Working Paper

No. 130. September 2013

Survey Data and Short-Term Forecasts of Swedish GDP Growth

By Pär Österholm

National Institute of Economic Research

Survey Data and Short-Term Forecasts of Swedish GDP Growth

Pär Österholm

September, 2013

WORKING PAPER NO. 130, SEPTEMBER 2013
PUBLISHED BY THE NATIONAL INSTITUTE OF ECONOMIC RESEARCH (NIER)

NIER prepares analyses and forecasts of the Swedish and international economy and conducts related research. **NIER** is a government agency accountable to the Ministry of Finance and is financed largely by Swedish government funds. Like other government agencies, **NIER** has an independent status and is responsible for the assessments that it publishes.

The **Working Paper** series consists of publications of research reports and other detailed analyses. The reports may concern macroeconomic issues related to the forecasts of the institute, research in environmental economics, or problems of economic and statistical methods. Some of these reports are published in their final form in this series, whereas others are previews of articles that are subsequently published in international scholarly journals under the heading of **Reprints**. Reports in both of these series can be ordered free of charge. Most publications can also be downloaded directly from the **NIER** website: www.konj.se.

KONJUNKTURINSTITUTET, KUNGSGATAN 12-14, BOX 3116, SE-103 62 STOCKHOLM

TEL: +46 8 453 59 00 FAX: +46 8 453 59 80

E-MAIL: KI@KONJ.SE WEBSITE: WWW.KONJ.SE

ISSN 1100 -7818

Abstract

In this paper, we evaluate forecasting models for Swedish GDP growth which make use of data from Sweden's most important business survey, the *Economic Tendency Survey*. Employing nine years of quarterly real-time data, we conduct an out-of-sample forecast exercise. Results indicate that the survey data have informational value that can be used to improve forecasts, thereby confirming the empirical relevance of survey data for GDP forecasters.

JEL Classification: E22, E27

Keywords: Out-of-sample forecasts, Real-time data

Summary in Swedish

I denna studie utvärderas prognosmodeller för svensk BNP-tillväxt som utnyttjar data från Konjunkturbarometern. Resultaten från en prognosövning baserad på nio års realtidsdata ger vid handen att data från Konjunkturbarometern kan användas för att förbättra prognoser. Dessa resultat bekräftar att det är empiriskt relevant för prognosmakare att beakta enkätdata när BNP-tillväxten skall prognostiseras.

KONJUNKTURINSTITUTET, KUNGSGATAN 12-14, BOX 3116, SE-103 62 STOCKHOLM
TEL: +46 8 453 59 00 FAX: +46 8 453 59 80
E-MAIL: KI@KONJ.SE WEBSITE: WWW.KONJ.SE
ISSN 1100 -7818

Contents

1. Introduction

Knowing at which rate the economy is expanding or contracting is of fundamental importance to many agents in the economy. There is accordingly widespread interest among economists and forecasters to predict GDP growth. One problem when forecasting GDP growth though is that the time series in most countries is weakly serially correlated; this means that traditional univariate ARIMA models tend to not be very useful tools for this purpose. It should hence be beneficial to turn to alternative forecasting models. When it comes to short-run forecasts, one reasonable alternative is to rely on models that employ survey data, where these data are supposed to serve as coinciding or leading indicators; see, for example, Mitchell (2009) and Banbura and Rünstler (2011).[1]

The purpose of this paper is to assess if short-term forecasts of Swedish GDP growth can be improved by using survey data provided in the National Institute of Economic Research's *Economic Tendency Survey* and, if so, which variables are most useful. This is done by conducting a simulated out-of-sample forecast exercise where simple univariate regression models are evaluated using nine years of quarterly real-time data.[2] Our results indicate that there are improvements to be made from using the survey data, even if the usefulness of different variables seems to vary substantially.

2. Empirical study

2.1 The survey data

The National Institute of Economic Research's *Economic Tendency Survey* is the largest survey of its kind in Sweden. More than 6000 companies are included in the survey and each month representatives from upper management of the companies are asked questions concerning the present situation and the outlook for the near future regarding, for example, output, new orders, employment and prices.[3] However, the extent of the survey differs somewhat over time; a larger number of questions is asked in January, April, July and October. In this paper, we rely on the data from these more extensive surveys and hence work purely on a quarterly frequency.[4]

The data from the *Economic Tendency Survey* are aggregated in different ways for presentational purposes. There are four main categories: manufacturing industry, construction industry, retail trade

---

[1] Additional studies on the relationship between survey data and the real economy include Carroll *et al*. (1994), Ludvigson (2004), Dreger and Schumacher (2005), Mitchell *et al*. (2005), Kwan and Cotsomitis (2006) and Siliverstovs (2013). Alternatively, one could consider using financial data to forecast the real economy; see, for example, Mody and Taylor (2003).

[2] For discussions concerning the importance of using real-time data, see, for example, Croushore and Stark (2001).

[3] The questionnaires employed in the survey can be found at http://www.konj.se/1666.html. These show exactly how the question underlying each variable employed in the empirical analysis in this paper is phrased.

