OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

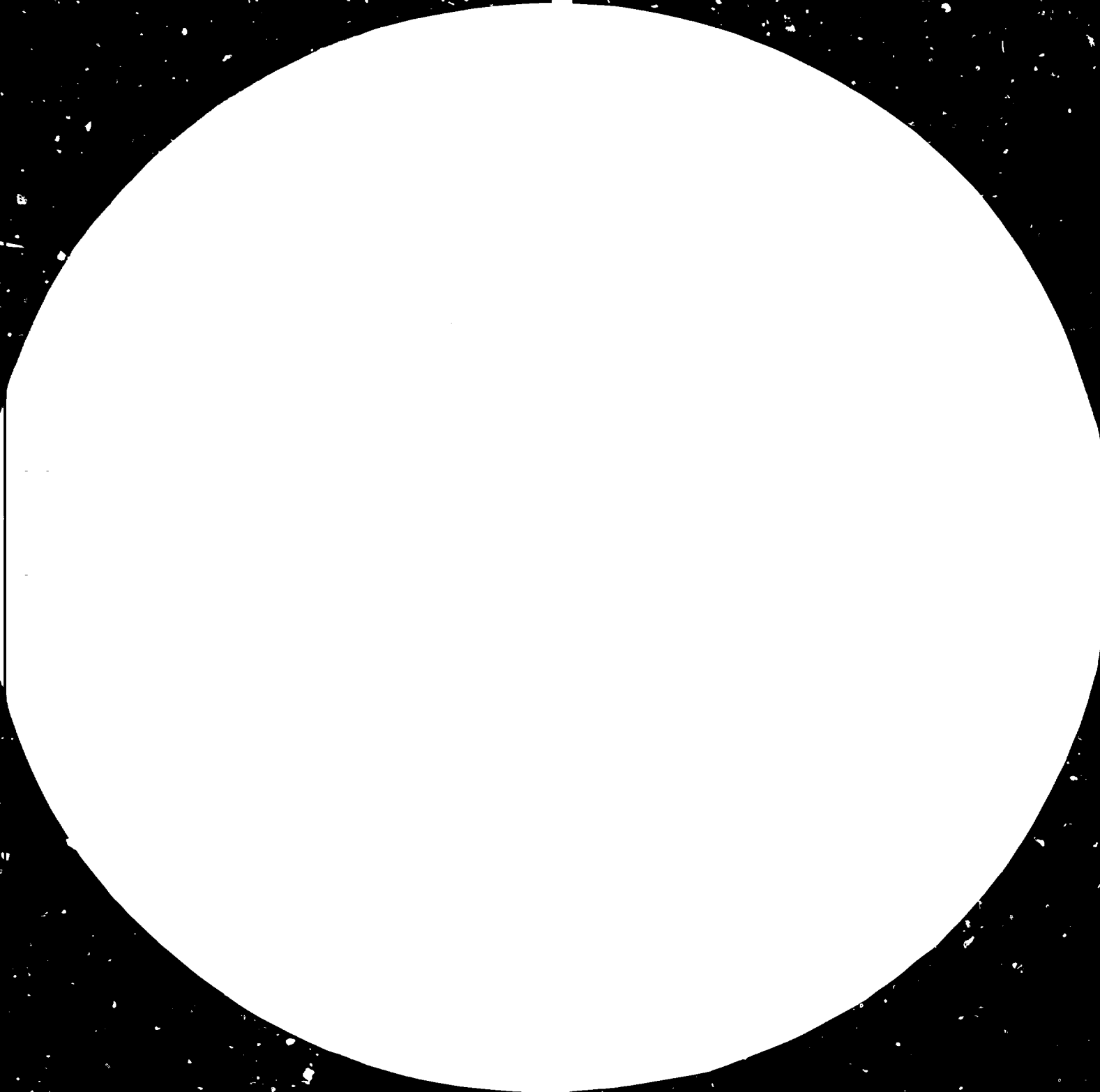
FAIR USE POLICY

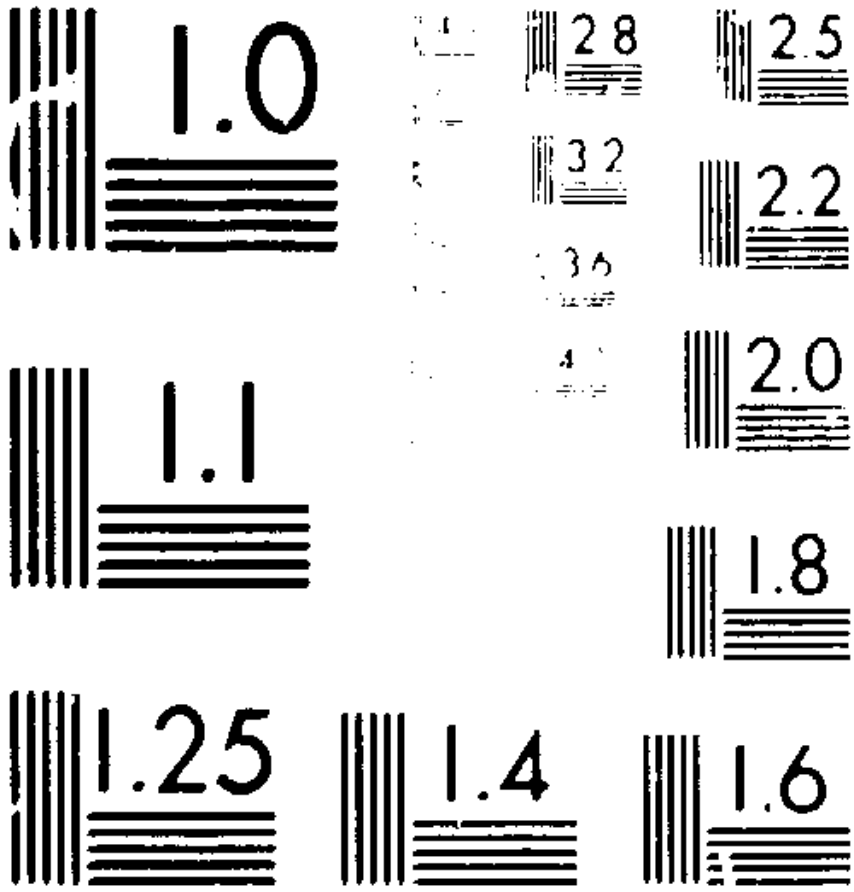
CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org





11376

United Nations Industrial Development Organization

Distr.
LIMITED

ID/WG.357/10
3 May 1982

ENGLISH

Research Seminar on Structural Changes in Industry in European CMEA Countries,

Budapest, Hungary, 22-26 March 1982

STRUCTURAL APPROACHES TO ECONOMIC ANALYSIS: SOME ASPECTS OF RECENT WORK AT THE UN ECONOMIC COMMISSION FOR EUROPE*

by

John A. Slater**

---

* The views expressed in this paper are those of the author and do not necessarily reflect the views of the secretariat of UNIDO. This document has been reproduced without formal editing.

** Senior Officer, General Economic Analysis Division, UN Economic Commission for Europe.

V.82-25364

Introduction

This study was prepared at the request of the UNIDO Secretariat by Mr. John A. Slater, Senior Officer of the General Economic Analysis Division of the UN Economic Commission for Europe and submitted to the Research Seminar on Structural Changes in Industry in European CMEA Countries, held in Budapest, Hungary, from 22 to 26 March 1982.

The study is part of the framework of the research programme of UNIDO on industrial redeployment and structural change. This programme constitutes a surveillance of the international industrial restructuring process, aiming at highlighting pertinent trends in industrial development nationally and internationally. By identifying the factors that determine structural changes and indicating the likely direction and possible implications of this process, uncertainties and rigidities in this process might be reduced and a basis created for a forward-looking conception of industrial co-operation between the developed and the developing countries.

This note is intended to provide information on some of the current work on structural questions now under way within the Economic Commission for Europe. In the last two or three years the greater part of the work has focussed upon the developed market economies of the region, but efforts have recently been made to apply similar approaches to the seven centrally planned economies (CPEs) of the region. The following comments are intended to summarize the data base created for the seven CPE countries, to call attention to the work published on these countries published in the Economic Surveys of Europe in 1980 and 1981, to give some indication of the reasons why the work was undertaken and the results it is expected to yield. While the note refers to the work undertaken on the developed market economies and published in the same editions of the Survey, it will do so only to provide a point of departure for discussing methodology, the directions proposed for future work on the CPE countries, and also, to point up some of the limitations of the "structural approach" as applied to the latter.

A ready-made definition of what is meant here by "structure" and "structural change" was included in one of the recent studies, on the market economies, but applies, mutatis mutandis to the work on the CPEs of the region discussed later. "'Structure' is defined as the percentage distribution of a given variable, such as output or employment, among the ... branches selected for study, and 'structural change' refers to changes in that distribution".[1] So far, so simple. And, clearly, a description of the structural changes so defined which took place over a review period can be further treated and developed in a large number of ways and for a number of specific purposes. But before going into these, it may be useful to describe briefly the data base now available for the seven CPE countries.

The data base

The data base consists of constant price, absolute value series (in national currencies) for 1970-1980 inclusive for net material product, broken down into six sectors of the economy - industry, construction, agriculture, transport and communications, trade (including procurement, material supply services etc) and "other" (unspecified sectors). Backing up these net output

---

1 Economic Survey of Europe in 1980, Chapter 4 "Changes in the Structure of West European Manufacturing Industry in the 1970s" pp.185-186.

series are the corresponding figures, again in constant price national currencies, for investment and fixed assets, and also for employment (in thousands).

Even at this level of aggregation, we have some difficulties. For the Soviet Union, agriculture, trade etc. and "other" are amalgamated, and for Romania trade and "other" are treated as one. This has been forced upon us by the discontinuation of the publication of Soviet net output figures for agriculture, in volume, since 1976, as well as by certain limitations in the Romanian data. The corresponding items for the other three series have, for the sake of consistency and ease of data processing, had to be similarly treated - at the price of some loss of information on these two countries. The "macro economic" series also include, for all countries, investment, employment and fixed assets in the non-material sphere (for which, of course, output data are unavailable).

