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Long Waves and Social Structures: A Strategy for Identification of Periods of Transformation and Stability in Sweden, Germany, Great Britain

Anttila, S.

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WORKING PAPER

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INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS
A-2361 Laxenburg, Austria

FOREWORD

The question of social impacts and transformations related to technological and economic change is an important theme for the Technology, Economy and Society Program at IIASA. Especially the disruptive nature of major transformations in the technological and economic base, as well as the social forces shaping the process of structural adjustment call for more detailed research.

The author develops and tests the hypothesis that important transformations in class structure in the historical process of industrialization (as reflected in changing employment patterns) go along with a discontinuous pattern in the propensity for social conflicts (as reflected in strike patterns). Although the results achieved are conceptually and empirically still preliminary, they nevertheless point to the importance of analyzing from a long-term, historical perspective the changing morphology of economies brought about by technological change and the relationship to societal conflicts and their possible resolution entailed in such restructuring processes.

The present paper evolved as a part of the overall research effort of the Dynamics of Change and Sustainability of Systems Project to analyze social dimensions of technological change and economic restructuring. The described work is the result out of a fruitful and productive stay of the author in the 1988 YSSP program. It appears as IIASA Working Paper because it addresses an important issue, and due to the hypotheses put forward and their careful discussion and empirical examination given by the author, which merits wider dissemination and further discussion.

Prof. Dr. F. Schmidt-Bleek
Leader
Technology, Economy & Environment Program

LONG WAVES AND THE STRUCTURE OF SOCIAL SYSTEMS

A strategy for identification of periods
of transformation and stabiliy in
Sweden, Germany, Great Britain.

By Sten Anttila

IIASA
International Institute for Applied Systems Analysis
A-2361 Laxenburg
AUSTRIA

Uppsala University
Department of Sociology
Box 513
S-751 20 Uppsala
SWEDEN
tel. (00)46 - (0)18 - 18 15 09

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PREFACE

This paper is a result of my participation in a research program during the summer of 1988: Young Scientists Summer Program (YSSP) at the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria. I was recomended to take part in this program by Professor Tom R. Burns, something I am very glad for.

I am grateful to my supervisor at IIASA Dr. Nebojsa Nakicenovic and his collaborator Dr. Arnulf Grubler. They awoke my interest for the problem of long waves in the economy and for the possiblity of relating this problem to social development, and they critizised and encouraged my work. The different seminars and informal meetings with the other participants in the summer program from all over the world brought new and interesting perspectives on the subject matter.

Back in Sweden, my supervisor at the Department of Sociology, Uppsala University, Dr. Pablo Suarez, has given me his competent remarks. I will always be in debt to him.

Finally, I would like to thank FRN, the Swedish NMO of IIASA, for giving me economical support during the summer in Austria.

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INTRODUCTION

1.1 THE OBJECTIVE

The main objective is to study (1) whether there are distinct periods of transformation and of stability concerning social structure, and (2) whether these periods corresponds to the long-term and wave-like cycles of growth and stagnation that has been studied by economists for a very long time.

A specific interest will be devoted to the problem of selecting data and how to define the data into quantitative variables. The strategy will be (1) to outline a multi-dimensional concept of social structure with reference to transformation and stability in consideration of sociological theory, and (2) to select data and define variables in such a way that they in combination behave in a way that fits with the concept.

1.2 PREVIOUS STUDIES

Long waves in the economy have been studied by economists since at least the time of Kondratieff and Schumpeter[1], and recently a new-born interest has arised among economic scholars[2]. The discontinous and clustered development of

[1] cf. Mandel 1982:9f; for a critical appraisal, Rosenberg and Frieschtak 1984.

technological innovations is often viewed as an important force when these waves are studied[3], but suggestions and efforts have also been made to introduce the development of social variables into the analyses[4]. Freeman and Perez e.g. hold that the periodic transformations of structures in economy and production requires an equally profound transformation of social and institutional frameworks. The social and institutional transformations are conceived as a reaccomodation that "...occurs as a result of a process of political search, experimentation and adaption, but when it has been achieved, by a variety of social and political changes at the national and international level, the resulting good 'match' facilitates the upswing phase of the long wave."[5].

To give a picture of the empirical results concerning different economical and technological measures so far, a sample will be presented below: Price fluctuations in UK can be seen in figure 1, and in USA in figure 2[6]. Table 1 shows different estimates, concerning the timing of long waves, made by various scholars on the basis of production[7]. Figure 3 shows the frequencies of basic innovations in world industry from the middle of the 18th century until the mid-

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[2] cf. Delbeke 1985.

[3] e.g. Mensch 1975, Marchetti 1983, Nakicenovic 1987.

[4] cf. Freeman and Perez 1988, Grubler 1987, Millendorfer 1985.

[5] 1988:39f.

[6] Adapted from Nakicenovic, 1987:4.

[7] Adapted from van Duijn, 1983:162f.

dle of the 20th century[8]. Finally, in figure 4, world-market shares of different energy sources are presented as a substitution process with reference to basic innovations[9].

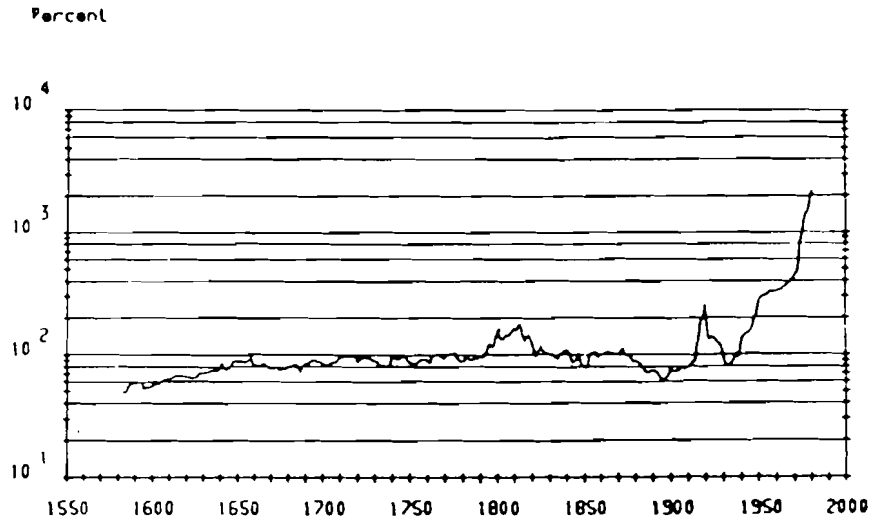

Figure 1: Wholesale Price Index, UK

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[8] Adapted from Marchetti, 1981:26; the data are origially from Mensch, 1975. Innovation is defined by Marchetti as something that starts a new industry in contrast to inventions which refers to the discoveries which are the base of innovations.

[9] Adapted from Nakicenovic, 1987:26

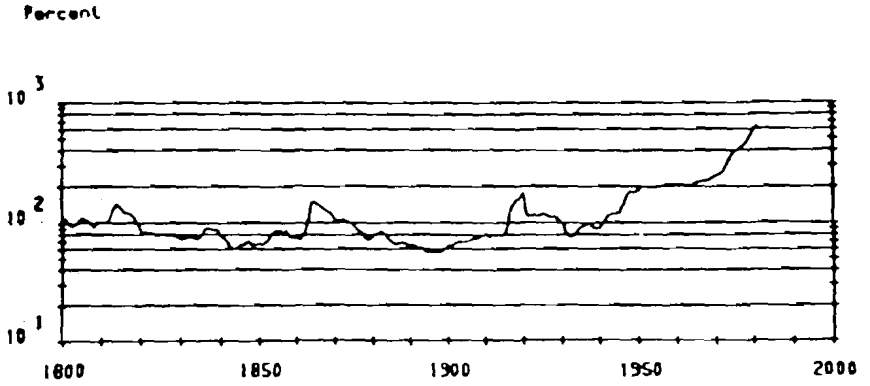

Figure 2: Wholesale Price Index, USA

	1st Kondratieff		*2nd Kondratieff*		*3rd Kondratieff*		*4th Kondratieff*	
	lower	upper	lower	upper	lower	upper	lower	upper
1. Kondratieff (1926)	ca. 1790	1810/17	1844/51	1870/75	1890/96	1914/20		
2. De Wolff (1929)	–	1825	1849/50	1873/74	1896	1913		
3. Von Ciriacy-Wantrup (1936)	1792	1815	1842	1873	1895	1913		
4. Schumpeter (1939)	1787	1813/14	1842/43	1869/70	1897/98	1924/25		
5. Clark (1944)	–	–	1850	1875	1900	1929		
6. Dupriez (1947; 1978)	1789/92	1808/14	1846/51	1872/73	1895/96	1920	1939/46	1974
7. Rostow (1978)	1790	1815	1848	1873	1896	1920	1935	1951
8. Mandel (1980)	–	1826	1847	1873	1893	1913	1939/48	1967
9. Van Duijn	–	–	1845	1872	1892	1929	1948	1973

TABLE 1

Timing of long waves according to various scientists

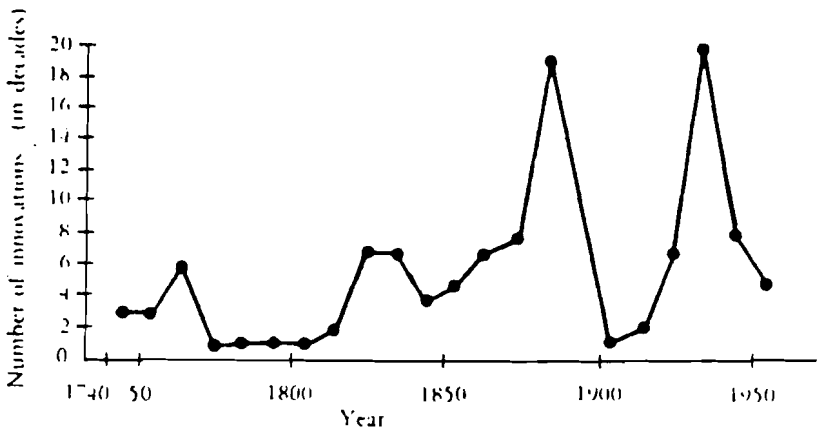

Figure 3: Frequency of basic innovations 1740-1960

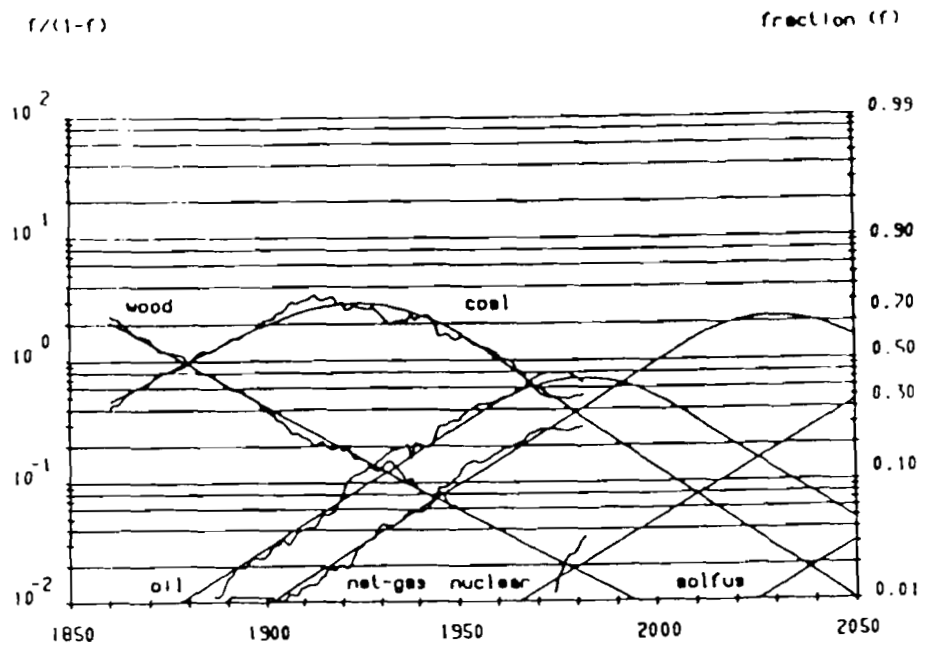

Figure 4: Global Primary Energy Substitution

1.3 PROBLEM AND STRATEGY

The enormous amount of different and alternative measures, that can be used when trying to identify periods of social transformation and stability, is a severe problem. There are different types of data that can be selected - from rates of illigitimate births and divorces to proportions of economical sectors and rates of labour disputes - and these data can be defined into quantitative variables in different ways, e.g. refering to the level of aggregation, the dimension of aggregation, ratios or absolute frequencies, which denominators in the ratios etc. Furthermore, the different options are likely to produce diverging and even contradicting results. And finally, due to the fact that the avail-

able data have originally been collected for administrative purposes, the different and alternative variables can vary concerning the extent to which they express what sociologists would conceive as transformation or stability of social structure.

A common strategy, when facing this problem, is to use concepts of social classes and class structure as a point of departure. The class concept is interpreted into empirical criterias in order to classify different individuals according to their class position within the structure. The next step is to find an approximation as good as possible of these categories on the basis of official statistics of economical sectors and occupations. Finally, the occurance of structural transformation is determined on the basis of the relative sizes of the class-position categories.

In this paper another strategy is chosen: (1) social structure with reference to transformation and stability is conceived as a quality of society and not of individuals, and as something that necessarily comes to expression along many different dimesions; (2) the concept is defined in terms of specifications concerning how developments along such dimensions are interrelated in consideration of sociological theory; (3) a population not of single indicators taken apart but of groups of variables is delimited - each variable representing a dimension of the concept; (4) this population is filtered and those groups, that express a combined behavior that fits with the specifications of the concept, are selected.

If the combined behavior of a certain group of variables does not fit with our structural concept, then this group is viewed as invalid with reference to this concept. On the other hand, groups of variables that display the specified behavior are regarded as valid. A result where no valid groups can be selected is problematic and can lead to two different conclusions: (1) the available data are invalid and not useful when trying to identify periods of structural transformation or stability, or (2) the outlined concept do not capture basic features of social history.

Oberschall[10] conceives social structure from the point of view of "...how resources, including leadership, are managed and allocated and the manner in which these resources can be converted to the pursuit of group goals.". This is also how social structure is imagined in this paper. In a modern framework Oberschall applies this conception in the following way[11]:

> "Population growth, migration, the growth of cities and of industry, changes in technology, in modes of production, communication, organization, and in the scale of society are everywhere accompanied by changes in the everyday lives and security of ordinary people. Some groups advance while others stand still or decline. Some, threatened with the loss of livelyhood, cling tenaciously to traditional ways; others, advancing and reaping unheard of profits, seek to speed up the processes of change and prepare to defend their gains against newer claimants. Others find further progress blocked by the determination of still powerful groups not to yield their inherited privileges. Existing institutions and social arrangements are no longer suited to solve new problems of an altogether different order of magnitude. New ideas that question sacred assumption and

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[10] 1973:29

[11] 1973:34f.

> time-honored ways of handling affairs are diffused. Dissatisfaction mounts; impatience, cramp, hatreds accumulate. Reforms lag bhind new needs. Eventually, the existing conflicts increases in intensity and new social conflicts erupt. Change and conflict are intimately linked. It is the rising and declining of groups and classes formed and transformed during periods of change that usually constitute the core of social movements and organized groups who seek to reform and revolutionize existing institutions or, on the contrary, defend the social order under attack..."

In Oberschall's characterization above, we seize upon the close relationship between the rise and decline of groups on the one hand and the conflict eruptions - as a consequence of e.g. institutional misfit - on the other hand. Our concept of social structure will be outlined on the basis of these two dimensions: (1) the level of conflict and (2) the rise and decline of groups.

