Estimating and Forecasting Production and Orders in Manufacturing Industry from Business Survey Data: Evidence from Switzerland, 1990–2003

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1. INTRODUCTION

Since general economic activity is highly sensitive to developments in the manufacturing industry, data on industrial production, sales, and orders provide key inputs for analyses of business cycles. However, a major drawback is the considerable compilation and publication lag regarding official data. Moreover, to keep these lags as short as possible, the latest published data are usually provisional and subject to substantial revisions.

Therefore, a fundamental issue for policy-oriented business cycle research is access to leading – or at least coincident – and reliable indicators of economic activity in manufacturing industry. To this end, the Swiss Institute for Business Cycle Research (KOF)[1] regularly conducts detailed monthly and quarterly business tendency surveys (BTS) amongst Swiss manufacturing firms.

This paper analyses, how the information from the KOF surveys is related to the official production, sales and order statistics generated independently and published by the Swiss Federal Statistical Office (Bundesamt für Statistik, henceforth: SFSO). While both data bases refer to the same industrial activity and the same classification of industrial activities, they are conceptually quite different: KOF survey data are mostly qualitative (perceived improvement, deterioration, or no change with respect to a given topic or

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1. The Swiss Institute for Business Cycle Research (KOF), a non-profit organisation, is an institute of the Swiss Federal Institute of Technology (ETH) Zurich. Its major activity is to analyse and forecast economic development in Switzerland. This acronym is derived from its name in German "*Ko*njunktur*f*orschungsstelle".

judgements) and on a monthly base, whereas the SFSO industry statistics are quarterly time series of quantitative indices.

Obviously, we should expect a trade-off between early availability and precision of indicators for economic activity. Specifically, business surveys generate data as early as possible, whereas final official statistics are processed *post hoc*, thereby relying on more – and probably better – information. These two sources of information are therefore complements rather than substitutes. While business surveys are conducted to indicate actual economic conditions and trends for the near future,[2] official statistics are expected to give a reliable picture of the past.

To state this argument in a formal manner, assume that at any point t in time, an observer of economic activity has access to business surveys as well as official statistics.[3] Accordingly he or she can refer to the following set of information:

$$I_t = \{\mathrm{BTS}(t)_t, \mathrm{BTS}(t+u)_t, \mathrm{POS}(t-v)_t, \mathrm{FOS}(t-w)_t\}, \tag{1}$$

where BTS(t) refers to information from business tendency surveys on present conditions, BTS($t + u$) to information on conditions with a lead of u, POS($t - v$) to information from provisional official statistics on past conditions with lag v, and FOS($t - w$) to final official statistics on past conditions with lag w, and $w > v > 0$.

Obviously, if both BTS data and official statistics refer to the same empirical representations in a reasonable way, they should correlate, and a failure to do so would cast serious doubt on at least one of the data collecting and generating processes. Consequently, a significant *ex post* correlation between quantitative data from business surveys and final official statistics – with a properly specified lead-lag structure, i.e. BTS(t) $\leftrightarrow$ FOS(t) – would be reassuring with respect to the validity of both sources of information and thereby the practical use of the entire set I_t.

Now, since business survey data are available with a considerable lead before official statistics (both provisional and final), it is important to have an idea of the trade-offs between early availability and accuracy. Specifically, if we know the extent to which the final official statistics referring to t (published at $t + w$) can be derived as a function

$$\mathrm{FOS}(t)_{t+w} = f[\mathrm{BTS}(t)_t] \tag{2}$$

from coincident BTS indicators,[4] or – with even more gain in early availability – as a function

$$\mathrm{FOS}(t)_{t+w} = g[\mathrm{BTS}(t)_{t-u}] \tag{3}$$

2. For international experience with BTS see e.g. OPPENLÄNDER (1996). For Switzerland, see ETTER (1985).
3. Other sources of information will not be discussed in this paper.
4. This is sometimes referred to as "nowcasting".

from leading BTS indicators, the deficiency of information from the survey data that shows up in the forecast errors of the *coincident prediction function* f and the *leading prediction function* g can be compared to the gain due to the availability lead before the corresponding OFS data, which is equal to w for coincident indictors, and amounts to $u + w$ for leading indictors.

For *provisional* official statistics, the availability lag is reduced by $w - v$ and thus amounts to v and $u + v$, respectively. However, since provisional statistics are by their very nature subject to – sometimes, as we shall see, substantial – revisions, this reduction of the availability lag comes at the cost of considerable uncertainty regarding the process of convergence of the provisional numbers to their final values. In this respect, an advantage of BTS data is that the original data are final.[5]

Let $E(t)$ denote the true realisation of economic conditions at time t and assume that the best approximation is found in the final official statistics.[6] The appropriate reference series for predictions of $E(t)$ is then given by FOS(t). Considering the transformation functions f (equation 2) and g (equation 3) and taking account of errors ε, at the time of publication of the final official statistics, E_t can be represented by the elements of I in the following ways:

$$\begin{aligned} E(t) &= \mathrm{FOS}(t)_{t+w} + \varepsilon_{\mathrm{FOS}(t)_{t+w}} \\ &= \mathrm{POS}(t)_{t+v} + \varepsilon_{\mathrm{POS}(t)_{t+v}} \\ &= f[\mathrm{BTS}(t)_t] + \varepsilon_{\mathrm{BTS}(t)_t} \\ &= g[\mathrm{BTS}(t)_{t-u}] + \varepsilon_{\mathrm{BTS}(t)_{t-u}}, \end{aligned} \tag{4}$$

where $\varepsilon_{\mathrm{FOS}(t)_{t+w}}$ is the final error in the official data, $\varepsilon_{\mathrm{POS}(t)_{t-v}}$ stands for the deviation of the provisional official number from the true value of $E(t)$.

The sequential availability of information on $E(t)$ in (4), where the final data come with a lag of w, the provisional official data with a somewhat shorter lag of v, the "nowcast"-estimate $f\,[\mathrm{BTS}(t)]$ can be computed more or less instantaneously, and the forecast

5. Of course, this does not imply that BTS data are better estimates of the final official statistics than the provisional official data, which is an empirical question. The conceptual advantage lies simply in the fact that the user can deal with data which will not be revised. Note, however, that this applies only for data which are not treated with symmetric seasonal filters, which make current data points due to future revisions by construction. An alternative is to refer to seasonal filters which are by construction stable in the current domain, but this inevitably introduces a phase shift.
6. This assumption is crucial. Since, like most economic aggregates, the variables of interest in this study (industrial production, sales, and orders) cannot be observed directly, they cannot be verified. Thus this is ultimately a matter of trust in the quality of the data processing within the statistical office. While a detailed discussion of this is outside the scope of this paper, we can certainly say that we have no reason to doubt this assumption for the official statistics underlying this study. However, suffice to remind the reader of the sometimes obviously misleading official figures at other times and in other parts of the world, it is not granted a priori that official statistics should be the proper choice as reference series.

g [BTS(t)] is available with a lead of u, implies the following hypothesis with respect to the errors:

$$\varepsilon_{\text{FOS}(t)_{t+w}} \leq \varepsilon_{\text{POS}(t)_{t+v}} \leq \varepsilon_{\text{BTS}(t)_t} \leq \varepsilon_{\text{BTS}(t)_{t-u}}. \tag{5}$$

The reasoning underlying (5) is simply that using more data generally leads to better estimates. Some qualifications, however, are in order. Remember that $\varepsilon_{\text{FOS}(t)}$ is unobservable, so that the first part of the argument, i.e. $\varepsilon_{\text{FOS}(t)_{t+w}} \leq \varepsilon_{\text{POS}(t)_{t+v}}$, cannot be tested empirically and is taken for granted by assumption. Moreover, note that the error term from the provisional official statistics, $\varepsilon_{\text{POS}(t)}$, can be further decomposed into the final error $\varepsilon_{\text{FOS}(t)}$ plus the revision R between the provisional and the final official statistics

$$\varepsilon_{\text{POS}(t)_{t+v}} = \varepsilon_{\text{FOS}(t)_{t+w}} + R_{t+w}, \tag{6}$$

so that an empirical *ex post*-series of R can be inferred from $\varepsilon_{\text{POS}(t)} - \varepsilon_{\text{FOS}(t)}$. Accordingly, an *ex post*-analysis of the correlation structure between BTS data and official statistics should address BTS $\leftrightarrow$ FOS only, since the provisional data are subject to the error R, which in itself carries no meaningful information – at least if it can be taken for granted that the statistical office processes its data without bias, and their revisions are caused by new data only.[7]

In what follows, this paper will focus on parsimonious specifications of f and g (equations 2 and 3). To this end, we shall present several selection criteria for bivariate and multivariate regressions of FOS on BTS data with pre-determined leads. Moreover, since this study is exclusively concerned with estimates of type BTS $\rightarrow$ FOS, we refrain from use of autoregressive forecasts within a given FOS series as well as cross-reference within different FOS or POS series.[8] Thus, this study does not aim at finding specifications of forecast models with the *best fit* with respect to a given FOS series – these would probably include autoregressive elements as well as cross-references within the data corpus of FOS –, but to identify sets of BTS indicators that are coincident or leading indicators for industrial activity in Switzerland.