[4] As an alternative, one could consider working with mixed frequencies; see, for example, Armesto *et al*. (2010) for a discussion.

and private service sector. These four main categories are in turn divided into sub-categories.[5] In this paper, we use a subset of the data which is judged to be the most relevant while at the same time meeting a requirement of the time series being long enough. To be specific, we employ data for the manufacturing industry, the investment goods industry, the construction industry and the total business sector.

To simplify the analysis of the data, the concept "net figures" is employed, where a net figure is the difference between the percentage of respondents reporting an increase and a decrease for a certain question. For example, if 45 percent of respondents state that there has been an increase in output volume over the past three months, 25 percent that there has been no change and 30 percent that there has been a decrease, the net figure is 45-30=15.[6] In total, 77 variables from the *Economic Tendency Survey* are employed in this paper; see Table 1 in the appendix for a complete list.

2.2 Out-of-sample forecast exercise

The out-of-sample forecast exercise is conducted using quarterly real-time data of seasonally adjusted GDP. The time series with net figures from the *Economic Tendency Survey* are not adjusted in any way and the most recent vintage is hence equivalent to real-time data.

We evaluate a short-term forecast of GDP growth. To be specific, we are interested in forecasting quarter $t+i$ GDP growth when standing part way through quarter $t+i$. This can be seen as conducting a nowcast. Alternatively, it could – since the national accounts are released with a delay of approximately two months – also be seen as having a forecast horizon of roughly one quarter.[7]

The benchmark model in our out-of-sample forecast exercise is an AR(1) model,

$$g_t = \delta + \rho g_{t-1} + v_t, \qquad (1)$$

where g_t is quarterly GDP growth and v_t is an error term.[8] However, Swedish GDP growth is very weakly serially correlated and a model with only a constant term therefore also appears to be a reasonable choice.[9] We accordingly also estimate

[5] For a general description of the survey, see http://www.konj.se/1670.html.

[6] This way of summarising the data is common practice in the literature; see, for example, Carabenciov *et al*. (2008).

[7] For a discussion of the importance of good nowcast/short-term forecasts, see, for example, Banbura *et al*. (2011).

[8] The AR(1) model is a commonly used benchmark in the macroeconomic forecasting literature due to its simplicity, flexibility and a forecasting performance which typically tends to be decent; see, for example, Mitchell (2009) and Pesaran *et al*. (2009).

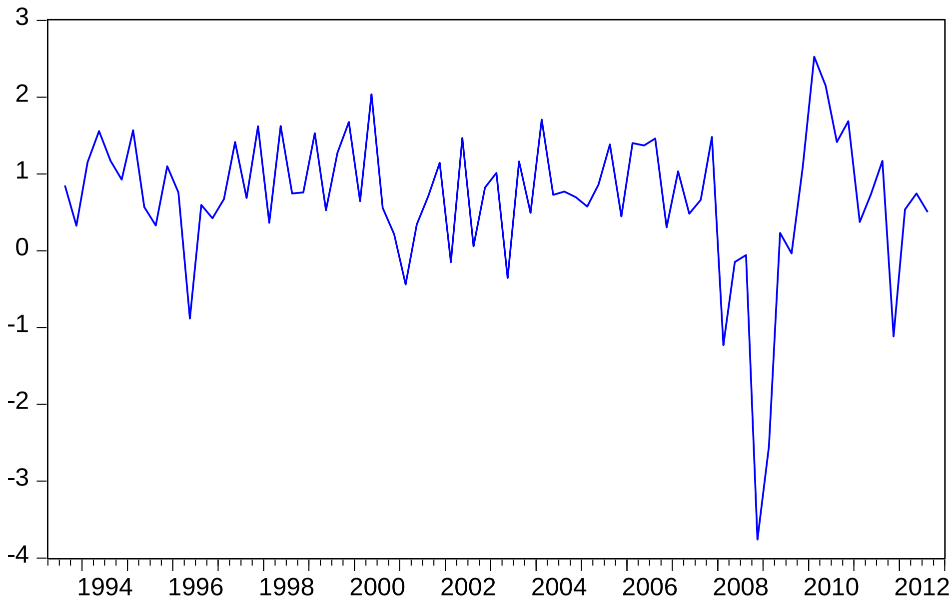
$$g_t = \kappa + \chi_t, \tag{2}$$

where χ_t is an error term. Finally, we estimate 77 models with survey data. These are given by

$$g_t = \alpha_j + \beta_j S_{j,t} + \varepsilon_{j,t}, \tag{3}$$

where $\varepsilon_{j,t}$ is the error term for model j and $S_{j,t}$ is a variable based on the survey data, $j = 1,\ldots,77$.

Figure 1. GDP growth.



Note: Percentage change from previous quarter in seasonally adjusted GDP. Vintage of data published in November 2012.

The first out-of-sample forecast is made using data on GDP growth from 1993Q2 until 2003Q4.[10,11] The forecast generated from this estimation is accordingly for 2004Q1. We then extend the sample one period, re-estimate the models and generate new forecasts, this time for 2004Q2. The last forecast uses data on GDP growth until 2012Q2 and the forecast is made for 2012Q3. This yields a total of 35 out-of-sample forecasts to evaluate for each of the 79 models.

[9] The weak serial correlation is visually confirmed in Figure 1. In real time, standing at the point in time of the first forecast, GDP growth would actually have been judged a white noise process according to the autocorrelation and partial autocorrelation functions. (These are not reported but are available upon request.)