- A period of structural transformation is characterized by (1) clearly marked processes of replacement where some groups rise and other decline, and (2) a dramatic increase of the level of conflict: (a) the more profound is the replacement process, the higher will be the level of conflict; and (b) the more concentrated in time is the phase of replacement, the more concentrated in time will be the eruption of conflict.
- A period of stability is characterized by (1) the absence of replacement processes comprising rise and decline of groups, and (2) a low level of conflict compared to periods of transformation: (a) the more absent is the replacement processes, the lower will be the level of conflict, and (b) the more slow and gradual is the process, the more homogenously will be the spread of conflicts through time.

- Replacements of groups are assumed to anticipate the eruption of conflicts, if there is any observable difference in timing.

If a pair of variables - that address groups and conflicts - are interrelated in the way specified above, then this pair is a valid measure with reference to our concept structural transformation and stability concerning social structure. And if such a pair do not display the specified behavior, then it is regarded as an invalid measure.

To give a more clear picture of what is meant by valid and invalid measures in this paper and in terms of the two dimensions above, two idealized examples of valid measures and two idealized examples of invalid measures will be graphically illustrated below (black bullets refer to disputes and the different triangles and squares refer to occupational and sectorial categories):

Figure 5 shows a combined behavior of groups and conflicts that is a valid measure of structural transformation: there is a clear replacement process including the rise and decline of certain groups, and eruptions of conflicts occures at the time point when one group is replacing another.

In figure 6, a valid measure of the structural state suggests that social transformations are absent: the groups are stable and there are no signs of any replacements, and the conflicts are homogenously spread through time.

In figure 7, there is a marked clustering of conflict eruptions to certain time points, but there are no corresponding replacement of groups. This means that the vari-

ables do not behave in the specified way, and that they as a combination is an invalid measure.

And finally, in figure 8, there are clear replacements without any related conflict eruptions - this is also viewed as a results of an invalid measure.

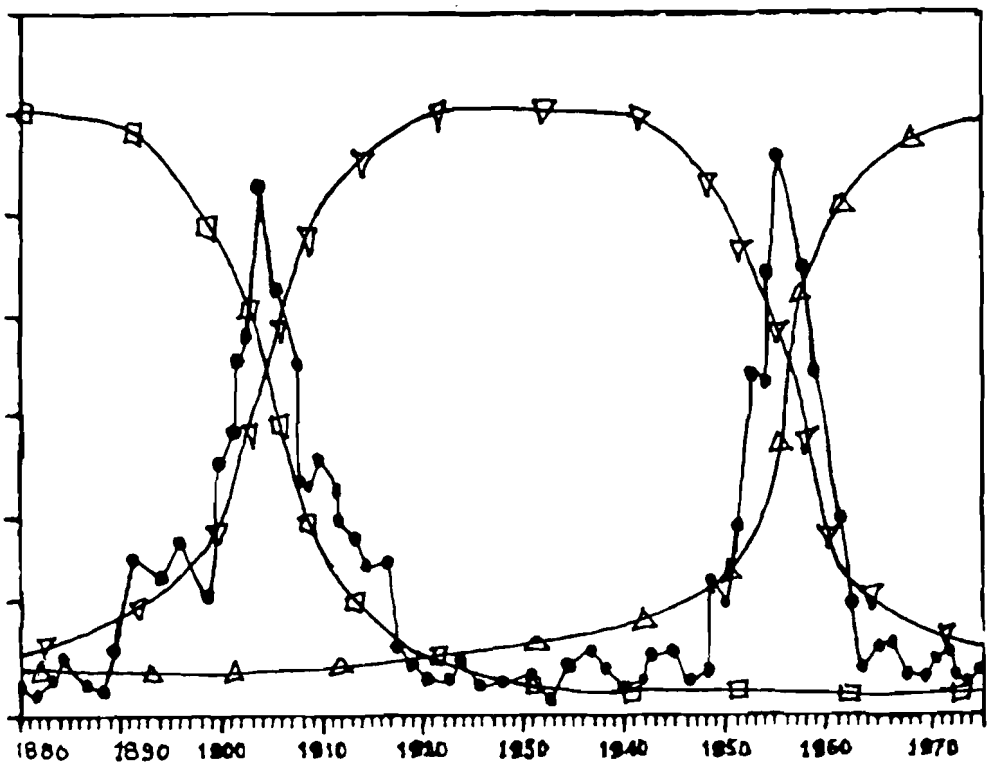

Figure 5: Valid measure of structural transformations

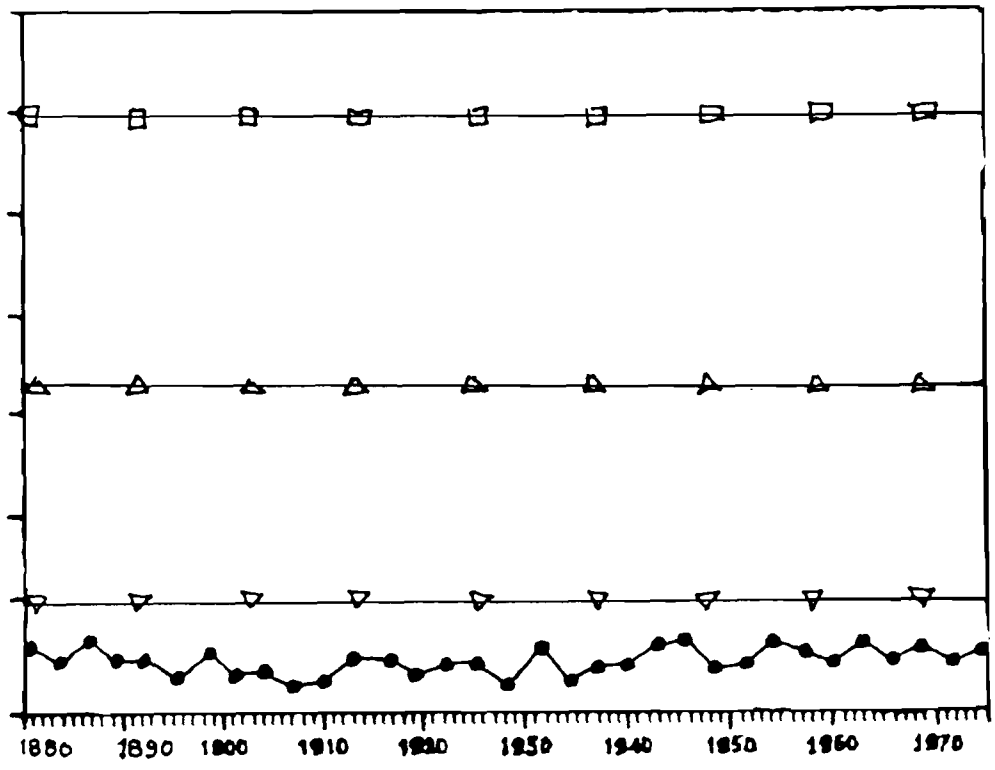

Figure 6: Valid measure of structural stability

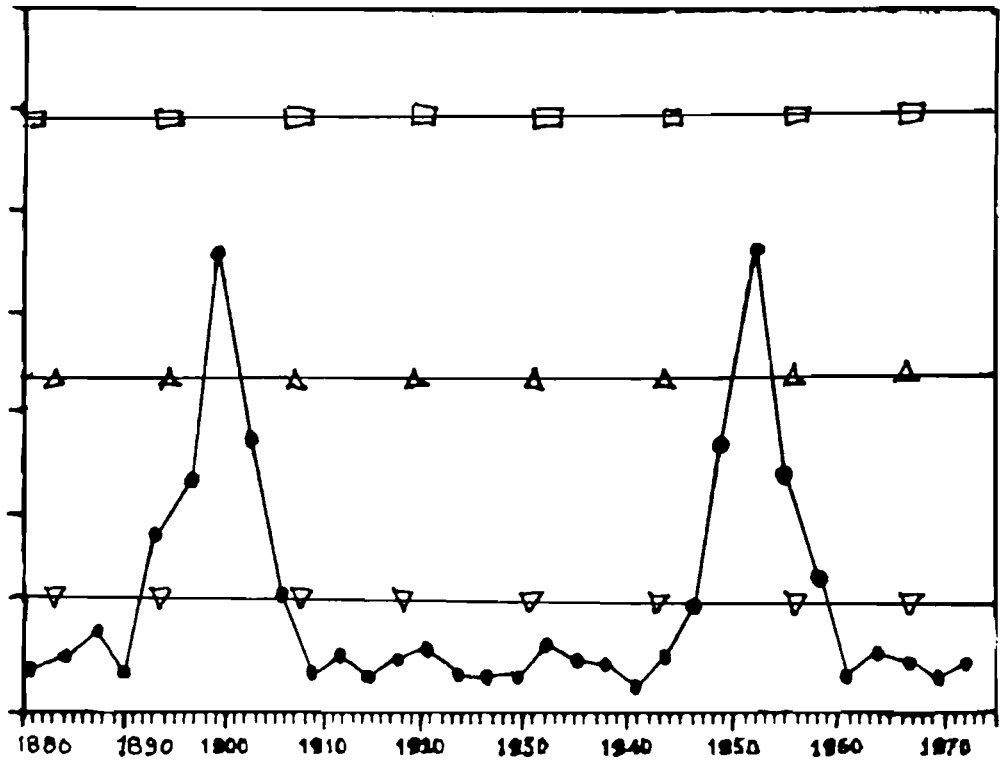

Figure 7: A pattern produced by an invalid measure

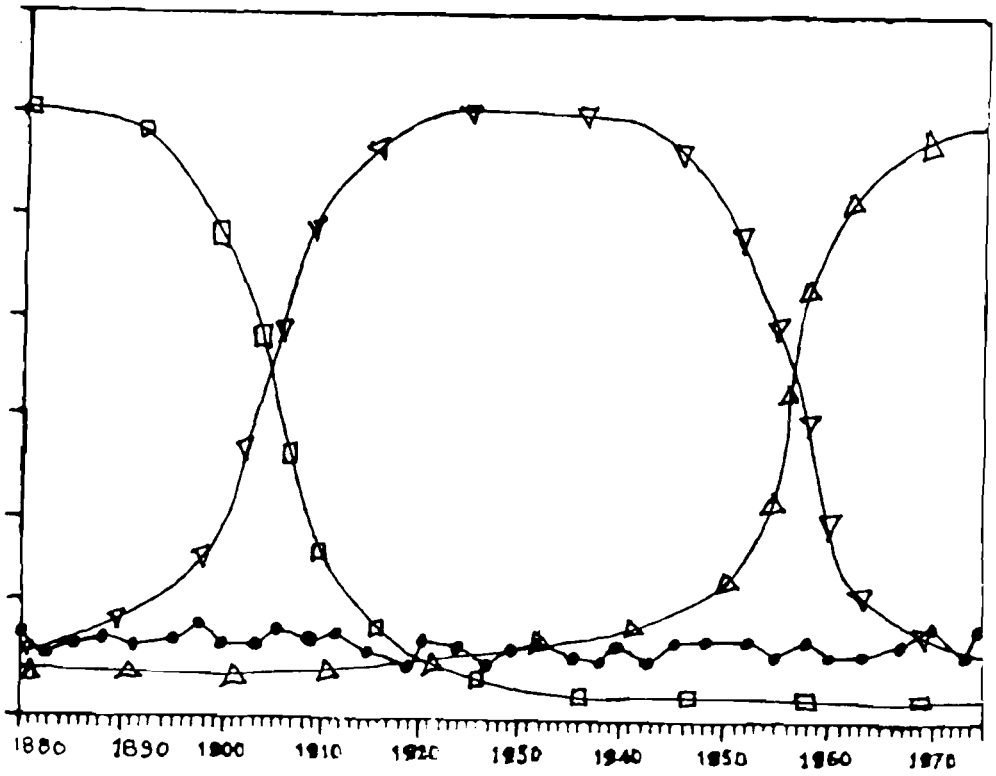

Figure 8: A pattern produced by an invalid measure

1.4 THE DATA

The data used in this paper with reference to social groups are based on economical sectors and occupations. The conflict data consists of different statistics on labour disputes. To give an overview of the different alternatives of measures, the possibilities of aggregation and disaggregation are shown in table 2 and table 3[12].

There are 11 different and availble aggregates in table 2. The right column gives some brief description of the contents of the aggregates. The 11 aggregates, however, are not possible to dissagregate because of the way the data are organized in the sources.

[12] Adapted from Flora et al 1987:446f.

I	Agriculture:	agriculture, forestry, fishing
II	Mining:	mining, quarrying
III	Manufacturing:	basic mineral products, basic metal products, fabricated metal products, machinery and equipment, fabricated non-metallic mineral products, chemicals, rubber and plastic products, paper, printing and publishing, furniture and wood products, textiles, wearing apparel and leather products, food, beverage, and tobacco, other manufacturing industries
IV	Construction:	building, construction of communication networks
V	Utilities:	electricity, gas and steam, water works and supply
VI	Commerce:	wholesale trade, retail trade
VII	Transport:	transport and storage, communication
VIII	Banking:	banking, insurance (except social security institutions)
IX	Services:	restaurants and hotels (ISIC: VI), laundry, cleaning, repair, sanitary services, domestic services (ISIC: VIII), private non-profit organizations, recreational and cultural services, education, health, social security institutions, religion, international organizations and external bodies
X	Public administration:	civil administration, police, military
XI	Unknown:	industry unknown, not adequately described (not: unknown whether active or not)

TABLE 2

Sectorial categories in the sources used in this paper

Table 3 shows 6 available aggregates. These aggregates refers to positions or statuses for the persons in each sector. The 6 position aggregates (7 if "unknowns" are consid-

Employers:	those employing others than family workers
Self-employed:	those working on their own account without help except for family workers
Employees:	higher-status dependent labourer or white-collar personnel, including civil servants
Workers:	lower-status dependent labourers or blue-collar personnel, including home-workers
Apprentices:	persons in vocational training in firms
Family workers:	assisting spouses, children or relatives

TABLE 3

Position categories in the sources used in this paper

ered) are so mixed up and their classification criterias are changing from census to census in such a way that the only possible way to get a rough comparability is to collaps them into two aggregates - this is according to Flora et al[13]: independent labour (employers and self-employed) and dependent labour (the others).

This gives 11 X 2 = 22 aggregates that can be collapsed in different ways. And, as was indicated earlier, the way these 22 aggregates are reaggregated may influence the picture of the timing and the extensiveness concerning changes and stablity of the occupational/sectorial proportions.

Labour disputes in this paper includes strikes, lock-outs and mixed disputes. Basically there are three different alternative quantitative definitions: (1) the frequency of

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[13] 1987:447

disputes, (2) the number of persons involved, and (3) the lost man-days of work due to labour disputes[14]. Although it is not motivated theoretically, the number of non-agricultural wage-earners are chosed as denominator when transforming these frequencies into ratios. It could e.g. be possible to argue that the number of disputes could have been divided by the number of work-places and that the lost man-days could have been divided by the total of available man-days. Such denominators would probably produce a slightly different pattern and one must be aware of this. The primary argument for not doing this is practical and due to availability of data.

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[14] Flora et al 1987:679f

2

THE RESULTS

There is an enormous amount of possibilities when defining different possible alternatives of empirical variables, and all of these possiblities will not be studied in detail here. In this paper the procedure below is followed.

Three sectors will be defined: agriculture, industry, and service. The reason why three sectors have been chosen and not e.g. four or two is that the studied period spans over such a long period that it could be possible for three different waves to occur: hypothetically the three sectors could be associeted with the development of these waves. Yet, the number as well as the definition of the sectors must be regarded as very preliminary. The distribution of these sectors is then compared to three different ways of defining labour disputes.

The purpose is to separate the combinations that produces invalid measures from the pairs of variables that are valid, according to the definition given above. The next step is to study the different subcategories of occupational and sectorial data in order to find out whether it is possible to reaggregate the data so that the resulting patterns are more close to the specified behavior.

