

# ECONOMIC NOTES

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*Abstracts from seven recent discussion papers are presented.*

## **A TIME SERIES ANALYSIS OF NEW ZEALAND CONSUMER EXPENDITURE BY DURABILITY**

*Discussion Paper G90/1*

*John McDermott*

Household expenditure on consumption forms the largest single category of aggregate national expenditure in New Zealand, being in the region of 60 per cent of gross domestic product. Since consumption is such a large component of the real economy it is important to model consumption behaviour so that policy makers understand how monetary and fiscal policy is likely to impact on the real economy, via changes in consumption patterns. This paper models the short-run (changes) and long-run (levels) behaviour of three categories of consumption for New Zealand, namely durables, non-durables and services. Initially the long and the short-run components are modelled independently and then the two components are modelled jointly. This study is part of a larger modelling exercise. The ultimate goal of this exercise is to produce a revised macroeconometric model of the New Zealand economy.

In the long run it was found that non-durable consumption is positively related to disposable income, the real value of the dwelling stock, the real value of the money supply and negatively related to the rate of consumer price inflation. Durable consumption is a positive function of disposable income and the real value of the dwelling stock, while services positively vary with disposable income and negatively vary with the price of services relative to other categories of consumption.

No link between consumption expenditure and interest rates could be found. However this may be because interest rates were regulated and credit rationed for much of the sample period used to estimate the equations. Monetary policy does impact directly on non-durable consumption through the negative impact of the rate of inflation on non-durable consumption expenditure. The indirect effects of monetary policy, however, can only be properly assessed within the context of the full macroeconomic model in which these equations are included.

## CONSUMPTION OF DURABLES, NON-DURABLES AND SERVICES IN NEW ZEALAND: A SYSTEM-WIDE ANALYSIS

*Discussion Paper G90/2*

*Alfred Y-T Wong and*

*John McDermott*

This paper estimates the income and price responses of three categories of household consumption for New Zealand, namely durables, non-durables and services. The results can be applied to forecasting consumption by durability and to government policy formulation in areas such as indirect taxation and trade liberalisation. This paper adopts the popular Rotterdam model to investigate the economic behaviour of household consumption in New Zealand. In this approach, demand equations for all goods are estimated simultaneously to capture the decisions of consumers and satisfy the budget constraints under which consumers operate.

The results show that the data satisfy the standard consumer demand hypotheses, including demand homogeneity. For homogeneity to hold the demand for consumer goods cannot change in response to a change in prices and income that leaves relative prices and real income unchanged. The estimated income elasticities are 1.35, 0.70 and 0.93 for durables, non-durables and services, indicating that durables are luxuries while non-durables and services are more akin to necessities. These results are intuitively appealing given that durables includes items such as cars, stereos and televisions, while non-durables and services includes items such as food and housing. The own-price elasticities are -0.49, -0.36 and -0.38 for durables, non-durables and services indicating that a rise in the relative price leads to a fall in demand when utility is held constant. Durables is the most price responsive category with a 1 per cent rise in the durables price, relative to the non-durables and services price, leading to a 0.49 per cent fall in consumption of durables.

The results of this study have important implications for economic policymakers. Consider the case of trade liberalisation. The initial effect of trade liberalisation is to reduce the price of traded goods relative to non-traded goods, i.e. an appreciation of the real exchange rate. The estimates of the cross price elasticities imply that there is demand substitutability between durables (mostly tradeables) and non-durables and services (mostly non-tradeables). Therefore the price of non-traded goods will also fall as a result of trade liberalisation and thus the real exchange rate will not appreciate to the extent it would if there were no substitution.

## MALE AND FEMALE LABOUR FORCE PARTICIPATION IN NEW ZEALAND 1978-1988

*Discussion Paper G90/3*

*Ray Brooks*

Understanding the factors influencing the supply of labour is important for both policymakers and forecasters, as changes in the labour force participation rate can have a significant impact on the overall performance of the economy. The unemployment rate in particular is affected by changes in the labour force participation rate as well as being affected by changes in employment. This paper provides an empirical analysis of the factors influencing the labour force participation of males and females in New Zealand over the period 1978 to 1988. Labour supply equations are estimated separately for males and females using the econometric technique of cointegration to establish the long-run relationship between the relevant variables.

The results from estimating the male labour supply equation show a positive relationship between real-after-tax wage rates and the male labour supply, and a relatively strong negative relationship between transfer payments from Government, such as National Superannuation, and the male labour supply. The rate of unemployment and income from sources other than salary and wages and Government are also found to be negatively related to the male labour supply.