7. We emphasise that this is conditional on the unbiasedness of the provisional data, i.e. by the professional skills and working standards within the statistical office. Since we have no a priori reason not to make this assumption, we leave the statistical investigation of POS $\leftrightarrow$ FOS for an other paper and continue (1) with the observation that POS is affected by an error R which is eliminated in the final data FOS on the basis of new information, and (2) with the assumption that R is 'white noise' with an expected mean value of zero.
8. Since the data generation process within the statistical office is (partly) a black box for outsiders, the last point is essential: If autoregressive techniques and cross referencing are practised, outsiders can improve the precision of their estimates of a reference series by the same means, but the results would be tautological.

2. THE DATA

The data for Switzerland correspond to the general picture drawn above. Specifically, our information on industrial activity stems from the following sources:

- Official statistics on production, sales, and orders published quarterly by the SFSO.[9]
- Data from the KOF business surveys.

2.1. Official Statistics

The Swiss Federal Statistical Office publishes industrial statistics on sales, incoming orders, order books and inventories of finished products for various levels of aggregation according to the NOGA classification (corresponding down to the 4-digit-level to the NACE, Rev. 1, of the EU), and in many cases, we were able to find a matching sub-aggregate in the KOF BTS data. An extensive screening of the data by means of some 10,000 cross-correlations revealed, however, that – for whatever transformation of either series – the narrower the aggregate, the lower is the correlation between the official series and the KOF BTS data (ETTER and GRAFF, 2001). From this very strong regularity, we are inclined to infer that a considerable amount of the noise in the 2- and 3-digit categories is cancelled out in the aggregate data. Therefore, in this paper, we restrict the presentation to the aggregate level NOGA D (manufacturing industry).

Empirically, the official Swiss production and sales series are highly correlated, so that in this paper, we focus on industrial production (PRODU) and, we do not report results for the sales series.[10] The second OFS series that we shall analyse is the incoming orders index (ORDER). The reason for this choice is that incoming orders are frequently referred to as leading indicators for overall industrial activity in business cycle analysis. Hence, any hints referring to this series might prove a valuable tool for policy-oriented analysis.

Following their present definitions, SFSO data on the manufacturing industry are only available from 1996:1. This partly is due to the fact that in the past, Switzerland has been rather reluctant to join supranational institutions and accordingly, until recently, there was less need or pressure to adapt its own statistical classifications, standards and procedures to common practice than in many other industrialised countries. However, the historical series for the last six years of the pre-1996 period have been recalculated and adapted as closely as possible to the current standards, so that there are now official index series going back to 1990:1. Presently, we can thus refer to roughly 13 years of indus-

9. "Der Geschäftsgang im sekundären Sektor: Die Produktions-, Auftrags-, Umsatz- und Lagerindizes".
10. Since the production series are mainly derived from the sales series, it might seem preferable to report the results for the sales index, and as a matter of fact, the correlation between the sales index and our BTS data is slightly higher than for the production index. However, the results do not differ in any substantial manner, so that for the sake of better comparability with other studies, we use the production rather than the sales series.

trial statistics, i.e. 52 quarterly observations, which is a rather short range for the detection of cyclical patterns.[11] At the time of finishing the last revisions of this paper, the latest provisional data in the SFSO series, published in the end of March 2003, refer to 2002:4. Note that we let our within sample analyses end in 2000:4.

Figures 1 and 2 show the official Swiss production and incoming orders indices. To get an idea of the extent to which the series has been subject to revisions, R, in the past (since the introduction of the new statistical standards in 1996), we also include the provisional values of the index values at the time of their first publication.

Figure 1: Swiss production index, 1990–2002

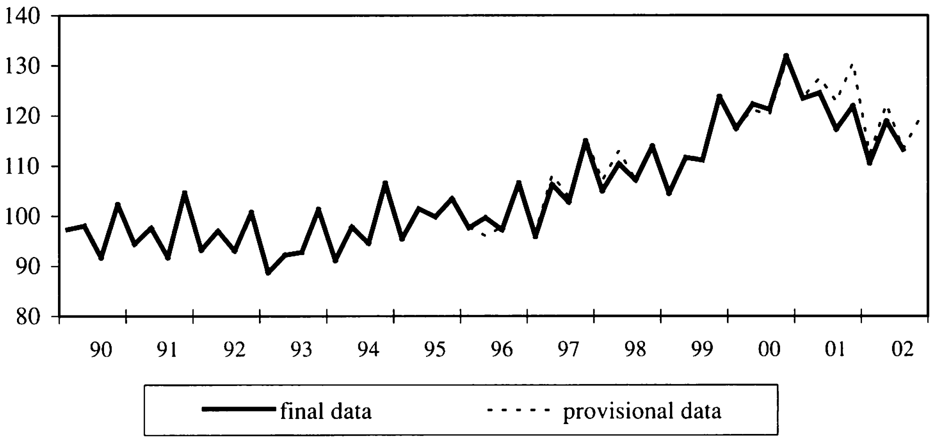
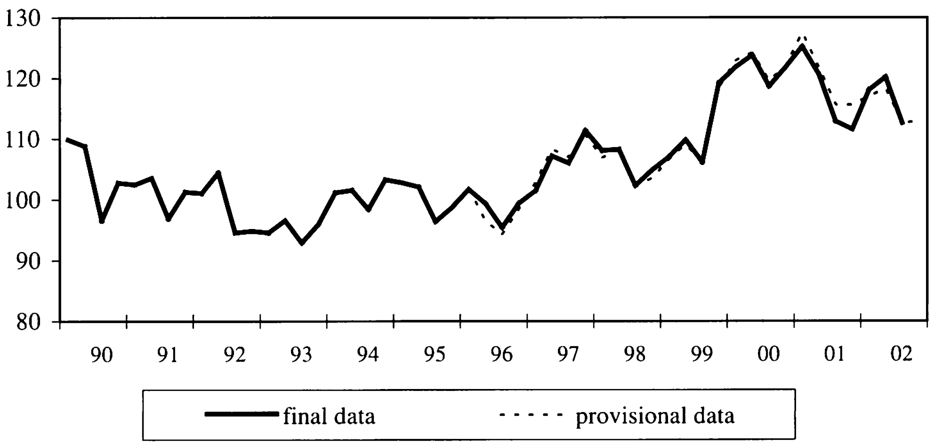


Figure 2: Swiss incoming orders index, 1990–2002



11. In any case, official statistics referring to industrial activity in Switzerland are no longer available for the years before 1990, so that there is an effective restriction which we have to acknowledge.

From 1990 to the present, the availability lag, v, for the provisional official statistics amounts to a mean of roughly 1½ quarters. In addition, until now, observers of Swiss industrial activity had to wait for another year for the final official figures, so that w equalled at least five quarters. However, the SFSO is presently reorganising its industrial statistics sampling procedures, and future revisions will only affect the last quarter.[12] Accordingly, for this study, we can draw on final official figures until 2002:3.

