthly reference series is to be preferred and therefore has to be constructed. To this end, the level of seasonally adjusted (real) GDP is interpolated using the Denton additive method.[2] This assures that the interpolated monthly observations add up to the published quarterly value.

Based on this monthly GDP series, growth rates at monthly frequency can be computed. However, a disadvantage month-over-month (m-o-m) growth rates is their high volatility, making the underlying business cycle less apparent, as seasonal, weather and working day effects as well as measurement error and other noise may have huge effects. Therefore, the m-o-m series is smoothed with a symmetric 13 months moving average,[3] centred on the observation at time t.[4]

To track the consequences of this synthetic reference series, we alternatively use the quarter-over-quarter (q-o-q) growth rate of seasonally adjusted Swiss GDP as reference, where the q-o-q growth rate is carried forward three times in a row to arrive at a monthly reference series that does not go beyond what the official statistics provide.[5] In other words, the synthetic monthly GDP growth variable is our preferred reference series, but all indicator construction steps as well as the subsequent analyses are likewise performed with the published quarterly growth rates as reference series. This allows us to analyse the consequences of our choice.

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[2] The objective of the Denton additive method is to distribute the quarterly values to a monthly frequency such that it keeps the difference between the estimated monthly series and an indicator series as constant as possible, subject to quarterly constraints. For a discussion of methods for temporal disaggregation, see Chen (2007).

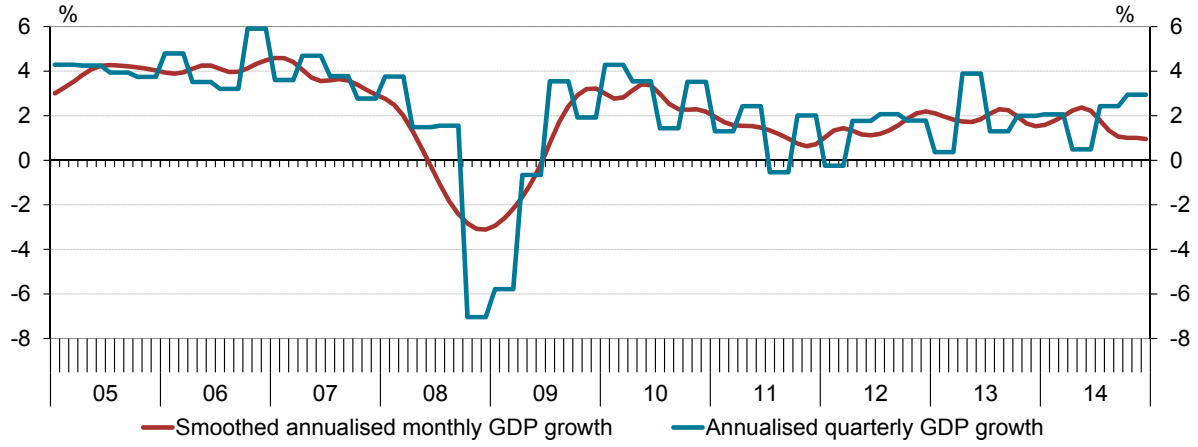
[3] Since the values for months t-6 and t+6 reflect the same months in two different years, they receive half the weight compared to the other observations.

[4] We also experimented with more sophisticated filters, like the Henderson filter. However, in the present setting we observed no advantages in contrast to the simple 13 months moving average. We hence opted for the less complicated and especially more transparent method.

[5] Note that both symmetric smoother and carrying forward procedure circumvent the end-point problem.

Figure 1 illustrates the two growth rates that we use to indicate the Swiss business cycle, computed from the GDP vintage published by the State Secretariat for Economic Affairs (SECO).[6] Obviously, the different measures of the growth rate cycle look quite similar, but differ in two aspects: The m-o-m growth rate has a lead before the q-o-q growth rates, and the latter is constant for three months in a row when broken down to monthly frequency.

Figure 1: Reference time series



3.2 Economic indicators

Using a priori expert judgement, 372 time series were identified to have a potentially close relationship to the Swiss growth rate cycle.[7] The lion's share of these variables cover the Swiss economy. Of these, over 300 come from the KOF Business Tendency Surveys covering the following sectors of the economy: banks, retail trade, accommodation and restaurants, construction, as well as manufacturing. The survey in the manufacturing sector is sub-divided into the following branches: food, textile, wood, paper, chemistry, metallurgy, machine construction, electrical, and others. Seven Swiss variables come from the consumer survey conducted by the State Secretariat for Economic Affairs (SECO). The remaining Swiss variables such as money supply, interest rates and their spreads, stock market indexes, exchange rates, automobile imports and registrations stem from different sources like the Swiss National Bank (SNB), the Swiss Federal Statistical Office (SFSO), and the Swiss Customs Administration (OZD). Since Switzerland is a small open economy, its business cycle can be expected to be strongly influenced by the world economy, in particular by economic developments among its main trading partners. We refer to variables provided by the CESifo World Economic Survey on assessments and expectations for the five largest regions in the world. For each of the eleven most important Swiss trading partners, we retain one business tendency and one consumer survey indicator per country. These business tendency and

[6] It shows the reference series as used in the selection procedure in September 2015. Older vintages are available on request.

[7] An overview of all variables used in this paper is given in Appendix 2 of this paper.

consumer surveys are provided by the European Commission, DG ECFIN for European countries, and national entities for China, Japan, and the United States. This results in 32 international variables. We on purpose keep this set of international variables restricted to circumvent spurious correlation.

From the total of 372 indicators in levels, we compute all economically sensible transformations, like one-, three- and twelve-month changes or growth rates. For the KOF survey variables, besides the balance statistics, we also take the shares of positive, negative and no-change answers into consideration. To remove seasonality, we submit all variables and all of their transformations (with the exception of seasonally differenced variables) to the X-13ARIMA-SEATS seasonal adjustment procedure developed by the United States Census Bureau. In total, we are left with 3,314 transformations. Most of the series are monthly, but a few – notably some survey questions − are at quarterly frequency. We use the Expectation Maximisation algorithm of Stock and Watson (2002b) based on information from the rest of the variables in the panel to impute monthly values to the quarterly series. Thus, all indicators are treated as they would be available at a monthly frequency.

For variables for which we have a clear economic reasoning about the sign of the relationship with the target variable, we guide the procedure further and include sign restrictions. This is done to reduce potential spurious correlations. However, a sign restriction is only introduced when being obvious. So, for example, a business tendency survey question regarding expected production (production will increase/remain unchanged/decrease) should clearly have a positive association with the target series and such a sign restriction is imposed. No sign restriction is imposed for example regarding sales prices. A firm may increase its sales price as a result of strong demand (pull effect) or because of a cost push shock. The direction of impact on economic may hence differ.

4. Construction of the composite indicator

This section documents the steps to select the variables and their transformations that enter the composite indicator from the initial pool of indicator variables. To keep the indicator up to date, this procedure is repeated once a year, typically in September, when the Swiss State Secretariat of Economic Affairs (SECO) releases the quarterly System of National Accounts (SNA), shortly after the release of the annual SNA by the Swiss Federal Statistical Office (SFSO). Accordingly, the timing of the annual update is contingent on the release date of an additional year of SNA data.

4.1 Automated variable selection procedure

Prior to initialising the selection procedure, variables for which the latest data points are not yet released due to their publication lags, are shifted forward to achieve a balanced panel at the end of the sample. We thus exactly follow the "vertical realignment" procedure applied by Altissimo et al. (2010). In comparison with other methods devised for dealing with this ragged-edge problem (like filling them with forecasts based on autoregressive models), the realignment method introduces no past revisions to the composite indicator – which we want to avoid as far

as possible. The forward shifts according to the publication lags are imposed until the selection procedure is re-run and the next vintage of the composite indicator is produced.[8]

We then apply the following procedure to each of the 3,314 transformed indicators. The in-sample period is set to a 10-year rolling window in order to reduce the dependence on distant past observations and to allow for a (relatively) timely update of the pool of leading variables. The common definition of business cycles also implies that usually at least one complete cycle should be covered by this window. The selection of indicators for the pool of leading variables used in the construction of the composite indicator is based on the cross-correlation analysis of that variable and the reference time series. We require that the corresponding maximum (absolute) cross-correlation is found at the lead range specified between zero and six months. Furthermore, we test the significance of the computed cross-correlation using the following result stating that sample cross-correlations at lag h between two independent stationary time series have the asymptotically normal (AN) distribution

$$(1) \qquad r_{yx}(h) \sim AN\left(0, T^{-1}\left[1 + 2\sum_{j=1}^{\infty} r_y(j) r_x(j)\right]\right),$$

where $r_y(j)$ and $r_x(j)$ are the respective autocorrelations at lag j, and T denotes the sample size (Brockwell and Davies, 1987, p. 400). A maximum order of autocorrelation function used in Equation (1) is selected using the $l_4 = int[4(T/100)^{(1/4)}]$ criterion as described in Schwert (1989, p. 151). In order to ensure that the finite-sample estimate of the variance in Equation (1) is positive, we use the Bartlett kernel as in Newey and West (1987). We use the usual z-test statistic in the form of the ratio of observed maximum cross-correlation and its standard deviation as shown in the equation above. For indicators for which we impose sign restrictions on their cross-correlation with the reference time series, we use a one-sided test, and correspondingly, a two-sided test is used for those indicators without explicit sign restrictions.

