WHAT, IF ANYTHING, HAVE WE LEARNED FROM THE RISE OF UNEMPLOYMENT IN BELGIUM, 1974-1983

by

Henri R. SNEESSENS
Chargé de Cours, Universités Catholiques de Louvain et de Lille

Jacques H. DREZE
Professeur, Université Catholique de Louvain

1. FACTUAL PERSPECTIVE

1.1. Belgium comes perhaps closer than any other country to being a "small open economy". Consequently, trends in world trade and export performance have a major impact on domestic activity; whereas the impact of domestic fiscal policy is damped by import leakages.

We wish to acknowledge gratefully the collaboration of Robert Leroy and Serge Wibaut in collecting and organising data, of Fati Mehta in estimating the model of Section 3, and Yves Leruth in preparing auxiliary computations. Responsibility for all the views expressed or omitted here is our own. We also acknowledge the financial support of the Belgian Government under Projet d'Action Concertée, n° 80/85-12.
The rise in Belgian unemployment since 1974 has been appalling, especially if compared to other EEC countries. Table 1 collects a few facts about employment and unemployment over the period 1974-1983. The salient features are:

(i) Male employment has gone down 10% while female employment has gone up 3%; the sharper increase in female unemployment is thus due to the increase in active population.

(ii) The increase in female employment is equal to the number of women in special employment programs; otherwise, there are offsetting movements in public employment (+69,200) and private employment (-71,000) of women.

(iii) The decline in private employment (15.3% altogether) is concentrated (up to 88%) in manufacturing, where the decline is staggering: 29.8% (twenty nine point eight percent)!!

Another useful piece of information concerns hours worked and the evolution of labour inputs in man-hours. In the manufacturing sector, average hours went down 11% in 10 years (1973-83), so that labour inputs went down 37.3%. Taking into account a 15% increase in value added at constant prices, the apparent increase in gross hourly productivity is nearly 85%. In services, average hours went down 9% and gross hourly productivity went up 27%.

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1 Indeed, 70.2 x .89 = 62.5. The figures in this paragraph come from Sonnet (1985).
Table 2 puts this information in an international perspective. The figures do not coincide with those of the previous paragraph, both because the periods are not identical (1974-82 versus 1973-83) and because sources or methods may not be identical. But the broad message is the same. Over the past decade, the apparent increase in gross hourly productivity of Belgian manufacturing has been enormous, and exceptional by international standards. In itself, it accounts for much of the differential rise in Belgian unemployment. That increase in productivity is one of the main facts to be explained, if anything is to be learned from the rise in Belgian unemployment.
TABLE 1: Population and employment, 1974-83, by sex and status

<table>
<thead>
<tr>
<th></th>
<th>MEN</th>
<th>WOMEN</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in 1,000</td>
<td>in %</td>
<td>in 1,000</td>
</tr>
<tr>
<td>Population of working age</td>
<td>3.103,1 + 225,9</td>
<td>7.3</td>
<td>2.827,6 + 199,8</td>
</tr>
<tr>
<td>(men: 15-64, women: 15-59)</td>
<td>84,6 - 45,9</td>
<td>1.8</td>
<td>1.354,2 + 279,9</td>
</tr>
<tr>
<td>Active population</td>
<td>0 + 99,8</td>
<td>0 + 26,4</td>
<td>0 + 126,2</td>
</tr>
<tr>
<td>Participation rates</td>
<td>2.625,1 - 7,1 pt</td>
<td>47,9</td>
<td>67,1 - 0.8 pt</td>
</tr>
<tr>
<td>Early retirements</td>
<td>45,7 + 207,1</td>
<td>51,2 + 241,1</td>
<td>96,9 + 448,2</td>
</tr>
<tr>
<td>Unemployment rates</td>
<td>1,7 - 8,1 pt</td>
<td>3,8</td>
<td>2,4 + 10,5 pt</td>
</tr>
<tr>
<td>Total employment</td>
<td>2.579,4 - 253,0</td>
<td>9.8</td>
<td>2.302,9 + 38,9</td>
</tr>
<tr>
<td>of which special programs</td>
<td>7,6 + 35,4</td>
<td>1,4</td>
<td>40,5</td>
</tr>
<tr>
<td>Public servants</td>
<td>537,4 + 57,9</td>
<td>10.8</td>
<td>262,0 + 109,7</td>
</tr>
<tr>
<td>Self-employed</td>
<td>405,8 - 9,1</td>
<td>2.2</td>
<td>228,5 + 1,5</td>
</tr>
<tr>
<td>Wage earners</td>
<td>1.636,0 - 301,6</td>
<td>18.4</td>
<td>812,5 - 72,5</td>
</tr>
<tr>
<td>of which manufacturing</td>
<td>805,2 - 213,7</td>
<td>26.5</td>
<td>295,9 - 114,8</td>
</tr>
</tbody>
</table>

Source: Official statistics and calculations at ECOS and IRES, Université Catholique de Louvain.
TABLE 2: Employment in manufacturing (indices): variations 1974-82

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(2)/(1) x (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>1.497</td>
<td>1.001</td>
<td>.910</td>
<td>.735</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1.394</td>
<td>.996</td>
<td>.944</td>
<td>.757</td>
</tr>
<tr>
<td>France</td>
<td>1.346</td>
<td>1.065</td>
<td>.905</td>
<td>.874</td>
</tr>
<tr>
<td>West Germany</td>
<td>1.280</td>
<td>1.061</td>
<td>.931</td>
<td>.890</td>
</tr>
<tr>
<td>Japan</td>
<td>1.271</td>
<td>1.246</td>
<td>1.015</td>
<td>.966</td>
</tr>
<tr>
<td>Italy</td>
<td>1.249</td>
<td>1.132</td>
<td>.949</td>
<td>.955</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1.237</td>
<td>1.014</td>
<td>.959</td>
<td>.855</td>
</tr>
<tr>
<td>Sweden</td>
<td>1.205</td>
<td>.947</td>
<td>.913</td>
<td>.861</td>
</tr>
<tr>
<td>United States</td>
<td>1.108</td>
<td>1.072</td>
<td>.975</td>
<td>.992</td>
</tr>
</tbody>
</table>


1.2. A more interesting, but also more difficult, comparison concerns real wages. The EC data are not fully adequate for that purpose, because the Belgian series is at variance with domestic data, especially in the critical year 1976. (See Figure 1 for a comparison of 3 series of Belgian real wages built around the same definition). But cumulative percentage changes for the period 1971-80 are almost identical for the three Belgian series. They amount to 56 or 57 %, as against 37 % for EC9. One cannot escape the conclusion that real wages grew faster in Belgium than in the European Community over that period, with a cumulative difference definitely
exceeding 10 %, probably exceeding 15 % and possibly being as high as 20 % or more.