2.1 SWEDEN

Figure 9 shows the ratio of disputes (squares each year) per non-agricultural wage earners each year placed upon three changing proportions of sectorial aggregates. The sectorial aggregates are agriculture (squares), industry (crosses - mining, manufacturing, construction, and transport), and service (white bullets - utilities, commerce, banking, services, and public administration). The category of "unknowns" are left out since it is quite small and does not show any dramatic changes (see figure 31 in the appendix).

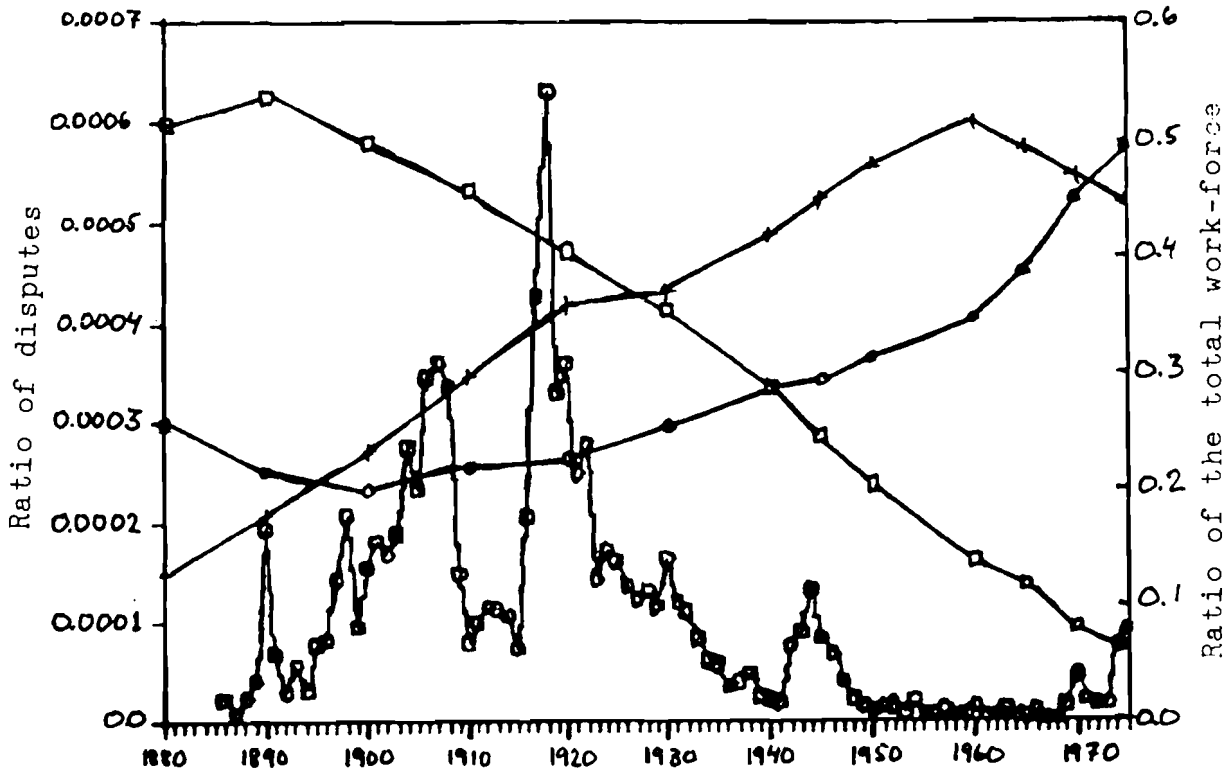

Figure 9: Labour disputes and sectors in Sweden 1880 - 1975

The pair of variables in figure 9 - the sectors and the rate of labour disputes - do not produce a pattern that def-

initely would qualify the pair as an invalid measure of structural transformation and stability.

First, there is a period of agricultural dominance. Then, during the decades around 1930, a replacement process seems to take place: industry seems to substitute agriculture as being the dominating sector. After a period where industry seems to dominate, a new replacement process seems to be initiated around 1970 when the service sector passes industry in size and becomes the largest one. This development is accompained by a shifted magnitude of labour disputes. A marked increase takes place during some decades around 1920. Then follows a period with a low dispute rate for two or three decades when industry is the dominating sector. And during the 1970s a weak tendency for labour disputes to increase can be discerned.

Of course, the increased magnitude of labour disputes do peak about 1920 - which is a little before the actual replacement - and of course is the increase during the 1970s not very marked. But at least there are clear replacement processes concerning the sectors and there are marked concentrations of labour disputes to specific time-periods (in any case in 1920).

In figure 10 labour disputes are defined as the number of persons involved in labour disputes per non-agricultural wage-earners.

It can be seen that the picture from figur 9 remains approximately the same. The magnitude of labour disputes shows a marked increase and the turning point of this erup-

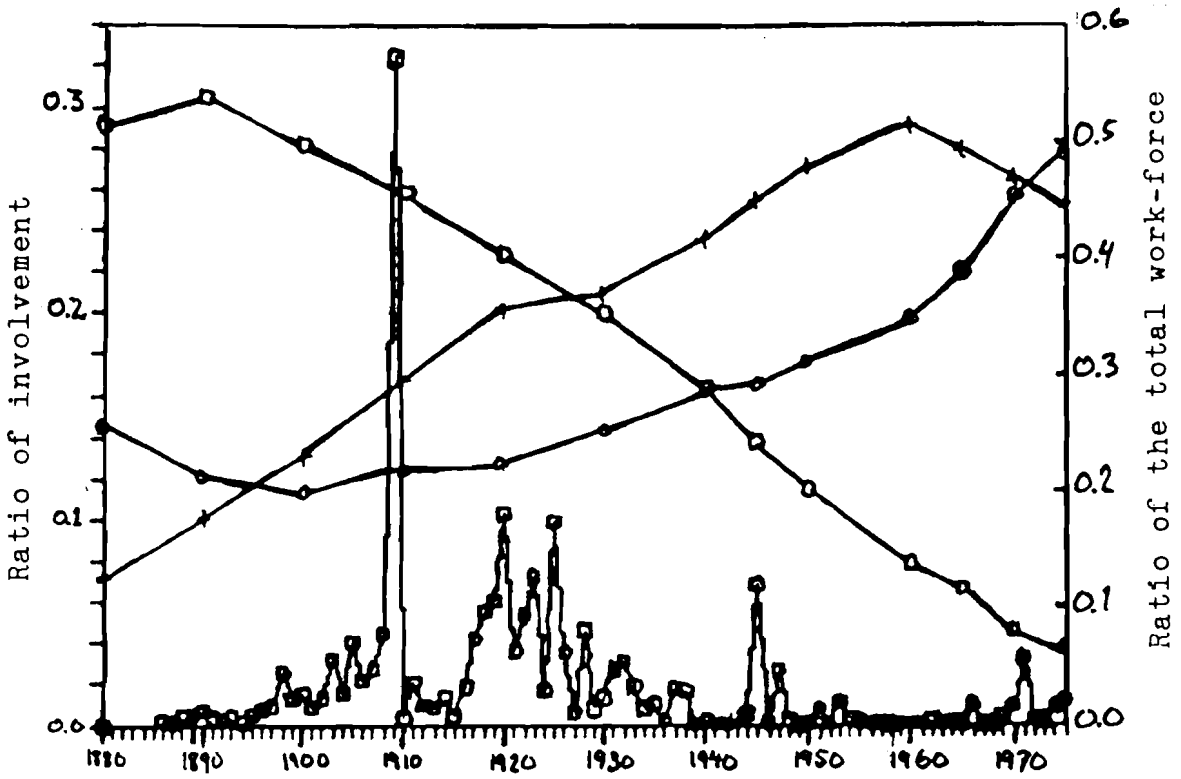

Figure 10: Dispute involvement and sectors in Sweden 1880 - 1975

tion seems to be around 1920. After this period of increased dispute a peaceful period follows. Finally, there is a possible tendency of increase during the 1970s. Compared to the development in figure 9, it can be said that the peaceful period seems to be a little longer in figure 10 and there seems also to be a peaceful period during the end of the 19th century - something that is not obvious in figure 9.

In figure 11 labour disputes are defined as the number of lost man-days of work per non-agricultural wage-earners.

Also in figure 11 does the general impression from figures 9 and 10 remain. It can be noticed that there is a

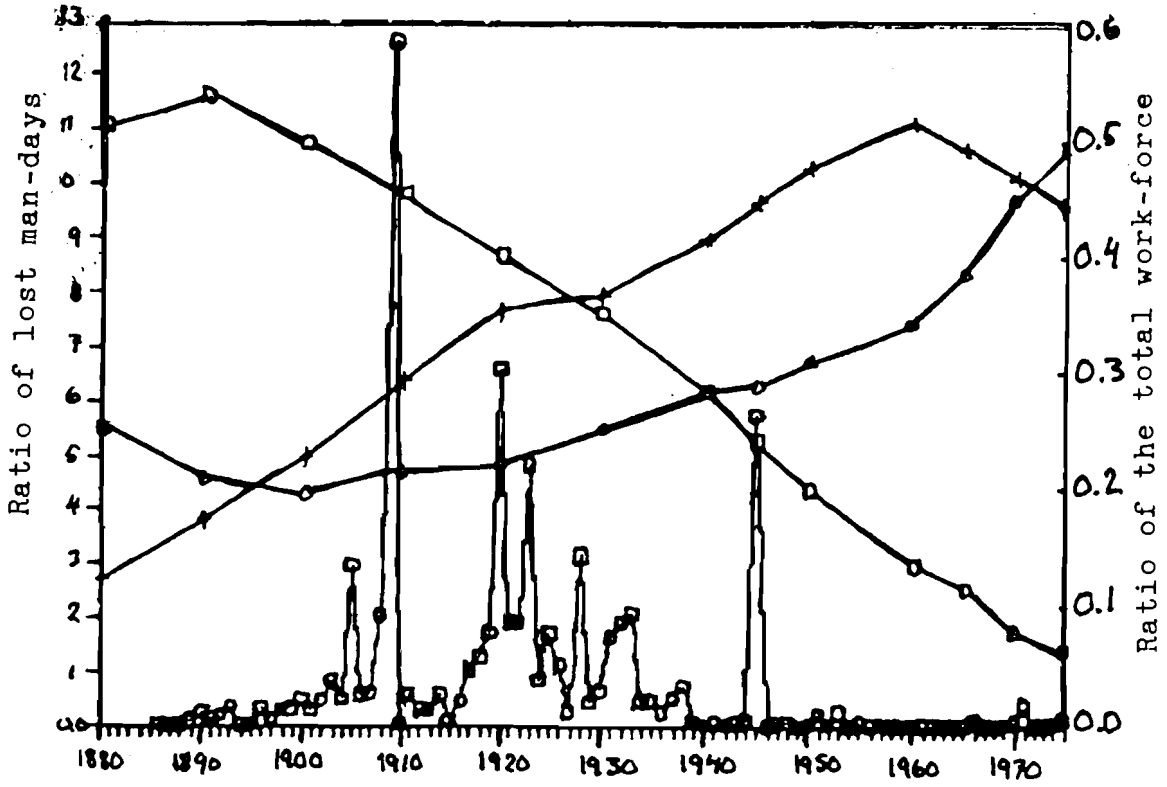

Figure 11: Man-days lost and sectors in Sweden 1880 - 1975

peaceful period during the last decades of the 19th century as in figure 10, however there is no tendency of increase during the 1970s as in both figures 9 and 10. Yet, if the total amount of available man-days of work would have been the denominator instead of the number of wage-earners, then a little increase could be expected due to longer holidays etc.

Also the occupational and sectorial data can be defined and aggregated in alternative ways. In the case of Sweden it is interesting to find out if it is possible to reaggregate the data in a way that would make the picture more adjusted to the patterns that were expected as in the case of valid measures. This means e.g. an earlier timing of the

replacement of agriculture by industry without affecting the initiated replacement of industry by service during the 1970s - the easiest way to manipulate with the data at hand.

The agricultural sector is not possible to disaggregate into any subsectors, as was indicated earlier. Therefore, all reaggregations has to be made on the basis of industry and service. Thus, if new patterns are to be produced, where a more suitable timing is present, then this has to be achieved by transfering subsectors between industry and service. Such a transferance could imply (1) subsectors that are large around 1920 and small around 1970 from service to industry, and/or (2) subsectors that are small around 1920 and large around 1970 from industry to service.

In figure 12 the industrial sector is disaggregated into as many subsectors as possible: mining (squares and the smallest one at the end of the period), manufacturing (crosses and the largest one), transport (black bullets and the next smallest one at the end of the period), and construction (white bullets and the next largest one at the end of the period).

It is obvious that manufacturing is the subcategory that displays the pattern that reminds most of the original industrial sector: first a marked increase that peaks 1960, which is then followed by a clear decrease. Manufacturing is also the clearly largest of the subsectors during the whole period. Transport and construction show slow and steady increases. Transport seems to stagnate after 1950 and construction shows a little decrease after 1970. Min-

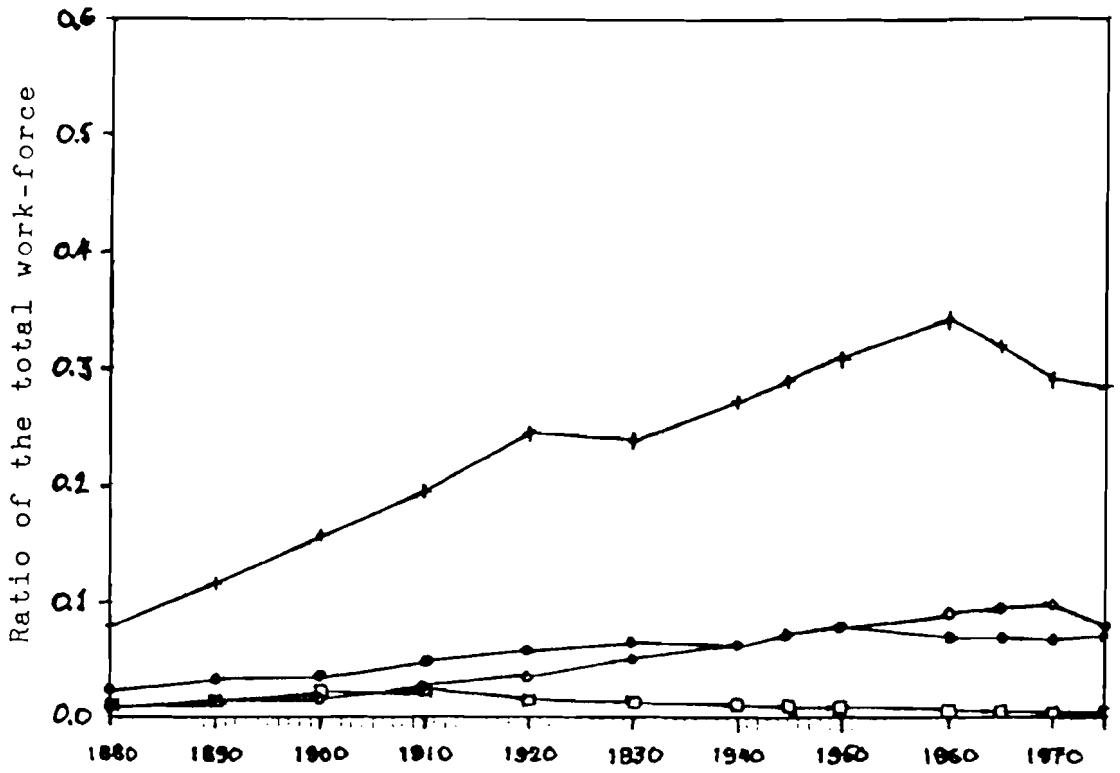

Figure 12: Industrial subsectors in Sweden 1880 - 1975

ing, finally, remains very small and relatively unchanged during the whole period.

In figure 13 the service sector - like industry in figure 12 - is disaggregated into as many subsectors as possible: utilities, commerce, banking, public administration, and service.