Note that cross-correlations are computed for combinations of different transformations ([log] level and [log] changes) and different presentations (e.g. for surveys we consider net balances, share of equal answers, as well as share of positive and share of negative answers) of the same variable. However, we allow only *one* transformation to be selected for computation of the composite indicator. Since the different transformations of an underlying indicator series usually show different magnitudes of the computed maximum absolute cross-correlations and different leads, we use the following "utility function" to select exactly one of the transformations of the indicator that pass the significance threshold: $U = \left|\hat{r}_{yx}^{\max}\right| (lead+1)^p$, with *lead* taking values between zero and six. The exponent parameter p is set to 0.5, allowing for a decreasing marginal utility of higher leads. This quantifies the trade-off between the size of the cross-correlation and its lead. It is typical that larger cross-correlations occur at smaller leads,

[8] When the publication of an indicator is delayed, interrupted or abandoned before the selection procedure is re-run, the resulting missing values are also imputed using the Expectation-Maximisation algorithm. When a publication lag is shortened, the forward shift determined in September for the current vintage is kept the same in order to avoid a backward revision of the barometer.

implying that in order to benefit from the leading properties of individual variables one may have to disregard transformations that have higher cross-correlations at shorter leads. That transformation of a variable with the highest value of the utility function U is selected in the computation of the composite leading indicator, subject to the condition that all restrictions imposed on sign, significance and lead with respect to the reference time series are met.

4.2 Computation of the composite indicator

The outcome of the selection procedure leaves us with a set of time series that fulfil the required leading properties with respect to the reference series. The computation of the composite leading indicator thus draws on a data panel characterised by both high temporal (T) and cross-sectional (N) dimensions. Therefore, we aggregate the data with an approximate static factor model like the one presented by Stock and Watson (2002a) that allows modelling the co-movement of numerous variables in terms of a few latent factors.

The approximate static factor model for an N-dimensional multiple time series X_t assumes the following factor model representation featuring k common latent factors, F_t, in matrix notation

(1) $X = F\Lambda' + e,$

where $X=(X_1,\ldots,X_T)'$ is a TxN matrix, $\Lambda= (\Lambda_1,\ldots, \Lambda_N)$ is an Nxk matrix of the factor loading coefficients, and $F=(F_1,\ldots,F_T)'$ is a Txk matrix of common factors. The idiosyncratic error term $e=(e_1,\ldots,e_T)'$ is variable-specific, and has the corresponding dimension of TxN. The idiosyncratic disturbances can be correlated both across time and cross section. The approximate static factor model relaxes restrictive assumptions of the classic factor analysis that requires cross-sectional and temporal independence of the idiosyncratic disturbances. Stock and Watson (2002a) show that under fairly general conditions regarding the error terms the latent factors can be consistently estimated using principal components (PC) extraction.

For the choice of the appropriate number of common factors to be extracted from the data, we rely on the procedure suggested in Ahn and Horenstein (2013). They propose to select the number of factors based on the sequence of ratios of adjacent eigenvalues λ_k of the sample correlation matrix of X_t arranged in a descending order:

(2) $ER(k) = \lambda_k/\lambda_{k+1},\ k=1,2,\ldots,k_{max},$

where "ER" stands for "eigenvalue ratio". According to Ahn and Horenstein (2013), the optimal number of factors k^*_{ER} is selected as follows:

(3) $$k^*_{ER} = \max_{1\le k\le k_{\max}} ER(k).$$

The authors show that this procedure leads to a consistent estimator for the number of underlying factors.

In our case, the ER-criterion consistently selects one principal component to be extracted from the panel of pre-selected variables. Hence, our composite indicator is given by this first principal component, a variable with a mean of zero and a standard deviation of one. To ease

the communication to, and understanding by, the general public, we re-scale it to a mean of 100 and a standard deviation of 10 within the 10-year window used in the variable selection procedure. This implies that values above 100 indicate that the underlying growth rate cycle is in a phase above its 10-year average; values below 100 indicate the opposite.

Once this selection procedure has resulted in composite leading indicator, we fix the set of underlying variables and seasonal adjustment factors for a year. After publishing the KOF Economic Barometer 12 months in real time, the procedure is being repeated. Only then, the reference series is updated, the 10-year reference window is moved by a year, new variables are allowed to enter the initial pool of indicator variables and variables that are no longer being published removed from this pool.[9] This well-defined and transparent updating procedure is, as far as we are aware, unique when it comes to regularly published composite leading indicators for the business cycle.

4.3 Producing historical vintages of the composite indicator

To assess the leading properties of the constructed indicator and show the benefits of this automated updating procedure, we need to create historical vintages. To this end, we refer to the real-time vintages of past GDP data releases to compute the reference series that forecasters would have faced in real time. The resulting monthly reference series with their respective 10-year windows are shown in Figure 3.

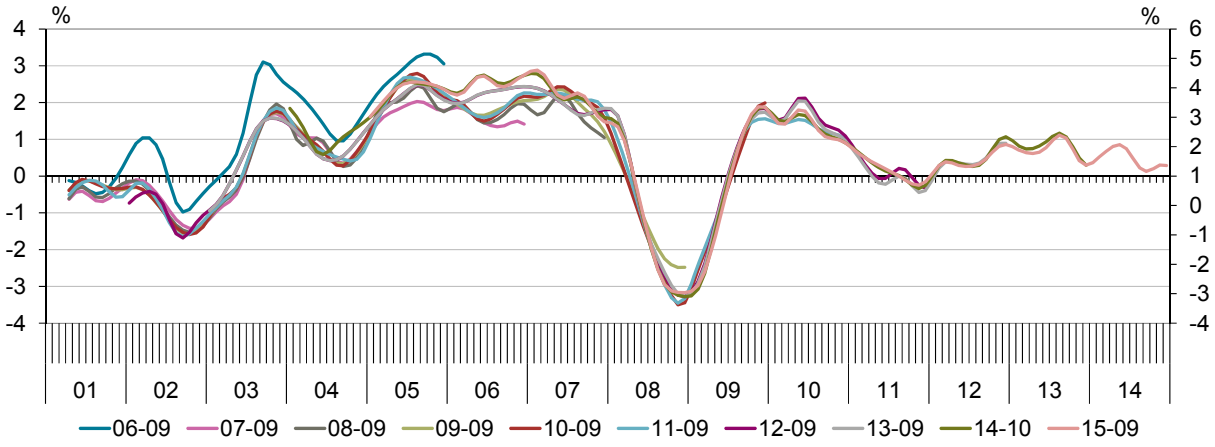
Ideally, the set of variables that go into the selection procedure would have to be reconstructed in real time too, to represent the actual information available in previous years. For technical reasons, this is hardly feasible. However, as most of our variables result from surveys and therefore undergo relatively minor revisions – if at all – this problem is substantially alleviated in practice. Hence, regarding the database of potential variables, we rely on what is often labelled a "pseudo-real time" setup. We construct these pseudo-real time vintages of the indicators by appropriately truncating them according to their publication lags. To account for changing seasonal factors, we estimate them recursively and conduct the seasonal adjustment vintage by vintage.

We start with a first pseudo-real time data vintage for September 2006. The corresponding sample for the cross-correlation analyses is 2001M4-2005M12 for this "first" vintage. The choice of a starting point in 2001M4 reflects the fact that the majority of the indicator series in our panel begin around this time. The subsequent vintages of the composite indicator are constructed using an expanding window in the cross-correlation analyses until the underlying sample reaches 10 years. This is achieved in September 2012, when the sample period for the cross-correlation analyses is 2002M1-2011M12. The last annual vintage of the composite

[9] To be able to compare the different vintages and versions of our composite indicator, we keep this set of *potential* variables to enter our indicators in this paper constant over time, i.e. across vintages.

indicator addressed here was computed in September 2015, with the corresponding 10-year window spanning the period 2005M1-2014M12.

Figure 2: Real-time vintages of the reference time series



5. Analysing the effect of regular rule-based indicator selection updates

One of the main innovative features of the proposed framework for constructing composite leading indicators is that we allow it to adapt to an ever-changing environment.[10] In what follows, we give an indication of the usefulness of this modelling feature by first comparing different vintages of the composite indicator to the changing reference series. Subsequently, we will construct some alternative versions of our composite leading indicator and compare their performance with our preferred and above-described one.

Table 1 reports the leads of the cross-correlation function maximum for vintages of the composite indicator (columns) with the respective vintages of the reference time series (rows).[11] When updated annually, the composite indicator has an estimated lead with respect to the reference time series of one or two months for all vintages, as can be seen from the diagonal elements of the table. The deterioration of the lead that results that occurs when not using the updating procedure can be inferred from the entries below the diagonal. Obviously, the deterioration is sometimes both pronounced and fast. The main exceptions are the early pseudo-real time vintages, where the in-sample period is extended rather than rolled forward. Here, the lead initially tends to improve for a number of years – but this is reversed after no more than three years, when those vintages turn into lagging indicators of the later reference series.

[10] An alternative would have been to test and allow for structural breaks, as one referee rightly stated. However, as the purpose here is to compute an indicator that is published every month in a standard way, creating dummy variables and incorporating auxiliary regressions could very quickly turn into ad hocism.

[11] Each cross-correlation analysis is performed based on the information that was available in September of the respective years.