Comparing growth rates of real wages across countries for the period 1971-80 yields the ranking in Table 3. The second and third columns of that table give the income share of labour in 1971 and 1980. The picture emerging from Table 3 is by no means clear-cut. There is a mild suggestion that real wages rose faster in countries where the income share of labour was initially lower, and typically rose fast enough there to bring about by 1980 a labour share exceeding the average (with Italy and Denmark the more obvious exceptions). The more solid fact, in so far as Belgium is concerned, is the exceptionally high rate of increase of real wages in the seventies — a fact that one would like to explain, and the consequences of which one would like to evaluate.
TABLE 3: Growth rates of real wages and income shares of labour

<table>
<thead>
<tr>
<th></th>
<th>Growth of real compensation per employee, total economy 1971-80</th>
<th>Adjusted share of labour income, total economy 1980-71</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average rate</td>
<td>Cumulative percentage</td>
</tr>
<tr>
<td>Belgium</td>
<td>4.6</td>
<td>57</td>
</tr>
<tr>
<td>Japan</td>
<td>4.2</td>
<td>51</td>
</tr>
<tr>
<td>France</td>
<td>4.1</td>
<td>49</td>
</tr>
<tr>
<td>Italy</td>
<td>3.4</td>
<td>40</td>
</tr>
<tr>
<td>EC9</td>
<td>3.2</td>
<td>37</td>
</tr>
<tr>
<td>Germany</td>
<td>3.1</td>
<td>36</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2.8</td>
<td>32</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2.3</td>
<td>26</td>
</tr>
<tr>
<td>Denmark</td>
<td>1.4</td>
<td>15</td>
</tr>
<tr>
<td>US</td>
<td>1.0</td>
<td>11</td>
</tr>
</tbody>
</table>

Source: European Economy (1984), Tables 23 and 24; the deflator of compensation per employee is the consumer price index.

1.3. A similar message, of rapid transition from balanced growth to pronounced disequilibrium, is conveyed by Figure 2. That figure, which is discussed at greater length in Section 3, presents estimates of labour supply (LS), "potential employment" (LP - defined as the employment corresponding to desired utilisation of productive capacities) and "Keynesian labour demand" (LK - defined as the employment needed to meet effective demand for domestic output).

Three distinct time periods stand out clearly on that figure: 1955-62; 1963-74; 1975 onward.
In the first subperiod, structural unemployment was progressively eliminated by industrialisation in Flanders - see Leroy (1962). The development of new industrial activities there led by 1963 to a situation of near equilibrium \( (LS = LP = LK) \). That situation prevailed until 1974. The "golden sixties" give an almost perfect picture of balanced growth: the three series move on parallel trends, with cyclical fluctuations superimposed on the demand series \( (LK) \). Since 1975, the three series diverge markedly. Whereas labour supply keeps growing (due to growth of female population and participation rates), the potential employment stagnates until 1979 and then falls off (due to the decline in investment), and the Keynesian labour demand declines sharply (due to insufficient effective demand). The behavior of \( LP \) and \( LK \) is also influenced by labour saving investment and technological progress (see below).

1.4. On the policy side, three points seem worth mentioning:

(i) Ever since unemployment became a major issue in the mid-seventies, Belgium has developed actively a number of special programs: early retirement, apprenticeships for the young, fully subsidised hiring of unemployed persons in non-profit organisations, a.s.o. Without these programs, unemployment figures would be another 5% higher (Table 1, lines 4 and 8).

(ii) Until 1981, Belgium tried to maintain stability of its exchange rate vis-à-vis the German mark and Dutch guilder; by 1981, a substantial current deficit had developed. In February 1982, the Belgian frank devalued 8%. This measure was accompanied by an incomes policy which has been continued to date. Whereas almost all wages and salaries had
previously been fully indexed, the Government has imposed real wage reductions of some 2 to 3% per year since then.

(iii) Business investments have for many years benefitted from interest rate subsidies. Over the past three years, tax advantages have been granted to individuals investing in stocks and to individuals or institutions subscribing new equity issues.

2. SOME TIGHTROPE EXERCISES OVER MANUFACTURING

2.1. In this section, we report briefly on three empirical studies of the Belgian manufacturing sector, which hopefully bear some relevance to the decline of employment there. Our reports are brief, because these studies proceed from a very thin data base; their results are suggestive, but not conducive to precise quantitative conclusions. Accordingly, we simply quote a few relevant results, with a minimum of explanations.

d'Alcantara (1983) has estimated a seven-sectors model of the Belgian economy, with a putty-clay vintage production model for each sector. There are four inputs (capital, labour, energy, materials). The model is estimated from 14 annual observations (1963-76). As of 1977, the estimated output elasticity of manufacturing labour demand was 2.5 times higher when computed for scrapping old equipment than when computed for new investment. In other words, when replacing old equipment by new one at unchanged capacity, 3 out of every 5 workers concerned could be dispensed with. The loss of some 150,000 thousand jobs in manufacturing from 1973 to 1977 inclusive is explained by d'Alcantara as the net outcome of "destroying" 340,000 jobs by scrapping old equipment,
while "creating" 190,000 jobs through new investments (of which some 135,000 correspond to modernisation and some 55,000 only correspond to capacity expansion).

These parameter estimates also imply an elasticity of capacity with respect to increases in wage costs equal to -.6, and an associated elasticity of labour demand equal to -.7. (Both figures are distinctly lower than those obtained for the Netherlands by Kuipers and Bosch (1976) and used by Drèze and Modigliani (1981) in their analysis of the long-run wage elasticity of employment in Belgium).

2.2. J.-P. Lambert (1984) has estimated a streamlined model of the Belgian manufacturing sector, defined by aggregation of micro markets in disequilibrium. On specific micro markets, transactions correspond to the minimum of supply and demand. Assuming lognormality of the distribution over micro markets of the ratio of supply to demand, one obtains an approximate expression for aggregate transactions as a CES function of aggregate supply and aggregate demand. The exponent of the CES function can be estimated from business survey data, namely from the proportion of firms reporting excess supply of goods and/or excess demand for labour.

The model is estimated from 18 annual observations (1963-80). The estimation results permit a decomposition of the observed decline in manufacturing employment from 1974 to 1980 (namely, 23.5 %) into four components: the change in frictional unemployment (negligible), the change in demand (accounting for 4.5 out of 23.5 %), the change in the stock of capital (negligible), and the substitution of capital for labour induced by relative prices (accounting for 19 out of 23.5 %).
It should be noted, however, that investment is exogenous in that model. Had investment been more important, resulting in growth rather than stability of the capital stock, then employment should also have been higher. The respective roles of insufficient demand and insufficient profitability in discouraging investment remain to be clarified. Also, exogenous neutral technological progress at an estimated rate of 3% per year has reduced the input requirements by nearly 20% over the six years period.

In comparison with the disequilibrium model reviewed in Section 3, that of Lambert innovates by incorporating some of the evidence from business survey data. Hopefully, that methodology may be extended in the future so as to make effective use of the firm level data, especially those collected in the investment surveys.

