ECONOMIC PAPERS

COMMISSION OF THE EUROPEAN COMMUNITIES • DIRECTORATE-GENERAL FOR ECONOMIC AND FINANCIAL AFFAIRS

No. 68 October 1988

Economies of Scale and
Intra-Community Trade

by Joachim Schwalbach

Internal paper

The Directorate-General for Economic and Financial Affairs,
Commission of the European Communities,
200, rue de la Loi
1049 Brussels, Belgium

ECONOMIC PAPERS

No. 68 October 1988

Economies of Scale and
Intra-Community Trade

by Joachim Schwalbach

Internal paper

II/291/88-EN This paper only exists in English

Contents

Tables

I. Introduction

It has been argued that industrial plant sizes are on average larger in the United States than in Europe.[1] As a consequence, European plants are considered to be too small to realize all significant scale economies in production, suffering a competitive disadvantage with respect to their American counterparts. Several reasons have been mentioned to account for why plant sizes differ between nations:

> "For one, some markets my be too small to support even a single plant of minimum optimal scale. And if buyers and government policymakers prefer some diversity of supply sources, two or more independent plants may survive in small markets, each plant too small to enjoy all economies of scale. ...... Dynamics also matter. The smaller the market is for any given (positive) growth rate, the more time it takes to accumulate a demand increment sufficient to absorb the capacity of a lumpy new MOS plant. Also, in markets small relative to the minimum optimal scale, oligopoly is likely, and the resulting concern for pricing interdependence and strategic position can aggravate propensities toward investment in inefficiently small plants." (Scherer et al., 1975, pp. 92-93).

It was generally expected that with the creation of a European Common Market existing gaps between current and cost efficient

---

[1] See Bain (1966) and Scherer et al. (1975), chapter 3.

plant sizes would diminish over time. If no tariff barriers hinder trade flows between national markets, producers choice of plant sizes are less limited, leading to an adjustment process towards larger plants and, consequently, toward a fuller exploitation of scale economies in production. If, in addition, most non-tariff barriers within the European Community can be removed, plant size differences between Europe and the United States should disappear, taking with it European cost disadvantages.

This study tests the hypothesis that the removal of trade barriers within the European Community had the effect of increasing plant sizes, enabling plants to realize all significant scale economies. The hypothesis will be tested by applying two very different data sets on a group of manufacturing industries for the Federal Republic of Germany and the United Kingdom. The study is organized as follows: Section II provides some background information on the development of trade and firm sizes within the European Communities. Sections III and IV explain the deviation of observed plant sizes and the minimum efficient sizes (MES) at different points in time. In Section III, engineering and cost estimates provide information on the MES and the elasticity of the average cost curve of selected product-lines. And in Section IV, alternative measures are employed for estimating MES on the four-digit industry level. Section V evaluates the main results and provides forecasts about the effects of further removals of trade barriers on the degree of cost efficient increase of plants.

II. Development of Intra-Community Trade and Firm Sizes

According to our hypothesis, we expect that the creation of a European internal market would increase intra-Community trade flows and, therefore, lead to an increase in plant and firm sizes in industries where there are significant unexploited scale economies.

Table 1 gives a first impression about intra- and extra-Community trade flows, summarizing import flows over time. Table 1 shows that since 1963, both intra- and extra-Community import flows have increased over time. A closer look at Table 1 also shows that, until about 1975, intra-Community imports were more intense than extra-Community imports. After 1975, extra-Community imports became more important in the majority of industries. By 1982, in only nine industries were intra-Community imports larger than extra-Community imports: metal, means of transportation, foods, textile, and paper industries. Jacquemin and Sapir (1987) analyzed the relative slowdown of intra-Community trade in detail and concluded that after the initial period of European integration (which spans from 1958 to about 1972 for the founding six member countries) the dynamics of intra-Community trade seems to have diminished particularly in consumer and investment goods industries partly because of industry-specific deficiencies as well as still existing non-tariff barriers within the European Common Market. The relative slowdown, instead, encouraged imports from the rest of the world.

With increasing overall trade flows we expect an increase in plant and firm sizes as well. Table 2 summarizes the data available to us and shows the development of average firm sizes in the European Community in selected two-digit NACE industries. Columns (1) and (2) in Table 2 show the average number of employees in European firms in the years 1975 and 1982, whereas column (3) shows the slope of the time trend in the period 1975 to 1982. Table 2 clearly demonstrates that there exists the expected tendency towards larger, less labor-intensive firms for nearly all industries. Tables 1 and 2 together, then, are jointly consistent with our basic hypothesis, although, of course, other factors may be at work.

III. Determinants of Plant Sizes on the Product-Line Level

In this section we test our hypothesis that scale economies and intra-Community trade flows can explain deviations of plant sizes from minimum efficient plant sizes (MES) by using data on the product-line level. The analysis relies on a regression model, similar to the one adopted by Scherer et al. (1975) and Müller and Owen (1985) in which the dependent variable is the deviation of the representative plant size from the MES. Independent variables are the cost increase associated with sub-MES plants and export/import intensities. The model can be specified as follows:

$$PSD_{it} = a_{0t} + a_{1t}\ MS_{it} + a_{2t}\ C_{it} + a_{3t}\ E_{it} - a_{4t}\ I_{it} + \mu_{it} \qquad (1)$$

where

PSD_{it} is the observed plant size deviation from MES, measured as the ratio of the average plant size and MES.

MS_{it} is the size of the product market, measured as the ratio of domestic production and MES.

C_{it} is the cost increase associated with one-third of MES output.

E_{it} is the export intensity, measured by 1+exports/domestic production.

I_{it} is the import intensity, measured by 1-imports/domestic consumption.

μ_{it} is the error term, reflecting all other factors which effect plant size deviations.

a_{0t}, ... ,a_{4t} are regression coefficients

Indices i represent product-lines and
t stands for the time periods.

Equation (1) shows the expected direction of causality. The bigger the market in relation to MES output, the bigger the representative plant size is, therefore, the smaller is the size deviation. Thus, we expect $a_1>0$. A steep unit cost curve might give rise to larger plants since there are considerable cost differences between small and large plants. Hence one would expect that in this case firms build larger plants and this would be reflected in a higher PSD-value. Thus, $a_2>0$. International trade can have various effects on the deviation of actual plant sizes from MES. Export opportunities extend the relevant market and might give firms the change to work off excess capacity and to add new capacity to its plants. A larger export share in a market might, therefore, lead to larger plant sizes and so to higher PSD values. Thus, $a_3>0$. Imports, on the other hand, intensify domestic competition and encourage firms to invest in larger, more efficient plants. This investment behavior might be expected in markets in which the required market share to operate a MES plant is high. As a result, one expects to observe a plant size increase if import shares are significantly high. Thus, $a_4<0$.