Table 1: Cross-correlation analyses across different vintages: leads

Vintage	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Sample	Lead of the composite indicator with respect to the reference time series									
01M04-05M12	1									
01M04-06M12	2	2								
01M04-07M12	3	2	2							
01M04-08M12	1	0	0	0						
01M04-09M12	-1	-2	-2	-1	1					
01M04-10M12	-1	-2	-2	-1	1	1				
02M01-11M12	-2	-2	-2	-1	1	1	1			
03M01-12M12	-2	-2	-2	-1	1	2	1	2		
04M01-13M12	-2	-2	-3	-2	2	2	2	2	2	
05M01-14M12	-2	-2	-3	-1	2	2	2	2	2	2

Given the period under consideration, the 2008−9 economic slump following the 2007 sub-prime mortgage crisis in the United States probably posed the hardest challenge for economic forecasting. Based on the above results, we feel confident about concluding that the annual updating procedure would have successfully coped with the major shock caused by the Great Recession, had it already been in place at that stage. The pseudo-real time simulations show that it preserved a stable lead with respect to the reference time series of one to two months, whereas the performance of all affected vintages drastically deteriorates as soon as the sample period includes observations from 2009 (line 5 of Table 1).[12] As we will show below, these benefits result from the regular updating process that includes a selection procedure in which variables are annually compared to a revised and by one year moved reference series.

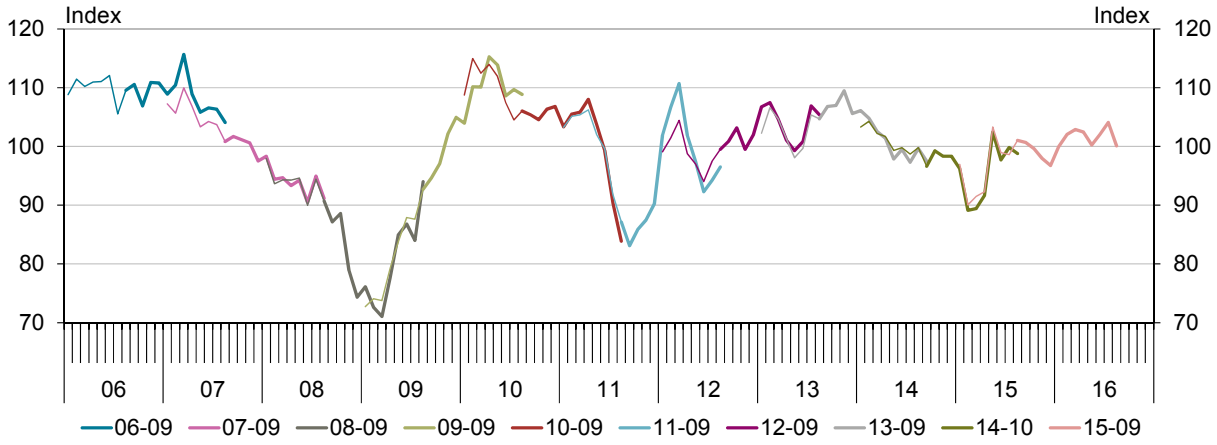
In a next step, we use the out-of-sample estimates of our preferred indicator and confront it with realisations of other versions of the indicator relative to our reference series. In Figure 4, we display the annual pseudo-real time vintages of the composite indicator. In the analysis, we will only use the (pseudo) real-time publication of the indicator, as this is what drives markets. Regarding the reference series, we always use the first release of a particular monthly observation after the indicator has been published.[13] Furthermore, besides using the smoothed monthly GDP series, we also take the actual quarterly GDP growth rate as a reference series. This comparison can be done at both the monthly and the quarterly frequency. In the latter case, the indicator values are averaged across the months that fall within a respective quarter. When

[12] More extensive robustness tests regarding the statistical properties and relative performance of the composite indicator are presented in Abberger et al. (2014).

[13] Note that this implies that the last 8 months of the vintage starting in September 2015 cannot be evaluated; at the time of writing not enough data are available to construct a realised reference series for 2016.

analysing at the monthly frequency, the quarterly GDP growth rates are distributed equally across the months within a quarter.

Figure 3: Pseudo real-time development of the composite indicator



Note: the thin lines represent backcasts. The bold lines the (pseudo) real-time publications.

We constructed three other versions (and the relevant pseudo real-time vintages) of the indicator, so that these can enter into a horse race with our preferred indicator. As a *first* alternative, we construct an indicator based on the same procedure, but in the selection process, we move to quarterly frequency and replace the monthly smoothed reference series by the actual quarterly GDP growth rate, which is frequently in the focus of observers of economic activity. This alternative shows whether our results are dependent on the selected reference series.

For the *second* alternative, we completely drop the selection phase and simply include all variables using all eligible transformations in the principal component analysis. This implies that the loadings are updated annually, but without 'knowledge' of the reference series. This allows us to judge the relevance of the selection procedure.

In the *third* version, we re-introduce some (non-automated) pre-selection that we keep constant across the vintages. As with the second alternative, it also takes up all potential indicators and does not use a reference series. However, only one transformation of each variable is allowed to enter the principal component analysis. This transformation (if not just the original series in levels) is picked based on economic judgement as to whether it is the most likely one to transmit a valid signal on the state of the Swiss growth rate cycle. Table 2 shows the number of variables selected in each of the vintages regarding each of the alternative composite indicators.

Table 2: Number of variables selected in each of the vintages of each of the composite indicators

Indicator\Vintage	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
KOF Economic Barometer	203	184	174	264	201	188	204	192	191	202
Based on quarterly GDP growth as reference time series	186	201	206	224	213	199	199	185	217	227
Based on all indicators and all transformations	3,314	3,314	3,314	3,314	3,314	3,314	3,314	3,314	3,314	3,314
Based on all indicators and one transformation each	372	372	372	372	372	372	372	372	372	372

We use the Diebold and Mariano (1995) forecast comparison test to calculate the predictive accuracy of each of the alternative indicators and compare it to that of our preferred indicator, the KOF Economic Barometer. The composite indicators are constructed to have a lead. We construct realised reference series to reflect leads of up to 6 months (or 2 quarters). Table 3 reports Relative Root Mean Squared Errors (RRMSE) of these three alternative indicators relative to our preferred indicator and using either the smoothed monthly GDP growth rate or the quarterly GDP growth rate as benchmark, i.e. realised reference series. These evaluations are carried out at both monthly and quarterly frequency. Values above one imply that our preferred indicator has a lower (root) mean squared error than the respective alternative.

All RRMSEs are above one.[14] This includes situations in which the benchmark is the quarterly GDP growth rate and the selection procedure has been based on quarterly GDP growth rates, too. Apparently, the quarterly GDP growth rates contain much noise; hence, they are difficult to match in an out-of-sample exercise.

In addition, when principal component analysis is applied without the selection process, the RRMSEs are above one. This shows that the selection step improves the quality of the indicator. The average gains when using our preferred indicator are sizeable (up to 42%), although according to the reported p-values of the Diebold and Mariano test, they are not always statistically significant. Having said this, at longer horizons the p-values tend to decrease, implying that our preferred specification of the indicator selection has the desired impact on the lead of the composite indicator. Comparing for example the preferred indicator with the one based on variables selected with quarterly GDP growth rates as reference series, maintaining monthly GDP growth as the benchmark, the differences are significant at conventional levels.

[14] We have also carried out the same analysis using absolute errors instead of squared errors as loss criterion. The results are virtually the same; in all cases, our preferred indicator outperforms the alternative ones.

Table 3: Relative Root Mean Squared Errors and Diebold-Mariano forecast comparison test results

Frequency	Monthly							Quarterly		
Assumed lead	0M	1M	2M	3M	4M	5M	6M	0Q	1Q	2Q
Composite Indicator										
	Smoothed monthly GDP growth as benchmark series									
Based on quarterly GDP growth	1.047	1.057	1.050	1.038	1.030	1.024	1.018	1.060	1.048	1.021
as reference time series	(0.47)	(0.36)	(0.28)	(0.24)	(0.15)	(0.06)	(0.01)	(0.47)	(0.22)	(0.00)
Based on all indicators	1.098	1.161	1.177	1.156	1.126	1.089	1.053	1.137	1.180	1.069
and all transformations	(0.55)	(0.33)	(0.23)	(0.17)	(0.14)	(0.13)	(0.18)	(0.34)	(0.17)	(0.37)
Based on all indicators	1.350	1.345	1.298	1.228	1.162	1.102	1.051	1.424	1.260	1.072
and one transformation each	(0.29)	(0.22)	(0.17)	(0.12)	(0.09)	(0.08)	(0.32)	(0.20)	(0.15)	(0.45)
	Quarterly GDP growth as benchmark series									
Based on quarterly GDP growth	1.039	1.023	1.017	1.018	1.024	1.019	1.015	1.057	1.022	1.017
as reference time series	(0.34)	(0.61)	(0.65)	(0.49)	(0.02)	(0.20)	(0.31)	(0.37)	(0.37)	(0.01)
Based on all indicators	1.087	1.084	1.073	1.058	1.057	1.045	1.031	1.129	1.066	1.037
and all transformations	(0.25)	(0.37)	(0.43)	(0.43)	(0.27)	(0.16)	(0.11)	(0.06)	(0.39)	(0.42)
Based on all indicators	1.307	1.216	1.146	1.099	1.077	1.050	1.028	1.375	1.110	1.035
and one transformation each	(0.13)	(0.23)	(0.32)	(0.34)	(0.19)	(0.11)	(0.40)	(0.08)	(0.37)	(0.53)

Note: Besides Root Mean Squared Errors of alternative indicators relative to our preferred indicator, the table reports p-values of the Diebold-Mariano (1995) forecast comparison test in parentheses.