Since the production and orders index series are conceptually non-stationary and, in addition to this – as can be seen in Figures 1 and 2 – strongly affected by seasonal factors,[13] we refer to YTY growth series (GR4PRODU, GR4ORDER) only, which we compute as

$$\mathrm{YTY} \equiv \mathrm{GR4}(Y) = \ln Y_t - \ln Y_{t-4}. \tag{7}$$

2.2. *The Swiss KOF Business Survey*

Business surveys are conducted by various institutions in Switzerland. Among these, the KOF surveys in the manufacturing industry, which where initiated already in the 1950s and rely on extensive information, are probably giving the most representative picture of business conditions in the Swiss manufacturing industry. Hence, this study draws on data from the monthly and quarterly KOF business tendency surveys in the Swiss manufacturing industry. The latest KOF data included in this study are from the monthly survey for February 2003 and the quarterly survey for 2002:4, respectively. Table 1 shows the items of the monthly and quarterly surveys with their acronyms.[14]

Apart from the "degree of capacity utilisation" (CAP_%), where the respondents are supposed to make an estimate in percentage points, all items are qualitative appraisals or judgements of past, present and future business conditions of the respondent's firms with respect to orders, production, stocks, employment, technical capacity, intermediate products and prices. Taken together, these items provide a solid basis for the assessment of the individual firm's business situation. During the period under consideration, there are well above 1,000 filled questionnaires per survey. Since the answers are from a stratified panel of Swiss firms with a continuously high response rate of about $^2/_3$, the individual data can be aggregated to characterise the business condition of the manufacturing industry.

12. Oral communication to the authors, 25th of March 2003.
13. Similar observations have been made for other economies, e.g. for Sweden (BERGSTRÖM 1995). The seasonal pattern in the Swiss FOS data (poor performance in the first and third quarters, good performance in the second and fourth quarters) have been cross-checked with other information, and no hints have been found for computational problems. An explanation could refer to the Swiss holiday pattern, but here we have to leave this question open for further investigation.
14. In the appendix, the items analysed in this study are reproduced from the French monthly and quarterly questionnaires. For the complete questionnaires in French, German and Italian, see *http://www.kof.ethz.ch*.

Table 1: Questions of the KOF BTS in manufacturing industry

Monthly survey	
IO_PM	Incoming orders compared to previous month
IO_PY	Incoming orders compared to the month of the previous year
OB_PM	Order books compared to previous month
OB_J	Order books, judgement
PR_PM	Production compared to previous month
PR_PY	Production compared to the month of the previous year
SIP_PM	Stocks of intermediate products compared to previous month
SIP_J	Stocks of intermediate products, judgement
SFP_PM	Stocks of finished products compared to previous month
SFP_J	Stocks of finished products, judgement
EXP_IO	Expected incoming orders (next three months)
EXP_PR	Planned production (next three months)
EXP_PIP	Planned purchase of intermediate products (next three months)
EXP_MD	Expected midterm development (beyond the next three months)
BA*	Business activity
PL*	Business plans
Quarterly survey	
EMP_PQ	Employment compared to previous quarter
EMP_J	Employment, judgement
CAP_PQ	Technical capacity compared to previous quarter
CAP_J	Technical capacity, judgement
CAP_%	Degree of capacity utilisation, percentage
PS_PQ	Profit situation compared to previous quarter
E_PIP	Expected prices for intermediate products

Note: * aggregated index.

There are three possible answers to each qualitative question. The judgements may be stated as "too high", "normal", "too low", and the changes as "up", "unchanged" or "down". The weighted individual answers of the firms are aggregated to form percentages of each response category in relation to the total.[15] Accordingly, the percentage shares of the categories sum up to 100 %. For many purposes, a more compact information is preferred and the balance technique is used to arrive at a single index, where balance is calculated as the difference between the positive and the negative percentage shares and thus indicates the dominant tendency.[16] However, note that the information

15. The weight on the micro-level is the firm's employment; weights on aggregate level are demographic data.
16. This method of extracting relevant information is widely used. For a discussion of its properties, see DASGUPTA and LAHIRI (1992).

reflected by the normal/unchanged responses is not referred to. Therefore, we do not look exclusively at the balance series but rather draw on the three response categories of the single indicators as well. Since this is rarely done in other studies, we dispose of a comparably large set of potential coincident and leading indicators.

To keep the notation for the numerous series derived from the KOF surveys compact, we let "too high" or "up" be denoted by an infix "H", "normal" or "unchanged" by "N", "too low" or "down" by "L", and the balance indicator is identified by "B".

Before correlating these series with their potential reference series from the official statistics, some transformations are necessary. First, all monthly survey data X are aggregated into quarterly series (mean values, denoted by "A" and, alternatively, end values, denoted by "E"), where

$$\mathrm{A}(X)_Q = (X_{m1} + X_{m2} + X_{m3})/3 \tag{8}$$

and

$$\mathrm{E}(X)_Q = X_{m3}. \tag{9}$$

Secondly, the KOF series are used alternatively in original (notational suffix "0") and deseasonalised form (suffix "1").

Thirdly, apart from the level series, we compute first differences with respect to the preceding quarter $(t-1)$ as well as with respect to last year's corresponding quarter $(t-4)$:

$$\mathrm{D1}(X) = X_t - X_{t-1}, \tag{10}$$

$$\mathrm{D4}(X) = X_t - X_{t-4}, \tag{11}$$

These quantifications and transformations lead to a very large number of series: For each item X in the monthly survey questionnaire, there are 4 quantifications (H, N, L, B), two aggregations into quarterly series (A, E) and original and deseasonalised alternatives (0, 1). This number of series is multiplied further by factor 3, since all of these are evaluated alternatively in levels, differences (D1) and seasonal differences (D4). Accordingly, one single item in the questionnaire can result in a maximum of 48 ($4 \times 2 \times 2 \times 3$) quantitative series.

General experience suggests that leading indicators from BTS data allow reasonably reliable forecasts of economic conditions about one or two quarters ahead. Since the analysed KOF series are going back well beyond 1990, our statistical analysis can draw on the full informational basis of the official data from 1990:1 to the present, with some reservations regarding a structural break or shift in the SFSO series after 1995:4 due to the introduction of the present standards in 1996:1.

3. PREVIOUS STUDIES

There are numerous studies from various countries, which screen the correlation of BTS data with official statistics, and some of these studies undertake to refer to BTS data in order to estimate the official data. Unsurprisingly, the results are mixed, but generally, BTS data seem to be extremely useful for the construction of coincident and leading indicators of economic activity. However, for Switzerland, the earlier evidence is comparably unfavourable, so that a new look at the data is in order.

An earlier attempt to derive numerical estimates of the Swiss official statistical production index by means of KOF BTS data failed to find sufficiently close correlations. According to STALDER (1989, pp. 35–36), this is at least partly due to the dubious quality of the reference series, the BIGA production index[17] from 1980:1–1989:3. Since official data, which are adapted to the new SFSO production index, have not been calculated for the years before 1990, there is no direct way to address STALDER'S assumption. If, however, the post-1990 official statistics series are plagued less by data problems than the previous, pre-1990 official series, the correlation between FOS data and quantifications of BTS data could meanwhile have improved, thereby providing a better basis for BTS → FOS estimates.

Similar work has been done by TAKALA and TSUPARI (1997) for Finland. They analysed the behaviour of the balance indicators in total manufacturing industry and in some important branches compared with yearly growth rates of industrial production. After a cross-correlation analysis, Granger causality tests were conducted to select the leading indicators. As an additional feature they ended with some cross-spectral analysis to find the optimal time lead.

FRITSCHE (1999) analysed the business survey data collected by the German ifo-institute. He started with a graphical interpretation of the leading properties of expectation indicators at economic turning points. Cross-correlation and Granger causality tests confirmed the leading characteristics of the used data. Unfortunately a detrended reference series was used giving the change-questions a lead by definition, therefore the effective lead would be somewhat smaller than the published one.

Another approach was chosen by HÜFNER and SCHRÖDER (2001). They analysed a set of coincident survey indictors with respect to leading survey indicators. To this end, they started with a graphical analysis and continued with cross-correlation and Granger causality tests. There were no significant differences in the forecasting ability, particularly in signalling changes in the direction of industrial production. However, the results are somewhat difficult to interpret because HÜFNER and SCHRÖDER did not use a reference series.

In the USA, MOORE et AL. (1994) analysed the behaviour of the cumulated balance indicators of different surveys in the CIBCR Leading Index, which is a highly reliable

17. Recall that official industrial statistics in Switzerland underwent major changes in the 1990s. In this context, "BIGA indices" denote the former series.

indicator for detrended economic development. The qualitative survey indicators showed a smoother performance, but the lead was not quite as long as with the quantitative indicators.