2.3. A related approach is followed by M. Gérard and C. Vanden Berghe (1984) in their analysis of manufacturing investment. These authors recognise that at any point in time some firms operate on competitive product markets and gear investment to a desired capital stock reflecting relative prices; whereas other firms operate on imperfectly competitive product markets and gear investment to a desired capital stock reflecting effective demand. An aggregation procedure comparable to that of Lambert (1984) leads again to an approximate expression for the desired stock of capital as a CES function of two expressions, one of which involves relative prices and the other effective demand. Estimates of the parameters of that expression imply estimates of the elasticity of desired capital respectively with respect to relative prices (here, the ratio of the cost of capital to the price of output) and with respect to effective demand (here, actual
output). These two elasticities vary over time. The former is negatively related in absolute value to the proportion of firms constrained by sales expectations, the latter is positively so related. Estimates derived from annual observations for the period 1956-82 (without reliance on business survey data) are displayed in Figure 3. That figure suggests a rapidly growing influence of effective demand on investment after 1974. Tentative as it may still be, that finding is worth keeping in mind when speculating about the determinants of investment.

A related study by Mulkay (1984) suggests that aggregate business survey data are relevant to assess the sensitivity of investment to profitability and effective demand respectively.

Also, it is worth noting that an inviting avenue for future research is defined by the possibility of treating investment endogenously, along the lines followed by Gérard and Vanden berghe (1984), in an extension of the models of Lambert (1984) and Sneessens (1981), using the additional information hopefully contained in business survey data.

2.4. Considering the share of exports in the final demand for Belgian manufactures, it is also important to treat exports endogenously, and to investigate the influence on exports of domestic costs and production capacities.

Bauwens and d'Alcantara (1983) have estimated a two-equations model (price and quantities) for Belgian exports of manufactures. Their results are consistent with an elasticity of export quantities with respect to domestic production capacities equal to unity and suggest an elasticity of the value of exports with respect to domestic wages of the order
of -.3. As for export prices, they seem largely determined by world prices (elasticity .8) and less so by domestic costs (elasticity .2). These results have been used by Drèze and Modigliani (1981).

2.5. Before drawing a tentative conclusion from the material collected in this section, we wish to introduce an additional bit of evidence. It concerns the number of workers (blue and white collars) laid off as a result of their employer's bankruptcy (Table 4). The exact coverage of the statistic is not entirely clear; bankruptcies involving less than 20 employees are not included, and there may be other omissions. On the other hand, some of the bankrupt firms continued under new ownership (typically with a much smaller workforce). Be that as it may, it is striking to find an annual average (76-83) of at least 30,000 workers laid off due to bankruptcy. It was noted in Table 1 that, over the period 1974-83, an average of 37,400 jobs a year were destroyed in the private sector. The rate of attrition suggested by bankruptcies is thus not far from the actual overall rate!

We conclude that all the findings reported in this section are consistent with, and give empirical content to, the frequently heard diagnostic that the Belgian manufacturing sector was choked by the combination of domestic labour costs growing faster than those of competitors and effective demand slackening off in a context of world recession. That combination was particularly damaging for two reasons. First, high costs and low output resulted in a severe loss of profitability, leading some firms to scrap capacity and lay off workers, while other firms simply went bankrupt. Second, slack demand at the world level prevented the Belgian producers from passing on wage costs into prices and enabled
foreign competitors to take over the market share thus abandoned. (From 1975 to 1979, wholesale prices of manufactures showed no trend, whereas retail and service prices went up 40%).

If one adds the observation that those firms which survived could only do so thanks to major gains in productivity, one has come a long way towards explaining the exceptional increase in apparent gross labour productivity of Belgian manufacturing industries. It would be hazardous to attempt imputing the overall increase back to individual causes, as there was much interaction. But it seems clear that the wage behaviour has played a significant role; without that additional complication the impact of the recession on manufacturing employment (29.8% from 1974 to 1983) would have been less severe. The differential rise of unemployment in Belgium relative to EC9 since 1974 corresponds to some 10 percent of the employment in manufacturing; with a differential rise in real wages of some 20 percentage points in Belgium relative to EC9 over the period 1971-80, a moderate wage elasticity of employment of -.5 would account for the differential rise in unemployment.

3. A MACROECONOMIC RATIONING MODEL

This section is devoted to the presentation and the estimation of a two-market macroeconomic rationing (or disequilibrium) model of the Belgian economy. The background is a situation where price and wage adjustments are not sufficient to clear the goods and the labour markets at each moment of time, so that employment can be, broadly speaking, determined either by a sales constraint (Keynesian unemployment) or by a capacity constraint (classical unemployment) or by a supply
<table>
<thead>
<tr>
<th>Year</th>
<th>Construction</th>
<th>Metal-mechanical-electrical</th>
<th>Other manufacturing</th>
<th>Services and others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>8663</td>
<td>19374</td>
<td>5089</td>
<td>3262</td>
<td>26376</td>
</tr>
<tr>
<td>1977</td>
<td>6195</td>
<td>14035</td>
<td>5860</td>
<td>3270</td>
<td>21199</td>
</tr>
<tr>
<td>1978</td>
<td>6195</td>
<td>13591</td>
<td>5860</td>
<td>3270</td>
<td>21199</td>
</tr>
<tr>
<td>1979</td>
<td>6195</td>
<td>10415</td>
<td>6095</td>
<td>3548</td>
<td>28498</td>
</tr>
<tr>
<td>1980</td>
<td>5976</td>
<td>8622</td>
<td>6013</td>
<td>27432</td>
<td>27432</td>
</tr>
<tr>
<td>1981</td>
<td>5976</td>
<td>9819</td>
<td>6013</td>
<td>27432</td>
<td>27432</td>
</tr>
<tr>
<td>1982</td>
<td>6172</td>
<td>8622</td>
<td>5326</td>
<td>27701</td>
<td>27701</td>
</tr>
<tr>
<td>1983</td>
<td>6845</td>
<td>9819</td>
<td>5326</td>
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<tr>
<td>1976-83</td>
<td>50737</td>
<td>23633</td>
<td>4941</td>
<td>25314</td>
<td>9678</td>
</tr>
</tbody>
</table>

Table 4: Bankruptcies: number of employees affected, by sector.

Source: Belgian Administrative Services.
constraint (repressed inflation and underconsumption). The model that will be developed builds on previous work on Belgian data by Sneessens (1981, 1983) and Lambert (1984).

Section 3.1 describes the structure of the model. The various building blocks are then considered separately: the production model (3.2), the employment and the import equation (3.3), the price and wage equations (3.4).

3.1. STRUCTURE OF THE MODEL

The equations of the model are described in Table 5. Three blocks are distinguished, describing respectively the determination of demanded, supplied and observed quantities on the goods market; the determination of demanded, supplied and observed quantities on the labour market; and finally the determination of prices and wages. Demanded, supplied and observed quantities are denoted by suffices D, S and T respectively.