For industry, the same four basic series have been established for 11 industrial branches: fuel, energy, metallurgy, engineering and metal working, chemicals, construction materials, wood and paper, textiles, other light industry, food and "other". For Hungary only ten branches are available (wood and paper are included in "other light"), and for the German Democratic Republic only nine (fuel and energy are combined; wood and paper is included in "other light"). In general, "other light" industry excludes textiles, but includes glass and ceramics and printing as well as leather and clothing, but includes only leather, clothing and furs for the Soviet Union. The production figures for industry are in terms of gross production, enterprise classification basis.

In addition to the domestic series, we now have available a set of data on east-west trade in industrial goods by branch of origin - the coverage of which is the same as the domestic series for each country (i.e. adjusted for national branch definition). However, in contrast to the domestic series, figures for exports and imports are expressed in current US dollars and are taken from OECD trade returns. Data on the German Democratic Republic's east-west trade, however, exclude transactions with the Federal Republic of Germany.

It should be noted that all domestic data (i.e. excluding trade) have been taken from national rather than CMEA (or UN) statistics. Although the CMEA secretariat has made heroic efforts to standardize definitions and coverage,

there are still many inconsistencies between series, due to differences in the price bases in which figures for different years - even for the same country - are expressed. Moreover, not all of the four series retained in the data base (notably fixed assets) are available on the basis of the CMEA classification. Finally, CMEA data are frequently limited to the socialist sector only. For these reasons, CMEA - and also UN - statistics are all but useless for analytical purposes in a number of areas, though they have been used to supplement national statistics in some cases (i.e. Soviet net material product in volume terms - despite the post-1976 exclusion of the Soviet net agricultural output series). The use of national statistics means, in the fist place, that cross-country comparisons even between CPEs are hazardous: oil refining is included in chemicals in the German Democratic Republic, Romania and the Soviet Union for instance, but not in the others, and other classification differences in light industry have already been mentioned.

There are also a number of omissions: neither Bulgaria or the Soviet Union give data on non-ferrous metallurgy for all four series; Romania gives no data for fixed assets by industrial branch - and nor has the German Democratic Republic since 1976. With these exceptions, the data base is, nonetheless, complete. The objective has been to establish all value series in the prices of the latest price base year and latest classification system used in each country's statistical sources. In some case the techniques used to complete a given series according to the common price basis or classification system retained for a given country can clearly not guarantee accuracy, notably in cases where it has been necessary to complete a series in prices of a given year by splicing it to a published index number series based on the weighting in a different year. Since most CPE countries do not publish long term retrospective series on a uniform price or classification basis, this possible source of error is unavoidable.

The four basic data sets have been used to generate a number of derived series. These include levels of labour productivity, capital intensity, capital productivity and also an unconventional measure relating labour productivity to the level of fixed assets, all by sector and branch. These, and the four basic series, are also expressed in the form of index numbers (1970 = 100) and in the form of annual growth rates, and also constant compound geometrical average rates of growth over five year periods based on 1970 and 1975 respectively.

The purpose of structural studies

A working definition - or perhaps objective - of the practice of economics, at macro-economic or industry level is the quantification of the costs and benefits of events which cause economic indicators to diverge from the trend. These events may be political - such as the 1975 oil price explosion - or arise from economic policy initiatives, or again random, unforeseen events - such as the depletion or discovery of important raw material deposits - which transform supply costs and hence demand structures. In the developed market economies, the oil price shock itself, the pressure of competition from newly industrialized countries and similar phenomena have all had an impact not only on over-all growth but usually also on particular industries to differing degrees. In the CPE countries, the relatively new phenomenon of labour shortage, the increased emphasis on the "intensification" of production in times of increasing costs and scarcities of raw materials and fuel, have also affected traditional growth patterns. The contents of this paper, and indeed the convening of this conference, both indicate a preoccupation with using a "structural approach" to contribute to the analysis of these and similar events. How, in practical terms, can this be done?

According to a previous ECE publication, structural studies can, in the first place be used to "compare and synthesize patterns of industrial development". Moreover, "similarities ... provide some broad guidelines for plotting likely future developments and possible policies, while ... divergencies serve to show that alternative paths have been taken in individual countries with greater or less success".[1]

The study from which these quotations were taken thus devoted a considerable amount of attention to relating patterns of development in CPE countries to over-all development levels - notably, changes in pace of industrial to total national output, and also growth, trade dependence, trade in industrial products, labour and capital productivity and capital intensity changes etc. in relation to development levels. Apart from the intrinsic interest of these findings in assessing domestic performance, data on elasticities of growth by branch were found to be significantly related to

---

1 Both quotations are taken from the Introduction to Structure and Change in European Industry, United Nations, New York 1977, p.xiii.

export performance. Nevertheless, with this and a few other exceptions, findings of immediate relevance for current policy formulation were rather sparse - at least in comparison with the results presented for the non-CPE countries of the ECE region.

In the market economy section of the study, an analysis of patterns of output was able to draw upon a considerable amount of information on the technical performance of different branches. A shift in the pattern of output towards the branches characterized by relatively high capital, skill and R & D intensity was found. This led to a discussion branch growth differentials from several aspects, and the conclusion was drawn that "a policy which operates in the sense of concentrating factors of production on [low capital, R & D] branches instead of encouraging a shift of resources towards the more dynamic ones is likely to hamper the development of the latter without encouraging that of the former".[1]

Other concrete conclusions of this kind were also drawn in later studies - notably those appearing the two last editions of the Economic Survey of Europe, one of them was an investigation on the effects of the oil price shock on the structure of production in the developed market economies of the region. It concluded that "the large disturbances in branch shares of output and employment in the period 1973-1975 ... were largely reversed in subsequent years". The study, inter alia, illustrated the degree to which different branches improved the growth of energy productivity.[2] The same study also analyzed a the complex interrelationship of a number of factors influencing, and in some cases offsetting, pressure towards structural change in output - notably sectoral wage developments in relation to labour productivity. The authors also examined structural changes in imports, concluding that "developing countries have a high marginal propensity to spend their higher export earnings on goods produced in the advanced industrial economies, so that policies to reduce labour-intensive imports from developing countries may only succeed in reducing exports of capital intensive products from the developed countries".[3]

---

1 Op. cit., p.79.
2 Economic Survey of Europe in 1980, p.223.
3 Ibid., p.224.

It is worth stressing that an important feature of the approach adopted was the attempt to show up the inter-branch dynamics of structural changes. If the continuous evolution of the world economy provides the pressure for changes in the structural distribution of over-all growth, a number of institutional factors can accelerate - or more often slow down - the adjustment process.

These examples, which are not intended to give comprehensive or balanced summary of the findings of ECE structural approaches to the market economies, simply serve to illustrate the ways in which research on a branch basis can yield findings specific enough to enrich the information on which policy decisions are based. It should be noted that, the various studies contained approaches on several levels: first, a description of what structural changes in output and production factors are, in fact, taking place; second, scrutiny of differences between branch profiles; third the classification of the branches themselves according to various characteristics (capital-intensive, R&D intensive, etc.); branch evaluations of comparative advantage and performance vis à vis foreign competition and also between branches. On this basis, a number of generalizations about industrial branch performance and prospects were made.

It is therefore clear that the structural approach to market economy countries can yield a number of important commentaries on past policies and also provide useful current policy making information. It is less clear that the structural approaches applied in the past to the CPE countries have on the whole, provided the same concreteness. There are a number of reasons for this, most of them well known. But it seems worth while first, to recapitulate them within the framework of this discussion of the structural aporoach, before proceeding to list some of the possibilities which, despite these constraints, nonetheless remain open .

Perhaps the biggest single obstacle to the use of the CPE countries' statistics (leaving aside the lack of information on the non-material production sphere) - is the effect on aggregate indicators of administered rather than market-determined prices. In the first instance, this rules out many useful, direct comparisons between countries (and also, incidentally, any aggregated approach to the seven countries as a whole). It is, of course, possible to make estimates of various kinds on a standardized price basis as in fact was

done in the earlier ECE work. But the use of such techniques (i.e. conversion into "standard costs", revaluation of domestic production in terms of a common currency by various methods) is likely to compound possible sources of error stemming from imperfections in the existing national currency data base, which has itself been completed by estimates which are not always irreproachable.

The pricing problem has a further dimension. It is not simply that a given value for a given observation is not comparible between countries for exchange rate reasons. It is also the fact that the system of administered prices itself results, for various reasons, in inter-branch price relatives which themselves strongly influence the apparent branch structure of output. This manifests itself clearly (and in a pattern which is moreover apparently uniform in essentials for all seven CPE countries) in the apparent undervaluation - in terms of producer (i.e. excluding turnover tax) prices - of, for instance, the engineering industry, and the over valuation of the food industry as compared with market economies. These are just two examples which emerge from a comparison of labour productivity levels within CPE and market economy countries; the engineering industry in all the latter coutries is a substantially higher-than-average labour productivity branch and there is no a priori reason to doubt that this is also the case in the CPE countries. In fact, it appears to be below the average in all CPEs but Bulgaria.[1] The price problem has a further impact when an attempt is made to compare domestic developments with those in foreign trade. The inclusion in the ECE data base of east-west trade in industrial goods by branch of origin should enable a number of important observations to be made on such subjects as import dependency, on export performance in relationships to output patterns and related questions - both over-all and by branch. But the lack of correspondence between the prices in which trade flows and domestic aggregates are expressed precludes examinations of actual branch dependency rates either for industry over-all or by branch. (However, changes in the ratios over times can be shown - which is not an unimportant contribution).