Utilities (squares and the smallest 1975), banking (crosses and the next smallest 1975), and public administration (white bullets and the third smallest 1975) remains quite small and relatively unchanged during the studied period. Commerce (black bullets and the next largest 1975) shows a slow and steady increase. And service (triangles and the largest), finally, decreases first, then it remains

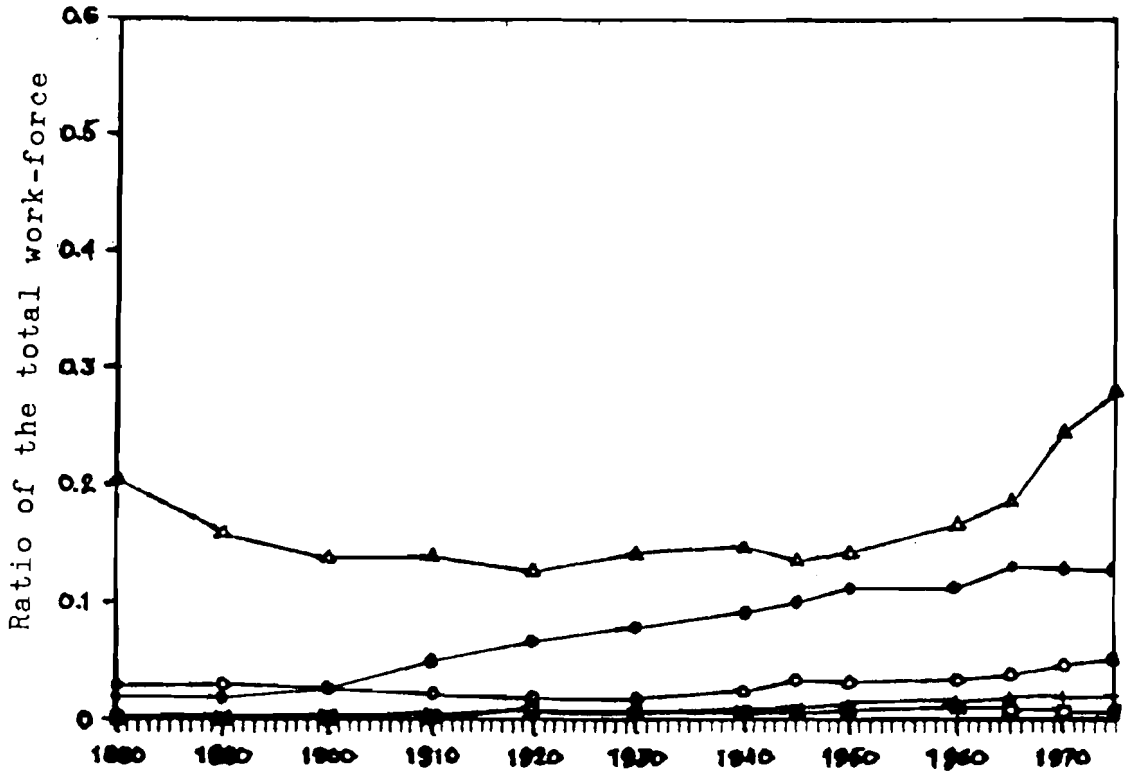

Figure 13: Subsectors of service in Sweden 1880 - 1975

unchanged for 6 or 7 decades, and ends the period by increasing rapidly.

Studying figures 12 and 13, it is obvious that the only way to make the replacement of agriculture by industry to occur at an earlier point of time is to transfer one or more subcategories from the service sector to industry - this could mean a complete amalgamation of service and industry. Such an operation, however, would lead to that no replacement is indicated during the 1970s.

The occupational and sectorial data can also be reaggregated with respect to positions, i.e. dependent or independent positions. Figure 14 shows the development of dependents and independents as proportions of the total work-force in Sweden 1880-1975.

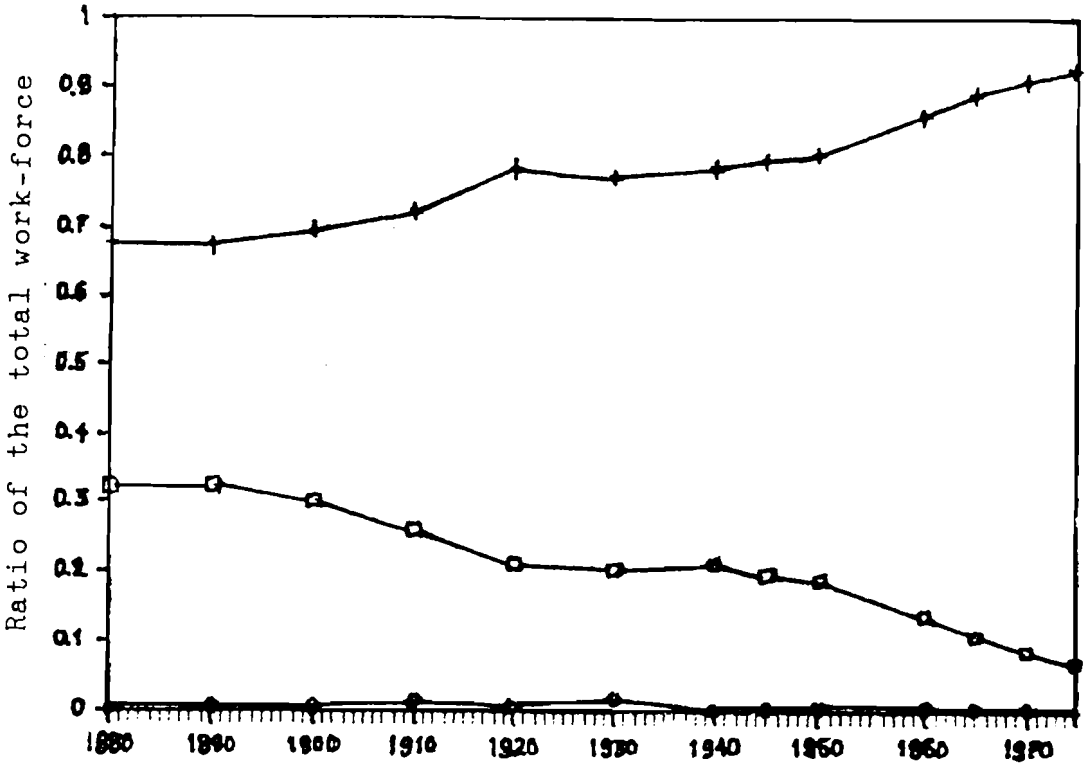

Figure 14: Dependents, independents and unknowns in Sweden 1880 - 1975

The development is changing but in a slow and stable way for both dependents and independents. The dependents increases during the whole period and the only deviation from the stable trend is a little peak or a threshold 1920. Independents displays a decreasing development that is approximately an opposite reflexion of the increase of dependents. (The third aggregate in this figure is "unknowns" according to the dependence dimension and the size is very small and stable.) If the pattern in figure 14 is related to labour disputes and compared to the idealized patterns in the introduction, then it is obvoius that the result would be an invalid measure of structural transformation and stability.

It is also possible to reaggregate the occupational and sectorial data considering both sectors and positions. It could be argued that fights for interests and for institutional recognition etc are carried out primarily within each sector between dependents and independents, and that it is primarily the dependents that are forced to fight. In addition, the relationship between relative size and relative strength is more easy to understand in the case of dependents than for independents. Therefore it might be relevant to compare the relative size of the dependents within sectors, when trying to estimate the timing of structural transformation.

If the three original sectors in this paper are disaggregated into dependent and independents and if these 6 subcategories are related to involvement in labour disputes, then the following pattern is produced (figure 15):

Both independents within industry and service have a rather small share that do not change much when the whole period is studied (the two smallest categories). Independents in agriculture are approximately equal in size in comparison to dependents (and a little larger than dependents within service) in the beginning of the period. The independents decrease a little faster, but at the end of the period they end up quite the same in size. It can also be noticed that revolving shifts seem to take place during the period around 1910 and 1920 - slightly before the indicated turning point of the involvement in labour disputes. A possible shift that might be related to a comming peak of dispute magnitudes can also be discerned during the 1970s.

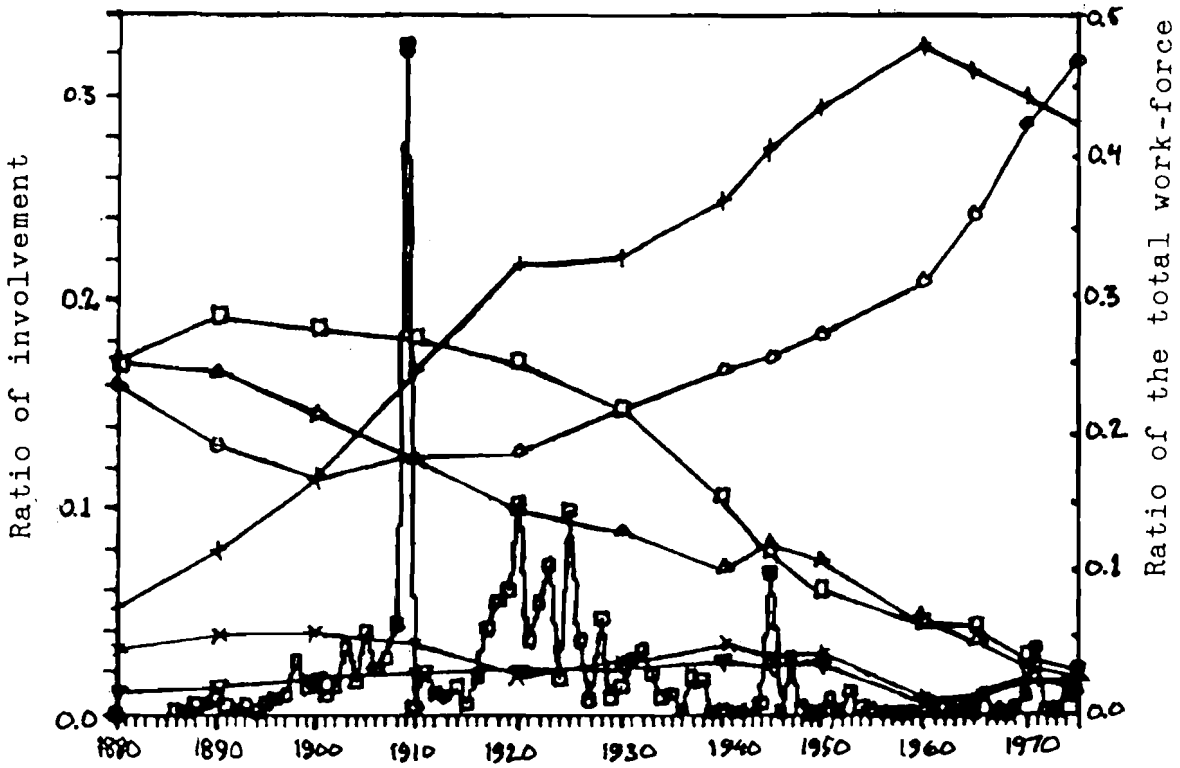

Figure 15: Disputes and positions within sectors in Sweden 1880 - 1975

2.2 GERMANY

Figure 16 shows the same graphs for Germany as in the case of Sweden in figure 9: the ratio of labour disputes (squares each year) per non-agricultural wage-earners placed upon the changing proportions of agriculture (squares), industry (crosses) and service sector (white bullets).

The pattern that is displayed in figure 16 do not definitely imply that the combinations are invalid measures of structural developments. There is a process of replacement where industry substitutes agriculture as being the dominating sector and there is also a period of marked concentration of disputes. However, the timing of the replacement

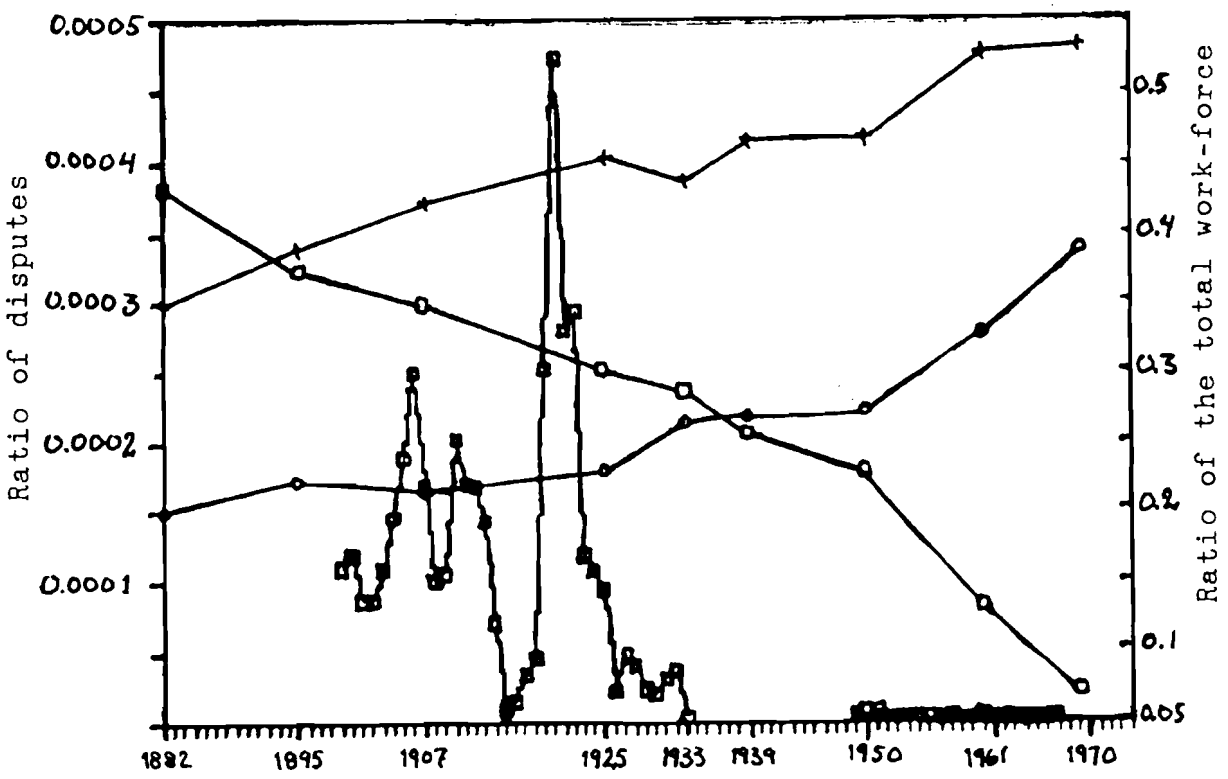

Figure 16: Labour disputes and sectors in Germany 1882 - 1975

and the peaking of dispute magnitudes is worse than in the case of Sweden: industry becomes the largest sector during the 1890s and the peak occurs around 1920. There is also a long period of industrial dominance after the replacement and furthermore a peaceful period concerning labour relations. Yet, there is as well a similar time-lag here[15].

[15] It can be mentioned here that during the periods when there is no data on disputes - 1882-1898 and 1934-1948 - this kind of lack is often due to the fact that strikes were not allowed. When this is the case, it can be interpreted as peaceful periods from a point of view of societies and social structures. It is not interesting here whether the peacefulness is caused by harmonious agreements or by dictatorial suppression. What is interesting is that diputes do not occur because of various structures in the society. Also a simple lack of data due to administrative procedures could be viewed as a system behavior, but not within the perspective in this

Labour disputes are defined as the number of persons involved in labour disputes per non-agricultural wage-earners in figure 17.

