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ON THE CONSISTENCY OF DATA ON PRODUCTION, DELIVERIES, AND INVENTORIES IN THE SWEDISH MANUFACTURING INDUSTRY

CLAES-HÅKAN GUSTAFSON

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Claes - Håkan Gustafson

ABSTRACT

The quality of final economic data is normally very difficult to evaluate. This paper uses the theoretical identity between the difference in output and sales on one hand and the sum of the changes in finished goods inventories and inventories of goods in process on the other, to check if the data series published are consistent. A lack of consistency would indicate a less than perfect data quality. We conclude that the series are not consistent and then perform several statistical tests in order to explore the nature of the inconsistency. We find that there are considerable differences in both the seasonal and cyclical patterns and that the errors are of a stochastic nature. Finally, two kinds of economic models are estimated on the alternative data sets. The estimates differ considerably and it is clear that the alternative data sets are by no means the same.

1. INTRODUCTION[1]

The question of the reliability of final data on production, deliveries, and inventories, which this paper is set out to discuss, is of interest for at least two reasons. The first reason is that final data constitute the benchmark for evaluating the quality of preliminary and intermediately revised data. Furthermore, final data are most often used to evaluate the efficiency of forecasting methods. Final data are simply the best substitute for the truth that is available.

The second reason originates from the research on inventory investment. Empirical research, based on Swedish data, of the determinants of industrial inventory investment yields results that are in some respects contrary to theory, which is all the more troubling considering that there is an overwhelming consensus about the main points of the theory

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[1]I am grateful to Olle Karlsson at the University of Örebro for assistance with the analysis of variance and to Lars-Erik Öller at the Economic Council, who has contributed with valuable comments on a preliminary draft.

(See Gustafson (1991) for a brief survey). For instance, the adjustment to a new long run desired level of stocks is generally estimated to take about one year, even though it would correspond to only a couple of days' work. Several authors have tried to explain this by referring to changes in various cost variables, which would slow down the adjustment processes. These variables have rarely been found to have a significant impact in empirical estimations, however. In view of these surprising results, it seems that there has to be something wrong. Parallel to the work on improving the theoretical models, it is reasonable to try to get an idea of the usefulness of the empirical data involved. This paper is meant to be a contribution in that field.

Although there may be good reasons to doubt the accuracy of final data in many areas, there are of course enormous difficulties involved in actually testing it, since there is nothing better to compare it with. In the case of data on production, deliveries, and inventories, however, we have a unique possibility to get an indication of final data quality.

The index of industrial production measures gross output and is in most cases (Gustafson & Holmén (1993)) based on the identity

$$Q_t - D_t = \Delta SF_t + \Delta SG_t, \qquad (1)$$

where Q_t is gross output, D_t is deliveries, SF_t is the stock of finished goods inventories, and SG_t is the stock of goods in process. Comparing the difference between output and deliveries with the sum of inventory investment in finished goods and goods in process thus gives an indication of the quality of the data, although it is still not possible to determine the exact source of discrepancies.

The Data

Output and delivery volumes are published in the form of indexes, monthly, quarterly, and annually, whereas real inventory stocks and investment are published quarterly and are given in Swedish kronor (SEK) in fixed prices. The final data on deliveries and inventories are published quite soon after the preliminary data - the time lag is less than a year - and are based on the same samples as the preliminary data. The revisions simply take account of information that arrives late and has to be substituted by imputed values in the preliminary data. The final data on production, on the other hand, is based on an annual total survey. Because of the extensive work involved in this, the final data on production are published with a time lag of about two years. The seasonal patterns of the monthly and quarterly data are not revised, however, but remain determined by the preliminary indicators of production, i.e. mainly hours worked, deliveries, and inventory changes. Obviously, the uncertainty that is connected with samples remains fully in the final versions of delivery data and inventory data and to some extent in production data. (Gustafson & Holmén, (1993).)

We have investigated data on two levels of aggregation: The aggregate manufacturing industry and engineering, which constitutes close to half of the manufacturing industry.

Our period of investigation begins with the second quarter of 1972, which is the earliest period for which inventory investment data were produced that are comparable to those of today. The first quarter of 1991 is the final one in this investigation, since it is the latest period for which final data on the index of industrial production exist. The 1970s were dramatic years in terms of the development of inventories, with a rapid and large increase in stocks between 1974 and 1977 and an almost equally strong decrease in the following years. Therefore, we have made some of the statistical tests on data for the sub-periods 1972:2 - 1982:4 and 1983:1 - 1991:1 separately as well as for the period as a whole.