---

1 As the constant prices used for the data base, i.e. Bulgaria, 1971, Czechoslovakia, 1977; German Democratic Republic, 1975; Hungary, 1976; Poland, 1977; Romania, 1977; Soviet Union, 1973. A further obstacle it presents is the fact that the import and export series are compressed in current US dollars, while domestic data are, as noted earlier in constant domestic prices. It might also be mentioned in passing, that since the engineering branch is one where productivity is growing faster the underweighting could be giving rise to some understatement of total industrial growth output growth, though this has not yet been investigated systematically at ECE.

A further "price problem" arises from the fact that all observations in the data base are in constant prices. Yet the outcomes of structural readjustment can only be satisfactorily evaluated if some measure of the net value to society of the shifts in volume terms is available. In market economies, such evaluations pose no particular problem since outcomes can be measured at current prices which reflect relative scarcities and social preferences. Without wishing to raise the question of price formation practices in east and west in any broader context, it is clear that within the narrow framework of structural analysis such an evaluative procedure is ruled out - at least to researchers outside planning bureaux. This is because, even where relatively complete current price series exist, they embody prices which do not reflect relative scarcities and cannot therefore be used to evaluate the degree of success of structural change in relation to either scarcities or social preferences.[1]

A second problem area concerns less the quality than the availability of data; namely the relatively high level of aggregation of the regular statistical series published by some of the CPE countries - notably the German Democratic Republic, Hungary and the Soviet Union (for all four basic series). For market economy countries it is possible to disaggregate the engineering and metal working branch series into at least four sub-branches (metal products, non-electrical machinery, electrical machinery and transport equipment). Though a two or three sub-branch breakdown is possible for some CPE countries for some of the four basic series, in fact it has not been possible to to now to incorporate any sub-branch breakdown of this or any other branch in the ECE data base. Work continues in this area, but it will almost certainly be impossible to improve the situation in this respect very much.

---

1 As just one example, ready to hand, the domestic investment price of machinery and equipment between 1970 and 1979 rose by only 10 and 25 per cent in Poland and Hungary respectively, (and fell by 10 per cnt in Czechoslovakia) while the price of this category of eastern imports from western countries rose over the same period by 3 1/2 times over the same period. Economic Survey of Europe in 1980, p.150.

Structural approaches to the CPE countries

Bearing in mind the very brief summary, or rather selection of results issuing from the structural approaches to the western economies noted earlier, it may be of interest at this point to summarize some of the conclusions deriving from recent ECE structural studies of the CPE countries. In a paper entitled "The Capital Cost of Growth",[1] an examination was made of the relationships between the growth of fixed assets in the material sphere relative to NMP, by sector, and of industrial fixed assets and gross industrial output by branch. The objective was to compare actual output levels (NMP and gross industrial production) with what they might have been if, successively, capital productivity (expressed in terms of capital-output ratios) and the structural distribution of fixed assets had remained, in subsequent years, as they had been in 1970 - in other words, to separate out effects of capital productivity and structural change respectively.

The results suggested first that by 1979 NMP levels were some 10-23 below "potential NMP" - i.e., NMP levels which might have been achieved if capital productivity and fixed asset structures had both remained as in 1970; but that structural change effects had contributed positively (by between 1 and 11 per cent of "potential" NMP) in all CPE countries. For industry, the output shortfall as defined above was 0.4 and 14.4 per cent of "potential" gross output.[1] Again structural changes provided a boost to growth in all four countries of eastern Europe for which data were available, (between 1-6 per cent of "potential" gross industrial output), but had a small negative (-0.3 per cent)

1 Economic Survey of Europe in 1980, Annex to Chapter III, Part 4, "Investment", pp.151-155.

effect in the Soviet Union. The main contribution to the growth-inhibiting effects of fixed asset productivity changes on NMP derived from agriculture and construction; within industry they derived from the consumer goods industries - and also, in most countries, from energy and fuel. By 1979, virtually no positive productivity contributions were being made in any country by any main sector to NMP except the industry sector as a whole in Bulgaria; the same was true for industrial branches except for engineering (Bulgaria, Czechoslovakia and the Soviet Union) and chemicals (Bulgaria and the Soviet Union). The findings for industry were summarized as follows: 'the striking feature is the extent to which growth-boosting and growth inhibiting effects (of COR changes) are concentrated on particular branches. Positive contributions were made in virtually all countries up to 1979 by engineering and to a lesser extent by chemicals. However the positive effect declined over time. The obverse of well above-average performance in these branches is the very large negative contribution to growth caused by rapidly rising CORs in the light and food industries".[1]

These findings were supplemented by a similar exercise included in the recently published Economic Survey of Europe in 1981. Data on sector and branch employment, included in the data base for the first time, enabled the structural effect of changes in the levels, distribution and productivity of both employment and fixed assets to be calculated, using basically the same approach as described above. The results were, however, presented differently, the various types of effect being related in percentage terms to actual growth between benchmark years (1970-1975, and 1975-1980). This exercise, part of which is reproduced as Annex 1, made use of an index relating the growth of labour productivity sector and branch to the growth of fixed assets; it showed, first, that the increment in labour productivity assoicated with a given increase in the level of fixed assets in the material sphere fell by 12-33 per cent, depending on country between 1970 and 1980; in industry the corresponding fall was 9-32 per cent.

This provides background for a comparison of the effects of changing levels, productivity and structural distribution of fixed assets and employment - an area of investigation of central interest in view of the transfer to an intensive development path stressed in all CPE country five-year plans for 1981-1985. The study quantified the extent to which increased levels of fixed

---

1 Ibid. p.155.

assets have been necessary to offset the fall in capital productivity. The negative contribution of declining capital productivity gathered place between the first and second halves of the 1970s, and the contribution of increments in the stock of fixed assets to total growth has risen sharply. On the employment side, the share of productivity has increased as a component of NMP increase in most countries, over 1970-1980, but the pattern is much less clear within the industrial sector; it has actually declined in three countries (Czechsolovakia, the German Democratic Republic and the Soviet Union) though it increased very substantially in Bulgaria and Poland (though figures for the latter country in 1980 are disturbed by the sharp break in output and employment trends due to the social and economic crisis in that year).

Further directions of work

Despite the limitations mentioned earlier with regard to the structural approach in relation to economic evaluations of the CPE countries, a number of options remain open and will be further developed at the ECE. First among them, and following the general pattern of work already undertaken for the market economy countries, an attempt will be made to evaluate on a sector and branch as well as an over-all NMP and total gross industrial output basis, the relationships between structual change and output growth - and in particular to test the applicability to the CPE countries of the "Verdoorn Law" and labour productivity growth. This "law", which asserts that output growth is a principal determinant of labour productivity growth, was found to hold good to a considerable extent for the market economies over the last decade. The five-year plan objectives of the CPE countries of the ECE to accelerate the growth of labour productivity while at the same time scheduling some deceleration in the growth of over-all output merit close analysis within this framework.[1]

A second area of investigation will be to gather together information on the factor proportions in total output with a view to calculating total factor productivity movements on a sector and branch basis; this will involve no more than the introduction into the data base of appropriate sectors and branch weighting coefficients for labour and fixed assets inputs - through gaps in systematic information on these series will need to be filled by assumptions

1 A study of the applicability of the Verdoorn Law to the developed market economies since 1973 is contained in the Economic Survey of Europe in 1981 (Chapter 1, pp.94-97 of the mimeograph prepublication version).

based on analogues. From this it would be logical to move towards estimates of the real and monetary costs of labour, by sector/branch and to evaluate their relationship to labour productivity growth. This would be particularly relevant to discussion of current policy issues in general, and notably to price formation, subsidies and other questions now under discussion in several CPE countries. However, information in this area of investigation is rather limited in several countries and it is felt unlikely at this stage that more than partial examinations will be feasible.

A further area of investigation, using the existing data base, will be to relate foreign trade developments on a sector and branch basis with developments in the domestic economies of the CPE countries. This will be confined for the most part to the CPE counties' east-west trade since only for these flows can information gaps in the CPE countries' own trade data be satisfactorily filled - using trade returns of market economy partner countries. An attempt will be made to deflate current dollar based trade data on a sector/branch of origin to constant prices using techniques and results already published by the ECE.[1] This will make possible detailed analysis of sector/branch trade elasticities, and also enable changes in trade dependence on both the export and import side of east-west trade to be charted more fully.

It is also intended to lay emphasis on CPE countries' trade in investment goods (classified according to CPE countries' end-use sector and branch) with a view to assessing the relative roles of indigenous technology in investment in each CPE country - whether originating in other CPE countries or from outside the area. This could lead into an over-all assessment of the role of imported technology as a growth determininant, within the framework of an sector/branch production function approach.

---

1 Economic Bulletin for europe, Vol. 31, No. 1 pp.54-70 and pp.118-183. "Prices and volumes of east-west Trade 1965-1977" and Statistical Appendix; New York, 1979.

The structural change phenomenon - an afterthought

Annex II to this note contains diagrams which chart for most of the period 1970-1980 the indices of structural change derived from the four domestic and two foreign trade series included in the CPE country data base. They are submitted for illustrative purposes only at this stage, having been prepared with some haste specially as an addendum to this note; no extended analysis has therefore been made or offered here.

However, it is already rather clear from the tables that particularly high rates of structural change took place in all CPE countries around the middle of the 1970s, with regard to industrial exports, imports and investments. These results were paralleled - though, as might be expected much more weakly - by structural changes in output, fixed assets and employment. Second, this phenomenon was followed by a further intensification in the rate of structural change around the year 1978. Interesting enough, these two peaks coincide with the successive post-1975 and post-1978 slowdown in economic growth observed in most countries of the area. It is of interest to note that there is, at first sight, some correlation between the current conjunctural situation in several countries of the area, and the earliness or lateness of the structural shift response to changing conditions. This area of investigation will, it is hoped, also be explored in the coming months within ECE.[1]

---

1 The index of structural changes is defined as half the sum of the absolute changes in branch share between succeeding years, i.e. $S = 0.5 \sum /a_{i2} - a_{i1}/$ where ai is the percentage share of branch i in total industrial production, fixed assets, investment or employment in successive years 1 and 2 respectively.