6. Conclusions and outlook

Composite indicators need regular indicator selection updates to reflect changing economic relationships, data availability and data revisions. In practice, revisions of composite indicators have so far largely been done *ad hoc* and in opaque ways. In this paper, we propose a transparent selection procedure that takes advantage of a data rich environment, at the same time refers to targeted predictors, thereby circumventing the selection of spurious variables. Regularly applying this predetermined selection procedure allows the indicator to adjust to the ever-changing environment in which it operates.

This framework is applied to compute a leading composite indicator for the Swiss economy. Its principal building blocks are (1) specifications of the underlying quantitative time series for the business cycle, i.e. the reference series (2) the selection procedure; (3) the identification of theoretically valid indicator series with empirically established leads to the reference series, (4) the calculation of weights needed to construct the actual indicator and (5) the aggregation of the selected variables using the calculated weights into a composite indicator.

The resulting composite leading indicator is published on a monthly basis since April 2014 as the "KOF Economic Barometer" and is widely considered the main leading composite indicator for the Swiss economy. Our main conclusions are that the new composite indicator demonstrates stable leading properties with respect to the reference time series for the business cycle. The "targeted" indicator selection approach chosen here proves to be superior to the alternative and widely practiced approach of lumping together as many indicators as possible before applying some form of factor extraction. Importantly, as a result of the regular updating

of the indicator selection, we prevent it from degenerating from an initially leading into an eventually lagging indicator.

As a final remark, we would highlight that while the data discussed in this paper relate to the Swiss economy, the method is general and can be used for a wide array of applications. The only prerequisite is a well-defined reference series for which a sizable number of potential leading indicator variables are available.

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Appendix 1: History of the KOF Economic Barometer

Since its introduction in 1976, the KOF Economic Barometer has been designed as a composite leading indicator for the Swiss business cycle. The first version relied on the identification of underlying variables by both cross-correlation analyses with a reference series reflecting the Swiss business cycle, and the knowledge of business cycle experts working at KOF at that time. It comprised one leading variable from the construction sector, one from manufacturing, the money supply (M1), the Swiss stock market index as well as two indicators reflecting labour market conditions,. It was computed in levels, corresponding to GDP at constant prices, and presented as the deviation from its trend according to a low-pass filter. The interpretation of this KOF Barometer thus relied on the relative deviations of both KOF Barometer and GDP from their trends.

In 1997, one of the six original variables, the stock market index, had lost its lead and was eliminated from the Barometer. This, along with the difficulty to interpret the relative deviations from trend, plus a major revision in Swiss National Accounting standards, which had considerably affected the Barometer's reference series, led to a first major revision. The resulting 1998 version represented a complete overhaul. The new indicator was the first to resort to the growth rate cycle as the quantitative representation of the Swiss business cycle. The reference series was computed as the year-over-year (y-o-y) growth rate of quarterly GDP. Moreover, the indicator selection focussed largely on the qualitative BTS data collected by KOF. Six variables were identified to have had a stable *ex post* lead to this particular reference series. Three of these were at monthly frequency and based on the KOF manufacturing industry survey: (1) the annual change of incoming orders, (2) the change of the order backlog compared to the previous month and (3) the expected purchase of intermediate goods. The others were at quarterly frequency: (4) the judgement of wholesale inventories from the corresponding KOF survey, the y-o-y change of the real order backlog in the construction sector provided by the SBV (Schweizerischer Baumeisterverband) and the evaluation of the financial situation in the coming 12 months from the consumer sentiment survey, at that time collected by the BWA (Bundesamt für Wirtschaft und Arbeit). These six variables were low-pass filtered (ARIMA-X11 smooth component), and from the filtered series the first principal component was extracted. The resulting standardised variable had a mean of zero and a standard deviation of one and was updated monthly and published without further transformation. According to the monthly press statements released by KOF at those times, it was to be interpreted as a qualitative indicator for the Swiss business cycle with a lead of six to nine months.

By 2005, the Barometer had lost much of its self-proclaimed lead, and – as researchers had become aware of the endpoint problem associated with symmetric filters – it turned out that the short lead that could still be observed *ex post*, had hardly ever been present in real time (Stulz, 2005). Another overhaul was hence called for. As for the previous versions of the KOF Barometer, the fundamental building blocks remained the identification of theoretically valid variables with empirically established leads with respect to a reference series, and the aggregation of these series into a composite indicator. While the 2006 version kept the tradition of using cross-correlation analysis and expert knowledge to select the variables that entered the principal component extraction procedure, two important changes were introduced. Firstly,

particular sectors whose business cycles did not move synchronised with the Swiss economy as a whole were treated separately. To this end, separate reference series were defined for the financial sector, the construction sector and remaining (by far largest) part of the Swiss economy, referred to as the "core", allowing the selection of underlying variables using cross-correlation analyses and expert judgement. The modular reference series corresponded to the y-o-y growth rates of sector-specific real value added. The three modules – financial, construction and the residual "core" – were subsequently aggregated to the KOF Barometer using their annual value added shares of the preceding year, so that the scaled KOF Barometer corresponded to the y-o-y growth of Swiss real GDP. The 2006 modular version of the KOF Barometer referred to 25 variables − 10 monthly and 15 quarterly − from various sources:

Core GDP Module:

- Three monthly variables from the KOF industry survey
- One monthly variable from the KOF retail trade survey
- One quarterly variable from the KOF hotels and restaurants survey
- One quarterly variable the from consumer survey the Swiss State Secretariat for Economic Affairs (SECO)
- One monthly variable on advertising from Media Focus
- One monthly and two quarterly items from the EU industry survey, published by the European Commission

Banking Module

- Six quarterly variables from the KOF banking survey
- Three monthly variables from the banking statistics of the Swiss National Bank
- One quarterly employment variables published by the Swiss Federal Statistical Office

Construction Module

- Three quarterly variables from the KOF construction survey
- One quarterly variable from the KOF project engineering survey
- One monthly variable on building permits from "Baublatt"

Finally, the low-pass filtering underwent significant changes. Instead of filtering the identified variables before they entered into the principal component extractions, filtering was performed at the final stage, i.e. after the three modular first principle components had been extracted and aggregated. Importantly, to circumvent (large) revisions in the KOF Barometer caused by the symmetrical low-pass filter used previously, the end-point stable Direct Filter Approach of Wildi (2008) was implemented instead.

As was to be expected, our routine monitoring started to reveal that some of the correlations of the underlying variables with the reference series observed when setting up the 2006 version of the KOF Barometer were getting less pronounced, and the leading properties showed tendencies of weakening, too. As the previous versions of the KOF Barometer, the 2006 version also referred to a relatively informal selection procedure to identify the variables for its underlying

modules. This procedure rested on both statistical information (cross-correlation and turning point analysis) as well as expert judgement. This implied that whenever an underlying variable lost its leading properties, or simply stopped to be published, the quality of the final indicator deteriorated. Furthermore, the choice of the three sector modules in the 2006 version of the KOF Barometer was based on the consideration that they should be particularly useful to identify cycles for those sectors characterised by pronounced deviations from the overall business cycle. Given the data available in 2005, the only two sectors with a substantial share in GDP that were not significantly correlated with the overall Swiss business cycle and for which relevant survey indicators were available turned out to be "construction" (NOGA 45) and "financial intermediation without FISIM (financial services indirectly measured)" (NOGA 65).[15] Disappointingly, after the introduction of the 2006 barometer, the "construction" module did not continue to show the correlation with the official y-o-y growth rate of real value added for the construction sector that had been established in sample. (Why this occurred remains an open question.) In addition, the other separate module in the 2006 version, NOGA 65, had been fitted on value added by the financial sector *excluding* FISIM. Shortly after the 2006 version Barometer had been launched, the SFSO started to *include* the FISIM into the value added measure of the financial sector. As a result, the new measure of value added in NOGA 65 turned out to be much more correlated with the overall economy than that available in 2006. Finally, as mentioned above, the 2006 version of the Barometer addressed the endpoint (revision) problem by abandoning the previous smoothing procedure for the underlying variables with a symmetrical low-pass filter. Instead, it referred to unfiltered variables and applied the asymmetrical Direct Filter of Wildi (2008) as a final step. Although the endpoint problem that had plagued the 1998 version of the Barometer was eliminated, this came at a price. With hindsight, the DFA induced a phase shift of up to one quarter, thereby considerably reducing the leading characteristics of the final KOF Barometer.[16]

[15] According to international convention, the value added of "financial intermediation" includes the so-called "financial intermediation services indirectly measured" (FISIM), which, due to construction, are highly correlated with overall economic value added. After subtracting the FISIM the resulting "independent" financial sector business cycle was no longer significantly correlated with the Swiss business cycle.

[16] Despite these problems that in the end led to another major revision, the 2006 version of the KOF Barometer had significant predictive power for y-o-y GDP growth up to two quarters ahead (Siliverstovs, 2011).