In order to be able to compare the difference between output and deliveries with the inventory investment data, which are published in SEK, we have had to convert the index numbers of output and deliveries into millions of SEK as well. This has been done by taking data on annual output and distributing them over the quarters using the index numbers for output as weights. Assuming deliveries to be equal to output in some quarter, where inventory data indicate almost no change in inventories, the delivery data series have been adjusted towards the level of the output series. In order to minimise the risk of creating bias by using some quarter with a measurement error for this adjustment, we have used the average difference between the series over eight different quarters, where the change in inventories was close to zero.[2] The tests performed in the paper are robust to the exact method used for this conversion.

In Chapter 2 we present the data series and conclude that there is some inconsistency in the data. The discrepancies are analysed using various statistics. In Chapter 3 we estimate a simple stock adjustment model and a more complicated inventory investment model in order to get an indication of how serious the inconsistencies are from the point of view of economic analysis.

2. THERE IS SOMETHING WRONG

Since the difference between output and deliveries is by definition equal to the change in inventories of finished goods and goods in process (Blinder (1986)), we should expect a coefficient of correlation close to 1.00 between the series, although stochastic sampling errors would allow for some discrepancy. Table 1 reveals, however, that the correlation

[2]The quarters used were 1980:2, 1984:3, 1985:2, 1985:3, 1988:1, 1989:2, 1989:3, and 1990:4 for the aggregate manufacturing and 1972:3, 1976:4, 1983:3, 1984:1, 1984:2, 1986:2, 1987:2, and 1987:3 for engineering.

is far from perfect. Surprisingly, the correlation is somewhat better in the earlier data than in the later, especially when we look at the seasonally adjusted series. Also, the correlation is better in the engineering industry than in the aggregate, which is contrary to the common belief, that measurement errors tend to cancel out as one goes to higher levels of aggregation.

Table 1. Coefficients of correlation between (production - deliveries) and change in inventories of finished goods and goods in process.

	Period	Aggregate manufact.	Engineering
Quarterly data	1972:1-1991:1	0.49	0.58
	1972:2-1982:4	0.50	0.61
	1983:1-1991:1	0.47	0.56
Quarterly data adj. for season	1972:2-1991:1	0.50	0.53
	1972:2-1982:4	0.56	0.60
	1983:1-1991:1	0.38	0.39
Annual data	1973-1990	0.63	0.72

The analysis of variance procedure presented in Table 2 shows that a small part of the total variance is explained by the different levels of the two series, which may partly be due to imperfections in the method of converting index numbers of output and deliveries into millions of SEK described above. The F-statistics indicate that a common seasonal pattern explains a substantial part of the total variation, which is significant at the 1% level at least, whereas a common cycle and trend is significant at the 10% level only. The patterns are almost identical in the different levels of aggregation. In both cases more than one third of the variance remains unexplained by variations that are common to the two series, however.

Table 2. Analysis of variance in the joined series of (production - deliveries) and change in inventories of finished goods and goods in process.

	Aggregate manufact.		Engineering	
	Sum of squares	F-stat.	Sum of squares	F-stat.
Different Levels	21	7.06	8	7.51
Common Season	143	21.63	50	20.40
Common Cycle and Trend	143	3.22	51	3.15
Error	163		62	
Total	470		172	

Note: The sums of squares have been divided by 10^6.

Although there is a significant common seasonal variance in the series, there is also a striking difference between the seasonal patterns, particularly at the aggregate level, as Table 3 reveals. In the engineering industry the ranking of the quarters is almost similar in the two series, although the size of the components differ substantially, whereas in the manufacturing industry as a whole even the peak and bottom quarters differ.

Table 3. Seasonal components of (production - deliveries) and change in inventory stocks of finished goods and goods in process in the aggregate manufacturing industry and in the engineering industry.

	Aggregate manufact.		Engineering	
	Output. - Deliv.	Invent. change	Output - Deliv.	Invent. change
Quarter 1	1 171	1 476	565	721
Quarter 2	1 391	-287	557	-11
Quarter 3	-1 800	-207	-380	381
Quarter 4	-762	-982	-742	-1 091
Rank of quarters	2 - 1 - 4 - 3	1 - 3 - 2 - 4	1 - 2 - 3 - 4	1 - 3 - 2 - 4

Note: Millions of SEK. The seasonal components have been calculated from an OLS regression procedure with seasonal dummies, trend, and a constant term.

Figures 1 and 2 show plots of the seasonally adjusted series, where each adjusted series contains the residuals from an OLS regression of the original series on a time trend, three seasonal dummy variables, and a constant term, in the aggregate manufacturing industry and in the engineering industry respectively. The curves are remarkably staggered even without the seasonal components. The cyclical behaviour is visible in the diagrams, especially in the first half of the period of analysis. A close look at the diagrams reveals that the directions of the changes in inventory investment according to our two definitions is the same only in 55% of the cases in aggregate manufacturing and in 64% of the cases in engineering. The fit is clearly better towards the end of period, particularly in the aggregate industry.