The demand for domestic production is described in two steps. Total final demand is first determined. This is done in a very simplified way: private consumption only is endogenous and represented by a function of total disposable income DI and of the unemployment UR. Domestic demand is next obtained by subtracting the demand for foreign goods MD, a function of total final demand itself and of relative prices. Notice that observed imports will be larger than this "normal" or "structural" demand level whenever there is an excess demand for goods on the domestic market (YD > YS*, where YS* is the production level achieved for a normal utilisation rate of the available factor inputs). In other words, the demand for domestic goods is unobserved and may be
TABLE 5: Structure of the model

A. GOODS MARKET

1. Demand: - Total final demand  \( FD = CD + EXO \)
   \( CD = CT = C(DI, UR) \)
   \( EXO = G + I + X \)
   - Demand for domestic production
     \( YD = FD - MD \)
     \( MD = M(FD, PM, PF) \)
     \( MT = MD + M'(YD/YS^*) \)

2. Supply:
   \( YS = A(\frac{WB}{VC}, t).LT.DUL^6 \)
   \( = B(\frac{WB}{VC}, t).KA.DUK^{6'} \)

3. Observed quantities:
   \( YT = YS \)

B. LABOUR MARKET

1. Demand:
   \( LK = L(A^{-1}.YD, LP, LT_{-1}) \) if \( LK < LP \)
   \( LP = L(A^{-1}.B.KA, LT_{-1}) \) otherwise

2. Supply:
   \( LS = LS \)

3. Observed Employment:
   \( LT = RF(LK, LP, LS) \)

C. WAGES AND PRICES
   \( \hat{w} = \hat{w}(UR, (YT-LT)_{-1}, P_{-1}) \)
   \( P = P(APC_{-1}(\frac{YD}{YS^*})_{-1}, P_{-1}) \)

SYMBOLS

- C, I, G, X, M stand for the usual national account concepts and satisfy \( F = C + I + G + X \) and \( Y = F - M; \)
- L, K stand for labour and capital respectively;
- WB and VC stand for unit labour cost and capital usage cost respectively;
- PM, PF stand for the price of imports and of final demand respectively.
at times larger than the observed production level. It is implicitly assumed that the supply of imports is infinitely elastic.

The production function is estimated in the form of a two-equations system describing the productivities respectively of labour LT and of capital KA, as functions of relative factor costs WB/VC, of an exogenous technical progress t and of indicators of the degrees of labour and capital utilisation (DUL and DUK). Available statistics on GNP of course refer to produced rather than to sold quantities: hence YT = YS.

The demand for labour of a particular firm is of course a positive function of anticipated sales, at least up to the point where production capacities are fully utilised. Employment is then at its maximum and will not increase any further, whatever the rise in expected sales. This leads to the distinction between two concepts. The first concept is the so-called "Keynesian" demand for labour (LK), i.e., the demand for labour that would be observed in the absence of any capacity shortages. It is directly related, via the inverse production function, to the demand for domestic goods. Because of adjustment costs and of overhead workers, it also depends on the capacity (or potential) employment level LP. The latter is essentially the employment level that would prevail if the firm were to use all its profitable production capacities, i.e., if there were no sales constraint. At the firm level, the demand for labour is obtained simply as the minimum of LK and LP.

We define the supply of labour as the sum of observed employment plus registered unemployment and consider this
amount to be exogenous and given. Observed employment $LT$ is then obtained as a function of the three aggregates $LK$, $LP$, $LS$. If the aggregate economy is treated like a single firm and aggregation problems are neglected, observed employment is, in a rationing context, simply defined as the minimum of $LK$, $LP$ and $LS$. When aggregation problems are properly taken into account, the rationing function $RF$ can no longer be represented by a simple Min condition; aggregate employment becomes a more complex function of the three aggregates. Following Lambert (1984) and Lambert, Lubrano and Sneessens (1984), we use a CES rationing function.

The rate of growth of nominal wages is written as a function of current and lagged rates of growth of prices and of labour productivity, plus an unemployment rate effect. The price level is a dynamic function of average production costs (APC); the mark-up on costs may increase in situations of excess demand for goods.

Ideally, this model should be estimated by a FIML procedure, if only because of the many cross-equation parameter restrictions. At this stage, we shall content ourselves with a block by block estimation procedure. The goods supply relationships are estimated first; the employment equation is next estimated jointly with the import equation (because of the unobserved variable $^YS^D_{x}$ appearing in the latter). We are then left with the wage and price equations.

3.2. THE PRODUCTION MODEL

Our production model is an extension of Sneessens (1981, 1983), the so-called Leontief-Cobb-Douglas model. Without going into details, let us simply indicate that the long-
run production constraint is a Cobb-Douglas function. Optimal factor proportions are chosen so as to minimise production costs, given a certain capacity target determined by the volume of sales expected in the medium or in the long run. Because of adjustment costs, factor proportions will not be revised in response to purely transitory stimuli like a temporary decrease in the production level. One will instead observe an underutilisation of the capital stock. The short-run production relationship will thus be in the form of a Leontief production model with rigid technical coefficients.

More formally, we write

\[(3.1)\quad Y_t = \text{cst}.e^{\gamma t}L^{\alpha}K^{(1-\alpha)}\]

\[= \text{cst}.e^{\gamma t}L^{\nu}.\left(\frac{K}{L}\right)^{1-\alpha}\]

where $\nu = \text{return to scales}$ and $L$ and $K$ stand for the quantities of labour and capital actually in use. The capital-labour ratio $\frac{K}{L}$ is determined by cost minimisation, that is (in logs and introducing some dynamics):

\[(3.2)\quad \ln\frac{K}{L} = \text{cst} + \theta(L) \ln \frac{WB}{VC}\]

where $WB$ and $VC$ stand for the cost of labour and capital respectively, and $\theta(L)$ is a lag polynomial function of the form $\frac{1}{1-\theta L}$. ($VC$ is here assumed proportional to the price of investment goods).

By substitution, we get:

\[\ln Y_t = \text{cst} + \gamma t + \nu \ln L + (1-\alpha) \theta(L) \ln \frac{WB}{VC}\]
The quantity of labour actually in use does in general differ from actual employment LT (labour hoarding phenomenon). That discrepancy will be taken into account by using an indicator of the degree of labour utilisation (DUL) based on partial unemployment figures. It also proved necessary to allow for a change in the rate of exogenous technical progress after 1974. If we furthermore decompose $\theta (L) \ln \frac{W_B}{V_C}$ as suggested in Klein (1958), the output-employment relationship to estimate becomes:

\[
(3.3) \quad \ln YT = \text{cst} + \gamma t + \Delta \gamma t' + \nu \ln LT + \delta \ln DUL \\
+ (1-\alpha) \theta^t \left[ \theta(L) \ln \frac{W_B}{V_C} \right]_0 + (1-\theta) \sum_{\tau=0}^{t-1} \theta^\tau \ln \left( \frac{W_B}{V_C} \right)_{t-\tau}
\]

where $t' = 0$ before 1974 and $t' = t-22$ afterwards. Table 6 reports on the results obtained by OLS for $\theta = 0.65$. Values of $\theta$ equal to 0.50, 0.75 and 0.90 resulted in a lower likelihood value. Table 6 shows that provided a change in the rate of exogenous technical progress is allowed, the remaining parameter estimates look remarkably stable before and after 1974. The rate of exogenous technical progress decreases from 2.7% before 1974 to 1.6% afterwards. The return to scale parameter is close to and not significantly different from unity.

