Chapter 5

# BIOGRAPHIC ANALYSIS OF THE DEMOGRAPHIC CHARACTERISTICS OF THE LIFE HISTORIES OF MEN AND WOMEN IN REGIONAL LABOUR MARKET COHORTS AS CLUSTERS OF BIRTH COHORTS

*H. Birg, E.-J. Flöthmann* and *I. Reiter*

## 5.1. Introduction

A considerable continuous decline in cohort birth rates has been registered since the beginning of this century in Germany and in many other industrialized countries. Longitudinal data allowed a more detailed description of this phenomenon. However, the interpretation of this process has not been as successful as its description. Following is an attempt to present a theoretical interpretation of the secular decline of cohort fertility based on a biographic theory of fertility and other long-term commitments in life histories. We shall discuss the achieved results by applying the biographic theory exemplary for the Federal Republic of Germany. The biographic theory is not in conflict with historical, sociological, economical and psychological approaches, moreover, it can be regarded as an attempt to combine different theories and to form one interdisciplinary or multidisciplinary theory.

## 5.2. Outline of the biographic theory of reproductive behaviour - an introduction

Basic idea of the biographic theory is to show that various types of behaviour which are relevant for demography such as reproductive behaviour, nuptiality and migration affect the complete life course of an individual. If behaviour does not just reflect a simple reaction or a plain adaption to social patterns, it must be the result of a choice between alternatives. And those alternatives available for selection do not always reflect alternatives of actual situations, they are alternative life courses affecting the complete future life.

In economics and partially also in sociology decisions in life are interpreted on the basis of the "rational choice" theory and within the framework of the "preference restrictions behaviour scheme". Basic assumption of the "rational choice" theory is that preferences and restrictions of a certain choice implicitly include the result of that decision. Not many objections can be made against this point of view. However, the question how preferences and restrictions arise and constitute themselves remains unanswered. When a woman makes a choice according to her preferences, for instance to have a child, she automatically influences future decisions by creating restrictions, e.g. for her decision to return to professional life. In this way the result of decision no. 1 is identical with the restriction of decision no. 2, and so forth, showing that all important decisions in a life course are dependent on each other in this manner. Only a perfect human being with a perfect ability to anticipate could be able to claim that it knows what it is doing when deciding in accordance with the preference-restrictions-behaviour-scheme. As human beings with a free will we are permanently busy making choices and decisions but we normally do not choose the alternatives which are available for selection.

It is a trivial fact that all relevant decisions in life are connected in an intertemporal way. Nevertheless it is problematic to draw the right conclusions for the formation of an effective theory. Here is one conclusion: Each biographic relevant action or decision has three possible effects: it can either restrict or increase future margins of action or it can restrict the margin in one and increase it in another sphere. All three cases have consequences which, in general, are irreversible. Normally only the results of relative unimportant decisions or actions are reversible. For instance, unwanted consequences following the choice of an impractical lodging can be diminished or revised by moving into another place of residence. Effects following the choice of a vocation are not reversible so easily. Completely irreversible for the life course are those consequences which result from biographic commitments to marriage and birth of children. These genuine demographic-biographic decisions concerning partner and children are even irreversible in two respects: firstly, because of practical reasons, secondly because of ethical and moral reasons. A divorce, for example, might not be possible due to practical reasons, i.e. causing too high costs. On the other hand a divorce might not be considered because of moral reasons. Irreversibilities owing to moral reasons usually arise from the fact that the responsibility for parenthood taken at birth of a child cannot be withdrawn just as it is pleased. Moral commitments result in a special, a

principal form of irreversibility which has to be distinguished from irreversibility simply resulting from economic-pragmatic reasons. The concept of irreversibility is one of the main aspects of the theory. The question whether a decision has to be interpreted as a biographic long-term commitment will be answered according to its irreversible consequences for future life. The principle is even more elementary as the principle of causality. The question whether event A is followed by event B or vice versa can be answered principally by perfect evidence whereas the question whether A is the cause of B or vice versa cannot be answered with the same degree of evidence. Even if B follows A, B might be an anticipated event causally connected with A.

Looking at history it can be noticed that the amount of biographic freedom has continuously increased - in Europe since modern times, in most of the developing countries since the beginning of industrialization and modernization. However, the advantage of having the freedom to make biographic choices is connected with a higher risk in long-term commitments. Biographic freedom is still growing due to changing living and working conditions, i.e. new professions and due to the abolition of cultural, social and economic restrictions of behaviour. Different historical epochs can be marked according to the increase of biographic freedom, being either characterized by the abolition of restrictions in behavior (i.e. restrictions in freedom enforced by the state or churches) or by the development and improvement of new options in life. Political revolutions lead to more freedom by diminishing restrictions, economic and social progress lead to more freedom by creating and enabling new options of living.