Figure 1. Inventory change according to the production and delivery data (solid line) and according to the inventory statistics (broken line) in the aggregate manufacturing industry 1972:2 - 1991:1. Seasonally adjusted data.

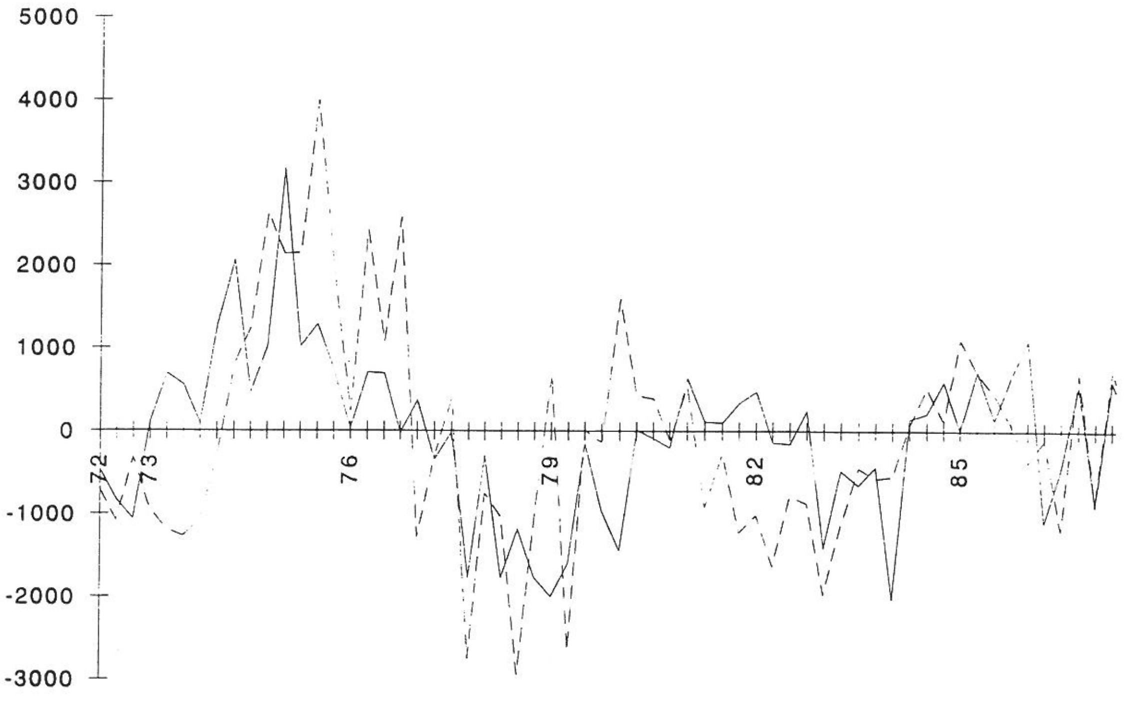
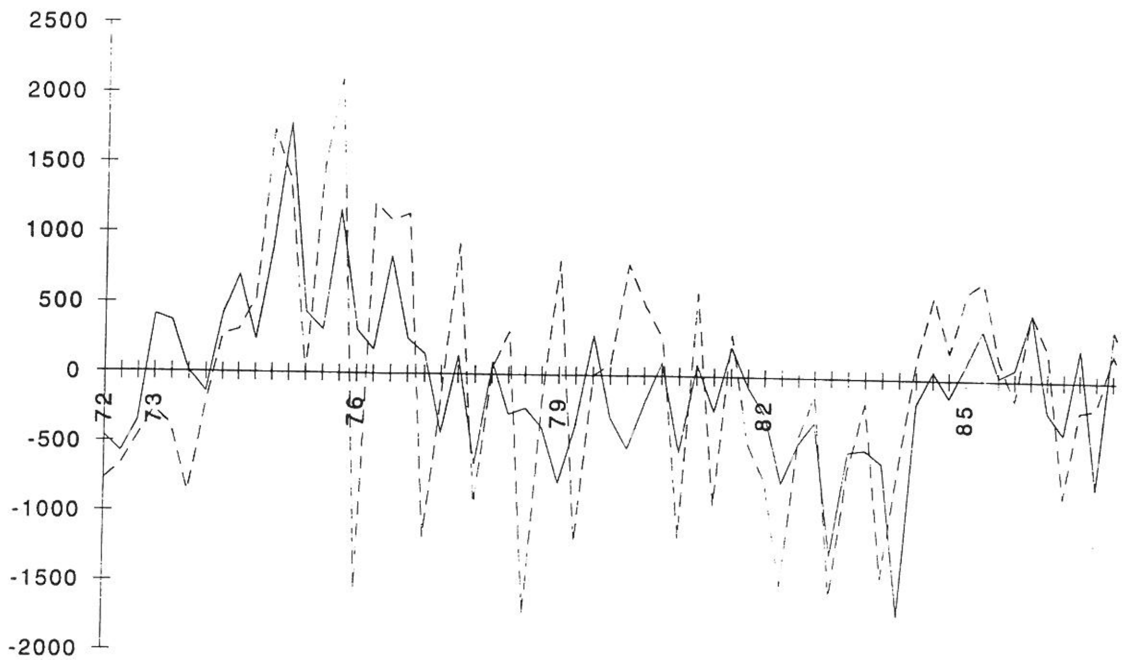