Appendix 2: Indicator variables used in the selection process

NAME_ENGLISH	SOURCE_ENGLISH	Sign	Publ. Lag	Transformation
Banks: Net interest income, over the last 3 months	KOF (Switzerland)	+	0	
Banks: Net fee and commission income, over the last 3 months	KOF (Switzerland)	+	0	P, D4Q
Banks: Net trading income, over the last 3 months	KOF (Switzerland)	+	0	M, LVL
Banks: Net interest income, over the next 3 months	KOF (Switzerland)	+	0	B, D4Q
Banks: Net fee and commission income, over the next 3 months	KOF (Switzerland)	+	0	M, LVL
Banks: Net trading income, over the next 3 months	KOF (Switzerland)	+	0	M, D1Q
Banks: Securities transactions for clients, over the last 3 months	KOF (Switzerland)	+	0	B, D4Q
Banks: Assets under management, over the last 3 months	KOF (Switzerland)	+	0	B, D4Q
Banks: Authorized loans, over the last 3 months	KOF (Switzerland)	+	0	P, LVL
Banks: Refinancing at customers funds, over the last 3 months	KOF (Switzerland)	+	0	M, LVL
Banks: Refinancing at other funds, over the last 3 months	KOF (Switzerland)	+	0	M, LVL
Banks: Credit rating of domestic borrowers, over the last 3 months	KOF (Switzerland)	+	0	P, LVL
Banks: Credit rating of domestic private clients, over the last 3 months	KOF (Switzerland)	+	0	M, D1Q
Banks: Credit rating of domestic corporate clients, over the last 3 months	KOF (Switzerland)	+	0	M, D1Q
Banks: Credit rating of domestic corporate SME clients, over the last 3 months	KOF (Switzerland)	+	0	M, D1Q
Banks: Credit rating of foreign borrowers, over the last 3 months	KOF (Switzerland)	+	0	P, LVL
Banks: Loans to domestic borrowers, over the next 3 months	KOF (Switzerland)	+	0	B, D1Q
Banks: Loans to domestic private clients, over the next 3 months	KOF (Switzerland)	+	0	B, D1Q
Banks: Loans to domestic corporate clients, over the next 3 months	KOF (Switzerland)	+	0	E, LVL
Banks: Loans to domestic corporate SME clients, over the next 3 months	KOF (Switzerland)	+	0	
Banks: Loans to foreign borrowers, over the next 3 months	KOF (Switzerland)	+	0	B, D1Q
Banks: Business situation with domestic clients	KOF (Switzerland)	+	0	E, D12M
Banks: Business situation with foreign clients	KOF (Switzerland)	+	0	E, D12M
Banks: Overall business situation, over the next 6 months	KOF (Switzerland)	+	0	E, D12M
Banks: Demand for services from domestic clients, over the last 3 months	KOF (Switzerland)	+	0	M, D12M
Banks: Demand for services from domestic private clients, over the last 3 months	KOF (Switzerland)	+	0	B, D12M
Banks: Demand for services from corporate clients, over the last 3 months	KOF (Switzerland)	+	0	M, D12M
Banks: Demand for services from corporate SME clients, over the last 3 months	KOF (Switzerland)	+	0	B, D12M
Banks: Demand for services from foreign clients, over the last 3 months	KOF (Switzerland)	+	0	E, D12M
Banks: Demand for services from domestic clients, over the next 3 months	KOF (Switzerland)	+	0	E, D12M
Banks: Demand for services from domestic private clients, over the next 3 months	KOF (Switzerland)	+	0	
Banks: Demand for services from domestic corporate clients, over the next 3 months	KOF (Switzerland)	+	0	E, D12M
Banks: Demand for services from domestic corporate SME clients, over the next 3 months	KOF (Switzerland)	+	0	
Banks: Demand for services from foreign clients, over the next 3 months	KOF (Switzerland)	+	0	B, D3M
Banks: Employment situation, over the last 3 months	KOF (Switzerland)	+	0	B, D12M
Banks: Employment situation, over the next 3 months	KOF (Switzerland)	+	0	B, D12M
Banks: Interest rate margins, over the next 3 months	KOF (Switzerland)	+	0	E, D12M
Banks: Commision rates, over the next 3 months	KOF (Switzerland)	+	0	E, LVL
Money supply, M1	Swiss National Bank (Switzerland)	+	1	
Money supply, M2	Swiss National Bank (Switzerland)	+	1	
Money supply, M3	Swiss National Bank (Switzerland)	+	1	
Securities transactions	Swiss National Bank (Switzerland)	+	1	LOG, D3M
Swiss Performance Index (SPI)	Swiss National Bank (Switzerland)	+	1	LOG, D3M
Swiss Performance Index (SPI): Insurance sector	Swiss National Bank (Switzerland)	+	2	
Swiss Performance Index (SPI): Banking sector	Swiss National Bank (Switzerland)	+	2	
Nominal effective exchange rate of CHF vs 24 countries	Swiss National Bank (Switzerland)		1	
Real effective exchange rate of CHF vs 24 countries	Swiss National Bank (Switzerland)		1	LOG, D12M
Nominal effective exchange rate of CHF vs 16 European countries	Swiss National Bank (Switzerland)		1	
Real effective exchange rate of CHF vs 16 European countries	Swiss National Bank (Switzerland)		1	
Nominal effective exchange rate of CHF vs countries in euro area	Swiss National Bank (Switzerland)		1	
Real effective exchange rate of CHF vs countries in euro area	Swiss National Bank (Switzerland)		1	
Nominal three-month interest rate, Euro-Franc	Swiss National Bank (Switzerland)	-	1	
Long- and short-term interest rate spread (CHF)	SNB/Own calculations	+	1	
Short-term interest rate spread (USD-CHF)	SNB/Own calculations	+	1	D12M
Long-term interest rate spread (USD-CHF)	SNB/Datastream/Own calculations	+	1	
Short-term interest rate spread (EURO-CHF)	SNB/Own calculations	+	1	
Long-term interest rate spread (EURO-CHF)	SNB/Datastream/Own calculations	+	1	
New registration of personal cars	SFSO (Switzerland)	+	2	
Vacancies	SECO (Switzerland)	+	2	LOG, D3M
Import of personal cars	Swiss Customs Administration (Switzerland)	+	1	LOG, D3M
Retail trade: Expected turnover	KOF (Switzerland)	+	0	P, D3M
Retail trade: Business situation, assessment	KOF (Switzerland)	+	0	B, D3M
Retail trade: Client frequency, previous month over the same month last year	KOF (Switzerland)	+	0	B, D3M
Retail trade: Inventories, assessment	KOF (Switzerland)	-	0	
Retail trade: Employment situation, assessment	KOF (Switzerland)	-	0	E, D12M
Consumer survey: Job security	SECO (Switzerland)	+	1	
Consumer survey: Timing of large purchases	SECO (Switzerland)	+	1	D4Q
Consumer survey: Savings/Debts	SECO (Switzerland)	+	1	
Consumer survey: Household financial situation, ex post	SECO (Switzerland)	+	1	D1Q
Consumer survey: Household financial situation, ex ante	SECO (Switzerland)	+	1	D1Q
Consumer survey: Economic situation, ex post	SECO (Switzerland)	+	1	
Consumer survey: Economic situation, ex ante	SECO (Switzerland)	+	1	D1Q
Retail trade: Expected employment situation	KOF (Switzerland)	+	0	
Retail trade: Profit, over the last 3 months	KOF (Switzerland)	+	0	
Retail trade: Expected purchases	KOF (Switzerland)	+	0	E, D4Q
Retail trade: Business situation, over the next 6 months	KOF (Switzerland)	+	0	B, D1Q