The female labour supply is found to be related mainly to demographic factors. The proportion of the population under five is negatively correlated with female participation rates, as females leave the labour force to care for children. The number of females attending tertiary educational institutions provides an indicator of the increased willingness of females to participate in the workforce (due to changing tastes or social attitudes) and is found to be positively correlated with the female labour force participation rate. The third major influence on the female labour supply found in this paper is the rate of unemployment, with a rise in the unemployment rate being correlated with a fall in the female labour supply, which is consistent with the result for the male equation. This provides evidence of a 'discouraged worker effect' whereby employment is perceived as being more difficult to obtain as unemployment rises therefore discouraging workers from remaining in the labour force. In addition, the real-after-tax wage rate is found to be positively related to the female labour supply but the relationship is considerably weaker than for the male labour supply.

Short-run error correction models (ECM) based on quarterly changes in the relevant variables are also estimated for both male and female labour supply. The coefficient on the error correction term, measuring the degree of adjustment to the long-run equilibrium, is found to be significant in both the male and female short-run ECMs and many of

the variables influencing labour supply in the long run are also found to impact on the quarterly changes in the male and female labour supply. An interesting contrast between the two equations is the quicker adjustment to the long-run equilibrium in the female labour supply equation which may be a result of a greater proportion of part-time work among females, thereby allowing more flexibility, and the social acceptance of females moving in and out of the workforce.

The important results in this paper, from the viewpoint of policymakers concerned about the level of unemployment, are that a reduction in the real after-tax wage rate or a rise in transfers from Government are related to a fall in labour force participation. For example, a 10 per cent fall in the real after-tax wage rate is associated with a fall in the labour supply of around 20,000 full-time equivalent workers, consisting mainly of males. Taken in isolation this will lead to a fall in unemployment. However, without allowing for both the impact on employment of the change in the real wage rate (a fall in the gross real wage rate will increase the quantity of labour demanded) and the second round effect of the consequent change in household income, it is difficult to assess the magnitude of the impact on unemployment. A more satisfactory assessment of the full impact of a change in real wages on the labour supply, employment and unemployment can only be obtained by experimenting with a macroeconomic model such as the Reserve Bank's new econometric model.

## **EXCHANGE RATE AND FOREIGN PRICE INDICES: ARE TRADE WEIGHTS APPROPRIATE?**

*Discussion Paper G90/4*

*Ulf D. Schoefisch*

The trade weighted exchange rate index (TWI) is used by the Reserve Bank as an indicator of the impact of exchange rate movements on the domestic price level. However, the concept of using trade weights may not be appropriate for this purpose. In particular, it ignores the fact that the distribution of currencies in which New Zealand's external trade is invoiced does not coincide with the trade shares.

The use of a trade weighted foreign producer price index as an indicator of the impact of overseas price inflation on the domestic price level may also be inappropriate. Its main deficiency is the fact that a trade weighted Producer Price Index (PPI) does not allow us to adequately include direct influences of commodity prices which exhibit movements distinctly different from those observed for producer prices.

In this study, alternative exchange rate and foreign price indices are estimated. These are based on the results from a regression of the Consumer Price Index (CPI) on internal and external price influences

over the period June 1978 to March 1988, using the techniques of cointegration and principal components. The alternative index weights differ significantly from the currently used trade shares, as shown below:

Country/Commodity	Alternative Exchange Rate Index	Alternative Foreign Price Index	Trade Weights as at 1989:2 (for comparison)
	%	%	%
United Kingdom	11.8	25.4	11.7
United States	31.1	15.3	23.8
Australia	13.2	24.9	30.7
Japan	29.4	6.2	28.9
West Germany	14.5	11.2	4.9
Oil		9.9	
Industrials		7.1	
	100.00	100.00	100.00

The alternative exchange rate index strongly reflects the dominance of the US dollar and the yen as currencies of denomination. The relatively high influence of the deutschmark can be explained by its increasing function as a proxy for a wider range of European currencies. The foreign price index includes commodity prices for oil and industrials. It shows the influence of the UK as being nearly three times its trade share while Japanese producer prices have a surprisingly small impact. The latter may be explained by the fact that Japanese producers have proven to be very flexible in their pricing strategies with respect to the aim of penetrating new markets.

The relative merits of using trade weighted and alternative indices as regressors in an equation explaining the CPI is analysed in the paper. Both specifications perform equally well over the sample period, with the alternative indices suggesting a stronger influence of external factors on the CPI than the trade weighted counterparts. However, the out-of-sample forecasting performance (over the period from June 1988 to March 1989) of both the trade weighted and alternative measures is inadequate. The price level is underpredicted by around 4 to 7 per cent, with the trade

weighted measures producing a superior forecast. Overall, the weight of evidence suggests that in the current absence of a convincing alternative, trade weights are not inappropriate in measuring the impact of external influences on the CPI.