Figure 2. Inventory change according to the production and delivery data (solid line) and according to the inventory statistics (broken line) in the engineering industry 1972:2 - 1991:1. Seasonally adjusted data.



A natural question to ask at this point is whether the measurement errors are systematic, i.e. whether the residuals e_t of the regression equation

$$(Q_t - D_t) = \beta_0 + \beta_1 \Delta(SF + SG)_t + e_t \quad (2)$$

depend on the explanatory variable. We have run equation (2) and then checked the residuals for heteroscedasticity. Table 4 shows the results of four different tests, none of which reveals any significant heteroscedasticity. We must conclude that the inconsistencies between the series, although large, are stochastic.

Table 4. Tests of heteroscedasticity.

	t- statistics	
	Aggregate manufact.	Engineering
Park test	1.26	1.49
Glejser test (A)	1.21	1.15
Glejser test (B)	1.02	1.37
Spearman's rank test	1.28	0.86

Note: Park test: $\ln e_t^2 = \alpha + \beta \ln X_t + v_t$ (Park (1966)). Glejser test (A): $|e_t| = \alpha + \beta X_t + v_t$. Glejser test (B): $|e_t| = \alpha + \beta (1/X_t) + v_t$, where $X_t = \Delta(SF + SG)_t$ (Glejser (1969)). Spearman's rank test: $t = r_s\sqrt{N-2}/\sqrt{1-r_s^2}$, where $r_s = 1 - 6[\Sigma d_t^2/(N(N^2-1))]$ (Godfrey (1988)).

3. DOES IT MATTER?

For the economic analyst, who is a user of these data, the most crucial question is whether the alternative data sets yield significantly different estimates when confronted with theoretical models.

One of the oldest questions in inventory theory is whether inventory stocks have a smoothing or bunching effect on production, as deliveries change over time. Theory is not conclusive on this point. The most commonly accepted theory, the buffer stock theory, assumes that inventories are held by firms as an insurance against stock-outs in the event of increasing sales. If sales increase, however, firms may deliver from stocks and thus allow the inventories to decrease, but at the same time they may try to increase their buffers in response to the larger variations in deliveries that may occur when sales are larger. The theoretical discussion on this matter has centred around questions like the expected duration and the degree of surprise in the delivery variations and on the importance of the shape of the firms' cost functions.

A simple way of checking if inventory stocks are smoothing or bunching is to check whether the variance of output is greater or smaller than that of deliveries (Blinder & Maccini (1990)).

$$Var(Q) < Var(D) ,$$

where Q is output and D is deliveries, is an indication of smoothing behaviour and vice versa. Also, if inventories smooth production, inventory investment should decrease when deliveries increase, i.e.

$$Cov[\Delta(SF+SG), D] < 0 .$$

Table 5 reveals the indications of smoothing or bunching behaviour in our data, where the change in inventories are taken from the inventory statistics.

Table 5. Indicators of smoothing or bunching inventory behaviour.

	Var (Q)	Var (D)	Cov[Δ(SF+SG),D]
Aggregate manufact	20 280	18 937	-12 874
Engineering	6 841	8 474	-1 282

Note: Unsmoothed data.

Surprisingly, the indications in the aggregate manufacturing industry are inconclusive, since the comparison of the variances in output and deliveries indicate bunching, whereas the negative covariance between inventory change and deliveries indicates smoothing behaviour. In the engineering industry, however, both indications show that inventories smooth output in relation to deliveries.