[10] This means that the earliest point in time at which it could have been made was late February/early March 2004.

[11] Some models are estimated on a shorter sample, starting in 1996Q2, since some of the survey data series are not available from 1993.

Forecast errors are recorded and used to calculate the root mean square forecast errors (RMSFEs). The RMSFE is defined as

$$RMSFE = \sqrt{\frac{1}{N}\sum_{i=0}^{N-1}\left(g_{t+i} - g_{t+i|t+i}\right)^2} \ , \qquad (4)$$

where N is the number of forecasts (that is, 35), g_{t+i} is the outcome at time $t+i$ and $g_{t+i|t+i}$ is the forecast of GDP growth for quarter $t+i$ made earlier the same quarter.[12]

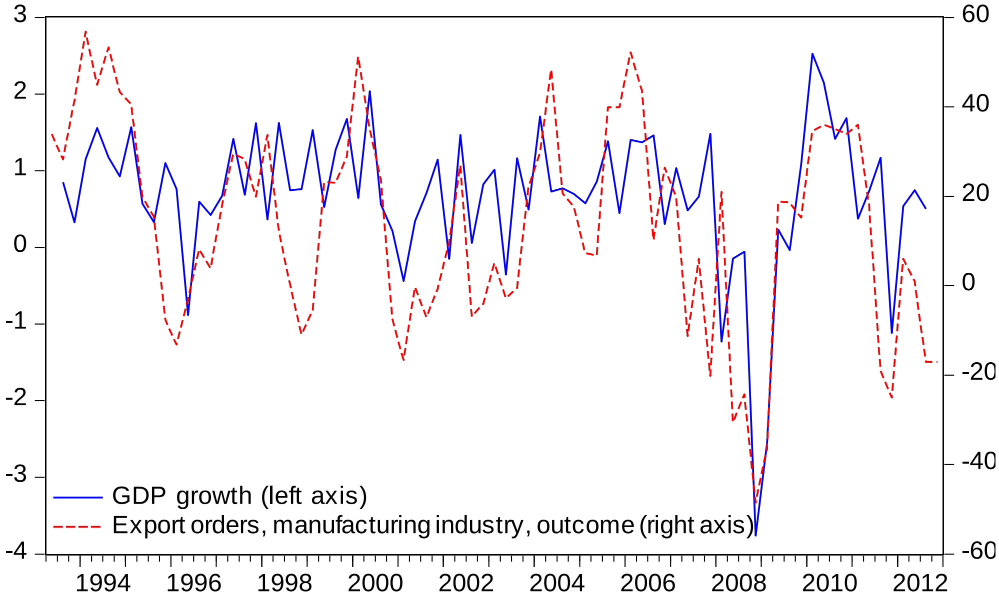
2.3 Results

The results from the out-of-sample forecast exercise are given in Table 1 in the appendix. As can be seen, the benchmark AR(1) model has an RMSFE of 0.900. The forecasting performance of the model with only a constant is almost identical, 0.905.

Among the models employing survey data, the forecasting performance varies substantially. The lowest RMSFE is found for the model which makes use of the survey data describing the outcome for the export orders in the manufacturing industry (question 108 in the *Economic Tendency Survey*); the time series is plotted together with GDP growth in Figure 2. The RMSFE of this model is 0.739 which is 18 percent lower than that of the AR(1) model; this constitutes a fairly large improvement in forecasting performance. It can be noted that the model relying on the data based on this question for the investment goods industry also generates good out-of-sample forecasts. In a similar manner, the outcome for the domestic orders (question 107) and expectations concerning new orders in the domestic (question 205) and foreign (question 206) markets generally appear useful from a forecasting perspective. Data based on quite a few questions do not appear useful though. One of the least informative questions for GDP growth appears to be the outcome concerning finished inventories (question 121). Both models relying on these data have RMSFEs that are larger than that of the AR(1) model (0.968 for the manufacturing industry and 0.959 for the investment goods industry).

[12] No tests for whether differences in forecasting performance are statistically significant are conducted. Significance testing – using, for example, tests in the style of Diebold and Mariano (1995) – is, in our opinion, not particularly interesting in the present application. In line with, for example, Beechey and Österholm (2010) we argue that the model which minimises the loss function of the forecaster (which here is assumed to be quadratic) should be the preferred one. For further criticism of significance testing, see Armstrong (2007).

Figure 2. GDP growth and export orders in the manufacturing industry.



Note: GDP growth is measured as the percentage change from the previous quarter in seasonally adjusted GDP. Vintage of data published in November 2012. The outcome for the export orders in the manufacturing industry is measured as the net figure.

As is well-known from the forecasting literature, an arithmetic mean of available forecasts often performs well; see, for example, Clemen (1989). In order to assess whether such a strategy would pay off also in this case, we evaluate the forecast which at each point in time is generated as the arithmetic mean of the forecasts from every model excluding the AR(1) model. As it turns out, this forecast has an RMSFE which is only marginally lower than that of the AR(1) model. This finding is perhaps not too surprising given that we just established that several questions were associated with poor forecasting performance. It hence does not seem like a very appealing strategy for a forecaster to rely on this mean forecast when forecasting Swedish GDP growth in practice.