The hypothesis will be tested for the periods 1965 and 1982. While we expect $a_i>0$, i=1,2,3 and $a_4<0$ for both periods, we wish to test the additional hypothesis that the effect of trade on plant size has increased over time. Thus, $a_{it}<a_{it+1}$, i=1,2,3 and $a_{4t}>a_{4t+1}$, which means that we expect a more significant influence from exports and imports in 1982 than in 1965 due to increasing trade liberalization within the European Community.

The data sample consists of MES and unit costs curve estimates on a product-line level. Some of the estimates come from various published sources and were performed by scholars using engineering and cost analysis approaches. The rest were made exclusively for this study by using the same estimation method. The result is shown in Table 3. The estimates in Table 3 suggest that, in most industries, MES output as well as cost disadvantages of sub-MES plants have increased over time. Technological change is the main cause of increases in the minimum efficient plant size. New production processes led to both lower unit costs and an increase in plant sizes required to take full advantage of the cost reduction potential. The technological development of recent years appear to be most significant in product-lines like beer brewing and cement in which cost disadvantages by sub-MES plants are particularly intense.

The remaining data on domestic production, exports, and imports were gathered from statistical sources for 1965 and 1982 for the Federal Republic of Germany. For the United Kingdom data were only available for 1982.

Regression results

Table 4 summarizes the regression results for the Federal Republic of Germany (FRG) and the United Kingdom (UK). The usual statistical tests were performed. The functional form of the regression equation was tested by applying a Lagrange multiplier test suggested by Godfrey and Wickens (1981). Heteroskedasticity was not detected, but multicollinearity was observed to be severe between the import variable and all other independent variables in the 1982 German sample. The stepwise regression results will show the impact of collinearity on the estimated coefficients.

The results in Table 4 show that market size in the FRG has an increasingly positive effect on plant size development over time. The coefficients are statistically significant but their values are very small. Thus, the positive effect on market size on the choice of larger plant sizes is still limited, e.g. a 100 percent increase in market size would lead to an 0.07 percent increase in RSD only. For the UK, the results show the opposite sign but the coefficient is statistically not significant, therefore we should not attach too much importance to it. However, it is interesting to speculate on how a negative sign could be interpreted. One obvious possibility is that the extent of diseconomies of scale, which restrict the expansion of plants, are relatively important. Such diseconomies are often transportation costs which are particularly intense in product-lines like beer brewing and cement, and lead to a fragmentation of markets. Other causes of diseconomies of scale may be product variety since a large variety increases changeover costs and reduces lot-size economies in production thereby raising the unit cost curve. In the UK, the diseconomies of scale seem to be overcompensated by scale economies.

The cost gradient coefficients have the expected positive sign for the FRG, although they are not statistically significant. Thus they give only moderate support for the hypothesis that the steeper the unit cost curve, the greater the incentive is to build larger plants. For the UK, the hypothesis is not confirmed since the effect is not significant. This suggests that diseconomies of scale may be more important in the UK than in Germany and may, therefore, lead to smaller plant sizes.

The results in Table 4 show that international trade plays an important role in determining plant size deviations from cost efficient plant sizes. In particular, exports provide the opportunity to enlarge plants. The results are highly significant for the FRG in both periods and for the UK in 1982. For the FRG, the export coefficient is larger and shows stronger significance in 1982 than in 1965, which suggests that exports have become more important over time as a determinant of plant capacity decisions. In the UK, the plant size expansion effect from exports seems to be stronger than in the FRG. Imports, on the other hand, also had a positive effect on plant size development in both countries. This effect was not significant in 1965 in the FRG and in the UK, but it was significant for the FRG in 1982. The results also indicate that the aforementioned multicollinearity between the imports variable and the other variables is particularly severe for the German data in 1982 between imports and exports. In sum, the results on trade show quite clearly that exports and imports had a simultaneous positive effect on the creation of larger plants. This observation and the positive association between exports and imports support the theory of intra-industry trade which shows that increasing differentation of products and services increase intra-industry trade. This effect on trade is enhanced if, in addition, trade barriers are low.

IV. Determinants of Plant Sizes at the Industry Level

In this section, we explain the deviation of observed plant sizes from minimum efficient plant sizes at the four-digit industry level and therefore at a slightly more aggregate level than in Section III. With the analysis on the industry level we are able to set up a larger data base which provides the opportunity to test the stability of the regression results on the product-line level in Section III. This stability test is important since the results in Section III might be very sensitive to an increase in the number of observations. Furthermore, the industry analysis enables us to select a richer set of explanatory variables.

By moving to the industry level we sacrifice the quality of the MES estimates. Since MES estimates are not available for a large number of industries, we have to apply alternative measures of MES. Alternative measures have been proposed in the literature and empirical tests have shown that two measures in particular are good substitutes: the 'Top 50 percent' index and the 'Midpoint' plant size index.[2] The first index "......is found by moving down the plant size distribution starting with the largest plants, until enough plants have been included to encompass 50 percent of total industry employment or output. The average plant size of those plants which account for the top half of the cumulative employment or output size distribution is then calculated." The other index ".... estimates the

---

[2] See Scherer et al. (1975), chapter 3.

employment or output of that individual plant which is located at the 50 percent point of the cumulative size distribution." (Scherer et al., 1975, p.66).

With the two alternative MES measures at hand we are able to provide a first look at the plant size deviation from MES and its development over time at the industry level. For this purpose we grouped 102 German four-digit industries into its corresponding 16 two-digit NACE industries for the time period 1979-1985. The ratio between average plant size and MES will show whether plants are large enough to realize all scale economies and how plant sizes developed over time relative to the MES. Table 5 summarizes the calculated average ratio of average plant size to MES for the years 1979 and 1985, where the average plant size is measured in terms of the number of employees and the MES is represented by the TOP 50 percent index of total industry employees. The first impression we get from Table 5 is that actual plants are on average smaller than MES. In 1979, for instance, plants in the mineral oil refining industry are on average only 40 percent of MES and in 1985 about 60 percent. The deviation across industries varies which means that in the chemical industry we observe the largest deviation from efficient plant sizes while in the extraction of minerals industry the average plant is close to a cost efficient plant. Table 5 also shows that in 1985 plants on average exceeded the MES in two industries, namely in the extraction of minerals and the motor vehicles industries. In 1985 plants in these industries reached a cost efficient size. In the other industries one observes the same general pattern that the plant size deviation decreased over time. The adjustment process towards more cost efficient plants can be clearly seen in Table 5 and this process was relatively fast if one takes into account that the time period 1979-85 under consideration is relatively short.