One of the simplest models of inventory behaviour is the flexible accelerator stock adjustment model, used for example by Lovell (1962) and Feldstein & Auerbach (1976), which is based on the buffer stock idea. Assuming that the desired inventory stock depends on expected deliveries, i.e.

$$(SF + SG)_t^* = a_0 + a_1 D_t^e, \quad (3)$$

where the superscripts * and e indicate "desired" and "expected" respectively, and that the firms adjust their inventory stocks partly to the desired level during one time period, i.e.

$$(SF + SG)_t = b\,(SF + SG)_t^* + (1 - b)\,(SF + SG)_{t-1}\,, \qquad (0 < b < 1)\,, \quad (4)$$

where b may be interpreted as the speed of adjustment to a new desired inventory level, we arrive at the following expression for the inventory stock in time period t:

$$(SF + SG)_t = a_0 b + a_1 b\, D_t^e + (1 - b)\,(SF + SG)_{t-1}\,. \quad (5)$$

Assuming naive expectations, i.e. $D_t^e = D_{t-1}$, allows us to estimate (5) in the form

$$(SF + SG)_t = \beta_0 + \beta_1 D_{t-1} + \beta_2 (SF + SG)_{t-1} + v_t\,, \quad (6)$$

where v_t is assumed to be a white noice error term.

The results of the estimation are shown in Table 6. In Alternative 1 we have computed the inventory stock taking the volume of the stock at the beginning of 1972:2 from the inventory statistics as a benchmark, letting the difference between output and deliveries add to the accumulated stock in every successive period. In Alternative 2 all inventory stocks are taken directly from the inventory statistics. The Chow test has been used to test whether the two data sets belong to the same regression.

Table 6. Estimates of a simple flexible accelerator stock adjustment model.

	Aggregate manufact.		Engineering	
	Alternative 1	Alternative 2	Alternative 1	Alternative 2
	$(SF + SG)_t$	$(SF + SG)_t$	$(SF + SG)_t$	$(SF + SG)_t$
Constant	35 679 (6.01)	-7 116 (2.83)	11 798 (3.39)	-3 600 (2.63)
Deliveries_{t-1}	-0.04 (0.82)	0.16 (3.34)	0.05 (1.17)	0.16 (3.24)
$(SF + SG)_{t-1}$	0.3 (2.67)	1.0 (40.74)	0.6 (4.77)	1.0 (35.77)
D-W-statistic	1.81	1.12	1.77	1.78
Adjusted R^2	0.08	0.97	0.23	0.96
Chow test F - statistic	16.65		5.20	
(Critical value of 1% $F_{3,146}$	3.95		3.95)	

Note: Absolute t-values in parentheses.

The explanatory power of this simple theoretical model is dramatically different in the two data sets, particularly at the aggregate level. The prime reason for this is probably that the auto regressive pattern is more prominent in Alternative 2, i.e. in the data that we take from the inventory statistics. The estimated coefficient of 1.0 for the lagged inventory stock suggests that b in equation (4) is zero, which means that there is no adjustment in stocks in response to changes in desired inventories. In the Alternative 1 series we estimate a speed of adjustment of 0.7 and 0.4 per quarter in the aggregate industry and in engineering respectively. Deliveries have a significant positive impact on inventory holding according to the inventory statistics, but not according to the output and delivery data.

The Chow tests indicate that the two alternative data sets do not belong to the same regression in either case, although they are considerably closer to doing so in the engineering industry than in aggregate manufacturing. The choice of data set is obviously crucial to the results even in the estimation of a simple model like this one.

More recent research on inventory investment has brought input and output prices and the cost of capital into focus as possible explanatory variables. Table 7 shows the results of an estimation of such a model. The estimated equation is

$$\begin{aligned}\Delta \ln (SF + SG)_t = \beta_0 + \beta_1 \ln (SF + SG)_{t-1} + \beta_2 \ln SM_{t-1} + \beta_3 \ln P_{t-1} + \beta_4 \ln W_{t-1} + \\ \beta_5 \ln R_{t-1} + \beta_6 \ln X_{t-1} + \beta_7 \text{TIME} + \beta_8 Q1 + \beta_9 Q2 + \beta_{10} Q3 + \\ \beta_{11} \text{SUBS} + v_t, \qquad (7)\end{aligned}$$

where SM is the stock of material inventories, P is the real output price, W is the real blue collar wage cost per hour, R is the real cost of capital, X is a shift variable for real market demand, TIME is a linear trend, Q1, Q2, and Q3 are seasonal dummies, and SUBS is a dummy variable for the subsidies to inventory investment in 1972 and in 1975:3 - 1976:4. The lagged variables indicate an assumption of naive expectations. Alternative 1 and Alternative 2 inventory stocks are the same as in Table 6 above. The theoretically expected signs of some of the β:s are

$$\beta 1, \beta 4, \beta 5 > 0 \text{ and } \beta 2, \beta 3, \beta 6 < 0.$$

The equation is part of a simplified version of a model from Gustafson (1991). (A brief presentation of the model is provided in Gustafson & Ohlsson (1993).) The full model contains an equation which describes investment in material inventories and a more elaborate treatment of expectations.

