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Changes in Comparative Advantages and Paths of Structural Adjustment and Growth in Sweden, 1975-2000

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CHANGES IN COMPARATIVE ADVANTAGES AND PATHS OF STRUCTURAL ADJUSTMENT AND GROWTH IN SWEDEN, 1975-2000

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FOREWORD

Declining rates of national population growth, continuing differential levels of regional economic activity, and shifts in the migration patterns of people and jobs are characteristic empirical aspects of many developed countries. In some regions they have combined to bring about relative (and in some cases absolute) population decline of highly urbanized areas; in others they have brought about rapid metropolitan growth.

The objective of the Urban Change Task in IIASA's Human Settlements and Services Area is to bring together and synthesize available empirical and theoretical information on the principal determinants and consequences of such urban growth and decline.

Many industrialized countries have experienced slower economic growth and reduced productivity increases, during the 1970's, combined with sustained relatively high rates of unemployment. There is a widespread belief that the causes of this development are external to the national country, a rather natural assumption to make for small, open economies. This report is part of a series focusing on the analysis of the impacts of various growth and adjustment consequences, for urban areas in the small open economy of Sweden, of external and internal changes in its comparative advantages. The report is a joint study of the Urban Change Task of the Human Settlements and Services Area and the Economic Modeling Task of the System and Decision Sciences Area. It has been partially supported by a grant from the Industry Fund of the U.S. National Academy of Sciences.

A list of publications in the Urban Change Series appears at the end of this paper.

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ABSTRACT

The purpose of this study is to identify possible future development paths for the Swedish economy in a context where both world market conditions and domestic factor accumulation and technical change are explicitly taken into account. The main analytical tool used in the study is a general equilibrium model of the Swedish economy. World market prices and trade flows as well as domestic factor accumulation and productivity change are exogenous to the model. The sectoral allocation of capital and labor as well as domestic consumption, foreign trade, and the domestic price system are endogenously determined variables.

The study's projections indicate that Sweden is entering a period with considerably slower economic growth than during the earlier part of the postwar period. Underlying this result is an assumed slowdown of the rate of productivity growth. The assumed rates of productivity change do not differ significantly between the sectors. Consequently reallocation gains can be achieved only through a reduction of the intersectoral differences in the marginal productivity of capital, characterizing the initial year of the project period.

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CHANGES IN COMPARATIVE ADVANTAGES AND PATHS OF STRUCTURAL ADJUSTMENT AND GROWTH IN SWEDEN, 1975-2000

1. BACKGROUND AND AIM OF STUDY

The research presented in this report is inspired by the slow-down of economic growth and the emergence of new "problem" industries and regions in Sweden, as in many other industrialized countries, during the 1970's. Only to some extent do these problems seem to be of a short-term, business cycle nature. They also seem to be the result of a long-term, gradual shift in the pattern of comparative advantages of industrialized countries. There are many reasons behind this shift. One is that developing countries are becoming increasingly competitive in several markets where industrialized countries previously dominated as suppliers. Other reasons are, for instance, differential growth rates between countries, differential rates of factor accumulation, and differential technical changes between sectors.

In some, and perhaps most cases, these sources of comparative-advantage changes, in the long run, tend to bring about increased productivity of the world economy as a whole. However, in the short run, changes in comparative advantages induce structural adjustment in national economies. If this adjustment is significant, the problems that arise might be, or at least might seem

to be, larger than the potential long-term benefits of a complete adjustment to the new pattern of comparative advantages. Moreover, the individual country does not necessarily gain from the comparative advantage changes even in the long run.

The experiences of the Swedish economy in the 1970's are often interpreted as a partial or temporary loss in the ability to adjust rapidly to changing external conditions. However, whether this is true or not, it is a fact that Swedish economic policy in the past few years to a large extent has been redirected to ensure that the reallocation of capital and labor from stagnating to expanding industries does not lead to increased unemployment at national, regional, and sectoral levels.

Policies with such far reaching aims easily lead to inefficient uses of the economy's resources. If they are carried out on a large scale, conflicts between goals related to economic growth and regional and local employment goals are likely to emerge. One way of reducing the significance of these problems is to create a system for "early warning signals". The rationale of such a system is that if changes in comparative advantages can be foreseen reasonably well, much of the necessary adjustment is taken care of by "normal" market forces carried out gradually over an extended time period. Moreover, in such a case there is a better chance that policies for structural change, compatible with various social goals, can be designed and implemented early enough to become efficient.

Obviously it is not possible to foresee the future. But it is possible to design forecasting methods which are focused on factors of importance for the development of comparative advantages and which can provide insights into the long-term adjustment behavior of the economy. This is particularly important in economies which, like Sweden, have a large foreign trade dependence but a limited influence on world market conditions.

So far, however, long-term forecasting in Sweden has been focused on capital accumulation, labor supply and productivity growth. Obviously such factors are very important determinants of economic development, especially if, as was the case in the 1950's and 1960's, producers face a world market situation which can be characterized as a "seller's market".

In this paper we nevertheless switch the focus to the development of externally induced comparative advantage changes. This switch is partly motivated by the increasing degree of price-competition on world markets. An additional reason to alter the focus is the interest in finding out how external and internal changes in Sweden's comparative advantages inter-relate and affect the long run performance of the economy in dimensions of particular policy interest.

Consequently, the purpose of this study is to identify possible future changes in Sweden's comparative advantages, and to analyze how these changes might affect the rate and pattern of full employment economic growth, particularly in terms of the sectoral and regional composition of employment. More specifically, we wish to analyze how Sweden's comparative advantages might be affected by specified development paths for world market prices and trade flows, and what a complete adjustment to changing comparative advantages would mean in terms of changes in the sectoral and regional composition of production and employment. In addition, we analyze to what extent alternative scenarios for capital accumulation, labor supply, and productivity growth make any significant difference in these dimensions. Apart from highlighting these substantive issues, our ambition is to develop an approach to the long-term forecasting of comparative-advantage changes in a small, open economy.

2. THE MODEL

The model used in the analysis is a general equilibrium model of a small open economy. Since it is a pure equilibrium model, it does not explicitly incorporate various obstacles

to structural change, reflecting for instance rigidities in capital and labor markets. Thus the main output of the model analysis is a set of conditional estimates of the structural changes of the Swedish economy which would result from a complete adjustment to changes in comparative advantages over a period of 15 to 25 years.

The model does not have an explicit regional dimension. Thus, the regional impact analysis has to be carried out by means of exogenous information about the regional distribution of the production units of the sectors identifed in the model.

A full description of the model, as well as its solution algorithm, can be found in Bergman and Por.(1980). In this section the basic structure of the model is briefly described.

The growth of the labor force as well as net capital formation for the economy as a whole are exogenous to the model. The same applies to technical change and world market conditions in terms of international prices of traded goods and the volume of international trade. Thus, for a given point in time, world market conditions and the domestic supply of capital and labor are given.

In the model 23 production sectors and 20 groups of traded goods are identified. The model endogenously determines a sectoral allocation of labor and capital, consistent with equilibrium on all commodity and factor markets at prices equal to marginal (and average) production costs. Accordingly, production, consumption, foreign trade, and price formation are endogenous to the model.

On all commodity markets in the model economy the supply originates from domestic production and, with some exceptions, imports. In all domestic production sectors capital, labor, and energy are substitutable factors of production, while the

use of produced non-energy inputs is proportional to output. The production technology exhibits constant returns to scale in all sectors. Consequently the equilibrium price of production sector output, P_j, is equal to average production cost.

The technology in a given production sector j can be summarized by a unit cost function

$$P_j = P_j^* + \sum_{i=2}^{n} P_i^D a_{ij} + V \bar{P}_j \bar{b}_{jj} + \theta_j P_j \quad ;$$

where P_i^D is the market price of commodities of type i, $V \bar{P}_j \bar{b}_{jj}$ is the cost of complementary imports[†] and $\theta_j P_j$ is the net indirect tax per unit of output. The market price, P_i^D, is a weighted average of the import price of commodity i and the domestic production cost of that commodity. The weights are determined by the share of imports in the domestic supply of commodity group i.

The variable P_j^*, the "net" unit cost of producing commodity j, can be expressed as a function of the "prices" of capital, labor, and energy. This function is derived from explicit production functions and the assumption that producers maximize their profits. Since the production technology exhibits constant returns to scale, this is equivalent to assuming cost minimization behavior.

The production functions are of a nested CES and Cobb-Douglas type. Thus, there is a constant elasticity of substitution between a composite capital-labor input, defined by a Cobb-Douglas function, and energy.