Based on the results in Table 5, how can one explain the variance of plant size deviations across industries? Various factors explain the deviation, which can be labeled as industry-specific and trade-specific factors. If one considers the extration of minerals and the motor vehicles industries, in which the average plant size is close to the MES, one finds different factors explaining the small deviation. In the extraction of minerals industry the structure of the market consists of various local markets which are determined by the location of the inputs and the transportation costs. These local markets are protected from trade by natural entry barriers and are large enough to exploit scale economies. In the motor vehicles industry, on the other hand, international competition is the main force for driving plants toward a cost efficient size. In general, plant size deviations from MES exist mainly because markets are too small in relation to MES, trade barriers hinder the extension of markets, demand growth is not high enough to reduce excess plant capacity, and shipment costs as well as product variety lead to a fragmentation of markets which are smaller than MES.

A more systematic insight into the importants of factors explaining the plant size deviation, is provided by the regression analysis which we want to perform now. The regression model is specified in a similar fashion than in Section III as follows:

$$PSD_{it} = b_{0t} + b_{1t}\ MS_{it} + b_{2t}\ E_{it} - b_{3t}\ I_{it} + b_{4t}\ CR_{it} + b_{5t}\ GR_{it} + b_{6t}\ PR_{it} - b_{7t}\ EM_{it} + \mu_{it} \qquad (2)$$

where

PSD_{it} is the ratio of the average plant size and MES, which is represented by the TOP 50 and MIDPOINT indices, respectively.

MS_{it} is the market size, measured as the ratio of domestic consumption and TOP 50 and MIDPOINT, respectively.

E_{it} is the exports intensity which is measured in two ways: E^T_{it} is the exports intensity based on total exports (=intra + extra-Community exports) and measured by 1+exports/ domestic production.
E^I_{it} is the intra-Community exports intensity, measured by 1+intra-Community exports/total exports.

I_{it} is the imports intensity which is also measured in two ways: I^T_{it} is equal to 1-total imports/domestic consumption and I^I_{it} is equal to 1-intra-Community imports/total imports.

CR_{it} is the seller concentration ratio, measured by the five-firm ratio for the UK and the Herfindahl index for the FRG.

GR_{it} is the percentage growth of production.

PR_{it} is the productivity ratio, measured by the ratio of domestic production and the number of employees.

EM_{it} is the extent of multi-plant operation, measured by the average number of plants operated by firms in the industry.

$b_{0t}, \ldots\ldots, b_{7t}$ are regression coefficients.

μ_{it} is the error term, representing all other factors which determine plant size deviations.

Indices i represent three-digit industries in the UK and four-digit industries in the FRG and

t stands for the time periods 1979, 1985 for the FRG and 1979, 1983 for the UK.

Equation (2) shows that seven explanatory variables were selected for which data are available. Expected signs of the causal relationship between the endogenous variable and the exogenous variables are shown in the regression model. The core variables are the market size, exports, and imports variables. With respect to these variables we expect that market size has a positive influence on plant size development. Markets which are large in relation to MES output might have a favorable effect on plants' capacity expansion decision. Thus, we expect $b_{1t}>0$. Exports and imports (total as well as intra-Community) influence plant size decisions positively. Exports increase the relevant market and open the opportunities to build larger plants. Imports put pressure on domestic firms' decision makers to increase their plant sizes toward the most cost efficient size. Thus, b^T_{2t} and $b^T_{3t}<0$. In addition, the impact of Intra-Community trade on plant size decisions might be even higher. Therefore, we expect more cost efficient plants in industries in which the ratio of intra-Community to total trade is higher. Thus, $b^I_{2t}>0$ and $b^I_{3t}<0$.

From the additional variables we expect explanatory power as well. Among them the concentration variable, since concentrated markets might have larger plants due to the fact that large market shares by dominant sellers provide the chance to build larger plants. Thus, we expect $b_{4t}>0$. If, however, markets are fragmented, we might expect even large sellers to favor a multiple plant structure. The average number of plants operated by firms is therefore a good indicator of the existence of local markets. We therefore might expect a negative association between plant size deviations and the extent of multi-plant operation, i.e. $b_{7t}<0$. Market growth might have a positive effect on plant size decisions. Indivisibilities in physical production capacity lead to a certain extent of excess capacity at a time when new capacity is set up. This risk of holding excess capacity permanently will be reduced if demand growth is be expected, thus $b_{5t}>0$. Finally, the productivity of the labor force might also have positive effects on plant size decisions. The higher the labor productivity will be, the more firms will be inclined to operate larger plants, thus $b_{6t}>0$.

Regression Results

Tables 6 and 7 summarize the regression results for the sample of up to 105 four-digit industries in the FRG and of 103 three-digit industries in the UK.[3] For the FRG, we were able to run regressions for the periods 1979/1985 and for the UK for 1979/1983. Furthermore, the data samples for the FRG and the UK differ slightly in two respects: for the FRG , the data on trade flows allow to make the distinction between intra-Community and total trade flows, whereas for the UK, only total trade flow data were available. In addition, for the UK we only have access to the TOP 50 measure of minimum efficient plant size. And finally, separate regressions were performed for the producer and consumer goods industries in the FRG.

The results in Tables 6 and 7 for the total sample show that nearly all coefficients of the explanatory variables have the expected

[3] The usual statistical tests were performed. The test of the functional form showed a linear specification to be preferable. No heteroskedasticity was detected. Also no severe multicollinearity is present.

signs. The coefficients of all exports variable (total and intra-Community) are highly significant for the German sample, but not for the UK in both time periods. We can conclude that the convergence towards more efficient plant sizes is significantly affected by total exports as well as intra-Community exports in the FRG, and the importance of exports has increased over time. For the UK, we find slight support for the proposition that total exports are a increasing force driving plant size developments, but this support is not statistically significant. If we divide the sample into producer and consumer goods industries, we find that only in producer goods industries are exports an important determinant of plant sizes in the FRG. In consumer goods industries, by contrast, exports do not seem to play any role at all, even over time.

Imports, on the other hand, also have a positive impact on plant sizes but we cannot put to much weight on it since the coefficients are not statistically significant in both countries and both periods. Additionally, we observe an increase in the coefficients over time which suggests that the positive influence of imports on plants size developments became more important over time.