In this model the explanatory power is somewhat stronger in the Alternative 1 data sets than in the Alternative 2 data sets, contrary to the case of the simple stock adjustment model. The estimated coefficients of the model are in some cases considerably different in the two data sets. The most prominent difference is in the lagged stock of inventories of finished goods and goods in process, where all the estimates are statistically significant, but where Alternative 2 data only yield the expected negative sign. The Alternative 1 results are probably impossible to rationalise theoretically, since they imply that inventory investment is larger the larger the inventory stocks are.

The lagged stock of input materials and the input prices are significant or close to significant with the expected signs in the Alternative 2 data but not in the data based on output and deliveries. The seasonal patterns indicated also differ somewhat between the data sets. The statistical significance of the cost of capital and the trend variable differ considerably between the data sets on both levels of aggregation.

Table 7. Estimates of a more complete flexible accelerator stock adjustment model.

	SNI 3		SNI 38	
	Alternative 1 $\Delta(SF + SG)_t$	Alternative 2 $\Delta(SF + SG)_t$	Alternative 1 $\Delta(SF + SG)_t$	Alternative 2 $\Delta(SF + SG)_t$
Constant	-6.7 (3.18)	-3.0 (1.82)	-4.9 (1.67)	0.5 (0.35)
ln $(SF + SG)_{t-1}$	0.5 (4.79)	-0.2 (3.24)	0.7 (3.53)	-0.1 (3.31)
ln SM_{t-1}	0.1 (0.85)	0.4 (3.55)	-0.1 (1.07)	0.1 (1.50)
ln P_{t-1}	-0.1 (1.17)	0.2 (2.04)	-0.02 (0.22)	0.3 (3.47)
ln W_{t-1}	-0.1 (1.61)	0.2 (1.67)	0.2 (1.41)	0.3 (2.78)
ln R_{t-1}	0.02 (2.41)	0.01 (1.95)	0.1 (4.16)	0.02 (1.89)
ln X_{t-1}	0.2 (0.77)	0.2 (1.13)	-0.2 (0.73)	0.01 (0.05)
TIME	-0.002 (1.04)	-0.003 (2.54)	-0.001 (0.35)	-0.003 (1.79)
Q1	0.04 (4.32)	0.04 (4.37)	0.1 (9.01)	0.1 (6.97)
Q2	0.03 (2.12)	0.02 (2.81)	0.1 (5.37)	0.04 (4.10)
Q3	-0.1 (6.04)	0.01 (1.56)	-0.01 (0.53)	0.05 (5.26)
SUBS	-0.005 (0.39)	-0.01 0.76)	0.01 (0.60)	0.0001 (0.00)
D-W-statistic	2.21	1.33	2.23	2.33
Adjusted R^2	0.79	0.49	0.77	0.56
Chow test F - statistic	10.50		8.32	
(Critical 1% value of $F_{12,128}$	2.35		2.35)	

Note: Absolute t - values in parentheses.

The Chow tests reject the hypotheses that the data sets belong to the same regressions in this case as well. The choice of data set is obviously important to the analytical results obtained in this kind of model as well. This theoretical model is clearly in favour of the Alternative 2 data set collected from the inventory statistics.

4. CONCLUSIONS

It is clear that the data on inventory investment obtained from the inventory statistics and those that can be derived from output and delivery data are not the same.

The seasonal patterns are different in the two data series, but considerable differences still remain after seasonal smoothing. There is no sign of a systematic measurement error, however.

The choice of data in estimation of theoretical models is vital to the results. Judging from our estimations, stock adjustment inventory models favour the inventory statistics data, suggesting that output and delivery data are those that should most urgently be checked for errors.

Our results indicate that the data errors are worse on a more aggregate level. Contrary to the common belief, data errors do not seem to cancel out in the process of aggregation. This suggests that the causes of the problem are not only to be sought in the raw data, but also in the processing of it.

Sammanfattning

Kvalitén i definitiva ekonomiska data är i allmänhet svår att bedöma, eftersom inget bättre finns att jämföra med. Icke desto mindre är pålitligheten hos definitiva data av stort intresse, såväl för analytiskt forskningsarbete som för prognosverksamhet, där prognosernas värde oftast bedöms efter hur väl de visar sig stämma med just definitiva data.