NAME_ENGLISH	SOURCE_ENGLISH	Sign	Publ. Lag	Transformation
Accomodation: Overnight stays (foreign guests), over the same quarter last year	KOF (Switzerland)	+	0	
Accomodation: Overnight stays (domestic guests), over the same quarter last year	KOF (Switzerland)	+	0	
Accomodation: Overnight stays (total), over the same quarter last year	KOF (Switzerland)	+	0	
Accomodation: Room occupancy rate, in %	KOF (Switzerland)	+	0	%, D1Q
Accomodation: Turnover, over the same quarter last year	KOF (Switzerland)	+	0	
Accomodation: Turnover, over the same quarter last year, in %	KOF (Switzerland)	+	0	
Accomodation: Bookings, over the same quarter last year	KOF (Switzerland)	+	0	M, D1Q
Accomodation: Employment situation, assessment	KOF (Switzerland)	-	0	P, D1Q
Accomodation: Capacity, assessment	KOF (Switzerland)	-	0	
Accomodation: Profit, over the last 3 months	KOF (Switzerland)	+	0	P, D1Q
Accomodation: Overnight stays (foreign guests), over the next 3 months	KOF (Switzerland)	+	0	P, D1Q
Accomodation: Overnight stays (domestic guests), over the next 3 months	KOF (Switzerland)	+	0	B, D1Q
Accomodation: Overnight stays (total), over the next 3 months	KOF (Switzerland)	+	0	B, D1Q
Food and beverage services: Beverages sales, over the same quarter last year	KOF (Switzerland)	+	0	
Food and beverage services: Food sales, over the same quarter last year	KOF (Switzerland)	+	0	
Food and beverage services: Total sales, over the same quarter last year	KOF (Switzerland)	+	0	
Food and beverage services: Turnover, over the same quarter last year, in %	KOF (Switzerland)	+	0	
Food and beverage services: Turnover, over the same quarter last year	KOF (Switzerland)	+	0	
Food and beverage services: Employment situation, assessment	KOF (Switzerland)	-	0	P, D4Q
Food and beverage services: Capacity, assessment	KOF (Switzerland)	-	0	
Food and beverage services: Profit, over the last 3 months	KOF (Switzerland)	+	0	
Food and beverage services: Beverages sales, over the next 3 months	KOF (Switzerland)	+	0	P, D1Q
Food and beverage services: Food sales, over the next 3 months	KOF (Switzerland)	+	0	P, D1Q
Food and beverage services: Total sales, over the next 3 months	KOF (Switzerland)	+	0	P, D1Q
Number of overnight stays in hotels	SFSO (Switzerland)	+	2	
Food, beverages, tobacco: Orders, over the previous month	KOF (Switzerland)	+	0	
Food, beverages, tobacco: Orders, previous month over same month last year	KOF (Switzerland)	+	0	
Food, beverages, tobacco: Order books, over the previous month	KOF (Switzerland)	+	0	
Food, beverages, tobacco: Order books, assessment	KOF (Switzerland)	+	0	E, LVL
Food, beverages, tobacco: Production, over the previous month	KOF (Switzerland)	+	0	
Food, beverages, tobacco: Production, over same month last year	KOF (Switzerland)	+	0	
Food, beverages, tobacco: Intermediate products inventory, assessment	KOF (Switzerland)	-	0	
Food, beverages, tobacco: Finished products inventory, assessment	KOF (Switzerland)	-	0	M, LVL
Food, beverages, tobacco: Expected orders	KOF (Switzerland)	+	0	
Food, beverages, tobacco: Expected production	KOF (Switzerland)	+	0	
Food, beverages, tobacco: Expected intermediate products purchase	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Orders, over the previous month	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Orders, previous month over same month last year	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Order books, over the previous month	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Order books, assessment	KOF (Switzerland)	+	0	B, D3M
Textile, clothing, leather, footwear: Production, over the previous month	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Production, over same month last year	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Intermediate products inventory, assessment	KOF (Switzerland)	-	0	E, D3M
Textile, clothing, leather, footwear: Finished products inventory, assessment	KOF (Switzerland)	-	0	
Textile, clothing, leather, footwear: Expected orders	KOF (Switzerland)	+	0	B, D3M
Textile, clothing, leather, footwear: Expected production	KOF (Switzerland)	+	0	M, D3M
Textile, clothing, leather, footwear: Expected intermediate products purchase	KOF (Switzerland)	+	0	M, D3M
Wood; other non-metals: Orders, over the previous month	KOF (Switzerland)	+	0	P, LVL
Wood; other non-metals: Orders,previous month over same month last year	KOF (Switzerland)	+	0	
Wood; other non-metals: Order books, over the previous month	KOF (Switzerland)	+	0	P, LVL
Wood; other non-metals: Order books, assessment	KOF (Switzerland)	+	0	P, D12M
Wood; other non-metals: Production, over the previous month	KOF (Switzerland)	+	0	P, LVL
Wood; other non-metals: Production, over same month last year	KOF (Switzerland)	+	0	
Wood; other non-metals: Intermediate products inventory, assessment	KOF (Switzerland)	-	0	P, D12M
Wood; other non-metals: Finished products inventory, assessment	KOF (Switzerland)	-	0	E, LVL
Wood; other non-metals: Expected orders	KOF (Switzerland)	+	0	P, LVL
Wood; other non-metals: Expected production	KOF (Switzerland)	+	0	M, D12M
Wood; other non-metals: Expected intermediate products purchase	KOF (Switzerland)	+	0	P, LVL
Paper, printing, publishing: Orders, over the previous month	KOF (Switzerland)	+	0	E, LVL
Paper, printing, publishing: Orders,previous month over same month last year	KOF (Switzerland)	+	0	
Paper, printing, publishing: Order books, over the previous month	KOF (Switzerland)	+	0	
Paper, printing, publishing: Order books, assessment	KOF (Switzerland)	+	0	
Paper, printing, publishing: Production, over the previous month	KOF (Switzerland)	+	0	
Paper, printing, publishing: Production, over same month last year	KOF (Switzerland)	+	0	
Paper, printing, publishing: Intermediate products inventory, assessment	KOF (Switzerland)	-	0	
Paper, printing, publishing: Finished products inventory, assessment	KOF (Switzerland)	-	0	
Paper, printing, publishing: Expected orders	KOF (Switzerland)	+	0	M, D3M
Paper, printing, publishing: Expected production	KOF (Switzerland)	+	0	M, D3M
Paper, printing, publishing: Expected intermediate products purchase	KOF (Switzerland)	+	0	M, D3M
Chemistry; petroleum processing; rubber: Orders, over the previous month	KOF (Switzerland)	+	0	P, LVL
Chemistry; petroleum processing; rubber: Orders, previous month over same month last year	KOF (Switzerland)	+	0	
Chemistry; petroleum processing; rubber: Order books, over the previous month	KOF (Switzerland)	+	0	M, LVL
Chemistry; petroleum processing; rubber: Order books, assessment	KOF (Switzerland)	+	0	B, D3M
Chemistry; petroleum processing; rubber: Production, over the previous month	KOF (Switzerland)	+	0	
Chemistry; petroleum processing; rubber: Production, over same month last year	KOF (Switzerland)	+	0	
Chemistry; petroleum processing; rubber: Intermediate products inventory, assessment	KOF (Switzerland)	-	0	
Chemistry; petroleum processing; rubber: Finished products inventory, assessment	KOF (Switzerland)	-	0	
Chemistry; petroleum processing; rubber: Expected orders	KOF (Switzerland)	+	0	M, LVL
Chemistry; petroleum processing; rubber: Expected production	KOF (Switzerland)	+	0	
Chemistry; petroleum processing; rubber: Expected intermediate products purchase	KOF (Switzerland)	+	0	B, D12M
Metal industry: Orders, over the previous month	KOF (Switzerland)	+	0	
Metal industry: Orders,previous month over same month last year	KOF (Switzerland)	+	0	
Metal industry: Order books, over the previous month	KOF (Switzerland)	+	0	
Metal industry: Order books, assessment	KOF (Switzerland)	+	0	B, D3M
Metal industry: Production, over the previous month	KOF (Switzerland)	+	0	
Metal industry: Production, over same month last year	KOF (Switzerland)	+	0	
Metal industry: Intermediate products inventory, assessment	KOF (Switzerland)	-	0	B, D3M
Metal industry: Finished products inventory, assessment	KOF (Switzerland)	-	0	M, D12M
Metal industry: Expected orders	KOF (Switzerland)	+	0	M, D3M