Annex 1

(v) Investment, output and productivity 1976-1980[1]

Investment, as the channel along which are directed increments in fixed assets and new technology, is the key determinant of long-term changes in labour and over-all productivity levels. Levels of labour productivity are affected by investment flows in several ways: first, by changes in the share of new investment allocated to above-average and below-average productivity sectors and branches, and second, over time, by the share of investments allocated to faster and slower productivity growth sectors and branches. Third, the impact of investment will depend upon the facility with which it is absorbed by recipient sectors and branches, as illustrated by the cost, in terms of investment, of changes in labour productivity. The object of the present section is, in the first instance, to chart the structural changes described above in relation to movements in ICORs, and also to relate them to over-all capital and labour productivity trends.

In the first place, structural shifts within the material sphere largely moved in favour of industry - a high labour productivity sector - during the second half of the 1970s. The only exceptions were Poland and the Soviet Union, where agriculture and transport and communications, respectively, were the principal beneficiaries.

Within industry the position is different. In all countries, the branches with above average labour productivity levels are energy, metallurgy, chemicals and food. To this list can be added fuel (Czechoslovakia, [illegible] the Soviet Union) and engineering (Bulgaria). Investment shifts towards metallurgy took place in five countries (excluding Bulgaria and the Soviet Union) between 1971-1975 and 1976-1980. Of the other branches, allocations to chemicals rose only in three countries (Bulgaria, German Democratic Republic and Hungary) and to energy in three countries (Czechoslovakia, Hungary and Poland). There were also shifts to fuel in Czechoslovakia and the Soviet Union, and to engineering in Bulgaria. It is thus far from clear to what extent industrial labour productivity has benefited due to investment shifts from branches with low labour productivity levels to branches where they are high; the net shift to the branches listed above was either negative, as in Bulgaria, Czechoslovakia

---

1 Extract from Economic Survey of Europe in 1981, Chapter 3, Section 4.

and Romania (- 0.3 to - 1.9 percentage points) or positive but small, as in the German Democratic Republic, Poland and the Soviet Union (+ 0.2 to + 1.6); it was, however, bigger in Bulgaria (3 percentage points).[1]

Positive effects were however achieved, from structural shifts due to shifts towards sectors and branches where productivity was increasing at above-average rates. As shown in table 3.4.8, between 1971-1975 and 1976-1980 this took place in 7 out of the 34 sector observations shown for the material sphere of the seven countries in the region. In addition, in 10 cases there were shifts out of below-average labour productivity growth sectors. In industry, this was the case for 12 and 21 out of 72 observations respectively. There was considerable variation between countries. In Poland, the shifts in investment in the material sphere were almost totally at variance with labour productivity trends - i.e. all shifts consisted of movements out of above-average labour productivity growth sectors and into below-average productivity growth sectors, and apart from small shifts out of agriculture in Romania and the Soviet Union, the same was true of these two countries. But there were more positive shifts (in three sectors) in Bulgaria, Czechoslovakia and the German Democratic Republic. In Hungary all the resource shift was towards above-average labour productivity growth sectors and away from those where labour productivity growth was below-average. Within industry, individual country performance is even more markedly different. Structural shifts in investment were positive, in the sense defined above, in nine out of ten of the inter-branch shifts recorded in the Soviet Union, six out of ten in Poland, five out of ten in Bulgaria, and five out of nine in Hungary, - but in only three out of nine in the German Democratic Republic, four out of ten in Czechoslovakia and two out of ten in Romania.

These bird's eye view comments do not, of course, take account of the weighting of different sectors or branches in total output, nor of the size of the shift, nor of the difference between the rates of growth of labour productivity - and hence do not explain over-all growth outcomes. In fact, in most countries there has been a fairly widespread shift to the above-average labour productivity growth rate industrial sector and away from agriculture,

---

1 The above comment implies that labour productivity changes are independent of investment. While this is clearly not the case, investment is not the only determinant - as witness the differential rates of growth of labour productivity with regard to fixed asset increases due to other "absorption" factors.

and, within industry, towards engineering and energy and away from the often below-average labour productivity growth branches such as textiles, and the light and food branches. Conversely, the main shifts toward slow growing labour productivity branches within industry involve fuel (all countries but Poland and the German Democratic Republic) and metallurgy (all countries but the Soviet Union where there was a shift away from this branch). The net effects of investment shifts on over-all labour productivity growth, therefore, has probably been positive in most countries of the region - except in the material sphere for Bulgaria and Poland, and for industry in Romania. However, there was a very marked shift away from the high labour productivity growth chemical industry in all countries but Poland, and also in the Soviet Union.

Leaving aside for the moment the question of the "absorptive capacity" of sectors/branches for investment, these observations can usefully be compared with the figures shown in table 3.4.9 which summarize, inter alia, the effects of changes in fixed asset (and employment) structures on the growth of NMP and gross industrial output. In order to separate out the effects of structural changes in inputs, growth performance in the material sphere and in industry respectively have been related to changes in the distribution of fixed assets and employment between sectors and branches. In order to separate out the effects of both productivity and structural change, actual growth outcomes have been compared with what it they might have been if, in the first place, sector branch productivity remained at 1970 levels while structures were held constant and vice versa. It is thus possible to show successively the contribution of changes in the level, productivity and sector/branch structure of each of the two factors of production (fixed assets and employment) to total growth.[1]

The table clearly shows up two developments during the past decade. In the first place, it broadly confirms that structural changes in the investment sector, as they have impinged upon fixed assets, have had a noticeable and positive effect on growth. For the material sphere as a whole, changes in

---

1 It should be noted that in this part of the analysis the effects of shifts between sectors/branches with different levels of labour productivity have been included for convenience with the effects over time due to shifts between sectors/branches with different rates of productivity growth.

fixed asset structures have contributed between 8 and 29 per cent of the total NMP increment 1970-1980.[1] In industry, the figure has been somewhat lower - a positive contribution of between 3 and 11 per cent of the total rise in gross industrial output in eastern Europe, while - exceptionally - structural shifts were responsible for a 2.3 per cent negative contribution in the Soviet Union. Second, the table shows that these positive structural change effects have increased in strength for some countries but fallen in others and probably for the region as a whole - from a range of 4-2.3 per cent of total NMP growth outcomes in 1970-1975 to 1-17 per cent in 1975-1980; in the case of industrial growth the corresponding regional trends are slightly less clear, positive contributions having varied between 1.5-9.9 per cent in the earlier period to -6.7 to 14.4 per cent between 1975 and 1980. Positive structural change contributions to NMP strengthened between the two periods for Czechoslovakia, the German Democratic Republic and the Soviet Union, and within industry for Bulgaria, Hungary and Poland, since the middle of the 1970s. In the future, improvements in the structure of the economy may involve moves back into sectors or branches where productivity growth has been, up to now, slower than average - notably fuels.

At this point it is illuminating to examine the "absorptive capacity" question, and notably its development on a sector/branch basis, as illustrated by a comparison of labour productivity growth indices with the increase in fixed assets with which it was associated and on which its development largely depends (table 3.4.6). The table shows, in the lower panel, that the increment in labour productivity associated with a given increment in fixed assets was between 12 and 33 per cent lower in 1980 than in 1970 in the material sphere as a whole, and between 8 and 32 per cent lower for gross industrial output.

The magnitude of changes shown by these, and figures is not only large, but also varies widely between individual sectors and branches. It is also quite clear that there are substantial differences between the performance of individual countries. Even so, in all countries without exception, the effect of changes in the level of fixed assets would have been responsible - assuming no change in their 1970 capital productivity performance - for very much more

1 The tabulation does not show, for space reasons, movements between 1970 and 1980 but movements between the benchmark years 1970 and 1975 and 1975 and 1980.

than the increments in growth actually achieved. This potential effect has, however, been eroded on a very large scale by the declines in capital productivity which actually took place since 1970. The results can be illustrated very graphically by referring again to table 3.4.6. Labour productivity gains in the material sphere in terms of fixed assets cost least in the German Democratic Republic, closely followed by Czechoslovakia, Bulgaria and Hungary. They were most costly in Romania and the Soviet Union. Whereas in the first four countries gains from an incremental unit of fixed assets fell by 12-14 per cent since 1970, in Poland, Romania and the Soviet Union they fell by 30-35 per cent. In most cases productivity growth in industry was less costly than average in terms of fixed assets - or only slightly more so - than the average for the material sphere between 1971-1975 and 1976-1980 (though this was not true if 1980 is compared with 1970 due to slow growth or absolute declines in industrial production in the later year). Conversely, productivity gains in construction and agriculture were everywhere - with the exception of Romanian agriculture - very much more costly than average.

Within the industrial sectors, the chemical industry showed better than average performance in all countries but Bulgaria, while for construction materials the converse was the case in all countries but the German Democratic Republic. Engineering performance was also relatively good, recording generally better than average performance - notably in Czechoslovakia (where productivity gains actually became cheaper in terms of fixed assets over the period). Textiles, other light industry and the food industry taken together also in general performed worse than the average of all branches - though in the German Democratic Republic and Hungary textiles performed better than average. The energy industry performed worse than average in all countries but Hungary and the Soviet Union. A similar mixed pattern is revealed for fuel; it performed well only in Bulgaria and Hungary (where it accounts for only about 4 per cent of total industrial production).

