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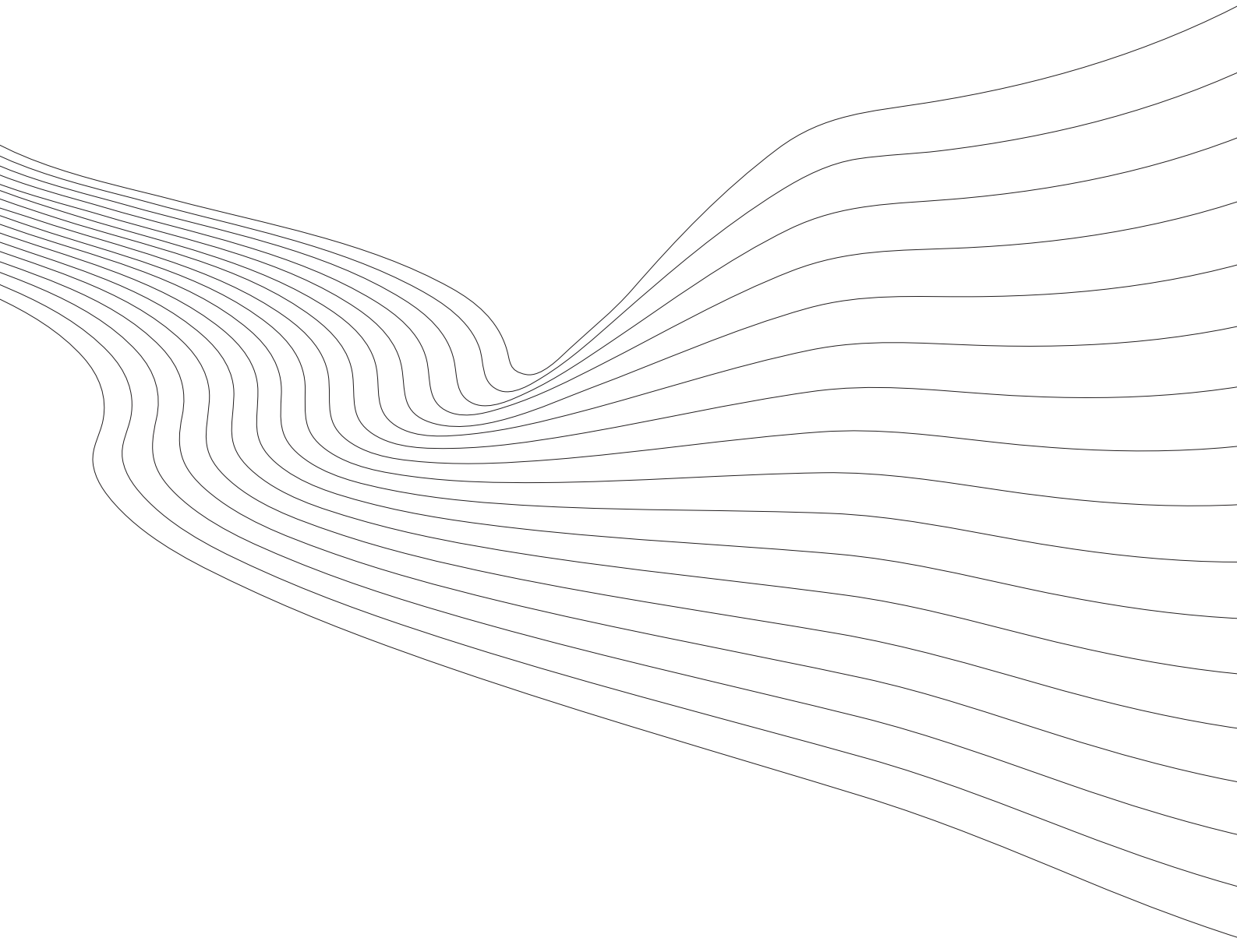

No. 202
July 2008

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Abstract

This paper analyses revisions of Swiss current account data, taking into account the actual data revision process and the implied types of revisions. In addition we investigate whether the first release of current account data can be improved upon by the use of survey results as gathered by the KOF Swiss Economic Institute, ETH Zurich. An answer in the affirmative indicates that it is possible to improve first releases and thereby enhance the current assessment of the Swiss economy.

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

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1 Introduction

First estimates of current account statistics attract quite some attention in the media as they contain substantial information on recent economic developments, directly enter 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 considerable 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 forecasts (backcasts) by Swiss research institutes and the State Secretariat for Economic Affairs released shortly before the revisions.

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, policy makers most often use preliminary data, while ex post their actions are scrutinized on the basis of partly revised or even final data. We are interested in the true but unobserved, final figures and assume that data revisions improve the quality of our observable indicator. A natural question to ask then 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.[1] Real-time data sets exist for the US (Federal Reserve Economic Data, ALFRED), the euro area (EABCN Real Time Database, RTDB), the OECD, and several other countries. This paper focuses on Switzerland and analyses revisions of Swiss current account data, taking into account the data revision process and implied types of revisions. In addition, we investigate whether first releases can be improved upon by the use of survey results as gathered by the KOF Swiss Economic Institute at the ETH Zurich.

The paper fits in the tradition of the debate on whether data revisions are 'news', i.e. the measurement errors of consecutive vintages behave like a set of rational forecast errors, or 'noise', i.e. measurement errors of consecutive vintages are mutually uncorrelated, initiated by Mankiw, Runkle and Shapiro (1984) and Mankiw and Shapiro (1986).[2] In this line of literature the existence of different types of revisions has typically not been exploited. McKenzie (2006) notes eight reasons for revisions of official statistics: (i) incorporation of source data with more complete or otherwise better reporting (e.g. including late respondents) in subsequent estimates: (ii) correction of errors in source data (e.g. from editing) and computations (e.g. revised imputation); (iii) replacement of first estimates derived from incomplete samples (e.g. sub-samples), judgmental or statistical techniques when firmer data become available; (iv) incorporation of source data that more closely match

[1] For a recent overview of modelling data revisions, see Jacobs and van Norden (2007).

[2] Recent contributions are Faust, Rogers and Wright (2005), Swanson and van Dijk (2006) and Aruoba (2008).

the concepts and/or benchmarking to conceptually more accurate but less frequent statistics; (v) incorporation of updated seasonal factors; (vi) updating of the base period of constant price estimates; (vii) changes in statistical methodology (such as the introduction of chain-linked volume estimates), concepts, definitions, and classifications; (viii) revisions to national accounts statistics arising from the confrontation of data in supply and use tables. These different reasons affect data revisions at different horizons. For example, the first three reasons only have an impact on the most recent estimates in a vintage, while changes in statistical methodology (vii) affect the complete vintage. Hence, the first aim of the paper is to explicitly deal with different types of revisions.

