A real-time analysis of the Swiss trade account

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First draft: July 2006
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For presentation at the MMF Conference, 13-15 September, York, UK
and the 28th CIRET Conference 2006, September 20-23, Rome, Italy

Abstract

First estimates of trade account statistics attract quite some attention in the media as they contain substantial information on recent economic developments. It is well known, however, that subsequent revisions of in particular this series can sometimes have substantial consequences for ex post evaluations of the economy. As a small open economy, Swiss overall growth as measured by its GDP is particularly prone for these revisions. This paper sets up a real-time dataset which is then used to analyze to what extent the first release of current account data (as compared to its revision) contains a structural bias and/or can be improved upon by the use of survey results as gathered by KOF at the ETH Zurich. If this is the case, this would allow for improvements in its future first release and thereby enhance the current assessment of the Swiss economy.

JEL classification: C22, C53, C82
Keywords: current account statistics, real-time analysis, data revision

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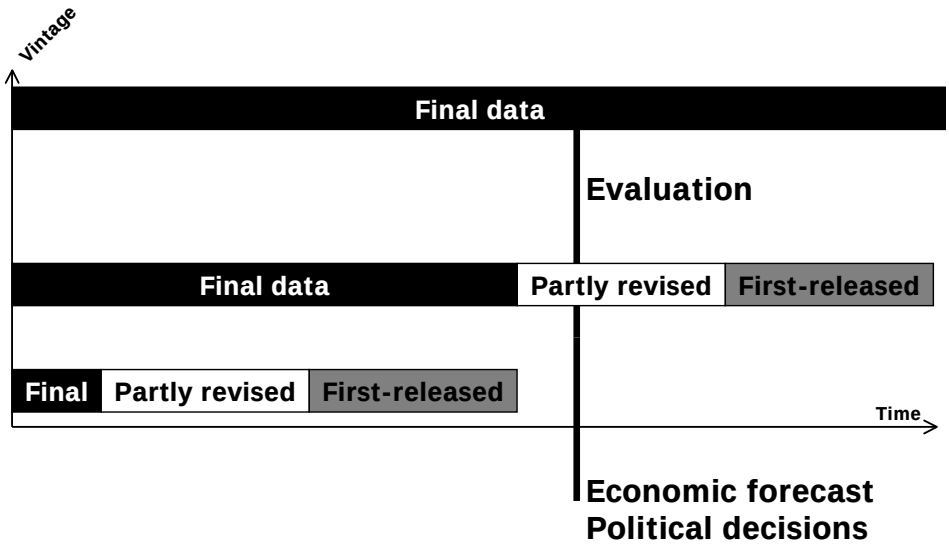
1 Introduction

First estimates of import and export statistics attract quite some attention in the media as they contain substantial information on recent economic developments, go directly into the system of national accounts and consequently affect GDP estimates. It is well known, however, that subsequent revisions of in particular these series can sometimes have substantial consequences for ex post evaluations of the economy. This especially holds for a small open economy like Switzerland. For instance, the revisions in August 2005 of the current account statistics for the year 2004 led to a first release of GDP growth (in September 2005) for the year 2004 by the Swiss statistical office which was approximately 0.5 percentage points higher than forecasted (backcasted) by Swiss research institutes and the State Secretariat for Economic Affairs before the revisions.

Figure 1 illustrates some of the difficulties generally associated with real-time data. Especially for economic forecasting a closer look at questions pertaining to the quality of preliminary data releases is needed. Economic forecasters routinely use 'currently available' data, which are almost by definition formed by combining different vintages. Their predictions are initially appraised against preliminary releases. Ex post or in sample benchmarking of forecasting performance, however, is usually based on fully revised or final data. Along the same lines, policymakers most often use preliminary data, while ex post their actions are scrutinized on the basis of partly revised or even final data. Assuming that we are interested in the true but unobserved, final figures and data revisions improve the quality of our observable indi-

Figure 1: Real-Time Data



cator, then a natural question to ask is whether it is possible to improve preliminary data by predicting future revisions using information contained in past revisions or for example in readily available survey indicators.

Real-time data attract a lot of attention nowadays. Real-time data sets exist for the US (Federal Reserve Economic Data, ALFRED), the euro area (EABCN Real Time Database, RTDB), and several other countries but not for Switzerland. This paper sets up a real-time dataset for Switzerland, which is then used to analyze to what extent the first release of trade account data (as compared to its revision) contains a structural bias and/or can be improved upon by the use of survey results as gathered by KOF at the ETH Zurich.

The paper fits in the tradition of the debate on whether data revisions are 'news' or 'noise', initiated by Mankiw, Runkle and Shapiro (1984) and Mankiw and Shapiro (1986). Recent contributions are Faust, Rogers and Wright (2005) and Aruoba (2006). However, revisions to components of the trade balance have not been studied often. Exceptions are Patterson (1992) and Garratt and Vahey (2005). Research into the feasibility of using survey information to explain and improve first releases is even more scarce. Jacobs and Sturm (2004) find that ifo indicators can play a role in improving first releases of German industrial production, a conclusion similar to the one we reach here for Swiss current account data and KOF survey indicators. We sketch how first releases can be improved by using a state space model. General introductions to state-space modeling are provided in the textbooks of Harvey (1989) and Hamilton (1994, Chapter 13). Howrey (1978, 1984) is an early adopter of the methodology to model data revisions, see also Harvey et al. (1983) or Harvey (1989, Section 6.4.4). For a recent application see Kishor and Koenig (2005).

Our paper is structured as follows. Section 2 describes our real-time data set on Swiss current account statistics and defines revisions. Section 3 introduces the KOF business survey indicators. After the data analysis in Section 4, Section 5 shows whether revisions are 'news' and whether KOF indicators are informative. Section 6 presents an real-time forecasting exercise, while Section 7 sketches how first releases can be improved using state-space models. Section 8 concludes.