Viewed globally, these results can be broadly confirmed by reference to table 3.4.9. This shows that very big disproportions between the <u>role of labour and capital productivity in growth</u> are present in all countries of the area. In order to achieve the labour productivity contributions shown, the rise in fixed assets - as already implied in the previous paragraphs has in all cases been extremely large. Although the effect over the whole decade is not shown in the table, the effects have been big enough, in fact - on the

assumption of 1970 capital productivity levels as described earlier - to account for between 129 and 188 per cent of production growth in the material sphere over and above the level actually achieved - and similarly, a corresponding 105 to 195 per cent of industrial growth.[1] Although the productivity effect has been boosted by the favourable effects of structural changes in fixed asset allocations in almost all countries, the decline in capital productivity has, therefore wiped out between one third and three quarters of potential gains in the material sphere as a whole, and 20-40 per cent in industry (except in Czechoslovakia, where in industry the figure was as low as 9 per cent over the decade). Moreover, the position worsened in the second half of the decade, at the same time as the positive contribution made by structural change in fixed assets in some countries weakened. The causes of these phenomena lie outside the investment sector. But their effects on production far outweigh those of a declining labour force. With the available supply of labour, the immediate task is clearly to arrest the declining trend of over-all capital productivity which would, in itself, provide a very substantial boost to the growth of the productivity of labour.

Several countries have drawn attention to the need to modernize the stock of fixed assets by writing off obsolescent plant and equipment. No systematic data are available on write-off rates for the countries of the region, but a comparison between increases in gross fixed capital formation and changes in the level of fixed assets yields results which serve to indicate, albeit approximately, recent trends in this respect. Arithmetical averages of the results suggest that write-off rates rose somewhat between 1971 and 1975, but declined fairly steeply in 1976-1980 in most countries for both the material sphere and in industry (as also in the non-material sphere between 1975 and 1980). The exceptions are Czechoslovakia and Hungary (but not in industry). The implied fall in depreciation rates moved downwards rather sharply in 1979 and 1980. The decline tended in all countries to be steepest in agriculture and construction while within industry, it was widespread among sectors. Prolongation of the life of fixed assets may well be inevitable in the medium term given the reduction in investment growth planned in most countries. But it may be a considerable hindrance in achieving the required gains in labour productivity, and in arresting or reversing the downward trend in capital productivity.

---

1 Excluding the German Democratic Republic and Romania which do not publish a breakdown of fixed assets by industrial branch.

ANNEX II

Indices of structural change for seven CPE countries

1. Bulgaria
2. Czechoslovakia
3. German Democratic Republic
4. Hungary
5. Poland
6. Romania
7. Soviet Union

TABLE 3.4.7

Structural change in investment
(Indices, 1970 = 100)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Material sphere										
Bulgaria	97.9	94.4	95.0	91.5	91.5	94.0	94.2	91.6	92.9	95.0
Czechoslovakia	98.8	96.9	99.0	97.4	95.9	97.4	96.9	95.8	96.5	95.3
German Dem.Rep.	98.0	96.0	94.9	97.0	97.2	96.6	97.6	95.9	94.3	93.2
Hungary	95.9	93.8	94.0	94.1	93.3	92.1	89.8	90.9	91.9	91.0
Poland	98.2	95.6	93.0	93.2	93.5	91.9	93.0	93.6	95.8	96.3
Romania	96.7	97.1	96.5	94.4	93.1	95.1	93.7	92.5	91.4	88.8
Soviet Union	98.4	97.7	97.2	96.4	96.9	96.8	97.1	96.3	96.1	96.7
Industry										
Bulgaria	88.7	90.6	86.3	90.2	92.2	94.7	89.1	91.9	87.0	83.9
Czechoslovakia	97.2	93.1	91.9	93.7	91.6	91.3	90.3	84.2	83.8	83.9
German Dem.Rep.	96.0	90.4	89.0	89.2	89.2	87.5	87.4	88.3	91.8	89.9
Hungary	93.2	89.6	88.4	88.6	89.5	90.5	90.6	91.9	89.8	87.8
Poland	97.7	94.3	90.9	90.3	88.8	87.7	87.9	88.3	91.7	88.4
Romania	98.3	96.4	94.3	92.2	90.8	90.0	89.4	87.9	87.0	85.6
Soviet Union	99.1	98.7	97.3	96.1	95.3	94.8	93.3	91.0	92.1	91.5

Source: As for table 3.4.1.

Note: This index is calculated as 100 minus half the sum of changes in shares between a base year and subsequent years, viz. $100 - 0.5 \sum_{i} a_{in} - a_{i70}$, where a_{in} and a_{i70} is the the percentage share of sector or branch i in total (i.e. material sphere or industrial investment in year n and in the year 1970, respectively. See also Economic Survey of Europe in 1980, p.189.

TABLE 3.4.8

Structural shifts in investment allocations in relation to ICORs, capital and labour productivity

(Coefficients (ICORs), average annual percentage change) (productivity) and percentage points (structural change)[a]

A. Material sphere

	Industry	Construction	Agriculture	Transport and communications	Trade	Total material sphere
Bulgaria						
ICORs	3.1	2.4	-38.8	6.4	1.0	3.8
Capital productivity	0.3	-5.9	-6.4	-1.6	-0.8	-1.5
Labour productivity	6.8	5.4	3.1	5.9	9.6	7.1
Structural shift	1.1	-0.8	-2.3	1.2	0.5	-
Czechoslovakia						
ICORs	4.4	4.5	219.9	7.6	1.4	4.8
Capital productivity	-1.1	-4.9	-6.0	1.3	-0.7	-1.5
Labour productivity	4.4	1.7	2.1	5.2	4.7	4.2
Structural shift	0.3	1.7	-0.7	-0.3	-1.0	-
German Democratic Republic						
ICORs	4.7	3.3	170.1	12.2	1.9	5.2
Capital productivity	-0.7	-3.5	-4.5	-0.7	-0.8	-1.1
Labour productivity	5.0	3.0	1.3	3.2	4.6	4.3
Structural shift	1.0	0.6	-1.8	-0.1	-2.5	-
Hungary						
ICORs	5.4	1.8	43.9	17.2	2.3	6.7
Capital productivity	-1.6	-5.6	-5.3	0.1	-4.3	-1.7
Labour productivity	6.4	5.0	3.2	2.7	3.7	5.0
Structural shift	3.1	0.5	-3.1	-0.7	0.1	-

Table 3.4.8 (continued)
A. Material sphere

	Industry	Construction	Agriculture	Transport and communications	Trade	Total material sphere
Poland						
ICORs	3.8	6.4	-28.4	5.7	1.0	5.5
Capital productivity	-2.6	-11.5	-7.4	0.1	-	-3.4
Labour productivity	6.0	1.3	0.5	5.6	4.5	4.9
Structural shift	-1.4	0.8	1.7	-1.6	-0.6	-
Romania						
ICORs	3.3	3.0	9.2	9.5	0.9	3.6
Capital productivity	-1.3	-6.9	-4.3	-2.1	0.3	-1.9
Labour productivity	5.7	6.4	8.8	3.5	11.0	9.0
Structural shift	0.1	2.2	-1.6	0.6	-1.3	-
Soviet Union						
ICORs	2.8	3.1	9.3 [b]	11.0	..	4.1
Capital productivity	-1.4	-5.0	-5.1	-1.8	..	-2.7
Labour productivity	4.6	2.4	2.9	2.8	..	3.9
Structural shift	-0.8	0.2	-0.5	..2	..	-

Table 3.4.8 (continued)

B Industry

	Energy	Fuel	Metallurgy	Engineering	Chemicals	Construction materials	Wood, paper	Textiles	Other light industry	Food	Total industry
Bulgaria											
ICORs	8.1	6.6	1.6	0.7	1.4	2.3	1.6	0.7	0.7	0.9	1.3
Capital productivity	-2.4	-0.7	4.9	2.4	1.8	-2.4	-3.5	-1.7	-4.9	-4.3	-0.7
Labour productivity	2.2	5.0	6.6	9.0	8.9	6.9	6.1	5.6	4.4	3.9	5.8
Structural shift	-1.0	2.2	-1.1	3.4	-3.5	1.5	-1.2	-1.0	-1.8	0.3	-
Czechoslovakia											
ICORs	7.5	4.3	1.8	0.8	1.0	1.9	1.5	1.5	1.0	1.2	1.5
Capital productivity	-2.5	-2.8	0.4	1.3	1.1	-2.0	-2.4	-1.4	-1.7	-2.4	-0.5
Labour productivity	2.0	2.4	3.6	6.6	6.6	5.0	5.4	4.6	5.1	3.3	4.8
Structural shift	2.1	1.4	2.4	3.7	-3.6	-1.9	0.4	-0.8	-0.2	-0.2	-
German Democratic Republic											
ICORs	7.2 [c]	..	3.0	1.0	2.1 [d]	3.4	..	1.2	1.4 [e]	1.2	1.9
Capital productivity	..	..	..	..	..	..	..	..	..	..	..
Labour productivity	3.6	..	4.7	6.0	6.7	4.9	..	6.3	5.3	1.7	5.2
Structural shift	-2.5	..	3.7	0.5	-1.3	-0.5	..	-0.8	-0.4	0.5	-
Hungary											
ICORs	5.9	12.0	2.9	1.0	1.0	3.5 [f]	..	2.6	1.1 [f]	1.9	1.8
Capital productivity	-1.2	-3.3	1.6	-1.6	-1.6	-3.3	..	-3.4	-3.8	-4.6	-2.5
Labour productivity	6.8	4.2	4.0	6.2	8.6	5.9	..	4.7	4.8	2.3	5.4
Structural shift	2.3	1.7	1.2	1.9	-3.8	-2.3	..	-1.6	-2.6	3.3	-
Poland											
ICORs	6.1	3.0	2.4	0.7	1.4	2.6	1.3	0.6	0.5	0.8	1.2
Capital productivity	-0.9	-3.1	-5.5	-2.8	-0.8	-3.2	-3.0	-3.4	-2.1	-4.3	-2.7
Labour productivity	5.6	3.4	6.1	8.0	7.1	6.5	7.1	6.3	6.2	4.4	6.1
Structural shift	1.3	-0.4	1.7	2.4	1.4	-2.5	0.8	-2.5	-0.5	-2.4	-

TABLE 3.4.8 (continued)

B Industry

	Energy	Fuel	Metallurgy	Engineering	Chemicals	Construction materials	Wood, paper	Textiles	Other light industry	Food	Total industry
Romania											
ICORs	10.5	5.4	1.4	0.6	1.5 [d]	1.1	1.0	0.4	0.3	0.6	1.0
Capital productivity	..	..	..	..	..	..	..	..	..	..	..
Labour productivity	5.2	2.9	5.7	7.0	7.3	10.2	6.4	6.5	6.3	4.7	6.3
Structural shift	-0.2	1.6	5.8	-0.5	-1.1	-1.6	-0.3	-0.2	-1.1	-0.4	-
Soviet Union											
ICORs	3.8	6.2	2.8	0.6	1.3 [d]	1.9	2.2	0.7	0.3 [g]	0.8	1.2
Capital productivity	-0.5	-3.2	-3.1	-0.1	-1.0	-3.2	-3.5	-3.0	-2.3	-3.0	-2.0
Labour productivity	3.3	3.5	2.9	7.1	5.4	2.5	3.2	2.7	3.0	1.7	4.0
Structural shift	-1.3	2.3	-0.7	2.2	0.8	-0.7	-0.5	-0.1	-0.3	-0.8	-

Sources: As for table 3.4.1.