The share of imports in the domestic supply is assumed to be determined by domestic production costs, P_i, in relation to world market prices expressed in the domestic currency unit,

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[†]The coefficient $\bar{b}_{jj}$ defines the use of complementary imports per unit of output in sector j, $\bar{P}_j$ is the world market price of that commodity and V is the exchange rate.

VP_i^{WI}. Thus, the import of commodity group i, M_i, is determined by

$$M_i = m_i(X_i - Z_i) \quad ,$$

where X_i is domestic production, Z_i is exports, and

$$m_i = m_i^0 \left(\frac{P_i}{(1+\phi_i)VP_i^{WI}} \right)^{\mu_i} \quad ;$$

where m_i^0 is a constant and ϕ_i a custom duty. The share of imports in domestic supply, $m_i/(1+m_i)$, affects the market price of the commodity group i, P_i^D, and thus domestic production costs, through the equation

$$P_i^D = \frac{m_i}{1+m_i}(1 + \phi_i)VP_i^{WI} + \frac{1}{1+m_i} P_i \quad .$$

This completes the brief description of the supply side in the model economy, and next we turn to the demand side. The intermediate demand for goods and services is determined from the assumption about fixed proportions between output and the use of produced, non-energy inputs in the production sectors. On the final demand side, real public consumption is exogenously determined. That "almost" applies to gross investments as well, since net investments and the total capital stock in the economy are exogenously determined. Thus, gross investments have an endogenous element only because the sectoral allocation of the capital stock is endogenously determined, and depreciation rates differ between the sectors.

However, household consumption expenditures as well as export demand are highly endogenous final demand components. The demand for consumer goods and services by the household sector is assumed to be a function of the relative prices of

those goods and services and the disposable income (less saving) of the household sector. More specifically household demand is represented by a system of demand equations with constant prices and expenditures.

The export functions, finally, are simply the import functions of the "rest of the world". Although a considerable share of output in many industrial sectors in Sweden is exported, Swedish producers have a limited influence on world market prices and the volume of international trade. Accordingly, these magnitudes are treated as exogenous variables. The exports from each of the trading sectors are assumed to depend partly on the relation between domestic production cost and the world market price, and partly on the exogenously determined development of international trade with the commodity group in question. The export functions can thus be written

$$Z_i = Z_i^0 \left(\frac{P_i}{VP_i^{WE}} \right)^{\varepsilon_i} e^{\sigma_i t} \quad ;$$

where Z_i^0 is a constant.

In order to "close" the model, equilibrium conditions for all commodity and factor markets, including the currency market, are needed. However, the specification of these equilibrium conditions is obvious and need not be repeated here. It may be added that in the model the price system is normalized so that the general price level is kept constant over time.

3. SECTORAL CLASSIFICATION AND SCENARIOS

In order to apply the projection model described in the preceding section to the present context, two requirements should be satisfied. The first is that the sectoral breakdown should be consistent both with the theoretical principles underlying the model and with the problem focus of the empirical

analysis. In the first subsection below the sectoral breakdown used in the study is presented and discussed against the background of this requirement.

The second requirement is that an empirical basis for the definition of exogenous variables and parameters of the model can be established. In order to understand the outcome of the projections, it is also important to sort out the economic rationales behind the relationships between different scenarios. Our base case scenario, to be used as a norm of comparison for projections with other scenarios, is presented in the second subsection below. The alternative scenarios are presented in the third subsection.

3.1 The Sectoral Classification

Because of computational considerations and data availability the number of sectors had to be restricted to 23 sectors. The analytical focus on the impact of changing comparative advantages on Swedish economic development suggested more detail in the industrial breakdown than in the corresponding breakdown of the non-traded-goods sectors. Consequently, 15 industrial sectors were given a separate treatment in the model. The classification of the industrial sectors was based on the expected origins of future changes in comparative advantages.

In the model, there are basically three explicitly treated causes for changes in comparative advantages which are related to supply. The first two are differential growth rates of primary factors (capital and labor) and pure technical change (within and outside the industrial sector), respectively. A third partially independent determinant originates in the specification of the production functions. Thus, technical change is neutral only with respect to the use of capital versus labor, but is "primary factor saving" in terms of the relative use of intermediate factors (energy with respect to other intermediate goods).

Causes related to demand that have altered comparative advantages are introduced through the impact of differential

growth rates of world markets (i.e., world trade) and changes in world market prices structures.

According to these determinants, both demand and supply characteristics of the industrial products should influence the aggregation principles. Here, the supply characteristics were given priority in most instances. In addition, earlier studies of Sweden's changing international specialization*, as well as the nature of the world market scenarios, indicated that the development of human capital or skills also has an important role in this context. Since that factor could not be explicitly incorporated in the production functions, it was instead taken into account in the classification of sectors. In special cases, backward and forward linkages due to transportation costs or technical integration have influenced the sectoral definitions.

Instead of strictly applying a single aggregation principle, we tried to take all these considerations into account in accordance with our best judgment. The following presentation of the sectors provides information about how the various factors affected the sectoral classification. The sectors are all listed in Table 3.1. The table is roughly organized so that the primary sectors (and those strongly related to the primary sector) appear first, followed by the secondary and tertiary sectors.

The energy sector comprises not only all kinds of energy production but also petroleum refineries and asphalt, coal, and oil industries. This treatment of the energy sector is based on earlier studies and does not need further elaboration here (see particularly Bergman, 1978).

There is one pure primary sector: mining and quarrying (sector 4). This sector has been a large Swedish export sector for centuries, producing a relatively homogeneous output. Thus it almost exclusively produces iron and pellets of iron rather than more highly priced minerals. Consequently aggregation causes no particular problems.

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*See Ohlsson (1977 and forthcoming, chapters 6, 7 and 10).

Table 3.1 The sectors in the projection analysis.

Number	Production sector
1	Energy[a]
2	Agriculture, fishing, basic food
3	Forestry, wood, pulp,and paper
4	Mining and quarrying
5	Other food, beverages, liquor and tobacco
6	Textile, clothing,and leather
7	Paper products
8	Chemical products[b]
9	Non-metallic mineral products except petroleum and coal
10	Metals
11	Fabricated metal products
12	Non-electrical machinery, instruments, photographical and optical equipment,and watches
13	Transport equipment except ships and boats
14	Electro-technical products
15	Ships and boats
16	Printing and miscellaneous products
17	Hotel and restaurant services, repairs, letting of premises other than dwellings, and private services other than bank, insurance, and business services
18	Construction
19	Wholesale and retail trade, communications
20	Transport and storage
21	Financial and insurance services
22	Housing services
23	Public services
24	Capital goods[c]

[a] Including petroleum refineries and asphalt and coal products.

[b] Excluding petroleum refineries and asphalt and coal products.

[c] The capital goods sector is not a production sector but a "bookkeeping" sector which aggregates different kinds of capital goods, primarily machinery and buildings, in fixed proportions to an aggregate capital good used in all "real" production sectors.

There are two mixed primary-secondary sectors: the agriculture, fishery,and basic food sector (no. 2) and the forestry, wood, pulp,and paper sector (no. 3). Obviously, one of the principles for aggregation has been the strong input-output relationship between primary and secondary production. Moreover, there are so-called economies of integration between them, which in the case of the "agri-food" sector are attributable to transportation costs and policy-imposed ties*. In the case of the forest based sector, transportation costs and technical integration economies motivate the aggregation into one sector. The forest-based sector is strongly export oriented. The agri-food sector is sheltered from international competition by policy measures.

Apart from these characteristics the primary and primary-based sectors also have high or extremely high capital and energy intensities in common. In addition, they are all producing relatively standardized products which, with the exception of the products of the agri-food sector, are sold in internationally competitive markets.

There are four "semi-raw-material-based" sectors, of which one is the foreign trade-exposed: other food, beverages, liquor,and tobacco industry (no. 5). The backward linkages of this latter sector are less strong than those within the agri-food sector. Moreover, it is not as much based on domestic raw materials.

Another semi-raw-material-based sector is the industry for non-metallic mineral products (no. 9), which excludes petroleum and coal products. This industry is in part a foreign trade-sheltered sector, particularly because of high

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*The agricultural sector is to a high degree excluded from foreign competition in Sweden. Moreover, there is a subsidy system for the basic food industry aimed at compensating it for the otherwise too high input prices created by the agricultural policy. Finally, much of the ownership of the basic food sector is in the hands of farmer cooperatives, which in fact suggests the existence of monopolistic or oligopolistic competition.

costs of transportation. The remaining two industries within this category are the chemical (no. 8) and the metal (no. 10) industries, respectively. Both contain large parts which have earlier been characterized by more pronounced backward linkages than those appearing to prevail nowadays. It would, however, have been more satisfactory to divide both sectors into at least two parts, one of which would then have been producing the more highly manufactured products. Unfortunately, the present data base did not allow such a breakdown.