2 The real-time Swiss current account data

In Switzerland current account figures are collected by the Swiss National Bank (SNB) and published in Monthly Bulletins ('Statistische Monatshefte').[1] Current account information is provided for income (exports) and expenditures (imports) and net exports (exports minus imports). For all three categories information is provided on total goods, specialist goods, total services, tourism, total factor earnings, labour factor earnings, capital factor earnings, transfer payments and totals.

Our real-time data set consists of monthly vintages published between October 1986 and March 2006 which provide quarterly information. The vintages have between 5 and 11 quarterly figures on current account series and cover the period 1984Q1–2005Q3. The publication lag is around one quarter. For example the January 2006 vintage publishes first estimates for 2005Q3. Figure 2 illustrates the structure of our real-time data set and shows the vintages of July 2005 up to and including March 2006, plus the final vintage (June 2006). As the final vintage is the only one taken from an electronic database, it is the only complete vintage, i.e. with observations from 1984Q1 up to and including 2005Q3.

[1] For background information on the history of Swiss current account statistics see Schlup (2006).

Figure 2: Structure of Real-Time data

Year	Quarter	XGDS200506	XGDS200507	XGDS200508	XGDS200509	XGDS200510	XGDS200511	XGDS200512	XGDS200601	XGDS200602	XGDS200603	XGDS200606
1998	1											29327
1998	2											30148
1998	3											27854
1998	4											30168
1999	1											29071
1999	2											29619
1999	3											29768
1999	4											33283
2000	1											34896
2000	2											34415
2000	3											34461
2000	4											38191
2001	1											39879
2001	2											37042
2001	3											34073
2001	4											33716
2002	1											33271
2002	2											35227
2002	3											31778
2002	4	32654										32654
2003	1	33595	33595	33621	33621							33621
2003	2	32158	32158	32167	32167	32167	32167	32167				32167
2003	3	32107	32107	32164	32164	32164	32164	32164	32164	32164	32164	32164
2003	4	34728	34728	34776	34776	34776	34776	34776	34776	34776	34776	34776
2004	1	34948	34948	35034	35034	35034	35034	35034	35034	35034	35034	35034
2004	2	35077	35077	35105	35105	35105	35105	35105	35105	35105	35105	35105
2004	3	35166	35166	35176	35176	35176	35176	35176	35176	35176	35176	35176
2004	4	36688	36688	36666	36666	36666	36666	36666	36666	36666	36666	36666
2005	1		36713	36713	36713	37058	37058	37058	37078	37078	37078	37085
2005	2					38512	38512	38512	38702	38702	38702	38723
2005	3								38135	38135	38135	38280
2005	4											41309

Notes: Each column shows one release as published in one Monthly Bulletin of the SNB. The last 6 numbers of a column's name depict the year and month of release; 'XGDS' stands for expenditures on foreign goods (imports). The final columns is the latest electronic release as available at the start of this project.

Four types of revisions can be identified in the data:

Benchmark revisions: the introduction of SNA93 and ESVG95 led to benchmark revisions in 1995:8 and 2004:8; both vintages were revised backward completely.

End-of-Summer revisions: during Summer quarterly series are adapted to the (new and revised) annual totals for the previous two years resulting in revised figures for the last two years plus the first quarter of the current year. These revisions took place in the September vintages before 1994 and the ones of August thereafter.

End-of-Year revisions: in 2001:12, 2002:12, 2004:01, 2005:01 and 2006:01 additional revisions in capital factor earnings took place. These revisions, possibly due to changed accounting rules after September 2001, do not have an impact on exports and imports of goods and services.

Other revisions: mainly between the first few releases sometimes additional revisions take place, because of new and better information becoming available.

Let $y_i(t)$ be the ith release of the current account series in period t ($i = 1, \ldots$). In this paper we look at *Increasing Width Revisions* which are defined as $\Delta y_i(t) \equiv y_{i+1}(t) - y_1(t)$.[2] Below we consider what we label 'annual' and 'final' revisions. 'Annual' revisions are in general as $y_{12} - y_1$ ($y_{15} - y_1$), and show the effect after one (two) first End-of-Summer revisions of first releases

[2] *Fixed Width Revisions* are defined as $y_{i+1}(t) - y_i(t)$.

for the second, third and fourth (first) quarter of each year.[3]

The 'final' revision is calculated as the difference between the final release (FR), and the first release. It is quite possible that true final data will never be available for the economic time series we use. This is because benchmark and definitional changes are ongoing and may continue into the indefinite future. We use growth rates to mitigate any level effects of benchmark revisions. Any other effect of benchmark revisions is treated as noise. We calculate our final release from the June 2006 vintage. Ideally, no revisions should occur after two End-of-Summer revisions have been implemented. The End-of-Summer revisions imply that first releases for the first quarter of every year are revised three times before becoming final, whereas first releases for the second, third and fourth quarter are already final after two End-of-Summer revisions.[4] Therefore, two years is sufficient for the Swiss current account data to become final, and hence when comparing the final release of a current account category growth rate $y_{FR}(t)$ with the first release $y_1(t)$, we take the sample 1985Q1–2003Q3, or 75 observations.

Below we confine attention to exports and imports of goods and services. By this we avoid the end-of-year revisions from 2001 onwards. Furthermore, we are ultimately interested in forecasting national account statistics and the KOF indicators are intended to cover the real side of the economy. Hence,

[3]Note that in our definition the annual revision of the first quarter is realised after the second End-of-Summer revision. The first release of a first quarter is published shortly before Summer, and its first revision—during Summer—does not use any annual information for that year. It takes until the next Summer before annual data is incorporated in its release. Our 'annual' revision therefore is defined by the first time annual data is included in the revision process.

[4]A typical End-of-Summer revision results in revisions of the previous two years and the first quarter of the current year.

theoretical reasons induce us to stick to goods and services.