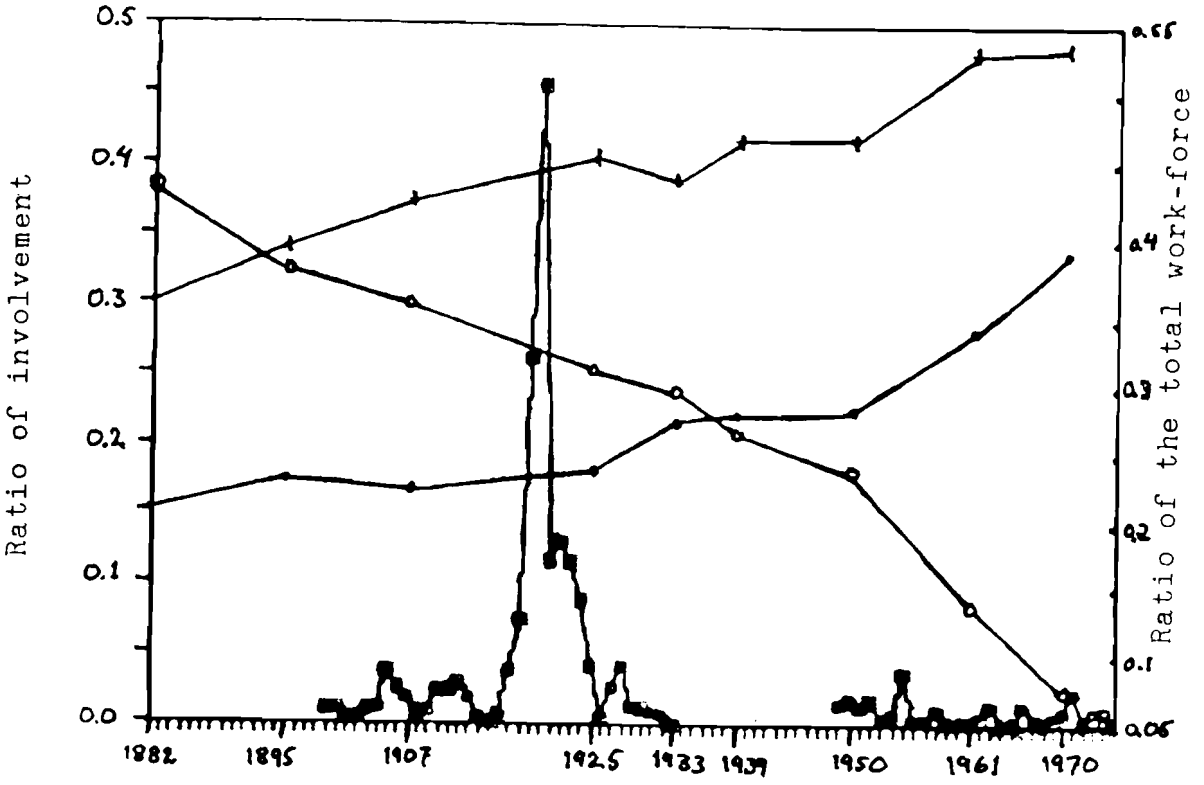

Figure 17: Dispute involvement and sectors in Germany 1882 - 1975

This changed definition of labour disputes does not change the general picture very much, as can be seen. The difference compared to figure 16 is that the increase in dispute seems to be a little more concentrated around 1920 in figure 16. This means that a peaceful period during the beginning of the 20th century might be perceived.

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paper. Therefore missing data - especially during the beginning of the studied period - causes a lot of problems.

The definition of labour disputes in figure 18 - lost man-days of work due to labour disputes per non-agricultural wage-earners - does not change the general picture much either. The pattern in this figure reminds a little more of the pattern in figure 16 than in figure 17.

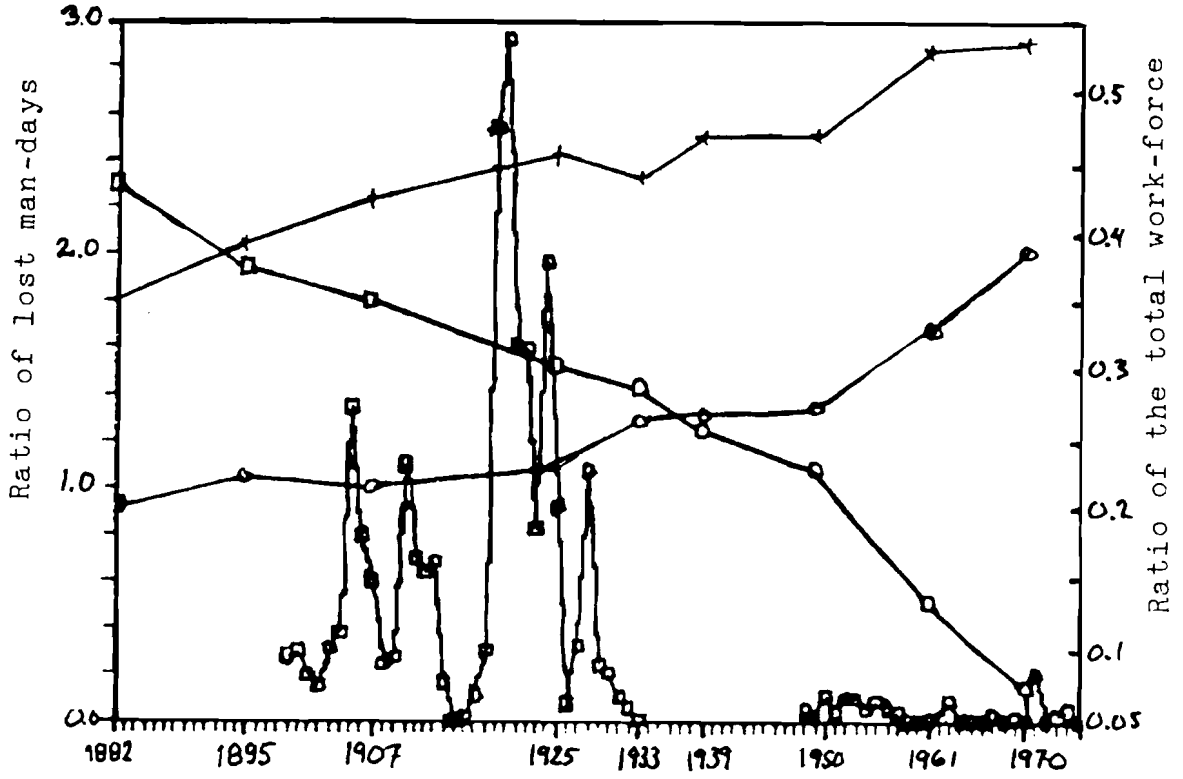

Figure 18: Man-days lost and sectors in Germany 1882 - 1975

Also in the case of Germany, it is interesting to find out if it is possible to reaggregate the occupational and sectorial data in order to produce a pattern with a better timing concerning the peak in labour dispute magnitude and the replacement of agriculture by industry. As in the Swedish case, agriculture is not possible to disaggregate into any subsectors. This means that the possible operations are

limited to transferance of subsectors between industry and service. To make the replacement to occur a little closer in time to the dispute peak, the only possibility is that subsectors has to be transfered from industry to service; this is due to the long time distance between the peak of disputes and the replacement that is adjusted. Therefore, the subcategories in the service sector is not studied here as in the case of Sweden (these subcategories are displayed in the appendix, figure 29).

Figure 19 displays all possible subcategories within the original industrial sector in this paper.

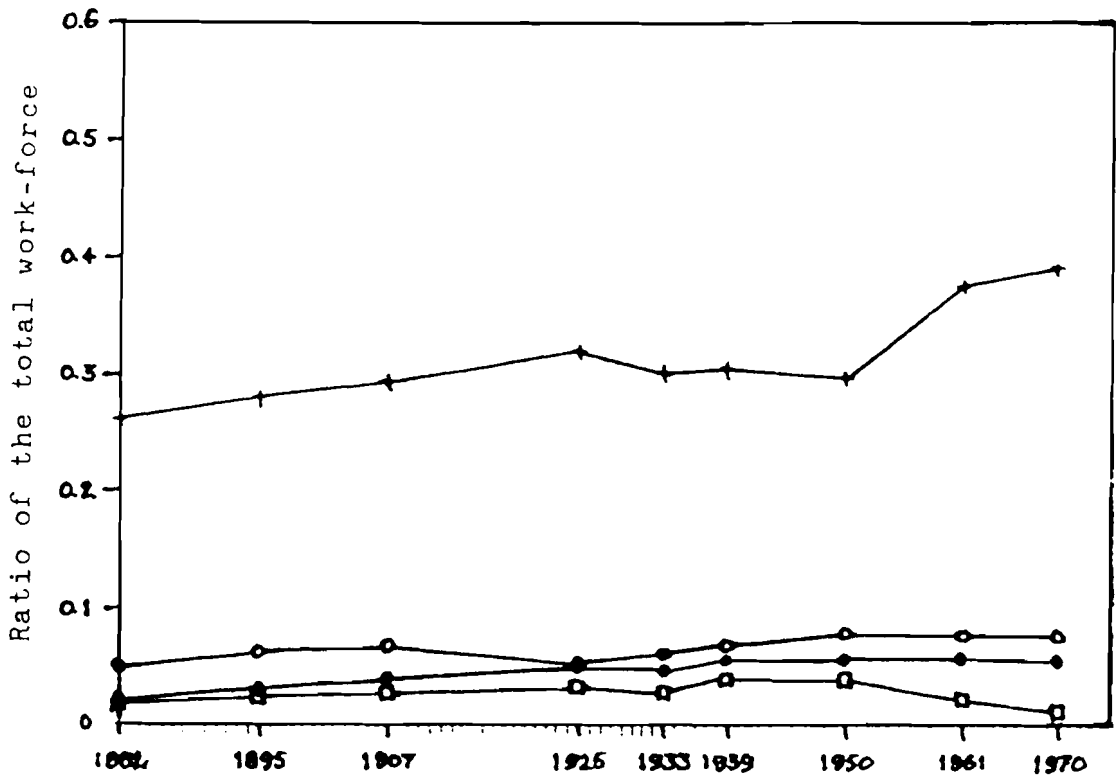

Figure 19: Industrial subsectors in Germany 1882 - 1975

Manufacturing (crosses) is the clearly dominating subsector and it reminds much of the original industrial sector. There is a shallow trough between 1925 and 1950, but if the whole period is focused, then there is a steady but not very fast increase. The other sectors remain fairly small and relatively unchanged during the whole period In 1970 construction (white bullets) is the next largest, transport (black bullets) is the next smallest, and mining (sqaures) is the smallest. Maybe a very slow increase can be discerned in the case of transport.

In figure 20, transport and construction has been transfered from industry to service. This means that industry only consists of manufacturing and mining. Related to the rate of involvement in labour disputes, the following picture is produced: (1) first there is a period of agricultural dominance with few or no labour disputes, (2) then slightly before 1920 a replacement process seems to coincide with a peak of dispute magnitudes, and (3) after this replacement there is a very low level of involvement in labour disputes and industry is the largest sector - yet industry is not clearly dominating and this might imply some problems concerning interpretation.

It is also possible to study the occupational and sectorial data from the point of view of positions. In figure 21, dependents (squares) and independents (crosses). It can be seen that independents displays a steady and stable decrease, dependents goes through an opposite and corresponding increase, and unknowns (the smallest category) remains very small and unchanged during the whole period.

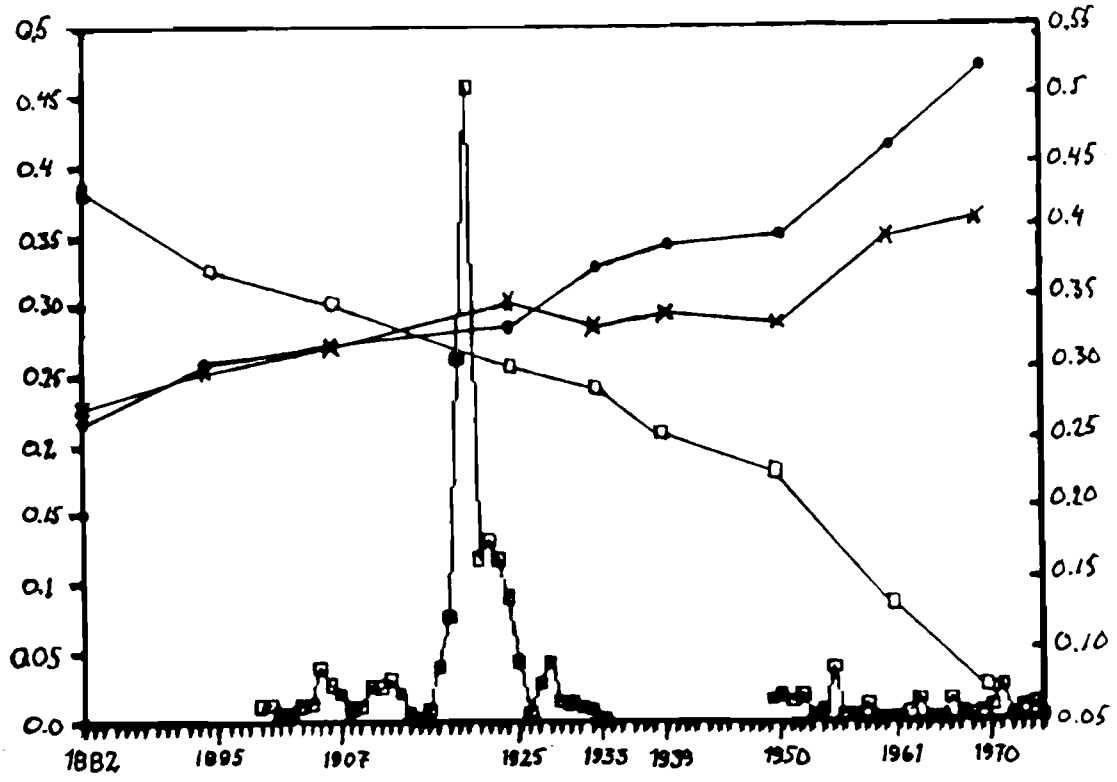

Figure 20: Dispute involvement and revised sectors in Germany 1882 - 1975

It is obvious that these categories jointly with any of the definitions of labour disputes lead to a combination of definitions that would produce invalid measures of structural developments. The stable developments cannot be combined with a marked concentration of disputes to specific time-periods, according to our concept of social structure.

Finally, if the three initial sectors are divided into dependents and independents (figure 22) - as in figure 21 for Sweden - it can be seen that the resulting subcategories might be reaggregated into a pattern that is approximately similar to the pattern in figure 20. This can be done by leaving agriculture and service undivided along the depen-

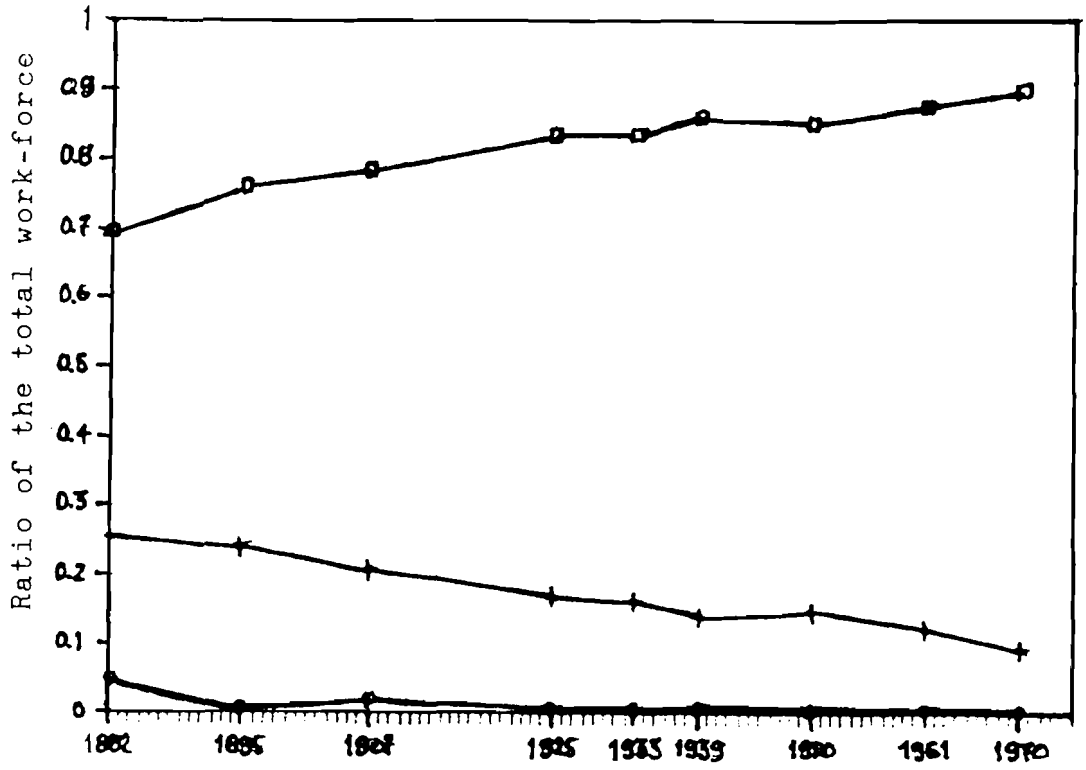

Figure 21: Dependents, independents and unknowns in Germany 1882 - 1975

dence dimension and by moving independents from industry to service. However, agriculture would be replaced as being the largest sector a little earlier than in figure 20.