The second purpose of our paper is to verify whether the first few releases of current account data can be improved upon by the use of survey results as gathered by the KOF Swiss Economic Institute at the ETH Zurich. If this turns out to be the case, it allows for improvements in future first releases and thereby enhances current assessment of the Swiss economy. Surveys have been used to model expectations, see for example Lee and Shields (2000), but research into the feasibility of using survey information to explain and improve first releases is still 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.

Our paper is structured as follows. Section 2 describes the real-time data set on Swiss current account statistics and describes the data revision process. Section 3 investigates whether different types of revisions are 'news'

or 'noise'. Section 4 introduces the KOF business tendency survey indicators, while Section 5 tries to answer the question whether KOF indicators are informative for revisions. Section 6 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').[3] Information is provided for income (consisting among other things of exports), expenditures (consisting among other things of imports) and the balance of the current account (income minus expenditures).[4]

Our real-time data set is a complete revision triangle consisting of monthly vintages with quarterly data of these totals. The first vintage, published in August 1995, covers the 1984Q1–1995Q2 period, while the last vintage, published in June 2007, has data for the 1984Q1–2006Q2 period.[5] The data is kindly provided by the Swiss National Bank (SNB).[6]

Figure 1 visualizes the data revision process in a revision triangle showing later vintages moving from left to right across columns, and later points in time moving down the rows. Five types of revisions are distinguished:

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

[4]The income and expenditures side consists of goods, services, factor earnings and transfer payments.

[5]The publication lag is around one quarter.

[6]There are some minor discrepancies between the electronic version we received from the SNB and figures as published in the Monthly Bulletin. This once more illustrates the difficulties of constructing a real-time data set. Note that the Monthly Bulletin only contains a few observations per vintage and therefore would severely limit our statistical analysis.

Benchmark revisions: the introduction of SNA93 and ESA95 led to benchmark or comprehensive revisions in 1995:8 and 2004:8; both vintages were revised backward completely.

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 in the ones of August thereafter.

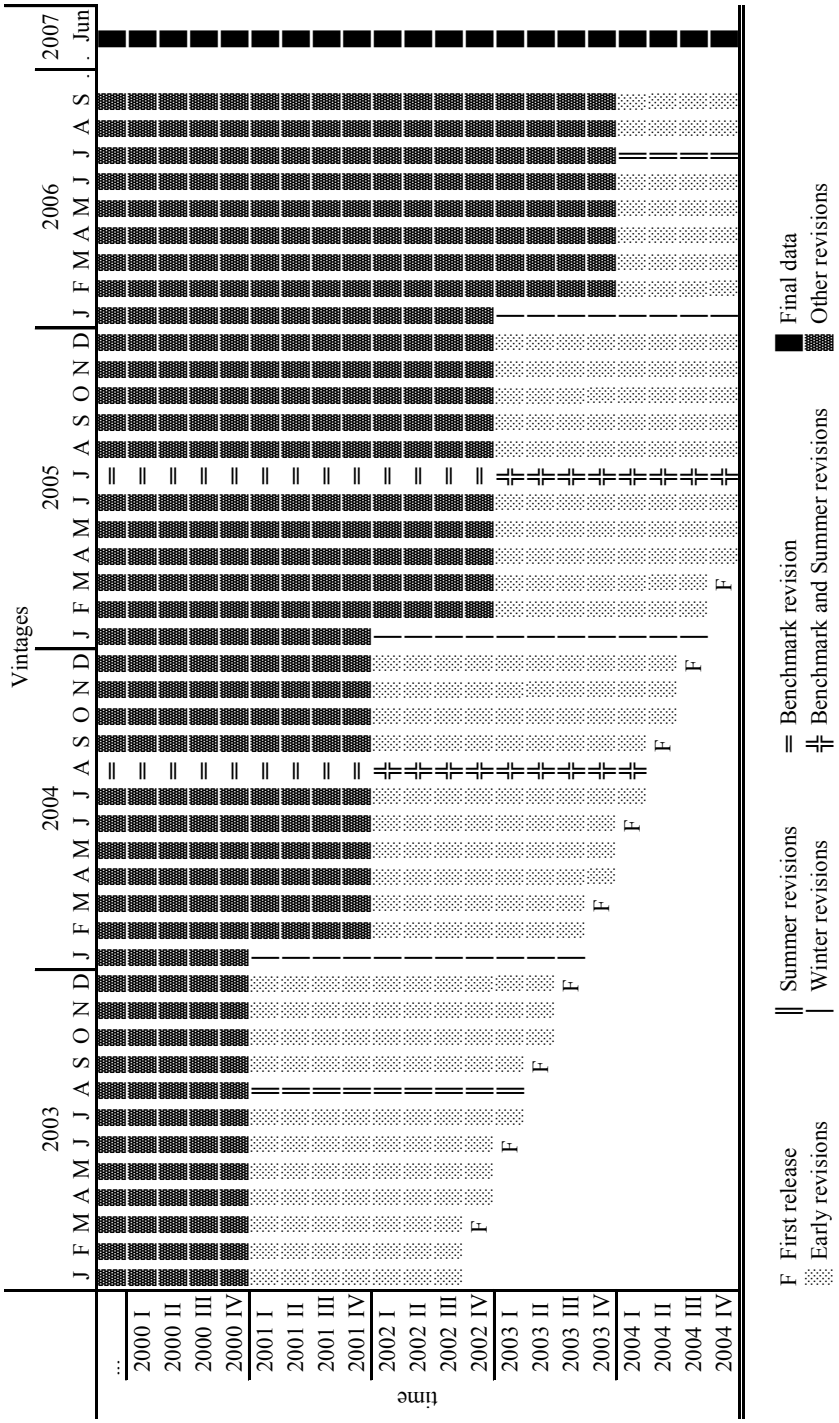
Winter revisions: in 2001:12, 2002:12, 2004:01, 2005:01 and 2006:01 additional revisions in capital factor earnings took place. These revisions are based upon annual information on reinvested business returns ('Reinvestierte Erträge').

Early revisions: between the first release and the release after its final winter revision, each data point can be revised due to new and/or updated information which are captured by neither the summer, winter nor benchmark revisions.

Other revisions: a small number of minor revisions do take place after the end of the (winter and) summer revisions cycle and are therefore not classified above.

Each row in Figure 1 reflects subsequent estimates for one observation. The leftmost element is the first release, the second its first revision, etc. We consider the final vintage, as released in June 2007 and depicted in black, to consist of final releases. Hence, if we move from the first estimate to the right

Figure 1: Data Revision Process



we come across Early, Summer, Winter and Benchmark revisions, however not necessarily in that order.[7]

Using the standard notation in this literature that superscripts refer to vintages and subscripts to time periods, y_t^{t+1} is the estimate available at time $t+1$ of the value of y at time t, which is the first release of y_t assuming a one-period publication lag. Normally the *total revision* is then defined as the difference between the final release, y_t^{FR}, and the first release, y_t^{t+1}. In order to mitigate the effects of benchmark revisions, most authors use growth rates. But, as shown by Siklos (2006) and Knetsch and Reimers (2006), this solution is far from optimal. If different revision types behave differently, similar problems might also arise elsewhere. Furthermore, by using growth rates valuable information is lost. One of the aims of this paper is to explicitly decompose the total revision into its components, i.e. *Benchmark*, *Early*, *Summer*, *Winter* and *Other* revisions. Therefore we stick to using levels.