I denna uppsats utnyttjas den unika möjligheten att jämföra definitiva dataserier för lagerförändringar i industrin, som yppar sig genom att data i Sverige publiceras för såväl produktion (output) som leveranser av varor som för lager. Enligt gängse definitioner, vilka för övrigt ligger till grund för databearbetningen vid Statistiska Centralbyrån, är skillnaden mellan output och leveranser lika med förändringen i summan av färdigvarulager och lager av varor i arbete. I uppsatsen jämförs de data över lagerförändringarna som kan härledas från produktions- och leveransdata med dem som kan tas direkt ur tabeller. Datamaterialet avser kvartalsdata för perioden 1972:2 - 1991:1, dels i den aggregerade tillverkningsindustrin, dels i verkstadsindustrin.

Korrelationen mellan dataserierna är förvånansvärt låg, i allmänhet under 0,60, och lägre på aggregerad nivå än på disaggregerad. Särskilt påfallande är skillnaderna i säsongsmönstren mellan serierna.

Variansanalys ger vid handen att det finns en gemensam säsongsvariation i dataserierna och ett gemensamt konjunktur- och trendmönster. Ca 1/3 av variationen i serierna är dock ej gemensam. Test av homoscedasticitet tyder på att de betydande mätfel, som uppenbarligen finns i materialet, inte har någon enkel systematik.

För att få en indikation på vilken betydelse mätfelen kan ha i samband med ekonomisk analys, har två ekvationer från lagerteorin estimerats; dels en enkel stock-adjustmentekvation, dels en ekvation som bygger på mer avancerad teori, där ett antal kostnads- och efterfrågevariabler ingår. Resultaten av estimationerna skiljer sig i båda fallen dramatiskt åt mellan dataserierna. Chow-test visar att de båda uppsättningarna av data inte tillhör samma regression.

Uppenbarligen är valet av data avgörande för de empiriska resultaten av lagerforskning på svenska data. De färdiga lagerdata, som tas direkt ur tabellerna, ger dock resultat som rimmar betydligt bättre med lagerteorins utsagor än de data man kan härleda ur produktions- och leveransstatistiken, vilket tyder på att det är i de senare man främst bör söka efter källorna till mätfelen.

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APPENDIX A

Indexes of output and deliveries in fixed prices (Index 1980 = 100), and inventory stocks of finished goods and goods in process at the end of each quarter in fixed prices (1980 price level), millions of SEK, in the aggregate manufacturing industry (SNI 3).
(Source: Statistics Sweden, TSDB.)

	Output	Deliveries	Inventories
1972:1	94.6	84.4	48 514
1972:2	100.3	92.0	47 854
1972:3	78.8	81.7	46 885
1972:4	102.5	103.1	45 890
1973:1	100.3	91.2	46 720
1973:2	108.0	96.5	45 529
1973:3	84.9	83.9	44 328
1973:4	109.6	107.0	42 531
1974:1	106.5	94.1	43 946
1974:2	115.4	100.0	44 708
1974:3	88.1	87.8	45 984
1974:4	111.3	106.2	47 857
1975:1	109.6	91.7	51 678
1975:2	110.6	98.9	53 741
1975:3	85.7	83.2	57 727
1975:4	109.6	105.8	58 875
1976:1	101.2	93.6	60 751
1976:2	110.3	100.0	63 040
1976:3	85.2	85.0	64 038
1976:4	109.2	108.2	65 767
1977:1	99.6	91.3	66 077
1977:2	104.4	97.8	65 588
1977:3	79.4	81.8	65 875
1977:4	100.8	105.7	62 223
1978:1	95.3	89.5	63 019
1978:2	100.9	99.2	61 750
1978:3	78.6	85.1	58 645
1978:4	105.1	110.4	56 765
1979:1	97.5	97.5	58 859
1979:2	108.8	107.0	55 939
1979:3	86.6	90.3	55 743
1979:4	111.6	114.8	54 616
1980:1	105.0	103.7	57 669
1980:2	103.7	97.2	57 778
1980:3	84.9	88.8	57 918
1980:4	109.1	110.3	56 769
1981:1	101.0	93.5	58 723
1981:2	106.5	100.1	57 440
1981:3	81.5	85.2	56 868
1981:4	107.5	107.4	54 559
1982:1	97.6	91.0	54 912
1982:2	106.3	101.1	52 865
1982:3	79.9	84.8	51 741
1982:4	107.0	107.6	49 739
1983:1	98.5	98.3	49 086
1983:2	109.6	105.9	47 496
1983:3	83.5	90.4	46 661
1983:4	113.9	117.1	44 918

