OECD Economics Department Working Papers No. 71

Modelling Business Sector Supply for the Smaller OECD Countries

Raymond Torres,

Peter Jarrett,

Wim Suyker

https://dx.doi.org/10.1787/615253815306

OECD

General Distribution

OECD

DEPARTMENT OF ECONOMICS AND STATISTICS

WORKING PAPERS

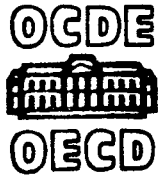
No. 71: MODELLING BUSINESS SECTOR SUPPLY FOR THE SMALLER OECD COUNTRIES

by

Raymond Torres, Peter Jarrett and Wim Suyker

Growth Studies Division

October 1989



GENERAL DISTRIBUTION

ECONOMICS AND STATISTICS DEPARTMENT

WORKING PAPERS

This series of Working Papers is designed to make available, to a wider readership, selected studies which the Department has prepared for use within OECD. Authorship is generally collective, but main individual authors are named.

Comment on the Papers is invited, and may be sent to OECD, Department of Economics and Statistics, 2 rue André Pascal, 75775 Paris Cedex 16, France. Additional copies of the Papers on a limited basis can be forwarded on request.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

23450

This paper presents business sector supply blocks for thirteen smaller OECD economies. The starting point is the approach adopted by the Economics and Statistics Department for the major economies. The structure of the supply blocks is explained and estimation results are presented. Results from several diagnostic simulations using the new blocks are also presented. Finally the way the supply blocks can be used to compare aggregate supply and demand is set out.

* * *

Dans cette étude, des blocs d'offre pour le secteur productif de treize "petits" pays de l'OCDE sont présentés. La modélisation de ces blocs d'offre s'inspire de l'approche adoptée par le Département d'économie de l'OCDE pour les sept "grandes" économies de l'OCDE. La structure des blocs d'offre est analysée et les résultats des estimations sont discutés. Les résultats d'un ensemble de tests de simulation sont également présentés. Enfin, dans cette étude ou s'interroge sur la manière d'utiliser le bloc d'offre afin d'évaluer l'écart entre l'offre et la demande.

MODELLING BUSINESS SECTOR SUPPLY FOR THE SMALLER OECD COUNTRIES

by

Raymond Torres, Peter Jarrett and Wim Suyker

Growth Studies Division

October 1989

Administrator, Country Studies II Division, Principal Administrator, Country Studies III Division and Administrator, Growth Studies Division, respectively. The Annex, which is a summary of a forthcoming working paper, has been written by Mark Keese. Helpful comments and suggestions were received from many colleagues in the Economics and Statistics Department. In particular, we would like to thank Bob Ford, Mark Keese, John Martin and Pete Richardson. Efficient research assistance was provided by Mark Keese and Rita Varley.

MODELLING BUSINESS SECTOR SUPPLY FOR THE SMALLER OECD COUNTRIES

TABLE OF CONTENTS

MODELLING BUSINESS SECTOR SUPPLY FOR THE SMALLER OECD COUNTRIES

TABLES AND CHARTS

LIST OF TABLES

LIST OF CHARTS

MODELLING BUSINESS SECTOR SUPPLY FOR THE SMALLER OECD COUNTRIES

INTRODUCTION

A major trend in macroeconometric modelling in recent years has been to pay much greater attention to the determinants and role of aggregate supply. The OECD's international macroeconomic model INTERLINK is no exception in this regard. The development and specification of supply blocks for the business sector for the seven major economies are described in Helliwell et al. (1986) and Jarrett and Torres (1987). The basic approach builds upon an aggregate, three-factor (capital, energy and labour) production function to derive equations for factor demands and output supply. The supply block also determines a measure of factor utilisation which enters directly into the price blocks. Incorporating these supply blocks has made a significant difference to overall model properties -- see Richardson (1988).

However, the existing supply blocks in INTERLINK for the smaller OECD countries have been relatively rudimentary until now, with employment and investment determined independently. This paper reports on the results of a complete respecification and estimation of new supply blocks for thirteen smaller OECD countries based on an aggregate two-factor production function for the business sector. In the new blocks, supply-side effects work through two main channels: business fixed investment and business employment. Work is also under way to integrate supply-side considerations into the price blocks in INTERLINK of the smaller OECD countries.

Part I of this paper presents an overview of the supply blocks in the model. Part II discusses the specification of the production function, the basic building block of supply-side modelling, and presents estimation results. The production function is then used for the joint determination of factor demands; the resulting employment and investment functions are presented in Part III. Part IV presents simulation properties with the new supply blocks. Part V discusses the concept of potential output and presents estimates derived from the supply blocks. The final section contains some

concluding remarks. The Annex presents the data sources and methods used for the construction of the business sector data base (see also Keese and Salou (1990)).

I. OVERVIEW OF THE SMALL COUNTRY SUPPLY BLOCKS

The starting point for the development of business sector supply blocks for the smaller OECD economies was the approach adopted for the major economies; this is described in Helliwell et al. (1986) and in Jarrett and Torres (1987). However, important simplifications have been made because of the lack of data for some of the smaller countries and the necessity to keep the overall size of the INTERLINK model within manageable limits.

A key element of the small-country supply blocks is the aggregate two-factor production function for the business sector (Chart 1). Capital and labour are the two primary inputs into production. The production function is assumed to be characterised by a constant elasticity of substitution (CES) and constant returns to scale. Technical progress is postulated to be Harrod-neutral, i.e. purely labour-augmenting. The tested hypothesis under this specification is that technical progress consists of an autonomous disembodied element, an embodiment effect and a "catch-up" effect, which proxies spillover from technological progress in the frontier country, which is taken to be the United States. This approach is comparable with the one followed for the major economies.

"Normal output", which plays a crucial role in the factor demand equations, is defined as the volume of output given by the production function at actual levels of factor inputs. Planned output is a weighted average of actual and normal output, modified for deviations of profitability from normal levels. Optimal factor inputs, are determined by cost minimisation, given the level of planned output. Actual factor demands are assumed to adjust gradually towards these optimal levels, subject to short-run profitability, excess demand and cross-equation disequilibrium effects.

As mentioned, the supply blocks for the smaller economies are simpler than those for the major economies. The major simplifications are:

-- A two-factor instead of a three-factor production function. Energy has been omitted as the third input. This avoids the nested production function and the flexible vintage structure of the bundling of capital and energy in the supply blocks for the major economies;

-- Exogenous stockbuilding. In contrast, the supply blocks for the major countries have an implicit stockbuilding equation which splits the effects of demand and supply shocks into changes in output and inventories. As a result, in the small-country models actual business output is not directly affected by supply shocks;

There are also some differences between the basic specifications for the major and smaller economies:

-- For the smaller economies, allowance is made for possible spill-overs from technical progress in the United States but not for complete catch-up to the trend labour efficiency growth in the United States in the long-run, as there is for the major economies.

-- Cross-equation disequilibrium effects have been tested for in the factor demand equations for the smaller economies but not in those for the major economies. In the tradition of Nadiri and Rosen (1969), deviations of actual from optimal capital demand may influence actual labour demand and a disequilibrium in the labour market may affect the demand for capital.

II. THE PRODUCTION FUNCTION

1. Characteristics of the production function

At the core of the supply block is an aggregate production function for the business sector, which combines capital and labour and is characterised by:

i) constant elasticity of factor substitution;

ii) constant returns to scale;

iii) Harrod-neutral technical progress, implying a constant capital-output ratio in long-run equilibrium. Technical progress is therefore captured by the index of labour efficiency.

Labour efficiency growth is assumed to have three elements:

i) an embodiment element which is proxied by capital accumulation;

ii) a "catch-up" element, defined as the difference between the growth rates of total factor productivity (TFP) in the United States and the country in question (see Englander and Mittelstädt (1988) for the method used to calculate TFP); and

iii) an autonomous disembodied element.

The equation for labour efficiency (ELEFF) is:

$$\Delta \ln(ELEFF) = \alpha_1 + \alpha_2 \, IBV/KBV(-1) + \alpha_3 \, SPILL \qquad [1]$$

where IBV is business sector fixed investment, volume
KBV is actual business sector fixed capital stock, volume
SPILL is the "catch-up" effect.

Employment is measured in terms of persons. As a consequence, all variations in hours worked per worker are reflected in the labour efficiency index. An exception is for the Netherlands where labour input has been measured in terms of man years.

All estimates relate to the business sector which has been defined to include both private and public enterprises, incorporated and unincorporated firms and therefore equals the total economy outside the general government sector. In the case of Norway, the aggregate business sector has been split between the oil and non-oil sectors, since no stable estimation results could be obtained for the business sector as a whole.

The basic production function has the following CES form:

$$QBSV = (XBETA * (ETB*ELEFF) ** \rho + XGAMA * KBV ** \rho) ** (1/\rho) \qquad [2]$$

where QBSV is normal business-sector output and represents the value given by the production function;

ETB is business-sector employment;

ρ is equal to $(\tau-1)/\tau$, where τ is the elasticity of substitution;

and XBETA and XGAMA are scale parameters.

2. Estimation strategy and results

Equation [2] cannot be estimated directly, since both the labour efficiency index and the parameters of the production function (the elasticity of substitution and the scale parameters) are unknown. Therefore, the production structure is estimated in two steps. First, the elasticity of substitution between capital and labour and the index of labour efficiency are estimated by combining equation [1] and the first-order condition on labour for maximising profits in competitive input and output markets (i.e. the marginal product of labour equals the real product wage). This gives the following labour productivity growth equation:

$$\Delta\ln(GDPBV/ETB) = \tau POLY\ |\Delta\ln(WSSE/PGDPB)| + b_1 + b_2\ IBV/KBV(-1) + b_3\ SPILL \qquad [3]$$

where GDPBV is actual business sector gross output, volume
WSSE is total compensation per employee in the business sector
PGDPB is the deflator for business sector gross output
POLY is the Almon polynominal distributed lag.

The impact of the real-wage variable (WSSE/PGDPB) and its lags have been estimated using an Almon lag and the elasticity of substitution is the sum of the estimated lag coefficients. Labour efficiency growth is estimated as:

$$\Delta \ln ELEFF = (b_1 + b_2\ IBV/KBV(-1) + b_3\ SPILL)/(1-\tau) \qquad [4]$$

In the second step, the scale parameters XBETA and XGAMA are obtained by estimating the underlying CES production function directly, given ELEFF and the estimated elasticity of substitution.

The resulting estimates of the parameters of the production function for the 13 countries considered are reported in Table 1. The estimated elasticities of substitution are shown in the first line. The labour efficiency coefficients b_1, b_2 and b_3 are shown in the second part. Finally, the estimated scale parameters are shown at the bottom of the table.

The unweighted average value of the estimates for the elasticity of substitution for the 13 countries is 0.5. This means that, on average, a rise in the price of labour relative to the cost of capital by 1 percentage point produces a long-run increase in the capital/labour ratio of 0.5 per cent. This compares with an unweighted average of 0.65 for the major seven economies -- see Jarrett and Torres (1987, Table 1). It is also of some interest to compare these estimates with corresponding estimates in various national models; Table 2 provides the relevant data. National estimates are of the same order of magnitude for Australia, Ireland and the Netherlands. However, for Belgium, Denmark, Finland and New Zealand the present estimates are somewhat lower than national estimates.

The autonomous and embodied elements of the technical progress hypothesis proved to be mutually exclusive, in the sense that for no country

were both statistically significant. The hypothesis yielding the best fit was chosen. As a consequence, the estimated labour productivity equations include embodiment and exclude autonomous technical progress for all countries, except Belgium. To get more acceptable estimates for labour efficiency growth the embodiment term was defined for some countries as a moving average of investment to the capital stock instead of the current value of the ratio (see notes to Table 1). Significant catch-up effects were identified for Australia and Belgium, although again it proved necessary to smooth the measure of U.S. productivity growth to avoid unstable estimates of labour efficiency growth.

Chart 2 reports the corresponding growth estimates for actual and normal business output, the associated indices of labour efficiency and the ratios of actual to normal output -- the so-called intensity of factor utilisation (IFU). As will be seen in the next section, each of these variables plays a role in the modelling of employment and business fixed investment. The IFU estimates also provide an important measure of goods market disequilibrium for use in the analysis of price formation.

III. FACTOR DEMANDS

Employment and investment demand functions for the business sector have been estimated within a consistent framework using, in particular, expressions for optimal factor demands derived from the estimated production technologies. The first two parts of this section describe the general methodology followed. Estimation results for the 13 countries are reported in the third part.

1. Desired labour and capital demand

Assuming cost minimisation, desired capital and labour demands depend upon expected future output and relative factor prices. The output (scale) effect is unity, given the assumption of constant returns to scale. The magnitude of the relative factor price (substitution) effect is given by the elasticity of substitution.

The equations are:

$$\ln EBSTAR = \ln (QBSTAR/ELEFF) + g\,(WSSE/UCC) \quad [5]$$

$$\ln KBSTAR = \ln QBSTAR + g'\,(WSSE/UCC) \quad [6]$$

where QBSTAR is expected future output

UCC user cost of capital

g and g' represent functions of relative factor prices and the production-function parameters and are designed to make the factor demands consistent with cost minimisation in the long-run.

Expected future output (QBSTAR) is assumed to be a weighted average of actual and normal output *if* profitability equals its normal (or average) level. Thus, a rise in aggregate demand leads initially to a less-than-proportional rise in expected future output and to a rise in factor utilisation. Expected future output is assumed also to be positively influenced by the departure of profitability from its normal level. Profitability is proxied by the ratio of the business-sector value added deflator (PGDPB) to marginal costs (CKL). CKL is a weighted average of unit factor costs with productivity measured by the labour efficiency index; the weights are fixed and are based on the parameters of the production function.

The equation for expected future output is:

$$\ln QBSTAR = W_1 * \ln GDPBV + (1-W_1) * \ln QBSV + W_2 * \ln (PGDPB/CKL)$$
$$= \ln QBSV + W_1 * \ln IFU + W_2 * \ln (PGDPB/CKL) \quad [7]$$

W_1 is the long-run elasticity of desired factor demand to factor utilisation (or, alternatively, the weight of actual output in the expected output identity); and

W_2 is the long-run elasticity of desired factor demand to profitability.

2. Adjustment of actual to desired labour and capital demand

Actual levels of factor demand have been modelled in the context of a traditional partial adjustment model. In doing so, the long-run elasticities of actual to desired factor demands are constrained to be unity. This ensures that actual factor demands in the long-run are equal to desired factor demands in growth-rate terms.