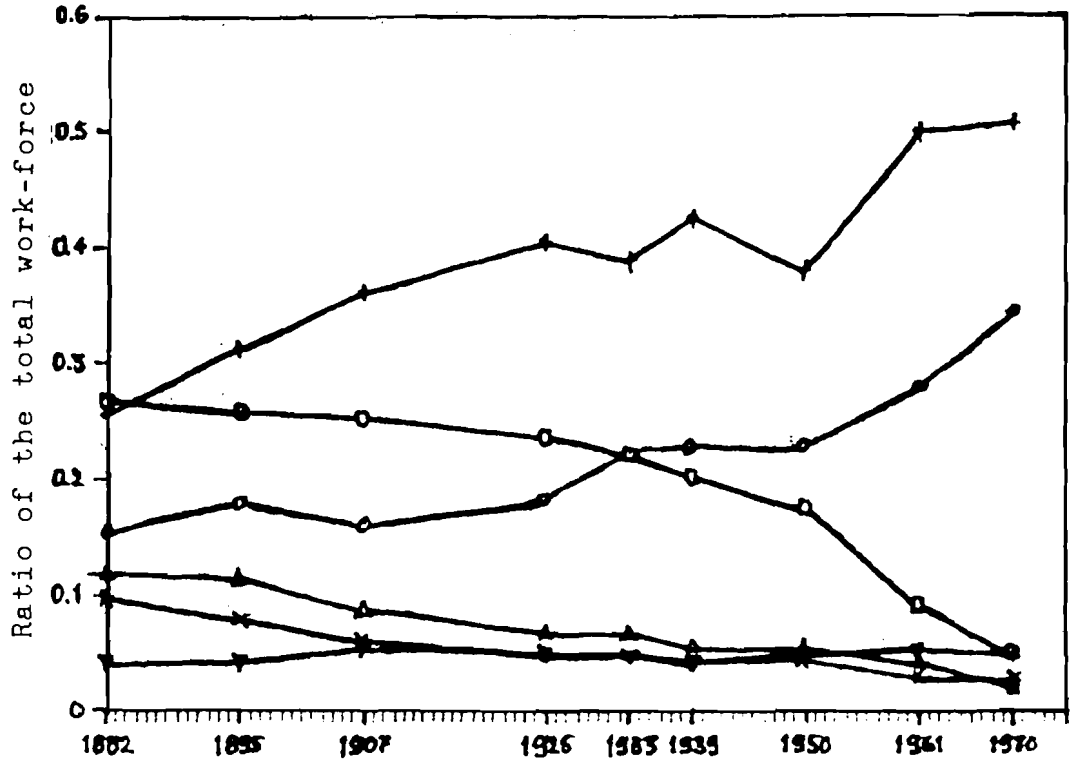

Figure 22: Positions within sectors in Germany 1882 - 1975

2.3 GREAT BRITAIN

Figure 23 shows the graphs for Great Britain that corresponds to figures 9 and 16 in the case of Sweden and Germany: the number of labour disputes (squares each year) per non-agricultural wage-earners placed upon the sectors of agriculture (squares), industry (crosses) and service (white bullets.

The pattern in this figure do not definitely imply an invalid measure. The sectors display a very stable pattern without any replacements. Agriculture is the smallest sector for the whole period and shows a slow and steady decrease. Industry is the largest sector during the whole period and shows a slow and steady increase except for a dip

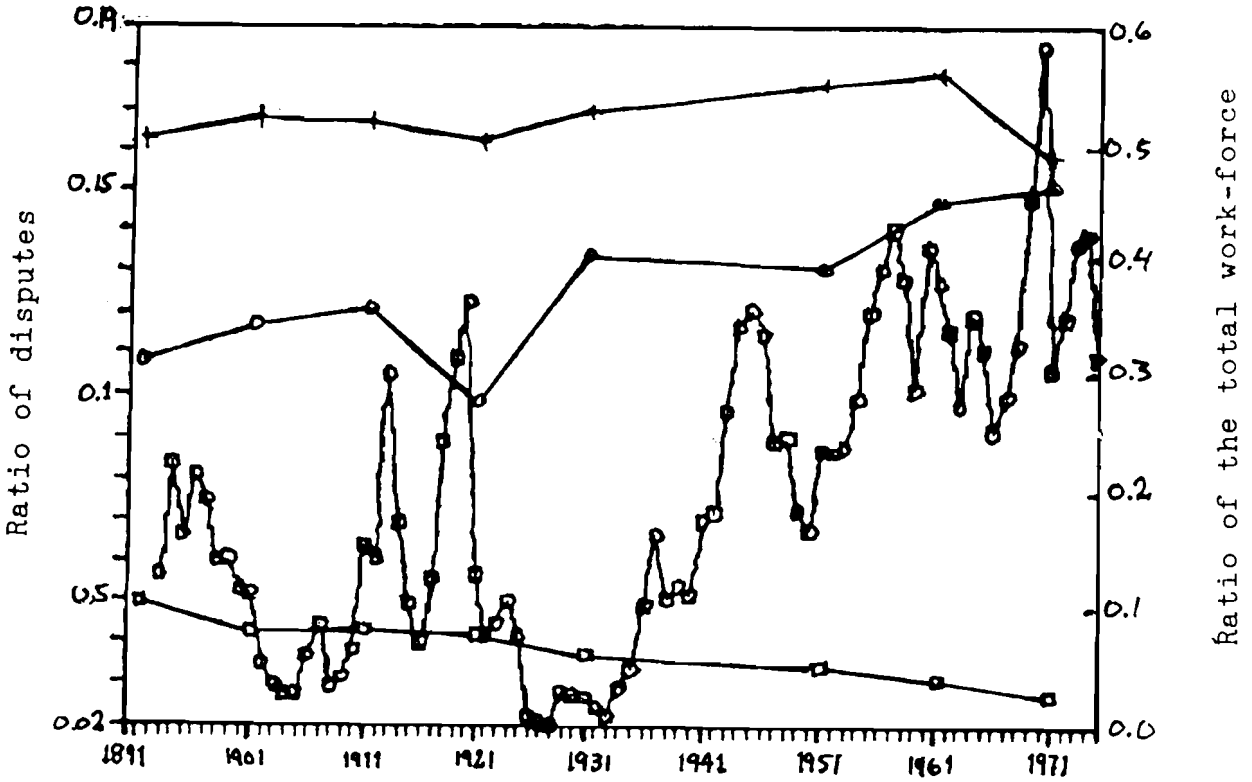

Figure 23: Labour disputes and sectors in Great Britain 1890 - 1975

1971. The service sector is the second sector in size. Also service shows a slow increase when the whole period is focused. This increase is maybe a little faster than in the case of industry. One deviation from the stable trend is a dip 1921. If the number of labour disputes per non-agricultural wage-earners is taken into consideration, it can be seen that the pattern is not characterized by a very strong concentration of disputes to some specific years, compared to the corresponding figures for Sweden and Germany.

It might be said that the second half of the studied period is little less peaceful than the first half. Maybe one could also speak about two more peaceful periods around

the turn of the century and around 1930. If this is a correct description of the dispute pattern, then the variables used jointly in figure 23 produces an invalid measure. Yet, these tendencies do not seem to be very obvious.

If the other two definitions of labour disputes are related to the three sectors, then a quite opposite patterns will result (see figures 24 and 25).

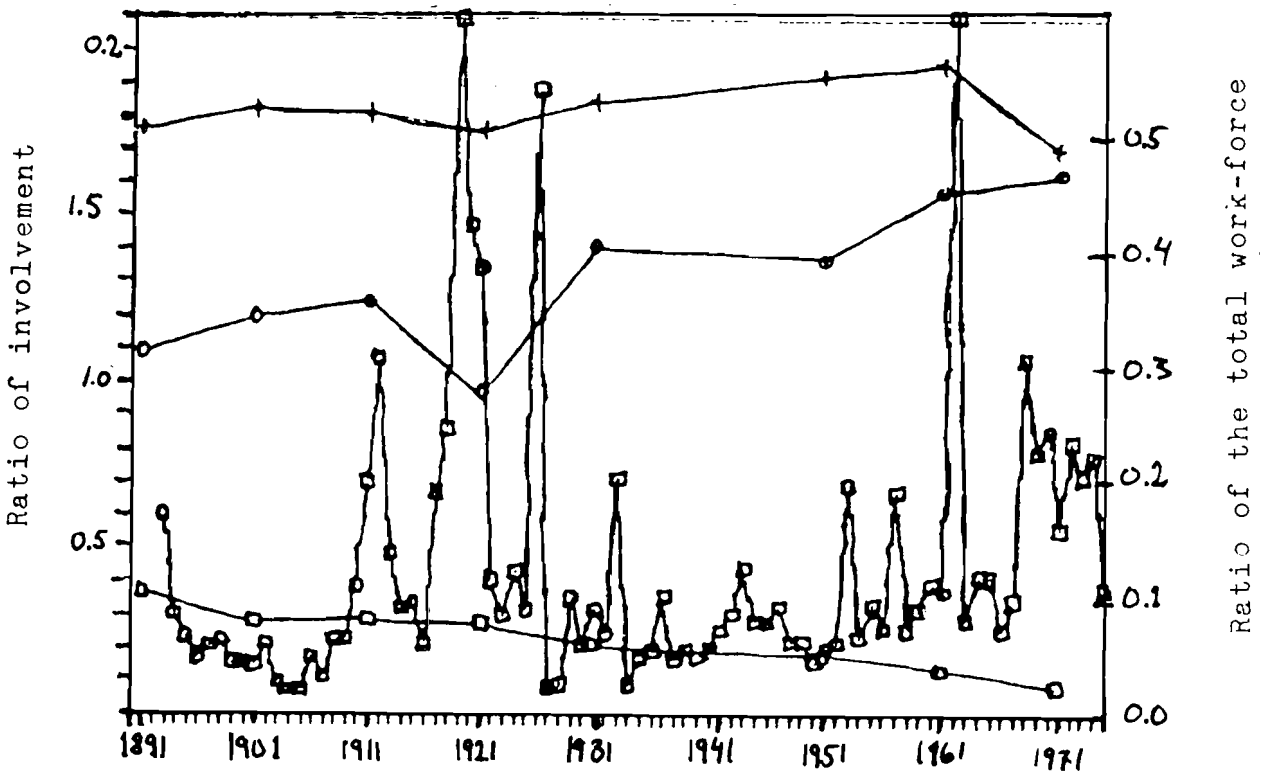

Figure 24: Dispute involvement and sectors in Great Britain 1890 - 1975

Both these definitions of labour disputes lead to a more concentrated conflict pattern than in figure 23. Marked eruptions of labour disputes seems to occure around 1920 and around 1970 in both cases. Relatively peaceful periods seem

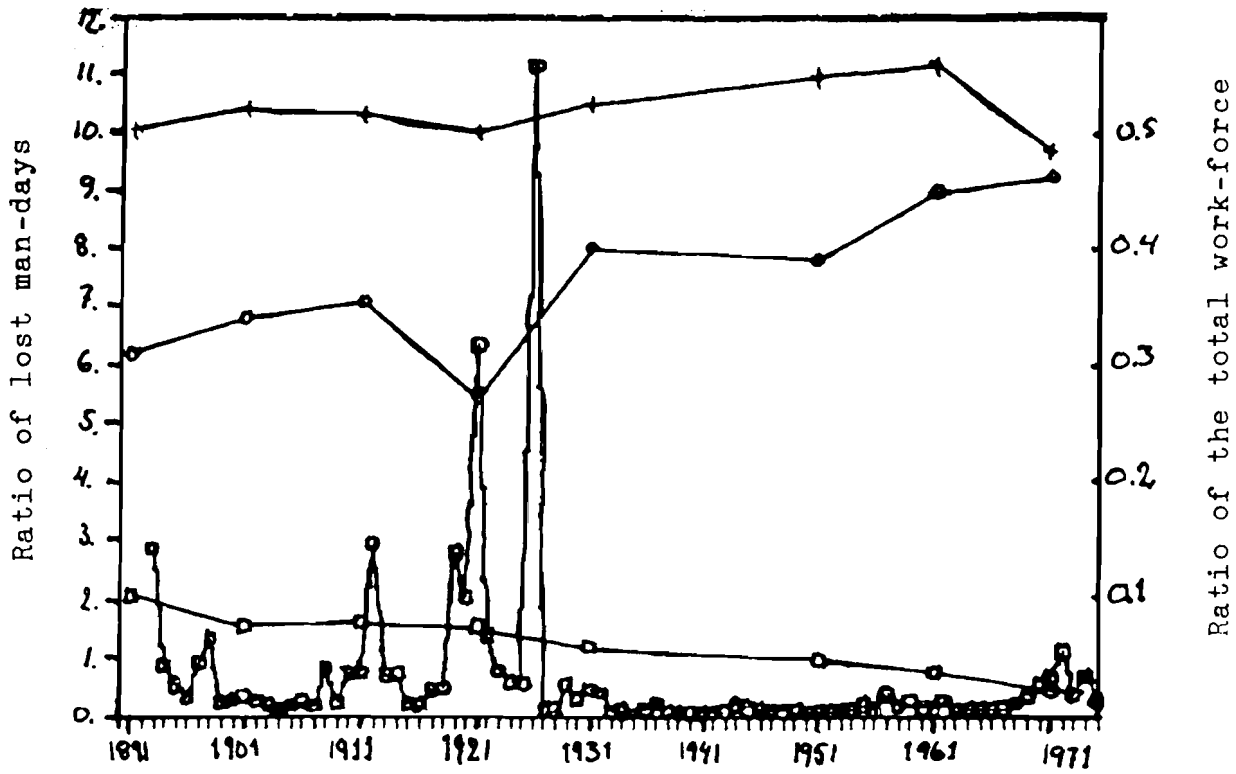

Figure 25: Man-days lost and sectors in Great Britain 1890 - 1975

to be present during the turn of the century and during three decades after 1930. When these two definitions of labour disputes are related to the development of the three sectors, it can be concluded that the pairs of variables produce invalid measures of structural developments.

To be able to reaggregate the occupational and sectorial data in order to make them more suitable to the pattern of labour disputes in figures 24 and 25, the following developments among the subcategories must be found: the stable development of each sector is due to increases of some subcategories and a neutralizing decrease of other subcategories. If this holds true, it is possible to join together subcate-

gories that increases during the same periods and to join other subcategories that decreases during the same periods. This would in the end produce a much more unstable pattern where there would be periods of replacements that could coincide with the eruptions of labour disputes.

Figure 25 shows all the subsectors of industry and figure 26 shows all subsectors of the initial service sector. As can be seen the subsectors do not show a pattern that would make such reaggregations possible.