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Metal industry: Expected production	KOF (Switzerland)	+	0	B, D3M
Metal industry: Expected intermediate products purchase	KOF (Switzerland)	+	0	B, D3M
Machine construction, vehicle construction: Orders, over the previous month	KOF (Switzerland)	+	0	
Machine construction, vehicle construction: Orders,previous over same month last year	KOF (Switzerland)	+	0	
Machine construction, vehicle construction: Order books, over the previous month	KOF (Switzerland)	+	0	
Machine construction, vehicle construction: Order books, assessment	KOF (Switzerland)	+	0	B, D1M
Machine construction, vehicle construction: Production, over the previous month	KOF (Switzerland)	+	0	
Machine construction, vehicle construction: Production, over same month last year	KOF (Switzerland)	+	0	
Machine construction, vehicle construction: Intermediate products inventory, assessment	KOF (Switzerland)	-	0	B, D3M
Machine construction, vehicle construction: Finished products inventory, assessment	KOF (Switzerland)	-	0	B, D3M
Machine construction, vehicle construction: Expected orders	KOF (Switzerland)	+	0	M, D3M
Machine construction, vehicle construction: Expected production	KOF (Switzerland)	+	0	B, D3M
Machine construction, vehicle construction: Expected intermediate products purchase	KOF (Switzerland)	+	0	M, D3M
Electrical, electronic equipment: Orders, over the previous month	KOF (Switzerland)	+	0	
Electrical, electronic equipment: Orders, previous month over same month last year	KOF (Switzerland)	+	0	E, LVL
Electrical, electronic equipment: Order books, over the previous month	KOF (Switzerland)	+	0	
Electrical, electronic equipment: Order books, assessment	KOF (Switzerland)	+	0	P, D3M
Electrical, electronic equipment: Production, over the previous month	KOF (Switzerland)	+	0	
Electrical, electronic equipment: Production, over same month last year	KOF (Switzerland)	+	0	
Electrical, electronic equipment: Intermediate products inventory, assessment	KOF (Switzerland)	-	0	
Electrical, electronic equipment: Finished products inventory, assessment	KOF (Switzerland)	-	0	B, D1M
Electrical, electronic equipment: Expected orders	KOF (Switzerland)	+	0	M, D3M
Electrical, electronic equipment: Expected production	KOF (Switzerland)	+	0	B, D3M
Electrical, electronic equipment: Expected intermediate products purchase	KOF (Switzerland)	+	0	B, D3M
Other industry: Orders, over the previous month	KOF (Switzerland)	+	0	
Other industry: Orders, previous month over same month last year	KOF (Switzerland)	+	0	
Other industry: Order books, over the previous month	KOF (Switzerland)	+	0	
Other industry: Order books, assessment	KOF (Switzerland)	+	0	B, D3M
Other industry: Production, over the previous month	KOF (Switzerland)	+	0	E, LVL
Other industry: Production, over same month last year	KOF (Switzerland)	+	0	
Other industry: Intermediate products inventory, assessment	KOF (Switzerland)	-	0	E, LVL
Other industry: Finished products inventory, assessment	KOF (Switzerland)	-	0	
Other industry: Expected orders	KOF (Switzerland)	+	0	M, LVL
Other industry: Expected production	KOF (Switzerland)	+	0	M, LVL
Other industry: Expected intermediate products purchase	KOF (Switzerland)	+	0	M, D12M
Food, beverages, tobacco: Production technical capacity, over the last 3 months	KOF (Switzerland)	+	0	
Food, beverages, tobacco: Production technical capacity, assessment	KOF (Switzerland)	-	0	
Food, beverages, tobacco: Capacity utilisation, in %	KOF (Switzerland)	+	0	
Food, beverages, tobacco: Profit, over the last 3 months	KOF (Switzerland)	+	0	E, D4Q
Food, beverages, tobacco: Production assured in months	KOF (Switzerland)	+	0	
Food, beverages, tobacco: Competition position domestically, over the last 3 months	KOF (Switzerland)	+	0	E, LVL
Food, beverages, tobacco: Competition position in the EU, over the last 3 months	KOF (Switzerland)	+	0	M, D4Q
Food, beverages, tobacco: Competition position outside of the EU, over the last 3 months	KOF (Switzerland)	+	0	M, D4Q
Food, beverages, tobacco: Production impediments: Insufficient demand	KOF (Switzerland)	-	0	
Food, beverages, tobacco: Production impediments: Insufficient labor	KOF (Switzerland)	+	0	%, D4Q
Food, beverages, tobacco: Production impediments: Insufficient technical capacity	KOF (Switzerland)	+	0	
Food, beverages, tobacco: Production impediments: none	KOF (Switzerland)	+	0	
Food, beverages, tobacco: Expected exports, over the next 3 months	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Production technical capacity, over the last 3 months	KOF (Switzerland)	+	0	E, LVL
Textile, clothing, leather, footwear: Production technical capacity, assessment	KOF (Switzerland)	-	0	M, D1Q
Textile, clothing, leather, footwear: Capacity utilisation, in %	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Profit, over the last 3 months	KOF (Switzerland)	+	0	P, D4Q
Textile, clothing, leather, footwear: Production assured in months	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Competition position domestically, over the last 3 months	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Competition position in the EU, over the last 3 months	KOF (Switzerland)	+	0	B, D4Q
Textile, clothing, leather, footwear: Competition position outside of the EU, over the last 3 months	KOF (Switzerland)	+	0	B, D4Q
Textile, clothing, leather, footwear: Production impediments: Insufficient demand	KOF (Switzerland)	-	0	
Textile, clothing, leather, footwear: Production impediments: Insufficient labor	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Production impediments: Insufficient technical capacity	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Production impediments: none	KOF (Switzerland)	+	0	
Textile, clothing, leather, footwear: Expected exports, over the next 3 months	KOF (Switzerland)	+	0	B, D1Q
Wood; other non-metals: Production technical capacity, over the last 3 months	KOF (Switzerland)	+	0	
Wood; other non-metals: Production technical capacity, assessment	KOF (Switzerland)	-	0	
Wood; other non-metals: Capacity utilisation, in %	KOF (Switzerland)	+	0	
Wood; other non-metals: Profit, over the last 3 months	KOF (Switzerland)	+	0	M, D4Q
Wood; other non-metals: Production assured in months	KOF (Switzerland)	+	0	
Wood; other non-metals: Competition position domestically, over the last 3 months	KOF (Switzerland)	+	0	M, D4Q
Wood; other non-metals: Competition position in the EU, over the last 3 months	KOF (Switzerland)	+	0	B, D1Q
Wood; other non-metals: Competition position outside of the EU, over the last 3 months	KOF (Switzerland)	+	0	M, D4Q
Wood; other non-metals: Production impediments: Insufficient demand	KOF (Switzerland)	-	0	
Wood; other non-metals: Production impediments: Insufficient labor	KOF (Switzerland)	+	0	
Wood; other non-metals: Production impediments: Insufficient technical capacity	KOF (Switzerland)	+	0	
Wood; other non-metals: Production impediments: none	KOF (Switzerland)	+	0	
Wood; other non-metals: Expected exports, over the next 3 months	KOF (Switzerland)	+	0	P, D4Q
Paper, printing, publishing: Production technical capacity, over the last 3 months	KOF (Switzerland)	+	0	P, D4Q
Paper, printing, publishing: Production technical capacity, assessment	KOF (Switzerland)	-	0	
Paper, printing, publishing: Capacity utilisation, in %	KOF (Switzerland)	+	0	
Paper, printing, publishing: Profit, over the last 3 months	KOF (Switzerland)	+	0	B, D1Q
Paper, printing, publishing: Production assured in months	KOF (Switzerland)	+	0	
Paper, printing, publishing: Competition position domestically, over the last 3 months	KOF (Switzerland)	+	0	E, D4Q
Paper, printing, publishing: Competition position in the EU, over the last 3 months	KOF (Switzerland)	+	0	E, LVL
Paper, printing, publishing: Competition position outside of the EU, over the last 3 months	KOF (Switzerland)	+	0	B, LVL
Paper, printing, publishing: Production impediments: Insufficient demand	KOF (Switzerland)	-	0	
Paper, printing, publishing: Production impediments: Insufficient labor	KOF (Switzerland)	+	0	%, D1Q
Paper, printing, publishing: Production impediments: Insufficient technical capacity	KOF (Switzerland)	+	0	
Paper, printing, publishing: Production impediments: none	KOF (Switzerland)	+	0	
Paper, printing, publishing: Expected exports, over the next 3 months	KOF (Switzerland)	+	0	
Chemistry; petroleum processing; rubber: Production technical capacity, over the last 3 months	KOF (Switzerland)	+	0	P, D1Q
Chemistry; petroleum processing; rubber: Production technical capacity, assessment	KOF (Switzerland)	-	0	M, D4Q