It is a specific anthropological condition of life that the gain of biographic freedom has to be paid with an automatic loss of security. We can only make use of our freedom by making choices and decisions and the more alternatives there are available the more risky it is to make a commitment. Our ability to extend the limits of freedom is not automatically joined with an improvement of our ability to live with risks. The biographic theory interprets the decline in marriage and fertility rates as the consequence of the attempt to avoid or to delay the risk involved in long-term commitments within biographically relevant choices.

With regard to a formal argumentation we will replace the ordinary term of life course by the technical notion biographic sequence. With the term

biographic sequence is understood a listing of the constitutive elements in the life of an individual according to their time of occurrence. Biographic elements comprise, firstly, the temporally extensive phases in life and, secondly the events which occur at given points in time. Examples of phases are those of the various stages of human development (childhood, puberty, maturity, old age) the states of economic standing in life (education, active occupation, retirement) and those role sequences differentiated by sociologists such as child, teenager, marriage partner, mother or father, grandmother or grandfather, spinster or bachelor, etc. Examples of events are the successful completion of schooling (or breaking-off schooling) of various types, changes in occupation, changing residential location, acquiring permanent personal relationships (marriage), divorces, becoming a mother or father, etc. The definition of what a biographic element is therefore appears to be somewhat open. Indeed, the definition has to be oriented on the analytical job at hand. To a large extent, however, society defines the elements through its institutional and legal structure, social norms, codes of accepted behaviour, common ethical beliefs, etc. As an example, the implications of a marriage do not depend solely on the marriage partners but are, in some areas, largely determined by the society.

The terms biographic universe and virtual biography are used to define the concept of biographic freedom. The biographic universe is the formal set of all biographic sequences that can be constructed by mathematical permutation, variation or combination from a set of biographic elements. The virtual biography is a subset of the biographic universe. The virtual biography consists of those sequences which come, or have come, into consideration in the build-up of the factual biography of an individual. Every individual has certain preconceptions of the biographic sequences he may want to follow, of those which are possible and of those which - after certain commitments have been made - are no longer possible. All these preconceptions can effect biographical decisions even then when they are based on false arguments, inadequate information or errors of judgement. In the same way that every individual has his personal "inner world" he also has his own virtual biography. The virtual biography therefore changes with time through experience, gains in knowledge and understanding as well as by means of external influences. The factual biography is only one of the many elements of the virtual biography and perhaps is not the most important one of that.
The following two examples will serve to illustrate the concept of biographic universe. Two different models will be considered: In Model 1 all biographic

sequences are constructed by permutation from a given set of biographic elements, in Model 2 they are constructed by variation. If we look at three biographic elements, for instance L = vocational training (learning phase), E = working (earning phase) and F = family phase, these elements provide a universe with six sequences by permutation: (LEF), (LFE), (ELF), (EFL), (FLE) and (FEL). Four elements lead to a universe with $1 \cdot 2 \cdot 3 \cdot 4 = 4! = 24$ sequences, five elements to one with 5! = 120 and six give a universe with 6! = 720 sequences. With 10 elements the universe contains 10! = 3.6 million different sequences. The number of possible sequences explodes as the number of basic elements increases. The astronomical size of the number of possible sequences in the biographic universe is rather of theoretical than of immediate practical importance. Practical relevance only applies to a relative small subset of the biographic universe which we have labeled with the term virtual biography. Here the difference between the biographic universe and the virtual biography is of minor importance, we will therefore simply use the term biographic universe for the following description.

As the sequences in Model 1 are constructed by permutation we will call it "model of permutational sequences". Each sequence consists of the same number of elements. In Model 2 the sequences are constructed by variation. This implies the possibility to construct sequences of differing length which at the same time enlarges the number of sequences to a great extent. Permutation as well as variation are possible with and without recurrence of elements. A third model can be developed if sequences are constructed by combination. So we are in possession of numerous instruments to develop models of biographic universes. As every individual has a specific biographic universe a general biographic model cannot exist. We have chosen the following two models for the purpose of demonstration without regarding many other possibilities.