Figure 1 shows that in our case this decomposition is relatively straightforward. Except for the first release (denoted by 'F') each cell represents a (potential) revision. The shade and symbol of the cell shows how the revision has been classified. Within each row the sum of the cells with the same color represent the total of that type of revision. The only difficulty arises with the two benchmark revisions in our sample. These at least partly also represent Summer revisions. This identification problem is tackled by extrapolating—within these two vintages—the revisions of the older data (back to 1984) to the final 9 quarters. For this an AR(4) process is assumed. The part not

[7]Keeping track of the different revisions, i.e. proper bookkeeping, is one of the accomplishments of this paper. Any model of real-time data has to deal with different types of revisions one way or the other, and with benchmark revisions in particular.

explained by this extrapolated AR(4) process is treated as 'Summer revision'.

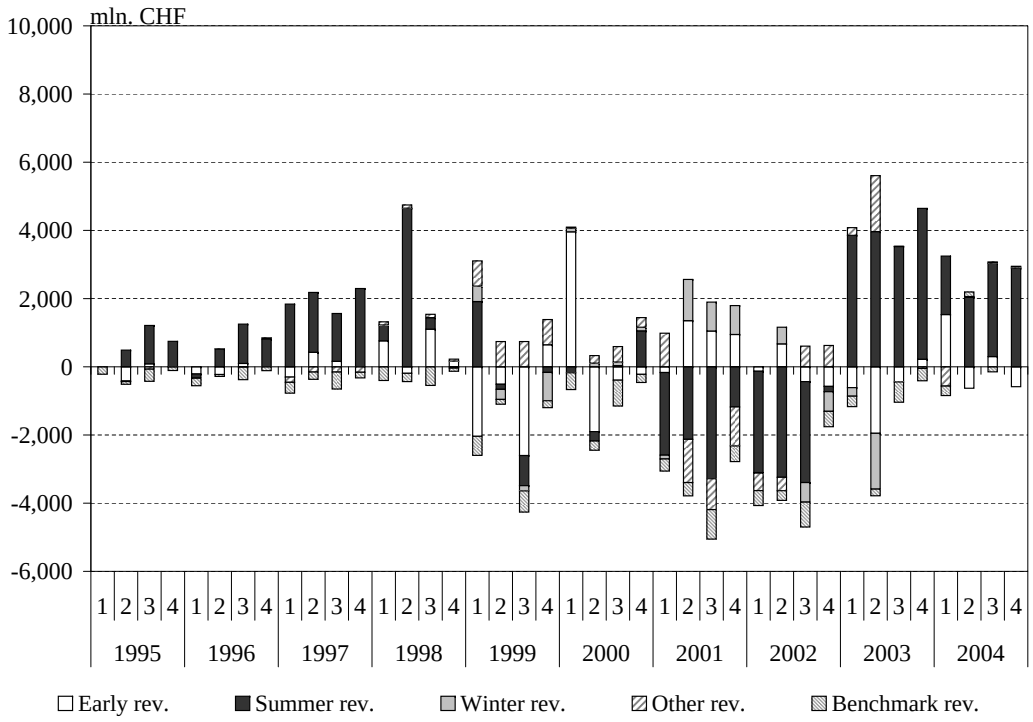
We calculate our final release from the June 2007 vintage. The Summer revisions imply that first releases for the first quarter of every year are revised three times before becoming final, whereas first releases for the second, third and fourth quarter are already final after two Summer revisions. Therefore, two years is sufficient for the Swiss current account data to become final (abstracting from Benchmark and Other revisions), and hence when comparing the final release of a current account category y_t^{FR} with the first release y_t^{t+1}, we take the sample 1995Q1–2004Q4, or 40 observations.[8]

Figure 2 shows the different types of revisions in the current account balance in millions of Swiss francs. Revisions occur in the positive and in the negative direction. Total revisions, the sum of the positive and negative components of the bars, are sizable, between -4.1 and +4.3 billion Swiss francs. Figure 3 and 4 reveal similar patterns for the income and the expenditure side of the current account. Overall the revisions are more sizeable when focusing on these two sides of the balance sheet. Hence, the revisions on the income and expenditure sides appear to at least partly cancel out in their balance. It is also notable that the amplitude is largest for the income side (Figure 3). Relative to the first release, the sum of the positive and negative components vary between -5% and +14%. Eyeballing the three graphs indicates that especially Summer revisions are important. This is not surprising as around that time first estimates and revisions of annual data are released in Switzerland. Consequently, some higher frequency data relevant for the

[8]Note that as our first vintage is published in August 1995, our first release concerns the first quarter of 1995.

current account statistics are revised. Still, the other types of revisions also have an impact. Overall, Benchmark revisions do not play a substantial role.

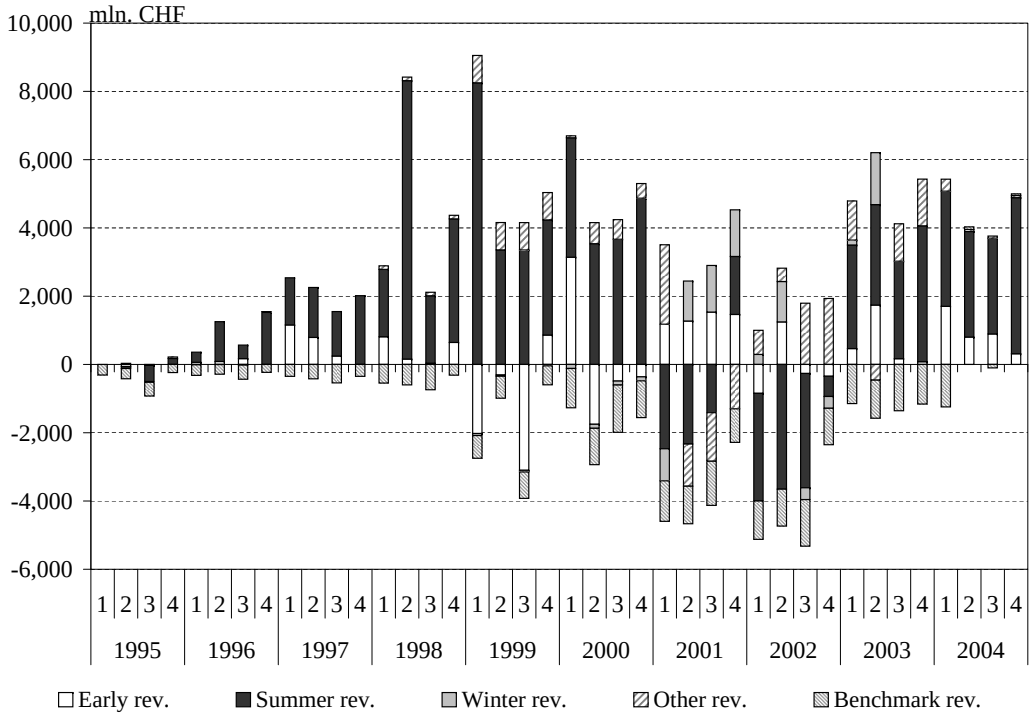
Figure 2: Revisions of the trade balance



Note: Revisions are shown in millions of CHF.