In estimation, two sets of special factors were considered as potentially modifying the adjustment process. First, possible cross-equation disequilibrium effects are allowed for. Following Nadiri and Rosen (1969), it is assumed that deviations of actual from desired capital demand might influence labour demand, and vice versa, since producers may compensate for slow adjustment of one factor by varying the level of the other. Second, temporary factor utilisation and profitability effects are permitted. These factors tend to modify the speed of adjustment. The resulting equations are as follows:

$$\begin{aligned} \ln ETB = {} & c_0 + c_1 \ln ETB_{-1} + c_2 \ln ETB_{-2} + c_4 \ln EBSTAR \\ & + c_5 \ln EBSTAR_{-1} + c_6 \ln EBSTAR_{-2} \\ & + c_7 \Delta(\ln IFU_{-j}) + c_8 \Delta\{\ln(PGDPB_{-j}/CKL_{-j})\} \\ & + c_9 \{\ln(KBSTAR_{-j}/KBV_{-j-1})\} \end{aligned} \qquad [8]$$

with $c_1 + c_2 + c_4 + c_5 + c_6 = 1$; $c_7 \geq 0$, $c_8 \geq 0$, $c_9 \geq 0$ and $0 \leq j \leq 2$

$$\begin{aligned} \ln KBV = {} & d_0 + d_1 \ln KBV_{-1} + d_2 \ln KBV_{-2} + d_3 \ln KBV_{-3} \\ & + d_4 \ln KBSTAR + d_5 \ln KBSTAR_{-1} \\ & + d_7 \Delta(\ln IFU_{-j}) + d_8 \Delta\{\ln(PGDPB_{-j}/CKL_{-j})\} \\ & + d_9 \{\ln(EBSTAR_{-j}/ETB_{-j-1})\} \end{aligned} \qquad [9]$$

with $d_1 + d_2 + d_3 + d_4 + d_5 = 1$: $d_7 \geq 0$, $d_8 \geq 0$ and $d_9 \geq 0$

3. Estimation strategy and results

The equations for expected output and optimal factor inputs (equations 5, 6 and 7) can be substituted into the equations for actual factor

demands (equations 8 and 9). The two resulting non-linear equations cannot be estimated separately as both contain the factor-use coefficient W_1 and the profitability coefficient W_2 of the expected output equation. However, the coefficients of the factor demand equations and W_1 and W_2 can be estimated simultaneously using the minimum-distance estimator. The coefficients W_1 and W_2 were imposed in cases where the regression estimates had the wrong sign, were insignificant or were otherwise unacceptable (e.g. average speeds of adjustment of actual to desired factor demands substantially different from the average over the thirteen countries or troublesome dynamic properties). Dummy variables were included to reflect special factors and also to get more acceptable adjustment speeds -- for details, see the notes to Table 3.

Detailed estimation results for the factor demand equations are reported in Table 3 and summarised in Table 4. As stated above, the output supply elasticity is constrained to unity. The impact of relative factor prices is given by the elasticity of substitution. The estimated values for the excess-demand effect (W_1) range from 0.05 in the case of New Zealand to 0.5 for the Netherlands, with an average of 0.19. The estimates of the profitability elasticity (W_2) vary from 0.02 in the Greek model to 0.34 for the Netherlands, with an average of 0.11.

The estimated lag structures of the employment and investment functions differ from country to country as well. In the labour demand equation, the coefficient attached to current desired labour input (c_4) is generally very high. In two cases (Austria and Denmark), it is unity, implying an instantaneous response of actual to desired employment. In general, labour input would appear to be very flexible. Only for Greece, the Netherlands, Norway and Sweden does labour demand appear to adjust slowly, as attested by the relatively high values of the estimated mean lag. Significant factor disequilibrium effects are present in about half of the country models.

Not surprisingly, the capital stock turns out to be a relatively rigid factor input. The mean lag is relatively long, ranging from 5 years in the case of Greece to nearly 15 years for Norway. In contrast with the employment equations, labour-market disequilibrium affects investment in only three country models (Denmark, Spain and Sweden). There is little evidence to

support the hypothesis of significant factor utilisation or profitability effects on the speed of adjustment, except in a few cases (see Tables 3 and 4).

Having described the total structure and estimation results of the supply block, the consequences on supply of a given permanent demand shock can be set out. A positive demand shock causes expected future output to rise, but initially less than proportionally. This leads to rises in desired and actual factor demands. As a consequence of the less-than-proportional rise in expected future output and the lagged adjustment of actual to desired factor demands, factor utilisation and labour productivity increase. The rise in actual factor demands leads to a rise in normal output and therefore to a further rise in expected future output and desired factor demands. The positive impact of excess demand on profitability reinforces this process. Adjustment continues until actual, normal and expected future output are all equal. However, this analysis is partial as the feed back on aggregate demand from increased factor demand is not taken into account.

IV. SIMULATION PROPERTIES

In order to assess the properties of these new supply blocks for supply behaviour and their impact on the overall simulation properties of the corresponding country models, in which they were to be embedded, a series of shocks were simulated using the Spring 1988 version of the INTERLINK model. To the extent that these tests were carried out in a version which excludes direct supply influences on prices, the simulation properties presented here are only preliminary. The labour efficiency growth has been incorporated in INTERLINK as an exogenous variable. This means that in the simulations technical progress is invariant to changes in the investment ratio. In general, incorporating the new supply blocks results in more consistent reactions of investment and employment to demand and relative-factor price shocks, while bringing simulation properties broadly in line with those of major-country models. Note that the shocks are intended for diagnostic purposes and in no way should be seen as representing feasible policy alternatives. The shocks, given in single-country mode, are:

i) a fiscal (government non-wage expenditure) shock with fixed nominal interest rates and exchange rates;

ii) a monetary (nominal interest rate) shock with fixed exchange rates and fixed real government expenditures;

iii) an exchange-rate shock with fixed nominal interest rates and fixed real government expenditures; and

iv) a nominal wage shock with fixed nominal interest rates, exchange rates and real government expenditure.

The following paragraphs outline some of the key results.

i) A fiscal shock with fixed exchange rates and interest rates produces very different effects in the short and long run. In the short-run, a rise in fiscal expenditures increases domestic demand, thereby exerting upward pressure on the intensity of factor use and therefore, through the increase in planned output, on employment and investment (Table 5). The resulting fall in the unemployment rate leads to a rise in wage and price inflation, further stimulating fixed capital formation (via the implied reduction in real interest rates). On the external side, net exports tend to decrease relative to baseline. Export performance deteriorates due to negative competitiveness effects from wage and price developments; imports are stimulated by the rise in domestic demand.

Over time, the negative contribution to output growth from the foreign sector tends to offset the positive contribution of domestic demand. As a result, output and employment tend to return to baseline levels in line with the theoretical presumption that higher government expenditure should be fully crowded-out in the long-run. But the real effects of a fiscal shock do not vanish over a simulation horizon of 10 years.

ii) A reduction in <u>short-term interest rates</u> produces two different effects: it lowers the cost of borrowing for both consumers and producers, and it improves business profitability. The reduction in borrowing costs for

households boosts private consumption and housing investment (Table 6). Business investment is stimulated through the shift in relative factor prices in favour of capital, through a rise in profitability and through the multiplier/accelerator effect resulting from expansion of consumer demand. The employment response depends on three different factors. First, labour demand is negatively affected by the substitution effect coming from the change in relative factor prices. Second, there is a positive scale effect on employment from the rise in profitability and expected output. Finally, for some countries the disequilibrium in capital demand spills over into higher demand for labour. In most cases employment rises and unemployment falls somewhat. This labour market tightening exerts some upward pressure on nominal wages and prices.

iii) The short-run effects of a devaluation occur through two main channels. First, it reduces the price of exports relative to those of competitors. Second, it raises the cost of imported goods. The improvement in export-price competitiveness stimulates real net exports and therefore expected future output and factor demands (Table 7). The rise in import prices translates into higher price inflation and produces two opposite effects on domestic demand. On the one hand, under the unchanged nominal interest rate assumption, real interest rates fall relative to baseline, thereby expanding interest-sensitive components of domestic demand. On the other hand, with wages lagging behind prices, real labour incomes deteriorate initially, implying a negative impact on private-consumption and housing-investment. In the short-run, the overall private consumption and housing investment response depends on whether the negative real-income effect dominates the positive real-interest-rate effect. Note that, in contrast with the major country models, no separate inflation effect is present in the private consumption equations in most of the small-country models (Holtham and Kato, 1986 and Richardson, 1987). In the very short-run output becomes somewhat more labour-intensive as real wages drop more than real interest rates and capital costs. In the longer run, however, real wages rise due to the increase in total demand and output becomes less labour-intensive.

Over time, competitiveness is eroded by higher price inflation, reducing the growth of net exports and its positive impact on output. As a

result, aggregate price inflation tends to decelerate, and the rise in real wages gradually comes to an end. In the very long run, full price homogeneity can be expected: the terms of trade should return to their initial level and all real variables would be unchanged relative to baseline, with only nominal variables affected.

iv) A wage moderation scenario has been simulated via a cut of one percentage point in the wage rate in the first period (Table 8). This shock produces gains in employment which come through three main channels. First, a reduction in the wage rate encourages firms to substitute labour for capital in the production process. In addition, given that prices lag behind wages, business profitability improves, resulting in higher expected output and factor demands. The improvement in profit conditions occurs even in a context of rising real interest rates, reflecting the combination of the constant nominal interest-rate assumption and the presence of deflationary pressures coming from wage developments. Third, with constant exchange rates, the reduction in labour costs enhances price competitiveness and results in a positive contribution of net exports to output growth. In this context -- favourable substitution, profitability and competitiveness effects -- job creation is stimulated over the medium run. However, in the very short run (first period), some country models show a fall in output. This is primarily due to the negative impact on consumer demand coming from the size of the initial reduction in real wages.

V. POTENTIAL OUTPUT AND EXCESS DEMAND

Apart from the determination of factor demands, a major purpose of the supply blocks is to produce a measure for both potential output and the gap between actual and potential output. Potential output can play a useful role as a summary indicator of aggregate supply, and it does so already in the OECD Secretariat's medium-term projections for the major seven countries (Torres and Martin, 1989). The gap variable is supposed to proxy the degree of excess demand and is a determinant of price-setting behaviour. Potential output in

the business sector (QBVPT) is defined as the level of output from the estimated production function using:

i) the actual level of the business-sector capital stock;

ii) the labour efficiency index; and

iii) potential business-sector employment.

Potential output is defined as the maximum level of output consistent with stable inflation -- see Torres and Martin (1989). Therefore, it seems logical that the level of actual capital stock should affect potential output since it reflects a binding physical constraint. In contrast, it is not desirable to include actual employment in the potential output definition because labour input is subject to strong cyclical fluctuations. Therefore, potential employment is calculated as a function of a geometric moving average of the labour force (the "normal" labour force) and the "non-accelerating wages rate of unemployment" (NAWRU). The NAWRU is defined by resorting to the wage equation in INTERLINK and assuming that real wages grow in line with labour efficiency, that is that real unit labour costs are unchanged through time. This leads to the following definitions of potential employment and potential output:

$$\text{Potential business employment} = \text{"normal" labour force} * (1 - \text{NAWRU}) - \text{general government employment} \quad [10]$$

$$\text{Potential output} = F(\text{potential business employment};\ \text{ELEFF};\ \text{actual capital stock}) \quad [11]$$

where F denotes the production function.

The results of these calculations are shown in Chart 2. In the first panel, the growth rates of actual, normal and potential output are graphed together. In the second part, two measures of capacity utilisation are shown. The ratio of actual to normal output (IFU) indicates the degree of tension with respect to current factor inputs. The ratio of actual to potential

output (IFU2) represents a proxy for excess demand. Finally, in the bottom panel, labour productivity growth and labour efficiency growth are presented.

Labour-efficiency growth (ELEFF) decelerated in most small economies in the 1970s and 1980s However, in some of the smaller economies there has been a pickup in recent years. Factor utilisation rates reached a record low in the early 1980s and have increased since then. But in 1986, most smaller economies were still experiencing substantial factor underutilisation.

The estimated gaps for some countries are not entirely satisfactory despite the efforts made to get acceptable results. For instance, the decline in labour efficiency growth over time in Australia and Austria may be underestimated, resulting in a marked downward trend in the calculated IFU and estimated business cycles which might be too long. The downward trend in the calculated IFU series for Spain is caused by the NAWRU which is estimated to be relatively constant while the actual unemployment rate rose substantially in the 1980s. This may be a reason to re-examine into the estimation of the NAWRU, although the drop in real unit labour costs in Spain supports the existence of excess labour supply. All in all, these results point to the need for future research.

VI. CONCLUDING REMARKS

This paper describes the new supply blocks for thirteen smaller OECD countries in INTERLINK. The models for these countries have been enriched in four main respects:

i) the investment and employment equations are now consistent in the sense that they are derived from the same theoretical framework;

ii) the role of supply is explicitly recognised, as profitability and technical progress directly influence macroeconomic variables;

iii) demand and relative-factor price shocks yield simulation results which are more in line with those of the major-country models in INTERLINK;

iv) a measure of potential output is derived, thus allowing medium-term analysis of supply developments.

In the next step, revised price blocks for these countries will be incorporated in INTERLINK to bring the modelling of the supply-side into line with that of the major economies. For this reason, simulation properties of the small-country models presented here, though encouraging, are still preliminary and further work is envisaged to improve them.

REFERENCES

Bradley, J. and J. FitzGerald (1988), "Industrial output and factor input determination", European Economic Review, 32.

Bureau du Plan (1989), Maribel II, Brussels.

Carrasco, N. and J.R. Lorente (1988), "Ecuaciones de demanda de trabajo de la economia española, "una aproximación crítica", Apuntes y documentos económicos, March.

Clements, R.T., C.D. Hansen and M.J. Homes (1988), "The Reserve Bank econometric model of the New Zealand economy", Economic Modelling, April.

Det Okonomiske Raad (1985), Danish Monetary Policy in Transition, Copenhagen, September.

Dixon, P.B., B.R. Parmenter, J. Sutton and D.P. Vincent (1982), ORANI: A Multisectoral Model of the Australian Economy, North-Holland.

Easton, B. and K. Patterson (1987), "Interest rates in five macroeconomic models of the U.K.", Economic Modelling, January.

Englander, A.S. and A. Mittelstädt (1988), "Total factor productivity: macroeconomic and structural aspects of the slowdown", OECD Economic Studies, No. 10, Spring.

Gelauff, G.M.M., A.R.M. Wennekers and A.H.M. de Jong (1985), "A putty-clay model with three factors of production and partly endogenous technical progress", De Economist, 133(3).

Helliwell, J., P. Sturm, P. Jarrett and G. Salou (1986), "The Supply Side in OECD's macroeconomic model", OECD Economic Studies, N° 6, Spring.

Holtham, G. and H. Kato (1986), "Wealth and inflation effects in the aggregate production function", OECD Economics and Statistics Department Working Paper, No. 35.

Jarrett, P. and R. Torres (1987), "A revised supply block for the major seven countries in Interlink", OECD Economics and Statistics Department Working Paper, No. 41.

Keese, M. and G. Salou (1990), "A business sector data base for OECD countries", OECD Economics and Statistics Department Working Paper, forthcoming.

Koutsevelis, P. and P. Karadeloglou (1986), "Proposals for the construction of a macroeconomic model for the Greek economy", CPER, mimeo.

Kuipers, S.K. and A.H. van Zon (1982), "Output and employment growth in the Netherlands in the post-war period: a putty-clay approach", De Economist, 130(1).

Muysken, J. and A.H. van Zon (1987), "Employment and unemployment in the Netherlands, 1960-1984: A putty-clay approach", Recherches Economiques de Louvain, 53(2).

Nadiri, M.I. and S. Rosen (1969), "Interrelated factor demand functions.", American Economic Review, 59(4).