3 The KOF business survey

KOF - Applied Economic Research, an institute at the ETH Zurich, is a non-profit organisation. Its major activity is to analyse and forecast economic developments in Switzerland. Regular surveys (business, investment and innovation surveys) some of which conducted since the 1950s, provide an up-to-date, comprehensive information system for the short- and medium-term analysis of the overall economy, for individual branches of industry, and for cantonal/regional studies.

Our KOF indicators are calculated from quarterly and monthly surveys in the manufacturing industry and the hotel sector. Respondents are invited to answer most of the questions on a three-category scale: 'good/better', 'satisfactorily/same' or 'bad/worse'. The replies are weighted by firm size and aggregated to form percentages of each category of the total. The percentage shares of the positive and negative responses to each question are balanced (ignoring the answer 'satisfactorily/same'). In this way each qualitative question can be converted into a single KOF indicator. According to KOF experience, the best way to assess the current business situation in the industry sector—which is most important for in particular exports, but also for imports of goods—is to use a composite indicator which combines the answers of three survey questions: 1) assessment of the order books, 2) year-over-year development of order receipts, and 3) year-over-year production development. All three stem from the monthly industry survey. We

label this the composite business assessment indicator for the industry sector [Industry] in our tables. The participating firms are classified by the extent to which they export their products. This allows us to employ the same indicator but this time using only those firms which export share is above 67% [Exporting]. For the import and export of services we also expect that the assessment of hotel nights spend by foreigners (as compared to last year) as reported in the KOF Hotel-survey will be a good indicator [Hotel nights]. Not only do hotel nights by foreigners in Switzerland directly measure exports of services, but they also approximate changes in across border business relations.

An important feature of KOF Business Survey indicators is the fact that we can treat them as being not revised in the course of time.[5] As we will see, this property of KOF Business Survey indicators can be helpful when investigating trade account series, which are revised frequently.

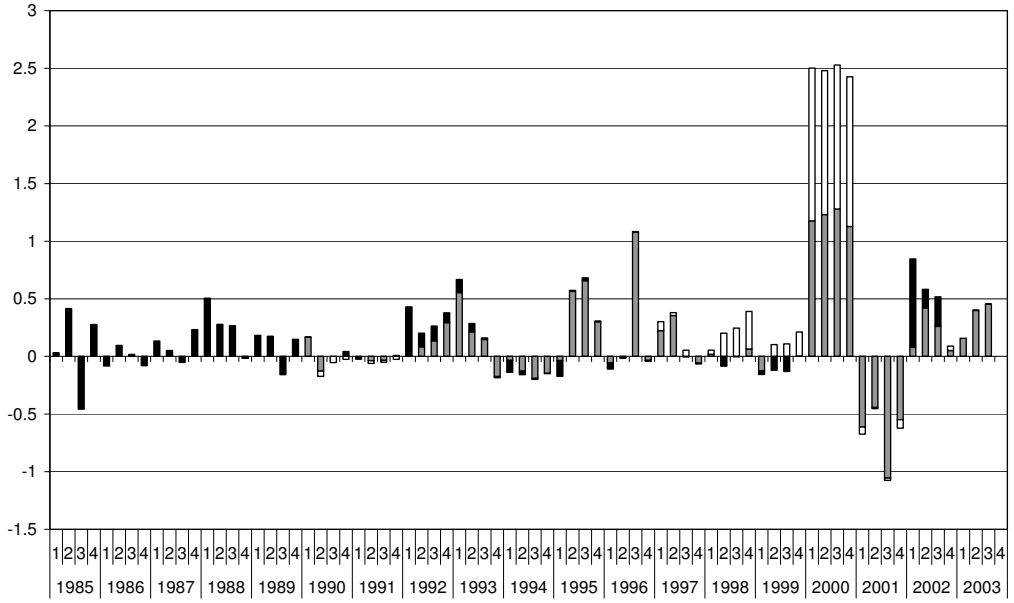
4 Data analysis

Our real-time data set consists of exports and imports of goods and services, and three KOF indicators. Figure 3 shows annual and final revisions of Swiss exports and imports of goods and services. We observe final revisions going in the same direction as annual revisions (black bars) and in opposite directions (white bars). Revisions in exports and imports of services are generally larger than exports and imports of goods.

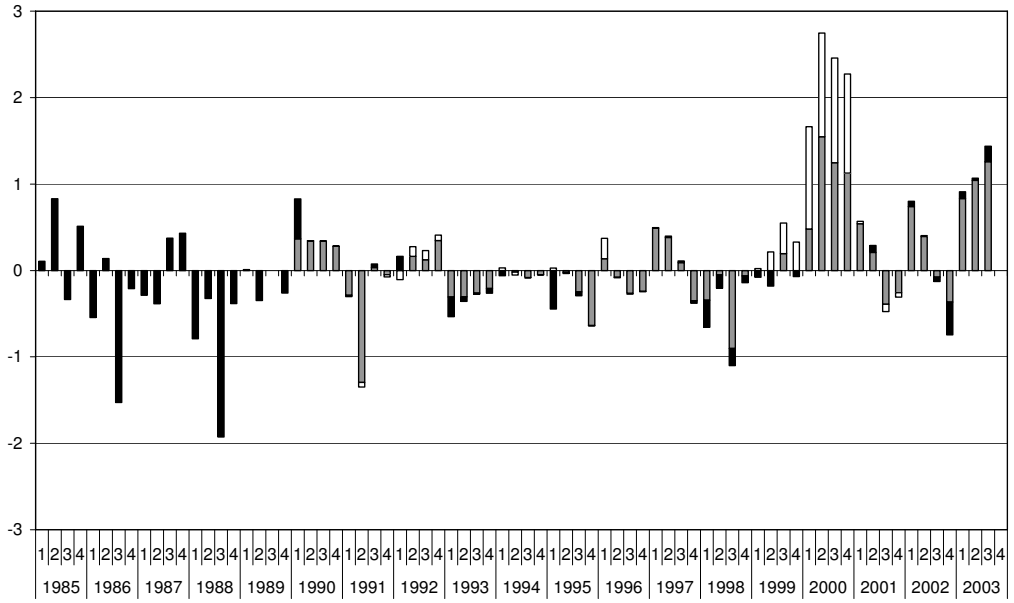
[5] Actually, KOF indicators are revised at least twice before they become final. However, revisions take place within one month, and are—because of the publication lag—available well before the first release of the current account statistics.