Based on the findings so far in this paper though, one could argue that it is would be a reasonable approach in practice to choose a subset of the models – say the ten best – and use the mean of those as one's point forecast.[13] Evaluating this strategy, we find that such a forecast would have had an RMSFE of 0.752 – substantially lower than the AR(1) model's and second only to the best model described above. The difference relative to the best model is negligible in practice though. It should be pointed out that this forecast could not have been generated in real time since we then did not know which variables would be most successful in predicting GDP growth in this sample. However, from a practical viewpoint, it seems reasonable to expect this forecast to do well in the future.

[13] Specifically, the best ten models are those relying on data from questions 107, 108, 205 and 206 for the manufacturing industry, questions 107, 108, 201, 205 and 206 for the investments goods industry and question 205 for the construction industry; see Table 1 in the appendix for details.

3. Conclusions

In this paper, we have investigated whether short-term forecasts of GDP growth in Sweden can be improved by relying on survey data. Our results indicate that the survey data have informational value that can be used to improve the forecasts.[14] When forecasting Swedish GDP growth in practice, a forecast based on the simple arithmetic mean of the forecasts from the best performing models should be a reasonable approach.

[14] Other studies that have found that the *Economic Tendency Survey* has had predictive power for real economic variables in Sweden include Hansson *et al*. (2005) and Österholm (2010). Neither of these studies used real-time data though.

References

Armesto, M. T., Engemann, K. M. and Owyang, M. T. (2010), "Forecasting with Mixed Frequencies", *Federal Reserve Bank of St Louis Review* 92, 521-536.

Armstrong, J. S. (2007), "Significance Tests Harm Progress in Forecasting", *International Journal of Forecasting* 23, 321-327.

Banbura, M. and Rünstler, G. (2011), "A Look into the Factor Model Black Box: Publication Lags and the Role of Hard and Soft Data in Forecasting GDP", *International Journal of Forecasting* 27, 333-346.

Banbura, M., Giannone, D. and Reichlin, L. (2011), "Nowcasting", in Clements, M. P. and Hendry, D. F. (eds), *The Oxford Handbook of Economic Forecasting*. Oxford University Press, New York.

Beechey, M. and Österholm, P. (2010), "Forecasting Inflation in an Inflation Targeting Regime: A Role for Informative Steady-State Priors", *International Journal of Forecasting* 26, 248-264.

Carabenciov, I., Ermolaev, I., Freedman, C., Juillard, M., Kamenik, O., Korshunov, D., Laxton, D. and Laxton, J. (2008), "A Small Quaterly Multi-Country Projection Model with Financial-Real Linkages and Oil Prices", IMF Working Paper 08/280, International Monetary Fund.

Carroll, C. D., Fuhrer, J. C. and Wilcox, D. W. (1994), "Does Consumer Sentiment Forecast Household Spending? If So, Why?", *American Economic Review* 84, 1397-1408.

Clemen, R. T. (1989), "Combining Forecasts: A Review and Annotated Bibliography", *International Journal of Forecasting* 5, 559-583.

Diebold, F. X. and Marino, R. S. (1995), "Comparing Predictive Accuracy", *Journal of Business and Economic Statistics* 13, 253-263.

Dreger, C. and Schumacher, C. (2005), "Out-of-sample Performance of Leading Indicators for the German Business Cycle: Single vs. Combined Forecasts", *Journal of Business Cycle Measurement and Analysis* 2005/1, 71-87.

Croushore, D. and Stark, T. (2001), "A Real-Time Data Set for Macroeconomists", *Journal of Econometrics* 105, 111-130.

Hansson, J., Jansson, P. and Löf, M. (2005), "Business Survey Data: Do They Help in Forecasting GDP Growth?" *International Journal of Forecasting* 21, 377–389.

Kwan, A. C. C. and Cotsomitis, J. A. (2006), "The Usefulness of Consumer Confidence in Forecasting Household Spending in Canada: A National and Regional Analysis", *Economic Inquiry* 44, 185-197.

Ludvigson, S. (2004), "Consumer Confidence and Consumer Spending", *Journal of Economic Perspectives* 18, 29-50.

Mitchell, J. (2009), "Where Are We Now? The UK Recession and Nowcasting GDP Growth Using Statistical Models", *National Institute Economic Review* 209, 60-69.

Mitchell, J., Smith, R. J. and Weale, M. (2005), "Forecasting Manufacturing Output Growth Using Firm-Level Survey Data", *Manchester School* 73, 479-499.

Mody, A. and Taylor, M. P. (2003), "The High-Yield Spread as a Predictor of Real Economic Activity: Evidence of a Financial Accelerator for the United States", *IMF Staff Papers* 50, 373-402.

Österholm, P. (2010), "Improving Unemployment Rate Forecasts Using Survey Data", *Finnish Economic Papers* 23, 16-26.

Pesaran, M. H., Schuermann, T. and Smith, L. V. (2009), "Forecasting Economic and Financial Variables with Global VARs", *International Journal of Forecasting* 25, 642-675.

Siliverstovs, B. (2013), "Do Business Tendency Surveys Help in Forecasting Employment? A Real-Time Evidence for Switzerland", *Journal of Business Cycle Measurement and Analysis* 2013/1, 1-20.