Market size and demand growth are both powerful explanatory variables. In both countries, larger and faster growing markets provide the opportunity to build larger and more cost efficient plants. The size of the market in the UK seems to be the dominant factor affecting plant size decisions. If one takes the significant effect of the concentration variable into account as well, one is inclined to argue that large markets in the UK are well protected by entry barriers, maybe because of cost efficient production. Entry barriers may also explain why intra-industry trade flows are less pronounced between the UK and other countries.

Seller concentration is a powerful explanatory factor in both countries, and also in both subgroups of industries. However, the significance of concentration is more pronounced in the UK. The results suggest that large sellers in concentrated industries in the UK seem to operate with larger plants, whereas in the FRG a higher extent of multi-plant operation is preferred. The regression results on the extent of multi-plant operation support this view: the more important the concentration variable is in explaining plant sizes, the larger the plants are and the smaller the number of plants operated by large firms.

Labor productivity has no explanatory power in either country. The coefficient shows in most regressions the expected sign but the effect is not statistically significant. This result is somewhat surprising since we would expect cost efficient plants to have a higher labor productivity.

If we compare the results on market size, exports, and imports with the one in Section III, we see that the signs of the regression coefficients remain stable. However, the values of the coefficients are different. At the industry level we receive lower values which seems to be the consequence of moving from the product-line level to a more aggregate industry level analysis.

V. Evaluation of the Overall Results and Comparative Static Analysis

The results show positive and increasing effects of exports and imports on plant size developments towards more cost efficient plant sizes in the FRG and the UK. The results can be used to speculate to what extent trade flow changes affect plant sizes and cost efficiency of plants. For this purpose we experiment with the average values of the regression variables and their estimated coefficients in Section III. First of all, we are interested in the plant size effect of trade flow increases. For simplicity, we assume that exports and imports flows increase by 10 percent. If we calculate the growth rate for each period and each country separately we receive the following results:

		Exports	Imports
FRG	1965	4.7%	7.3%
	1982	8,5%	16.5%
UK	1982	19.4%	4.1%

These numbers tell us that a 10 percent increase in exports and imports would increase average plant size in the FRG in 1965 by 4.7% and 7.3%, respectively. And in 1982 the increase would be 8.5% and 16.5%. In the UK, the increase in average plant size would be even 19.4% if exports increase by 10% and 4.1% if imports increase by the same amount. This seems to be a rather strong response to changing trade flows.

In comparison with the above speculative results we are able to calculate the actual overall trade effect for the FRG. Taking the actual average increase of 73 percent in exports and 107 percent in imports during the period 1965 to 1982 into account, we receive an average plant size growth by 97 percent. Therefore, trade flows basically doubled plant sizes within the observed time period.

Our second exercise will be to speculate about the impact of a plant size increase on the improvement on the cost efficiency of plants. If plants increase in size due to increasing trade flows one should expect an increase in cost efficiency as well. To what extent this improvement in cost efficiency can be depends on the increase of trade flows. Three scenarios are worth considering: First, exports increase by 100 percent. Second, import flows double in size and third, both exports and imports increase each by 100 percent. For each scenario we will be able to calculate the expected effect on cost efficiency under the additional assumption that total consumption remains unaffected by trade flow increases.

If exports increase by 100 percent, the export share on total domestic production increase from its level in 1982 of 36.6 percent to 53.6 percent at a later point in time. As a consequence, average plant size increases should have a decreasing effect on unit costs. Prior to the export increase, actual average plant size had 14.94

percent higher unit costs than a MES plant. After doubling of exports, the disadvantage by sub-MES plants diminished to 12.49 percent. As a result, the increase of cost efficiency is about 16.4 percent.

If imports increase by 100 percent, we expect an increase in cost efficiency as well, since imports have also a positive effect on plant size development in the FRG and the UK. Actual import share on total domestic consumption was in 1982 about 32.1 percent and it would be twice as much after the import increase by 100 percent. The corresponding cost efficiency improvement is about 26.5 percent which leaves the average plant size with 10.98 percent higher costs than a MES plant. The cost efficiency increase by imports is therefore higher than the effect of increasing exports flows.

If exports and imports increase in magnitude and total domestic consumption still remains unchanged, domestic production has to decrease. The overall effect will be a rise in cost efficiency of about 55 percent. This efficiency increase is considerable taking into account that average plant size is now larger than one half (0.518) of a MES plant which leaves a cost disadvantage of only 6.72 percent.

References

Bain, Joe S. (1966), International Differences in Industrial Structure, New Haven: Yale University Press.

Godfrey, L.G. and Wickens, M.R. (1981), Testing Linear and Log-Linear Regressions for Functional Form, Review of Economic Studies, Vol. 48, pp. 487-496.

Jacquemin, Alexis and Sapir, Andre (1987), Intra-EC Trade: A Sectoral Analysis, CEPS Working Paper, No. 24, January.

Müller, Jürgen and Owen, Nicholas (1985), The Effect of Trade on Plant Size, in: Schwalbach, Joachim (editor), Industry Structure and Performance, Berlin, pp. 41-60.

Scherer, F. M. et al. (1975), The Economics of Multi-Plant Operation, Harvard University Press: Cambridge.

Table 1 :