Except for one industry, the remaining eight industries are clearly the so-called footloose industries; they are both foreign trade-exposed and little dependent on the location of raw materials production. Three of the seven footloose industries are labor intensive in their production methods: the textile, clothing, and leather industry (no. 6), the fabricated metal products industry (no. 11),and the electro-technical industry (no. 14).

In many product fields of the first of these industries, the high market shares of LDCs suggests the emergence of a price leadership position of low wage countries. Both of the other two sectors have segments in which LDCs have already acquired a substantial competitiveness, but their overall market share is still not high.* The fabricated metal products industry has, for instance, subindustries which are intensively using semi-modern manual skills and to some extent also technical personnel. Finally, the electro-technical industry contains parts which are among the most technical-personnel-intensive in relatively "young" technology fields. In other words, these two industries should ideally have been broken down into two or more sectors.

Three of the remaining five industries have somewhat higher although still not particularly high,capital intensities. They are primarily distinguished from other footloose industries

*See, for instance, OECD (1979) and references and analysis in Ohlsson (1980).

because of their high human skill intensities (technical personnel and skilled manual workers). The latter feature is most pronounced for the machinery industry (no. 12) and also for the transport equipment industry (no. 13). Shipyards (no. 15) are less human skill requiring. This industry is at present a government regulated industry across the world, a characteristic which also holds for the aircraft producing part of the transport equipment industry.

The paper products sector (no. 7) has been rather dynamic in the 1960's and 1970's with respect to the growth rate of domestic demand. It has an intermediate position on three of the factor intensities discussed above, i.e., on capital, technical personnel, and skilled manual worker intensities. Finally, the miscellaneous industrial products industry (no. 16) also includes the printing industry, which has only in the past five years been exposed to a measurable degree of international competition.

All the remaining sectors belong to the tertiary sector, with the only exception of the capital goods sector constructed for "bookkeeping" purposes (cf. footnote 3 of Table 3.1). Given the focus of the study, we abstain from commenting on these more trade-sheltered sectors.

In summary, the sectoral breakdown is not exactly the most desirable one. However, it incorporates certain basic technology differences that can be associated with changing comparative advantages. Additional information of the possible sectoral developments can only be introduced in the projections through adjustments of the sectoral values of exogenous variables and parameters. The next two subsections outline the scenarios for these variables and parameters.

3.2 Base Case Scenarios

The projections of the model are made for the relatively long time periods 1976-1990 and 1991-2000, respectively. Our base year is 1975, the latest year from which a complete data

base is obtainable. With such long time horizons, it is impossible to claim that any projection whatsoever is the most likely one. Instead, it is more useful, in terms of policy implications analysis, to establish alternative scenarios in order to find a possible range of structural adjustment and growth paths. The analytical philosophy behind the alternatives can be described as follows.

As mentioned in section 1, there are external and internal causes that change comparative advantages. The main differences between the two, for a small open economy, lies in that a) the external causes can affect the internal ones but the opposite direction of influence can be ignored, and b) the causes that are controllable for domestic economic policies are all internal. This latter distinction suggests that the policy strategy analysis can be incorporated in the model projections through variations in the values of exogenous variables and parameters that belong to the internal cause category.

There are two ways of incorporating changes in comparative advantages through changes in the numerical values of parameters or exogenous variables. One is a change in individual sectoral values and the other is a uniform change in all values across sectors. Both ways may have macro as well as structural impacts, but there is one major difference in that the latter, "magnitude" type of change, does not alter the sectoral comparative advantage ranking, changing only the strength of advantages and disadvantages.

The most obvious example of this is a more rapid accumulation of capital than of labor, which, *ceteris paribus*, strengthens the comparative advantage of capital intensive industries. Indirectly, other magnitude changes, such as the rate of growth of world trade or of technical change, may also have a similar consequence through its effects on the use of primary factors.

Against this background, it was regarded as natural to construct a base case, which combined certain world trade scenarios with scenarios of internal causes for changing comparative advantages based on the official Swedish long term forecasts. This means, in turn, that the "domestic scenarios" in the base case more or less project the future causes to be similar in magnitude and structure as those of the past two decades.

As is clear from section 2 the world market scenarios consist of assumptions about a) growth rates of the world market for trade-exposed sectors, and b) changes in world market relative prices. The most globally comprehensive and consistent set of estimates on the two sets of variables was found in Leontief (1977) within its Scenario A. This scenario is the most "endogenous" one of that study; except for a few regions neither GDP nor employment are assumed to attain target values. Instead, those magnitudes are endogenously determined under the constraints incorporated in the global model-system utilized in the study.

The world market price assumptions are based on projections of production costs in the American economy. Implicitly therefore, it seems to presuppose that US producers are able to maintain much of the same price leadership role in the world economy as they had in the 1950's and 1960's. Although the European and Japanese challenges altered this role in the ten years before our starting year, and the industrialization of LDCs are about to alter it in one or two sectors, this basic assumption will not be questioned in the present study. The issue, however, is large enough to be a topic for another paper. For the sake of brevity it is not treated here.

This limitation in the realism of our world market scenarios are perhaps not as serious as it might first appear. The reason for this is that the use of historical data on American production costs for projections of world market relative price changes is also possible in another case. Suppose that American industry acts as a price taker on the world market

but as a consequence of its size has no factor-biased intra-industry specialization. Then its domestic prices and costs of production follow those established at the world market.

The second set of world market variables obtained from the same source was the growth rates of world trade by commodity groups. There is not much to say about these figures in terms of their theoretical or empirical underpinning. Both sets of variables are presented in Table 3.2 together with some other scenario variables.

If the cross-sectoral differences in the two sets of world market variables are evaluated, however, two rather surprising changes compared to historical experience should be noticed. One is the extremely favorable development for exporters of textiles, clothing, and leather with respect to both the relative price change (a moderate decrease) and the world trade growth rate. With respect to this growth rate this sector ranks as the most dynamic sector together with three others: namely, paper products, non-metallic mineral products*, and printing and miscellaneous products.

Given the above mentioned nature of the relative price forecasts it appears as if Leontief's price forecast may be subject to a bias from an intra-industry specialization in the US on less price sensitive segments of the textile and clothing sector.** This may follow as a consequence of the successful LDC market penetration. The associated relative cost increases in the US industry have then a built-in upward bias if taken as a projection of the world market relative

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*Also this sector obtains a remarkably favorable world market future, but this judgment is based more on the composition of the domestic industry than on the past trends in world trade.

**Thus for this particular sector we consider the price leadership role of the US economy and the assumption of no factor-biased intra-industry specialization to be unrealistic.

Table 3.2 Sectoral specifications of world market scenarios, price elasticities, and productivity growth.

Sector number	Sector	Percentage growth in world trade 1975-90	Percentage growth in world trade 1990-2000	Relative price in the year 1990	Relative price in the year 2000	Import price elasticity	Export price elasticity	Yearly rate of productivity growth in percent
1	Energy	-	-	2.71	3.05	-	-	1.0
2	Agriculture, fishing, basic food	0.0	1.0	1.07	1.11	1.5	-2.5	1.0
3	Forestry, wood, pulp, and paper	7.0	6.0	0.91	0.90	0.8	-1.5	1.0
4	Mining and quarrying	4.0	4.0	1.00	1.00	1.0	-2.0	1.0
5	Other food, beverages, etc.	1.0	1.0	0.95	0.93	1.0	-2.0	1.0
6	Textile, clothing, leather	8.0	7.0	0.93	0.92	1.5	-3.0	2.0
7	Paper products	8.0	7.0	0.87	0.86	0.3	-0.6	2.0
8	Chemical products	6.0	5.0	0.98	0.99	1.0	-1.5	4.0
9	Non-metallic mineral products	8.0	7.0	0.93	0.94	0.5	-1.0	1.0
10	Metals	4.0	3.0	0.97	0.96	0.8	-1.5	3.0
11	Fabricated metal products	4.0	3.0	0.97	0.96	1.5	-2.5	2.0
12	Non-electrical machinery, etc.	6.0	6.0	1.00	1.00	1.8	-2.5	2.0
		(5.0)*	(5.0)*	(0.89)*	(0.89)*			
13	Transport equipment	6.0	5.0	0.95	0.94	0.6	-1.0	2.0
14	Electro-technical products	7.0	6.0	0.90	0.93	0.8	-1.2	2.0
15	Ships and boats	5.0	5.0	0.85	0.82	1.0	-1.5	2.0
16	Printing and miscellaneous	8.0	7.0	0.87	0.86	0.8	-1.2	2.0
17	Hotel, restaurants, etc.	4.0	4.0	1.00	1.00	0.2	-0.3	0.5
18	Construction	4.0	4.0	1.00	1.00	-	-	1.5
19	Wholesale and retail trade, etc.	4.0	4.0	0.91	0.91	0.2	-0.3	1.5
20	Transport and storage	5.0	4.0	0.95	0.96	0.2	-0.3	1.5
21	Financial and insurance sources	4.0	3.0	1.01	1.00	0.2	-0.3	0.5
22	Housing services	-	-	-	-	-	-	1.0
23	Public services	-	-	-	-	-	-	0.0
24	Capital goods	-	-	-	-	-	-	-

*The figures within parenthesis are the original ones from Leontief (1977).

