# NEW WORKING PAPERS FROM NORGES BANK

**Norges Bank's Working Papers *(Arbeidsnotater)* present research projects (not necessarily in their final version), and are published among other reasons to enable the author to benefit from the comments of colleagues and interested parties. Only Working Papers published in English are listed below. Subscriptions are available free of charge and individual copies may be obtained from Norges Bank's Library. Postal address: PO Box 1179 Sentrum, N-0107 Oslo, Norway.**

*Moshe Kim, Doron Kliger and Bent Vale:* "Estimating switching costs and oligopolistic behaviour". *Arbeidsnotat* 1999/4. 51 p. ISSN 0801-2504. ISBN 82-7553-141-1.

We present an empirical model of firms' strategic behaviour in the presence of switching costs. Customers' transition probabilities embedded in firms' strategic interaction are used in a two-stage game to derive structural estimable equations of first order condition, market-share (demand), and supply equations. The novelty of the model is in its ability to extract information on both the magnitude and significance of switching costs, as well as on customers' transition probabilities, from conventionally available highly aggregated data which do not contain customer-specific information. As a matter of illustration, the model is applied to panel data of banks, to estimate the switching costs in the market for bank loans. We find that the point estimate of the average switching cost is 4.1%, which is about one third of the market average interest rate on loans, and that over a quarter of the customer's added value is attributed to the lock-in phenomenon generated by this switching cost. About a third of the average bank's market share is due to its established bank-borrower relationship. The duration of bank-customer relationship implied by the model estimates averages 13.5 years. The presented technique may be applicable to modelling a wide class of problems where only aggregate data exist.

*Gunnar Bårdsen, Eilev S. Jansen and Ragnar Nymoen:* "Econometric inflation targeting". *Arbeidsnotat* 1999/5. 38 p. ISSN 0801-2504. ISBN 82-7533-143-8.

Inflation targeting makes the Central Bank's conditional inflation forecast the operational target for monetary policy. Successful inflation targeting requires knowing the transmission mechanisms to inflation from shocks as well as instruments. The econometric implications are that the exogeneity assumptions of a conditional forecasting model of inflation are crucial to the quality of the forecasts. We advise that econometric inflation forecasting should be based on a core wage-price model, grafted into a wider set of equations that capture the important transmissions mechanisms between inflation and policy instruments (interest rate, exchange rate) as well as between inflation and shocks to the economy. We develop a model of the inflation process in Norway by estimating a dynamic model of wages and prices, supplemented with marginal models of the transmission mechanisms of shocks and instruments. The exogeneity assumptions are tested and accepted. Finally, we demonstrate the model responses to shocks and corresponding changes in monetary instruments and examine the suitability of the full system for inflation forecasting.

*Qaisar Farooq Akram:* "Multiple unemployment equilibria: Do transitory shocks have permanent effects?". *Arbeidsnotat* 1999/6. 36 p. ISSN 0801-2504. ISBN 82-7553-144-6.

We adapt the multiple equilibrium approach to characterise the behaviour of Norwegian unemployment since 1972. This approach may be associated with unemployment hysteresis as a nonlinear phenomenon. In this nonlinear framework transitory shocks may cause a transition from one equilibrium to another and thus have permanent effects on economic activity. A Markov regime switching model and an LSTAR model are employed to take account of possible multiple equilibria and asymmetric responses to positive and negative shocks. The empirical results seem to support these contentions.

*Roger Bjørnstad and Ragnar Nymoen:* "Wages and profitability: Norwegian manufacturing 1967 Q1-1998 Q2". *Arbeidsnotat* 1999/7. 23 p. ISSN 0801-2504. ISBN 82-7553-145-4.

Economic theories of imperfectly competitive labour markets predict that wages are linked to profits. In spite of this, profit variables are not explicitly specified in empirical models of wage formation that otherwise appear to be interpretable, to have well behaved residuals and to have constant parameters. Does this mean that theory overplays the role of profitability in wage formation? The answer is probably not: using Norwegian wage formation as an example, we show that existing wage equations that have been successful empirically in fact contain a close linkage between wage setting and profits. We also investigate if there are gains in predictability by making this link explicit in the wage model with the use of a measure of gross operating surplus. Nevertheless, the equations are stable over the 1990s, a period when unemployment reached a post-war all-time high. Finally, the determinants of profitability are modelled within a vector auto-regressive model. The analysis indicates little, if any, loss of information when wages are modelled in a single equation.

*Gunnar Bårdsen, Stan Hurn and Kenneth Lindsay :* "The generic properties of equilibrium correction mechanisms" *Arbeidsnotat* 1999/8, 7 p. ISSN 0801-2504. ISBN 82-7553-146-2.

Linear dynamic equilibrium correction mechanisms are shown to follow from the discreation of continuous economic processes with steady-state solutions. In addition, the proposed procedure provides testable restrictions on the coefficients of the dynamic econometric model. JEL Classification: C50. Keywords: Equilibrium correction, dynamic modelling, difference schemes, power series representations.

*Espen Sjøvoll:* "Assessment of credit risk in the Norwegian business sector" *Arbeidsnotat* 1999/9, 79 p. ISSN 0801-2504. ISBN 82-7553-147-0.

This thesis presents a model that measures credit risk in the Norwegian business sector, using firm bankruptcy as proxy for credit risk. Probit analysis, a discrete response model, is applied to micro level financial information from more than 500 000 observations from the period 1989-1998. Bankruptcies in the period 1995-1998 are used to develop the model, and bankruptcies in the period 1991-1993 are used for out of sample testing. A set of time-consistent indicators of bankruptcy is found by combining ideas from both the theory of industrial organisation and financial statement analysis. The results support the idea of a learning effect in companies. This effect is recognised with reduced risk of bankruptcy when observations are subject to age. Furthermore, the results indicate that debt and interest burden increase risk of bankruptcy, while equity decrease risk of bankruptcy. Real-estate companies generally have a lower risk, while restaurants generally have a higher risk. JEL Classification: C13, G33. Keywords: Bankruptcy, probit estimation, credit risk.