Figure 3: Annual and final revisions of Swiss exports and imports of goods and services (percentages), 1985Q1–2003Q3

Exports, goods



Imports, goods



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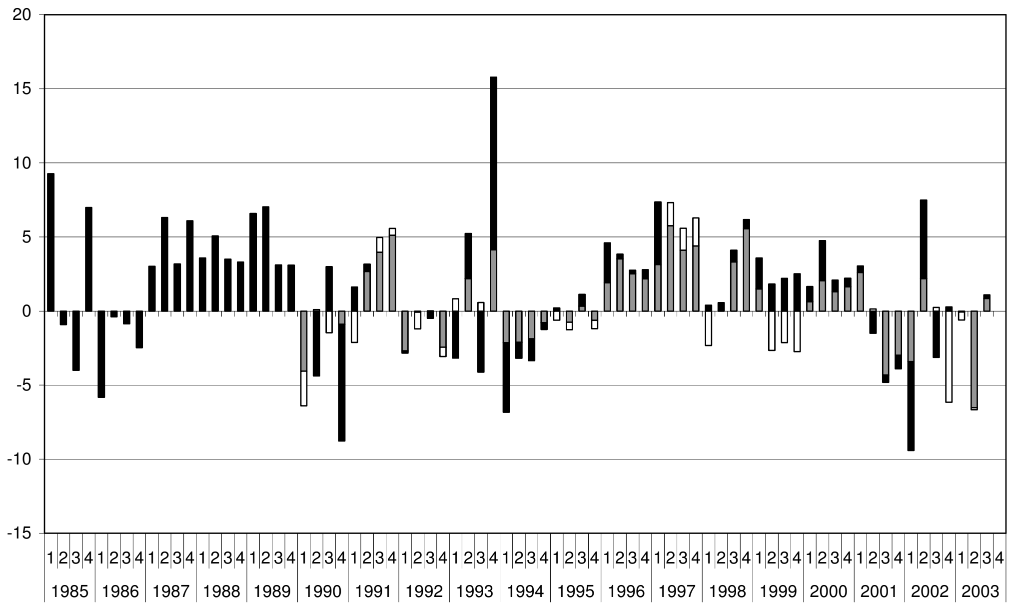
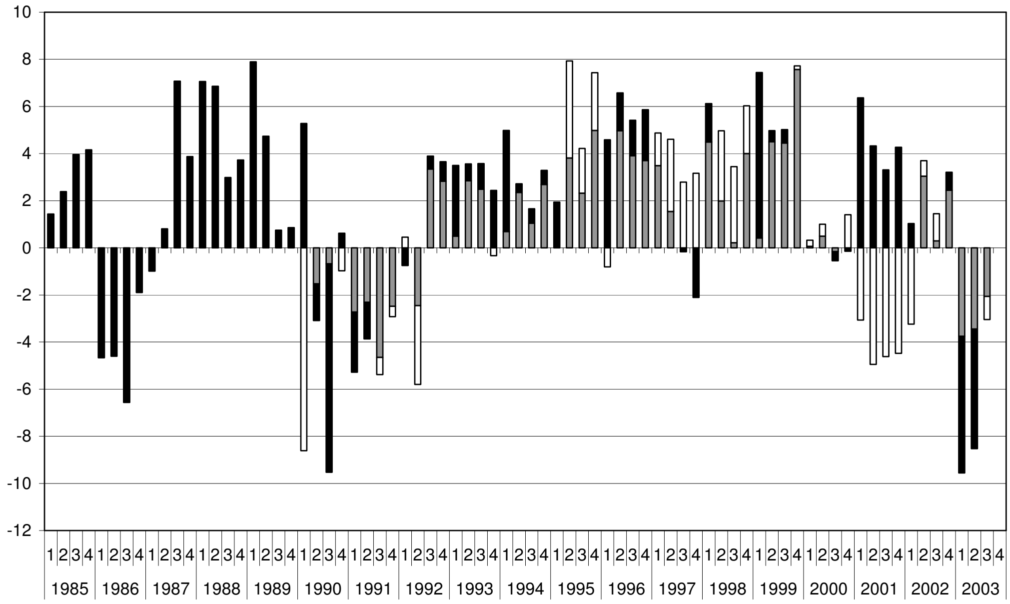
Exports, services



Imports, services



Notes: The sum of the gray and white bars depict the annual revision. The sum of all revisions (i.e. the final revision) is shown by the sum of the gray and black bars. Therefore, black bars indicate that the subsequent revisions went in the same direction as the annual revision, whereas white bars point out that subsequent revisions undid part of the annual revision. In case of both white and black bars, the subsequent revisions more than undid the annual revision, making the final revision point in the opposite direction as the annual revision. Until 1989Q4 annual revisions cannot be calculated and only black bars are shown.

The 2000 revisions in exports and imports of goods are striking. Noticeable too is the large difference in the order of magnitude of these revisions. Whereas data on goods are hardly revised, i.e. the revisions in the growth rates are in general below 0.5 percentage points, data on services with revisions up to 15 percentage points are very prone to revisions. In particular imports and exports goods are still measured at the border and therefore often do not need to be revised.