Richardson, P. (1987), "Recent developments in OECD's international macroeconomic model", OECD Economics and Statistics Department Working Paper, No. 46.

Richardson, P. (1988), "The structure and simulation properties of OECD's Interlink model", OECD Economic Studies, N° 10, Spring.

Tarkka, J., A. Willman and C. Rasi (1988), "Production and employment in the BOF4 quarterly model of the Finish economy", Bank of Finland Discussion Papers, 14/88.

Torres, R. and J.P. Martin (1989), "Potential Output in the Seven Major OECD Countries", OECD Economics and Statistics Department Working Paper, No. 66.

GLOSSARY

CKL	Dual cost, capital-labour
EBSTAR	Desired business sector employment
ELEFF	Labour efficiency index
ETB	Actual business sector employment
GDPBV	Actual business sector gross output, volume
IBV	Business sector fixed investment, volume
IFU	Intensity of factor utilisation (GDPBV/QBSV)
IFU2	Intensity of factor utilisation (GDPBV/QBVPT)
KBSTAR	Desired business sector fixed capital stock, volume
KBV	Actual business sector fixed capital stock, volume
NAWRU	Non-accelerating-wage rate of unemployment
PGDPB	Deflator for business sector value added
QBSTAR	Expected future business sector output, volume
QBSV	Normal business sector gross output, volume
QBVPT	Potential business sector output, volume
UCC	user cost of capital
WSSE	Total compensation per employee in the business sector

Table 1

PRODUCTION FUNCTION ESTIMATION RESULTS

$$\Delta \ln(GDPBV/ETB) = \tau * POLY(\Delta \text{ real wages}) + b_1 + b_2 \, IBV/KBV(-1) + b_3 \, SPILL$$

$$\Delta \ln(KLEFF) = (b_1 + b_2 \, IBV/KBV(-1) + b_3 \, SPILL)/(1-\tau)$$

$$GDPBV = (XBETA*(KLEFF*ETB)^{**}\rho + XGAMA*KBV^{**}\rho)^{**}(1/\rho)$$

	ASL	OST	BEL	DEN	FIN	GRE	IRE	NET	NZD	NOR	SPA	SWE	SWI
Elasticity of substitution	0.422 (1.9)	0.384 (1.5)	0.473 (7.8)	0.438 (2.6)	0.621 (3.3)	0.630 (5.4)	0.403 (3.2)	0.430 (2.3)	0.443 (2.1)	0.379 (3.2)	0.640 (5.0)	0.414 (3.2)	0.627 (4.5)
Polynominal form (a)	POLY (0,4)	POLY (0,2)	POLY (0,1)	POLY (0,5)	POLY (0,7)	POLY (0,3)	POLY (0,4)	POLY (0,3)	POLY (2,5)	POLY (0,1)	POLY (0,3)	POLY (0,1)	POLY (0,2)
b_1			0.019 (7.2)										
b_2	0.151 (2.5)	0.183 (2.9)		0.131 (2.3)	0.102 (1.7)	0.124 (2.8)	0.251 (3.0)	0.198 (2.7)	0.087 (1.5)	0.034 (0.7)	0.072 (1.8)	0.104 (1.8)	0.051 (1.4)
b_3	0.295 (2.4)	0.146 (1.1)	0.335 (5.7)					0.185 (1.42)					
Autocorrelation coefficients:													
First order:			-0.311 (2.2)	0.702 (5.5)			0.514 (3.9)		-0.57 (4.4)				-0.261 (1.8)
Second order:				-0.362 (3.0)									
Sample	62II-86II	68I-86II	63II-86II	64II-86II	72II-86II	65I-86II	64II-86II	63I-85II	64I-86II	66II-86II	65II-86II	64II-86II	63I-86II
SEE	0.0143	0.0114	0.0075	0.0067	0.0160	0.0155	0.0122	0.0150	0.0321	0.0158	0.0151	0.0201	0.0106
R^2	0.46	0.386	0.658	0.362	0.531	0.620	0.50	0.328	0.43	0.68	0.578	0.254	0.643
DW	1.9	2.07	2.35	2.11	2.03	1.68	1.7	1.94	2.3	2.2	2.27	2.28	2.09
XBETA	0.770E-7 (n.a.)	0.444E-8 (n.a.)	0.205E-6 (10.9)	0.265E-6 (36.0)	0.764E-3 (6.0)	0.107E-2 (34.5)	0.170E-5 (4.0)	0.491E-6 (27.4)	0.106E-4 (16.0)	0.26E-8 (n.a.)	0.415E-3 (55.3)	0.842E-7 (24.5)	0.197E-2 (40.6)
XGAMA	1.429 (n.a.)	1.010 (n.a.)	0.949 (7.5)	0.662 (7.5)	0.450 (1.8)	0.179 (5.7)	3.84 (3.5)	0.656 (7.1)	0.294 (1.1)	1.141 (n.a.)	0.146 (6.2)	1.120 (0.7)	0.238 (6.0)

(a) POLY (a,b) represents the polynomial lag distribution of the real wage terms; a is the degree of the polynomial and b-1 is the number of lags.

NOTES TO TABLE 1

Australia The real wage term is the average of current, twice- and thrice-lagged real wage growth. The embodiment term is defined as the ratio of a five-semester moving-average of non-mining investment to total business capital stock. Also TFP in the United States is smoothed by way of a five-semester moving average. A dummy equal to 1 in 1975II has been included with a coefficient of -0.041 (t=2.8). A dummy equal to 1 in the 1980s has been included with a coefficient of -0.005 (t=1.1).

Austria The real wage term is a moving average of the first, fifth and sixth lagged changes. The b_3 parameter actually applies only to SPILL beginning in 1977. Also, an additional shift on the embodiment parameter b_2 beginning in 1977 with a value of -0.115(t=2.50) was included.

Belgium Dummy variables equal to unity from 1965II to 1967I with constrained coefficient estimate -0.019 and from 1973II to 1986II with coefficient estimate -0.010(t=4.6) were also included.

Denmark An interactive dummy variable is attached to the embodiment term. The coefficient is -0.063(t=1.2). In addition, a dummy equal to one in 1971II-1972I and 1981II-1982I with a coefficient of 0.013(t=3.2) has been added.

Finland The real wage term is the average of current and sixth lag real wage growth. The embodiment term is defined as the ratio of a five-semester moving average of investment to capital stock.

Greece The real wage term is the average of current and twice-lagged real wage growth. The embodiment term applies to all periods other than 1973I-1983II.

Ireland Business output is total domestic business production. The real wage term is the average of current, twice- and thrice-lagged real wage growth. The embodiment term is defined as the ratio of a five semester moving-average of investment to capital stock.

Netherlands The SPILL term is a first-order lag on the difference in productivity growth with the USA. Productivity growth in the United States has been smoothed by way of a five-semester moving average. Rather than current investment (IBV), the embodiment term is defined using a five-semester moving average of IBV. Negative autonomous technical progress for the period 1974II-1981I has been found by way of a shift in the constant term; the coefficient is -0.009(t=1.7).

NOTES TO TABLE 1 (Continued)

New Zealand — Rather than current investment (IBV) the embodiment term is defined using a six-semester moving average of IBV. A dummy equal to 1 in 1966II, 1967I and 1968I and zero otherwise with a coefficient of -0.036(t=2.3) and a dummy equal to 1 in 1977I and zero otherwise with a coefficient of -0.079(t=2.4) have been included.

Norway — The production function only applies to the non-oil, non-shipping business sector. This is consistent with the Desk projection procedures. Additional autonomous technical progress has been included for the period 1964II to 1974II by way of a dummy, the dummy is 1 for the period 1964II-1972II, .8 for 1973I, .6 for 1973II, .4 for 1974I, .2 for 1974II; the coefficient is 0.015(t=2.2). A dummy equal to 1 in 1983I and -1 in 1983II has been included; the coefficient cis .05(t=4.2). A dummy equal to 1 in 1986I and -1 in 1986II has been included; the coefficient is -0.04(t=3.2). A dummy equal to 1 in 1970II and zero otherwise with a coefficient of -0.6(t=3.2), a dummy equal to 1 in 1971II and zero otherwise with a coefficient of -0.4(t=2.1) and a dummy equal to 1 in 1973II and zero otherwise with a coefficient of .04(t=2.6) have been included.

Spain — The real wage term is the average of current and twice-lagged real wage growth. Rather than current investment (IBV) the embodiment term is defined using a four-semester moving average of IBV. A dummy equal to 1 in 1975I, 1984I, 1984II and -2 in 1975II with a coefficient of 0.031(t=5.3) has been included.

Sweden — Rather than current investment (IBV) the embodiment term is defined using a three-semester moving average of IBV. An interactive dummy variable equal to one from 1982I-1983II is attached to the embodiment term; the coefficient is opposite to the one shown in the Table, so that no embodiment effects are present for that period.

Switzerland — The real wage term is the average of current and first-order lag real wage growth. A semestrial dummy equal to unity in 1967I, 1968II, 1969II, 1970I, 1974I, 1975II and 1976II and -1 in the other semesters of those years with parameter estimate 0.021(t=6.9) was also included. Rather than current investment (IBV) the embodiment term is defined using a five-semester moving average of IBV. An interactive dummy equal to one from 1973I to 1976II is attached to the embodiment term; the coefficient attached is opposite to the one shown in the table, so that no embodiment effects are present for that period.

Table 2

Estimates of the elasticity of capital/labour substitution in different national models compared with INTERLINK

Australia	ORANI (Dixon et al.)	0.50
	INTERLINK	0.42
Belgium	MARIBEL (Bureaudeflau)	0.81
	INTERLINK	0.47
Denmark	SMEC (Det Okonomiste Raad)	0.69
	INTERLINK	0.44
Finland	BOF4 (Tarkka et al.)	1.00
	BOF3 (Tarkka et al.	0.58
	INTERLINK	0.62
Greece	MYKL (Koutsevelis and Karadeloglau)	0.50
	INTERLINK	0.63
Ireland	Bradley and FitzGerald	0.32
	INTERLINK	0.40
Netherlands	Muysken and Van Zon	0.38
	Kuipers and Van Zon	0.32
	Gelauff et al.	0.44
	INTERLINK	0.43
New Zealand	Bank of New Zealand (Clements et al.)	0.69
	INTERLINK	0.44

Table 3 – Factor Demand Estimation Results

A. Employment Function

$\ln(ETB) = c_0 + c_1\ln(ETB(-1)) + c_2\ln(ETB(-2)) + c_4\ln(ETB^*) + c_5\ln(ETB^*(-1)) + c_6\ln(ETB^*(-2)) + c_7\Delta\ln(IFU(-j)) + c_8\Delta\ln(PGDPB(-j)/CKL(-j)) + c_9\ln(KBV^*(-j)/KBV(-j-1))$

	ASL	OST	BEL	DEN	FIN	GRE	IRE	NET	NZD	NOR	SPA	SWE	SWI
c_0	0.0046 (1.6)	−0.0102 (11.6)	0.0089 (7.4)	−0.0100 (5.3)	−0.0155 (3.6)	−0.0010 (1.0)	0.0487 (3.9)	−0.0024 (2.2)	0.0118 (1.5)	0.0054 (4.7)	−0.0110 (6.2)	0.0232 (15.7)	−0.0633 (148.1)
c_1	0.3709 (4.5)	0.4479 (7.0)	0.5794 (8.8)		0.6980 (8.5)	0.8424 (16.2)	1.2534 (12.8)	1.6193 (24.5)	0.8198 (i)	0.6955 (15.4)	0.1741 (3.9)	0.5406 (7.2)	0.7996 (21.3)
c_2		0.0236 (i)	−0.1231 (i)				−0.4505 (5.5)	−0.6505 (i)				0.1594 (i)	
c_4	0.6291 (i)	1.0000 (i)	0.6646 (17.0)	1.0000 (i)	0.7090 (14.4)	0.1696 (i)	0.1972 (i)	0.2496 (4.8)	0.7444 (11.7)	0.3045 (i)	0.8259 (i)	0.3000 (i)	0.5000 (i)
c_5		−0.4715 (7.8)	−0.1210 (i)		−0.4070 (i)			−0.2183 (3.9)	−0.5642 (6.4)				−0.2996 (i)
c_6													
c_7						0.0700 (2.6)							
c_8									0.0420 (2.0)j=1				
c_9		0.1292 (8.7)j=0	0.2278 (9.9)j=0	0.1970 (a) (20.3)j=2	0.0300 (b) (i)j=0				0.0336 (4.0)j=1		0.0940 (a) (17.1)j=2		
W_1	0.3000 (i)	0.1038 (10.8)	0.2005 (8.0)	0.1546 (4.6)	0.1870 (3.4)	0.0880 (2.3)	0.3 (i)	0.4972 (3.2)	0.0471 (1.7)	0.08 (i)	0.0883 (i)	0.2345 (3.3)	0.1818 (4.4)
W_2	0.1500 (i)	0.0700 (i)	0.1237 (11.3)	0.0788 (2.9)	0.1000 (i)	0.0200 (i)	0.15 (i)	0.3363 (2.8)	0.1000 (i)	0.10 (i)	0.0253 (1.9)	0.1000 (i)	0.0888 (3.3)
RH01	0.69 (3.8)			0.5609 (4.7)		0.4160 (2.1)						0.7023 (5.31)	
SMPL	69I–85II	69II–86I	69I–86I	69II–85II	72II–86I	68I–86I	70I–86II	71I–85II	69II–86II	68I–86II	71II–85II	74II–85II	69I–85II
SEE	0.006	0.0019	0.0015	0.0029	0.0042	0.0038	0.0074	0.0027	0.0050	0.0074	0.0032	0.0026	0.0026
R^2	0.988	0.9930	0.9985	0.9965	0.9748	0.9906	0.967	0.9946	0.9949	0.9778	0.9985	0.9890	0.9926
DW		2.46	1.72	1.58	2.32	1.61					1.62	1.65	1.58
h	0.3	−1.59	0.77	0.46	−0.88	0.85	1.1	1.2	0.3	0.1	0.99	0.88	1.20
Mean lag (c)	0.6	0	0.39	0	0.50	4.90	1.8	3.2	1.4	2.3	0.21	2.86	0.40
Median lag (c)	0	0	0	0	0	3	2	2	0	1	0	2	0

(a) $\ln(KBV^*(-2)-KBV(-2))$ (b) $\ln(KBV^*(-2)-KBV(-2))$ (c) semesters (i) = coefficient imposed.