Table 1 shows the average revisions, both in levels (top panel) and relative to first releases. The significance of these averages are calculated by means of a standard t-test. If an average revision is significantly different from zero, we interpret this as a consistent bias in the revision process during this sample. This table highlights several aspects. First of all, many types of revisions have significant biases both in levels and relative to their first releases. With respect to the Benchmark revisions, this is no surprise; these are definitional changes which are likely to affect all observations in the same

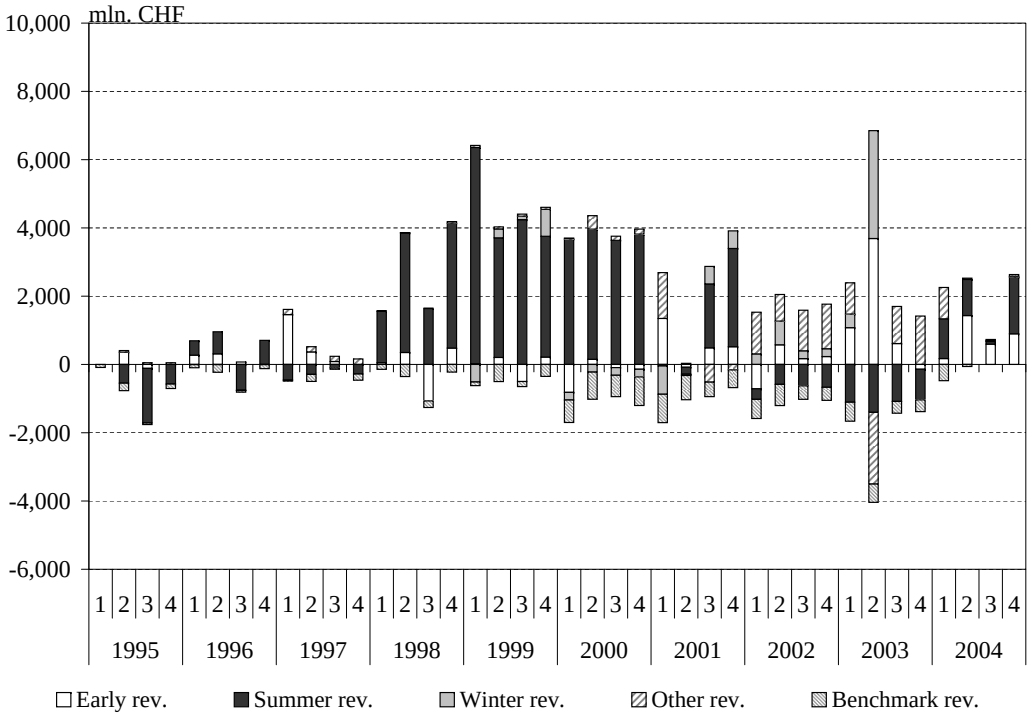
Figure 3: Revisions of total exports



Note: Revisions are shown in millions of CHF.

direction. However, especially the bias in the (Early and) Summer revisions raises the question whether a statistical agency should correct for the bias in the publication of its statistics. A second observation is that by far the largest revisions take place in summer. On average, these revisions amount to 7.9% (current account), 3% (income) and 2.1% (expenditures) of their original value and dominate the entire revision process. A final observation is that especially with respect to the Early, Other and Total revisions, the income and expenditure sides of the current account cancel out rendering the average revision bias to become insignificant in the overall current account balance.

Figure 4: Revisions of total imports



Note: Revisions are shown in millions of CHF.

3 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, which implies for the final release

$$y_t^{FR} = y_t^{t+1} + \nu_t^{t+1}, \qquad \text{cov}(y_t^{t+1}, \nu_t^{t+1}) = 0. \tag{1}$$

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

Table 1: Average bias in revisions

	Current account		Income side		Expenditures side	
	Mean	Sign.	Mean	Sign.	Mean	Sign.
	Levels in millions of CHF					
Total revisions	371.61	0.29	1,795.71	0.00	1,424.10	0.00
Early revisions	-27.87	0.88	292.87	0.10	320.75	0.01
Summer revisions	656.17	0.06	1,800.39	0.00	1,072.20	0.00
Winter revisions	-4.12	0.95	119.02	0.14	123.13	0.18
Benchmark revisions	-325.46	0.00	-723.09	0.00	-327.41	0.00
Other revisions	75.69	0.39	314.03	0.02	238.34	0.02
	Relative to first release (in perc.)					
Total revisions	5.2%	0.12	3.0%	0.00	2.7%	0.00
Early revisions	0.2%	0.92	0.4%	0.11	0.6%	0.01
Summer revisions	7.9%	0.02	3.0%	0.00	2.1%	0.00
Winter revisions	0.1%	0.83	0.2%	0.14	0.2%	0.18
Benchmark revisions	-3.4%	0.00	-1.2%	0.00	-0.6%	0.00
Other revisions	0.5%	0.54	0.5%	0.01	0.4%	0.02

Note: Sign. gives p-values of a standard t-test.

the total revision process this would imply

$$y_t^{t+1} = y_t^{FR} + \epsilon_t^{t+1}, \qquad \text{cov}(y_t^{FR}, \epsilon_t^{t+1}) = 0. \tag{2}$$

In this case, the Mincer-Zarnowitz (1969) test of the "noise" specification regresses the measurement error $y_t^{FR} - y_t^{t+1}$ on a constant and the final release. In our case, we can write

$$\Delta y_t = \alpha_1 + \beta_1 y_t^{FR} + \varepsilon_t^{t+i}. \tag{3}$$

where Δy_t represents either the total revision $(y_t^{FR} - y_t^{t+1})$ or revisions in one of its components, i.e. Early, Summer, Winter, Benchmark or Other revisions. The null hypothesis that measurement errors are independent of true values ($\alpha_1 = 0,\ \beta_1 = 0$), i.e. no noise, may be tested with a Wald

test; since the errors may suffer from heteroskedasticity and autocorrelation, robust standard errors are typically used.