Model 1 is based on permutation without recurrence of elements, the basis of Model 2 is variation with recurrence of elements. We are considering 6 biographic elements for model 1 and 3 elements (L, E and F) for Model 2. In addition Model 2 is assumed to have two restrictions: 1) The number of elements per sequence comes to a maximum of 6. 2) Each element can occur more than once without following one another in position. Model 1 contains 720 sequences. The number of sequences in Model 2 is - due to the two restrictions - reduced from 1019 to 189. Figure 1 shows different types of

Model 1 with 2, 3 and 4 elements including restrictions. Model 2 is shown in Figure 2.

Owing to a pinpointed alteration of the adjoining conditions it is possible to approximate both models to reality. Despite their differences the branched structure of the biographic universe which both models have in common is apparent: Everyone can notice that each biographic choice causes a reduction in the number of biographic sequences from element to element. The more sequences there are eliminated the more risky it is to make a decision which might turn out to be inappropriate at a later point of time. The quotient of the number of sequences rejected by the commitment and of the number of options available before commitment will be called risk of a biographic commitment. Small biographic universes contain minor risks, large universes involve great risks. Every individual gathers more practical experience with each commitment marking a process called biographic aging. Biographic age is defined as the sum of sequences eliminated from the biography by commitments and - in the same way as the risk of a biographic commitment - it highly depends on the extension of the biographic universe. Therefore, we are integrating a second term, the relative biographic age, which indicates the standardized biographic age according to the maximum number of sequences rejected. Figure 3 depicts both terms for the 2 models schematically.

The actual biography of an individual seldom coincides with his wishes. The difference between the actual and the desired sequence is called biographic divergence or separation. For a virtual biography made up of the set of all permutational sequences of the biographic elements the divergence or separation between any two of the sequences is defined as the number of phases that must be traced back from their respective ends until the two sequences become the same. For example, in Figure 1 the separation between the sequence 15 and 16 for the case $n = 4$ is equal to 2.

Deriving from the term separation it is possible to introduce a further central notion of the biographic theory, namely that of biographic mobility. Moving from one biographic element to another on a given sequence is called intra-sequential biographic mobility. The movement from one biographic sequence to another sequence is called inter-sequential biographic mobility. Model 1 shows that - when moving from one sequence to another - one or more elements recur in the same sequence. These sequences are called inefficient

sequences. The movement of element 1 in sequence no. 7 to element 4 in sequence 12 with the recurrence of element 1 exemplifies an inefficient sequence (see Figure 1). For model 2 the term inefficient sequence has to be redefined because not all sequences are of the same length.

With the expressions and concepts defined it is possible to formulate the basic substantive hypotheses of the biographic approach. Hypothesis 1: The more sequences that are contained in the biographic universe and/or in the virtual biography the greater is the risk to be associated with long-term commitments and so - ceteris paribus - the smaller is the probability of long-term commitment for example, of having a child. If a given commitment rules certain sequences out of the virtual biography this implies that certain degrees of freedom have been lost and certain options or styles of life are no longer possible. The possibilities lost are termed the biographic opportunity costs of the commitment. Biographic opportunity costs include the economic, but not vice versa. Hypothesis 2: The greater the divergence between the actual and the desired biographic sequence the smaller is the probability (ceteris paribus) of long-term commitments, e.g. of having a child.

Both hypotheses agree with the empirical results presented in the empirical part of this paper. We will have to examine and compare further hypotheses already formulated in publications (Birg, Felber, Flöthmann 1984 and Birg 1987) within the specific data of the biographic survey. With that we will extend our analysis to married couples and unmarried couples living together whose biographies mutually influence one another. For an analysis of the virtual biographies of couples see Birg 1989 (p. 16f).

Historically seen the process of secular decline of fertility can be interpreted with terms of the biographic theory of fertility, as follows: The further we trace back in history the more clearly it shows that either social groups, the society, the churches or the state - owing to fixed rules concerning the sequence and type of biographic elements - took over the decision as to which order biographic elements ought to have during a life course. Then in Europe, because of enlightenment, political revolutions and reformatory efforts more and more restrictions were abolished and since the beginning of industrialization and urbanization the variety of economic and occupational/professional alternatives grew, increasing the number of biographic elements at the same time.