Table 3 (Continued) – Factor Demand Estimation Results

B. Investment Function

$\ln(KBV) = d_0 + d_1\ln(KBV(-1)) + d_2\ln(KBV(-2)) + d_3\ln(KBV(-3)) + d_4\ln(KBV^*) + d_5\ln(KBV^*(-1)) + d_7\Delta\ln(IFU(-j)) + d_8\Delta\ln(PGDPB(-j)/CKL(-j)) + d_9\ln(ETB^*(-j)/ETB(-j-1))$

	ASL	OST	BEL	DEN	FIN	GRE	IRE	NET	NZD	NOR	SPA	SWE	SWI
d_0	0.0161 (13.4)	0.0166 (6.0)	0.0011 (2.3)	0.0131 (5.0)	0.0035 (1.2)	0.0137 (4.1)	−0.0004 (0.0)	0.0084 (7.7)	0.0153 (3.4)	0.0172 (22.4)	0.0266 (9.8)	0.0123 (2.1)	0.0176 (1.8)
d_1	0.9535 (120.6)	1.2584 (13.3)	1.8655 (51.8)	1.6500 (8.9)	1.7530 (30.2)	1.5588 (22.3)	0.9603 (99.4)	1.6327 (44.7)	1.7627 (23.2)	0.9665 (84.3)	1.6942 (19.2)	1.6671 (18.4)	1.6613 (11.2)
d_2		−0.2973 (3.3)	−0.8706 (i)	−0.9424 (i)	−0.7618 (i)	−0.5958 (i)		−0.6493 (i)	−0.7750 (i)		−0.9453 (i)	−0.6799 (i)	−0.6797 (i)
d_3				0.2687 (2.0)							0.2098 (2.7)		
d_4	0.0465 (i)	0.2400 (7.1)	0.0336 (6.6)	0.0603 (5.7)	0.1020 (4.7)	0.0370 (5.2)	0.0397 (i)	0.0755 (7.8)	0.0123 (3.2)	0.0335 (i)	0.0413 (8.4)	0.0128 (2.4)	0.0184 (1.6)
d_5		−0.2011 (i)	−0.0285 (5.8)	−0.0366 (2.5)	−0.0932 (5.0)			−0.0620 (6.1)					0.0386 (b) (1.8)
d_7			0.0296 (3.6)j=1								0.0113 (1.5)j=2		
d_8													
d_9				0.0377 (2.0)j=1							0.1100 (i)j=0	0.0972 (4.0)j=1	
w_1	0.3000 (i)	0.1038 (10.8)	0.2005 (8.0)	0.1546 (4.6)	0.1870 (3.4)	0.0880 (2.3)	0.3 (i)	0.4972 (3.2)	0.0471 (1.7)	0.08 (i)	0.0883 (5.3)	0.2345 (3.3)	0.1818 (4.4)
w_2	0.1500 (i)	0.0700 (i)	0.1237 (11.3)	0.0788 (2.9)	0.1000 (i)	0.0200 (i)	0.15 (i)	0.3363 (2.8)	0.1000 (i)	0.10 (i)	0.0253 (1.9)	0.1000 (i)	0.0888 (3.3)
RHO1	0.84 (24.0)						1.20 (7.3)						
RHO2							−0.46 (3.0)						
SMPL	69I–85II	69II–86I	69I–86I	69II–85II	72II–86I	68I–86I	70I–86II	71I–85II	69II–86II	68I–86II	71II–85II	74I–85II	69I–85II
SEE (a)	0.0126	0.0264	0.0127	0.0185	0.0250	0.0391	0.0282	0.0130	0.0355	0.0775	0.0333	0.0256	0.0297
R^2	1.0000	0.9999	1.0000	0.9999	0.9999	0.9999	1.0000	1.0000	0.9999	0.9996	0.9999	0.9998	0.9999
DW		1.87	1.94	1.59	2.26	1.72					1.96	1.86	1.80
h	−0.8	0.40	−0.10	n.a.	−0.73	0.75	0.7	0.3	1.0	−0.2	0.09	−0.30	0.97
Mean lag (c)	20.5	11.89	18.68	22.29	11.72	9.92	24.2	20.7	17.2	28.8	10.41	24.01	14.31
Median lag (c)	14	5	15	14	8	7	17	12	14	20	7	17	9

(a) SEE*mean(KBV/IBV) (b) $\ln(KBV^*(-1)/KBV^*(-2))$ (c) in semesters.

NOTES TO TABLE 3

FACTOR DEMAND DUMMY VARIABLES

Country	Values (1 unless otherwise indicated)	Parameter Estimate	t-ratio
Employment functions			
Australia	1971I	-0.0085	(2.2)
	1974II	0.0093	(2.4)
	1982II-1983I	-0.0084	(2.2)
Austria	1978I	0.0033	(2.5)
Belgium	1975II; -1 in 1975I	0.0027	(3.3)
	1969II	0.0038	(5.9)
Denmark	1972I; -1 in 1971I	-0.0065	(3.8)
Finland	1978I	-0.0084	(2.5)
Ireland	1978II-1979I	0.0272	(5.6)
Greece	1973II, 1974I	-0.0190	(6.2)
Netherlands	1981I, 1981II	-0.0078	(5.0)
New Zealand	1979I;	0.0087	(2.1)
Norway	1976I	.0272	(4.2)
	1972I-1972II	.0195	(4.2)
	1982I-1984II	-.0151	(5.1)
Switzerland	1976I; -1 in 1975I and 1975II	0.0109	(8.6)
Sweden	1980I; -1 in 1980II	0.0074	(7.9)
Investment Functions			
Australia	1970I	0.0024	(6.7)
	1975I	0.0030	(4.3)
	1980II-1982I	0.0024	(5.3)
Belgium	1971I, 1976II, 1980I, 1981II, 1983II, 1984I; -1 in 1971II, 1976I, 1980II, 1981I, 1983I, 1984II	0.0017	(9.7)
Finland	1975I; -1 in 1975II, 1976I	0.0032	(4.2)
	1973II	0.0055	(4.2)
Greece	1973II, 1974I	0.0052	(2.0)
Ireland	1983I-1986II	-0.0027	(2.2)
Netherlands	1972II	-0.0024	(5.6)
	1981I, 1981II	-0.0012	(2.6)
	1976I	-0.0044	(7.8)
Norway	1973I	-0.0128	(3.0)
	1982I-1984II	0.0182	(4.2)
Switzerland	1970I, 1975II; -1 in 1970II, 1975I	0.0029	(3.7)

Table 4

DETERMINANTS OF LABOUR AND CAPITAL DEMAND

	AUL	OST	BEL	DEN	FIN	GRE	IRE	NET	NZD	NOR	SPA	SWE	SWI	Simple Mean
Elasticity of desired labour and capital demand relative to:														
Output supply	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Relative factor prices	0.422	0.384	0.473	0.438	0.621	0.630	0.403	0.430	0.443	0.379	0.640	0.414	0.627	0.484
Factor utilisation	0.300	0.104	0.201	0.155	0.187	0.088	0.300	0.497	0.047	0.080	0.088	0.235	0.182	0.190
Profitability	0.150	0.070	0.124	0.079	0.100	0.020	0.150	0.336	0.100	0.100	0.025	0.100	0.089	0.111
Mean lag (a)														
Labour demand	0.6	0	0.4	0	0.5	4.9	1.1	3.2	1.4	2.3	0.2	2.9	0.4	1.4
Capital demand	20.5	11.9	18.7	22.3	11.7	9.9	24.2	20.7	17.2	28.8	10.4	24.0	14.3	18.0
Temporary effects on labour demand (b)														
Factor utilisation	..	..	..	..	..	0.070	..	..	..	..	..	..	..	..
Profitability	..	..	..	..	..	..	..	..	0.042	..	..	..	..	..
Temporary effects on capital demand (b)														
Factor utilisation	..	..	0.030	..	..	..	..	..	..	..	0.011	..	..	..
Profitability	..	..	..	..	..	..	..	..	..	..	..	..	..	..

a) The mean lag represents the number of semesters which are required for the representative firm, on average, to adjust actual factor demands to their desired levels.

b) These effects are nil in the long run. The figures represent impact elasticities.

Table 5

Single-country effects of an increase in government expenditure with fixed nominal interest rates and exchange rates (a)
(percentage differences from baseline)

	Australia	Austria	Belgium	Denmark	Finland	Greece	Ireland	Netherlands	New Zealand	Norway	Spain	Sweden	Switzerland
Real GDP/GNP													
Year 1	1.1	0.8	0.4	0.8	1.0	0.9	0.3	0.6	0.5	0.6	1.2	0.7	0.7
Year 2	1.3	0.7	0.4	0.9	1.1	1.0	0.4	0.8	0.5	0.6	1.9	0.8	0.8
Year 5	1.6	0.5	0.4	0.8	0.9	1.0	0.4	0.7	0.5	0.6	2.1	0.4	0.8
Real total domestic demand													
Year 1	1.3	1.4	1.1	1.2	1.4	1.2	0.9	1.1	1.1	1.2	1.5	1.1	1.2
Year 2	1.6	1.4	1.2	1.5	1.5	1.4	1.0	1.5	1.1	1.2	2.4	1.3	1.4
Year 5	2.2	1.4	1.3	1.4	1.5	1.6	0.9	1.3	1.2	1.2	2.7	1.0	1.5
Real total private investment													
Year 1	0.6	1.0	0.2	1.0	0.9	0.3	0.1	0.4	0.1	0.0	1.1	0.3	0.3
Year 2	0.9	0.5	0.4	1.8	1.1	0.8	0.2	0.7	0.2	0.1	4.1	1.0	0.7
Year 5	1.5	0.7	0.5	0.9	1.2	2.3	0.3	0.6	0.5	0.4	5.0	-1.0	1.2
GDP/GNP deflator													
Year 1	0.0	0.1	0.0	0.0	-0.1	0.5	0.1	0.0	0.2	0.0	0.2	0.2	0.2
Year 2	-0.1	0.4	0.0	0.1	0.2	0.8	0.2	-0.1	0.4	0.1	0.4	0.5	0.4
Year 5	0.8	1.2	0.1	0.7	1.1	1.1	0.2	0.0	0.8	0.5	0.2	0.8	0.7
Wage rate													
Year 1	0.2	0.5	0.2	0.1	0.4	0.2	0.1	0.0	0.2	0.0	0.4	0.4	0.3
Year 2	0.5	0.9	0.2	0.4	1.1	0.6	0.2	0.1	0.5	0.1	1.2	1.3	0.6
Year 5	2.2	1.7	0.6	1.2	2.7	0.7	0.2	0.3	1.1	0.5	1.6	1.7	1.1
Unemployment rate (b)													
Year 1	-0.3	-0.2	-0.1	-0.3	-0.2	0.0	0.0	-0.1	-0.1	0.0	-0.3	-0.1	-0.1
Year 2	-0.5	-0.1	-0.2	-0.6	-0.3	-0.1	-0.1	-0.2	-0.1	-0.1	-0.7	-0.2	-0.1
Year 5	-0.5	0.1	-0.2	-0.5	-0.2	-0.1	-0.1	-0.3	-0.1	-0.2	-1.6	0.2	-0.1
Current balance (U.S.$ billion) (b)													
Year 1	-0.4	-0.5	-1.0	-0.4	-0.2	-0.2	-0.1	-0.7	-0.1	-0.3	-0.6	-0.6	-0.5
Year 2	-0.6	-0.5	-1.1	-0.4	-0.3	-0.2	-0.2	-1.1	-0.1	-0.4	-1.1	-0.8	-0.6
Year 5	-1.4	-0.6	-1.4	-0.5	-0.4	-0.3	-0.2	-1.0	-0.1	-0.6	-1.3	-0.7	-0.8

a) An increase in government non-wage expenditures equivalent to 1 per cent of baseline real GNP/GDP.
b) Level deviation from baseline.

Table 6

Single-country effects of a percentage point decrease in short-term interest rates with fixed exchange rates and fixed real government expenditures (percentage differences from baseline)

	Australia	Austria	Belgium	Denmark	Finland	Greece	Ireland	Netherlands	New Zealand	Norway	Spain	Sweden	Switzerland
Real GDP/GNP													
Year 1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Year 2	0.0	0.2	0.0	0.2	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.1
Year 5	0.1	0.3	0.1	0.4	0.1	0.4	0.2	0.2	0.0	0.3	0.0	0.2	0.4
Real total domestic demand													
Year 1	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
Year 2	0.0	0.3	0.0	0.3	0.0	0.1	0.1	0.1	0.0	0.2	0.0	0.1	0.2
Year 5	0.1	0.6	0.1	0.7	0.1	0.6	0.4	0.3	0.0	0.4	0.2	0.2	0.7
Real total private investment													
Year 1	0.0	0.4	0.1	0.2	0.0	0.1	0.1	0.1	0.0	0.2	0.1	0.0	0.2
Year 2	0.1	1.0	0.4	0.8	0.1	0.5	0.3	0.2	0.0	0.5	0.1	0.2	0.7
Year 5	0.3	2.5	1.4	1.8	0.5	2.9	1.5	0.7	0.0	1.4	0.6	0.9	2.3
GDP/GNP deflator													
Year 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Year 2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Year 5	-0.3	0.2	0.0	0.2	-0.1	0.4	0.1	0.0	0.0	-0.2	0.5	0.0	0.1
Wage rate													
Year 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Year 2	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Year 5	-0.4	0.3	0.0	0.4	0.0	0.2	0.2	0.0	0.0	-0.3	0.6	0.0	0.1
Unemployment rate (a)													
Year 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Year 2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Year 5	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.1	0.5	0.0	0.1
Current balance (U.S.$ billion) (a)													
Year 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
Year 2	0.0	-0.1	0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2
Year 5	0.0	-0.2	0.1	-0.1	0.0	-0.1	0.0	-0.2	0.0	-0.1	-0.2	-0.1	-0.5

a) Level deviation from baseline.

Table 7

Single-country effects of a 10 per cent effective depreciation with fixed nominal interest rates and fixed real government expenditures
(percentage differences from baseline)

	Australia	Austria	Belgium	Denmark	Finland	Greece	Ireland	Netherlands	New Zealand	Norway	Spain	Sweden	Switzerland
Real GDP/GNP													
Year 1	0.6	0.9	0.5	0.6	0.1	-0.1	0.3	0.8	0.4	1.1	0.7	0.6	0.8
Year 2	1.2	3.1	1.9	2.0	1.5	0.9	0.8	1.8	0.5	2.1	3.2	1.8	2.4
Year 5	1.1	2.2	2.1	1.4	1.5	2.2	1.4	0.6	0.5	1.7	4.4	1.0	2.9
Real total domestic demand													
Year 1	-0.1	0.1	-0.6	0.2	-0.6	-0.9	-0.9	-0.3	-0.6	0.2	-0.3	-0.1	-0.3
Year 2	0.1	1.9	0.1	1.3	0.2	-0.6	-0.6	-0.1	-0.5	1.1	1.4	0.8	0.9
Year 5	0.6	2.7	0.6	1.0	1.6	1.0	0.2	0.7	-0.7	2.4	3.4	0.1	2.9
Real total private investment													
Year 1	0.1	1.4	0.0	0.7	-1.1	-0.6	-0.2	-0.4	-0.1	0.4	0.3	0.5	-0.2
Year 2	0.8	5.5	2.2	4.5	1.1	0.6	0.8	1.7	0.3	2.2	5.3	3.1	2.2
Year 5	1.8	7.5	6.7	3.7	6.7	7.7	3.4	3.6	1.4	6.5	11.6	-2.3	7.7
GDP/GNP deflator													
Year 1	0.5	1.0	1.4	1.4	1.9	2.2	3.0	0.3	2.7	2.8	0.7	2.1	1.7
Year 2	1.9	3.6	4.5	3.4	4.9	4.3	5.5	4.6	6.7	5.2	2.8	5.4	4.7
Year 5	6.2	10.8	9.7	8.1	11.1	5.4	6.2	12.5	4.9	12.0	4.6	7.6	7.3
Wage rate													
Year 1	0.8	1.1	1.3	1.6	1.3	1.9	1.3	0.9	2.1	1.5	0.7	2.6	1.7
Year 2	2.4	5.7	4.5	4.1	5.0	3.9	2.5	4.3	5.6	4.1	3.0	8.2	5.5
Year 5	7.2	14.2	11.3	9.5	16.0	4.7	3.0	12.7	3.6	11.5	8.1	11.0	9.0
Unemployment rate (a)													
Year 1	-0.2	-0.6	-0.5	-0.4	-0.5	0.0	-0.2	-0.1	-0.2	-0.2	-0.4	-0.2	-0.2
Year 2	-0.5	-1.1	-1.0	-0.9	-1.2	0.0	-0.5	-0.5	0.1	-0.5	-1.3	-0.4	-0.4
Year 5	-0.3	0.2	-2.7	-0.7	-0.6	0.0	-0.9	-0.6	0.0	-0.9	-3.1	0.9	-0.4
Current balance (U.S.$ billion) (a)													
Year 1	0.8	-0.2	0.2	-0.3	0.0	0.2	0.2	0.0	-0.1	0.1	0.5	0.1	0.0
Year 2	1.7	0.4	1.6	0.1	0.4	0.6	0.3	1.9	0.1	0.3	2.6	0.9	0.5
Year 5	1.4	-0.1	2.3	0.1	0.1	0.4	0.3	0.8	0.1	-0.3	2.0	1.3	-0.3

a) Level deviation from baseline.