Appendix

Table 1. Root mean square forecast errors.

		Equation (3): Manufacturing	Equation (3): Investment	Equation (3): Construction	Equation (3): Total
Equation 1: AR(1)	0.900	-	-	-	-
Equation 2: Constant	0.905	-	-	-	-
101	-	0.826	0.855	0.889	-
102	-	0.948	0.906	0.899	-
103	-	0.910	0.889	0.899	-
104	-	0.927	0.946	0.904	-
105	-	0.931	0.915	1.033	-
106	-	0.891	0.909	0.911	-
107	-	0.752	0.771	-	-
1073	-	-	-	0.913	
108	-	0.739	0.755	-	-
109	-	0.887	0.905	-	-
110	-	0.890	0.902	-	-
112	-	0.908	0.939	-	-
113	-	0.945	0.911	-	-
114	-	0.926	0.898	-	-
115	-	0.930	0.935	-	-
116	-	0.882	0.907	-	-
117	-	0.905	0.912	-	-
118	-	0.914	0.914	-	-
119	-	0.916	0.883	-	-
120	-	0.890	0.879	-	-
121	-	0.968	0.959	-	-
122	-	0.856	0.878	-	-
125	-	0.895	0.916	-	-
201	-	0.820	0.816	0.845	-
202	-	0.875	0.862	0.836	-
203	-	0.927	0.910	0.833	-
204	-	0.883	0.909	0.885	-
205	-	0.804	0.777	0.787	-
206	-	0.814	0.756	-	-
207	-	0.818	0.856	-	-
Sales prices, present	-	-	-	-	0.927
Sales prices, expectation	-	-	-	-	0.913
Number of employees, present	-	-	-	-	0.891
Number of employees, expectation	-	-	-	-	0.832
Demand situation	-	-	-	-	0.903
Shortage of labour	-	-	-	-	0.914
Main factor currently limiting production: insufficient demand	-	-	-	-	0.922
Mean (all)	0.864	-	-	-	-
Mean (best ten)	0.752	-	-	-	-

Note: The numbers in the far left column refer to the number a specific quesiton has in the *Economic Tencency Survey*.

Titles in the Working Paper Series

No	Author	Title	Year
1	Warne, Anders and Anders Vredin	Current Account and Business Cycles: Stylized Facts for Sweden	1989
2	Östblom, Göran	Change in Technical Structure of the Swedish Economy	1989
3	Söderling, Paul	Mamtax. A Dynamic CGE Model for Tax Reform Simulations	1989
4	Kanis, Alfred and Aleksander Markowski	The Supply Side of the Econometric Model of the NIER	1990
5	Berg, Lennart	The Financial Sector in the SNEPQ Model	1991
6	Ågren, Anders and Bo Jonsson	Consumer Attitudes, Buying Intentions and Consumption Expenditures. An Analysis of the Swedish Household Survey Data	1991
7	Berg, Lennart and Reinhold Bergström	A Quarterly Consumption Function for Sweden 1979-1989	1991
8	Öller, Lars-Erik	Good Business Cycle Forecasts - A Must for Stabilization Policies	1992
9	Jonsson, Bo and Anders Ågren	Forecasting Car Expenditures Using Household Survey Data	1992
10	Löfgren, Karl-Gustaf, Bo Ranneby and Sara Sjöstedt	Forecasting the Business Cycle Not Using Minimum Autocorrelation Factors	1992
11	Gerlach, Stefan	Current Quarter Forecasts of Swedish GNP Using Monthly Variables	1992
12	Bergström, Reinhold	The Relationship Between Manufacturing Production and Different Business Survey Series in Sweden	1992
13	Edlund, Per-Olov and Sune Karlsson	Forecasting the Swedish Unemployment Rate: VAR vs. Transfer Function Modelling	1992
14	Rahiala, Markku and Timo Teräsvirta	Business Survey Data in Forecasting the Output of Swedish and Finnish Metal and Engineering Industries: A Kalman Filter Approach	1992
15	Christofferson, Anders, Roland Roberts and Ulla Eriksson	The Relationship Between Manufacturing and Various BTS Series in Sweden Illuminated by Frequency and Complex Demodulate Methods	1992
16	Jonsson, Bo	Sample Based Proportions as Values on an Independent Variable in a Regression Model	1992
17	Öller, Lars-Erik	Eliciting Turning Point Warnings from Business Surveys	1992
18	Forster, Margaret M	Volatility, Trading Mechanisms and International Cross-Listing	1992
19	Jonsson, Bo	Prediction with a Linear Regression Model and Errors in a Regressor	1992