**Figure 1.** **Biographic universe - Model of permutational sequences with restrictions.**

The 8 sequences are emphasized that fulfil the conditions:
(I) 1 before 2 and 3 before 4, (II) 1 and 2 before 4

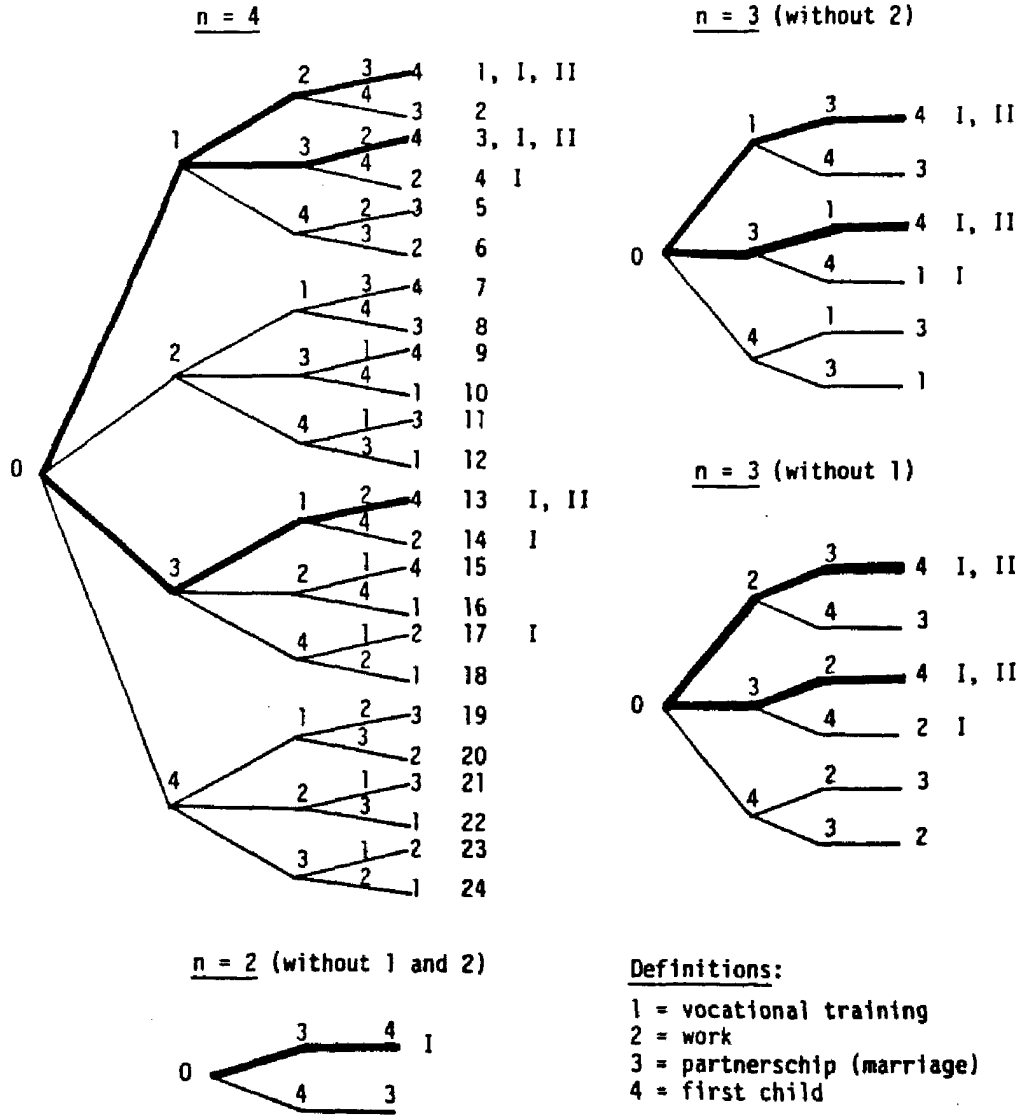


**Figure 2.** **Biographic universe of the model of 189 variational sequences with constraints.**

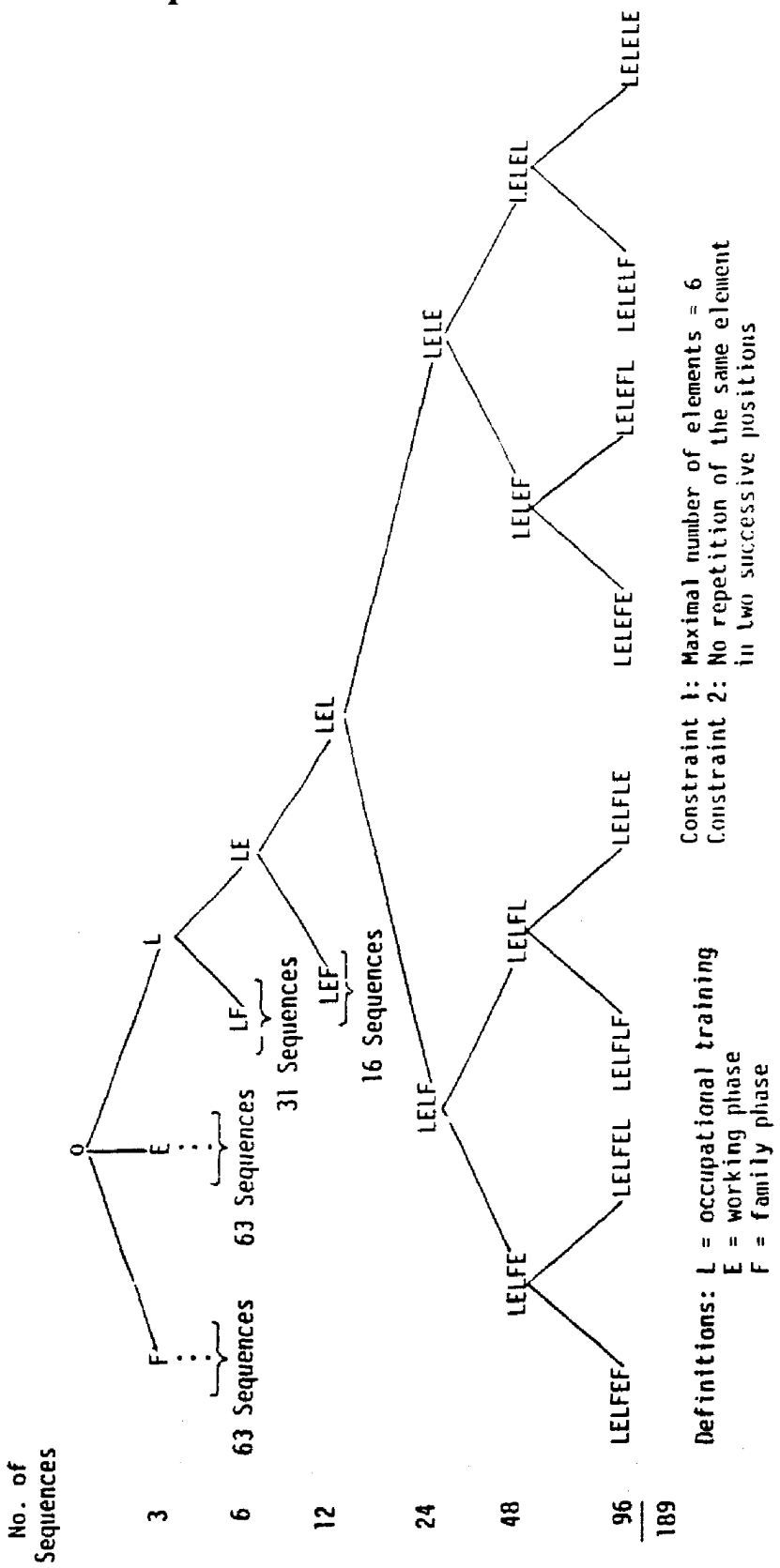


**Figure 3.** **Biographic universes of two different biographic models.**

| Commitment by transition | No. of sequences rejected by the commitment | Open options | Risk | Biographic age $A^*$ | $A^*/A^*_{max}$ |
|---|---|---|---|---|---|
| - Biographic universe of the model of 720 permutational sequences - | | | | | |
| 0 | | 720 | | | |
| 0 --> 1 | 600 = 5·5! | 120 | 0.833 | 600 | 0.834 |