Table 8

Single-country effects of a 1 per cent decrease in the wage rate with fixed nominal interest rates and fixed real government expenditures
(percentage differences from baseline)

	Australia	Austria	Belgium	Denmark	Finland	Greece	Ireland	Netherlands	New Zealand	Norway	Spain	Sweden	Switzerland
Real GDP/GNP													
Year 1	-0.1	0.0	-0.1	0.0	0.0	0.1	0.0	0.0	0.1	-0.1	0.0	0.0	-0.1
Year 2	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.3	0.1	-0.1
Year 5	0.1	0.1	0.4	0.0	0.2	0.1	0.2	0.3	0.0	0.2	0.8	0.0	0.1
Real total domestic demand													
Year 1	-0.1	0.0	-0.1	0.0	-0.1	0.0	-0.2	-0.1	-0.1	-0.1	0.0	0.0	-0.2
Year 2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.1	-0.1	-0.2	0.1	0.1	-0.5
Year 5	-0.1	0.0	0.0	-0.3	-0.1	-0.3	-0.1	-0.1	0.1	-0.2	0.5	0.0	-0.4
Real total private investment													
Year 1	-0.1	0.2	-0.1	0.4	0.0	-0.3	-0.2	-0.1	-0.1	-0.1	0.0	0.1	-0.4
Year 2	-0.1	-0.1	-0.3	0.6	-0.3	-0.9	-0.3	-0.2	-0.1	-0.2	0.6	0.4	-1.2
Year 5	-0.2	-0.1	-0.3	-0.5	-0.5	-2.0	-0.4	0.0	0.1	-0.6	2.0	-0.1	-0.9
GDP/GNP deflator													
Year 1	-0.4	-0.1	-0.3	-0.3	-0.5	-1.1	-1.0	-0.5	-1.2	-0.3	-0.8	-0.3	-0.9
Year 2	-0.9	-0.3	-0.6	-0.7	-1.0	-1.5	-1.1	-1.0	-1.1	-0.6	-1.2	-0.2	-1.3
Year 5	1.2	-0.2	-1.0	-1.7	-0.9	-1.3	-1.0	-1.3	0.5	-1.3	-1.7	0.2	-0.9
Wage rate													
Year 1	-1.1	-0.6	-1.2	-1.2	-1.2	-0.6	-1.3	-1.2	-1.4	-1.1	-1.3	-0.7	-1.6
Year 2	-1.3	-0.4	-1.3	-1.6	-1.7	-1.1	-1.4	-1.7	-1.3	-1.2	-1.8	-0.3	-2.1
Year 5	-1.4	-0.2	-1.4	-2.4	-1.5	-0.9	-1.5	-1.8	0.6	-1.8	-2.2	0.5	-1.4
Unemployment rate (a)													
Year 1	-0.1	-0.2	-0.2	-0.4	0.0	0.0	0.0	-0.1	-0.2	-0.1	-0.1	-0.1	-0.1
Year 2	-0.2	-0.1	-0.2	-0.5	0.0	-0.1	-0.1	-0.2	-0.3	-0.1	-0.3	-0.1	-0.2
Year 5	-0.2	-0.1	-0.3	-0.6	-0.4	-0.3	-0.2	-0.4	0.0	-0.2	-1.0	0.0	-0.3
Current balance (U.S.$ billion) (a)													
Year 1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Year 2	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.3
Year 5	0.4	0.1	0.3	0.1	0.1	0.1	0.1	0.4	0.0	0.2	0.5	0.0	0.4

a) Level deviation from baseline.

Chart 1

THE SMALL-COUNTRY SUPPLY BLOCK IN CONTEXT

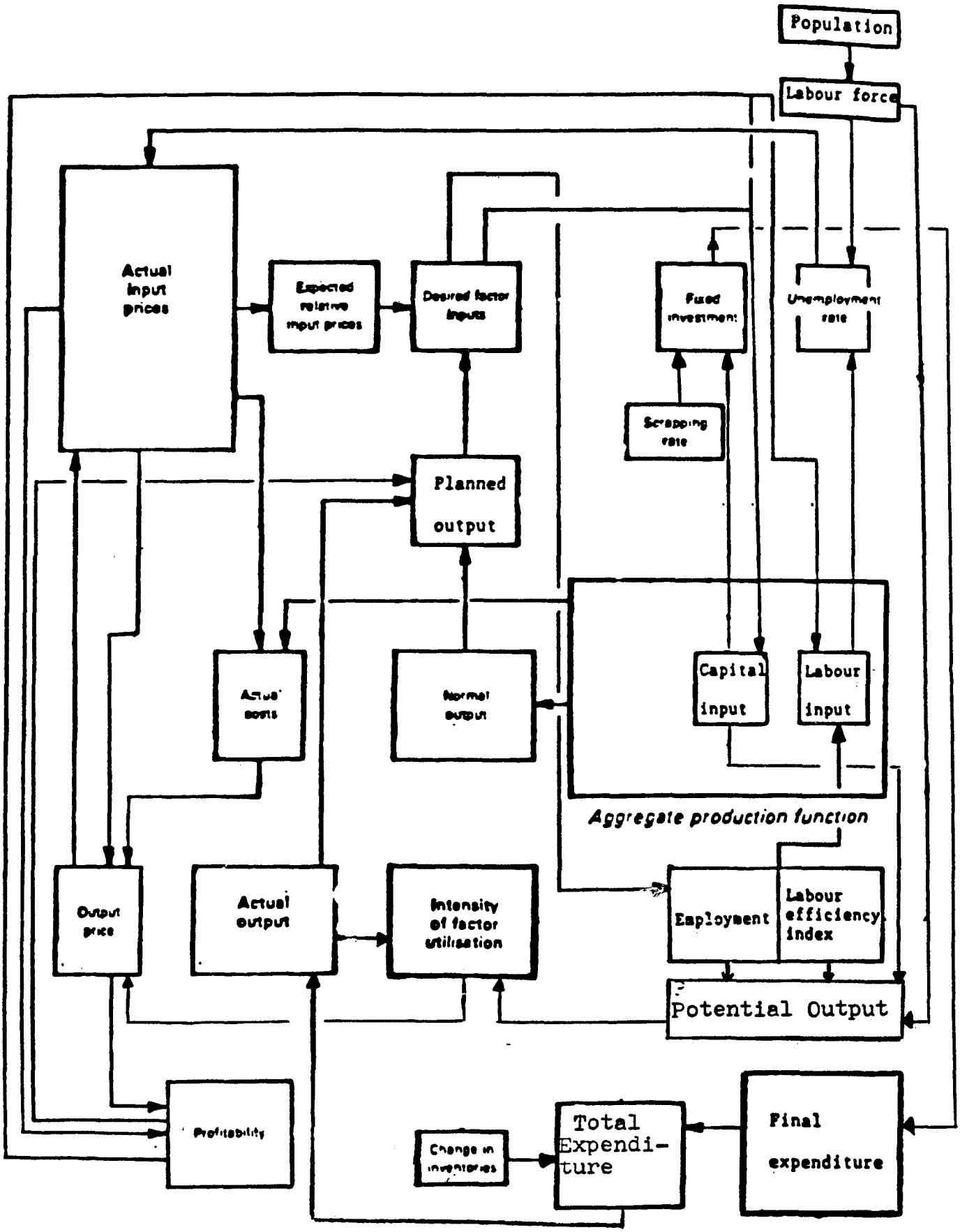


Chart 2

OUTPUT, CAPACITY UTILISATION AND LABOUR PRODUCTIVITY

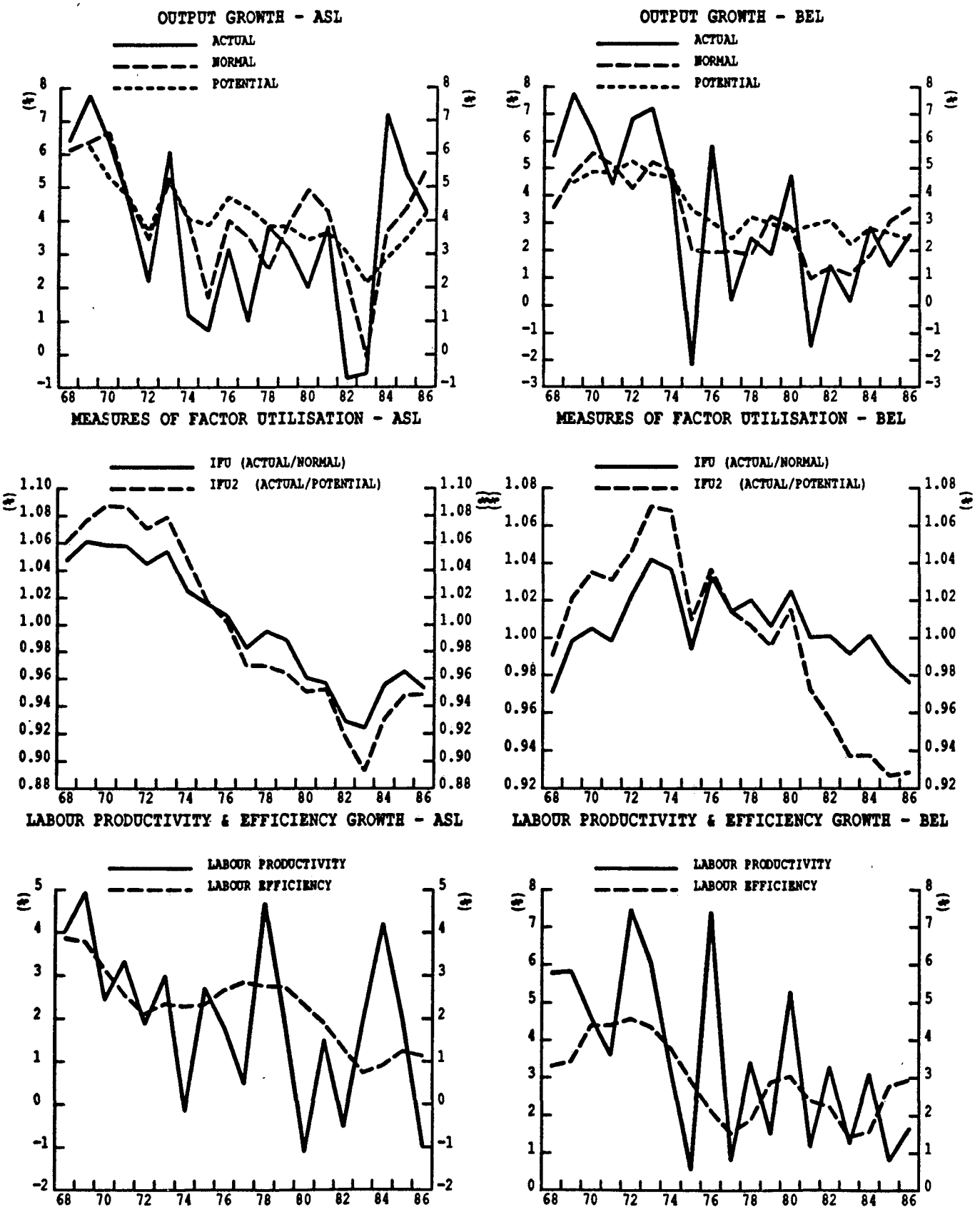
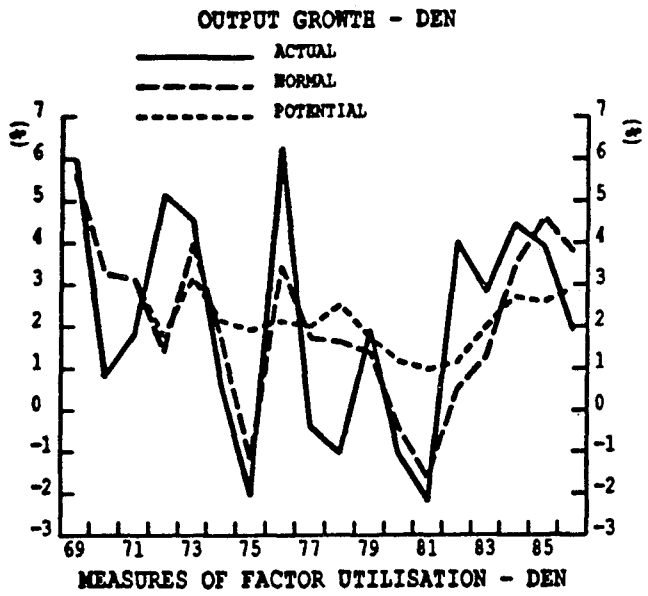
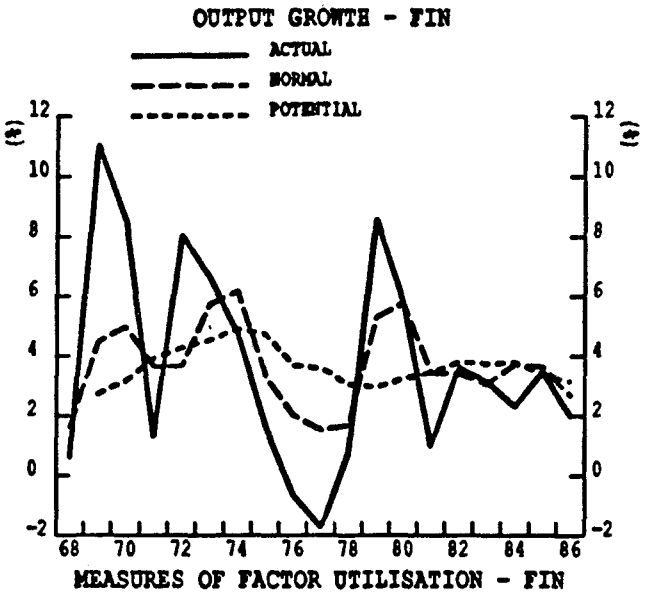
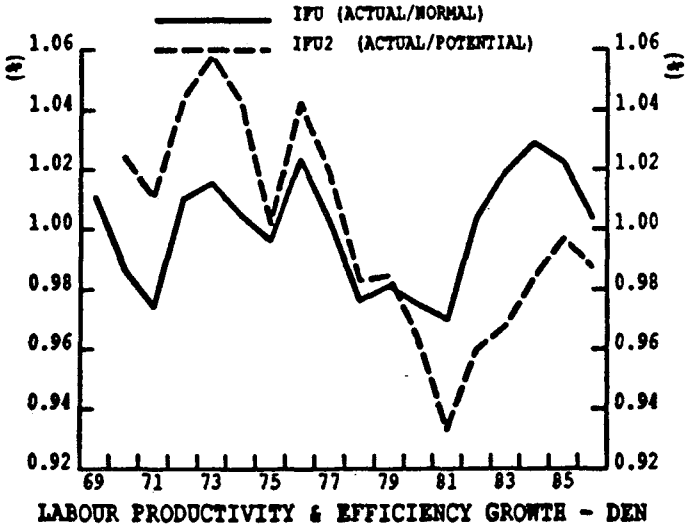