Source: See the main text.

price. In turn, this may explain the rather high projected world market growth rates for these products. For this reason, the projections of the Swedish textile industry must be considered as being rather optimistic both from the price and the world market growth points of view.

Another remarkable projected change is the comparatively low market growth figures for certain engineering sectors (non-electrical machinery, transport equipment and electro-technical products) and the chemical industry compared to both shipyards and certain raw material based sectors (forestry, wood, pulp, and paper and sectors 9 and 10).

According to this feature and the earlier mentioned one, it is tempting to conclude that Leontief's study has used a constellation of assumptions which is very favorable for an industrial composition of a typical developing country. Consequently, the world market scenarios utilized in the present study must be interpreted to be on the pessimistic side for Sweden's high skill intensive, footloose industries and overly optimistic for its raw material, raw material based, and raw labor intensive,footloose sectors. Accordingly, the projected structural adjustments must be considered to be smaller than expected from the history of the first five years of the projection period.

Moreover, the same conclusion holds for any country as far as the structural influence of changing relative prices is concerned, because of the rather small spread in projected prices within the industrial sector. The only exception to this latter observation is the energy sector, where the relative price level more than triples compared to all other sectors.

As can be seen from Table 3.2 we have adjusted the market growth rate from 5 to 6 percent and assumed a more favorable relative price development for the non-electrical machinery industry. Instead of the above noted possible reasons for such

an adjustment in this case it is the Swedish intra-industry specialization in investment goods for raw material and raw material based production etc., that causes this. According to the Leontief projections the rapid growth of these sectors should be associated with a more than average rate of increase in demand for investment goods. Moreover, the production of such heavy machinery has had a lower rate of technical change than for instance computer and office machinery production. For this reason the relative price decrease of the cited study appears to be biased downwards for a machinery industry with the present Swedish output mix.

Table 3.2 also provides the sectoral relative price elasticities of imports and exports and the annual rates of productivity growth. The former two sets of figures have been chosen on the basis of estimates in Hamilton (1979) on import share relative price elasticities for the period 1960-75. Generally speaking, the price elasticities of this study seem to be rather low. Combined with the small relative price changes, this is likely to produce an impact on structural change which is on the small side.

The price elasticities estimated by Hamilton were changed for only three sectors: namely, the chemical, non-electrical machinery, and transport equipment industries. The elasticities were adjusted downwards for the two former and upward for the last sector. The assumed high elasticities for chemicals and non-electrical machinery are probably a consequence of the combination of low tariff barriers and rapid intra-industry trade and specialization in the 1960's and 1970's rather than particularly high substitutability with similar products produced in other countries. Likewise, the estimates of the transport equipment industry were presumed to be low because of favorable relative tariff rate development. [See Ohlsson (forthcoming), chapter 6.]

As is obvious from Table 3.2 the export price elasticities are generally assumed to be higher than the import price elasticities. The same rank ordering as for the price import elasticities is accepted, but the difference between the two is attributed to proximity advantages in the home market for domestic producers. Since Sweden is geographically fairly isolated from its main foreign markets and because of the large surface over which the economy is spread, the differences between the two are usually large in absolute terms. Small relative differences were introduced for homogeneous industries with highly tradeable products. Needless to say, these differences introduce a stronger element of arbitrariness for export price elasticities than for the import price elasticities.

Finally, the assumed annual growth rates of productivity presented in Table 3.2 are based on projections by the Swedish Ministry of Economic Affairs [see Restad (1976)]. These projections have since been revised downwards. However, the revised values were unavailable to us in some of the more detailed sectors. For these sectors we made proportional downward revisions. The forestry, wood, pulp, and paper sector has been attributed an even lower figure. This is because the decreasing availability of domestic raw material supplies is assumed to increase the costs of additional supplies.

In accordance with the most recent figures from the Ministry of Economic Affairs we have assumed a yearly increase of 1.8 percent in real public consumption throughout the period 1975-2000. The corresponding figure for the real capital stock of the economy is set to 2.5 percent per year. Labor supply measured in man-hours is assumed to remain constant at the 1975 level. This latter assumption allows for the fulfillment of ambitious goals about increased labor participation rates in an almost stable Swedish population mainly through an enhanced degree of part-time work. Consequently, the differential growth rates for the two primary factors induce, *ceteris paribus*, a more capital intensive specialization.

This concludes our presentation of the base case assumptions. The principles and figures for the alternative scenarios are discussed next.

3.3 Alternative Scenarios

Early computations suggested that macroeconomic development and the sectoral distribution of employment were rather insensitive to reasonable changes in relative prices or price elasticities. In order to alter the results substantially the magnitudes had to be altered considerably on both. Instead the projections turned out to be more sensitive to changes in rates of world market growth and domestic productivity.

For this reason, the "alternative scenarios" were built on alternative assumptions about the latter two sets of exogenous variables. The most simple change is to merely alter the magnitudes, i.e., not the sectoral differences in world market growth rates and productivity rates. We considered it reasonable to adjust the magnitudes downwards by 1 percent per year for all tradeable sectors, i.e., to let the world market growth rate decline even more compared to the past post-World War II decades than was projected in Leontief (1977). Given the already historically very low rates of productivity growth, the 1 percent change in productivity rates was an upward change. Even so, however, the rate of productivity growth would fall behind that of the 1960's. Calling the base case number I, three alternative combinations of assumptions were used:

Case II The same as the base case in all respects except for a 1 percent higher annual productivity growth rate in all sectors

Case III The same as the base case in all respects except for a 1 percent lower rate of world market growth in all tradeable sectors

Case IV Combines the two adjustments of cases 2 and 3 but are in all other respects utilizing the same assumptions as the base case

Apart from these cases, the sensitivity of certain macroeconomic results to alternative assumptions about capital accumulation and labor supply was also analyzed. For simplification, these alternative assumptions have been condensed and are not discussed in detail.

4. THE PROJECTIONS

The results of the model simulations are given in the following subsections. In the first two subsections base case results are presented, first the projected macroeconomic development (4.1) and then the sectoral development (4.2). Subsection 4.3 deals with the consequences of altered world trade and productivity assumptions at the macroeconomic level, while the ensuing subsection deals with the corresponding sectoral consequences. In order to avoid repetition, and to acquire a better tie to the subsequent analysis of regional implications in section 5, the sectoral consequences are described in terms of employment consequences.

4.1 Macroeconomic Developments: The Base Case

The model was solved for the years 1990 and 2000, but in most cases we prefer to present the macroeconomic results in terms of annual percentage rates of change during the periods 1976-1990 and 1991-2000. It was assumed that the initially prevailing intersectoral profit differences will be eliminated by 1990. Consequently, the first of these sub-periods can be regarded as a period of adjustment from a disequilibrium to an equilibrium state of the economy.

To begin with we focus on the projected development of GDP, aggregate real consumption, industrial production and employment, the functional distribution of income, and relative size of the public sector.

Table 4.1 contains the projected growth rates for real GDP and aggregate private consumption during the two subperiods 1976-1990 and 1991-2000. These four figures contain three

striking results: the rate of economic growth is considerably lower than the postwar average, the two sub-periods are different and, finally, the share of private consumption in real GNP increases over the whole period. In what follows, possible explanations of these three results are offered.

Table 4.1 Projected annual percentage growth rates for real GDP and aggregate private consumption, 1976-2000.

	1976-1990	1991-2000
GDP	2.2	1.8
Private consumption	3.0	2.6

During the period 1950-1975, the average rate of economic growth (growth of GDP) in Sweden was 3.6 percent per annum. If the "bad" years in the beginning of the 1970's are excluded, the average rate for 1950-1970 becomes 3.8 percent per annum. This means that, according to our projections, Sweden has entered a period with considerably slower economic growth than during the earlier postwar period.