For Switzerland, MARTY (1997) analysed the KOF BTS indicators. He proceeded in a way similar to our study; but his reference series was GDP and not industrial production, because at that time the revised index of industrial production covered only six years. After the selection process by cross-correlation and graphical interpretation of turning points, the remaining indicators entered the principal component method to aggregate them to the new leading indicator "KOF barometer", which in Switzerland is nowadays widely referred to with respect to potential short and medium term turning points in GDP growth. However, this indicator focuses exclusively on turning points and thus does not make any reference to levels.

4. EMPIRICAL ANALYSIS

4.1. Cross-Correlations

With the BTS and official statistics series and time ranges as described above, a large number of cross-correlations were computed to screen the data for pairs of highly correlated series at the aggregate industry level. From these, all pairs where the maximum correlation showed up contemporaneously or with a lead of the KOF series were selected for further analyses (Granger causality, pattern of turning points). This resulted in the identification of all "highly" correlated pairs of series with predetermined and stable lead-lag structures, where the selection threshold was predetermined as

$$|r| \geq 0.7 \Leftrightarrow r^2 \geq 0.5. \tag{12}$$

The results referring to the YTY growth rates of the production and the incoming orders index, GR4PRODU and GR4ORDER, are presented in Table 2, which shows the 10 pairs with highest absolute values of correlation for every predetermined lead ($\lambda = 0, 1$).

Table 2: Cross-Correlations, NOGA D, $\lambda = 0,1$

Reference series	KOF BTS series	|r|max.	Lead BTS → FOS (quarters)
GR4PRODU	EXP_PR_EB1[a]	0.814	1
GR4PRODU	EXP_PIP_EB1	0.812	1
GR4PRODU	EXP_IO_EL1	−0.803	1
GR4PRODU	BP_EB1	0.800	1
GR4PRODU	EXP_MD_EB1	−0.795	1
GR4PRODU	EXP_PIP_EH1	0.790	1
GR4PRODU	OB_PM_EL1	−0.785	1
GR4PRODU	EXP_PIP_EB0	0.785	1
GR4PRODU	EXP_PR_EB0	0.784	1
GR4PRODU	EXP_IO_EB1	0.783	1
GR4PRODU	IO_PY_AL0	−0.878	0
GR4PRODU	BA_EB0	0.874	0
GR4PRODU	IO_PY_AB0	0.869	0
GR4PRODU	PS_PQ_B1	0.863	0
GR4PRODU	IO_PY_EL0	−0.861	0
GR4PRODU	BA_AB0	0.860	0
GR4PRODU	PS_PQ_L1	−0.860	0
GR4PRODU	IO_PY_EB0	0.848	0
GR4PRODU	PR_PY_EL0	−0.848	0
GR4PRODU	IO_PY_AH0	0.842	0
GR4ORDER	EXP_IO_EB1	0.799	1
GR4ORDER	EXP_PR_D4AH0	0.785	1
GR4ORDER	EXP_PR_D4AH1	0.784	1
GR4ORDER	EXP_PR_D4EB0	0.772	1
GR4ORDER	EXP_PR_D4EH0	0.770	1
GR4ORDER	BA_D1AB0	0.769	1
GR4ORDER	EXP_PR_D4EB1	0.768	1
GR4ORDER	EXP_PR_D4EH1	0.764	1
GR4ORDER	EXP_PIP_D4AH0	0.764	1
GR4ORDER	EXP_PIP_D4AH1	0.764	1
GR4ORDER	IO_PY_EB0	0.891	0
GR4ORDER	IO_PY_EL0	−0.888	0
GR4ORDER	IO_PM_AL1	−0.887	0
GR4ORDER	IO_PM_AB1	0.877	0
GR4ORDER	PS_PQ_B1	0.875	0
GR4ORDER	IO_PY_EH0	0.874	0
GR4ORDER	OB_PM_AB1	0.871	0
GR4ORDER	PS_PQ_L1	−0.870	0
GR4ORDER	OB_PM_AL1	−0.869	0
GR4ORDER	PS_PQ_B0	0.849	0

Notes: a) Reading example: EXP_PR_EB1, item in questionnaire on planned production, last month of a quarter used as quarterly value, balance indicator, deseasonalised.

4.2. *Turning Point Analysis*

In the related economic literature, going back to BURNS and MITCHELL (1946), there are different theoretical concepts of business cycles, and accordingly, turning points are dated differently (AMSTAD, 2000). A common concept is oriented at the growth rate of one or more economic indicators and comes under the heading of acceleration/deceleration. This concept is based on the dynamics of the economy and therefore looks at points of extreme growth rates, i.e. mathematical points of inflection. At the same time, it distinguishes between positive and negative growth rates; and this distinction is used to define the phases of the classical cycle, where a recession is commonly defined by at least two consecutive time periods with negative growth rates.

Other concepts are focussed on the degree of capital utilisation and distinguish between phases of normal use of capital, bottlenecks, or excess capacity. This corresponds to the growth cycle concept, which goes back to the work of MINTZ (1969), where growth cycles are defined as different states between points of extreme deviation from an average trend. By definition, downturns will come earlier, upturns later in trend-adjusted series with upward trends than in unadjusted series.

With respect to forecasts of economic trends, the interest of policy makers is concentrated on hints to the dynamics of GDP growth, or of industrial production, and these are commonly assessed by (yearly) growth rates. Our definition of turning points is therefore based on the concept of acceleration/deceleration. Specifically, a turning point is dated in the last quarter of a tendency's direction if the quarter with the change of tendency is followed by two further quarters where the tendency is at least not opposed to the new tendency. In other words, a new tendency has to be confirmed (or at least not contradicted) by three quarters in a row. At the beginning and the end of a time series we apply the rule of BRY and BOSCHAN (1971), which says that a turning point cannot be defined in the first or the last two quarters of a time series.

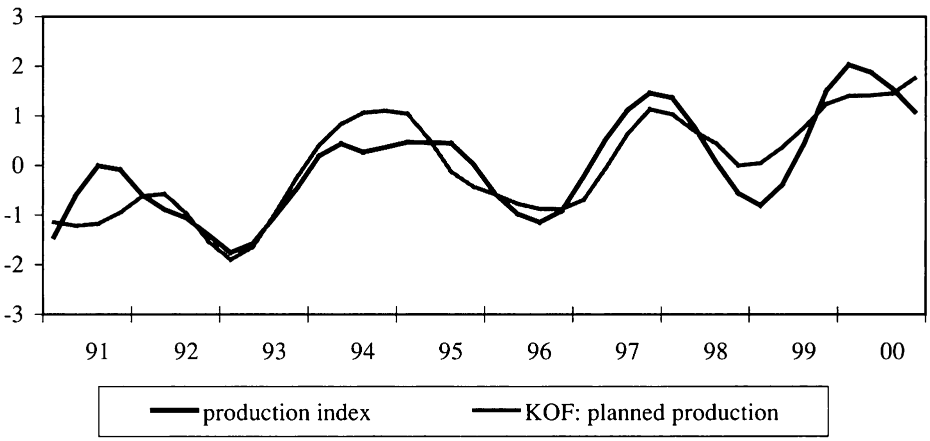
Referring to this concept, for our official statistics, the analysis of turning points has to be limited to the GR4(Y) series (year to year growth rates of quarterly data), which are conceptually stationary. The BTS data under consideration – balance, H-, N-, L-percentage – are by definition stationary. We compare the SFSO and the BTS data under the following conditions:

- The two time series fulfil the correlation criteria,
- if the cross-correlogramme indicates a lead of BTS, a Granger causality test is significantly rejecting the null hypothesis "BTS_{t-k} is not a predictor of SFSO_t" with $p \leq 1\%$.[18]

18. See GRANGER (1969). After a first identification of the predominant lead-lag structure between a given pair BTS $\rightarrow$ FOS, a confirmatory Granger causality test was conducted by regressing the FOS series on its lagged value as well as the lagged value of the pre-selected BTS series, $Y_t = \beta_0 + \beta_1 Y_{t-\lambda} + \beta_2 X_{t-\lambda} + \varepsilon_t$, where the lag λ for both regressors was fixed equal to the lead of the BTS series before the FOS series as identified by the maximum correlation in the cross-correlogrammes. Only very few of the pre-selected pairs failed to pass the test $\beta_2 \neq 0$. For details, see (ETTER and GRAFF, 2001).