20	Gorton, Gary and Richard Rosen	Corporate Control, Portfolio Choice, and the Decline of Banking	1993
21	Gustafsson, Claes-Håkan and Åke Holmén	The Index of Industrial Production – A Formal Description of the Process Behind it	1993
22	Karlsson, Tohmas	A General Equilibrium Analysis of the Swedish Tax Reforms 1989-1991	1993
23	Jonsson, Bo	Forecasting Car Expenditures Using Household Survey Data- A Comparison of Different Predictors	1993
24	Gennotte, Gerard and Hayne Leland	Low Margins, Derivative Securitites and Volatility	1993
25	Boot, Arnoud W.A. and Stuart I. Greenbaum	Discretion in the Regulation of U.S. Banking	1993
26	Spiegel, Matthew and Deane J. Seppi	Does Round-the-Clock Trading Result in Pareto Improvements?	1993
27	Seppi, Deane J.	How Important are Block Trades in the Price Discovery Process?	1993
28	Glosten, Lawrence R.	Equilibrium in an Electronic Open Limit Order Book	1993
29	Boot, Arnoud W.A., Stuart I Greenbaum and Anjan V. Thakor	Reputation and Discretion in Financial Contracting	1993
30a	Bergström, Reinhold	The Full Tricotomous Scale Compared with Net Balances in Qualitative Business Survey Data – Experiences from the Swedish Business Tendency Surveys	1993
30b	Bergström, Reinhold	Quantitative Production Series Compared with Qualiative Business Survey Series for Five Sectors of the Swedish Manufacturing Industry	1993
31	Lin, Chien-Fu Jeff and Timo Teräsvirta	Testing the Constancy of Regression Parameters Against Continous Change	1993
32	Markowski, Aleksander and Parameswar Nandakumar	A Long-Run Equilibrium Model for Sweden. The Theory Behind the Long-Run Solution to the Econometric Model KOSMOS	1993
33	Markowski, Aleksander and Tony Persson	Capital Rental Cost and the Adjustment for the Effects of the Investment Fund System in the Econometric Model Kosmos	1993
34	Kanis, Alfred and Bharat Barot	On Determinants of Private Consumption in Sweden	1993
35	Kääntä, Pekka and Christer Tallbom	Using Business Survey Data for Forecasting Swedish Quantitative Business Cycle Varable. A Kalman Filter Approach	1993
36	Ohlsson, Henry and Anders Vredin	Political Cycles and Cyclical Policies. A New Test Approach Using Fiscal Forecasts	1993

37	Markowski, Aleksander and Lars Ernsäter	The Supply Side in the Econometric Model KOSMOS	1994
38	Gustafsson, Claes-Håkan	On the Consistency of Data on Production, Deliveries, and Inventories in the Swedish Manufacturing Industry	1994
39	Rahiala, Markku and Tapani Kovalainen	Modelling Wages Subject to Both Contracted Increments and Drift by Means of a Simultaneous-Equations Model with Non-Standard Error Structure	1994
40	Öller, Lars-Erik and Christer Tallbom	Hybrid Indicators for the Swedish Economy Based on Noisy Statistical Data and the Business Tendency Survey	1994
41	Östblom, Göran	A Converging Triangularization Algorithm and the Intertemporal Similarity of Production Structures	1994
42a	Markowski, Aleksander	Labour Supply, Hours Worked and Unemployment in the Econometric Model KOSMOS	1994
42b	Markowski, Aleksander	Wage Rate Determination in the Econometric Model KOSMOS	1994
43	Ahlroth, Sofia, Anders Björklund and Anders Forslund	The Output of the Swedish Education Sector	1994
44a	Markowski, Aleksander	Private Consumption Expenditure in the Econometric Model KOSMOS	1994
44b	Markowski, Aleksander	The Input-Output Core: Determination of Inventory Investment and Other Business Output in the Econometric Model KOSMOS	1994
45	Bergström, Reinhold	The Accuracy of the Swedish National Budget Forecasts 1955-92	1995
46	Sjöö, Boo	Dynamic Adjustment and Long-Run Economic Stability	1995
47a	Markowski, Aleksander	Determination of the Effective Exchange Rate in the Econometric Model KOSMOS	1995
47b	Markowski, Aleksander	Interest Rate Determination in the Econometric Model KOSMOS	1995
48	Barot, Bharat	Estimating the Effects of Wealth, Interest Rates and Unemployment on Private Consumption in Sweden	1995
49	Lundvik, Petter	Generational Accounting in a Small Open Economy	1996
50	Eriksson, Kimmo, Johan Karlander and Lars-Erik Öller	Hierarchical Assignments: Stability and Fairness	1996
51	Url, Thomas	Internationalists, Regionalists, or Eurocentrists	1996
52	Ruist, Erik	Temporal Aggregation of an Econometric Equation	1996
53	Markowski, Aleksander	The Financial Block in the Econometric Model KOSMOS	1996