There are many factors behind this development: slower rate of capital formation and technical change, stagnation in the supply of labor* (in man-hours), and a relatively fast growth of an already big public sector which, in accordance with national accounting conventions, is here attributed a zero productivity increase. In addition, some private service sectors, with a relatively slow rate of productivity increase, grow faster than GDP.

The second startling feature of our results is the difference between the two sub-periods; the rate of growth is considerably higher from 1976 to 1990 than from 1991 to 2000.

*Observe that the labor force is assumed to be fully employed in all model simulations.

The explanation is simple and straightforward. The initial year, 1975, shows many features of a disequilibrium situation. The average rate of profit was very low and the intersectoral differences in terms of profit rates were significant. In two of the 23 aggregated sectors losses were revealed by the data. Thus, a sectoral reallocation of resources could produce substantial efficiency gains. That is exactly what happens between 1975 and 1990 in our projection.* Net investments are concentrated in a few relatively profitable sectors and old capital is not replaced in some sectors. This development tends to equalize profit rates, and thus the marginal productivity of capital in the different sectors. This equalization leads to an increase in the average productivity of the economy's resources. During the second sub-period, however, these potential reallocation gains are already exploited, and capital accumulation and technical change are the main sources of economic growth.

With this background even the low growth rates displayed in Table 4.1 might in practice be too optimistic. In a process where efficiency in resource allocation is a significant source of economic growth, labor and capital markets have to function quite smoothly; without much delay resources have to be reallocated from stagnating to expanding sectors. The present institutional framework of the Swedish economy does not seem to be well-suited for fostering such a process. In particular, the interregional and intersectoral labor mobility may be substantially lower in the future than in the 1950's and 1960's. This might be a possible result of changes in the institutional framework of the labor market in the 1970's and the implementation of very ambitious policy goals aimed at stabilizing employment on the regional or county and sometimes even the firm level.

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*In Bergman-Por (1980) the potential reallocation gains are estimated, using the same model and data base. The results indicate that a full exploitation of the potential reallocation gains in 1975 would lead to a GDP which would be 4 percent higher than the actual value.

As was mentioned in section 3.2, a factor, which suggests that the growth rates are too low, is the relatively small amount of incentives to structural adjustment hidden in the Leontief (1977) world economy projections. This reduces the intersectoral differences in terms of comparative advantage changes and, thus, the contribution to economic growth from intersectoral reallocation of resources.

Another feature of our 1976-1990 projection is that the profit level in the private sector of the economy, measured as total pre-tax net profits in relation to the replacement value of the capital stock, increases from 3.8 to 4.7 percent. This increase contributes to the growing share of capital income in total national income. It can be questioned whether such a development would be politically accepted in Sweden without a negotiated change in the distribution of ownership in the industrial sectors.

However, this is a very crude way of posing the income-distribution problem; the marginal productivity of capital need not be equal to the after tax income from capital. The critical point of the analysis is therefore whether the rate of profit after taxes is high enough to bring about the assumed annual 2.5 percent increase in the economy's stock of capital.

The third striking result is the relatively fast growth of private consumption.* By assumption, investments grow by by 2.5 per annum and real public consumption by 1.8 percent per annum. Since GDP grows by an average of 2.0 percent per annum, an average rate of private consumption growth of 2.8 percent per annum implies that exports grow slower than GDP. That is exactly what takes place in our base case projection. Due to a significant terms-of-trade improvement (1.9 percent per annum

*As will be discussed in some detail in section 5, this result does not conform to the long term projections carried out by the Ministry of Economic Affairs.

despite increasing real oil prices) external balance is maintained although real exports only grow 1.7 percent per annum.

This result is not, however, due to a favorable cost of production development in Sweden. Instead, the terms-of-trade improvement is a consequence of a continuous appreciation of the Swedish currency which, in turn, is the result of the fast growth of world market trade in relation to Swedish economic growth*. A projected reallocation of exports towards commodities with relatively increased world market prices have a similar effect on the terms of trade. From a technical point of view this result is fairly straightforward. The value of imports should grow at about the same rate as the value of exports, but if world market demand grows considerably faster than import demand, constant prices and constant world market shares would together lead to mounting (current account) surpluses. The "solution" is some combination of appreciation and decreasing world market shares.

However, from an empirical point of view, this result should be interpreted with care. The currency appreciation which takes place in our projection leads to a considerable gap, about 40 percent, between Swedish and world market prices for some commodity groups. We have no such experiences from the estimation period, and consequently we do not know whether our estimates of the price elasticities in the export and import functions are still valid for the price relations prevailing in our projections for the year 2000.** Another reason to be cautious on this point is the rapid net accumulation of foreign debt in Sweden in the past 5 to 7 years. It has led to a new goal of economic policies: namely, the repayment of the outstanding foreign debt in the 1980's. Therefore, the current account is targeted to yield a surplus, which if the policies are successful, would create a slower appreciation

*This point is further dealt with in subsection 4.3.

**Cf. further the critical appraisal of the approach in section 6.

or even a depreciation of the Swedish crown. Another consequence would be a more rapid real growth of exports.

Table 4.2 contains some results on the semi-macro level. Industrial production grows slower than GDP and industrial employment decreases during the entire projection period. Energy consumption grows considerably slower than the 5.5 percent per annum experienced during the period 1950-1972. A few comments should be made about these results.

Table 4.2 Projected annual percentage growth rates for industrial production and employment and total energy consumption, 1975-2000.

	1975-1990	1991-2000
Industrial production	1.9	1.5
Industrial employment	-1.0	-2.3
Total energy consumption	1.1	2.2

During the postwar period industrial production has, in general, been growing faster than GDP in Sweden. According to our projection, the reversed relation will hold in the future. However, the consumption of industrial goods continues to grow faster than GDP. Thus the basic difference is that the import share in the domestic supply of industrial goods increases considerably, from 27.8 percent in 1975 to 40.2 percent in 2000. This is, of course, the mirror image of the above-mentioned terms-of-trade improvement and the slow export expansion. The much slower growth of exports and production for the domestic market explains in turn why industrial employment decreases at a fast rate. At the turn of the century, the industrial sector would then have lost about 30 percent of its 1975 employment (in man-hours) to primarily service-producing sectors. Another way of expressing the causes behind this development is to say that the industrial

sector is squeezed between competition with foreign producers in commodity markets and foreign-trade-sheltered producers (particularly the public sector) in the (primary) factor markets. The latter is the result of the absence of (or low) productivity growth rates in tertiary sectors and the lack of strong demand restricting factors when production costs increase.

The relatively slow rate of energy consumption growth is, of course, partly a result of the slow growth of industrial production. It is also, however, a result of substitutions of capital and labor for energy, induced by an increasing relative price of energy. Between 1950 and 1972, the real price of energy decreased by nearly 3 percent per annum. In our projection the average rate of increase between 1975 and 2000 is 1.0 percent per annum. However, most of the price increase takes place during the first sub-period, primarily as a result of the substantial increase of the rate of interest, which affects the capital intensive energy sector more than other sectors. The uneven development of the relative price of energy explains the differences in energy consumption growth between the two sub-periods.

On *a priori* grounds, it cannot be ruled out that the projected slow growth of industrial production in the Swedish economy is the result of increasing energy costs. However, a closer look at the results does not support such a hypothesis. The share of energy costs in total production costs is generally low in the industrial sectors, between 5 percent and 10 percent at the terminal point (the year 2000), compared to 3 - 8 percent in 1975. This means that the projected energy price increase still has a relatively minor impact on the development of production costs in the industrial sectors.

Moreover, as long as Swedish energy prices change in the same way as energy prices in other countries, the development of Sweden's comparative advantages should not be much affected by increasing relative prices of energy. To put it

differently the tripling of world market energy prices is also enhancing the world market prices for energy-requiring sectors. In the base case projection, we have assumed an "unchanged energy policy" in Sweden. That is, we have not assumed any major changes in production technology in the energy sector or in the taxation of energy. The world market price projections, obtained from the Leontief study, rest on similar assumptions.

However, that development might induce different energy policies in different countries, which in the long run can have an impact on the international division of labor. In the Swedish case there are well established goals for the development of aggregate energy consumption. Thus, according to a parliamentary decision in 1975, total energy consumption should not grow by more than 2 percent per annum between 1973 and 1985, and by 1990 zero energy consumption growth should be attained. Although these goals are not absolute, it is likely that an energy consumption growth which is considerably faster than these target rates, would induce additional energy conservation efforts. According to our results, however, there is no clash between the "endogenous" growth of energy consumption and the target growth rates until the beginning of the 1990's. We conclude that according to the declared energy policy goals, our projected development is feasible at least until 1990.