Figure 4: KOF business survey indicators

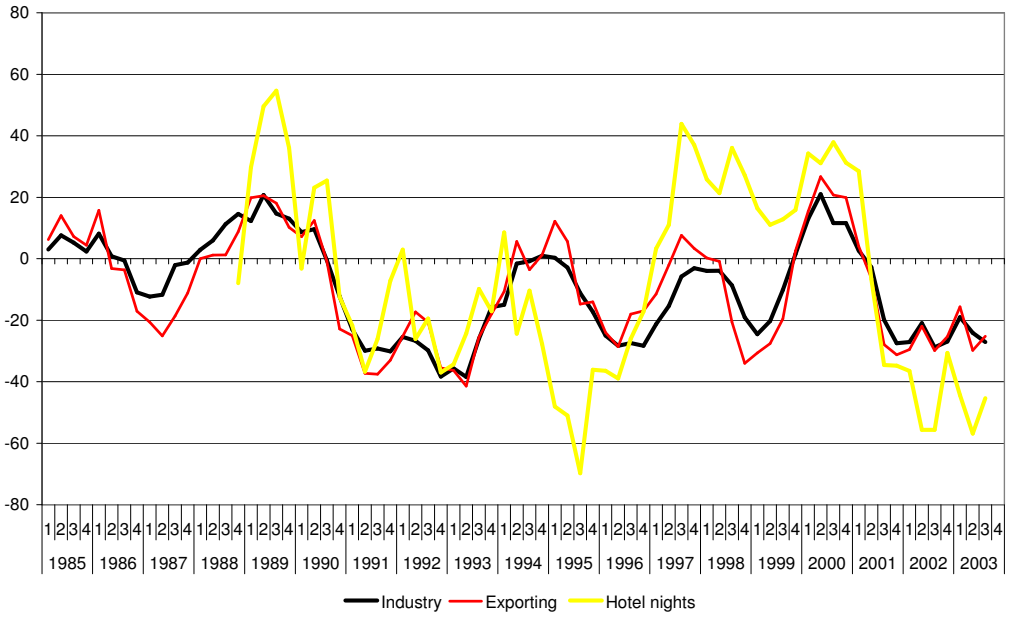


Figure 4 shows the KOF indicators for the period for which we have final data, 1985Q1–2003Q3. The correlation between the KOF Industry and the KOF Exporting indicators is high (0.9), where the KOF indicator derived from the number of hotel nights foreigners spent in Switzerland follows the pattern of the other two also fairly closely (0.6).

Table 1: Summary statistics for revisions in Swiss current account statistics and KOF indicators (available observations in 1985Q1–2005Q3)

Series	#Obs.	Mean	Sign.	St.Dev.	Min.	Max.	Skewness	Kurtosis	Jarque-Bera	Sign.
	Final revisions									
exports, goods	75	0.15	0.00	0.41	−1.06	1.28	0.64	1.72	14.32	0.00
exports, goods	55	0.17	0.01	0.46	−1.06	1.28	0.54	0.91	4.59	0.10
imports, goods	75	−0.01	0.90	0.61	−1.93	1.55	−0.08	1.49	7.01	0.03
imports, goods	55	0.08	0.32	0.57	−1.30	1.55	0.47	0.68	3.07	0.22
exports, services	75	1.32	0.01	4.41	−9.42	15.78	0.01	0.73	1.67	0.43
exports, services	55	0.78	0.20	4.46	−9.42	15.78	0.22	1.43	5.15	0.08
imports, services	75	1.71	0.00	4.03	−9.55	7.90	−0.93	0.60	11.82	0.00
imports, services	55	1.61	0.00	4.03	−9.55	7.57	−1.09	1.01	13.21	0.00
	Annual revisions									
exports, goods	55	0.25	0.01	0.71	−1.08	2.53	2.15	5.30	106.96	0.00
imports, goods	55	0.21	0.04	0.74	−1.35	2.75	1.60	3.72	55.26	0.00
exports, services	55	0.26	0.55	3.16	−6.66	7.32	0.04	−0.14	0.06	0.97
imports, services	55	0.92	0.07	3.74	−8.61	7.93	−0.32	−0.43	1.34	0.51
	KOF Indicators									
KOF industry	75	−9.53	0.00	15.78	−38.45	20.99	0.04	−1.16	4.21	0.12
KOF industry	55	−14.52	0.00	14.73	−38.45	20.99	0.48	−0.73	3.35	0.19
KOF exporting	75	−9.66	0.00	17.82	−41.43	26.66	0.15	−1.15	4.40	0.11
KOF exporting	55	−13.68	0.00	17.46	−41.43	26.66	0.49	−0.79	3.66	0.16
KOF Hotel nights	60	−6.93	0.10	32.07	−69.78	54.66	0.11	−1.14	3.34	0.19

The top two panels of Table 1 list summary statistics of final and annual revisions of the current account categories. We report the mean, standard deviation, skewness, kurtosis and the Jarque-Bera test statistic for normality, together with the number of observations. In principle the number of observations equals 75 and covers 1985Q1–2003Q3. However, in the first years of our sample the Monthly Bulletins do not report enough quarters are reported in to allow us to calculate annual revisions. So for annual revisions the sample begins in 1990Q1, leaving us with 55 observations. Final and annual revisions in exports and imports of services can be quite large. For example the maximum final revision in exports of services amounts to nearly 16 percentage points (1993Q4), and the minimum final revisions is minus 9.55 percentage points for imports of services (2003Q1). Revisions in exports and imports of goods are more modest and roughly range between -2 and +3 percentage points. As noted before, the revisions of data in the year 2000 are relatively extreme when it comes to the trade of goods. The annual revisions were substantially upward, whereas subsequent revisions corrected this to some extent. This explains why the annual revisions of exports and imports of goods are on average larger than those of the final revisions (Table 1). The final revisions in services are in general larger than the annual revisions, but there is not one particular year driving this result.

Swanson, Ghysels and Callan (1999) observe a systematic bias in early revisions of industrial production in the US. Using this information would allow to increase the accuracy of preliminary releases in the US. Jacobs and Sturm (2004) come to an opposite conclusion for German industrial production. The situation with respect to revisions in Swiss current account data is

mixed. The mean differs significantly from zero for most final and annual revisions, but there are exceptions like e.g. final revisions in imports of goods. The skewness, kurtosis and Jargue-Bera outcomes indicate that normality is rejected for most revisions.