Trends in Community Imports Trade in Manufacturing Industries

Industry	1963	1970	1975	1981	1982	1963	1970	1975	1981	1982
	Intra-Community Imports					Extra-Community Imports				
Manufacturing industry	8,5	23,3	49,8	105,1	120,5	10,8	22,2	41,5	105,9	120,5
Mineral oil refining	3,9	10,6	38,5	95,0	101,4	4,6	3,8	22,7	109,5	145,1
Production and preliminary processing of metals	11,0	28,7	47,0	89,6	95,9	13,0	38,4	44,8	79,6	87,2
• Iron and steel	14,9	33,2	52,9	91,8	99,7	13,3	38,0	49,7	74,0	109,2
Non-metallic mineral products	8,7	24,0	47,2	99,9	106,8	9,4	22,9	43,2	109,1	112,7
• Concrete, cement, plaster products for construction	12,7	31,2	62,2	92,0	97,9	15,9	28,3	70,3	109,9	114,6
• Glass and glassware	8,8	26,1	46,2	102,1	113,7	7,8	19,0	36,9	105,5	118,8
Chemicals and man-made fibres	6,2	19,7	45,1	111,3	123,2	10,4	25,1	45,1	113,5	126,3
• Basic industrial chemicals	5,7	17,3	42,4	110,0	121,0	10,6	25,2	45,1	112,4	123,6
• Pharmaceutical products	5,4	24,6	50,9	119,9	134,8	8,3	23,2	46,3	120,8	138,8
Metal articles	8,5	25,0	52,1	99,7	107,7	7,3	19,4	44,9	104,3	112,9
• Tools and finished metal goods	9,1	24,2	46,4	100,5	111,8	6,6	17,7	42,0	107,0	111,5
Mechanical engineering	11,4	28,3	53,3	99,0	106,8	11,9	26,4	50,4	112,1	124,8
• Machine-tools for working metal	15,5	35,9	55,3	100,2	101,9	13,7	26,5	40,7	101,1	103,6
• Plant for mines, iron and steel, etc.	10,5	29,8	55,8	94,0	97,7	13,3	28,5	54,1	106,8	116,6
Office and data-processing machinery	5,6	25,6	46,6	121,6	150,2	4,1	21,4	36,3	127,6	157,2
Electrical engineering	8,3	25,2	52,4	106,0	117,7	6,0	17,3	38,9	124,0	143,2
• Electrical machinery	9,0	27,3	49,8	99,9	110,6	8,8	24,1	43,2	115,6	131,1
• Telecommunications equipment, etc.	8,0	24,1	62,7	109,2	125,4	7,0	20,4	43,5	120,9	141,4
• Radio, television, etc.	8,4	25,2	66,2	107,0	118,1	4,8	14,6	36,7	129,1	150,7
• Domestic type electric appliances	9,0	26,0	59,9	107,9	119,8	4,1	12,3	39,9	132,2	134,8
Motor vehicles	6,6	21,7	44,4	108,3	126,1	2,5	7,9	28,3	112,0	124,7
Other means of transport	13,0	23,9	56,3	130,7	168,8	4,5	17,6	34,8	106,0	103,7
• Shipbuilding	13,7	35,3	95,5	91,1	92,3	4,6	32,6	63,4	86,2	100,3
• Aerospace equipment manufacturing and repairing	13,3	20,7	43,6	152,4	215,7	4,7	15,3	27,5	106,9	101,9
Instrument engineering	7,3	20,6	47,8	105,1	113,1	5,9	14,9	39,0	118,6	125,4
Food, drink, and tobacco	9,5	22,6	58,7	115,9	133,2	31,8	38,0	59,4	111,6	124,0
Textile	26,9	57,1	104,5	105,2	230,3	19,7	35,5	77,5	114,3	221,2
Leather and leather goods	13,2	26,5	56,6	103,7	123,0	7,5	15,2	43,1	107,1	123,8
Mass-produced footwear	5,5	17,1	42,1	99,6	117,3	3,9	10,6	31,9	109,9	117,5
Ready-made clothing	6,1	20,6	50,5	103,0	114,6	3,8	10,9	43,3	114,1	125,9
Timber and wooden furniture	6,3	18,5	45,2	102,1	107,2	16,1	26,7	39,3	96,3	95,8
Pulp, paper and paper products	6,1	21,9	47,6	114,7	127,0	17,8	33,8	60,9	118,5	122,5
Printing	9,0	24,1	49,3	106,3	115,7	9,4	25,1	47,3	119,2	130,6
Rubber products	6,8	21,0	61,2	109,1	115,2	8,3	18,8	40,4	104,2	119,6
Plastic products	5,1	18,9	43,1	106,4	121,0	7,7	19,5	41,0	115,7	133,0

Source: Yearbook of Industrial Statistics, 1984, pp. 118-119.

Table 2:

Average Firm Size in the European Community's Manufacturing Industries

NACE No.	Industries	Average Number of Employees in Firms: Years 1975	1982	Slope of Trend 1975-82
22	Production of preliminary processing of metals	548.2	486.4	-6.486
23	Extraction of minerals	84.8	89.2	0.426
24	Manufacture of non-metallic mineral products	132.7	127.9	-1.540
25	Chemical industry	326.3	327.3	-0.235
31	Manufacture of metal articles	110.6	100.8	-1.460
32	Mechanical engineering	175.1	158.5	-2.576
33	Manufacture of office machinery and data processing machinery	977.5	748.1	-27.156
34	Electrical engineering	405.3	339.2	-10.642
35	Manufacture of motor vehicles	704.7	697.8	2.030
36	Manufacture of other means of transport	477.2	492.7	1.374
37	Instrument engineering	134.9	116.8	-2.581
41	Food industry	163.1	163.1	-0.694
43	Textile industry	150.7	132.3	-3.507
44	Leather industry	72.5	66.8	-0.827
45	Footwear and clothing industry	104.5	99.1	-1.385
46	Timber and wooden furniture industry	75.7	72.4	-0.514
47	Manufacture of paper and paper products; printing and publishing	128.3	117.0	-1.510
48	Processing of rubber and plastics	158.3	145.3	-2.045
49	Other manufacturing industries	93.7	83.9	-1.458

Source: Own calculation from 'CRONOS SEF VISA'

Table 3:

Estimates of Economies of Scale

NACE No.	Industry	Minimum Efficient Scale (MES)	Unit Cost Increase 1/3 MES	Unit Cost Increase 1/2 MES	Year	Source
140.1	Mineral oil refining	10 million tons/year	<5%		1982	DIW
		10 million tons/year		5%	1969	Pratten
		5.95 million tons/year		3%	1967	Weiss
		10 million tons/year	4.8%		1965	Scherer
221	Steel (integrated plants)	9.6-12 million tons/y	>10%		1982	DIW
		4.1 million tons/year		8%	1969	Pratten
		3.6 million tons/year		10%	1967	Weiss
		3.6 million tons/year	11%		1965	Scherer
241	Bricks	35 million a year	30%		1982	Schwalbach
		25 million a year		25%	1969	Pratten
242.1	Cement	1.3 million tons/year	39.9%		1982	Schwalbach
		1.0 million tons/year	38.2%		1972	Schwalbach
		2.0 million tons/year		9%	1969	Pratten
		1.2 million tons/year	26%		1965	Scherer
247.2	Glass Bottles	133,000 tons a year	11%		1965	Scherer
		180,000 tons a year	13%		1982	Schwalbach
251	Basic industrial chemicals					
	* Ethylene	500,000 tons/year	5-10%		1982	DIW
	* Sulphuric acid	350,000 tons/year	5-10%		1982	DIW
		1 million tons/year		1%	1969	Pratten
	* Ammonia	550,000 tons/year	5-10%		1982	DIW
	* Synthetic rubber	60,000 tons/year		15%	1969	Pratten
	* Synthetic yarn	40,000 tons/year		7%	1969	Pratten
	* Synthetic polymer	80,000 tons/year		5%	1969	Pratten
255	Paint	38 million litre/year	4.4%		1965	Scherer
258.1	Soap and detergents	70,000 tons/year		2.5%	1969	Pratten

Table 3 , cont.