The analogous test of the "news" model regresses the measurement error (e.g. $y_t^{FR} - y_t^{t+1}$) on a constant and the first release

$$\Delta y_t = \alpha_2 + \beta_2 y_t^{t+1} + u_t^{t+1}. \tag{4}$$

The similar null hypothesis ($\alpha_2 = 0,\ \beta_2 = 0$) now tests whether data revisions are predictable; accepting the null hypothesis, implies that they are not. The null hypotheses in the "noise" and the "news" specification are mutually exclusive but they are not collectively exhaustive, i.e. we may be able to reject both hypotheses, particularly when the constant in both test equations differs from zero (see Aruoba, 2008, Appendix A.2).

Table 2 lists the estimation outcomes for Equations (3) and (4) for the different types of revisions of the current account, income and expenditures. To save space only p-values of the tests for the the individual coefficients and joint significance tests are shown. With the exception of Benchmark revisions, we cannot reject the null hypothesis that revisions are not forecastable for the current account balance ("news" regressions). The outcomes of the "noise" regressions differ for the Summer revisions and the Total revisions of the current account. In the "noise" specification the parameter of the final release (β) becomes significantly different from zero, and the joint null hypothesis of no bias and no effect for the final release ($\alpha = \beta = 0$) is rejected too. Consequently, total revisions are noisy too.

As reported in the final row of Table 2, the residuals of the income and

Table 2: Are revisions in Swiss exports and imports 'news' or 'noise'?

		News regressions						Noise regressions					
		Total revisions	Early revisions	Summer revisions	Winter revisions	Benchmark revisions	Other revisions	Total revisions	Early revisions	Summer revisions	Winter revisions	Benchmark revisions	Other revisions
Current account	α=0	0.19	0.20	0.22	0.12	0.11	0.10	0.04	0.89	0.08	0.10	0.02	0.32
	β=0	0.40	0.18	0.66	0.21	0.24	0.12	0.00	0.84	0.01	0.08	0.76	0.20
	α,β=0	0.18	0.38	0.14	0.28	0.00	0.24	0.00	0.96	0.00	0.20	0.00	0.38
Income side	α=0	0.65	0.31	0.47	0.18	0.08	0.35	0.44	0.20	0.80	0.21	0.22	0.33
	β=0	0.88	0.13	0.90	0.17	0.00	0.19	0.13	0.07	0.27	0.19	0.01	0.14
	α,β=0	0.02	0.06	0.03	0.36	0.00	0.03	0.03	0.03	0.04	0.40	0.00	0.05
Expend. side	α=0	0.89	0.39	0.89	0.65	0.03	0.01	0.27	0.36	0.53	0.55	0.03	0.03
	β=0	0.33	0.15	0.72	0.51	0.00	0.00	0.03	0.15	0.21	0.45	0.00	0.01
	α,β=0	0.00	0.05	0.16	0.37	0.00	0.00	0.00	0.06	0.12	0.33	0.00	0.00
	#Obs.	39	39	39	39	39	39	39	39	39	40	40	39
	Correl	0.61	0.31	0.64	0.65	0.68	0.71	0.61	0.32	0.65	0.65	0.69	0.71

Notes: Except for the rows 'Obs.' and 'Correl.', this table reports p-values of exclusion tests. The results are based upon Ordinary Least Squares (OLS) regressions with Newey-West standard errors correcting for autocorrelation up to the fourth order. 'Correl' shows the correlation between the OLS residuals of the income and expenditures equations.

expenditure side equations exhibit a high degree of correlation. Only the residuals of the Early revisions equations have a correlation coefficient significantly below 0.6. Given these high correlation coefficients, Table 3 reports p-values of exclusion tests when estimating the two equations as a system, i.e. applying the Seemingly Unrelated Regression (SUR) technique. The joint

Table 3: Are revisions in Swiss exports and imports 'news' or 'noise'? SUR estimates

		News regressions						Noise regressions					
		Total revisions	Early revisions	Summer revisions	Winter revisions	Benchmark revisions	Other revisions	Total revisions	Early revisions	Summer revisions	Winter revisions	Benchmark revisions	Other revisions
Income side	α=0	0.37	0.53	0.28	0.46	0.04	0.38	0.34	0.43	0.50	0.60	0.09	0.43
	β=0	0.94	0.33	0.78	0.29	0.00	0.16	0.07	0.26	0.13	0.39	0.00	0.19
	α,β=0	0.00	0.14	0.00	0.16	0.00	0.01	0.00	0.12	0.00	0.20	0.00	0.01
Expend. Side	α=0	0.91	0.70	0.96	0.96	0.00	0.14	0.07	0.54	0.14	0.96	0.00	0.30
	β=0	0.25	0.37	0.55	0.82	0.00	0.05	0.00	0.26	0.03	0.82	0.00	0.12
	α,β=0	0.00	0.02	0.00	0.37	0.00	0.01	0.00	0.01	0.00	0.37	0.00	0.01

Notes: Except for the rows 'Obs.' and 'Correl.', this table reports p-values of exclusion tests. The results are based upon Seemingly Unrelated Regressions (SUR).

significance tests indicate that in most cases we can reject both the no news and no noise hypothesis. The only consistent exception are Winter revisions. Independent of the estimation technique (OLS or SUR) and the side of the balance sheet (income vs. expenditures), the null hypothesis of both no news and no noise cannot be rejected using conventional significance levels.

4 The KOF business survey

KOF Swiss Economic Institute at the ETH Zurich is a non-profit organisation whose major activity is to analyse and forecast economic developments

in Switzerland. Regular surveys (business, investment and innovation surveys) some of which conducted since the end of the 1930s, 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.[9]

An important feature of KOF business survey indicators is the fact that they are not revised in the course of time.[10] Furthermore, KOF indicators are not used in the production process of the current account statistics. The combination of these two properties make KOF business survey indicators excellent candidates when further investigating the revisions in trade account statistics.

Our KOF indicators are calculated from quarterly and monthly surveys in the manufacturing industry, the wholesale trade 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 into 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.

We adopt two approaches when selecting our KOF Business Survey indicators. First, we look for indicators that measure the cyclical condition of the Swiss economy, a latent variable. According to KOF experience, the best way

[9]For more information on the KOF business survey indicators and some of its uses see Graff and Etter (2004) and Graf (2008).

[10]Actually, several 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.