## **THE EFFICIENCY OF NOMINAL AND REAL TAX SYSTEMS**

*Discussion Paper G90/5*

*Arthur Grimes*

The paper analyses the interaction of inflation with nominal and real tax systems by incorporating each of a real tax system (which taxes only real asset returns) and a nominal tax system (which also taxes the inflation component) into the consumption capital asset pricing model. Abstracting from administrative costs, it is shown that a real tax system generally leads to a lesser distortion of consumption patterns and of asset returns than does a nominal tax system, even in an environment with zero expected inflation.

## **FOOD COMMODITY PRICES - WHAT CAN THEY TELL US ABOUT FUTURE FOOD PRICE INFLATION?**

*Discussion Paper G90/6*

*D. T. Gibbs*

In order for the Reserve Bank to effectively formulate and implement monetary policy, the Bank needs to rely on its checklist of indicator variables to provide it with accurate information regarding monetary conditions. Recent overseas literature has looked at the question of whether commodity prices should be included in such a checklist. Generally, however, this literature has found little evidence to suggest that a strong and reliable link exists between commodity prices and the general level of prices in an economy.

This paper focuses on the linkage between the levels of food commodity spot (and export) prices and the Food Price Index in New Zealand. The analysis applies the econometric methodology of cointegration but concludes that there is no simple long-run relationship between food commodity prices and the Food Price Index. However, when the Food Price Index is disaggregated into various food groups and modelled separately there is some evidence of a stable long run relationship. For example, the results suggest that a 10 per cent increase in an index of meat spot prices will lead to a 4.7 per cent increase in the consumers meat price index after four months, while a 10 per cent increase in an index of dairy export prices will lead to a 3 per cent increase in the consumers dairy price index after six months.

## A FORECASTING EQUATION FOR THE PRODUCER PRICE INDEX FOR INPUTS

*Discussion Paper G90/7*

*B. Hodgetts and R. Brooks*

In order for the Reserve Bank to achieve its price stability objective efficiently, an understanding of the factors influencing the Consumers Price Index (CPI) is essential. One major influence on the CPI is the cost of inputs faced by the business sector, as represented by the Producers Price Index for inputs (PPI-I). This paper outlines the estimation of a forecasting equation for the PPI-I. The equation is incorporated into the Bank's new macroeconomic model and has an important bearing on forecasts of the CPI.

The empirical analysis in this paper establishes a long-run relationship, in level terms, between the PPI-I and the cost of labour (measured by normal unit labour costs), foreign prices (i.e. the foreign currency price of New Zealand's exports and imports of goods) and the Reserve Bank's trade weighted exchange rate index using the cointegration technique. The statistical tests, however, show that a long-run relationship (i.e. cointegration) is established only at a marginal statistical significance level for the period 1979-1988. The theoretically desirable restriction that a 1 per cent change in both foreign prices and the cost of labour is consistent with a 1 per cent change in the PPI-I was imposed and accepted. However, the restriction that a 1 per cent rise (fall) in foreign prices could be offset by a 1 per cent appreciation (depreciation) of the trade weighted index (TWI) could not be accepted without the inclusion of a linear time trend. The linear time trend may be capturing either an increase in margins, differences in the construction of the price indices in the regression, or the impact of administered increases in government charges over the sample period.

Forecasting equations are specified in quarterly changes with an adjustment over time to the long-run relationship (specified in levels). The preferred equation provides a good degree of fit over the sample period and the forecasting performance both in and out-of-sample is satisfactory. The tests of the forecasting performance excluding the use of the time trend indicate that its exclusion does not have a significant effect on the forecasts toward the end of the sample, and the out-of-sample forecasting accuracy actually improves. It is therefore suggested that the use of the time trend is not appropriate in future forecasting work with the equation.

The adjustment properties of the equation, in response to some exogenous shocks, are also analysed. For example, a 10 per cent depreciation of the exchange rate, is shown to contribute to a 6.2 per cent increase in the PPI-I with around 90 per cent of this impact occurring within three quarters. However, the *ceteris paribus* nature of this stimulation which captures only first-round effects, with no second-round effects on wage rates, means that caution should be exercised when drawing conclusions about the ultimate effects of a depreciation

on inflation or competitiveness. A better insight into the ultimate effects of such a shock can be gained by experimenting with this equation in the Bank's new macroeconomic model.