260	Man-made fibres					
	* Acrylic fibres	19,278 tons/year		9.5%	1967	Weiss
	* Polyester fibres	18,144 tons/year		10%	1967	Weiss
	* Cellulosic fibres	31,752 tons/year		5%	1967	Weiss
321.1	Combine harvester	20,000 units/year	10%		1982	DIW
321.2	Tractors	90,000 units/year		6%	1982	DIW
330	Electronic typewriters	500,000 units/year	5-10%		1982	DIW
343.2	Auto batteries	1 million units/year	4.6%		1965	Scherer
345.1	T.V. sets	1.3-2.2 million units/y	5%		1982	DIW
346	Fridges machines	800,000 units/year	6.5%		1965	Scherer
		500,000 units/year		8%	1969	Pratten
		1.5 million units/year	12%		1982	DIW
	Washing machines	500,000 units/year		8%	1969	Pratten
		800,000 units/year	7.5%		1980	Müller/ Owen
351	Cars	500,000 units/year	15%		1982	DIW
	Trucks	200,000 units/year	12%		1982	DIW
363.1	Bicycles	100,000 units/year		4%	1969	Pratten
427.1	Beer brewing	2.8 million hl/year	18%		1981	Schwalbach
		2.0 million hl/year	14%		1974	Schwalbach
		3.0 million hl/year		7%	1980	Cockerill
		1.6 million hl/year		9%	1969	Pratten
		5.3 million hl/year	5%		1965	Scherer
		2.4 million hl/year		10%	1967	Weiss
429	Cigarettes	70 billion units/year	3%		1982	DIW
		36 billion units/year	2.2%		1965	Scherer

Table 3. cont.

451	Footwear	4,000 pairs a week	1.5%		1980	Müller/ Owen
	Leather shoes	1 million pairs/year	1.5%		1965	Scherer
	Shoes	300,000 pairs/year		2%	1969	Pratten
481.1	Car tyres	9 million units/year	5-10%		1982	DIW
		16,500 units/day		5%	1967	Weiss

Source: DIW (1985), Empirische Untersuchung von industriellen Größenvorteilen (Economies of Scale) nach der Methode der Ingenieurschätzungen, Berlin.

Müller, J. and Owen, N. (1983), Economic Effects of Free Trade in Manufacturing Products within the EC, Berlin.

Pratten, C.F. (1971), Economies of Scale in Manufacturing Industry, Cambridge.

Scherer, F.M. et al. (1975), The Economics of Multi-Plant Operations, Cambridge.

Schwalbach, J. (1984), Ausmaß und Entwicklung von Größenvorteilen in der deutschen Bier- und Zementindustrie, Berlin.

Schwalbach, J. (1987), Größenvorteile im verarbeitenden Gewerbe, mimeo, Berlin.

Weiss, L.W. (1976), Optimal Plant Size and the Extent of Suboptimal Capacity, in: R.T. Masson and P.D. Qualls (eds.), Essays on Industrial Organization in Honor of Joe S. Bain, Cambridge, pp. 123-141.

Table 4:

Regression Results on Plant Size Deviation and International Trade

Dependent variable: Ratio of average plant size and minimum efficient plant size

Country	Year	Number of cases	Regression Coefficients: Constant	Market size	Cost gradient	Exports	Imports	R^2
FRG	1965	22	0.181*** (5.05)	0.0004 (0.94)				0.042
			0.194*** (3.32)	0.0004 (0.86)	0.125 (0.29)			0.047
			-0.382* (-1.39)	0.0007* (1.58)	0.182 (0.44)	0.443** (2.14)		0.240
			-0.225 (-0.52)	0.0007* (1.56)	0.219 (0.51)	0.425** (1.98)	-0.166 (-0.48)	0.250
	1982	20	0.217*** (4.66)	0.002** (1.83)				0.156
			0.262*** (3.37)	0.0014* (1.65)	0.372 (0.73)			0.182
			-0.574** (-1.81)	0.002*** (2.67)	0.115 (0.25)	0.562*** (2.70)		0.438
			-0.079 (-0.14)	0.0016** (1.73)	0.257 (0.53)	0.353 (1.24)	-0.319 (-1.07)	0.478
			0.653*** (4.94)				-0.599*** (-3.21)	0.365
UK	1982	19	-0.105*** (-3.36)	-0.133 (-0.43)				0.011
			-0.510*** (-3.29)	-0.198 (-0.61)	-0.887 (-0.79)			0.048
			-0.221*** (-3.39)	-0.145 (-0.45)	-0.422 (-1.10)	0.714** (2.34)		0.303
			-0.201*** (-3.06)	-0.143 (-0.43)	-0.417 (-1.07)	0.724** (2.05)	-0.056 (-0.06)	0.303

Significance levels: *** 1%, ** 5%, * 10%, two-tailed test.

Table 5:

Plant Size Deviation in Manufacturing Industries in the Federal Republic of Germany, 1979-1985.

NACE No.	Industries	Ratio of Average Plant Size and Minimum Efficient Plant Size (MES)	
		1979	1985
14	Mineral oil refining	0.40	0.60
22	Production and preliminary processing of metals	0.44	0.62
23	Extraction of minerals	0.60	1.20
24	Manufacture of non-metallic mineral product	0.53	0.82
25	Chemical industry	0.28	0.37
31	Manufacture of metal articles	0.45	0.54
32	Mechanical engineering	0.35	0.42
34	Electrical engineering	0.33	0.50
35	Manufacture of motor vehicles	0.53	1.08
37	Instrument engineering	0.44	0.58
41/42	Food, drink, and tobacco	0.50	0.68
43	Textile industry	0.54	0.64
45	Footwear and clothing	0.63	0.78
46	Timber and wooden furniture	0.62	0.75
47	Manufacture of paper and paper products; printing and publishing	0.50	0.59
48	Processing of rubber and plastics	0.46	0.56

Table 6:

Empirical Results on the Determinants of Plant Sizes in the Federal Republic of Germany

Dependent variables: D_1 = Average plant size/MIDPOINT plant size
D_2 = Average plant size/TOP50 plant size