| 1 --> 2 | 96 = 4·4! | 24 | 0.800 | 696 | 0.968 |
| 2 --> 3 | 18 = 3·3! | 6 | 0.750 | 714 | 0.993 |
| 3 --> 4 | 4 = 2·2! | 2 | 0.667 | 718 | 0.999 |
| 4 --> 5 | 1 = 1·1! | 1 | 0.500 | 719 | 1.000 |
| 5 --> 6 | 0 = 0·0! | 0 | 0.000 | | |
| | ---- | | | | |
| | 719 | | | | |
| -Biographic universe of the model of 189 variational sequences with constraints- | | | | | |
| 0 | | 189 | | | |
| 0 --> 1 | $126 = 2(2^6 - 1)$ | 63 | 0.667 | 126 | 0.670 |
| 1 --> 2 | $32 = 2 \cdot 2^4$ | 31 | 0.508 | 158 | 0.840 |
| 2 --> 3 | $16 = 2 \cdot 2^3$ | 15 | 0.516 | 174 | 0.926 |
| 3 --> 4 | $8 = 2 \cdot 2^2$ | 7 | 0.533 | 182 | 0.968 |
| 4 --> 5 | $4 = 2 \cdot 2^1$ | 3 | 0.571 | 186 | 0.989 |
| 5 --> 6 | $2 = 2 \cdot 2^0$ | 1 | 0.667 | 188 | 1.000 |
| | ---- | | | | |
| | 188 | | | | |