Only for the turning point analysis, all selected time series were smoothed over the respective analysis period (SFSO: 1990:1–2000:4; BTS: 1985:1–2000:4) by the CENSUS-X11 procedure, because original data of the economic time series of the type used here include a large component of seasonal and noise elements. Therefore, a sensible determination of turning points has to be based on the smooth component. Figure 3 illustrates the graphical matching of the standardised and smoothed series for GR4PRODU and the indicator variable EXP_PR_EB1 (item "planned production", quarterly end value, balance indicator, deseasonalised), where the cross-correlation (Table 2, first line) indicates a lead of one quarter for the BTS series.

Figure 3: Z-scores of reference series GR4PRODU and EXP_PR_EB1, $\lambda = 1$



To avoid effects of marginal changes of the smoothed time series on the determination of turning points, we rounded the standardised time series to one decimal point. Hence, the analysis of the changes of a series was performed in discrete steps of 0.1 standard deviations. Finally, attention has to be given to the fact that, by definition, after an upper (lower) turning point, there can follow – if any – only a lower (upper) turning point.

Then, the upper and the lower turning points of the SFSO time series were identified. These serve as the reference points for the BTS time series. After this, the development of BTS series to the correspondent SFSO series was analysed with respect to the lead-lag structure. In this context, note that apart from indicating a given turning point in the reference series, a control series can fail to signal a turning point, or it can indicate a turning point, where there is none in the corresponding SFSO series, and this has to be accounted for.

Summarising quality criteria for turning points

Since a comparison of the SFSO and the BTS series with respect to their turning points has to account for different aspects, we calculated two different summary measures. This will enable us later to select the "best" BTS time series as regressors in our approach.

- The first measure is the average lead (AVL) at all – i.e. upper and lower – turning points of a BTS time series with respect to the corresponding SFSO data. Generally, leading indicators are strong at the average lead, but often fail to lead at the turning points, thereby failing to provide what is perhaps the most relevant information for users.
- The second measure is our index of quality (QI). We define this index as follows:

$$QI = \frac{NCS - NFS}{NTP}, \tag{13}$$

where NCS is the number of correct turning point signals by the BTS indicator, NFS is the number of false signals and NTP is the number of the turning points in the reference series. Note that QI assumes its maximum value 1.0 for an indicator series which signals all turning points of the reference series correctly and, in addition, does not give any false signals. False or missing signals reduce the index by the same amount (symmetric penalty function).

4.3. OLS Regressions

We can now proceed with three criteria to judge the coherence between an SFSO reference series and its potentially corresponding BTS time series:

- absolute value of the cross-correlation coefficient,
- deviation of average lead at turning points (AVL) from lead λ at maximum $|r|$,
- quality at turning points index (QI).

The selection of a single best leading or coincident indicator for an SFSO time series, however, is complicated by the fact that these criteria do not have a hierarchical structure. Hence, the choice of an indicator has to refer to the needs or preferences of the potential user. This is shown in Table 3. To construct this table, we picked for the two reference series with two alternative lead-lag structures given by $\lambda = 0, 1$, the single transformation of a given BTS series which yields the highest absolute correlation. This selection problem is illustrated by the bold entries, which indicate the best result with respect to *one* of the criteria, given a pre-specified lag.[19]

19. For example, with respect to the reference series GR4ORDER and a pre-specified lead of one quarter, EXP_IO_EB1 scores best in all criteria. But for making a one-period-ahead forecast of GR4PRODU, there are two alternatives. If the best average fit is given priority, one would choose EXP_PR_EB1; however, if the interest is directed towards best performance at turning points, one would choose EXP_PIP_EB1. Likewise, alternative regressors show up for GR4PRODU at $\lambda = 0$ (IO_PY_AL0 vs. BA_EB0) as well as for GR4ORDER at $\lambda = 0$ (IO_PY_EB0 vs. PS_PQ_B1).

Table 3: Best pairs with respect to selection criteria, NOGA D, $\lambda = 0, 1$

Reference series	BTS	Lead	|r|max.	AVL	QI
GR4PRODU	EXP_PR_EB1	1	**0.814**	0.7	**1.0**
GR4PRODU	EXP_PIP_EB1	1	0.812	**1.0**	**1.0**
GR4PRODU	EXP_IO_EL1	1	−0.803	1.9	**1.0**
GR4PRODU	BP_EB1	1	0.800	0.8	0.9
GR4PRODU	EXP_MD_EB1	1	−0.795	0.4	**1.0**
GR4PRODU	OB_PM_EL1	1	−0.785	0.3	**1.0**
GR4PRODU	IO_PY_AL0	0	**−0.878**	−0.4	**1.0**
GR4PRODU	BA_EB0	0	0.874	**−0.3**	0.9
GR4PRODU	PS_PQ_B1	0	0.863	0.4	**1.0**
GR4PRODU	PR_PY_EL0	0	−0.848	−0.9	0.9
GR4ORDER	EXP_IO_EB1	1	**0.799**	**0.9**	**1.0**
GR4ORDER	EXP_PR_D4AH0	1	0.785	0.4	**1.0**
GR4ORDER	BA_D1AB0	1	0.769	**0.9**	**1.0**
GR4ORDER	EXP_PIP_D4AH0	1	0.764	0.4	**1.0**
GR4ORDER	IO_PY_EB0	0	**0.891**	0.6	**1.0**
GR4ORDER	IO_PM_AL1	0	−0.887	−0.9	**1.0**
GR4ORDER	PS_PQ_B1	0	0.875	**−0.3**	**1.0**
GR4ORDER	OB_PM_AB1	0	0.871	−0.4	**1.0**

Referring to these pairs, reasonably precise *ex post*-estimates of SFSO data can be obtained through regressions of the reference series on just one coincident or – though to a lesser extent – leading series from the KOF business tendency surveys,[20] where the estimation equation is

$$Y_t = \beta_0 + \beta_1 X_{t-\lambda} + \varepsilon_t. \tag{14}$$

Referring to the regressors that, from the cross-correlogrammes, are *a priori* known to correlate highly with a reference series, regression (14) results in coefficients of determination in the range of 0.6–0.8. To improve the fit further, we consider a structural break regarding the stability of the parameters between 1995/1996 due to the introduction of the new official statistics, so that

$$Y_t = \beta_0 + \beta_1 D + \beta_2 X_{t-\lambda} + \beta_3 D \times X_{t-\lambda} + \varepsilon_t, \tag{15}$$

where $D = 0$ for quarters until 1995:4, and $D = 1$ thereafter. If an F-Test for joint significance of D and $D \times X_{t-\lambda}$ implies $p \leq 0.1$, regression (15) is fitted, if $p > 0.1$, regression

20. For details, see Etter and Graff (2001).

(14) is run.[21] Obviously, this ensures that additional regressors to account for a structural break are included if, and only if they result in a (moderately) *significant* increase of the overall regression R^2.

There is, however, room for an improvement of these estimates, since additional predictive BTS series can be included as regressors into the model. This is presented in the following section.

4.4. *Multivariate Regressions: Regressor Selection Procedures and Out of Sample Estimations/Forecasts 2001:1–2003:2*

Any OLS regression fit can be improved by additional regressors. However, it is well known that multicollinearity can severely impair the precision of the coefficient estimates, thereby rendering such a regression less useful for analytical purposes. In the context of this paper, this implies that the overall fit of our within-sample regressions can successively be improved by the inclusion of other BTS series as regressors, but, due to multicollinearity, the estimated parameters are then at the same time successively getting less close to what might be meaningful structural relationships.