Chart 2 (continued)







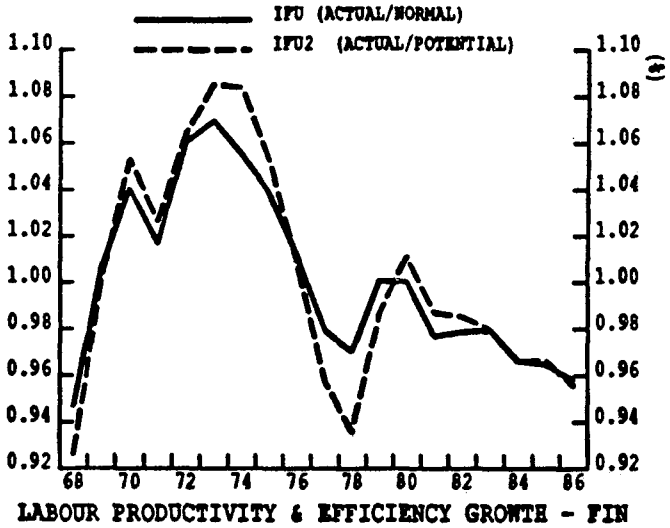
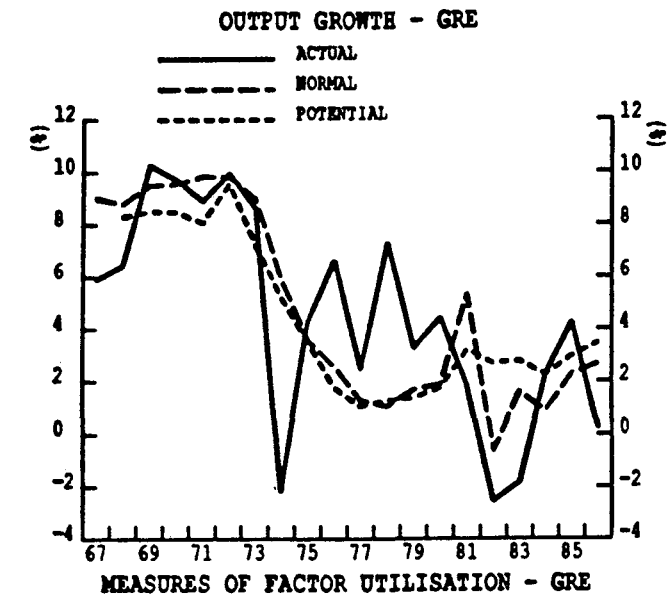
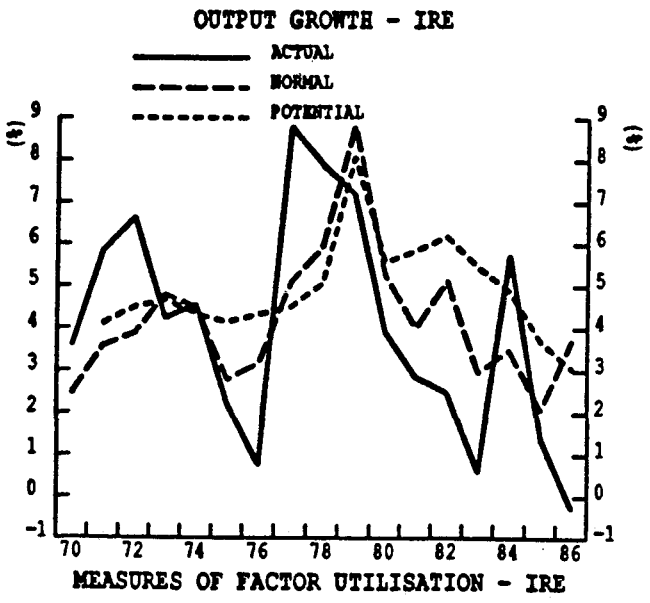


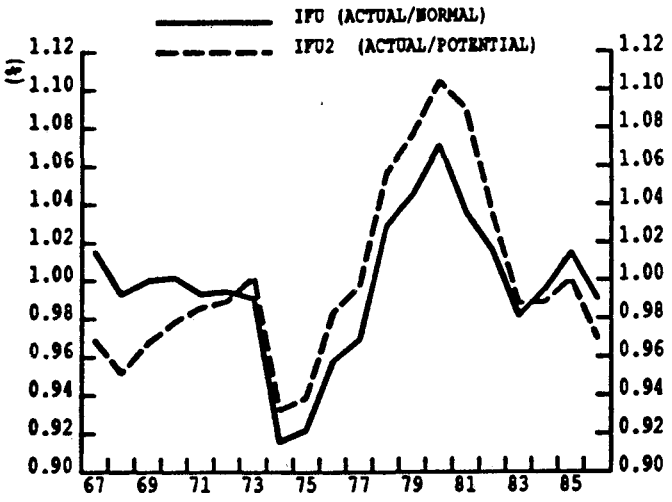
Chart 2 (continued)

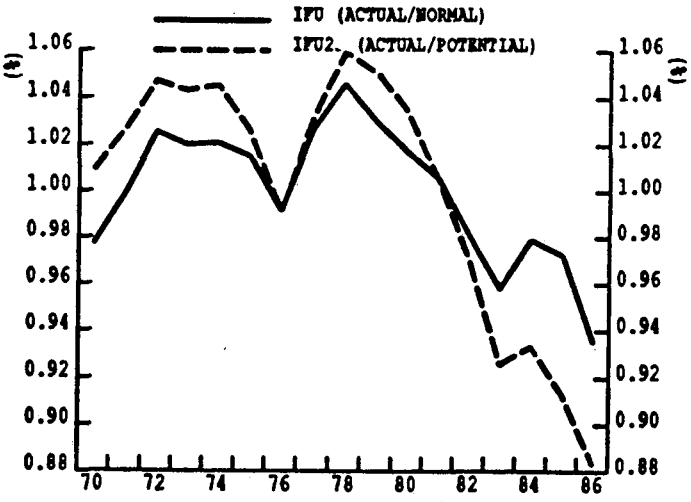




MEASURES OF FACTOR UTILISATION - GRE

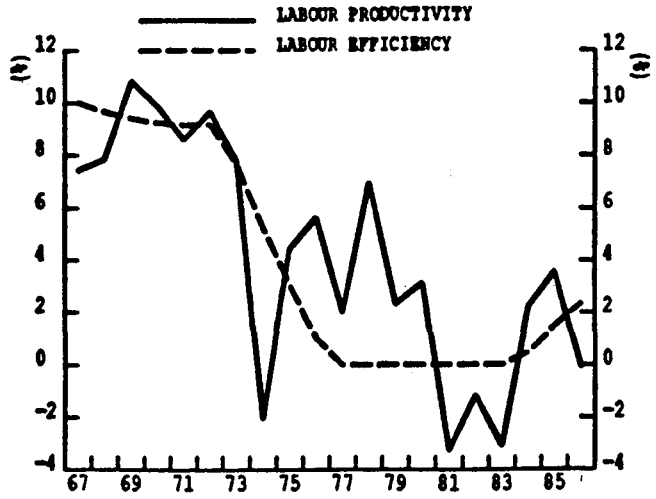
MEASURES OF FACTOR UTILISATION - IRE





LABOUR PRODUCTIVITY & EFFICIENCY GROWTH - GRE

LABOUR PRODUCTIVITY & EFFICIENCY GROWTH - IRE



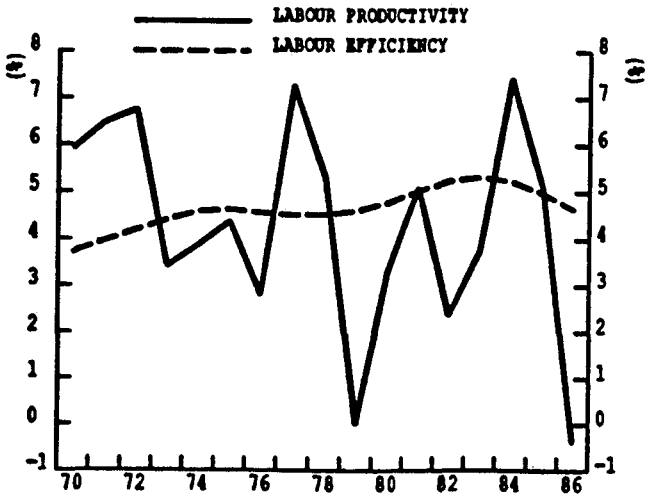
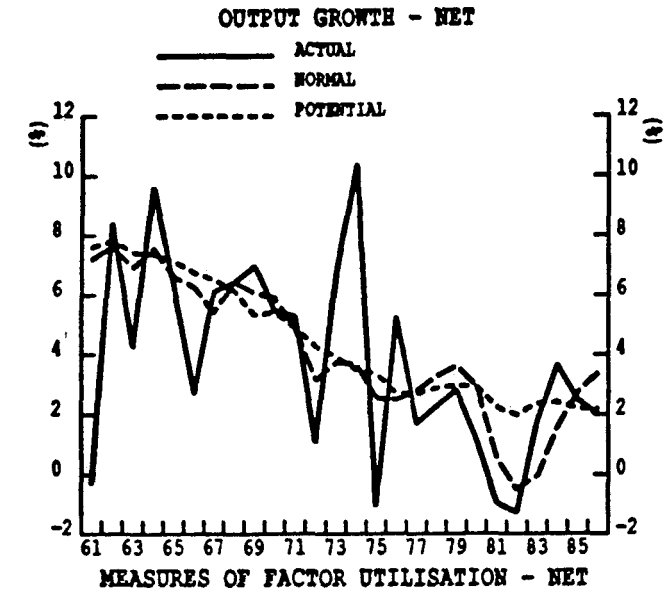
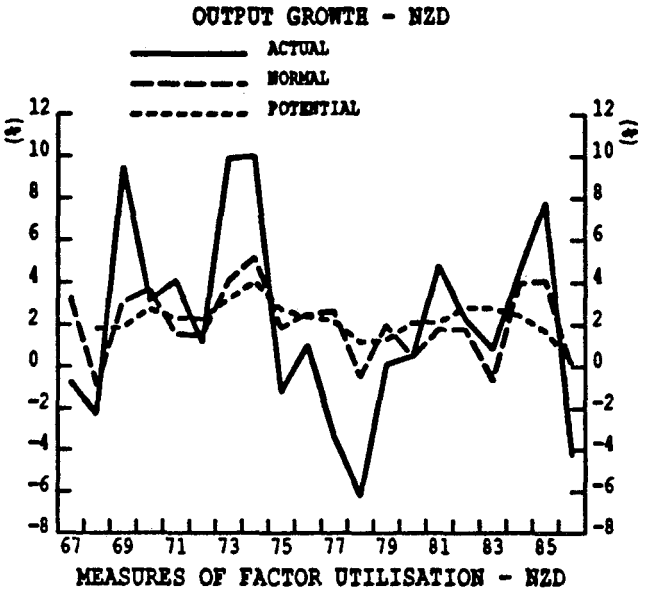
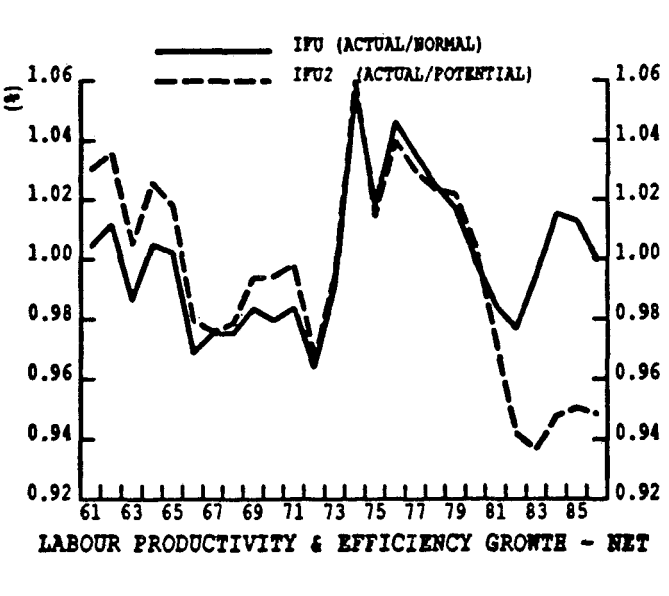
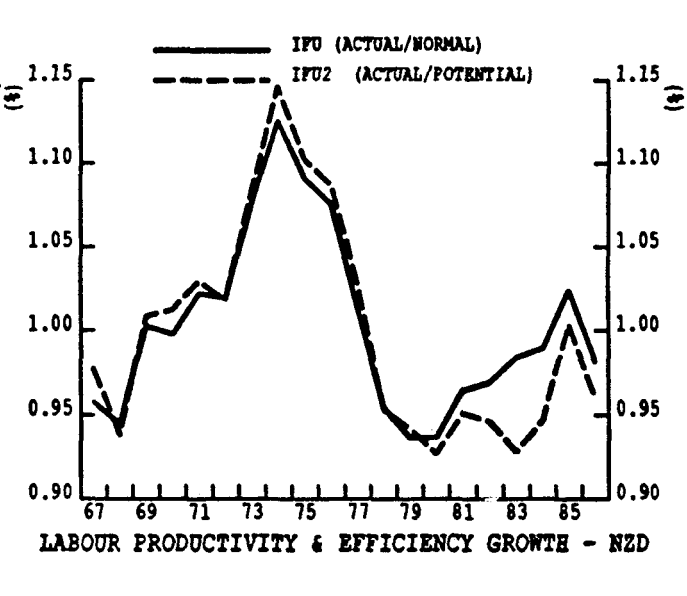