Notes: Unless otherwise indicatedbelow, other light industry includes clothing, footwear, leather, glass and ceramics and printing.

a ICORs (coefficients) are derived from average investment ratios in 1976-1980 divided by the percentage growth of average NMP in 1975-1980 over the average for 1971-1975 annualized over five years. Capital and labour productivity (average annual percentage changes) are based on geometrical measures of growth over 1976-1980 based on 1975. Structural shifts (percentage points) relate to changes between the annual averages in 1976-1980 compared with those in 1971-1975.

b Includes trade and procurement etc., and other unspecified activities.

c Includes fuel.

d Includes oil refining.

e Includes wood and paper.

f Includes glass.

g Clothing, leather, furs and footwear only.

TABLE 3.4.9

Contribution of changes in the post-1970 levels, productivity and sector branch allocation of fixed assets and employment to NMP and industrial output changes 1970-1975 and 1975-1980
(Per cent of actual output growth)

	Bulgaria		Czechoslovakia		German Dem.Rep.		Hungary		Poland		Romania		Soviet Union	
	1975/1970	1980/1975	1975/1970	1980/1975	1975/1970	1980/1975	1975/1970	1980/1975	1975/1970	1980/1975	1975/1970	1980/1975	1975/1970	1980/1975
Material Sphere (NMP)														
Fixed assets: Output growth due to changes in:														
Levels	116.1	143.2	101.6	180.1	111.6	147.0	109.4	242.2	85.9	-718.5[a]	105.6	155.0	163.2	213.9
Productivity	-39.2	-56.3	-14.3	-97.4	-19.3	-58.0	-24.7	-143.4	0.7	721.2	-9.2	-63.5	-68.7	-125.6
Sectoral allocation	23.1	13.1	12.7	17.3	7.7	11.2	15.3	1.2	13.4	-42.7	3.6	8.5	5.5	11.7
Employment: Output growth due to changes in:														
Levels	2.2	0.3	4.9	7.6	1.0	7.6	-2.1	-15.2	14.8	24.8[a]	1.8	1.7	21.6	17.9
Productivity	84.8	93.2	88.6	88.0	98.9	92.1	98.5	115.3	76.9	-106.2	72.6	79.3	77.6	80.1
Sectoral allocation	13.1	6.5	6.5	4.4	0.1	0.3	3.6	-0.1	8.3	-18.6	25.6	19.0	0.8	2.0
Industry (gross output)														
Fixed assets: Output growth due to changes in:														
Levels	100.6	133.0	82.4	130.6	102.7	103.0[b]	131.9	262.1	93.2	255.1	..	..	118.6	185.8
Productivity	-5.9	-45.9	12.5	-31.5	-6.7	-4.1	-34.4	-175.0	-3.1	-169.5	..	..	-20.1	-79.1
Branch allocation	5.3	12.9	5.1	0.9	4.0	1.1	2.5	12.9	9.9	14.4	..	..	1.5	-6.7
Employment: Output growth due to changes in:														
Levels	22.1	11.0	7.6	9.4	3.7	7.0	3.4	-21.3	26.5	2.9	..	..	18.1	25.7
Productivity	80.0	90.0	91.4	90.3	96.1	89.3	91.5	116.9	74.7	97.0	..	..	86.0	76.2
Branch allocation	-2.1	-1.0	1.0	0.3	0.2	3.7	5.1	4.4	-1.2	0.1	..	..	-4.1	-1.9

Sources: As for Table 3.4.1.

Note: These figures quantify, in per cent of actual growth, the three identified growth components shown which therefore sum to 100 per cent. They differ somewhat from those shown in text tables in section 3.3(i) above (text table on page 178) since they are based on national (rather than CMEA) statistics and hence include activities outside the socialist sector.

a Because of the decline in the absolute level of production in the year 1980 as compared with 1975, the figures for Poland appear with their signs reversed; they should be interpreted as if signs were opposite to those shown. Magnitudes can be very large because of the relatively small drop in output between the two years.

b 1976/1975.

ANNEX III

Indices of structural change for seven CMEA countries[1]

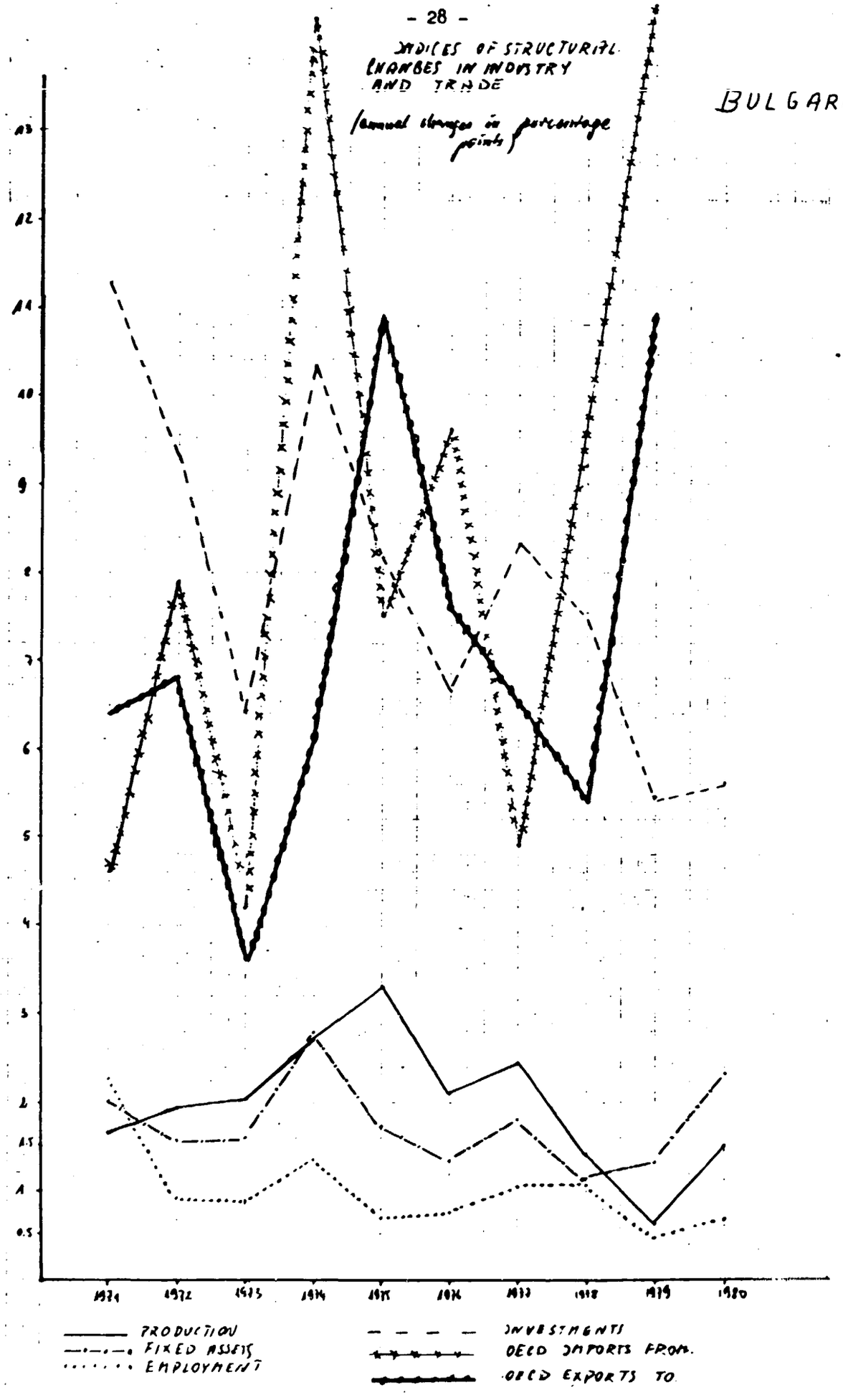
1. Bulgaria
2. Czechoslovakia
3. German Democratic Republic
4. Hungary
5. Poland
6. Romania
7. Soviet Union