Since this is an explorative study, we want to keep the procedure as transparent as possible. Therefore, we derive four specifications, two of $f\,[\text{BTS}(t)_t]$ and two of $g\,[\text{BTS}(t+u)]$, where the leads of the BTS series are pre-specified as $\lambda = 0$ and $\lambda = 1$, respectively. Moreover, we limit the number of independent explanatory variables to two. As in the bivariate regressions, the possibility of structural breaks between 1995 and 1996 is accounted for, so that

$$Y_t = \beta_0 + \beta_1 D + \beta_2 X_{1_{t-\lambda}} + \beta_3 D \times X_{1_{t-\lambda}} + \beta_4 X_{2_{t-\lambda}} + \beta_5 D \times X_{2_{t-\lambda}} + \varepsilon_t, \qquad (16)$$

where D and $D \times X_{it-\lambda}$ (i = 1,2) are included as regressors if they turn out jointly significant in single predictor variable estimations. The selection of the predictor series X_1 and X_2 is straightforward. We choose for a given reference series and a pre-specified λ

1. as X_1 the BTS series with the highest absolute correlation to the reference series,
2. as X_2 the BTS series that performed best with respect to our turning point precision measures AVL $-\lambda$ and QI (see Table 3).[22]

In order to enable us to come up with some out of sample estimates, the endogenous official statistics series are the same as in the structural analyses above, where the YTY growth rate data range from 1991:1 to 2000:4 and no later revisions are considered. The KOF series, however, have been updated and now extend to 2003:1. Accordingly, with $\lambda = 0$, our coincident estimates include 2003:1 as the last quarter, and for $\lambda = 1$, we can

21. See Brown et al. (1975)
22. Note that AVL $-\lambda$ and QI can give different signals. In this case, we followed a hierarchical procedure, where AVL $-\lambda$ was given priority (here: choice of BP_EB0 $\leftrightarrow$ GR4PRODU at $\lambda = 0$).

present forecasts until 2003:2. Recall that for a first, albeit informal, inspection of the out of sample properties of our multivariate regressions, at the time of writing, we have access to final SFSO data until 2002:3 and to provisional SFSO data until 2002:4. Accordingly, the comparison of the first seven out of sample observations with its *g* (BTS) and *f* (BTS) estimates refers to final SFSO data and therefore allows a definite evaluation, whereas when comparing quarter 2002:4, one has to bear in mind that the official data are provisional. Finally, we have forecasts for up to two additional quarters, which cannot yet be compared with any official statistics, but which might be of interest for their own sake.

The regression results for *g* (BTS) and *f* (BTS) are summarised in Table 4. The overall fit R^2 is high for all specifications and ranges from 0.74–0.87. However, the overall fit is considerably closer for the incoming orders regressions. In addition, for the production index regressions, the selection procedure obviously leads to a higher degree of multicollinearity. Though there is some room for screening for pairs of less correlated predictor variables,[23] which would to a certain amount reduce multicollinearity, this would render the selection procedure less transparent. Moreover, since for the purpose of this basically explorative study, we are interested in the overall predictive characteristics of $\hat{Y}$ rather than the individual coefficient's regression statistics, we shall not pursue this issue further and move directly to the predictions.

Table 4: Regressions of reference series on two BTS series

Reference series	λ	BTS series 1	BTS series 2	intercept	structural break*	R^2
GR4PRODU	1	EXP_PR_EB1	EXP_PIP_EB1			
		0.002	0.001	0.014	none	0.74
		(1.42)	(0.58)	(1.38)		
GR4PRODU	0	IO_PY_AL0	BA_EB0			
		−0.003	0.0005	0.121	1st regressor	0.80
		(−1.84)	(0.13)	(2.87)		
GR4ORDER	1	EXP_IO_EB1	BA_D1AB0			
		0.003	0.002	−0.016	2nd regressor	0.86
		(5.03)	(2.25)	(−2.89)		
GR4ORDER	0	IO_PY_AL0	PS_PQ_B1			
		0.002	0.001	0.016	1st regressor	0.83
		(2.99)	(0.83)	(1.03)		

Notes: *) t-statistics in brackets, regression with two/three additional regressors D and $D \times$ BTS series (one or both) case of one or two structural breaks in bivariate regressions of FOS on either BTS series.

Figures 4 and 5 show the reference series GR4PRODU and GR4ORDER during the within sample period 1991:1–2000:4 together with their estimated values from coincident and leading BTS indicators *f* (BTS) and *g* (BTS) as specified in Table 3. Obviously, both alternative estimates are predicting levels as well as turning points, peaks and troughs of their reference series very well throughout the whole period. Moreover, the

23. See ETTER and GRAFF (2002).

predictions are less affected by noise, which is due to the fact that most of the predictor series are deseasonalised by CENSUS X11, whereas the reference series are YTY growth rates of the original data. Although the latter transformation filters some of the seasonal variance, it is likely to amplify the noise in the original series.

Figure 4: Reference series GR4PRODU and within sample estimations

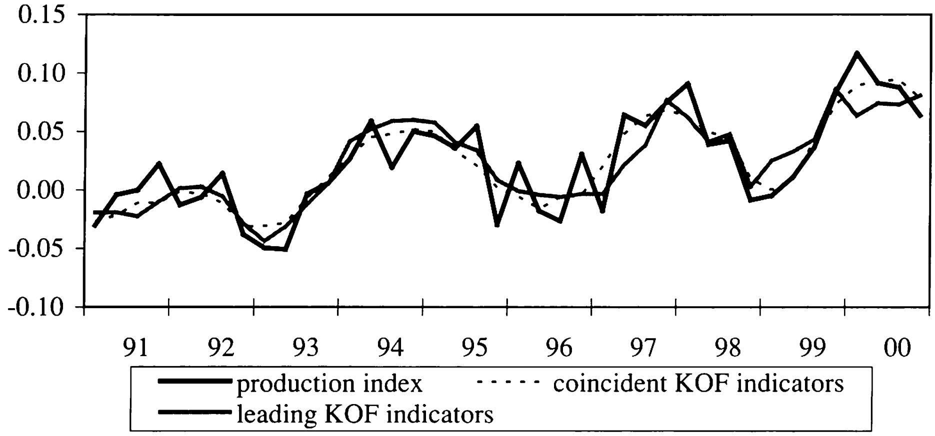
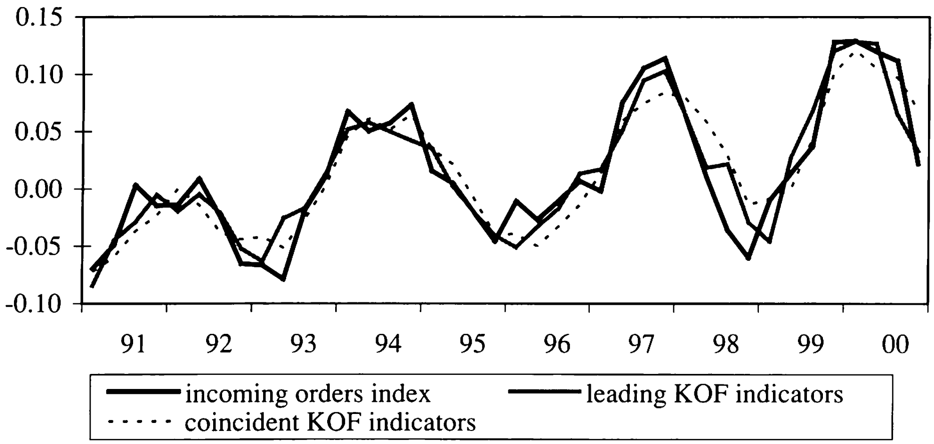


Figure 5: Reference series GR4ORDER and within sample estimations



Figures 6 and 7 show plots of the reference series GR4PRODU and GR4ORDER from 1996 (i.e. after the last major revision of the Swiss industry statistics) until 2003:2, that is the last quarter up to which we can compute out of sample estimates. The vertical dotted lines indicate the beginning of the out of sample period, for which the structural patterns of the within sample period together with the empirical realisations of the corresponding predictor series have been used to compute the predicted values , i.e. the estimations of the reference series with leading or coincident indicators. The reference series end in 2002:3, which is the last final official statistics data point, whereas the estimations on the basis of coincident predictors *f* (BTS) range until 2002:4 for GR4ORDER and 2003:1 for GR4PRODU, and the last quarterly value from the leading indicator estimations *g* (BTS) is 2003:2.[24]