54	Östblom, Göran	Emissions to the Air and the Allocation of GDP: Medium Term Projections for Sweden. In Conflict with the Goals of SO_2, SO_2 and NOX Emissions for Year 2000	1996
55	Koskinen, Lasse, Aleksander Markowski, Parameswar Nandakumar and Lars-Erik Öller	Three Seminar Papers on Output Gap	1997
56	Oke, Timothy and Lars-Erik Öller	Testing for Short Memory in a VARMA Process	1997
57	Johansson, Anders and Karl-Markus Modén	Investment Plan Revisions and Share Price Volatility	1997
58	Lyhagen, Johan	The Effect of Precautionary Saving on Consumption in Sweden	1998
59	Koskinen, Lasse and Lars-Erik Öller	A Hidden Markov Model as a Dynamic Bayesian Classifier, with an Application to Forecasting Business-Cycle Turning Points	1998
60	Kragh, Börje and Aleksander Markowski	Kofi – a Macromodel of the Swedish Financial Markets	1998
61	Gajda, Jan B. and Aleksander Markowski	Model Evaluation Using Stochastic Simulations: The Case of the Econometric Model KOSMOS	1998
62	Johansson, Kerstin	Exports in the Econometric Model KOSMOS	1998
63	Johansson, Kerstin	Permanent Shocks and Spillovers: A Sectoral Approach Using a Structural VAR	1998
64	Öller, Lars-Erik and Bharat Barot	Comparing the Accuracy of European GDP Forecasts	1999
65	Huhtala , Anni and Eva Samakovlis	Does International Harmonization of Environmental Policy Instruments Make Economic Sense? The Case of Paper Recycling in Europe	1999
66	Nilsson, Charlotte	A Unilateral Versus a Multilateral Carbon Dioxide Tax - A Numerical Analysis With The European Model GEM-E3	1999
67	Braconier, Henrik and Steinar Holden	The Public Budget Balance – Fiscal Indicators and Cyclical Sensitivity in the Nordic Countries	1999
68	Nilsson, Kristian	Alternative Measures of the Swedish Real Exchange Rate	1999
69	Östblom, Göran	An Environmental Medium Term Economic Model – EMEC	1999
70	Johnsson, Helena and Peter Kaplan	An Econometric Study of Private Consumption Expenditure in Sweden	1999
71	Arai, Mahmood and Fredrik Heyman	Permanent and Temporary Labour: Job and Worker Flows in Sweden 1989-1998	2000

72	Öller, Lars-Erik and Bharat Barot	The Accuracy of European Growth and Inflation Forecasts	2000
73	Ahlroth, Sofia	Correcting Net Domestic Product for Sulphur Dioxide and Nitrogen Oxide Emissions: Implementation of a Theoretical Model in Practice	2000
74	Andersson, Michael K. And Mikael P. Gredenhoff	Improving Fractional Integration Tests with Bootstrap Distribution	2000
75	Nilsson, Charlotte and Anni Huhtala	Is CO_2 Trading Always Beneficial? A CGE-Model Analysis on Secondary Environmental Benefits	2000
76	Skånberg, Kristian	Constructing a Partially Environmentally Adjusted Net Domestic Product for Sweden 1993 and 1997	2001
77	Huhtala, Anni, Annie Toppinen and Mattias Boman,	An Environmental Accountant's Dilemma: Are Stumpage Prices Reliable Indicators of Resource Scarcity?	2001
78	Nilsson, Kristian	Do Fundamentals Explain the Behavior of the Real Effective Exchange Rate?	2002
79	Bharat, Barot	Growth and Business Cycles for the Swedish Economy	2002
80	Bharat, Barot	House Prices and Housing Investment in Sweden and the United Kingdom. Econometric Analysis for the Period 1970-1998	2002
81	Hjelm, Göran	Simultaneous Determination of NAIRU, Output Gaps and Structural Budget Balances: Swedish Evidence	2003
82	Huhtala, Anni and Eva Samalkovis	Green Accounting, Air Pollution and Health	2003
83	Lindström, Tomas	The Role of High-Tech Capital Formation for Swedish Productivity Growth	2003
84	Hansson, Jesper, Per Jansson and Mårten Löf	Business survey data: do they help in forecasting the macro economy?	2003
85	Boman, Mattias, Anni Huhtala, Charlotte Nilsson, Sofia Ahlroth, Göran Bostedt, Leif Mattson and Peichen Gong	Applying the Contingent Valuation Method in Resource Accounting: A Bold Proposal	
86	Gren, Ing-Marie	Monetary Green Accounting and Ecosystem Services	2003
87	Samakovlis, Eva, Anni Huhtala, Tom Bellander and Magnus Svartengren	Air Quality and Morbidity: Concentration-response Relationships for Sweden	2004
88	Alsterlind, Jan, Alek Markowski and Kristian Nilsson	Modelling the Foreign Sector in a Macroeconometric Model of Sweden	2004
89	Lindén, Johan	The Labor Market in KIMOD	2004