During the 1970's, a conflict has arisen between private and public consumption. In accordance with the projections published by the Ministry of Economic Affairs, we have assumed that real public consumption will increase by 1.8 percent per annum between 1976 and 2000. In our projection that leads to an increase of public employment by 1.8 percent per annum. As a result, the share of the labor force employed by the public sector increases from 22.6 percent to 36.9 percent. The price index for public consumption increases by 2.2 percent per annum in relation to the general price level. Thus, in

our projection, the share of public consumption expenditures* in the nominal national income increases from 26.8 percent to 36.9 percent in 2000. The impact of this development on the share of private consumption expenditures is somewhat mitigated by an annual 0.6 percent decrease in the relative price of capital goods, which in conjunction with fixed development of real investment expenditures leads to a gradual decrease of the gross savings ratio. However, as can be seen in Table 4.3 the projected development implies a very slow growth of the disposable income of the household sector.

Table 4.3 Aggregate demand categories as a percentage share of GDP in constant and current prices.

	Constant prices		Current prices	
	1975	2000	1975	2000
Private consumption	51.8	64.6	51.8	44.7
Public consumption	26.8	25.4	26.8	36.9
Gross investments	22.3	25.7	22.3	18.5
Net exports	-0.9	-15.6	-0.9	0.0

To sum up, the projection based on base case assumptions implies a considerably slower rate of economic growth in Sweden in the future than during the first post-war decades. Moreover, there is a significant shift of demand and reallocation of resources from the industrial sector to the service sector.

4.2 Projected Sectoral Developments: The Base Case

Slow growth of the industrial sector as a whole does not prevent a substantial variation among industrial sectors. This

*The share of transfer payments in nominal national income is presently about 30 percent.

can be seen in Table 4.4. The figures can be compared with the annual growth rate of GDP which amounts to 2 percent for the whole 25-year period. As many as seven of the industrial sectors have higher projected growth rates than 2 percent. The most outstanding ones are, in descending order, the paper products and electro-technical products industries. Apart from the latter industry, however, the growth rates of the engineering sectors are very unfavorable considering the expectations in Sweden, as well as in other industrial countries, that these are the growth sectors. The rapid decline of the shipyards is expected and after five years has already been partially fulfilled, despite the rapid world market growth rate. Consequently, it is the combination of bleak relative price developments and moderate productivity increases which explain this result.

Despite the absence of powerful external incentives for structural change embedded in the Leontief-based world market scenarios, the typical stagnant industries are those recognized during the later 1970's. Apart from the already mentioned shipyards, we can notice the bad perspectives for, respectively, the textile, clothing,and leather industry; mining and quarrying; and the metal industry. The forestry, wood, pulp, and paper industry continues to have a relatively good growth performance, a result which appears attributable to Leontief's high world trade projections as well as to rapidly expanding deliveries to the most spectacular growth sector: the paper products industry.

In summary, therefore, the structural adjustments within the industrial sector appear to continue with regard to the stagnating industries, but the trends from the 1960's and 1970's for some of the expected Swedish future growth industries are altered. This is especially the case for the machinery industry. It is the combination of rather "pessimistic" world market scenarios for these industries and possibly the projected competitive domestic market for primary factors (especially from service sectors), that are probably accounting for this

Table 4.4 Projected annual growth rates of real production and of employment by sector 1975-2000.

Sector	Growth rate in % of Production	Employment
Energy	1.8	-3.2
Agriculture and basic food	2.1	-1.7
Forestry, wood, pulp, and paper	1.9	-0.1
Mining and quarrying	-0.2	-3.3
Other food, beverages, and tobacco	2.1	-0.7
Textiles, clothing, and leather	0.8	-2.4
Paper products	4.7	0.2
Chemical products	2.2	-3.2
Non-metallic mineral products	2.1	-0.7
Metals	-0.4	-5.1
Fabricated metal products	0.0	-3.0
Non-electrical machinery	0.8	-2.3
Transport equipment	1.1	-1.8
Electro-technical products	2.5	-2.6
Ships and boats	-1.9	-5.0
Printing and miscellaneous	2.1	-1.0
Hotel, restaurants, etc.	2.1	0.5
Construction	2.4	0.4
Wholesale and retail trade	1.7	-1.1
Transport and storage	1.9	-0.8
Financial and insurance services	1.9	0.8
Housing services	2.7	-2.6
Public services	1.8*	1.8

*Assumed to be exogenously given.

bleak outcome. Consequently, the small external incentives for structural change reduce the growth of the likely expansive sectors, but do not protect the problem sectors from stagnation or contraction. It is this very result which is accounting for the poor outlook for industrial employment. Even at the

assumed historically low rates of productivity increases, the industrial sectors cannot maintain their employment levels, except in the expansive paper products industry.

In the following section we shall dwell upon this issue in more depth. Let us here only direct attention to the discussion in the preceding section about the appreciation of the Swedish currency and the related slow growth of real exports compared to real imports, industrial production, and GDP. The successive appreciation of the Swedish currency leads to a projected ending of a long historical record of export-led growth; Sweden loses market shares rapidly domestically as well as abroad.

4.3 Macroeconomic Developments: Alternative Cases

At this point in the analysis of the projections, we have obtained a fairly evident perception of the main causes behind the economic development at large: reduced domestic sources of economic growth, smaller than expected external incentives for inter-sectoral structural adjustments in the trade exposed part of the economy, and rapidly growing world markets. By now it should also be clear why the alternative assumptions of cases II - IV were chosen to be increased productivity growth rates and decreased rates of world market growth: both influence the industrial sector in the same way, by reducing the pressures incurred through the appreciated Swedish currency and the significant improvement in Sweden's terms of trade. Thus, we alter two of the above mentioned three major growth pattern determinants keeping the third (i.e., the incentives for structural change between industries) fundamentally unchanged.

The equilibrium value of the exchange rate basically depends on the differences in cost levels and the rate of economic growth between two regions. In our analysis the latter factor turned out to be the most important one because of the combination of small relative price changes and small price elasticities. Thus, if the projected export and import price indices are evaluated using the initial (1975) exchnage

rate*, the terms of trade deteriorates by 0.8 percent** per annum between 1976 and 2000. However, if the equilibrium exchange rate is used in such an exercise, the result is a terms-of-trade improvement of 1.9 percent per annum. The difference is primarily a result of the significant difference between the relatively fast growth in "the rest of the world" and the slow growth at home.

Table 4.5 summarizes the projected development of the aggregate demand components and the terms of trade between 1976 and 2000 in the base case and the three other cases described in sub-section 3.3.

Table 4.5 Projected annual rates of growth 1976-2000 for selected macro-economic variables.

	I	II	III	IV
Private consumption†	2.9	4.0	2.2	3.6
Public consumption†	1.8	1.8	1.8	1.8
Gross investment†	2.6	2.6	2.6	2.6
Exports†	1.7	3.4	2.0	3.7
Imports†	3.4	3.7	2.6	3.0
GDP†	2.0	3.2	2.0	3.2
Terms of trade	1.9	0.4	0.7	-0.6

†In constant (1975) prices.

The results in Table 4.5 clearly indicate that the projected rates of change of the macro variables are quite sensitive with respect to variations in productivity and world market

*That is, "the rest of the world" is solely represented by the supply conditions, i.e., the parametric world market prices.

**To a large extent reflecting the relatively fast (4.4 percent per annum) increase of the world market price, in real terms, of oil.

trade assumptions. Although the variations made in these assumptions are arbitrary, they are well within the range given by the uncertainty of the long-term projections utilized in the construction of the scenarios. The results indicate that the uncertainty of these exogenous conditions leads to a significant uncertainty in the long-term projections of GDP, real consumption, and other macro-economic variables. This is illustrated by the results in Table 4.5.

One of the most interesting results obtained from these experiments is the remarkable difference the variations of underlying assumptions made in terms of changes in the export growth rate. According to Table 4.5 the rate of export growth is determined most of all by the productivity increase (cf. cases I and II respectively with cases II and III). Observe here also that even this higher productivity growth rate falls below the earlier post-war experience.

In summary, therefore it is quite likely that the contributions of the overall productivity change to economic growth is lowered compared to the contributions from factor accumulation in two ways: low sectoral productivity growth rates and small external changes in comparative advantages. In this respect future economic development would substantially deviate from past records. As has been shown by Aberg (1969), and in updated figures in IVA and IUI (1979), the percentage contribution of the so-called "technique factor" has increased over the post-war period at the expense of the contributions of capital and labor accumulation.