Independent variables	1979				
	Industries				
	All			Producer	Consumer
	D_1	D_1	D_2	D_1	D_1
Exports, total	0.015*** (3.07)		0.016*** (5.28)	0.016*** (2.76)	0.0014 (0.17)
intra		0.320*** (3.15)			
Imports, intra		-0.060 (-0.77)			
Seller concentration	-0.0006*** (-1.98)	-0.0007** (-2.05)	-0.0001 (-0.61)	-0.001* (-1.41)	-0.001** (-2.84)
Market size	0.00009** (1.73)	0.00008* (1.32)	0.00005 (0.70)	0.0002*** (2.42)	0.00002 (0.29)
Demand growth	0.105 (1.26)	0.071 (0.78)	0.095** (1.98)	-0.028 (-0.23)	0.113 (1.12)
Labor productivity	0.00001 (0.22)	-0.00001 (-0.28)	-0.00001 (-0.17)	0.00005 (0.08)	-0.00004 (-0.05)
Multi-plant operation	0.007 (0.48)	0.012 (0.72)	0.004 (0.50)	0.002 (0.09)	0.037* (1.65)
Constant	0.332*** (3.73)	0.283** (2.51)	0.092** (1.80)	0.406** (3.34)	0.372*** (3.11)
R^2	0.215	0.184	0.282	0.381	0.212
No. of cases	102	102	102	49	53

Significance levels: *** 1%, ** 5%, and * 10%, two-tailed test.

Table 6: cont.

Independent variables	1985				
	Industries				
		All		Producer goods	Consumer goods
	D_1	D_1	D_2	D_1	D_1
Exports, total	0.039*** (4.83)		0.020*** (4.12)	0.043*** (3.41)	-0.0019 (-0.16)
intra		0.655*** (3.91)			
Imports, intra		-0.055 (-0.82)			
Seller concentration	-0.00001 (-0.19)	0.000007 (0.18)	0.00001 (0.28)	-0.00002 (-0.41)	0.00004 (0.97)
Market size	0.0002*** (3.91)	0.0003*** (4.47)	0.0001* (1.61)	0.0004*** (4.84)	0.0001 (1.28)
Demand Growth	0.267*** (2.86)	0.374*** (3.68)	0.144*** (2.60)	0.112 (0.66)	0.161** (1.77)
Labor productivity	0.000003 (0.08)	-0.00004 (-0.80)	0.00002 (0.95)	-0.00004 (-0.68)	-0.00001 (-0.17)
Multi-plant operation	-0.101** (-2.28)	-0.083* (-1.64)	-0.198*** (-2.58)	-0.436** (-1.71)	-0.078** (-2.09)
Constant	0.240*** (3.17)	0.006 (0.042)	0.094** (2.09)	0.244** (2.00)	0.480*** (5.39)
R^2	0.438	0.390	0.539	0.691	0.177
No. of cases	105	105	105	52	53

Table 7:

Determinants of Plant Size Deviation in the United Kingdom

Dependent variable: Average plant size/TOP50 plant size

Independent variables	1979	1983
Exports, total	0.006 (0.23)	0.020 (0.76)
Imports, total	-0.002 (-0.65)	-0.001 (-0.23)
Seller concentration	0.124** (2.33)	0.151** (2.32)
Market size	0.0006*** (7.92)	0.0005*** (8.00)
Demand growth	0.181** (2.63)	0.080* (4.52)
Labor productivity	0.0002 (0.08)	-0.002 (-0.73)
Multi-plant operation	0.005 (0.35)	0.149* (1.33)
Constant	0.194*** (2.62)	-0.038 (-0.28)
R^2	0.466	0.424
No. of cases	103	103

Economic Papers

The following papers have been issued. Copies may be obtained by applying to the address mentioned on the inside front cover.

No. 1 EEC-DG II inflationary expectations. Survey based inflationary expectations for the EEC countries, by F. Papadia and V. Basano (May 1981).

No. 3 A review of the informal economy in the European Community, by Adrian Smith (July 1981).

No. 4 Problems of interdependence in a multipolar world, by Tommaso Padoa-Schioppa (August 1981).

No. 5 European Dimensions in the Adjustment Problems, by Michael Emerson (August 1981).

No. 6 The bilateral trade linkages of the Eurolink Model : An analysis of foreign trade and competitiveness, by P. Ranuzzi (January 1982).

No. 7 United Kingdom, Medium term economic trends and problems, by D. Adams, S. Gillespie, M. Green and H. Wortmann (February 1982).

No. 8 Où en est la théorie macroéconomique, par E. Malinvaud (juin 1982).

No. 9 Marginal Employment Subsidies : An Effective Policy to Generate Employment, by Carl Chiarella and Alfred Steinherr (November 1982).

No. 10 The Great Depression : A Repeat in the 1980s ?, by Alfred Steinherr (November 1982).

No. 11 Evolution et problèmes structurels de l'économie néerlandaise, par D.C. Breedveld, C. Depoortere, A. Finetti, Dr. J.M.G. Pieters et C. Vanbelle (mars 1983).

No. 12 Macroeconomic prospects and policies for the European Community, by Giorgio Basevi, Olivier Blanchard, Willem Buiter, Rudiger Dornbusch, and Richard Layard (April 1983).

No. 13 The supply of output equations in the EC-countries and the use of the survey-based inflationary expectations, by Paul De Grauwe and Mustapha Nabli (May 1983).

No. 14 Structural trends of financial systems and capital accumulation : France, Germany, Italy, by G. Nardozzi (May 1983).

No. 15 Monetary assets and inflation induced distorsions of the national accounts - conceptual issues and correction of sectoral income flows in 5 EEC countries, by Alex Cukierman and Jørgen Mortensen (May 1983).

No. 16 Federal Republic of Germany. Medium-term economic trends and problems, by F. Allgayer, S. Gillespie, M. Green and H. Wortmann (June 1983).

No. 17 The employment miracle in the US and stagnation employment in the EC, by M. Wegner (July 1983).

No. 18 Productive Performance in West German Manufacturing Industry 1970-1980; A Farrell Frontier Characterisation, by D. Todd (August 1983).

No. 19 Central-Bank Policy and the Financing of Government Budget Deficits : A Cross-Country Comparison, by G. Demopoulos, G. Katsimbris and S. Miller (September 1983).

No. 20 Monetary assets and inflation induced distortions of the national accounts. The case of Belgium, by Ken Lennan (October 1983).

No. 21 Actifs financiers et distorsions des flux sectoriels dues à l'inflation : le cas de la France, par J.-P. Baché (octobre 1983).

No. 22 Approche pragmatique pour une politique de plein emploi : les subventions à la création d'emplois, par A. Steinherr et B. Van Haeperen (octobre 1983).