The bottom panel of the table shows descriptive statistics for the KOF indicators. We note the significantly negative values of the means. As to be expected, the indicators are normally distributed.

5 Modelling revisions

Two polar views exist on data revisions. (i) Data revisions contain news: data are optimal forecasts, so revisions are orthogonal to earlier releases and therefore revisions are not forecastable

$$y_i(t) = y_1(t) + \varepsilon(t), \qquad \text{cov}(y_1(t), \varepsilon(t)) = 0. \tag{1}$$

(ii) Data revisions reduce noice: data are measured with error, so revisions are orthogonal to final data which allows revisions to be forecastable

$$y_1(t) = y_i(t) + \epsilon(t), \qquad \text{cov}(y_i(t), \epsilon(t)) = 0. \tag{2}$$

We apply both views in this paper. The news view is tested here; the noise view will be adopted to construct better first releases in Section 7. The Mincer-Zarnowitz (1969) test for forecast efficiency that corresponds to the

news or rational forecast specification estimates

$$\Delta y_i(t) = \alpha + \beta y_1(t) + \varepsilon(t), \tag{3}$$

and tests the null hypothesis of unbiasedness, $\alpha = \beta = 0$, which indicates unpredictable data revisions, with a Wald test. Table 2 lists the estimation outcomes for Equation (3) for 'annual' and final revisions of the Swiss current account data. Since the errors may suffer from heteroskedasticity and autocorrelation, we use Newey-West standard errors.

We conclude that the hypothesis that revisions are news is rejected for the final and annual revisions of exports of goods, and final revisions of exports and imports of services. Except for imports of goods, final releases do appear to have systematic, i.e. predictable, biases. In general, this is—with the possible exception of exports of goods—not the case for annual revisions. Since the estimates of the first release parameter $\hat{\beta}$ are never significantly different from zero, the no news outcome is driven by the non-zero drift term in the equations (as already reported in Table 1).

Table 2: Are revisions of current account data 'news'?

News model: $\Delta y_i(t) = \alpha + \beta y_1(t) + \varepsilon(t), \qquad i = A,\ FR$

	Goods		Services	
	exports	imports	exports	imports
	Final revisions ($i = FR$)			
α	0.100	−0.036	1.214	2.244
t-statistic	1.678	−0.411	1.858	2.657
β	0.011	0.007	0.027	−0.145
t-statistic	1.018	0.529	0.389	−1.360
#Obs.	75	75	75	75
R^2	0.026	0.009	0.001	0.025
LM(4)	0.000	0.785	0.249	0.390
News F	0.028	0.823	0.070	0.029
Theil-U (real-time)	0.961	1.051	1.013	0.967
	Annual revisions ($i = A$)			
α	0.093	0.125	0.237	1.590
t-statistic	1.355	1.074	0.475	1.769
β	0.046	0.035	0.006	−0.229
t-statistic	1.475	1.319	0.077	−1.507
#Obs.	55	55	55	55
R^2	0.134	0.129	0.000	0.074
LM(4)	0.001	0.509	0.623	0.001
News F	0.078	0.296	0.889	0.145
Theil-U (real-time)	0.911	0.934	1.049	1.222

Notes: t-statistics are based on Newey-West standard errors; LM(4) shows the p-value for the Lagrange-Multiplier test for autocorrelation up to the fourth order; News F shows the p-value of the Wald test for $\alpha = \beta = 0$; Theil-U (real-time) shows the Theil coefficient for relative forecast accuracy in real-time, see Section 6.

In this paper, we are in particular interested whether there is a role for KOF indicators in the revision process of Swiss current account series. So we augment the set of explanatory variables with KOF indicators and estimate the following equation

$$\Delta y_{FR}(t) = \alpha + \beta y_1(t) + \gamma KOF(t) + \varepsilon(t).$$

Forecast rationality implies that all the coefficients should be zero in any regression, which can be tested by a Wald test. Table 3 presents the outcomes of the augmented model, in which the three KOF indicators enter separately. Again we employ Newey-West standard errors to deal with possible heteroskasticity and autocorrelation, which is hinted at by the LM(4) outcomes.

We observe that the inclusion of KOF indicators does not change the outcomes of the news test for the final revisions. The null hypothesis that revisions are news is rejected at the 10% level in nine of twelve final revision regressions, including all regressions for the final revisions of the exports of goods and the imports of goods of services as in Table 2. For the annual revisions the null hypothesis is only rejected in four of twelve regressions, including the regressions for the imports of services. The KOF indicators do have an impact on the news test outcomes of the annual revisions. Whereas in the news model of Equation (1) the null hypothesis was only rejected for annual revisions of exports of goods (at the 10% level), the inclusion of KOF indicators results in rejection of the null for imports of services (and for exports of services with the KOF hotel nights indicator).

Table 3: Modelling revisions of current account data: are KOF indicators informative?

Model: $\Delta y_i(t) = \alpha + \beta y_1(t) + \gamma KOF(t) + \varepsilon(t), \quad i = A,\ FR$