**TABLE 6**: OLS estimates of (3.3) for $\theta = 0.65$ (standard errors between parentheses)

<table>
<thead>
<tr>
<th>SEE</th>
<th>estim. period</th>
<th>const.</th>
<th>$\gamma$</th>
<th>$\Delta \gamma$</th>
<th>$\nu$</th>
<th>$\delta[\theta(L)\ln \frac{W_B}{V_C}]_0$</th>
<th>$\alpha$</th>
<th>DW</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0089</td>
<td>1954-74</td>
<td>3.3433</td>
<td>.0264</td>
<td>-</td>
<td>1.0918</td>
<td>.1350</td>
<td>5.6431</td>
<td>.6175</td>
</tr>
<tr>
<td></td>
<td>(1.2058)</td>
<td>(.0080)</td>
<td></td>
<td></td>
<td>(.1764)</td>
<td>(.0480)</td>
<td>(1.2234)</td>
<td></td>
</tr>
<tr>
<td>0.0081</td>
<td>1954-81</td>
<td>3.3226</td>
<td>.0267</td>
<td>-0.0112</td>
<td>1.0303</td>
<td>.0925</td>
<td>5.6549</td>
<td>.6022</td>
</tr>
<tr>
<td></td>
<td>(.9328)</td>
<td>(.0062)</td>
<td></td>
<td></td>
<td>(.1561)</td>
<td>(.0453)</td>
<td>(.1732)</td>
<td></td>
</tr>
<tr>
<td>0.0080</td>
<td>1954-81</td>
<td>3.3705</td>
<td>.026</td>
<td>-0.0114</td>
<td>1.0000</td>
<td>.0965</td>
<td>5.6641</td>
<td>.6037</td>
</tr>
<tr>
<td></td>
<td>(.8837)</td>
<td>(.0060)</td>
<td></td>
<td></td>
<td>(.0017)</td>
<td>(.0395)</td>
<td>(.1692)</td>
<td></td>
</tr>
</tbody>
</table>
It is obvious that, starting from (3.1), it is possible to derive an output-capital relationship similar to the output-employment relationship (3.3). We get:

\[(3.4) \quad \ln YT = \text{cst} + \gamma t + \Delta \gamma . t' + \nu \ln KA + \delta' \ln DUK\]

\[-\alpha \left( \theta^t \left[ \theta(0) \ln \left( \frac{WB}{VC} \right)_0 - (1-\alpha) \sum_{\tau=0}^{t-1} \theta^\tau \ln \left( \frac{WB}{VC} \right)_{t-\tau} \right) \right] \]

where \(KA\) = total available capital stock and \(DUK\) = degree of capital utilisation.

The results of a joint maximum likelihood estimation of (3.3)-(3.4) are reported in Table 7. The constraint \(\nu = 1\) has now been imposed from the start. The estimation period is 1954-82 for the first equation, 1964-82 for the second, because of a lack of data on the degree of capital utilisation DUK. The correlation coefficient between the residuals of the two equations is 0.65. Table 7 shows that the estimated values of the parameters remain remarkably close to those previously obtained. The dynamic parameter \(\theta\) is now freely estimated and becomes 0.71, i.e. 30 % of the change in the technical coefficient \(K \over L\) implied by a change in relative factor costs is realised within the period. The starting value \(\left[ \theta(L) \ln \left( \frac{WB}{VC} \right)_0 \right]\) seems to be somewhat overestimated. A value of 5.56 is indeed larger than the observed value of \(\ln \left( \frac{WB}{VC} \right)\) in 1953 and implies a strong decline of \(\theta(L) \ln \left( \frac{WB}{VC} \right)\) in the early fifties. This seems unrealistic. Imposing \(\left[ \theta(L) \ln \left( \frac{WB}{VC} \right)_0 \right] = 5.45\) avoids that anomaly and leaves the log-likelihood almost unchanged. (The log-likelihood decreases from 204.32 to 204.17).
TABLE 7: Joint ML estimation of equations (3.3)-(3.4) with $v = 1$.

<table>
<thead>
<tr>
<th>$\gamma$</th>
<th>$\Delta \gamma$</th>
<th>$\delta$</th>
<th>$\delta'$</th>
<th>$(\theta - L) \ln \frac{WB}{VC}$</th>
<th>$\theta$</th>
<th>$\sigma$</th>
<th>DW</th>
<th>SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>.0261</td>
<td>-.0130</td>
<td>.0614</td>
<td>.2573</td>
<td>5.5645</td>
<td>.7079</td>
<td>.5662</td>
<td>2.00</td>
<td>.0072</td>
</tr>
<tr>
<td>(.0050)</td>
<td>(.0014)</td>
<td>(.0336)</td>
<td>(.0624)</td>
<td>(.1749)</td>
<td>(.0388)</td>
<td>(.1460)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For $v = 1$, equations (3.3)-(3.4) can be written more compactly as

\[(3.5)\quad YT = A(t, \frac{WB}{VC}) \cdot LT \cdot DUL^\delta,\]

\[(3.6)\quad YT = B(t, \frac{WB}{VC}) \cdot KA \cdot DUK^{\delta'}.\]

The potential employment level is the level of employment that prevails when all the available production factors are fully and efficiently used, i.e., if DUL and DUK are at their normal level (we neglect for the moment the effects of the adjustment costs mentioned in Table 5). Whatever those values, we may write:

\[(3.7)\quad LP = A^{-1} \cdot B \cdot KA\]

or after substitution for A and B and first differencing:

\[(3.8)\quad \dot{LP} = -\theta(L)(WB - VC) + KA.\]

Changes in the potential employment are the net result of changes in relative factor costs and in the capital stock. The evolution of these determinants over the period 1954-82 is reproduced in Figure 4.
One sees that the post-1975 decline in the potential employment level LP, as pictured in Figure 2, results from a sharper slowdown in the rate of growth of the capital stock compared to the rate of growth of relative labour costs. This mere statement of course does not say anything about the reasons for the decline in investments; to what extent is it due to a lack of profitability or to demand shortages? Of course, before drawing policy conclusions, one should face the additional question whether investment responds symmetrically to increases and decreases in relative labour costs—a question taken up in Section 4.

3.3. THE DEMAND FOR GOODS AND EMPLOYMENT

As indicated in Table 5 the actual employment level LT is a CES function of three quantities: the Keynesian labour demand level LK, the potential employment level LP and the supply of labour LS. More formally, we write

\[(3.9) \quad LT = \left[LK^{-\rho} + LP^{-\rho} + LS^{-\rho}\right]^{-1/\rho} \times \text{error term.}\]

For \(\rho = \infty\), we are back to the traditional min condition. For \(\rho\) positive and finite, LT is smaller than the minimum of LK, LP, LS. The discrepancy between LT and that minimum measures the importance of frictions. The smaller the value of \(\rho\), the more important the frictions. We define the frictional unemployment rate at equilibrium (FUR) as the unemployment rate that would be observed in a situation of macroeconomic equilibrium, i.e., for LK = LP = LS. More formally:

\[(3.10) \quad FUR = \frac{LS - LT}{LS} = 1 - 3^{-1/\rho}\]

when LS = LK = LP. We allow for an increase in FUR from 1953
to 1982 by specifying $\rho$ as an inverse function of time:

\begin{equation}
(3.11) \quad \frac{1}{\rho} = \rho_0 + \rho_1 t.
\end{equation}

As already mentioned, the supply of labour LS will be considered to be exogenous and defined as the sum of observed employment plus registered unemployment. Potential employment LP was already determined, up to a scaling factor, in equation (3.7). The Keynesian labour demand will be written (in logs) as:

\[ \ln LK = \lambda [\text{cst} - \ln A + \ln YD] + (1-\lambda) \ln LP \]

or alternatively as:

\begin{equation}
(3.12) \quad \ln LK = \text{cst} - \ln A + [\lambda \ln YD + (1 - \lambda) \ln YP]
\end{equation}

where $A$ is the technical coefficient determined in (3.5), $YP = \text{cst} \times A \times LP$, $YD$ = current demand for domestic goods. The last term between brackets can be interpreted as a measure of medium-run demand expectations; the higher $\lambda$, the larger the weight given to current demand conditions.