NAME_ENGLISH	SOURCE_ENGLISH	Sign	Publ. Lag	Transformation
Chemistry; petroleum processing; rubber: Capacity utilisation, in %	KOF (Switzerland)	+	0	%, D1Q
Chemistry; petroleum processing; rubber: Profit, over the last 3 months	KOF (Switzerland)	+	0	P, D4Q
Chemistry; petroleum processing; rubber: Production assured in months	KOF (Switzerland)	+	0	
Chemistry; petroleum processing; rubber: Competition position domestically, over the last 3 months	KOF (Switzerland)	+	0	B, D4Q
Chemistry; petroleum processing; rubber: Competition position in the EU, over the last 3 months	KOF (Switzerland)	+	0	
Chemistry; petroleum processing; rubber: Competition position outside of the EU, over the last 3 months	KOF (Switzerland)	+	0	
Chemistry; petroleum processing; rubber: Production impediments: Insufficient demand	KOF (Switzerland)	-	0	
Chemistry; petroleum processing; rubber: Production impediments: Insufficient labor	KOF (Switzerland)	+	0	
Chemistry; petroleum processing; rubber: Production impediments: Insufficient technical capacity	KOF (Switzerland)	+	0	%, D4Q
Chemistry; petroleum processing; rubber: Production impediments: none	KOF (Switzerland)	+	0	
Chemistry; petroleum processing; rubber: Expected exports, over the next 3 months	KOF (Switzerland)	+	0	
Metal industry: Production technical capacity, over the last 3 months	KOF (Switzerland)	+	0	E, D4Q
Metal industry: Production technical capacity, assessment	KOF (Switzerland)	-	0	M, D1Q
Metal industry: Capacity utilisation, in %	KOF (Switzerland)	+	0	
Metal industry: Profit, over the last 3 months	KOF (Switzerland)	+	0	P, D1Q
Metal industry: Production assured in months	KOF (Switzerland)	+	0	
Metal industry: Competition position domestically, over the last 3 months	KOF (Switzerland)	+	0	
Metal industry: Competition position in the EU, over the last 3 months	KOF (Switzerland)	+	0	P, D1Q
Metal industry: Competition position outside of the EU, over the last 3 months	KOF (Switzerland)	+	0	B, D4Q
Metal industry: Production impediments: Insufficient demand	KOF (Switzerland)	-	0	
Metal industry: Production impediments: Insufficient labor	KOF (Switzerland)	+	0	%, D1Q
Metal industry: Production impediments: Insufficient technical capacity	KOF (Switzerland)	+	0	
Metal industry: Production impediments: none	KOF (Switzerland)	+	0	
Metal industry: Expected exports, over the next 3 months	KOF (Switzerland)	+	0	B, D1Q
Machine construction, vehicle construction: Production technical capacity, over the last 3 months	KOF (Switzerland)	+	0	
Machine construction, vehicle construction: Production technical capacity, assessment	KOF (Switzerland)	-	0	M, D1Q
Machine construction, vehicle construction: Capacity utilisation, in %	KOF (Switzerland)	+	0	
Machine construction, vehicle construction: Profit, over the last 3 months	KOF (Switzerland)	+	0	P, D1Q
Machine construction, vehicle construction: Production assured in months	KOF (Switzerland)	+	0	
Machine construction, vehicle construction: Competition position domestically, over the last 3 months	KOF (Switzerland)	+	0	B, D1Q
Machine construction, vehicle construction: Competition position in the EU, over the last 3 months	KOF (Switzerland)	+	0	B, D4Q
Machine construction, vehicle construction: Competition position outside of the EU, over the last 3 months	KOF (Switzerland)	+	0	B, D4Q
Machine construction, vehicle construction: Production impediments: Insufficient demand	KOF (Switzerland)	-	0	
Machine construction, vehicle construction: Production impediments: Insufficient labor	KOF (Switzerland)	+	0	
Machine construction, vehicle construction: Production impediments: Insufficient technical capacity	KOF (Switzerland)	+	0	%, D1Q
Machine construction, vehicle construction: Production impediments: none	KOF (Switzerland)	+	0	%, D1Q
Machine construction, vehicle construction: Expected exports, over the next 3 months	KOF (Switzerland)	+	0	M, D1Q
Electrical, electronic equipment: Production technical capacity, over the last 3 months	KOF (Switzerland)	+	0	
Electrical, electronic equipment: Production technical capacity, assessment	KOF (Switzerland)	-	0	M, D1Q
Electrical, electronic equipment: Capacity utilisation, in %	KOF (Switzerland)	+	0	
Electrical, electronic equipment: Profit, over the last 3 months	KOF (Switzerland)	+	0	P, D1Q
Electrical, electronic equipment: Production assured in months	KOF (Switzerland)	+	0	
Electrical, electronic equipment: Competition position domestically, over the last 3 months	KOF (Switzerland)	+	0	P, D1Q
Electrical, electronic equipment: Competition position in the EU, over the last 3 months	KOF (Switzerland)	+	0	P, D1Q
Electrical, electronic equipment: Competition position outside of the EU, over the last 3 months	KOF (Switzerland)	+	0	M, LVL
Electrical, electronic equipment: Production impediments: Insufficient demand	KOF (Switzerland)	-	0	
Electrical, electronic equipment: Production impediments: Insufficient labor	KOF (Switzerland)	+	0	
Electrical, electronic equipment: Production impediments: Insufficient technical capacity	KOF (Switzerland)	+	0	
Electrical, electronic equipment: Production impediments: none	KOF (Switzerland)	+	0	
Electrical, electronic equipment: Expected exports, over the next 3 months	KOF (Switzerland)	+	0	M, D1Q
Other industry: Production technical capacity, over the last 3 months	KOF (Switzerland)	+	0	
Other industry: Production technical capacity, assessment	KOF (Switzerland)	-	0	
Other industry: Capacity utilisation, in %	KOF (Switzerland)	+	0	
Other industry: Profit, over the last 3 months	KOF (Switzerland)	+	0	M, D1Q
Other industry: Production assured in months	KOF (Switzerland)	+	0	
Other industry: Competition position domestically, over the last 3 months	KOF (Switzerland)	+	0	M, D4Q
Other industry: Competition position in the EU, over the last 3 months	KOF (Switzerland)	+	0	B, D4Q
Other industry: Competition position outside of the EU, over the last 3 months	KOF (Switzerland)	+	0	P, D4Q
Other industry: Production impediments: Insufficient demand	KOF (Switzerland)	-	0	
Other industry: Production impediments: Shortage of labour force	KOF (Switzerland)	+	0	
Other industry: Production impediments: Insufficient technical capacity	KOF (Switzerland)	+	0	
Other industry: Production impediments: none	KOF (Switzerland)	+	0	
Other industry: Expected exports, over the next 3 months	KOF (Switzerland)	+	0	P, D4Q
Architects and engineers: Value of constructions, residential buildings	KOF (Switzerland)	+	0	P, D4Q
Architects and engineers: Value of constructions, commercial construction	KOF (Switzerland)	+	0	M, D1Q
Architects and engineers: Value of constructions, public construction	KOF (Switzerland)	+	0	B, D1Q
Architects and engineers: Value of constructions, total	KOF (Switzerland)	+	0	P, D1Q
Architects and engineers: Order books, over the last 3 months	KOF (Switzerland)	+	0	B, D1Q
Architects and engineers: Range of orders in hand, in months	KOF (Switzerland)	+	0	
Architects and engineers: Business situation, assessment	KOF (Switzerland)	+	0	
Architects and engineers: Business situation, over the next 6 months	KOF (Switzerland)	+	0	M, D3M
Architects and engineers: Demand, over the next 3 months	KOF (Switzerland)	+	0	B, D3M
Architects and engineers: Employment situation, over the next 3 months	KOF (Switzerland)	+	0	M, D12M
Construction: Business situation, assessment	KOF (Switzerland)	+	0	
Construction: Demand, over the next 3 months	KOF (Switzerland)	+	0	M, D3M
Construction: Order books	KOF (Switzerland)	+	0	
Construction: Production activity, over the last 3 months	KOF (Switzerland)	+	0	B, D3M
Construction: Production impediments: none	KOF (Switzerland)	+	0	
Construction: Production impediments: Weather conditions	KOF (Switzerland)	-	0	
Construction: Production impediments: Shortage of labour force	KOF (Switzerland)	+	0	
Construction: Production impediments: Shortage of space and/or equipment	KOF (Switzerland)	+	0	
Construction: Employment situation, over the next 3 months	KOF (Switzerland)	+	0	M00, D12M
Construction: Production assured in months	KOF (Switzerland)	+	0	
Construction: Capacity utilisation, in %	KOF (Switzerland)	+	0	
Cement delivery, including imports	KOF (Switzerland)	+	3	
Baublatt indicator	KOF (Switzerland)	+	0	
CN MACROECONOMIC CLIMATE INDEX - LEADING INDEX SADJ	National Bureau of Statistics (China)	+	2	D3M
CN CONSUMER EXPECTATION INDEX NADJ	National Bureau of Statistics (China)	+	2	D1M
DE: EU CONSUMER SURV. Consumer Confidence Indicator	European Commission, DG ECFIN	+	1	D1M

NAME_ENGLISH	SOURCE_ENGLISH	Sign	Publ. Lag	Transformation
ES: EU CONSUMER SURV. Consumer Confidence Indicator	European Commission, DG ECFIN	+	1	D3M
GB: EU CONSUMER SURV. Consumer Confidence Indicator	European Commission, DG ECFIN	+	1	D12M
AT: EU CONSUMER SURV. Consumer Confidence Indicator	European Commission, DG ECFIN	+	1	D3M
BE: EU CONSUMER SURV. Consumer Confidence Indicator	European Commission, DG ECFIN	+	1	D3M
FR: EU CONSUMER SURV. Consumer Confidence Indicator	European Commission, DG ECFIN	+	1	D3M
IT: EU CONSUMER SURV. Consumer Confidence Indicator	European Commission, DG ECFIN	+	1	
NL: EU CONSUMER SURV. Consumer Confidence Indicator	European Commission, DG ECFIN	+	1	D3M
AT: EU INDUSTRY SURV. Industrial Confidence Indicator	European Commission, DG ECFIN	+	1	D3M
BE: EU INDUSTRY SURV. Industrial Confidence Indicator	European Commission, DG ECFIN	+	1	D3M
DE: EU INDUSTRY SURV. Industrial Confidence Indicator	European Commission, DG ECFIN	+	1	D1M
GB: EU INDUSTRY SURV. Industrial Confidence Indicator	European Commission, DG ECFIN	+	1	D3M
ES: EU INDUSTRY SURV. Industrial Confidence Indicator	European Commission, DG ECFIN	+	1	D3M
FR: EU INDUSTRY SURV. Industrial Confidence Indicator	European Commission, DG ECFIN	+	1	D3M
IT: EU INDUSTRY SURV. Industrial Confidence Indicator	European Commission, DG ECFIN	+	1	D3M
NL: EU INDUSTRY SURV. Industrial Confidence Indicator	European Commission, DG ECFIN	+	1	D1M
JP CONS.CONFIDENCE INDEX-OVERALL LIVELIHOOD(EXCL.1 PERSON HH)	Cabinet Office (Japan)	+	1	D12M
JP REUTERS TANKAN: BUS.CNDTN-MFRS., 400 FIRMS, FCST. NADJ	Tankan (Japan)	+	0	D3M
Univ of Michigan Consumer Expectations Index	University of Michigan (USA)	+	0	LVL
US ISM MANUFACTURERS SVY RESULTS: PRODUCTION - NET NADJ	Institute for Supply Management (USA)	+	1	
AS WES: ECONOMIC SIT. NEXT 6 MONTHS - OVERALL ECONOMY, ASIA NADJ	ifo (Germany)	+	1	LVL
AS WES: ECONOMIC SITUATION - OVERALL ECONOMY, ASIA NADJ	ifo (Germany)	+	1	D1Q
C3 WES: ECONOMIC SIT.NEXT 6 MONTHS-OVERALL ECONOMY, OCEANIA NADJ	ifo (Germany)	+	1	D1Q
C3 WES: ECONOMIC SITUATION - OVERALL ECONOMY, OCEANIA NADJ	ifo (Germany)	+	1	D1Q
LM WES: ECONOMIC SIT.NEXT 6 MO-OVERALL ECONOMY,LATIN AMERICA	ifo (Germany)	+	1	LVL
LM WES: ECONOMIC SITUATION - OVERALL ECONOMY, LATIN AMERICA NADJ	ifo (Germany)	+	1	
NA WES: ECONOMIC SIT.NEXT 6 MO-OVERALL ECONOMY,NORTH AMERICA	ifo (Germany)	+	1	D1Q
NA WES: ECONOMIC SITUATION - OVERALL ECONOMY, NORTH AMERICA NADJ	ifo (Germany)	+	1	
WE WES: ECONOMIC SIT.NEXT 6 MO-OVERALL ECONOMY,WESTERN EUROPE	ifo (Germany)	+	1	LVL
WE WES: ECONOMIC SITUATION- OVERALL ECONOMY, WESTERN EUROPE NADJ	ifo (Germany)	+	1	

Notes: The column "Sign" indicates the imposed sign restriction. The final column show those variables and transformations that have been selected by the automated selection procedure in the 2015 vintage. For the qualitative survey questions "P", "M" and "E" stand for the plus, minus and equal answers, respectively. In case we use the minus answers, the sign restriction is actually the opposite of what is listed. In case the equal answers are used, there is actually no sign restriction imposed. The "B" stands for the balances between plus and minus. "R" stands for answers formulated in terms of reach measured in months. "%" stands for answers formulated in percentages. "D1M" stands for the first monthly difference. "D3M" stands for the difference over a three-month period. "D12M" stands for the difference over a twelve-month period. "D1Q" and "D4Q" stand for the difference over one and four quarters, respectively. In case also "LOG" is mentioned, then the appropriate log difference is taken. "LVL" stands for the level. The final column reports the publication lag in months, if any.