90	Henrik Braconier, Tomas Forsfält	A New Method for Constructing a Cyclically Adjusted Budget Balance: the Case of Sweden	2004
91	Hansen, Sten and Tomas Lindström	Is Rising Returns to Scale a Figment of Poor Data?	2004
92	Hjelm, Göran	When Are Fiscal Contractions Successful? Lessons for Countries Within and Outside the EMU	2004
93	Östblom, Göran and Samakovlis, Eva	Costs of Climate Policy when Pollution Affects Health and Labour Productivity. A General Equilibrium Analysis Applied to Sweden	2004
94	Forslund Johanna, Eva Samakovlis and Maria Vredin Johansson	Matters Risk? The Allocation of Government Subsidies for Remediation of Contaminated Sites under the Local Investment Programme	2006
95	Erlandsson Mattias and Alek Markowski	The Effective Exchange Rate Index KIX - Theory and Practice	2006
96	Östblom Göran and Charlotte Berg	The EMEC model: Version 2.0	2006
97	Hammar, Henrik, Tommy Lundgren and Magnus Sjöström	The significance of transport costs in the Swedish forest industry	2006
98	Barot, Bharat	Empirical Studies in Consumption, House Prices and the Accuracy of European Growth and Inflation Forecasts	2006
99	Hjelm, Göran	Kan arbetsmarknadens parter minska jämviktsarbetslösheten? Teori och modellsimuleringar	2006
100	Bergvall, Anders, Tomas Forsfält, Göran Hjelm, Jonny Nilsson and Juhana Vartiainen	KIMOD 1.0 Documentation of NIER´s Dynamic Macroeconomic General Equilibrium Model of the Swedish Economy	2007
101	Östblom, Göran	Nitrogen and Sulphur Outcomes of a Carbon Emissions Target Excluding Traded Allowances - An Input-Output Analysis of the Swedish Case	2007
102	Hammar, Henrik and Åsa Löfgren	Explaining adoption of end of pipe solutions and clean technologies – Determinants of firms' investments for reducing emissions to air in four sextors in Sweden	2007
103	Östblom, Göran and Henrik Hammar	Outcomes of a Swedish Kilometre Tax. An Analysis of Economic Effects and Effects on NOx Emissions	2007
104	Forsfält, Tomas, Johnny Nilsson and Juhana Vartianinen	Modellansatser i Konjunkturinstitutets medelfristprognoser	208
105	Samakovlis, Eva	How are Green National Accounts Produced in Practice?	2008

106	Alek Markowski, Kristian Nilsson, Marcus Widén	Strukturell utveckling av arbetskostnad och priser i den svenska ekonomin	2011
107	Forslund, Johanna, Per Johansson, Eva Samakovlis and Maria Vredin Johansson	Can we by time? Evaluation. Evaluation of the government's directed grant to remediation in Sweden	2009
108	Forslund, Johanna Eva Samakovlis, Maria Vredin Johansson and Lars Barregård	Does Remediation Save Lives? On the Cost of Cleaning Up Arsenic-Contaminated Sites in Sweden	2009
109	Sjöström, Magnus and Göran Östblom	Future Waste Scenarios for Sweden on the Basis of a CGE-model	2009
110	Österholm, Pär	The Effect on the Swedish Real Economy of the Financial Crisis	2009
111	Forsfält, Tomas	KIMOD 2.0 Documentation of changes in the model from January 2007 to January 2009	2009
112	Österholm, Pär	Improving Unemployment Rate Forecasts Using Survey Data	2009
113	Österholm, Pär	Unemployment and Labour-Force Participation in Sweden	2009
114	Jonsson, Thomas and Pär Österholm	The Properties of Survey-Based Inflation Expectations in Sweden	2009
115	Hjelm, Göran and Kristian Jönsson	In Search of a Method for Measuring the Output Gap of the Swedish Economy	2010
116	Vartiainen, Juhana	Interpreting Wage Bargaining Norms	2010
117	Mossfeldt, Marcus and Pär Österholm	The Persistent Labour-Market Effects of the Financial Crisis	2010
118	Östblom, Göran, Maria Ljunggren Söderman and Magnus Sjöström	Analysing future solid waste generation – Soft linking a model of waste management with a CGE-model for Sweden	2010
119	Broberg, Thomas, Per-Olov Marklund , Eva Samakovlisa and Henrik Hammar	Does environmental leadership pay off for Swed-ish industry? - Analyzing the effects of environ-mental investments on efficiency	2010
120	Gustavsson, Magnus and Pär Österholm	Labor-Force Participation Rates and the Informational Value of Unemployment Rates: Evidence from Disaggregated US Data	2010
121	Jonsson, Thomas and Pär österholm	The Forecasting Properties of Survey-Based Wage-Growth Expectations	2010
123	Broberg, Thomas, Tomas Forsfält and Göran Östblom	The Excess Cost of Supplementary Constraints in Climate Policy: The Case of Sweden's Energy Intensity Target	2011

124	Patrik Baard, Henrik Carlsen, Karin Edvardsson Björnberg and Maria Vredin Johansson	Scenarios and Sustainability. A Swedish Case Study of Adaptation Tools for Local Decision-Makers	2011
125	Hansson, Sven Ove, Karin Edvardsson Björnberg and Maria Vredin Johansson	Making Climate Policy Efficient Implementing a Model for Environmental Policy Efficiency	2011
126	Antipin, Jan-Erik, Farid Jimmy Boumediene and Pär Österholm	Forecasting Inflation Using Constant Gain Least Squares	2012
127	Meredith Beechey, Pär Österholm	Policy Interest Rate Expectations in Sweden: A Forecast Evaluation	2012
128	Meredith Beechey, Pär Österholm	Central Bank Forecasts of Policy Interest Rates: An Evaluation of the First Years	2013
129	Jan-Erik Antipin, Farid Jimmy Boumediene, Pär Österholm	On the Usefulness of Constant Gain Least Squares when Forecasting the Unemployment Rate	2013
130	Pär Österholm	Survey Data and Short-Term Forecasts of Swedish GDP Growth	2013

National Institute of Economic Research, Kungsgatan 12-14, Box 3116, SE-103 62 Stockholm, Sweden
Phone: +46 8 453 59 00, Fax: +46 8 453 59 80, E-mail: ki@konj.se, Website: www.konj.se

ISSN 1100-7818