This shift in the role of factor accumulation is not at all a consequence of higher accumulation rates. On the contrary, both primary factors increased more in supply before the projection period than during it. Against this backgroud it is interesting to investigate the sensitivity of the projections with respect to the supply of capital and labor. Such a sensitivity analysis for the results in the year 2000 can be easily revealed in the form of elasticities of endogenous variables with respect to the total supply of capital and labor, respec-

tively (base case assumptions). The main findings are summarized in Table 4.6. The elasticities are valid for variations of the exogenous variables in question in the range of ±10 percent.

Table 4.6 The calculated elasticity of GDP and real private consumption with respect to selected exogenous variables.

Elasticity of / With respect to	GDP	Real private consumption
Total supply of capital	0.33	0.35
Total supply of labor	0.74	0.83

Again, the projections turn out to be quite sensitive to assumptions about exogenous conditions. Apparently the conclusion that the Swedish economy has entered a period with a significantly slower rate of economic growth than during the earlier post-war decades holds only under scenario definitions I and III but not with more normal rates of technical progress and higher capital and labor accumulation rates. However, in all projection cases the rate of GDP growth is slower than the 3.6 percent per annum during the period 1950-1975.

Another important result obtained under base case conditions was that industrial production was projected to grow slower than GDP in the future. This result, which represents a change of post-war trends, holds in all cases except case IV where industrial production grows by 3.4 percent per annum and GDP by 3.2 percent per annum. However, in all cases total employment (in man-hours) in the industrial sectors declines by more than 1 percent per annum. The overall impression of the table is that the best results for GDP and private consumption growth

would be achieved if the supply of labor could be increased. It can only be substituted for with a more than double rate of increase in capital or public sector productivity.

4.4 Projected Sectoral Developments: Alternative Cases

As mentioned in the introductory part of this section the sectoral implications of the four cases will be analyzed in terms of employment composition changes. The intersectoral variation is not much affected by variations in the rate of productivity and world market increases. In addition, a study of compositional changes in employment serves the purpose of putting more of the results in a policy perspective because of the priority in Sweden for various employment goals. The full employment equilibria projected here, however, do not allow an analysis of the full employment goal.

Table 4.7 presents the sectoral breakdown of employment in 1975 as well as in the year 2000 according to the four alternative cases. Let us first concentrate our attention on the broad changes in the employment composition.

The tertiary sector contributed to more than 60 percent of the national employment in 1975. About 25 percent of the labor force was occupied in the production of public services. The base case projects the tertiary employment share to be 76 percent in the year 2000 with 39 percent in the public service sector. The service economy has arrived, and a large part of it is organized as public services according to the present division of labor in Sweden between privately and publicly produced goods and services.

Cases II and III have in common a 1 percent per annum higher productivity growth in all sectors, i.e., including the public sector. Evidently, this makes quite a difference in terms of employment shares. Tertiary employment will then only expand from 62 percent to about 70 percent and the main reason is, in fact, the much lower rate of growth of employment in the public sector. Its employment share of the whole tertiary sector increases from 40 percent to 44 percent compared to more than 50 percent in the base case projection.

Table 4.7 The sectoral contribution to total employment in 1975 and in the year 2000 for cases I - IV.

Sector	Employment share in % in 1975	Case I 2000 (Base case)	Case II 2000	Case III 2000	Case IV 2000
Energy	1.0	0.5	0.6	0.5	0.4
Agriculture, fishing, basic foods	7.0	4.6	5.9	5.7	4.3
Forestry, wood, pulp, and paper	4.9	4.8	5.8	6.0	5.0
Mining and quarrying	0.5	0.2	0.3	0.4	0.3
Other food, beverages, tobacco	0.8	0.7	0.9	0.8	0.6
Textiles, clothing, leather	1.9	1.0	1.5	1.6	1.1
Paper products	1.1	1.2	1.2	1.1	1.1
Chemical products	2.1	0.9	1.2	1.3	1.0
Non-metallic mineral products	1.1	0.9	1.0	1.0	1.0
Metals	2.2	0.6	0.8	0.9	0.7
Fabricated metal products	3.0	1.4	1.9	2.2	1.7
Non-electrical machinery, etc.	4.5	2.5	3.4	3.9	3.0
Transport equipment	2.5	1.6	2.0	2.1	1.7
Electro-technical products	2.4	1.3	1.6	1.6	1.3
Ships and boats	1.2	0.3	0.4	0.4	0.3
Printing and miscellaneous products	2.1	1.6	1.9	1.9	1.6
Hotels, restaurants, etc.	9.7	11.1	12.8	12.2	10.4
Construction	9.9	10.8	9.3	9.3	10.8
Wholesale and retail trade	7.3	5.6	6.7	6.8	5.7
Transport and storage	5.8	4.7	5.2	4.9	4.3
Finance and insurance	3.6	4.4	4.6	4.6	4.3
Housing services	0.7	0.4	0.5	0.4	0.3
Public services	24.9	39.0	30.6	30.6	38.9
Total employment	100.0	100.0	100.0	100.0	100.0

Accordingly, an overall and (in absolute terms) equal rise in the rate of productivity growth improves the employment situation for primary and secondary sectors vis-à-vis the tertiary and for private services employment compared to the public services one. Apparently, it is the decline in the sectoral differences in the rate of productivity growth which accomplishes this change in our results. The more optimistic scenario that one has with respect to productivity growth in the tertiary sectors compared to the commodity producing sectors, the less the employment shift will be towards more service producing jobs.

Finally, it is worthwhile to take a quick look at the changes in the composition of employment between primary and secondary sectors. The following summary figures give a proper overview.

Table 4.8 Projected employment shares in selected sector-groups.

	Employment shares in % in		
		Case I	Case II
	1975	2000	2000
Primary and raw material based sectors (1,2,3,4)	13.4	10.1	12.6
Semi-raw material based sectors (5,9,10)	4.1	2.2	2.7
Raw labor intensive footloose sectors (6,11,16)	7.0	4.0	5.3
Paper, chemical and most engineering products (7,8,12,13,14)	12.6	7.5	9.4

Only the shipyards are excluded from the above overview. According to all projections this sector is the most dramatically declining one in terms of employment shares, despite rather optimistic projections of world market growth rates.

The projected sectoral employment shares summarized in this way have the same story to tell as above. The inter-sectoral changes in primary and secondary sectors are surprisingly small. In fact, the employment share decline is considerably smaller in the primary and raw material based sectors than in the remaining categories of secondary sectors. This outcome stands in sharp contrast to our historical records for at least the last three or four decades.

Another contrast to past developments is that the chemical and engineering sectors have such a mediocre future. As was mentioned earlier this result is mainly attributable to the world market scenarios obtained in Leontief (1977). These scenarios do not provide much incentives for structural changes within the industrial sector. In fact, it appears as if Leontief's relative price and market growth projections, if anything, show an opposite tendency for future structural incentives than has been experienced in the last several decades. There is therefore good reason to wonder whether these projections are compatible with both our general knowledge about the secular trends and with the projected trends in our own model towards a more service producing economy.

5. REGIONAL IMPLICATIONS

The projected full employment equilibria presume smoothly adjusting commodity and factor markets in the 25-year time horizon. Even though the time period is very long, there might be adjustment rigidities which are strong or long-standing enough to prevent the projected reallocation of resources to take place. Such rigidities may be endogenous to the economic system or policy imposed. Compared to several other small open economies, Sweden differs in its spatial extensiveness. To be precise, even the economy is spread over most of its surface and scattered on many, often relatively distantly located, villages or small towns.

The combination of a small open and spatially extensive economy may impose adjustment rigidities in two ways. First, the geographical mobility of factors and products may be more limited than in other small economies. Second, the regional population and employment goals may have a relatively high priority compared to other goals.

It is the latter type of rigidity that is focused on in the present paper. Instead of making quantified projections about the regional developments associated with the projected national-sectoral ones, we have settled for a more qualitative approach. By comparing the regional sectoral employment presented in section 4.4., it is possible to draw some general conclusions about the nature of the future regional labor market adjustment problems. The magnitude of the adjustment problems suggest in turn whether or not the projected developments are politically feasible in the sense that they could be acceptable with the current goal priorities.

The discussion on this point must combine two regional adjustment problems. One is historically associated with the contraction of the primary sectors in northern Sweden and the other with the rapid metropolitan growth of especially the Stockholm region, which is attributable to the expanding tertiary sector. Both these sectors incorporate many production units which are not as footloose as the corresponding establishments in the manufacturing industry.

The historical concentration of the tertiary sectors in metropolitan Sweden is shown in Table 5.1. The three metropolitan counties surrounding Stockholm, Gothenburg and Malmoe held in 1975 about 36 percent of Sweden's total population and 39 percent of its total employment. Their combined share of total employment was substantially higher in each one of the tertiary sectors. This was particularly the case for the

Table 5.1 Population and employment shares in percent of three metropolitan counties [Stockholm, Gothenburg and Botius (Malmoe) counties] in 1970 and 1975.