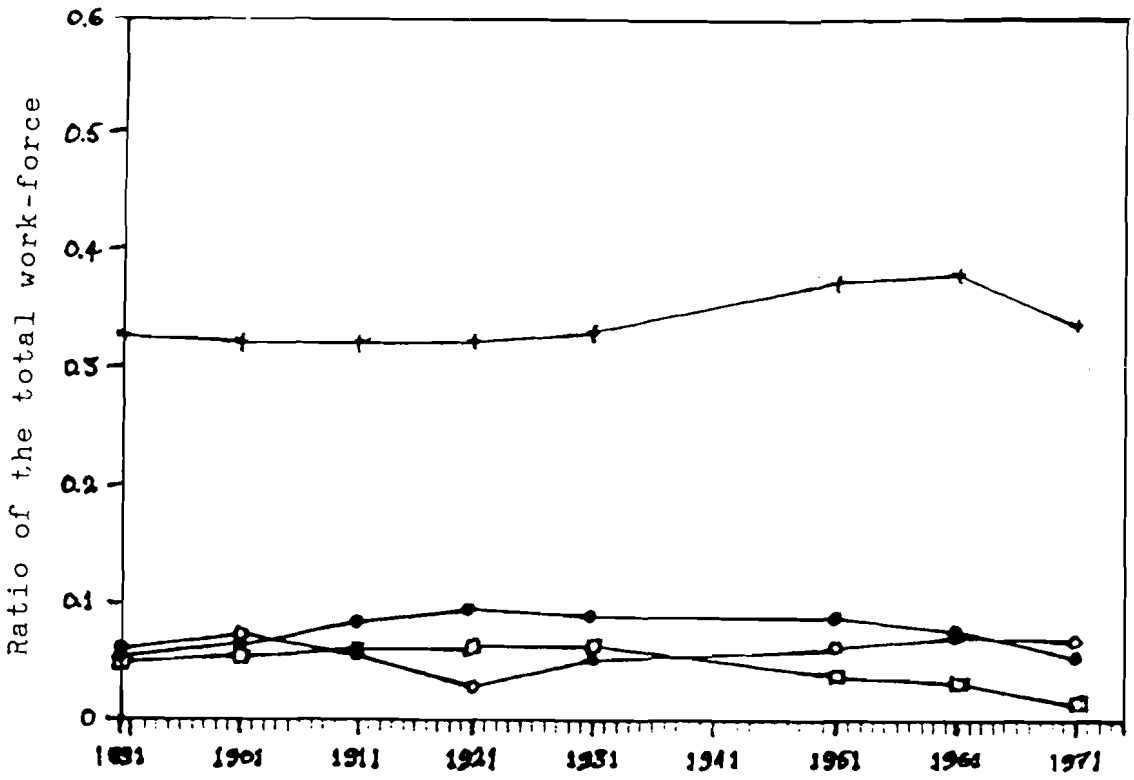

Figure 26: Industrial subsectors in Great Britain 1890-1975

Among the subsectors of industry, manufacturing (crosses) is the clearly largest category. Construction (white bullets) is the next largest sector at the beginning and at the

end of the studied period. Mining (squares) is the smallest subsector except for the period of 1911 - 1931, and transport (black bullets) is the next largest subsector from 1911 to 1961. Manufacturing is swaying a little during the end of the period and construction sways a little around 1920, but mining is very stable.

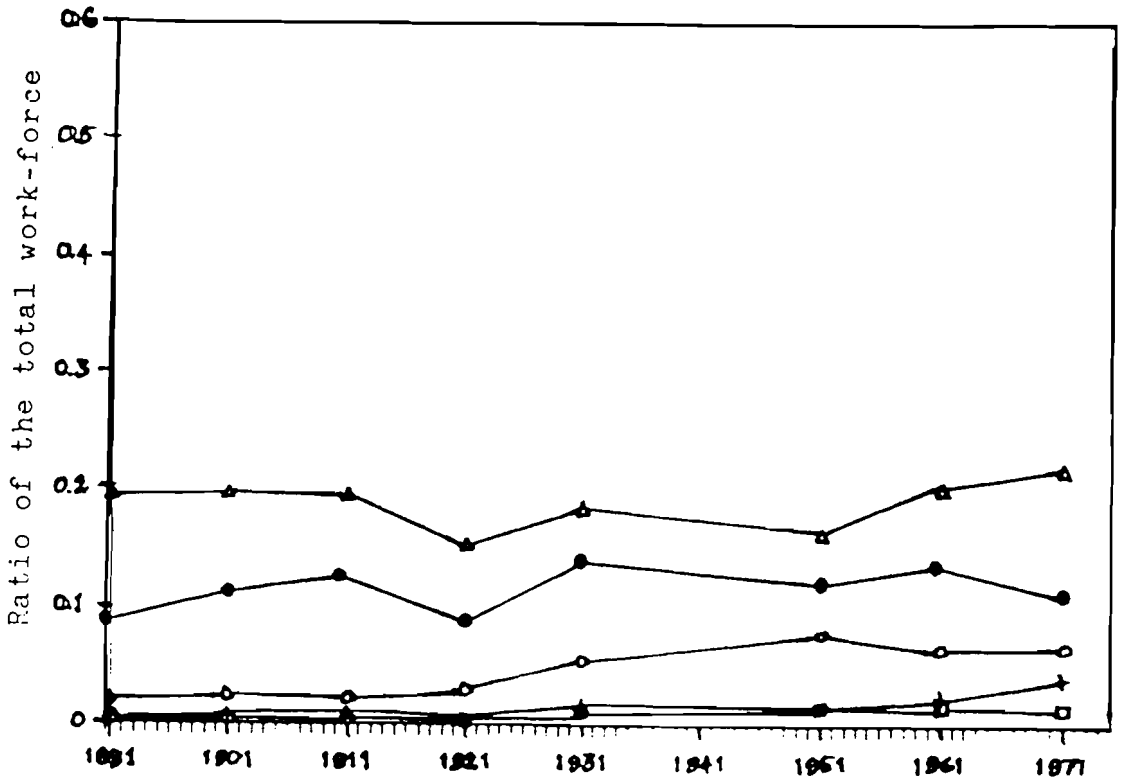

Figure 27: Subsectors of service in Great Britain 1890-1975

Of the subsectors that the initial service sector consists of, service - separated from all other subsectors - is the largest one during the whole period. It remains on approximately the same level during the studied period. Also utilities (Squares and the smallest), banking (crosses and the next smallest at the end of the period), public adminis-

tration (white bullets and the third smallest), and commerce (black bullets and the next largest subsector) display fairly stable developments, but all these subsectors increase somewhat though is is not very obvoius in some cases.

If the data are aggregated along the dependence dimension a similarly stable pattern is produced (figure 28). The pattern that is produced in this figure joined with the dispute variables in figures 24 and 25 does not produce any different results compared to these figures: it is possible to state that any possible combination would produce an invalid measure of structural transformation and stablity.

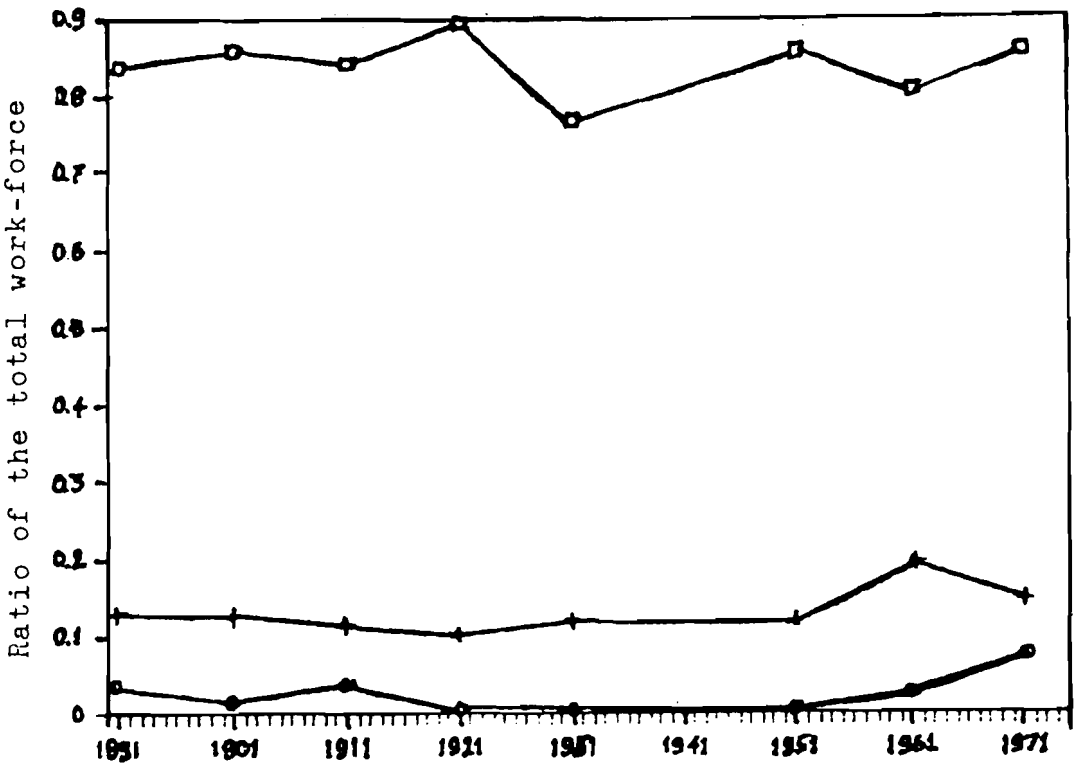

Figure 28: Dependents, independents, unknowns in Great Britain 1890-1975

The dependents shows an unstable pattern - especially around 1920 and 1930. Though, it is the largest category the whole period and does not change much in the long run. As can be seen, the instablility of the dependents is reflected in the development of unknowns (white bullets). This instablility is probably due to the proportion of unemployed and how they are categorized. The share of indepedents remains the same for almost the whole period, except for a little bump at the end of the period.

If the initial three sectors in figure 23 - 25 are divided into dependents and independents the picture is not changed very much. As can be seen in figure 29, all categories remain approximately the same in relative size when the whole period is studied In 1971 dependents within industry (crosses) is the largest, dependents within service (white bullets) is the next largest, independents within service (triangles) is the third largest, independents within industry (X-crosses) is the third smallest, and dependents and independents in agriculture (squares and delta-triangles) have approximately the same size and are the smallest categories.

There are, however, some instablilities that can be mentioned. Dependents within industry shows a dip around 1930 and a small peak around 1950. Dependents within service shows a small dip around 1920. The independents within service and industry increases a little and independents wihtin agriculture are decreasing in about the same degree. If the whole period is focused, however, the development concerning

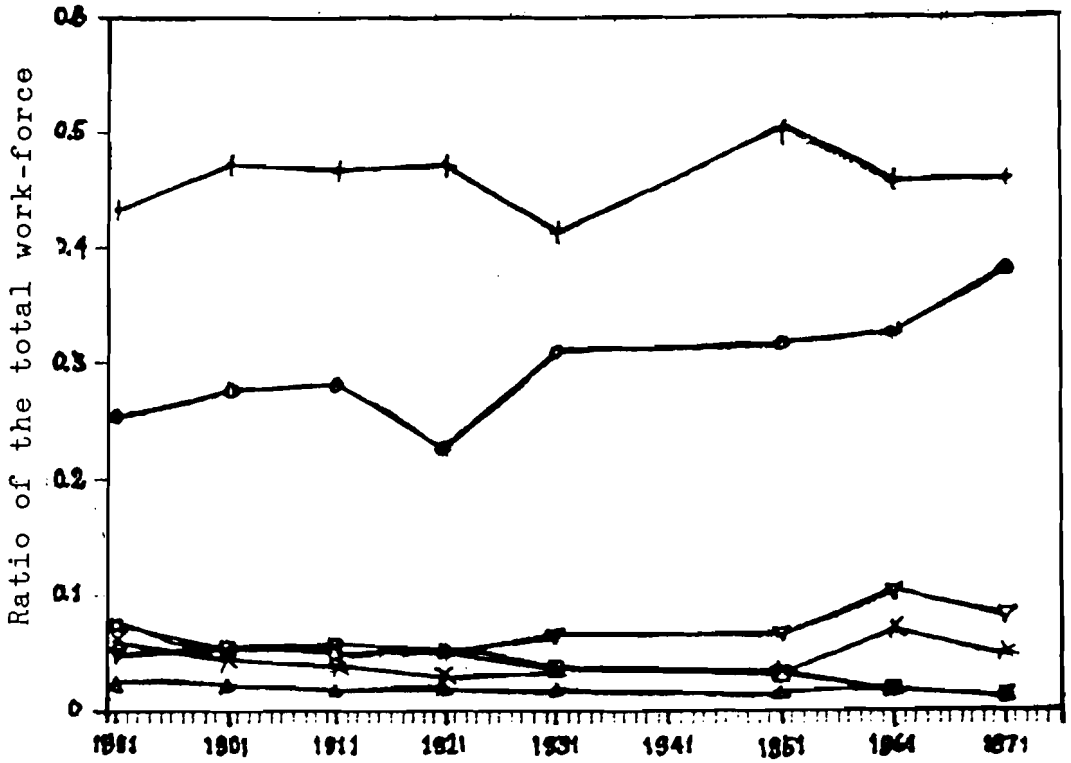

Figure 29: Positions within sectors in Great Britain 1890-1975

independents within the three sectors is stable and unchanging.

Because of the unchanging and fairly stable pattern that characterize all of the studied categories concerning Great Britain, it is not possible to reaggregate the data in such a way that would lead to a picture where revolving changes occur during the time of peaks in labour disputes around 1920 and 1970. Of course it would be possible to move construction from industry to the service sector and thereby producing an indication of a replacement of industry by service that is initiated slightly before 1971, but then there would be no replacement around 1920 - the most turbulent period.

3

CONCLUDING REMARKS

3.1 A SUMMARY OF THE RESULTS

The results of the study can be summarized in the following way. For two countries - Sweden and Germany - it is possible to redefine and reaggregate the data in order to adjust them to the requirements of the outlined concepts of social structure, with reference to transformation and stability. This can be done by reaggregating the occupational and sectorial data. For these countries, the data on labour disputes display approximately the same pattern no matter how this variable was defined quantitatively.

In the case of Great Britain, an adjustment of data might be achieved by selecting one of the quantitative definitions of labour disputes: number of disputes per non-agricultural wage-earners. Yet, it has to be remembered that the dispute pattern in this case do definitely not display a clear homogenous pattern (nor a pattern where disputes clearly seem to cluster to specific time-periods). The subcategories of occupations and sectors show such stability that it is not possible to change the general picture concerning the occurance of shifts and replacement processes on a national level.

When using the concept of social structure outlined in the introduction, the following relation to the phases of

long-waves on an international level seem to exist or at least not contradicted.

In the case of Sweden, a period of structural change seems to occur during some decades around 1920. Now, the long waves are supposed to be an international phenomena. If the long waves has approximately the same timing in the western world, then we may relate this time point to the figures and tables in the begining of this paper (figures 1 and 2) and the different estimations of the timing of the waves (table 1). It can be seen that there is a peak in price index both in the UK and in the US around 1920. Also a wave-crest[16] in terms of production do occur around 1920 according to almost all the scholars. The estimations that deviate most from 1920 are 1929 (in two cases) and 1913 (in two cases). It might also be that a new period of structural transformation is initiated during the 1970s in Sweden. If this is a reasonable perception, it can be noticed that also around this time point, there are accelerating price increases in both the UK and the US - although there is no peak in 1970. Among the scholars who have studied the development in terms of production after the 1930s, two estimate a wave-crest to take place 1973 and 1974 respectively. One, of the other two scholars, estimates the wave-crest to occur 1951 and the other estimates an occurance 1967. It might also be possible to see a relationship with the clustering of innovations in figure 3. The peak during the late 19th century might be perceived as a driving that initiated

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[16] Upper Kondratieff cycle is another frequently used term.

the growth period that ended after 1930 and the peak around 1930 might be perceived as a driving force behind the growth period after the second world war.