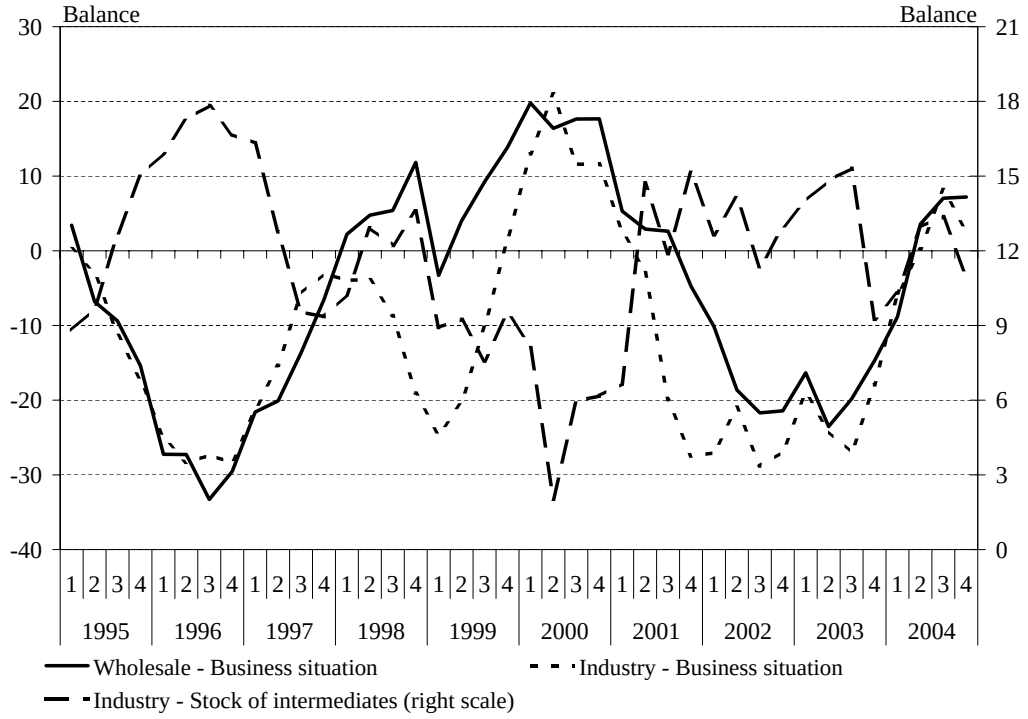
to assess the current business situation in the industry is to use a composite indicator which combines the answers of three survey questions: 1) assessment of the order books, 2) year-over-year development of order receipts, and 3) year-over-year production development. This composite indicator focuses on the demand for firms' products. Hence, a dimension not well captured is the stock of intermediate inputs. For the industry sector we therefore also include survey results from the question which directly addresses this.

Many products entering or leaving Switzerland go via the wholesale trade sector. For that sector KOF historically combines four survey questions to capture the current business situation: 1) assessment of the quantity of goods sold, 2) year-over-year development of the quantity of goods sold, 3) the assessment of the delivery periods, and 4) the year-over-year change in inventories. To summarize, we select the following indicators to approximate the cyclical situation:

- Wholesale trade business situation ('Grosshandel Geschäftsgang'),
- Industry business situation ('Industrie Geschäftsgang'),
- Industry stock of intermediate inputs ('Industrie Lager Vorprodukte').

Figure 5 shows the development of these three business survey indicators over time. We observe that the wholesale trade series and the industry business situation move fairly closely together (the correlation coefficient equals 0.79), whereas industry stock of intermediate products moves counter-cyclically, as expected (correlation with the industry business situation equals -0.71).

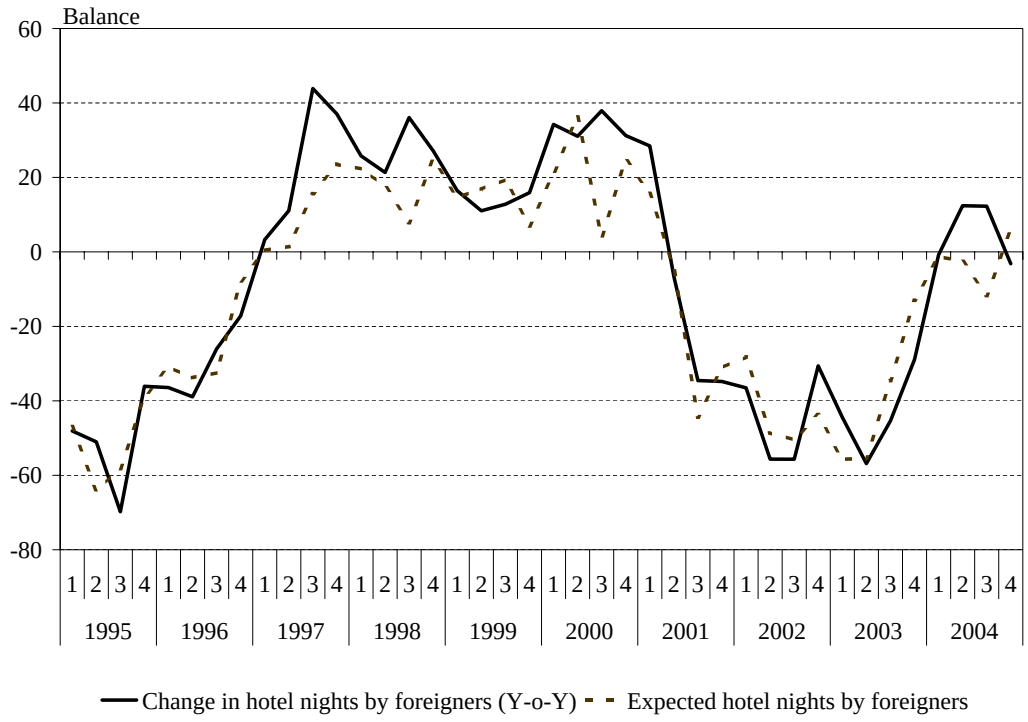
Figure 5: KOF Business Tendency Survey indicators for the industry and wholesale sectors



The second approach recognizes that business transactions are often facilitated by personal contact. The assessment of hotel nights spent by foreigners (as compared to last year) as reported in the KOF Hotel survey might therefore be a good indicator for across border business activities. Not only do hotel nights by foreigners in Switzerland approximate changes in across border business relations, they are also a direct measure of exports of services. Therefore we extract the following indicators from the KOF Hotel Survey:

- Hotel nights foreigners (as compared to previous year) ('Logiernächte Ausländer (Vorjahresvergleich)')
- Hotel nights foreigners (expectations w.r.t.) ('Logiernächte Ausländer

Figure 6: KOF Business Tendency Survey indicators for the hotel sector



(Erwartungen)')

Figure 6 shows the patterns in the Hotel survey indicators. The two indicators move closely together (correlation 0.94).

5 Can KOF indicators help explain revisions?

In this section, we investigate whether the KOF indicators described in the previous section have explanatory value in 'news' specifications of revisions, where the null hypothesis is that revisions are not forecastable.[11] Table 4

[11]We have also estimated extended 'noise' equations. Given the outcomes presented in Section 3, it comes as no surprise that those are very similar to those presented here.

Table 4: Can KOF indicators help explain revisions in the Swiss trade balance?