Sector	All three metropolitan counties		The metropolitan county of Stockholm, capital city of Sweden	
	1970	1975	1970	1975
Agriculture, forestry, fishing	15.6	15.7	3.4	3.4
Mining and quarrying	9.7	5.7	4.3	3.1
Manufacturing	31.0	30.1	13.4	12.5
Electricity, gas, heat and water production	44.4	39.9	24.4	21.2
Construction industry	35.9	35.2	18.2	17.2
Wholesale and retail trade, hotels, restaurants	47.1	46.3	25.0	24.5
Transport and communications	47.4	48.7	25.5	25.4
Finance, insurance, housing services, consulting	61.1	57.8	40.6	38.2
Public services	42.3	43.0	24.2	24.7
Total employment in above sectors	38.3	38.7	19.9	20.1
Total population	36.1	35.9	18.3	18.2

Source: Table 3.6 in Göteborgs kommun (1978).

finance, insurance, housing service, and consulting sectors.* Moreover, most of this location bias was due to the high shares of the capital city of Stockholm.

Against this background, it appears safe to conclude that each one of the sectoral employment projections in section 4.4 is bound to clash with present regional population and employment goals, if each region roughly maintains its 1975 sectoral employment shares. The base case projections appear incompatible with the regional employment goals because it seems unlikely that enough successful policies can be organized for the outmigration of the production of public and private services from Stockholm to distant cities. All four cases will also forcefully induce a more concentrated urban settlement, even if the regional balance can be restored through countervailing market forces or policies.

Consequently, our conclusion is that the higher the rate of productivity growth in the tertiary sector (especially in the public sector) compared to the manufacturing sector and the more labor saving the technical progress, the better the possibilities of attaining both a rapid economic growth and restoring a more balanced development of regional labor markets.

According to the sectoral projections the main structural adjustment in Sweden up to the year 2000 is that associated with the declining importance of the manufacturing industry compared to especially the tertiary sectors but also the primary sectors. Since the primary sectors and the raw material based industries have a projected slower employment decline than other manufacturing sectors, the adjustment pressures of northern Sweden merely emanate from the same

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*The decline in the employment concentration of the consulting sector between 1970 and 1975 is probably due to a decentralization of certain large insurance companies and commercial banks. This decentralization was made possible by the relatively early and rapid introduction of computers and computerized information systems of Swedish insurance companies and banks.

problem as all Sweden compared to the metropolitan regions: the pronounced concentration of tertiary production in especially the Stockholm area and the disruptively strong projected expansion of such production.

The biased inter-industry development would be surprisingly undramatic because of the almost equiproportional contraction of earlier expanding, stagnating and contracting parts of the manufacturing industry. This feature of the projections, which is attributable to the chosen world market scenario, is in our opinion rather unrealistic. All information about the emerging changes in the international division of labor in the world market for manufacturing products suggests strong incentives to structural adjustments in industrialized countries. At present, we must unfortunately accept the sectoral projections. This implies that the regional adjustment associated with these projections will be small unless both the inter-regional division of labor is different within the investigated industrial sectors and the growth rates differ a great deal between the sub-sectors of more disaggregatd levels. We know from the development in the 1960's and 1970's that this is likely (cf. Ohlsson 1979). However, the projected sectoral growth pattern constitutes a break with earlier sectoral trends, which makes it difficult to bring the analysis further on this point by utilizing information at more detailed sub-sector levels.

In conclusion, the projected sectoral changes within the manufacturing industry do not give rise to worries about major additional impacts from this sector on the regional balance of the domestic labor market. However, the world market scenarios used for the projections leave much doubt about the rather optimistic outlook for both raw material and raw material based production and raw labor intensive production compared to more technologically sophisticated products.

6. EVALUATION AND POSSIBLE ELABORATIONS OF THE METHODOLOGICAL APPROACH

The main purpose of this study is to identify possible future development paths for the Swedish economy in a context where both world market conditions and domestic factor accumulation and productivity growth are explicitly taken into account. However, a second purpose is to apply a slightly new approach in the analysis of these issues. Thus, after the presentation of our findings concerning the substantive issues, it is appropriate to evaluate the adopted methodological approach, and to point out some future directions of research. That is the purpose of this section.

The basic idea in our approach is to focus on the interaction between domestic and world market factors within a general equilibrium framework. This general equilibrium framework is here represented by a general equilibrium model of the Swedish economy. The model analysis generated two results which are suitable points of departure for an evaluation of the approach.

The first of these is the projected improvement in Sweden's terms of trade, which takes place despite of a considerable projected increase in oil prices. In a technical sense our result is the combined effect of three factors: the relatively low values of the price-elasticities in the import and export functions, a relatively fast projected growth of world market trade, and a relatively slow domestic economic growth. That these were the key factors was confirmed by an extensive sensitivity analysis of the results.

These findings suggest that it is important to take both the supply side (world market prices) and the demand side (world market trade) of "the rest of the world" explicitly into account in the analysis. Thus the terms of trade of the Swedish economy can be determined from world market prices, in foreign currency units, only when the rates of growth in Sweden and Sweden's trading partners coincide. When that is

not the case, which is the normal situation, projections of world market prices become an uncertain basis for projections of the terms of trade.

Obviously our results for the projected development of the terms of trade depend on the price-elasticities in the import and export functions. However, a rather extensive sensitivity analysis, with relatively large variations of the import and export price elasticities around the adopted values, indicated a substantial robustness of the results with respect to these parameters. Nevertheless the treatment of foreign trade in the model might be the crucial factor behind our results. This is because the very existence of downward sloping price-dependent import and export functions can be questioned for a country like Sweden, which to a large extent conforms to the concept of a "small, open economy".

In such an economy the producers in the trade-exposed sectors in general can be regarded as price-takers on international markets. However, available econometric evidence does not generally support the small, open economy assumptions for Sweden. We will not dwell on this issue here, but only point out that both our results and the specification of the model depends on the existence of downward sloping import and export functions.

The other result which was interesting from the methodological point of view was the limited structural change within the trade-exposed sector in our projections. Thus there were only two trading sectors with a considerably different development than the trade-exposed sector as a whole. These were the shipyards and the metal industry. That is, most of the projected reallocation of resources within the trade-exposed sector can be regarded as an adjustment to comparative advantage changes which have already taken place. This points at the basic difficulty with our approach: the projections of domestic factor accumulation and productivity change might very well

reflect the same expectations as those underlying the projections of world market prices and trade flows. If that is the case the two sets of projections cannot be used to generate projections of future changes in comparative advantages.

Thus, our limited knowledge about the expectations underlying the projections of exogenous conditions used in this study makes it difficult to draw conclusions about future structural change in Sweden on the basis of our results. There seem to be two ways to approach this issue. One is simply to make a closer investigation of the scenarios for domestic factor accumulation and, particularly, productivity growth. Another is to expand the representation of the "rest of the world" in the model in such a way that world market prices and trade flows can be generated from explicit assumptions about factor accumulation, productivity change and demand changes in the "rest of the world". These approaches are not mutually exclusive, and neither can be preferred on *a priori* grounds.

It is clear that our approach rests on the assumption that the projection of world market conditions is independent of the projection of exogenous domestic conditions. However, even if this assumption is satisfied one way or another, the usefulness of the type of exercises presented in this report to a large extent depends on the properties of the model used in the analysis. Obviously the model used in this study has definite limitations. A general equilibrium model of the type used here, i.e., where factors of production can be reallocated between sectors without frictions, can be used to identify the degree of structural imbalance in the economy. However, if the equilibrium allocation of resources at one point in time differs considerably from the one at another point in time, one can only conclude that if both equilibria should be realized, some kind of structural change process must take place; the model does not say anything about the nature of this process.

Consequently a desirable development of the model would be to incorporate some of the rigidities which characterize the real world. The most natural elaboration of the model in this context would be to incorporate a"putty-clay"nature of capital. That means that the model gets an explicit time-dimension and that sectoral reallocations of capital have to take place through investments. Further elaborations could involve an explicit regional dimension and a differentiation of the labor market into a number of more or less isolated sub-markets.

From our results, it is obvious that the public sector plays a crucial role for the projections of the industrial development. Little is known about the rate of productivity change of the public sector and the determinants behind this change. Perhaps even more crucial from the methodological point of view is that no policy imposed rigidities could be taken into account. Nor is the role of the government in the formation of human and non-human capital explicitly recognized in the projection model. Possible elaborations of the public sector and the role of the government appear therefore as interesting future avenues of research.

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