1 For definition of the index of structural change, see footnote to page 13 above.

INDICES OF STRUCTURAL CHANGES IN INDUSTRY AND TRADE

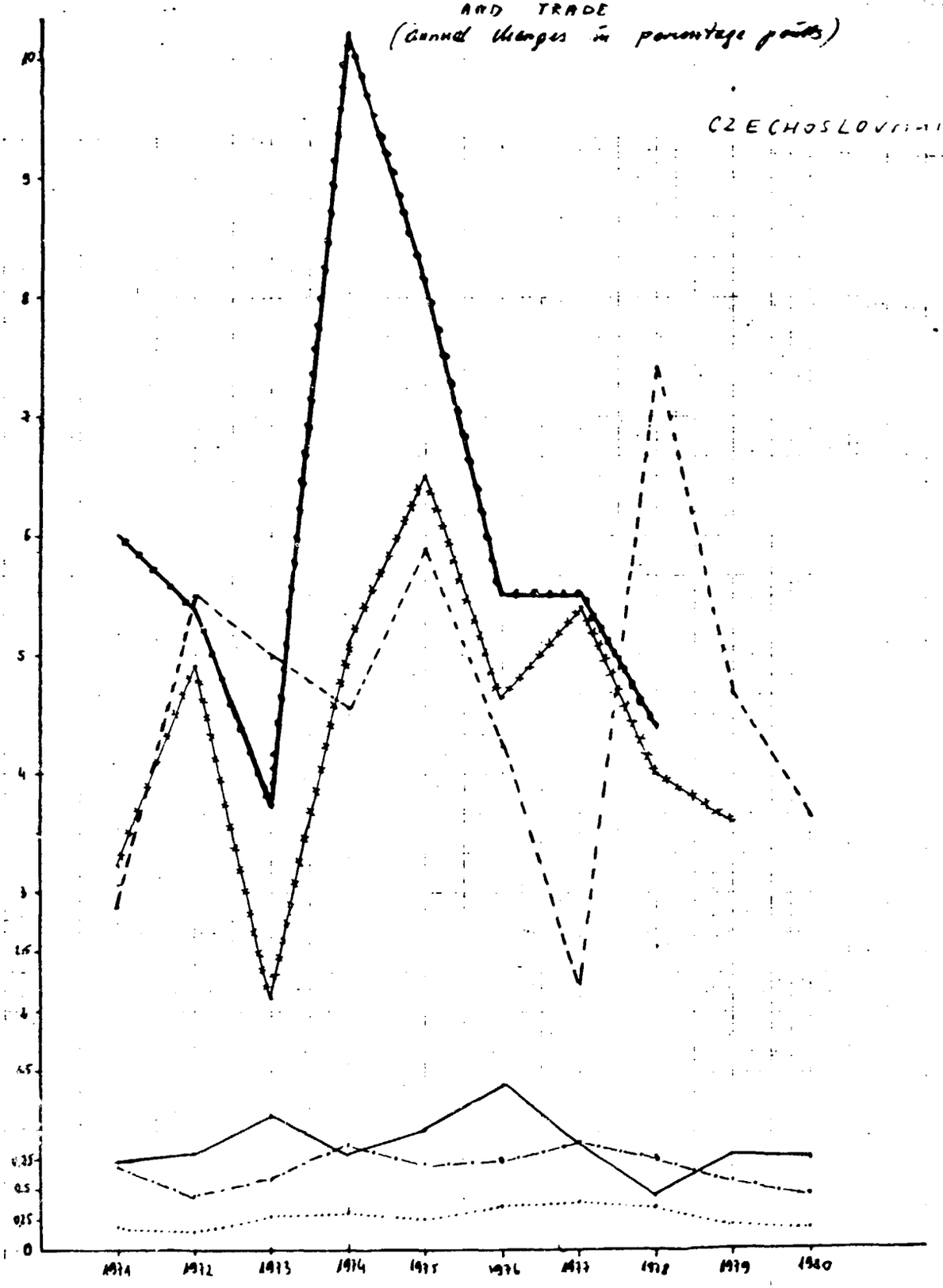
(annual changes in percentage points)

BULGARIA



INDICES OF STRUCTURAL CHANGES IN INDUSTRY AND TRADE
(annual changes in percentage points)

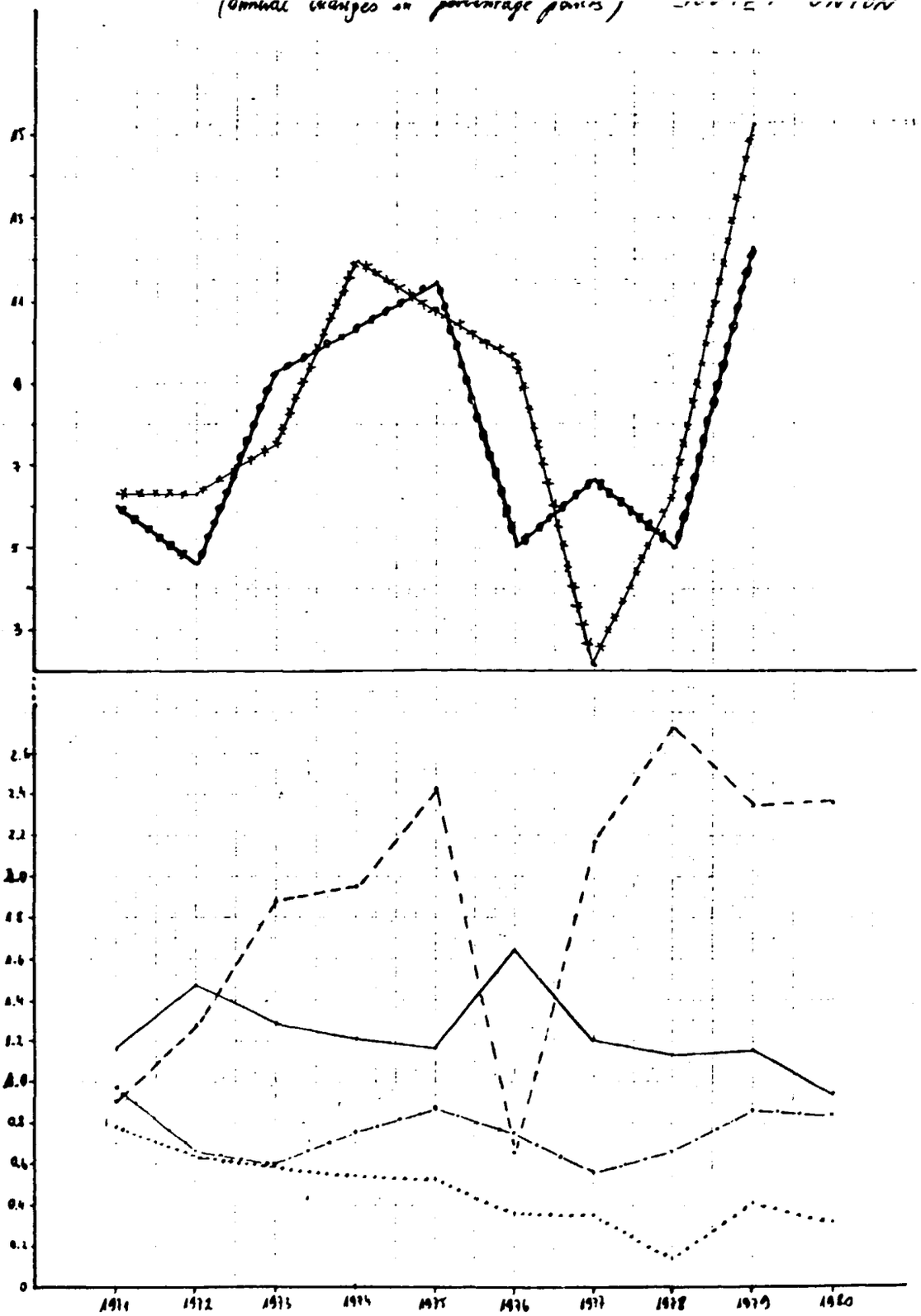
CZECHOSLOVAKIA



PRODUCTION
FIXED ASSETS
EMPLOYMENT
INVESTMENTS
OECD IMPORTS FROM
OECD EXPORTS TO

INDICES OF STRUCTURAL CHANGES IN INDUSTRY AND TRADE

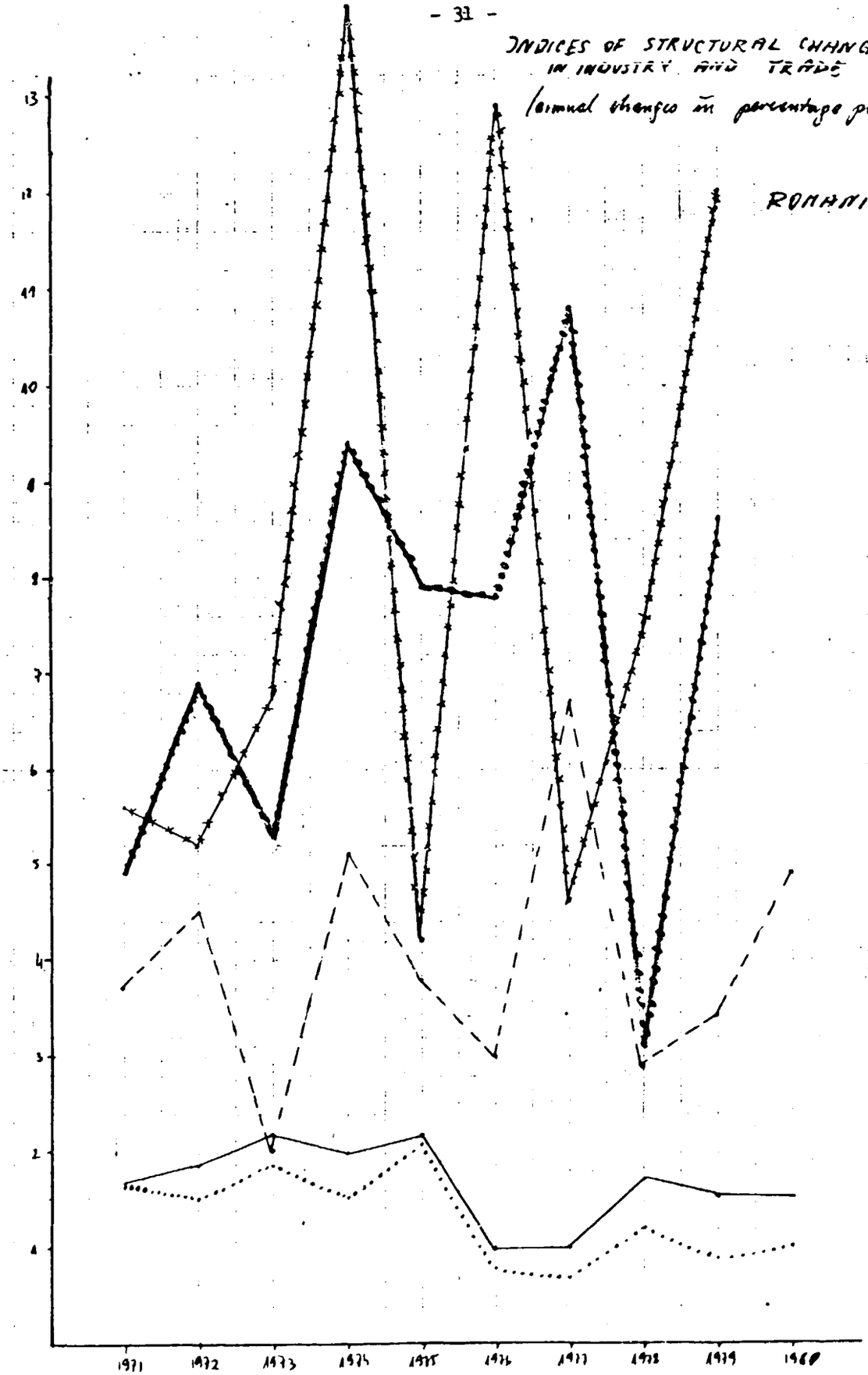
(annual changes in percentage points) SOVIET UNION