The demand for domestic goods $YD$ is unobserved. It is defined as total final demand minus normal or structural imports. With no final demand rationing on the goods market (through higher production rates and imports), total final demand is simply the sum of observed private and public consumption, investment and exports. The structural demand for imports (excluding energy imports which, for obvious reasons, are left exogenous) is specified as a log-linear function of total final demand (FD), of import prices (PM), and of domestic prices (PF):
(3.13) \[ \ln MD = \text{cst} + m_1 \ln FD - m_2 (\delta_0 \ln PM + \delta_1 \ln PM_{-1} + \delta_2 \ln PM_{-2}) + m'_2 (\delta'_0 \ln PF + \delta'_1 \ln PF_{-1} + \delta'_2 \ln PF_{-2}). \]

Because the bundles of goods involved are different and because a change in import prices PM is not without repercussions on PF, we allow different price elasticities of imports to PM and PF. We also allow for lagged price effects; the dynamic parameters will be constrained to add up to unity \((\delta_0 + \delta_1 + \delta_2 = \delta'_0 + \delta'_1 + \delta'_2 = 1)\).

Observed imports are always larger than or equal to normal structural imports: the discrepancy between the two is a function of the importance of domestic production shortages. We write:

(3.14) \[ \ln MT = \ln MD + m_3 \ln \left( \frac{YD}{YS^*} \right) + \text{error term}, \]

where \(YS^*\) is the production level that could be reached with currently available inputs and a normal input utilisation rate, after correction for the hoarding of labour; it satisfies \(YS^* \leq YD\).

Because of the unobservability of \(YD\), the employment and import equations (3.9) and (3.14) must be estimated jointly. This has been done by maximising their likelihood function under the assumption of a zero correlation between the two disturbances. Because domestic demand \(YD\) depends on employment \(LT\) (via household disposable income and private consumption), the Jacobian of the likelihood function is not simply equal to one, but depends instead on the parameters of
the consumption function. The latter is specified as a dynamic function of household disposable income. Assuming an error correction mechanism and allowing for specific effects of inflation and unemployment, we obtain (by OLS):

\[
\begin{align*}
\Delta \ln CT &= 0.2809 + 0.4607 \Delta \ln DI + (0.4247 \ln DI_{-1}) \\
&\quad (0.1527) (0.1411) (0.1319) \\
&\quad - 0.4728 \ln CT_{-1} + 0.0129 \Delta \ln PC \\
&\quad (0.1547) (0.1047) \\
&\quad + 0.2192 UR - 0.7577 \Delta UR \\
&\quad (0.1691) (0.2958) \\

DW &= 2.00 \\
SEE &= 0.0087.
\end{align*}
\]

The unemployment rate effect is significant while inflation is not. The coefficients of disposable income DI and of the employment rate UR imply an elasticity of consumption to disposable income rising from 0.46 in the short run to 0.90 in the long run when the change in disposable income is not the result of a change in the employment level; in the opposite case, the elasticities become (approximately) 1.0 in the short run and 0.5 in the long run. (This last estimate is unreasonable, indicating that a better specification of the consumption function is needed).

Given (3.15), the Jacobian of the likelihood function associated to (3.9)-(3.14) can be shown to be:

\[
1 - \lambda \left( \frac{LK}{LT} \right)^{-p} \left( 1 - \frac{MD}{FD} \right) \frac{CD}{YD} (0.46 \frac{\partial \ln DI}{\partial \ln LT} - 0.54 \frac{\partial UR}{\partial \ln LT})
\]

where LT stands for the deterministic part of (3.9).
Table 8 reproduces the ML parameter estimates of (3.9)-(3.14) (except for the constant terms) and their standard errors, conditionally on the parameter values previously obtained (production model and consumption function). The values of $\rho_0$, $\rho_1$ imply that the frictional unemployment rate, as defined by (3.10), has gone up from 1.78% in 1955 to 5.30% in 1982; the actual unemployment rates in the same year were 5.8% and 16% respectively. The high value of $\lambda$ (0.91) implies an extremely fast adjustment speed of employment to current needs, at least when there are no capacity or labour shortages. Traditional employment equations (without explicit account of capacity or labour supply constraints) usually yield values around 0.30. This suggests again that neglecting capacity and labour constraints may be responsible for the underestimation of the elasticity of employment to final demand in a situation of Keynesian unemployment.

**TABLE 8 : ML parameter estimates of (3.9), (3.14) (asymptotic standard errors between parentheses)**

<table>
<thead>
<tr>
<th>Employment equation</th>
<th>$\lambda = 0.9110$</th>
<th>$\rho_0 = 0.0126$</th>
<th>$\rho_1 = 0.0012$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(.1446)</td>
<td>(.0080)</td>
<td>(.0003)</td>
</tr>
<tr>
<td>DW = 1.89</td>
<td>SEE = 0.0042</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Import Equation</th>
<th>$m_1 = 1.1435$</th>
<th>$m_2 = 0.3603$</th>
<th>$m_2' = 0.7753$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(.0515)</td>
<td>(.0849)</td>
<td>(.1052)</td>
</tr>
<tr>
<td>$\delta_0 = 0.70$</td>
<td>$\delta_1 = 0.20$</td>
<td>$\delta_2 = 0.10$</td>
<td></td>
</tr>
<tr>
<td>$\delta_0' = 0.15$</td>
<td>$\delta_1' = 0.25$</td>
<td>$\delta_2' = 0.60$</td>
<td></td>
</tr>
<tr>
<td>DW = 1.96</td>
<td>SEE = 0.0183</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The dynamics of the price effects in the import equation turned out to be poorly estimated. We decided to fix the $\delta$'s
at what seemed to be reasonable values in view of the unconstrained estimation results. These four restrictions decrease the log-likelihood value from 175 to 171 but leave the other parameter estimates basically unchanged. The elasticity of imports to final demand prices is (in absolute value) about twice that to import prices themselves. The elasticity to final demand is not very far from unity and substantially below that obtained with traditional methods, i.e. when demand pressure effects are not modelled explicitly but are simply replaced by a term (most often insignificant) involving the degree of capacity utilisation. The demand pressure coefficient is here significant and implies that a one percentage point increase in the excess demand for domestic goods increases imports by 1.55 %. With imports representing about 60 % of GDP in 1982, it follows that about 90 % of any excess demand for goods is immediately compensated by additional imports.