1984:1	105.7	107.9	45 641
1984:2	117.0	111.8	45 212
1984:3	89.0	93.6	45 306
1984:4	122.2	122.6	44 201
1985:1	111.0	107.2	46 531
1985:2	121.8	115.2	46 684
1985:3	93.7	99.0	46 653
1985:4	120.5	121.1	45 462
1986:1	113.6	106.8	46 262
1986:2	119.0	118.6	45 559
1986:3	92.8	100.4	43 833
1986:4	123.7	125.1	41 830
1987:1	112.0	111.9	42 121
1987:2	123.2	117.8	42 221
1987:3	96.5	102.7	41 765
1987:4	128.7	133.2	39 728
1988:1	114.8	115.7	39 881
1988:2	127.7	127.8	40 839
1988:3	95.1	108.5	39 177
1988:4	129.3	135.6	37 775
1989:1	123.4	123.7	39 676
1989:2	130.1	131.0	39 532
1989:3	99.2	107.4	39 447
1989:4	132.1	136.0	38 574
1990:1	125.4	121.1	40 700
1990:2	133.8	125.5	40 067
1990:3	102.5	103.1	39 627
1990:4	130.8	126.5	39 668
1991:1	118.3	111.0	41 332

APPENDIX B

Indexes of output and deliveries in fixed prices (Index 1980 = 100), and inventory stocks of finished goods and goods in process at the end of each quarter in fixed prices (1980 price level), millions of SEK, in the engineering industry (SNI 38).
(Source: Statistics Sweden, TSDB.)

	Output	Deliveries	Inventories
1972:1	91.5	77.5	27 260
1972:2	94.7	85.3	26 725
1972:3	72.8	71.3	26 675
1972:4	99.2	99.1	25 351
1973:1	95.3	79.9	26 029
1973:2	102.4	87.6	25 848
1973:3	78.8	73.7	25 572
1973:4	106.4	105.5	24 453
1974:1	101.3	86.5	25 634
1974:2	112.8	96.3	26 105
1974:3	83.4	77.3	27 186
1974:4	114.9	107.0	27 992
1975:1	112.5	88.3	30 252
1975:2	116.1	102.3	30 367
1975:3	89.1	83.2	32 349
1975:4	118.9	109.7	33 495
1976:1	104.2	91.7	32 778
1976:2	112.3	101.1	34 094
1976:3	86.7	77.5	35 668
1976:4	115.9	114.2	35 810
1977:1	100.5	89.9	35 442
1977:2	106.8	100.7	35 347
1977:3	80.4	77.1	36 725
1977:4	105.1	110.7	34 763
1978:1	93.0	83.4	35 581
1978:2	99.7	93.2	35 919
1978:3	76.5	78.9	34 609
1978:4	106.9	111.2	33 354
1979:1	95.2	92.8	34 903
1979:2	109.0	103.8	33 692
1979:3	85.9	82.9	34 069
1979:4	114.2	118.7	33 046
1980:1	104.2	100.7	34 538
1980:2	102.5	96.8	35 001
1980:3	83.4	82.5	35 620
1980:4	113.0	120.0	33 319
1981:1	101.7	94.3	34 579
1981:2	110.3	105.7	33 578
1981:3	81.8	80.7	34 188
1981:4	116.4	120.6	32 535
1982:1	99.2	95.1	32 427
1982:2	110.5	110.4	30 821
1982:3	79.7	84.4	30 659
1982:4	113.5	120.2	29 328
1983:1	99.1	103.2	28 352
1983:2	113.4	112.3	27 555
1983:3	82.7	88.4	27 618
1983:4	121.1	130.7	24 943

1984:1	109.0	117.1	24 898
1984:2	122.5	119.5	24 861
1984:3	89.4	91.6	25 662
1984:4	133.3	140.1	24 579
1985:1	119.2	114.5	25 724
1985:2	133.5	127.3	26 214
1985:3	99.3	102.5	26 532
1985:4	133.5	139.4	25 079
1986:1	123.9	117.2	26 054
1986:2	132.4	131.2	26 020
1986:3	96.5	103.4	25 319
1986:4	135.2	140.7	23 758
1987:1	120.0	123.3	24 025
1987:2	130.7	125.8	23 942
1987:3	100.2	104.2	23 990
1987:4	142.9	153.2	22 074
1988:1	118.7	117.3	21 730
1988:2	140.8	139.3	22 942
1988:3	98.8	111.4	21 987
1988:4	146.0	155.9	21 005
1989:1	134.1	138.2	22 142
1989:2	145.4	147.3	22 374
1989:3	106.3	115.0	22 496
1989:4	149.8	162.0	20 965
1990:1	139.9	135.8	21 853
1990:2	153.1	141.3	21 377
1990:3	110.8	106.8	21 723
1990:4	147.5	144.8	20 523
1991:1	131.6	119.3	21 434

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