	Exports, goods			Imports, goods			Exports, services			Imports, services		
KOF	Industry	Exporting	Hotel nights	Industry	Exporting	Hotel nights	Industry	Exporting	Hotel nights	Industry	Exporting	Hotel nights
	Final revisions ($i = FR$)											
α	0.066	0.139	0.039	−0.020	0.099	0.019	1.674	1.590	2.056	2.868	2.745	3.218
t-statistic	0.859	1.342	0.762	−0.126	0.613	0.177	2.013	1.886	2.506	2.860	3.018	4.054
β	0.014	0.007	0.023	0.006	−0.007	0.010	−0.001	−0.004	−0.141	−0.210	−0.198	−0.353
t-statistic	2.005	0.790	2.369	0.430	−0.473	0.694	−0.014	−0.044	−1.254	−1.674	−1.645	−2.336
γ	−0.002	0.002	−0.003	0.001	0.008	0.000	0.037	0.027	0.057	0.040	0.031	0.040
t-statistic	−0.468	0.397	−2.092	0.146	1.249	−0.096	1.011	0.761	3.139	0.879	0.876	1.356
#Obs.	75	75	60	75	75	60	75	75	60	75	75	60
R^2	0.029	0.030	0.045	0.009	0.034	0.015	0.017	0.011	0.117	0.045	0.041	0.109
LM(4)	0.000	0.001	0.000	0.779	0.740	0.505	0.140	0.159	0.171	0.600	0.612	0.415
News F	0.007	0.050	0.001	0.942	0.488	0.883	0.059	0.084	0.000	0.029	0.023	0.001
Theil-U (real-time)	0.988	0.982	0.980	1.061	1.031	1.049	0.989	1.003	0.869	0.959	0.975	0.939
	Annual revisions ($i = A$)											
KOF	Industry	Exporting	Hotel nights	Industry	Exporting	Hotel nights	Industry	Exporting	Hotel nights	Industry	Exporting	Hotel nights
α	0.376	0.419	0.122	0.556	0.562	0.166	0.100	0.313	1.176	2.305	2.396	2.812
t-statistic	1.418	1.598	1.486	1.911	1.950	1.060	0.171	0.509	2.191	2.284	2.883	3.438
β	0.023	0.013	0.041	0.001	−0.007	0.028	0.011	0.002	−0.129	−0.275	−0.284	−0.445
t-statistic	1.357	0.691	1.832	0.097	−0.383	1.327	0.141	0.027	−1.763	−1.943	−2.086	−3.354
γ	0.014	0.016	0.001	0.024	0.025	0.002	−0.008	0.005	0.044	0.040	0.047	0.056
t-statistic	1.148	1.361	0.376	1.972	2.096	0.446	−0.263	0.154	3.026	1.148	1.814	2.639
#Obs.	55	55	55	55	55	55	55	55	55	55	55	55
R^2	0.186	0.214	0.135	0.242	0.275	0.134	0.001	0.001	0.123	0.095	0.117	0.212
LM(4)	0.000	0.001	0.001	0.526	0.223	0.483	0.464	0.516	0.421	0.001	0.001	0.004
News F	0.118	0.156	0.140	0.252	0.204	0.456	0.968	0.961	0.015	0.095	0.014	0.000
Theil-U (real-time)	0.900	0.878	0.923	0.874	0.856	0.946	1.128	1.097	0.938	1.217	1.190	1.102

Notes: t-statistics are based on Newey-West standard errors; LM(4) shows the p-value for the Lagrange-Multiplier test for autocorrelation up to the fourth order; News F shows the p-value of the Wald test for $\alpha = \beta = \gamma = 0$; Theil-U (real-time) shows the Theil coefficient for relative forecast accuracy in real-time, see Section 6.

The KOF indicators have explanatory power for final revisions, but only in two of the twelve models. The KOF hotel nights indicator seems to play the expected role in final revisions in exports of services. The KOF indicators perform slightly better in the annual revision models, with significant parameters in nearly half of the cases. The KOF industry indicator enters the annual revision models of the imports of goods, whereas the KOF exporting indicator has an impact on the imports of goods and services. The KOF hotel nights indicator contributes to the explanation of annual revisions of exports and imports of services, which makes it the best overall indicator of the three distinguished. The number of hotel nights spent by foreigners in Switzerland is a fairly good indicator of revisions in exports and imports of services.[6]

[6] A press release of the Swiss Federal Statistical office (Nr. 0350-0607-80, June 29, 2006) confirms the importance of nights spent by foreigner in Switzerland for the services trade balance: "Neben den statistischen Angaben aus der schweizerischen Beherbergungsstatistik werden zur Erstellung der Fremdenverkehrsbilanz Angaben zu Umsatzzahlen von Anbietern von Tourismusg¨utern und -dienstleistungen verwendet. Die Entwicklung von Besucherzahlen aus der Schweiz in den wichtigsten Destinationen werden direkt von den statistischen mtern der betreffenden L¨ander erhoben und dem Bundesambt fr Statistik geliefert.

Im gesamtwirtschaftlichen Güter- und Dienstleistungskreislauf spielt der Austausch mit dem Ausland eine wichtige Rolle. Statistisch abgebildet wird dieser in der Ertragsbilanz, die Fremdenverkehrsbilanz stellt dabei eine Teilbilanz der Dienstleistungsimporte und -exporte dar. Die Informationen der Fremdenverkehrbilanz fliessen zudem in die volkswirtschaftliche Gesamtrechnung ein, wo sie insbesondere bei der Überprüfung der privaten Konsumausgaben vom Inländer- zum Inlandkonzept eine wichtige Rolle spielen." (See
`http://www.bfs.admin.ch/bfs/portal/de/index/news/medienmitteilungen.Document.78768.pdf`.)

6 Forecasting

We evaluate the three models

$$\Delta y_i(t) = \alpha + \beta y_1(t) + \gamma KOF(t) + \varepsilon(t) \quad (4)$$

$$\Delta y_i(t) = \alpha + \beta y_1(t) + \varepsilon(t) \quad (5)$$

$$\Delta y_i(t) = \varepsilon(t) \quad (6)$$

in real time for annual ($i = A$) and final revisions ($i = FR$). We begin with the estimation of the model parameters on the sample 1985Q1–1997Q4, and predict the revisions $\Delta y_A(t)$ and $\Delta y_{FR}(t)$ for t =1998Q1. Then we reestimate the model for 1985Q1–1998Q1 and calculate predictions for 1998Q2. We continue this procedure up to and including 2003Q3. Thus we obtain series of predictions of the three revision models, which we then compare to the benchmark of actual revisions. We summarize the prediction errors by means of Theil's U, which measures the relative forecasting performance of two forecasts

$$U = \frac{RMSE_1}{RMSE_2},$$

where the Root Mean Squared Error (RMSE) is

$$RMSE(i) = \sqrt{\frac{1}{n}\sum_{t=1}^{n}\left(RI(i,t) - RI_B(t)\right)^2}.$$

A value of U smaller than one corresponds to forecasts having a smaller RMSE than the benchmark. The Theil U statistics of the comparison of the second model to the benchmark are listed in Table 2, of the first to the

benchmark in Table 3.