Figure 6: Reference series GR4PRODU and out of sample estimations

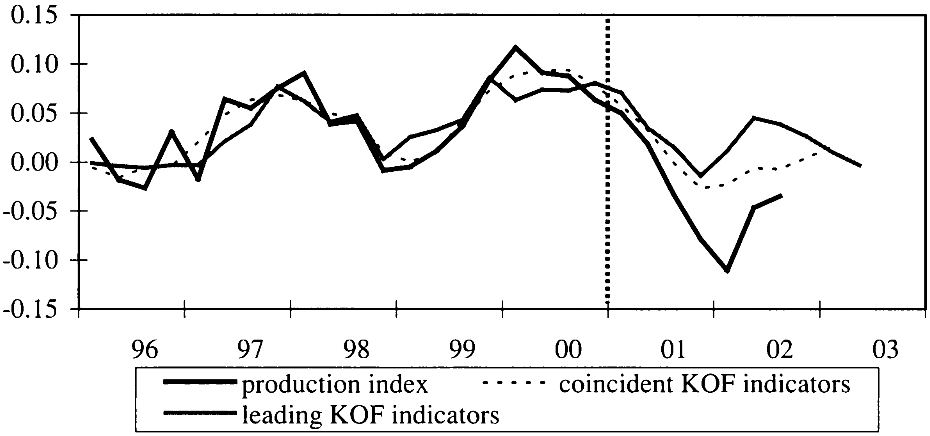
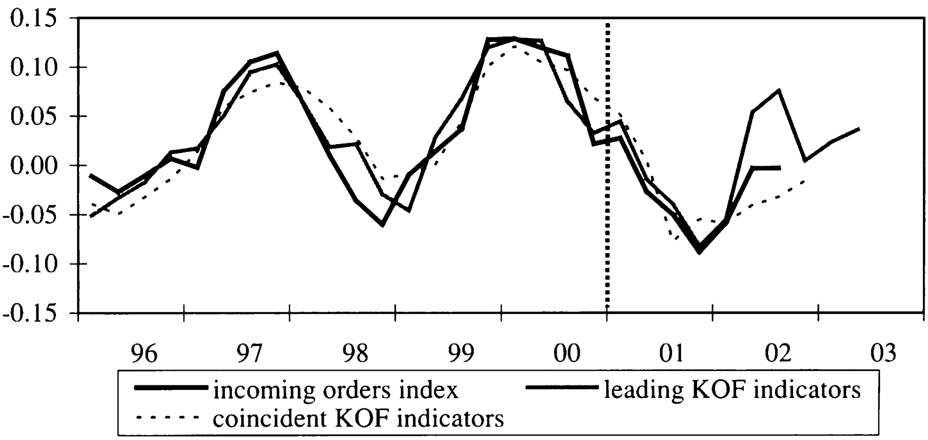


Figure 7: Reference series GR4ORDER and out of sample estimations



24. At the time of finishing this paper, the data basis from the KOF BTS surveys was as follows: Series of monthly surveys are available until February 2003, whereas the quarterly survey data, from which some of the coincident GR4ORDER-predictors are taken, end in 2002:4. To illustrate the predicted tendency at the right margin, the last two monthly numbers have been transformed into quarterly data by averaging and taking the February 2003 number as quarterly end value, respectively. Note that these provisional BTS data points are for illustrative purposes only and do not enter into any of the analytical work.

Comparing the periods until and after 2000:4, it is fair to say that the estimated paths still capture the major tendency after 2000:4, though – especially for GR4PRODU – the long lasting downswing in the final official statistics with its pronounced trough in 2002:1 is less reflected by the survey data, where it ends already a quarter earlier. Therefore, some caution is in order with respect to the stability of the structural patterns from the 1990s. Interestingly, the present uncertainty with respect to the expected upswing is revealing itself in the figures: The leading-indicator-based predictions signalled a rather sharp upswing in the second half of 2002, which was revised downward later, as can be seen from the series itself as well as from the lower level of the coincident predictions, which are based on later surveys. In other words, the respondents of the KOF industry surveys were too optimistic in the first part of 2002, when observers of economic activity in Switzerland and elsewhere – among these major business cycle research institutions – were expecting the upswing to arrive very soon, and expectations are generally revised downward ever since.

Last, but not least, in addition to the seven final out of sample data points of the two reference series, we also compare our estimated out of sample series to what is probably the most appropriate rival estimate – the provisional figures of the SFSO, which, from the discussion above should be assumed to be unbiased estimates of their final values. Moreover, since the provisional official statistics come with a lag of v as compared to coincident BTS indicators, and $v + u$ as compared to leading indicators, they can draw on more information and, hence, should be better predictors than any BTS based predictions of either type f (BTS) or g (BTS). Accordingly, we compare our estimates with the provisional official data for 2001:1–2002:3 at the time of their first publication, and the final official figures serve as the yardstick. For the period under consideration, the availability lead of the BTS based estimates before the first provisional official data roughly equals $v = 1\frac{1}{2}$ quarter or $v + u = 2\frac{1}{2}$ quarters, respectively. Figures 8 and 9 show the time series plots from 2001:1 for all series under consideration.

Figure 8: GR4PRODU, final, provisional and out of sample estimations

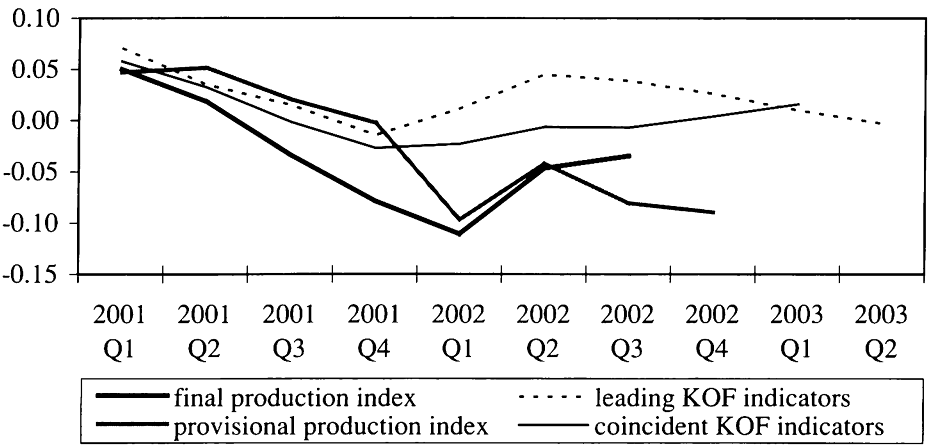


Figure 9: GR4ORDER, final, provisional and out of sample estimations

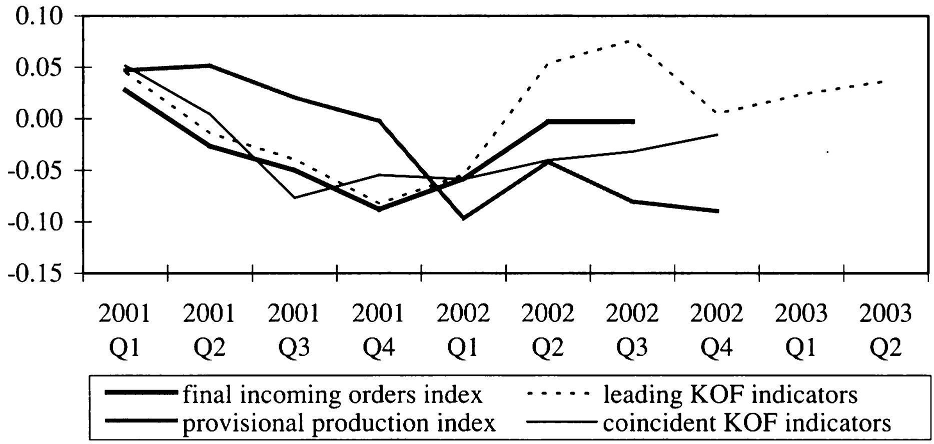


Table 5 presents two descriptive statistics regarding the predictive qualities of the statistical office's provisional statistics, f (BTS) and g (BTS) with respect to the final official figures for GR4PRODU and GR4ORDER from 2001:1–2002:3 (n = 7).