No. 23 Income Distribution and Employment in the European Communities 1960-1982, by A. Steinherr (December 1983).

No. 24 U.S. Deficits, the dollar and Europe, by O. Blanchard and R. Dornbusch (December 1983).

No. 25 Monetary Assets and inflation induced distortions of the national accounts. The case of the Federal Republic of Germany, by H. Wittelsberger (January 1984).

No. 26 Actifs financiers et distorsions des flux sectoriels dues à l'inflation : le cas de l'Italie, par A. Reati (janvier 1984).

No. 27 Evolution et problèmes structurels de l'économie italienne, par Q. Ciardelli, F. Colasanti et X. Lannes (janvier 1984).

No. 28 International Co-operation in Macro-economic Policies, by J.E. Meade (February 1984).

No. 29 The Growth of Public Expenditure in the EEC Countries 1960-1981 : Some Reflections, by Douglas Todd (December 1983).

No. 30 The integration of EEC qualitative consumer survey results in econometric modelling : an application to the consumption function, by Peter Praet (February 1984).

No. 31 Report of the CEPS Macroeconomic Policy Group. EUROPE : The case for unsustainable growth, by R. Layard, G. Basevi, O. Blanchard, W. Buiter and R. Dornbusch (April 1984).

No. 32 Total Factor Productivity Growth and the Productivity Slowdown in the West German Industrial Sector, 1970-1981, by Douglas Todd (April 1984).

No. 33 An analytical Formulation and Evaluation of the Existing Structure of Legal Reserve Requirements of the Greek Economy : An Uncommon Case, by G. Demopoulos (June 1984).

No. 34 Factor Productivity Growth in Four EEC Countries, 1960-1981, by Douglas Todd (October 1984).

No. 35 Rate of profit, business cycles and capital accumulation in U.K. industry, 1959-1981, by Angelo Reati (November 1984).

No. 36 Report of the CEPS Macroeconomic Policy Group. Employment and Growth in Europe : A Two-Handed Approach by P. Blanchard, R. Dornbusch, J. Drèze, H. Giersch, R. Layard and M. Monti (June 1985).

No. 37 Schemas for the construction of an "auxiliary econometric model" for the social security system, by A. Coppini and G. Laina (June 1985).

No. 38 Seasonal and Cyclical Variations in Relationship among Expectations, Plans and Realizations in Business Test Surveys , by H. König and M. Nerlove (July 1985).

No. 39 Analysis of the stabilisation mechanisms of macroeconomic models : a comparison of the Eurolink models by A. Bucher and V. Rossi (July 1985).

No. 40 Rate of profit, business cycles and capital accumulation in West German industry, 1960-1981, by A. Reati (July 1985).

No. 41 Inflation induced redistributions via monetary assets in five European countries : 1974-1982, by A. Cukierman, K. Lennan and F. Papadia (September 1985).

No. 42 Work Sharing : Why ? How ? How not ..., by Jacques H. Drèze (December 1985).

No. 43 Toward Understanding Major Fluctuations of the Dollar by P. Armington (January 1986).

No. 44 Predictive value of firms' manpower expectations and policy implications, by G. Nerb (March 1986).

No. 45 Le taux de profit et ses composantes dans l'industrie française de 1959 à 1981, par Angelo Reati (Mars 1986).

No. 46 Forecasting aggregate demand components with opinions surveys in the four main EC-Countries - Experience with the BUSY model , by M. Biart and P. Praet (May 1986).

No. 47 Report of CEPS Macroeconomic Policy Group : Reducing Unemployment in Europe : The Role of Capital Formation, by F. Modigliani, M. Monti, J. Drèze, H. Giersch and R. Layard (July 1986).

No. 48 Evolution et problèmes structurels de l'économie française, par X. Lannes, B. Philippe et P. Lenain (août 1986).

No. 49 Long run implications of the increase in taxation and public debt for employment and economic growth in Europe by G. Tullio (August 1986).

No. 50 Consumers Expectations and Aggregate Personal Savings by Daniel Weiserbs and Peter Simmons (November 1986).

No. 51 Do after tax interest affect private consumption and savings ? Empirical evidence for 8 industrial countries : 1970-1983 by G. Tullio and Fr. Contesso (December 1986).

No. 52 Validity and limits of applied exchange rate models : a brief survey of some recent contributions by G. Tullio (December 1986).

No. 53 Monetary and Exchange Rate Policies for International Financial Stability : a Proposal by Ronald I. McKinnon (November 1986).

No. 54 Internal and External Liberalisation for Faster Growth by Herbert Giersch (February 1987).

No. 55 Regulation or Deregulation of the Labour Market : Policy Regimes for the Recruitment and Dismissal of Employees in the Industrialised Countries by Michael Emerson (June 1987).

No. 56 Causes of the development of the private ECU and the behaviour of its interest rates : October 1982 - September 1985 by G. Tullio and Fr. Contesso (July 1987).

No. 57 Capital/Labour substitution and its impact on employment by Fabienne Ilzkovitz (September 1987).

No. 58 The Determinants of the German Official Discount Rate and of Liquidity Ratios during the classical gold standard : 1876-1913 by Andrea Sommariva and Giuseppe Tullio (September 1987).

No. 59 Profitability, real interest rates and fiscal crowding out in the OECD area 1960-1985 (An examination of the crowding out hypothesis within a portfolio model) by Jørgen Mortensen (October 1987).

No. 60 The two-handed growth strategy for Europe : Autonomy through flexible cooperation by J. Drèze, Ch. Wyplosz, Ch. Bean, Fr. Giavazzi and H. Giersch (October 1987).

No. 61 Collusive Behaviour, R & D, and European Policy by Alexis Jacquemin (November 1987).

No. 62 Inflation adjusted government budget deficits and their impact on the business cycle : empirical evidence for 8 industrial countries by G. Tullio (November 1987).

No. 63 Monetary Policy Coordination Within the EMS : Is There a Rule ? by M. Russo and G. Tullio (April 1988).

No. 64 Le Découplage de la Finance et de l'Economie - Contribution à l'Evaluation des Enjeux Européens dans la Révolution du Système Financier International par J.-Y. Haberer (Mai 1988).

No. 65 The completion of the internal market : results of macroeconomic model simulations by M. Catinat, E. Donni and A. Italianer (September 1988).

No. 66 Europe after the crash : economic policy in an era of adjustment by Charles Bean (September 1988).

No. 67 A Survey of the Economies of Scale by Cliff Pratten (October 1988).

No. 68 Economies of Scale and Intra-Community Trade by Joachim Schwalbach (October 1988).