Real-time forecasts with smaller RMSEs than the benchmark are obtained in the final revisions of the exports of goods and the imports of services, and in the annual revisions of exports and imports and goods. These results carry over to the real-time forecasts of the first model compared to the third model. The inclusion of KOF indicators does not seem to have a large impact on the Theil U outcomes.

7 Towards better first releases

In this section we sketch how to obtain better first releases for current account variables in Switzerland. We adopt the noise view of revisions, Equation (2), i.e. the preliminary releases depend on the final release and a KOF indicator

$$\begin{aligned} y_1(t) &= \theta_1 y_{FR}(t) + \phi_1 KOF(t) + u_1(t) \\ y_2(t-1) &= \theta_2 y_{FR}(t-1) + \phi_2 KOF(t-1) + u_2(t-1) \\ &\vdots \\ y_{FR}(t-FR+1) &= y_{FR}(t-FR+1). \end{aligned}$$

For expository reasons we assume that the preliminary releases of the growth rate of the current account variable in Switzerland are unbiased. The final release follows an AR(p) process

$$y_{FR}(t) = \lambda_1 y_{FR}(t-1) + \lambda_2 y_{FR}(t-2) + \ldots + \lambda_p y_{FR}(t-p) + \varepsilon(t),$$

we assume that p is smaller than FR.

The corresponding state-space model consists of the measurement equation and a transition equation. The measurement equation is

$$\boldsymbol{y}(t) = \boldsymbol{Z}\boldsymbol{\alpha}(t) + \boldsymbol{\phi}'\boldsymbol{KOF}(t) + \boldsymbol{u}(t), \tag{7}$$

where $\boldsymbol{y}(t) = (y_1(t), y_2(t-1), \ldots, y_{FR}(t-FR+1))'$, the state vector $\boldsymbol{\alpha}(t) = (y_{FR}(t), y_{FR}(t-1), \ldots, y_{FR}(t-FR+1))'$, $\boldsymbol{\phi}' = (\phi_1, \phi_2, \ldots, \phi_{FR-1})$,
$\boldsymbol{KOF}(t) = (KOF(t), KOF(t-1), \ldots, KOF(t-FR+1))'$,
$\boldsymbol{u}(t) = (u_1(t), u_2(t-1), \ldots, u_{FR-1}(t-FR), 0)'$, and

$$\boldsymbol{Z} = \begin{bmatrix} \theta_1 & 0 & \ldots & 0 & 0 \\ 0 & \theta_2 & \ldots & 0 & 0 \\ \vdots & \vdots & \ddots & \vdots & 0 \\ 0 & 0 & \ldots & \theta_{FR-1} & 0 \\ 0 & 0 & \ldots & 0 & 1 \end{bmatrix}.$$

The transition equation describes the dynamics of the system

$$\boldsymbol{\alpha}(t) = \boldsymbol{T}\boldsymbol{\alpha}(t-1) + \boldsymbol{R}\boldsymbol{\eta}(t) \tag{8}$$

where $\boldsymbol{R} = (1, 0, \ldots, 0)'$ and $\boldsymbol{\eta}(t) = (\varepsilon(t), 0, \ldots, 0)'$, and

$$\boldsymbol{T} = \begin{bmatrix} \lambda_1 & \lambda_2 & \ldots & \lambda_p \\ 1 & 0 & \ldots & 0 \\ \vdots & \ddots & & \vdots \\ 0 & 0 & \ldots & 1 \end{bmatrix}.$$

The error vectors $\boldsymbol{u}(t)$ and $\boldsymbol{\eta}(t)$ are vector white noise and uncorrelated at all lags, $\boldsymbol{KOF}(t)$ is predetermined, and the initial state $\boldsymbol{\alpha}(t)$ is uncorrelated with any realization of the error vectors $\boldsymbol{u}(t)$ and $\boldsymbol{\eta}(t)$.

At time $t = T$, true values of $\boldsymbol{y}(t)$ are available up to and including $t = T - FR$. Optimal estimates of first releases for $T - FR + 1$ to T can be obtained with the Kalman filter by combining these values with the preliminary observations and the KOF indicator figures for that period. We did not try to implement the model yet.[7] As noted in Section 2, it takes quite some time before data become final. So, we need to forecast many periods ahead to get estimates of first releases which might result in fairly large forecast errors.

8 Conclusion

This paper has taken a first step towards the construction of a real-time data set for Switzerland. We set up a real-time dataset for the Swiss trade account, and analyze to what extent the first release of current account growth rates (as compared to its revision) contains a structural bias and/or can be

[7]For an implementation to US leading indicators see Bouwman and Jacobs (2006).

improved upon by the use of survey results as gathered by KOF at the ETH Zurich. We find that final and annual revisions of imports of goods and the annual revisions of exports of services can be labeled 'news', so are not forecastable; other categories, however, are.

The KOF indicators do only occassionaly contribute to the explanation of final and annual revisions of Swiss trade balance categories. The KOF hotel nights indicator, which measures the numbers of hotel nights spent by foreigners in Switzerland, comes out best. The business assessment indicator of the industry (KOF industry) and of firms with an export share of over 67% (KOF exporting) perform less well.

Therefore it should be possible to improve first releases of trade account statistics, which would enhance the current assessment of the Swiss economy. We proposed a method to obtain better first releases. Unfortunately, benchmark revisions hamper the actual implementation of our method.

Acknowledgments

We thank Yngve Abrahamsen for helpful insights on Swiss current account data, and Christoph Woodtli for excellent research assistance.

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