A consultation[17] of new data sources on Sweden from 1975 to 1985 indicates that the new replacement process that seemed to be initiated about 1960 becomes more marked: agriculture becomes even smaller than before and decreases to 5% in 1980 and to 4% in 1985, industry decreases to 40% in 1980 and to 37% in 1985, and service increases to 55% in 1980 and to 58% in 1985. Also the tendency for a rised level of labour disputes becomes more marked during the period 1975 to 1985, at least if the number of persons involved per total workforce is considered: the highest level of involvement occured 1980 when about 20% of the labour force were involved - the largest share since 1909 - and the mean level is a little less than 0.3 percent which can be compared with the peak 1971 which involved slightly more than 0.3 percent.

Also in Germany, a period of structural change is indicated around 1920. And as in the case of Sweden, this can be related to the timing of the wave-crest that is shown in figures 1 and 2 and table 1. But in the case of Germany, there is no indication of any structural transformation at any other time point.

If we decide to view the dispute pattern in figure 23 as homogenously distributed through time - this is easy to question - it is possible to select a valid pair of variables. This implies that there is no indication of struc-

[17] Statistisk Årsbok, Sveriges Officiella Statistik, 1989:178,193, tab. 186,201, and 1984:193, tab. 201.

tural disruption during the studied period in the case of Great Britain. It means that there are no indicated relationships between the transformations of social structures and long waves in the economy. But, as was stated earlier the pair of variables in the case of Great Britain do not seem to be very valid.

Yet, if Great Britain is a typical case and Sweden is an exception, then the result concerning Great Britain can indicate that the concept of social structure, with reference to transformation and stability, does not capture basic features of social history. This begs for a re-appraisal and a review of different arguments in the theoretical discussion related to the concept[18].

3.2 FURTHER RESEARCH

The results in this working report is definitely not to be regarded as final or complete. The study implied the following: (1) a rough concept of social structure was outlined, (2) two types of data that were redefined in different ways, and (3) different patterns, that were produced by various pairs of variables, were compared to the ideal patterns that were required according to the concept.

All these aspects are related to different problems. Something that begs for more extensive and thorough studies. These problems are not going to be discussed in detail here however. Instead some suggestions of how to go further will be outlined.

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[18] cf. the critical remarks in Tilly 1984.

First, it is necessary to develop the rough concept of social structure and anchor it a little more in the results of theoretical discussions and from empirical research concerning social stability and change. Maybe this can be achieved by relating the theories of long waves to the studies of nation-building[19], modernization[20], and social movements, conflicts and cooperation[21]

Second, there are vague classifications of the various patterns as being concentrated to specific time-periods, as being homogenously distributed, as being characterized by revolving replacements or by unchanging stability etc. These classifications could be turned into a more formalized language by using statistics and mathematics.

Third, it would be very useful to study other possibilities of dissaggregation and reaggregation if this is possible when using other data sources. Especially a dissagregation of labour disputes according to sectors and occupations would be very interesting. Also a disaggregation of agriculture into other subsectors seems to be urgent. One type of dissaggregation that could be studied more is the dependent - independent dimension in each of the industrial and service subcategories.

Fourth, it would also be interesting to extend the time scope both concerning the time before 1880 and after 1975, and to include more countries.

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[19] Rokkan 1975

[20] Eisenstadt 1966, 1978

[21] Oberschall 1973, Moore 1978, Tilly 1984, Shorter and Tilly 1974, Axelrod 1984 etc.

Fifth, more examples of measures concerning conflicts and social categories and collectives are of interest - a more extented scope in terms of time and space requires this because of the specific ways these types of variables are expressed in different contexts: maybe there were no significant labour disputes in the modern sense during the 17th century but there were other kinds of conflict expressions such as riots etc. But also other types of data - besides conflicts and social categories and collectives - are of interest, e.g. institutional disruptions and continuities such as constitutional changes and changes concerning intitutions for conflict regulation.

Sixth, the outlined concept of structural swing is actually no more than one guiding principle for selecting and defining data in a quantitative way when confronting an insurmountable amount of different alternatives. Other principles for selection and definition should be used in the long run, e.g. a comparison how well the administrative categories approximate the categories developed in social theory. This is surely a way to refine the analyses.

Appendix A

OTHER FIGURES

In figure 30, all of the possible subcategories within the original service sector in Germany are displayed.

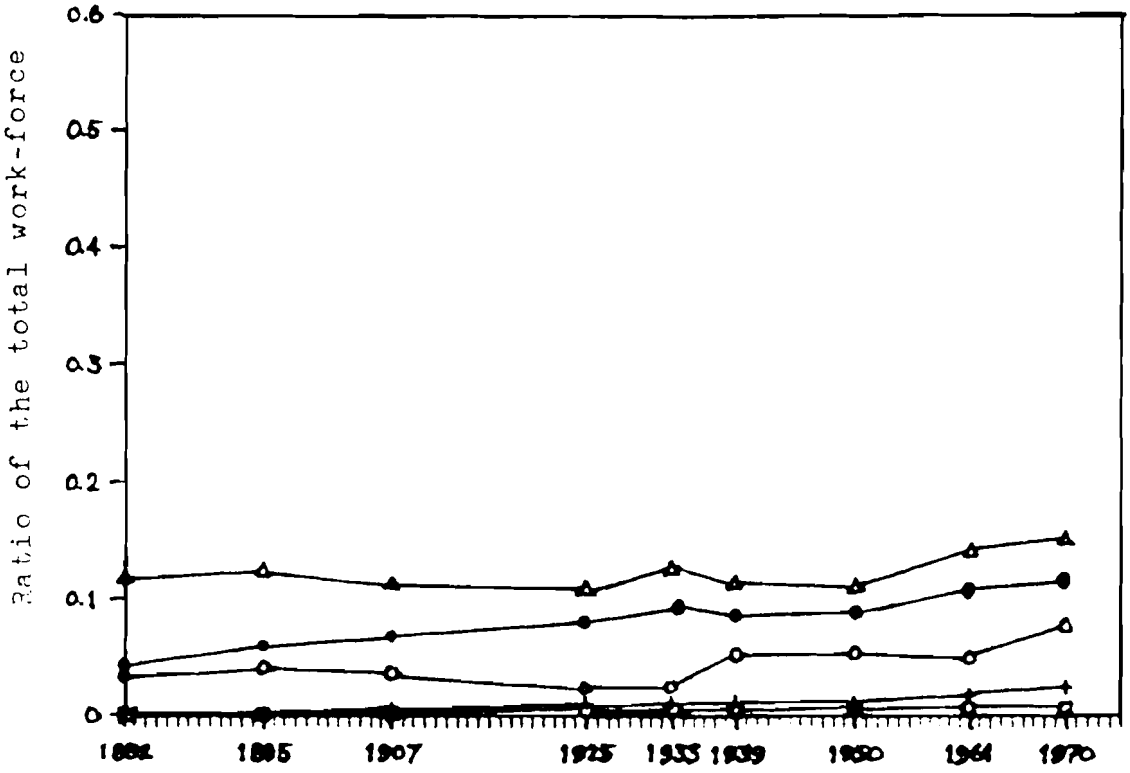

Figure 30: Subsectors of service in Germany 1882 - 1975

It can be mentioned that service (triangles) is the largest subsector, commerce (black bullets) is the next largest, public administration (white bullets) is the third largest subsector, and utilities (squares) is the smallest and banking (crosses) the next smallest subsector.

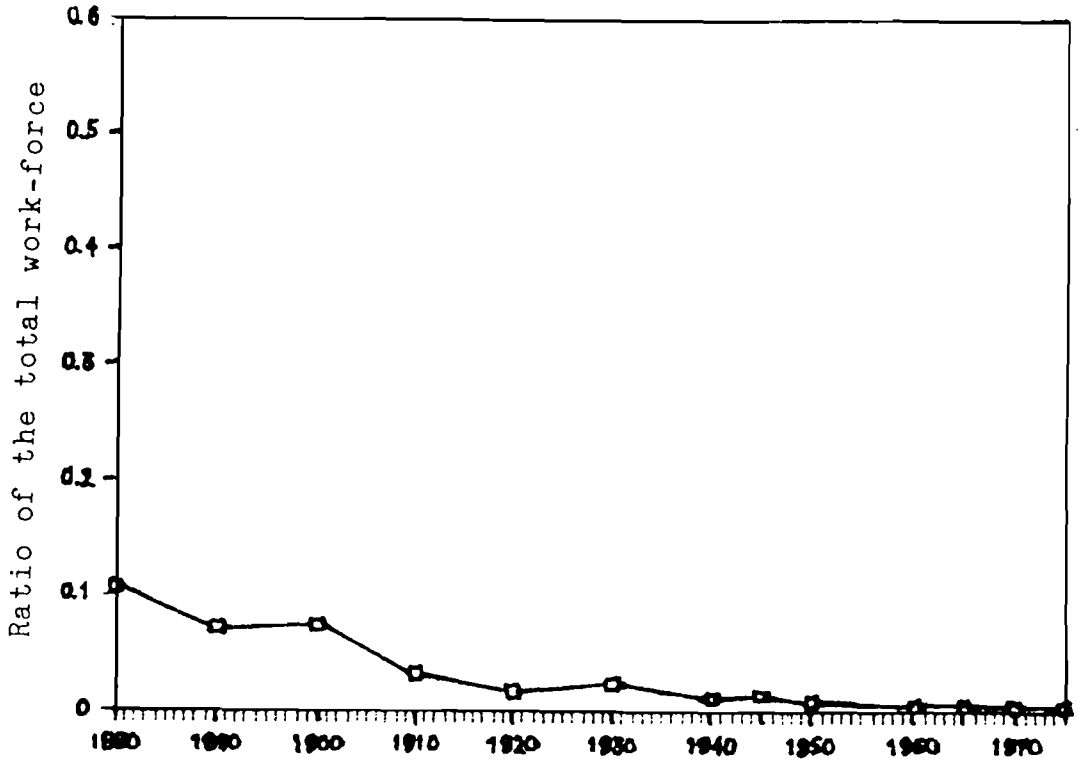

Figure 31: The sector of unknowns in Sweden 1880-1975

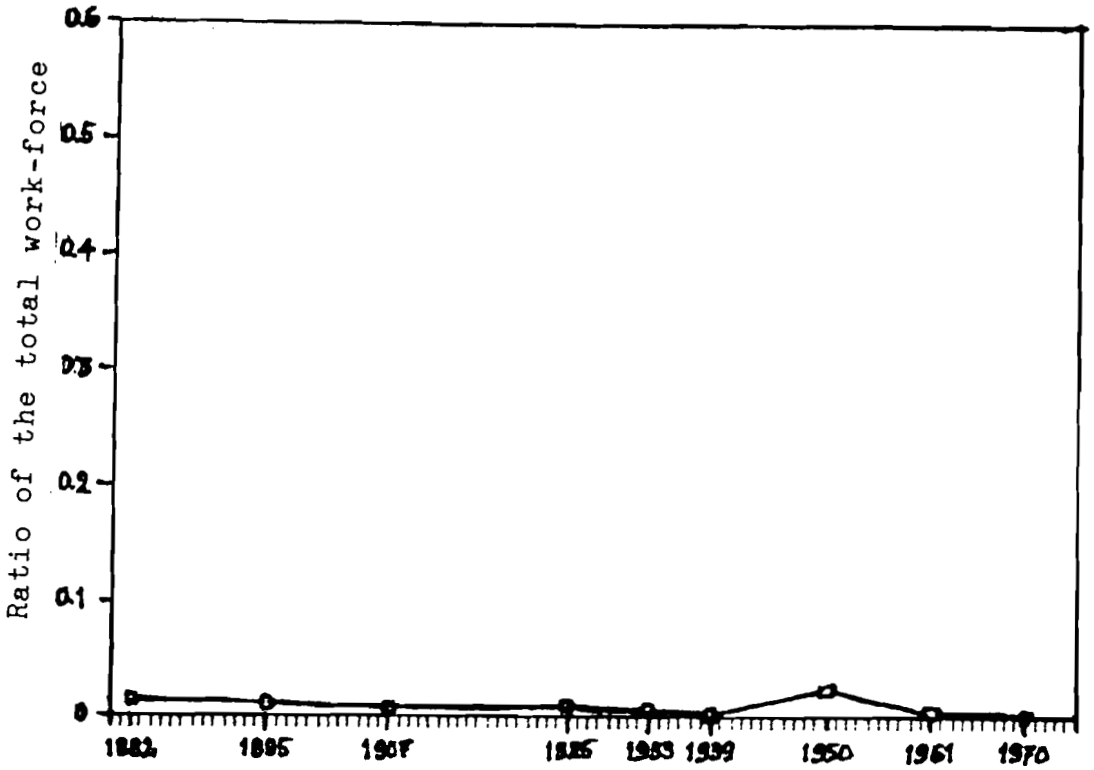

Figure 32: The sector of unknowns in Germany 1882-1975

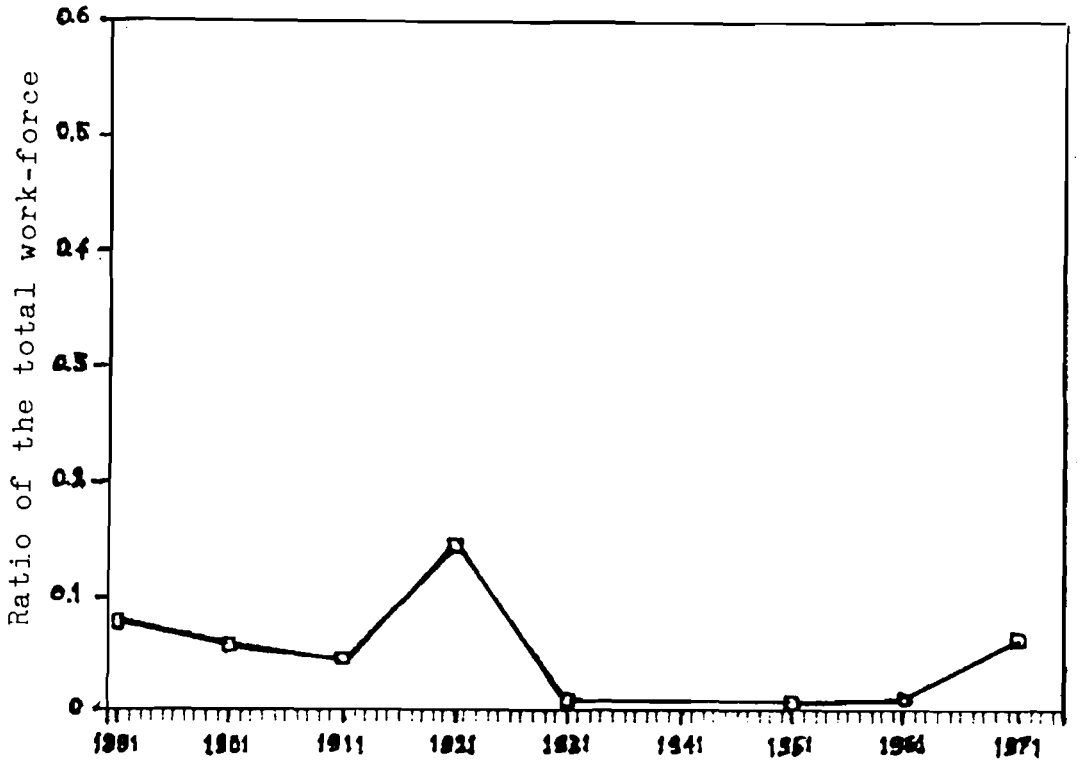

Figure 33: The sector of unknowns in Great Britain 1890-1975

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