INDICES OF STRUCTURAL CHANGES IN INDUSTRY AND TRADE

(annual changes in percentage points)

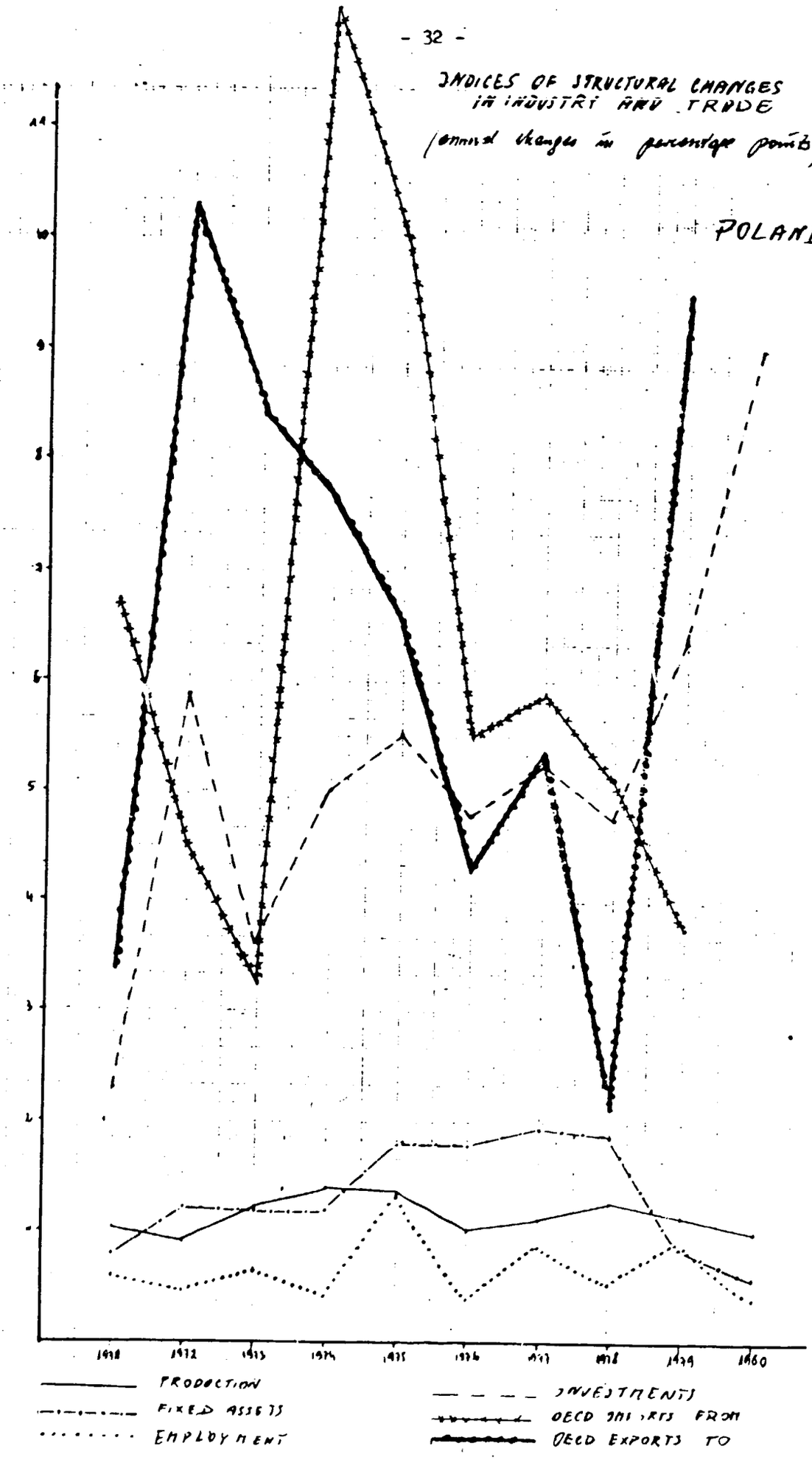
ROMANIA



INDICES OF STRUCTURAL CHANGES IN INDUSTRY AND TRADE

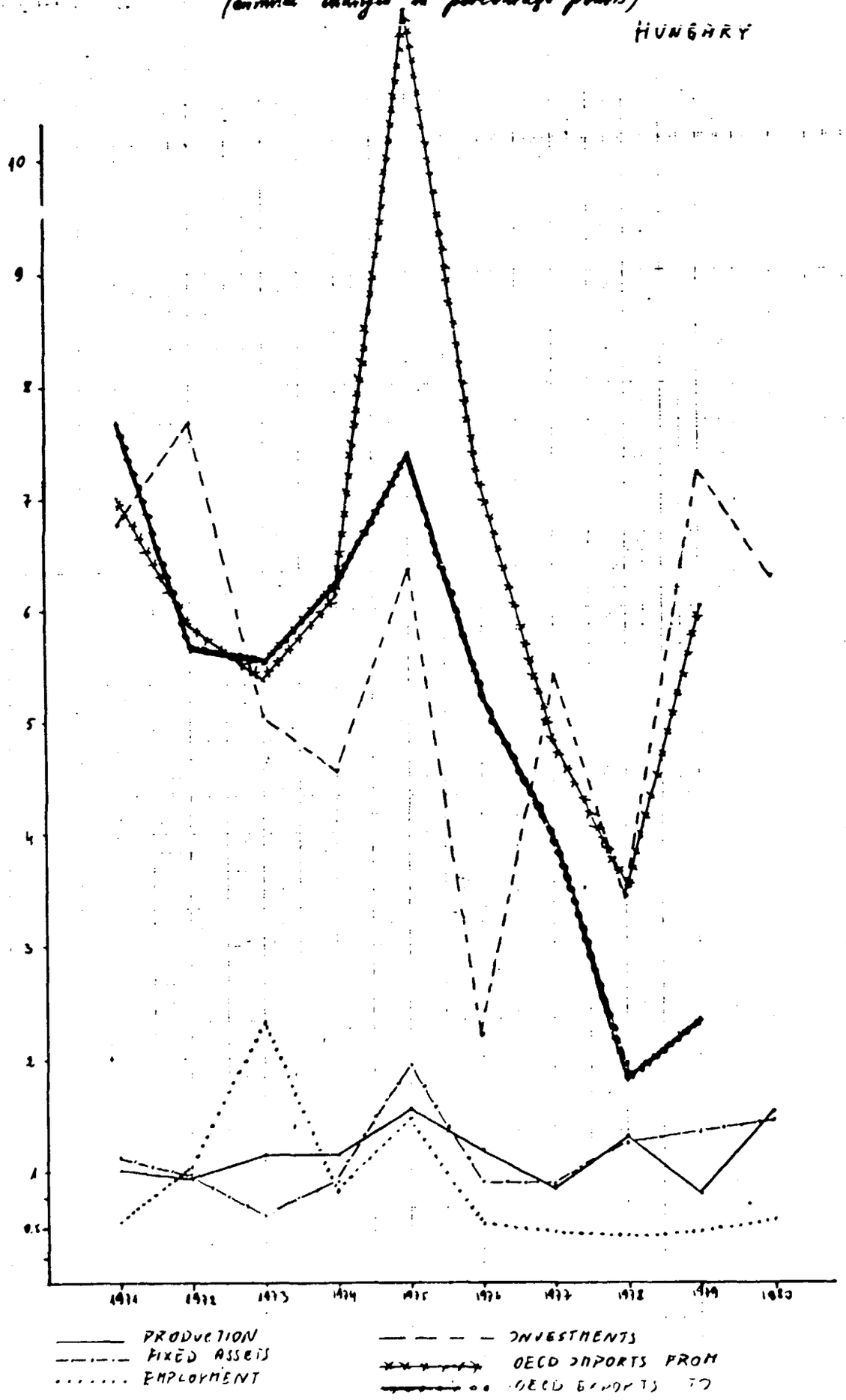
(annual changes in percentage points)

POLAND



INDICES OF STRUCTURAL CHANGES IN INDUSTRY AND TRADE
(annual changes in percentage points)

HUNGARY



INDICES OF STRUCTURAL CHANGES IN INDUSTRY AND TRADE

(annual changes in percentage points)

GERMAN DEMOCRATIC REPUBLIC