Table 5: Comparison of predictive properties of provisional data, f (BTS) and g (BTS), n = 7

	Refrence series GR4PRODU		Reference series GR4ORDER	
	R	MSE, %	R	MSE, %
Provisional Data	0.76	17.4	0.80	5.1
f(BTS) ($\lambda = 0$)	0.96	20.1	0.74	8.0
g (BTS) ($\lambda = 1$)	0.77	51.3	0.92	14.4

Surprisingly, at least for the period under consideration, the trade-off between early availability and accuracy is not quite obvious. With respect to correlation R, which relates to the co-movement of the series, the diagnostics is rather to the contrary. For GR4PRODU, the SFSO's provisional figures correlate less with their final data than either prediction from the KOF survey data. Moreover, the provisional SFSO GR4ORDER-series is less correlated to its final version than the series derived from leading KOF indicators. In other words, for most of 2001 and 2002, the survey-based-series were suited better to predict the *variance* of the final series than the provisional official estimate. On the other hand, as can be seen in Figures 8 and 9, in the out of sample domain, the survey-based-series tend to overestimate the *levels* of their reference series. This observation is reflected by the mean square prediction errors (MSE) in the third and fifth column of Table 5, which follows the expected pattern form the availability-accuracy trade-off and is consistently lower for series that are available later.

5. CONCLUSION

After a number of previous – disappointing – attempts by different researchers to derive indicators for Swiss official industrial statistics from BTS data, this study takes a new look at the data. Our results from an extensive screening of the data are now reassuring with respect to the validity of both business survey data and industrial statistics for Switzerland at high levels of aggregation.

Specifically, for the 1990s, a reasonably close relationship was detected between a number of KOF BTS indicators and related official statistics for coincident series as well as for KOF BTS series with a lead of one quarter. Given this, and in addition the earlier availability of the survey data before both provisional and final official statistics, it is important to have an idea of the trade-offs between early availability and accuracy. Based on final official data for 2001:1–2002:3, an evaluation of the out of sample forecast properties of coincident and leading BTS indicator based prediction shows that there is indeed a systematic trade-off as for as the level of the reference series is concerned, but – surprisingly – the BTS based predictions are outperforming the provisional official data in predicting the reference series' movements.

Interestingly, the present uncertainty with respect to the expected upswing in economic activity is reflected well in the recent BTS survey based forecast errors, where the respondents of the KOF industry surveys – like professional observers of economic activity in Switzerland and elsewhere – obviously were too optimistic in the first part of 2002, and expectations are generally revised downward ever since.

Finally, we add that for the purpose of practical predictions, the within sample period can reasonably be extended to include the last data point of the final official statistics series. At the same time, with new data becoming available, some of the earlier data points of the reference series could be dropped. Consequently, to keep the structural regressions parameters up to date, one might consider a moving reference period with a fixed amount of data points.

APPENDIX

Enquête conjoncturelle KOF

Industrie: questions mensuelles

1. Les entrées de commandes

a) comparé au mois précédent *

☐ ont augmenté ☐ sont restées identiques ☐ ont diminué

b) comparé au même mois de l'année précédente

☐ ont augmenté ☐ sont restées identiques ☐ ont diminué

2. Le carnet de commandes ○ pas de carnet de commandes

a) comparé au mois précédent *

☐ a augmenté ☐ est resté identique ☐ a diminué

b) nous jugeons notre carnet de commandes

☐ très chargé ☐ normal ☐ trop peu chargé

3. La production

a) comparé au mois précédent *

☐ a augmenté ☐ est restée identique ☐ a diminué

b) comparé au même mois de l'année précédente

☐ a augmenté ☐ est restée identique ☐ a diminué

4. Les stocks de prod. intermédiaires ○ pas de stocks

a) comparé au mois précédent *

☐ ont augmenté ☐ sont restés identiques ☐ ont diminué

b) nous jugeons les stocks de produits intermédiaires

☐ trop élevés ☐ normaux ☐ trop faibles

5. Les stocks de produits finis ○ pas de stocks

a) comparé au mois précédent *

☐ ont augmenté ☐ sont restés identiques ☐ ont diminué

b) nous jugeons les stocks de produits finis

☐ trop élevés ☐ normaux ☐ trop faibles

6. Durant les 3 prochains mois et en comparaison des 3 derniers*...

a) Les entrées de commandes

☐ augmenteront ☐ resteront identiques ☐ diminueront

b) la production

☐ augmentera ☐ restera identique ☐ diminuera

c) Les achats de produits intermédiaires

☐ augmenteront ☐ resteront identiques ☐ diminueront

7. Au-delà des 3 prochains mois, la marche prévisible des affaires *

☐ s'améliorera ☐ se maintiendra ☐ se dégradera

* Après élimination des variations saisonnières

Enquête conjoncturelle KOF

Industrie: questions trimestrielles supplémentaires

L'emploi

a) L'emploi à la fin du trimestre, comparé à la fin du trimestre précédent *

☐ a augmenté ☐ est resté identique ☐ a diminué

b) Nous jugeons le nombre de personnes occupées

☐ trop élevé ☐ satisfaisant ☐ trop faible

La capacité technique de production

a) A la fin du trimestre, comparé à la fin du trimestre précédent, elle

☐ a augmenté ☐ est resté identique ☐ a diminué

b) Nous jugeons la capacité technique de production

☐ trop élevée ☐ satisfaisante ☐ trop faible

c) Le taux moyen d'utilisation de la capacité technique de production a atteint, durant le trimestre écoulé, (en %)

50	55	60	65	70	75	80	85	90	95	100	105	110
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

La situation bénéficiaire, comparée au trimestre précédent,

☐ s'est améliorée ☐ est restée identique ☐ s'est détériorée

Perspectives

Au cours des prochains mois, les prix d'achat de nos produits intermédiaires (exprimés en francs suisses)

☐ augmenteront ☐ resteront identiques ☐ diminueront

* Après élimination des variations saisonnières

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SUMMARY

A fundamental issue for policy-oriented business cycle research is access to leading – or at least coincident – and reliable indicators of economic activity in manufacturing industry. Therefore, we analyse how the quickly disposable, qualitative information of the business tendency survey conducted by the Swiss Institute for Business Cycle Research (KOF) is related to the official production and order statistics of Switzerland. Pairs of high cross-correlations were selected for further analyses (Granger causality, pattern of turning points). In the next step, the remaining variables are used as predictors of the official statistics in a bivariate and multivariate approach. The results show a very high and stable relationship between the two data-sets particularly for nowcasts and – though to a somewhat lesser degree – for short term prognostics.

ZUSAMMENFASSUNG

Ein zentrales Anliegen wirtschaftspolitisch ausgerichteter Konjunkturforschung ist, über zuverlässig vorlaufende, oder zumindest mitlaufende Indikatoren der Wirtschaftsaktivität im industriellen Sektor zu verfügen. Wir untersuchen daher den Zusammenhang zwischen den rasch disponiblen Daten der KOF-Konjunkturumfragen und der schweizerischen Produktions- und Auftragseingangsstatistik des Bundesamtes für Statistik (BFS). Paare mit den höchsten Kreuzkorrelationen wurden für die weiteren Analyseschritte ausgewählt (Granger-Kausalitätstest, Wendepunktanalyse). Die daraus selektierten Variablen wurden in bivariaten und multivariaten Schätzungen der amtlichen Statistik als Prediktoren verwendet. Die Ergebnisse zeigen einen sehr hohen und stabilen Zusammenhang zwischen den qualitativen KOF-Indikatoren und der BFS-Statistik insbesondere für *nowcasts*, in etwas vermindertem Ausmass aber auch für Kurzfristprognosen.

RÉSUMÉ

L'une des exigences principales d'une étude conjoncturelle orientée vers la politique économique consiste à disposer d'indicateurs fiables des activités économiques dans le secteur industriel, qu'ils soient précoces ou pour le moins simultanés. Nous recherchons par conséquent la relation entre les données rapidement disponibles des enquêtes conjoncturelles du KOF et les statistiques de la production et de l'entrée des commandes établies par l'Office fédéral de la statistique (OFS). Des appariements sont sélectionnés avec les corrélations croisées les plus élevées en vue des étapes suivantes de l'analyse (test de causalité de Granger, analyse des points d'inflexion). Les variables sélectionnées qui en découlent ont été utilisées comme facteurs prévisionnels dans des évaluations bivariates et multivariates des statistiques officielles. Les résultats obtenus démontrent une relation très élevée et stable entre les indicateurs qualitatifs du KOF et les statistiques de l'OFS, en particulier pour les "nowcasts", et dans une mesure légèrement moindre également pour les prévisions à court terme.