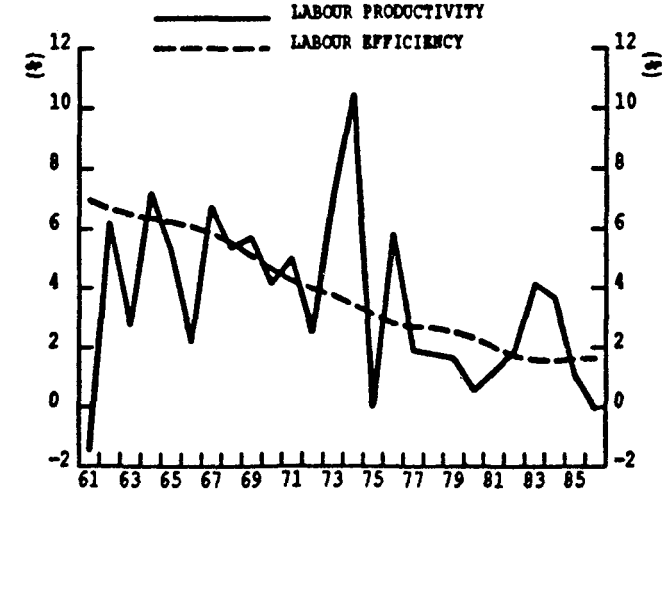
Chart 2 (continued)











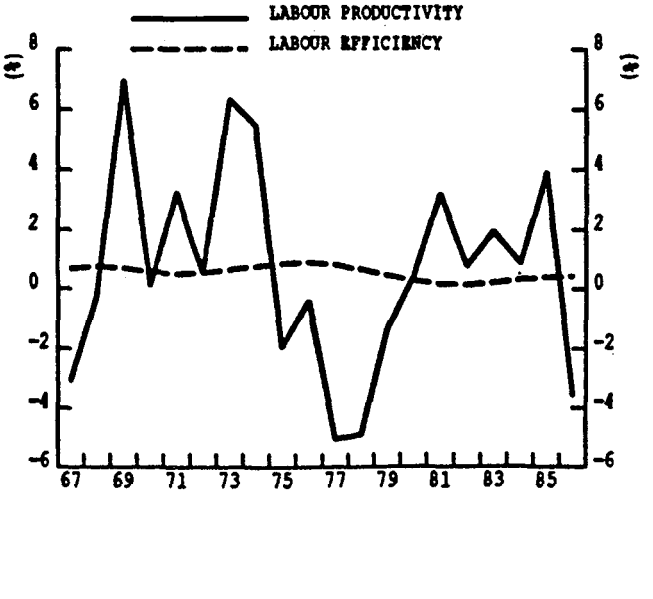
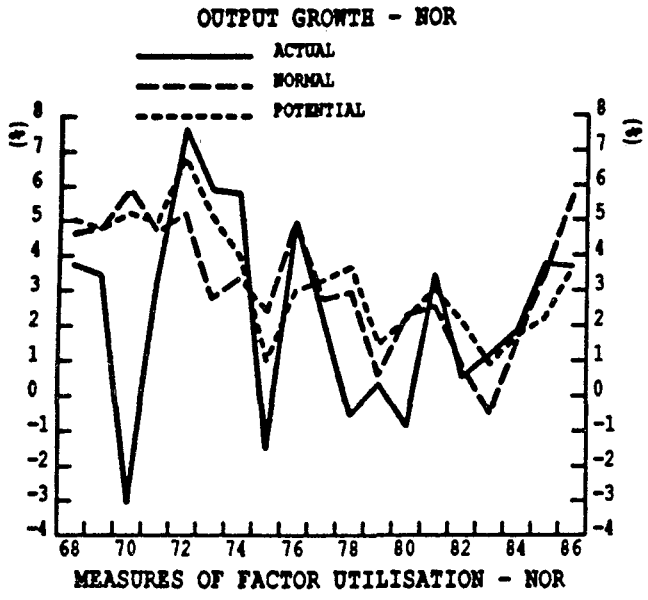
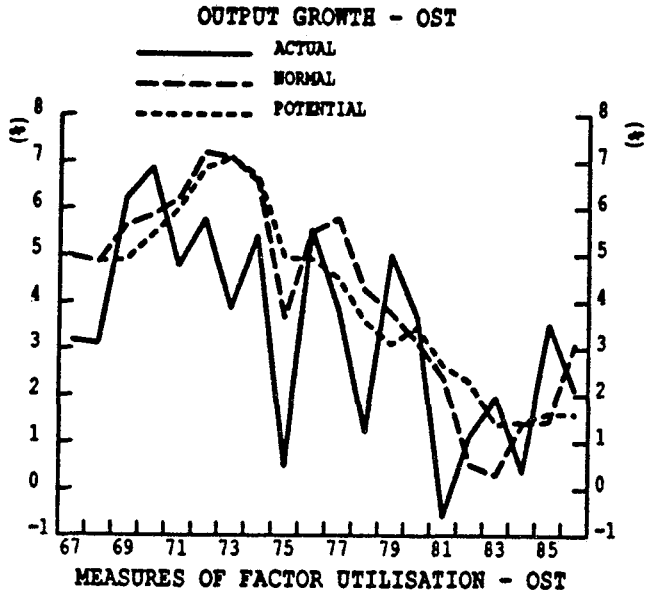
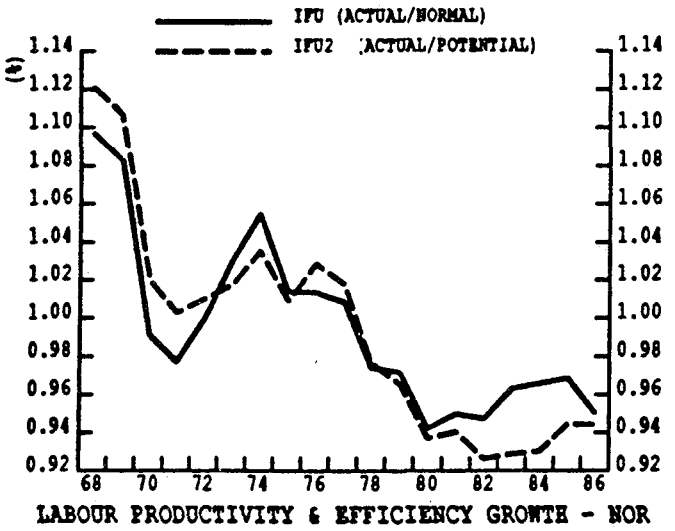
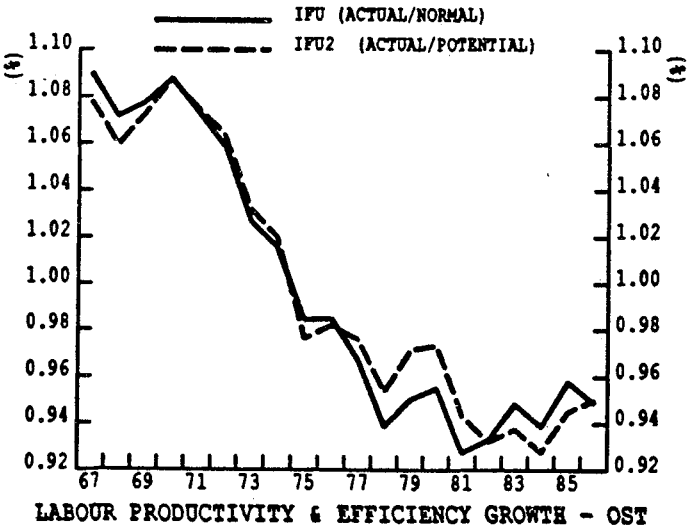


Chart 2 (continued)









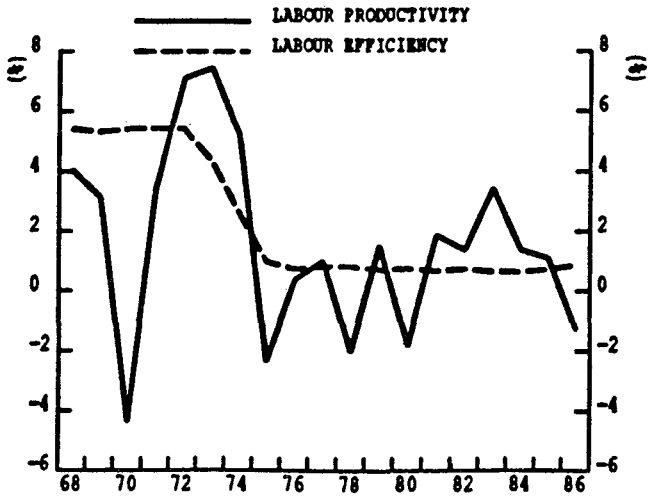
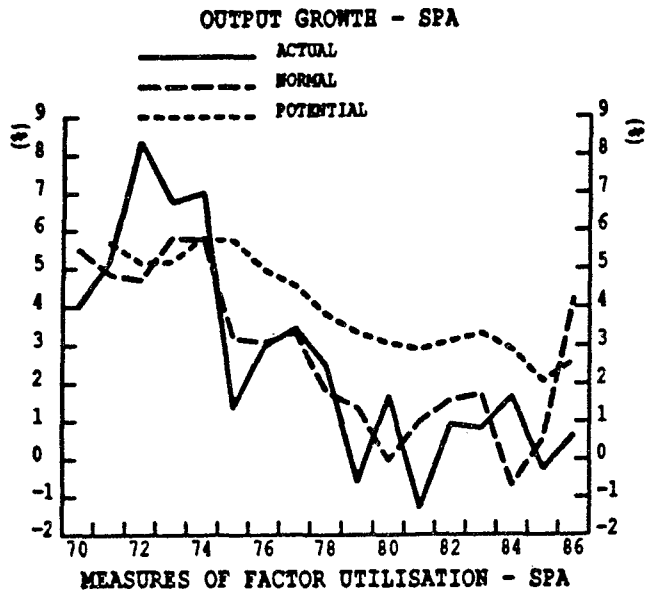


Chart 2 (continued)



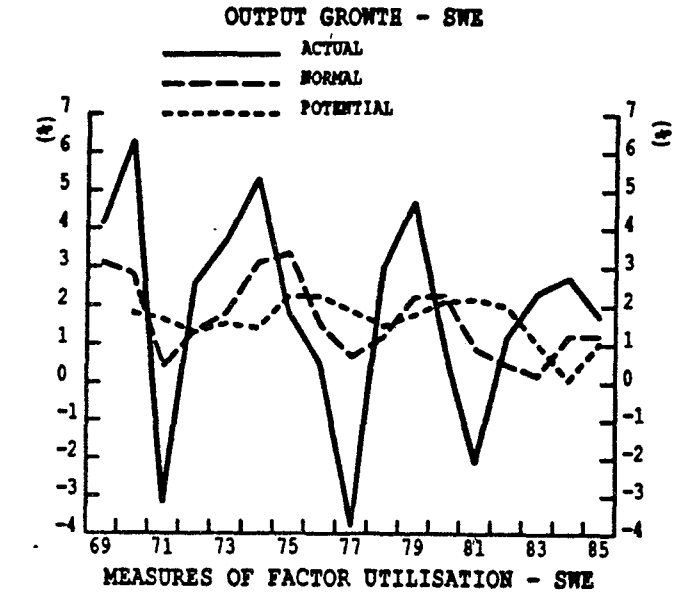
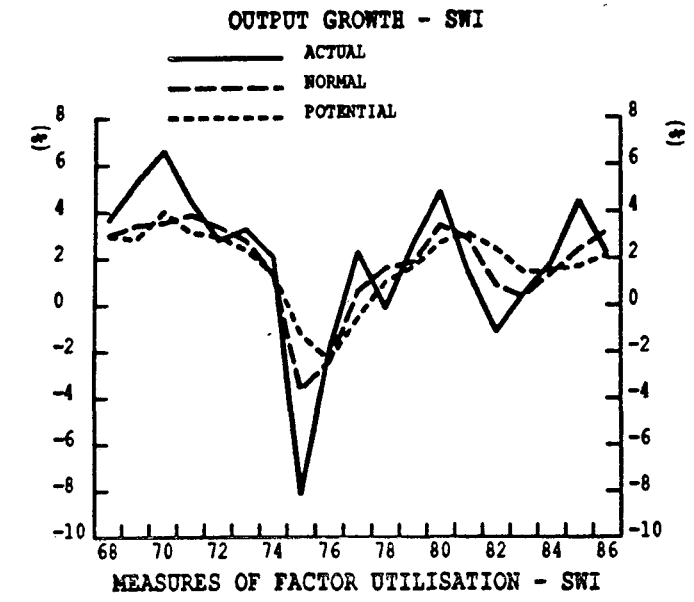
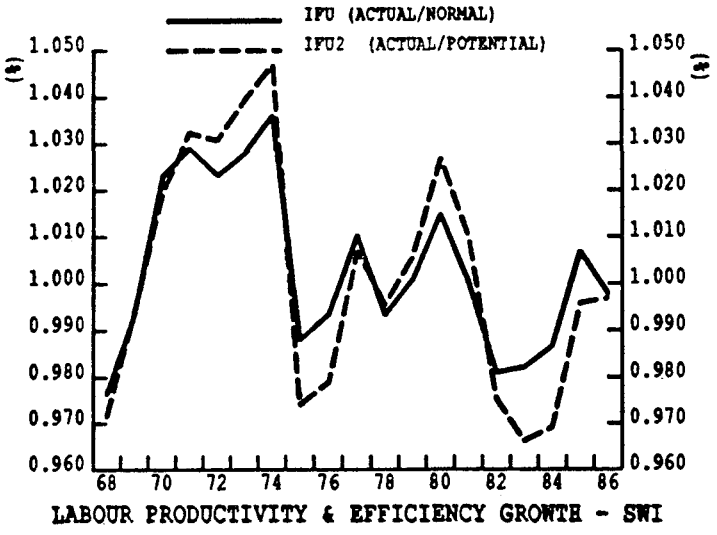
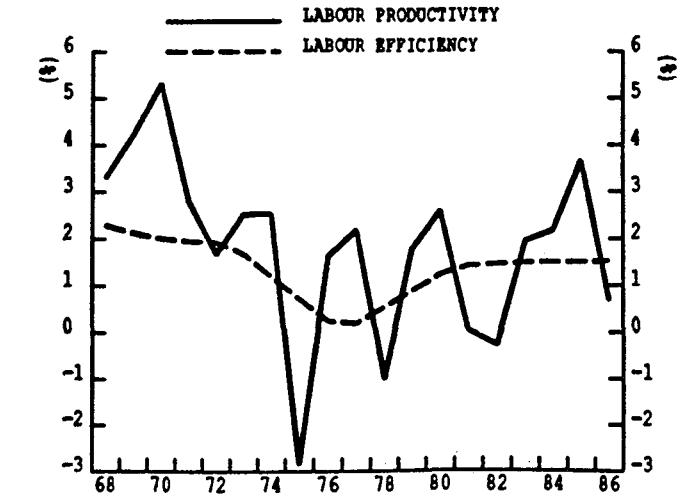


Chart 2 (continued)







ANNEX

BUSINESS SECTOR DATA FOR THE SMALLER OECD COUNTRIES: SOURCES AND METHODS

Introduction

To support the supply-side development of the OECD's international macroeconomic model, INTERLINK, and, in particular, the construction of new supply blocks for most of the smaller OECD countries, a business sector data base has been developed which contains time-series data on a consistent basis for output, investment, the capital stock, employment and factor prices for 20 OECD countries. The only countries not included at present are Iceland, Luxembourg, Portugal and Turkey.