		Hotels		Whole-sale	Industry		Hotels		Whole-sale	Industry	
		Expected hotel nights by foreigners	Change in hotel nights by foreigners (Y-o-Y)	Business situation	Business situation	Stock of intermediate inputs	Expected hotel nights by foreigners	Change in hotel nights by foreigners (Y-o-Y)	Business situation	Business situation	Stock of intermediate inputs
		Total revisions					Early revisions				
Current account	α=0	0.11	0.13	0.29	0.11	0.70	0.13	0.14	0.13	0.13	0.67
	β=0	0.34	0.36	0.46	0.30	0.58	0.14	0.15	0.14	0.16	0.28
	γ=0	0.29	0.28	0.77	0.19	0.69	0.54	0.27	0.07	0.17	0.75
	α,β=0	0.00	0.01	0.28	0.06	0.71	0.31	0.32	0.29	0.26	0.35
	α,β,γ=0	0.01	0.01	0.30	0.10	0.30	0.46	0.42	0.31	0.43	0.55
		Summer revisions					Winter revisions				
Current account	α=0	0.24	0.23	0.62	0.29	0.98	0.11	0.11	0.05	0.12	0.49
	β=0	0.63	0.64	0.89	0.62	0.92	0.17	0.18	0.06	0.17	0.36
	γ=0	0.67	0.69	0.56	0.66	0.57	0.44	0.53	0.11	0.39	0.77
	α,β=0	0.05	0.05	0.46	0.19	0.95	0.25	0.23	0.12	0.25	0.35
	α,β,γ=0	0.10	0.12	0.18	0.20	0.27	0.38	0.38	0.23	0.35	0.43
		Benchmark revisions					Other revisions				
Current account	α=0	0.18	0.11	0.12	0.28	0.11	0.28	0.23	0.23	0.27	0.57
	β=0	0.21	0.23	0.24	0.10	0.56	0.22	0.20	0.18	0.21	0.73
	γ=0	0.37	0.78	0.99	0.23	0.24	0.75	0.63	0.90	0.98	0.30
	α,β=0	0.00	0.00	0.00	0.00	0.00	0.45	0.43	0.40	0.38	0.02
	α,β,γ=0	0.00	0.00	0.00	0.00	0.00	0.36	0.32	0.38	0.36	0.05

Notes: p-value of exclusion tests are reported. Trade balance equations are estimated using OLS with Newey-West standard errors correcting for autocorrelation up to the fourth order. Import and export equations are estimated jointly using SUR.

reports p-values of different exclusion tests using the following 'news' specifications to which each of the five KOF indicators has separately been added:

$$\Delta y_t = \alpha_3 + \beta_3 y_t^{t+1} + \gamma_3 KOF_t^{t+1} + v_t^{t+1}. \tag{5}$$

Table 4 reports the results for the balance of the current account. As shown in the rows labelled $\gamma = 0$, none of the KOF indicators is able to explain

Table 5: Can KOF indicators help explain revisions in Swiss exports and imports?

		Hotels		Whole-sale	Industry		Hotels		Whole-sale	Industry	
		Expected hotel nights by foreigners	Change in hotel nights by foreigners (Y-o-Y)	Business situation	Business situation	Stock of intermediate inputs	Expected hotel nights by foreigners	Change in hotel nights by foreigners (Y-o-Y)	Business situation	Business situation	Stock of intermediate inputs
		Total revisions					Early revisions				
Income side	α=0	0.18	0.22	0.05	0.08	0.21	0.42	0.49	0.37	0.60	0.01
	β=0	0.81	0.83	0.29	0.46	0.72	0.28	0.31	0.23	0.37	0.04
	γ=0	0.00	0.01	0.02	0.05	0.34	0.27	0.58	0.48	0.95	0.01
	α,β=0	0.00	0.00	0.00	0.00	0.11	0.24	0.16	0.15	0.19	0.03
	α,β,γ=0	0.00	0.00	0.00	0.00	0.00	0.15	0.23	0.21	0.27	0.00
Expenditure side	α=0	0.77	0.90	0.10	0.76	0.11	0.50	0.56	0.14	0.32	0.06
	β=0	0.26	0.26	0.73	0.42	0.69	0.28	0.29	0.06	0.18	0.09
	γ=0	0.00	0.01	0.00	0.37	0.02	0.06	0.08	0.02	0.18	0.03
	α,β=0	0.00	0.00	0.00	0.00	0.00	0.08	0.03	0.02	0.14	0.15
	α,β,γ=0	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.00
		Summer revisions					Winter revisions				
Income side	α=0	0.07	0.11	0.01	0.04	0.03	0.19	0.22	0.17	0.06	0.00
	β=0	0.53	0.58	0.11	0.30	0.34	0.14	0.14	0.11	0.05	0.02
	γ=0	0.00	0.00	0.00	0.03	0.04	0.01	0.01	0.16	0.02	0.00
	α,β=0	0.00	0.00	0.00	0.00	0.01	0.25	0.16	0.12	0.13	0.00
	α,β,γ=0	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.11	0.01	0.00
Expenditure side	α=0	0.39	0.56	0.00	0.25	0.01	0.62	0.71	0.33	0.26	0.10
	β=0	0.71	0.68	0.03	0.83	0.55	0.56	0.57	0.26	0.27	0.27
	γ=0	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.05	0.02	0.03
	α,β=0	0.00	0.00	0.00	0.00	0.00	0.77	0.55	0.39	0.52	0.18
	α,β,γ=0	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.09	0.05	0.06
		Benchmark revisions					Other revisions				
Income side	α=0	0.02	0.03	0.01	0.01	0.37	0.42	0.40	0.24	0.30	0.35
	β=0	0.00	0.00	0.00	0.00	0.00	0.17	0.17	0.10	0.13	0.57
	γ=0	0.15	0.17	0.17	0.05	0.46	0.78	0.87	0.37	0.57	0.05
	α,β=0	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.04	0.01
	α,β,γ=0	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.02	0.03	0.00
Expenditure side	α=0	0.00	0.00	0.01	0.01	0.34	0.14	0.13	0.04	0.07	0.56
	β=0	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.01	0.03	0.11
	γ=0	0.80	0.93	0.59	0.77	0.06	0.82	0.62	0.11	0.25	0.56
	α,β=0	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.05
	α,β,γ=0	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.01

Notes: p-value of exclusion tests are reported. Trade balance equations are estimated using OLS with Newey-West standard errors correcting for autocorrelation up to the fourth order. Import and export equations are estimated jointly using SUR.

a significant part of any of the revisions. Hence, and confirming the results presented in Table 1, it is difficult to explain revisions in the balance of the income and expenditures sides of the current account.

However, when splitting up the balance sheet into the income and expenditures sides, the results change markedly (see Table 5).[12] With respect to the Benchmark revisions we do not expect any explanatory power of the KOF indicators; definitional changes should not be predictable. Indeed, the row $\gamma = 0$ in the bottom-left part of Table 5 indicates that none of the KOF-coefficients is significant at a five percent level. Also revisions which take place after the summer and winter cycles have been completed (which means revisions that take place after roughly two years and which are labelled Other revisions) are not expected to be correlated with the timely KOF indicators. The bottom-right part of the table confirms this intuition too.