Figure 5 reproduces the ratio of total imports to structural imports \( \frac{MT}{MD} \) and of domestic demand to normal domestic supply (given available inputs) \( \frac{VD}{VS} \) from 1955 to 1982. These two demand pressure indicators are always larger than 1, thereby indicating that, because of frictions, there always subsists a certain proportion of firms constrained by capacity or labour shortages rather than by sales. That proportion however becomes especially weak in 1958 and after 1980.

The values of the Keynesian labour demand and of potential employment \( LK \) and \( LP \) already reported in Figure 2 were derived from the estimates of equations (3.9)-(3.14). The fact that \( LK \) appears to be much below \( LP \) and \( LS \) after 1975 merely indicates that a substantial proportion of firms
(around 70 %) are faced with a sales constraint. The gap between \( \text{LK} \) and \( \text{LP} \) is, in 1982, larger than it has ever been over the three previous decades. This implies that overcoming the sales constraint would permit the creation of some 200 thousand new jobs. This would still leave more than 450 thousand workers unemployed, because of a lack of productive capacities (\( \text{LP} \) much below LS).

This reasoning of course remains simplistic and is at best indicative. One may, for example, consider that stimulating final demand would undoubtedly have a positive effect on investment, hence on the potential employment level \( \text{LP} \). The medium-run effect on employment of a reflationary policy could then be substantially larger than those obtained under the assumption of a fixed productive capacity. How much this is true cannot be said until changes in the capital stock are endogenised and the respective role of profits and demand expectations made precise. In any case, this can only be part of the whole story. Account should also be taken of other constraints like inflation, the current account, the budget deficit and the public debt. Belgium alone could do little without violating those constraints; in fact, those very constraints motivated the U-turn in economic policy after 1980. If reflation must help, it must come from abroad. But would it be sufficient? Is it not because the Belgian economy had lost so much of its competitiveness that unemployment grew so large after 1970, despite huge public deficits? That the current account deficit became so alarming after 1980? The fact that wage costs grew faster than in any other country from 1971 to 1980 (see Table 3) would seem to support that view.

Most of the underutilised productive capacities could then
precisely be in those sectors where demand is receding, that is, in those products for which the demand is likely to be little responsive to a macroeconomic reflationary policy.

To summarise, a large proportion of Keynesian unemployment, i.e., of sales constrained firms does not automatically imply that the source of the difficulty is on the demand side.

Obviously, a correct understanding of the situation that prevails today in Belgium, of the policy measures needed to make the recovery process as fast as possible, goes through an extension of the model to cover, not only prices and wages, but also investment, foreign trade and last but by no means least, structural problems. In this perspective, the estimation of LK, LP and LS, as reproduced in Figure 2, provides a description of the state of the economy, not an explanation of why things are what they are.

3.4. WAGE AND PRICE DETERMINATION

Our specifications of the wage and price equations follow those adopted by A. Dramais in his "Compact" model of the European Economy (Dramais, 1985). We present each equation in turn.

1. Wage equation

Our basic wage equation postulates that the rate of growth of nominal wages is determined by current and lagged values of the rate of inflation and of the rate of growth of labour productivity, plus a drift the importance of which is inversely related to the observed unemployment rate:
(3.16) \[ \dot{w} = \omega_0 + \omega_1 UR + \omega_2 (Y_T - L_T) + \omega_30 \dot{p} + \omega_31 \dot{p}_{-1}. \]

This equation can be written either in terms of labour costs or of net labour income per employee. In the former case, the dependent variable is defined as total wage cost, including employers' social security contributions, and the relevant price index is the price of value-added. In the latter case, the dependent variable is the net wage rate, after deduction for direct taxes and employees' social security contributions, and the relevant price index is the price of consumption goods.

Table 9 compares the results obtained with each formulation. The parameter estimates were obtained by 2SLS, with as instruments those implied by the labour productivity equation (3.3) (i.e., a constant, t, t', DUL, \[ [\theta(L) \ln \frac{WB}{VC} - 1] \]) plus those implied by the price equation (i.e., the rate of inflation lagged one period, the degree of capacity utilisation DUK and the demand pressure indicator \[ \frac{VD}{VS^*} \] derived in the previous section lagged one period). Both formulations yield similar parameter estimates. In both cases, the sum of the two price coefficients is larger than, albeit not significantly different from unity (1.28 and 1.13 respectively). The unemployment rate coefficients have the correct sign; it is however particularly weak and insignificant in the labour cost formulation. The elasticity of wages to labour productivity is around .60 and significantly different from zero (not from unity). When allowed for, lagged productivity effects appeared with the wrong sign, but not significantly different from zero.

Despite its simplicity, this equation does fit the data rather well. In particular, the high real wage gains
(relative to other countries) of the seventies are tracked closely. The fact that the sum of the inflation rate coefficients is in each equation larger than unity may suggest a situation characterised by an explosive wage-price spiral. One has to bear in mind however that the precision of these parameter estimates is rather poor and furthermore that the productivity coefficients are substantially below unity. Both effects may thus have compensated each other over the period considered. Further work is needed before these issues and interactions can be clarified.

| TABLE 9 : Parameter estimates of the wage equation (standard errors between parentheses) |
|---------------------------------------------|---------------------------------------------|
|                                           | Labour cost formulation | Labour income formulation |
| __________________________________________ | ___________________ | ________________________ |
| \( \omega_0 \)                            | .0142 (.0119)          | .0175 (.0152)           |
| \( \omega_1 \)                            | -.1586 (.0936)         | -.3793 (.1265)          |
| \( \omega_2 \)                            | .5685 (.2183)          | .5885 (.2846)           |
| \( \omega_{30} \)                          | 1.2600 (.1993)         | .9152 (.2641)           |
| \( \omega_{31} \)                          | .0196 (.1748)          | .2158 (.2325)           |
| SEE                                         | .0124                  | .0165                   |
| DW                                           | 1.76                   | 2.05                    |
2. Price equation

The price of value-added is determined in the long run by a mark-up on normal average production costs (APC). In the short run, the mark-up can be positively related to demand pressures on the goods market. With a dynamic specification in the form of an error correction mechanism, this yields

\[
\dot{P} = \pi_0 + \pi_1 \text{APC} + \pi_2 (\ln \text{APC}_{-1} - \ln P_{-1}) + \pi_3 \ln \frac{YD}{YS}\]

\[
+ \pi_4 \ln \left(\frac{YD}{YS}\right)_{-1}
\]

where APC = normal average production cost = (WB.LP + α.PI.KA)/YP.

The capital usage cost is thus approximated by a constant α times the price index of investment goods PI. The parameter α is estimated together with the other parameters.