Definitions of the relevant variables are given in the next section and sources are discussed in the final section. Since the supply blocks for the seven major OECD countries have a richer specification than those for the smaller countries, a wider range of data is available for them including, for example, series on business final energy demand and energy prices. However, the discussion here is limited to those variables for which data has been collected for both the smaller and larger OECD economies. A more complete description of this business sector data base (including details on sources and methods for the seven major OECD countries) will be given in a forthcoming working paper by Keese and Salou (1990). It is planned to release a diskette version of the data base for sale at the same time.

Definitions

General definition of the business sector

The business sector has been defined to encompass the activities of the unincorporated and incorporated sectors including public enterprises. The general government sector is excluded as well as dwelling investment by the

household sector (in the case of business fixed investment). Detailed definitions of institutional sectors are given in OECD (1989a).

In the description below of individual business sector variables, standard INTERLINK mnemonics have been used. Volumes are indicated by a "V" at the end of the mnemonic.

Output (GDPB and GDPBV)

Business sector output is defined as gross domestic product at factor cost less output in the general government sector. In nominal terms, it is constructed as

GDPB = GDP - NIT - CGW - CFKG

where

i) GDP is Gross Domestic Product;

ii) NIT refers to net indirect taxes;

iii) CGW is the general government wage bill; and

iv) CFKG refers to general government depreciation allowances.

At constant prices, the corresponding identity is

GDPBV = GDPV - NITV - CGW/PCGW - CFKG/PIG

where

i) GDPV is GDP at constant prices;

ii) NITV is NIT at constant prices (where no national source data exists, NITV has been constructed by applying the implicit aggregate tax rate in the national accounts constant-price base year to the constant-price series for the tax base defined as GDPV-CGW/PCGW);

iii) PCGW is an index of the implicit wage rate in the general government sector; and

iv) PIG is the implicit deflator for general government investment.

For complete consistency, imputed rent to owner-occupiers of dwellings in the household sector should also be removed. However, as data for this item was lacking for the majority of countries, it was decided not to make this adjustment.

Investment (IB and IBV) and the Capital Stock (KBV)

Business sector gross fixed investment is defined to be equal to total gross fixed investment less general government investment and (private) investment in dwellings. For all countries, it accounts for around 1/2 to 2/3 of total investment. The gross capital stock for the business sector corresponds as closely as possible to the above definition of business fixed investment. For many countries no official sources could be found and so it was necessary to construct a series for the gross capital stock "in-house". Where official series did exist, several adjustments were required to bring those series into line with the definitions of the business sector presented here. These problems are discussed further in the following section on sources.

Employment (ETB) and Employees (EEP)

Employment in the business sector is total employment (ET) less general government employment (EG). Employers and self-employed (ES) are then subtracted to obtain business sector employees (EEP).

The Wage Rate (WSSE)

The implicit wage rate in the business sector is constructed by subtracting the general government wage bill from total wages, salaries and supplements (WSSS) and dividing through by business sector employees.

The User Cost Of Capital (UCC)

UCC is constructed as

UCC = PIB * (IRLRE + XRSCRB + XRHOR)

where

i) PIB is the implicit deflator of business gross fixed investment;

ii) IRLRE is the expected real long-term interest rate, constructed as a long smoothed average of the real long-term interest rate (IRLR), itself computed as the long-term nominal interest rate (IRL) less a weighted lagged moving average of the GDP inflation rate;

iii) XRSCRB is the average historical rate of scrapping (RSCRB) of the capital stock; and

iv) XRHOR is a constant which is computed such that on average total factor earnings exhaust total output over the sample period.

Sources

For analytical purposes and in order to meet the requirements of INTERLINK, an analytical data base (ADB) is maintained which collects data directly from national sources as well as other OECD data bases. This was the main source for most variables in the business sector data base. All national accounts variables are generally consistent with the data presented in the OECD's annual national accounts publication, OECD (1989a). Labour force

series have been mainly taken from national statistical publications directly, although the data are, in general, comparable with the series published in Labour Force Statistics, OECD (1989b). Long-term interest rates for the construction of a user cost of capital series have usually been taken from Main Economic Indicators, OECD (1989c).

The collection of appropriate capital stock series posed particular problems for the construction of the business sector data base. Official capital stock estimates for the business sector were not readily available for Austria, Denmark, Ireland, the Netherlands, New Zealand, Spain and Switzerland. In the case of Greece and Norway, net capital stock series were available but not gross series. Therefore, for all these countries it was necessary to make "in-house" estimates of the business sector capital stock using a perpetual inventory method applied to business fixed investment broken down by major type of investment good. Finally, for Australia and Belgium (with minor adjustments) and Finland and Sweden the OECD's capital stocks data base, OECD (1989d), was used as the source for the business sector capital stock series.

REFERENCES

Keese, M. and G. Salou, "A Business Sector data base for OECD Countries", OECD Economics and Statistics Department Working Paper (forthcoming).

OECD (1989a), National Accounts, Volume II, 1975-1987.

OECD (1989b), Labour Force Statistics 1967-1987.

OECD (1989c), Main Economic Indicators.

OECD (1989d), Flows and Stocks of Fixed Capital, 1960-1987.

6.9.89

ECONOMIC AND STATISTICS DEPARTMENT

WORKING PAPERS

In April 1983, the Economics and Statistics Department initiated a new series of economic studies entitled ESD Working Papers.

The following titles have been circulated:

1. Use of Demand Elasticities in Estimating Energy Demand (out of print)
   Utilisation des élasticités de la demande dans l'estimation de la demande de l'énergie

   Axel Mittelstädt

2. Capital, Energy and Labour Substitution: The Supply Block in OECD Medium-Term Models
   Substitution du capital, de l'énergie et du travail : le bloc de l'offre dans les modèles à moyen terme de l'OCDE (épuisé)

   Patrick Artus

3. Wage Formation in France: Sectoral Aspects (out of print)
   Formation des salaires en France : aspects sectoriels (épuisé)

   Patrick Artus

4. Service Lives of Fixed Assets (out of print)
   Durée de vie utile des actifs fixes (épuisé)

   Derek Blades

5. Resource Prices and Macroeconomic Policies: Lessons from Two Oil Price Shocks
   Prix des ressources naturelles et politique macro-économique : les enseignements de deux chocs pétroliers (épuisé)

   John Llewellyn

6. Output Responsiveness and Inflation: An Aggregate Study
   Souplesse de la production et inflation : étude globale

   David T. Coe and Gerald Holtham

7. The Determinants of Exchange Rate Movements (out of print)
Les déterminants des mouvements des taux de change (épuisé)

Graham Hacche

8. Simulated Macroeconomic Effects of a Large Fall in Oil Prices (out of print)
Simulation des effets macro-économiques d'une forte baisse des prix pétroliers

Flemming Larsen and John Llewellyn

9. Medium-Term Financial Strategy: The Co-ordination of Fiscal Monetary Policy (out of print)
Stratégie financière à moyen terme : la coordination des politiques monétaire et budgétaire (épuisé)

Jean-Claudé Chouraqui and Robert Price

10. Price Dynamics and Industrial Structure: A Theoretical and Econometric Analysis (out of print)
Dynamique des prix et structure industrielle : une analyse théorique économétrique (épuisé)

David Encaoua (with collaboration from Paul Geroski and Riel Miller)

11. Evidence on Income Distribution by Governments (out of print)
L'Action exercée par l'Etat sur la redistribution du revenu

Peter Saunders

12. Labour Force Participation: An Analysis with Projections
Taux d'activité : analyse et projections

James H. Chan-Lee

13. The Demand for Money and Velocity in Major OECD Countries (out of print)
La demande de monnaie et la vitesse de circulation dans les grands pays de l'OCDE

A. Blundell-Wignall, M. Rondoni and H. Ziegelschmidt

14. The Conduct of Monetary Policy in the Current Recovery
La conduite de la politique monétaire dans la phase actuelle de reprise économique

Paul Atkinson and Jean-Claude Chouraqui

15. Structural Budget Deficits and Fiscal Stance (out of print)
Déficits budgétaires structurels et orientation de la politique budgétaire (épuisé)

Patrice Muller and Robert W.R. Price

16. Monetary Policy in the OECD INTERLINK Model
La politique monétaire dans le modèle INTERLINK

A. Blundell-Wignall, M. Rondoni, H. Ziegelschmidt and J. Morgan

17. Real Gross Product in OECD Countries and Associated Purchasing Power Parities (out of print)
Produit brut réel et parités de pouvoir d'achat dans les pays de l'OCDE (épuisé)

Peter Hill

18. The OECD Compatible Trade and Production Data Base (out of print)
Base de données compatibles sur le commerce et la production de l'OCDE

Derek Blades and Wendy Simpson

19. Nominal Wage Determination in Ten OECD Economies
Détermination des salaires nominaux dans dix économies de l'OCDE

David T. Coe and Francesco Gagliardi

20. Profits and Rates of Return in OECD Countries
Profits et taux de rendement dans les pays Membres de l'OCDE

James H. Chan-Lee and Helen Sutch

21. Real Interest Rates and the Prospects for Durable Growth
Taux d'intérêt réels et perspectives de croissance durable

Paul Atkinson and Jean-Claude Chouraqui

22. Energy Prices: Trends and Prospects
Les prix de l'energie : évolution et perspectives

Axel Mittelstädt

23. Changes in the Composition of Output and Employment
Changements dans la composition de la production et de l'emploi

Axel Mittelstädt and Françoise Correia

24. Labour Market Flexibility and External Price Shocks
Flexibilité du marché du travail et chocs extérieurs sur les prix

F. Klau and A. Mittelstädt

25. Discrepancies Between Imports and Exports in OECD Foreign Trade Statistics (out of print)
Ecart entre les importations et les exportations dans les statistiques du commerce extérieur de l'OCDE

Derek Blades and Marina Ivanov

26. Aggregate Supply in INTERLINK: Model Specification and Empirical Results

John Helliwell, Peter Sturm, Peter Jarrett and Gérard Salou

27. Commodity Prices in INTERLINK

Gerry Holtham, Tapio Saavalainen, Paul Saunders and Helen Sutch

28. Exchange Rates and Real Long-Term Interest Rate Differentials: Evidence for Eighteen OECD Countries

David T. Coe and Stephen S. Golub

29. Method of Calculating Effective Exchange Rates and Indicators of Competitiveness (out of print)

Martine Durand

30. Public Debt in a Medium-Term Context and its Implications for Fiscal Policy

Jean-Claude Chouraqui, Brian Jones and Robert Bruce Montador

31. The OECD Compatible Trade and Production Data Base 1970-1983

Anders Brodin and Derek Blades

32. The Formulation of Monetary Policy: A Reassessment in the Light of Recent Experience

Paul Atkinson and Jean-Claude Chouraqui

33. Mécanismes de transmission et effets macro-économiques de la politique monétaire en France : les principaux enseignements econométriques

Marc-Olivier Strauss-Kahn

34. Pure Profit Rates and Tobin's q in Nine OECD Countries

James H. Chan-Lee

35. Wealth and Inflation Effects in the Aggregate Consumption Function

G.H. Holtham and H. Kato

36. The Government Household Transfer Data Base

Rita Varley

37. Internationalisation of Financial Markets: Some Implications for Macroeconomic Policy and for the Allocation of Capital

Mitsuhiro Fukao and Masaharu Hanazaki

38. Tracking the US External Deficit, 1980-1985: Experience with the OECD INTERLINK Model

Pete Richardson

39. Monetary Policy in the Second Half of the 1980s: How Much Room For Manoeuvre?

Kevin Clinton and Jean-Claude Chouraqui

40. Tax Reform in OECD Countries: Economic Rationale and Consequences

Bob Hagemann, Brian Jones and Bruce Montador

41. A Revised Supply Block for the Major Seven Countries in INTERLINK

Peter Jarrett and Raymond Torres

42. OECD Economic Activity and Non-Oil Commodity Prices: Reduced-Form Equations for INTERLINK

Gerald Holtham and Martine Durand

43. Import and Export Price Equations for Manufactures

Richard Herd

44. Price Determination in the Major Seven Country Models in INTERLINK

Ulrich Stiehler

45. International Investment-Income Determination in INTERLINK: Models for 23 OECD Countries and Six Non-OECD Regions

David T. Coe, Richard Herd and Marie-Christine Bonnefous

46. Recent Developments in OECD's International Macroeconomic Model

Pete Richardson

47. A Review of the Simulation Properties of OECD's INTERLINK Model

Pete Richardson

48. The Medium-Term Macroeconomic Strategy Revisited

Jean-Claude Chouraqui, Kevin Clinton and Robert Bruce Montador

49. Are Commodity Prices Leading Indicators of OECD Prices?

Martine Durand, Sveinbjörn Blöndal

50. Private Consumption, Inflation and the "Debt Neutrality Hypothesis" The case of Eight OECD Countries

Giuseppe Nicoletti

51. The Effects of Monetary Policy on the Real Sector: An overview of Empirical Evidence for Selected OECD Economies

Jean-Claude Chouraqui, Michael Driscoll and Marc Olivier Strauss-Kahn

52. The So-Called "Non-Economic" Objectives of Agricultural Policy

L. Alan Winters

53. Alternative Solution Methods in Applied General Equilibrium Analysis

Richard G. Harris

54. Tests of Total Factor Productivity Measurement

A. Steven Englander

55. Quantifying the Economy-Wide Effects of Agricultural Policies: A General Equilibrium Approach

Jean-Marc Burniaux, François Delorme, Ian Lienert, John P. Martin and Peter Hoeller

56. On Aggregation Methods of Purchasing Power Parities

J.R. and M. Cuthbert

57. An International Sectoral Data Base for Thirteen OECD Countries

F.J.M. Meyer-zu-Schlochtern

58. Empirical Research on Trade Liberalisation with Imperfect Competition: A Survey

J. David Richardson

59. Eliminating the US Federal Budget Deficit by 1993: the Interaction of Monetary and Fiscal Policy

R. Herd and B. Ballis

60. Compatible Trade and Production Data Base: 1970-1985

Claude Berthet-Bondet, Derek Blades and Annie Pin

61. Ageing Populations: Implications for Public Finances

Robert P. Hagemann, Giuseppe Nicoletti

62. The Economic Dynamics of an Ageing Population: the Case of Four OECD Economies

Alan J. Auerbach, Laurence J. Kotlikoff, Robert P. Hagemann, Giuseppe Nicoletti

63. Modelling Housing Investment for Seven Major OECD Countries

Thomas Egebo and Ian Lienert

64. Revised Groupings for non-OECD Countries in OECD's macroeconomic model INTERLINK

Paul O'Brien, Laure Meuro, Arthur Camilleri

65. A Post Mortem on OECD Short-Term Projections from 1982 to 1987

Byron Ballis

66. Potential Output in the Seven Major OECD Countries

Raymond Torres and John P. Martin

67. Saving Trends and Behaviour in OECD Countries

Andrew Dean, Martine Durand, John Fallon and Peter Hoeller

68. The Impact of Increased Government Saving on the Economy

Richard Herd

69. The Information Content of the Terms Structure of Interest Rates: Theory and Practice

Frank Browne and Paolo Manasse

70. On the Sequencing of Structural Reforms

Sebastian Edwards