Given the importance of Summer revisions in the total revision process (see Table 1), our main interest lies in explaining these. The middle-left part of the table reveals that although the initial release (β) does not appear to help explain Summer revisions, the KOF indicators do play a significant role.

A similar, although slightly less pronounced, situation holds for the Winter revisions (middle-right part of the table). The major difference is that, whereas in case of the Summer revisions all KOF indicators have explanatory power, for the Winter revisions the business situation in the wholesale trade sector is insignificant at conventional levels. Of the sectors which enter our analysis, the wholesale trade is the one which is least involved in reinvest-

[12]To capture the high correlation between the income and expenditure side of the current account, the two equations are estimated jointly using the Seemingly Unrelated Regression estimator. The results do not qualitatively change when using OLS.

ments of business returns. Given that the Winter revisions are initiated by new information on reinvestments, this might explain our outcome. Recall that Tables 1, 2 and 3 indicate that Winter revisions do not contain an obvious bias. Nevertheless, KOF indicators—and in particular those stemming from the Hotel survey—are able to explain a significant part of it.

As shown in the upper-right part of Table 5, revisions on the income side of the balance sheet that take place before the first Summer revision (so-called Early revisions) are largely unbiased. Only the KOF industry indicator on the stock of intermediate inputs has a significant effect. This suggests predictive power of this particular KOF indicator for early revisions. On the expenditures side of the current account balance, the business situation in the wholesale sector significantly explains part of the revisions.

Summer revisions dominate the other types of revisions we distinguish. It is therefore not surprising that the outcomes of the Total revisions (upper-left part of Table 5) and the Summer revisions (middle-left part) are fairly similar.

To get an idea of the explanatory power of the KOF indicators, Table 6 reports the adjusted R^2s as standard goodness of fit measure. For comparison, it also reports this goodness of fit measure for models in which the KOF indicators do not enter (based on Tables 2 and 3). Except for benchmark and other revisions, we observe a substantial improvement in explanatory power when including KOF indicators. At the extreme, well over 50 percent of the variance of the revisions in expenditures which take place in summer is explained by using the KOF business situation indicator from the wholesale sector; without this indicator the explanatory power was basically zero.

Table 6: Goodness of fit (adj. R^2) of the estimated equations

	Without any KOF indicators	Hotels: Expected hotel nights by foreigners	Hotels: Change in hotel nights by foreigners (Y-o-Y)	Wholesale: Business situation	Industry: Business situation	Industry: Stock of intermediate inputs	Without any KOF indicators	Hotels: Expected hotel nights by foreigners	Hotels: Change in hotel nights by foreigners (Y-o-Y)	Wholesale: Business situation	Industry: Business situation	Industry: Stock of intermediate inputs
	Total revisions						Early revisions					
Cur.acc.	0.01	0.02	**0.03**	-0.02	0.05	-0.02	0.01	-0.01	0.01	**0.04**	0.04	-0.01
Income	-0.03	**0.15**	0.14	0.08	0.04	-0.03	0.00	0.00	-0.02	-0.01	-0.03	**0.15**
Expend.	0.01	0.23	0.16	**0.26**	0.00	0.12	0.00	0.07	0.06	**0.11**	0.03	0.09
	Summer revisions						Winter revisions					
Cur.acc.	**-0.02**	-0.04	-0.04	-0.03	-0.04	-0.04	0.00	0.00	-0.01	**0.06**	0.00	-0.02
Income	-0.03	**0.25**	0.20	0.16	0.07	0.05	0.02	0.17	0.18	0.06	0.14	**0.24**
Expend.	-0.02	0.41	0.34	**0.53**	0.09	0.24	-0.02	**0.16**	0.16	0.07	0.10	0.08
	Benchmark revisions						Other revisions					
Cur.acc.	0.01	0.00	-0.01	-0.01	**0.02**	0.01	0.02	-0.01	0.00	-0.01	-0.01	**0.05**
Income	0.35	0.37	0.36	0.36	**0.39**	0.34	0.01	-0.01	-0.02	0.00	-0.01	**0.09**
Expend.	0.40	0.38	0.38	0.39	0.38	**0.43**	0.04	0.01	0.02	**0.06**	0.04	0.02

Notes: Adjusted R^2 values are reported. Trade balance equations are estimated using OLS with Newey-West standard errors correcting for autocorrelation up to the fourth order. Import and export equations are estimated jointly using SUR. Bold figures represent the highest values in each particular row.

Overall, we find overwhelming evidence that several indicators as collected by the KOF Swiss Economic Institute can help explain revisions in the income and expenditure components of the current account statistics in the past. This suggests that they might also be helpful in improving future releases of these statistics.

6 Conclusions

This paper explores revisions in Swiss current account data. In absolute size, these revisions have increased since the end of the 1990s. The production process of these statistics as applied by the Swiss National Bank allows us to distinguish between Benchmark, Summer, Winter, Early and Other revisions. So far, most papers do not correct for benchmark revisions or more in general do not distinguish between different types of revisions. By far, most and the largest revisions take place during summer, i.e. when official annual statistics are published by Swiss Statistics.

Even when correcting for Benchmark revisions, we show that overall significant biases exist in the revision process of the Swiss current account data. During the past ten years quarterly exports were on average revised upward by CHF 1.8 billion; quarterly imports were upwardly corrected by approximately CHF 1.4 billion on average. We also find that revisions on both sides of the balance are highly correlated. Overall, this suggests substantial room for improving the first release of this data.

Business tendency surveys are carried out and published by KOF Swiss Economic Institute. These are timely statistics which are (for practical purposes) not revised and are not used in the production process of the Swiss current account statistics. For these reasons we test whether some selected indicators distilled from these surveys help explain revisions in the past. Especially in explaining Summer and to a lesser extent Winter and Early revisions the selected KOF indicators perform rather well. To explain Summer revisions especially the (expected) number of hotel nights spent by foreigners

and the business situation in the wholesale trade sector are very informative.

Based on the finding that KOF indicators can explain past revisions, KOF indicators might be used by government statisticians to improve preliminary data. Whether they should use sentiment indicators is an open question. It would be the case if the sole goal of government statisticians is to produce preliminary data which is as accurate as possible (relative to the 'final values').

Acknowledgments

We thank the Swiss National Bank (SNB) for kindly providing us with the data. The helpful insights on Swiss current account data of Yngve Abrahamsen, Hildegard Muff and Thomas Schlup are gratefully acknowledged. We thank Simon van Norden for sharing his ideas on modelling real-time data with us, two anonymous referees and participants of the MMF Conference, September 13–15 2006, York, UK, the 28th CIRET Conference, September 20–23 2006, Rome, Italy, and the Workshop on Real Time Data Analysis, July 23–24 2007, Zurich, for helpful comments on earlier versions. The usual disclaimer applies.

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