The 2SLS parameter estimates are reported in Table 10. The instruments used are the same as in the wage equation, plus the rate of growth of labour productivity lagged one and two periods. An increase in average production costs appears to be quickly passed on to prices (66% of the adjustment realised within the period). Notice that the specification adopted in (3.17) imposes that, in the long-run, cost increases are fully passed on to prices. This restriction is not rejected by the data. (When freely estimated, the long-run elasticity of prices to average production costs turns out to be .97 and not significantly different from unity). The demand pressure coefficients are positive, as expected, and indicate that the mark-up on costs increases when demand is strong relative to supply. It becomes approximately five
percent higher when aggregate demand is ten percent larger than aggregate supply, a situation never met in practice. This price effect of an excess demand for domestic goods is to be compared to its strong quantity effect on imports (see previous section). Finally, coefficient $\alpha$ is of a reasonable order of magnitude and significantly different from zero.

TABLE 10: Parameter estimates of the price equation (standard errors between parentheses)

<table>
<thead>
<tr>
<th>$\pi_0$</th>
<th>$\pi_1$</th>
<th>$\pi_2$</th>
<th>$\pi_{30}$</th>
<th>$\pi_{31}$</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>.0075</td>
<td>.6640</td>
<td>.2630</td>
<td>.0942</td>
<td>.3852</td>
<td>.1419</td>
</tr>
<tr>
<td>(.0421)</td>
<td>(.1396)</td>
<td>(.1910)</td>
<td>(.2223)</td>
<td>(.2467)</td>
<td>(.0749)</td>
</tr>
</tbody>
</table>

SEE = .0086               DW = 1.68

4. CONCLUDING INTERROGATIONS

4.1. We embarked on this exercise with the modest aims of (i) seeking an explanation for the differential rate of growth of Belgian real wages in the seventies; (ii) seeking an explanation for the dramatic decline in employment and increase in gross apparent labour productivity of the Belgian manufacturing sector over the past decade; and (iii) summarising what we had learned from the estimation of quantity rationing models.

On the first point, we were disappointed to discover that a pair of simple-minded equations for price and wage inflation tracked the sample observations quite accurately, without revealing anomalies in the seventies. (Prices are linked to demand tensions and an endogenously weighted index
of factor costs interpreted as average cost; wages are linked to price inflation, productivity increases and unemployment). These equations bring out the interdependence of prices, wages, productivity and employment. It would be daring to interpret them as bringing out causal or dynamic structures; a richer data base is probably needed to that end. Still, the following interpretation is suggestive. The price equation yields a long-run elasticity of prices to average production costs close to unity. The wage equation yields an elasticity of nominal wages to the price level slightly in excess of unity. These estimates provide a consistent picture of an economy where: (i) firms set prices on the basis of costs, including wage costs; (ii) nominal wages are fully indexed on prices; and (iii) income tax brackets are not indexed. Any attempt on the part of labour to protect real disposable incomes in the face of inflation will then result in over-indexation and an inflationary spiral. It is conceivable that the wage explosion which accompanied high inflation during the seventies resulted, at least partially, from such a process. If so, it would seem appropriate to correct the sensitivity to inflation resulting from the combination of full indexation of wages and no indexation of tax brackets... (As noted in Section 3.4, this interpretation is only suggestive, as the poor precision of some coefficients prevents us from drawing firm conclusions).

Looking at history through the filter of quantity rationing models, we feel that the concepts of "potential employment" and "Keynesian labour demand" provide a convincing (to us) interpretation... that is still grossly incomplete. These concepts are helpful to portray the supply side and demand side of the economy respectively. It seems definitely useful to evaluate by how much output and employment could be
boosted without either additional investment or the high rates of capacity utilisation suspected of "rekindling inflation" (although this last danger is probably less acute in a small open economy, where instead external imbalance might result). As a corollary, one also evaluates how many new working posts should be made available (through investment, additional shifts or worksharing, in order of decreasing contributions to potential output...) along the road to full employment.

At the same time, one must be careful not to interpret the spread between labour supply (or potential employment) and Keynesian labour demand as "due" to insufficient demand. In a country which exports more than one third of its value-added, and competes with imports for another third, excess supply may simply reflect excessive, though non-increasing, costs - either marginal (quantity setting firms) or average (price setting firms). Thus, a part of what is commonly labelled "Keynesian unemployment" may well be the consequence of a real wage problem; and that part could be significant in Belgium.

Similarly, one must be careful not to interpret the spread between labour supply and potential employment as "due" to factor prices (real wages). When potential employment corresponds to full use of given facilities, and varies over time through scrapping and/or new investments, one must reckon with the decisive influence of demand expectations on scrapping and investment decisions. Then, a part of what is commonly labelled "classical unemployment" may well be the consequence of an effective demand problem, and that part could be significant in Belgium.
We must accordingly conclude that an analysis of the employment problem which does not treat exports and investment endogenously is grossly inadequate. If, as suggested by Bawwens and d'Alcantara (1983), the elasticity of exports with respect to domestic production capacity is three times as high as the elasticity with respect to domestic wages, then a better understanding of the investment process deserves first priority on the research agenda. Given the complexity of the problem, it would seem imperative to rely on more disaggregated data, using all available sources of information.

There is an additional reason why such a research strategy commends itself. A number of authors have stressed the growing extent to which labour is now regarded as a fixed factor - a remark that is particularly applicable to Europe, and even more so to Belgium. New hirings and new fixed investments are then best viewed as a joint decision, and should be analysed as such - even though the choice of techniques (factor proportions) deserves separate attention.

There is an element of paradox here, since the model of Section 3 suggests instead a quite rapid adjustment of employment to desired levels, as if labour were in fact a variable factor. However, the "investment" aspect of hiring decisions is much less significant in periods of growth (1963-74) than in periods of stagnation, or of high uncertainty about future growth rates (today). Again, that aspect may affect less significantly lay offs (as in the period 1975-83) than new hirings (today??).

4.3. A related interrogation left unanswered in this exercise came up in Section 3.2 : is the elasticity of employment with
respect to real wages the same in case of wage increases and wage decreases? Or could it be that the relationship of employment to real wages is "kinky", in a small open economy like Belgium; with a higher elasticity of employment to wage increases than to wage cuts.... What prompts us to repeat this interrogation is the feeling that employment in the Belgian manufacturing sector is unlikely to grow, in response to the incomes policy of the eighties, at a rate comparable to that at which it fell in response (partially at least) to the differential growth of real wages in the seventies.

There is again an element of paradox here, since contractual and legal measures have attempted to protect labour from easy dismissals. These measures have clearly been of limited effectiveness, in the manufacturing sector. One type of situation when they are bound to be ineffective is of course bankruptcy - a phenomenon of quantitative significance, as revealed by Table 4 above, but seldom modelled explicitly in econom(etr)ics.
FIGURE 1: Belgian real wages: Annual rates of growth, three statistics
FIGURE 2: Labour supply (LS), Potential employment (LP) and Keynesian labour demand (LK) (millions of man years)
FIGURE 3: Manufacturing investment: absolute elasticities to demand (EKQ) and real capital cost (EKW), proportion of firms facing sales constraints (PCW)
FIGURE 4: Rates of change in the stock of capital (DKA) and relative factor prices (DRFC)
FIGURE 5: Indicators of tension: imports (RMTO) and final demand (RYDT)
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