Steadily and to a greater extent each individual itself had to choose and to decide on certain elements and their order within the own biography. The strength of having to bind to fixed patterns and ideals for the purpose of the own way of living lessened as the degree of biographic freedom increased.

The greater the biographic universe of an individual is the higher are the biographic opportunity costs resulting from biographic long-term commitments

like marriage and birth of a child. The secular decline of fertility can, therefore, be regarded as an immanent result of the process of social and economic development. There are no signs which could indicate an increase in the fertility rate in the developed countries.

### 5.3. A biographic-demographic survey based on biographic labour market cohorts as opposed to demographic cohorts

Despite the numerous differences between biographic alternatives and restrictions arising from commitments there is still a remaining amount of elements which people have in common and which allows us to look at groups of individuals. The demographic concept of cohorts is based on such a formation of individuals to groups. The standard definition of the term cohort is as follows: A cohort constitutes a group of individuals who have experienced a same demographic event in the same period of time. The definition of demographic cohorts depends on facts like birth (birth cohorts), marriage (marriage cohorts), divorce (divorce cohorts), etc. In this analysis we have focussed our interest on two birth cohorts (men and women born 1950 and 1955) and have decided to merely use the term "cohort" in the following context.

The methodological difference between the biographic analysis presented here and the conventional demographic cohort analysis lies in the extension of the concept of demographic cohort to the concept of biographic cohort: A demographic cohort constitutes a group of individuals who have happened to experience the same demographically relevant event at a given point of time. A biographic cohort, however, is defined as a group of individuals who have experienced the same sequence of events up to a given point of time. More differentiated data material is necessary for a biographic-demographic analysis than for a cohort analysis.

Cohort 1950 entered into the labour market around 1970, i.e. into a situation of full employment (unemployment rate = 1 %). Cohort 1955, although only 5 years younger, entered into a labour market with high unemployment (unemployment rate = 5 %), i.e. at a time when - due to the explosion of the oil-price in 1973 and the following economic crisis - there were hardly any prospects ahead. Both cohorts differ extremely as far as occupational prospects are concerned. However, the important instruments of modern contraceptive

methods equally apply to both groups. Cohort 1950 belonged to one of the first groups who were able to make use of modern contraceptives, especially the "pill". In the Federal Republic of Germany the number of births and the age-specific birth rates (= number of births per 1.000 women of a specific age) dropped to about the half between 1965 and 1975. This considerable reduction had a great influence particularly on those generations born between 1936 and 1944. Owing to the differing availability of modern contraceptives it is highly problematic to compare the reproductive behaviour of cohorts born before 1944 with that of younger cohorts.

In general, the individual conditions underlying each decision/commitment and depending on the labour market situation vary from region to region. It is obvious that in those regions which do not offer suitable jobs for women the activity rate of women cannot be high. In the Federal Republic of Germany the average rate of unemployment amounts to 8 % for all districts. But there are regional differences, for instance districts in southern Germany with only 4 % and districts in northern Germany with more than 15 % unemployment. Therefore, biographic restrictions as well as labour market conditions differ much more between regions at a given point in time than between cohorts belonging to different time periods. Each macro labour market cohort comprises various regional sub-cohorts which will be called regional labour market cohorts. Our empirical analysis and our survey are thus based on the following three regional types with differing labour market conditions:

I. Regional Type A with favourable labour market conditions (in the survey the cities of Düsseldorf and Hannover),

II. Regional Type B with unfavourable conditions (in the survey the coal and steel cities Bochum and Gelsenkirchen),

III. Regional Type C, the rural and remote communities of Ahaus, Vreden, Gronau and Leer.

The total number of interviews was 1576. A sub-group of 139 interviews were of couples. The single interviews also contained questions for the partner - if the randomly chosen person in fact had a permanent partnership.

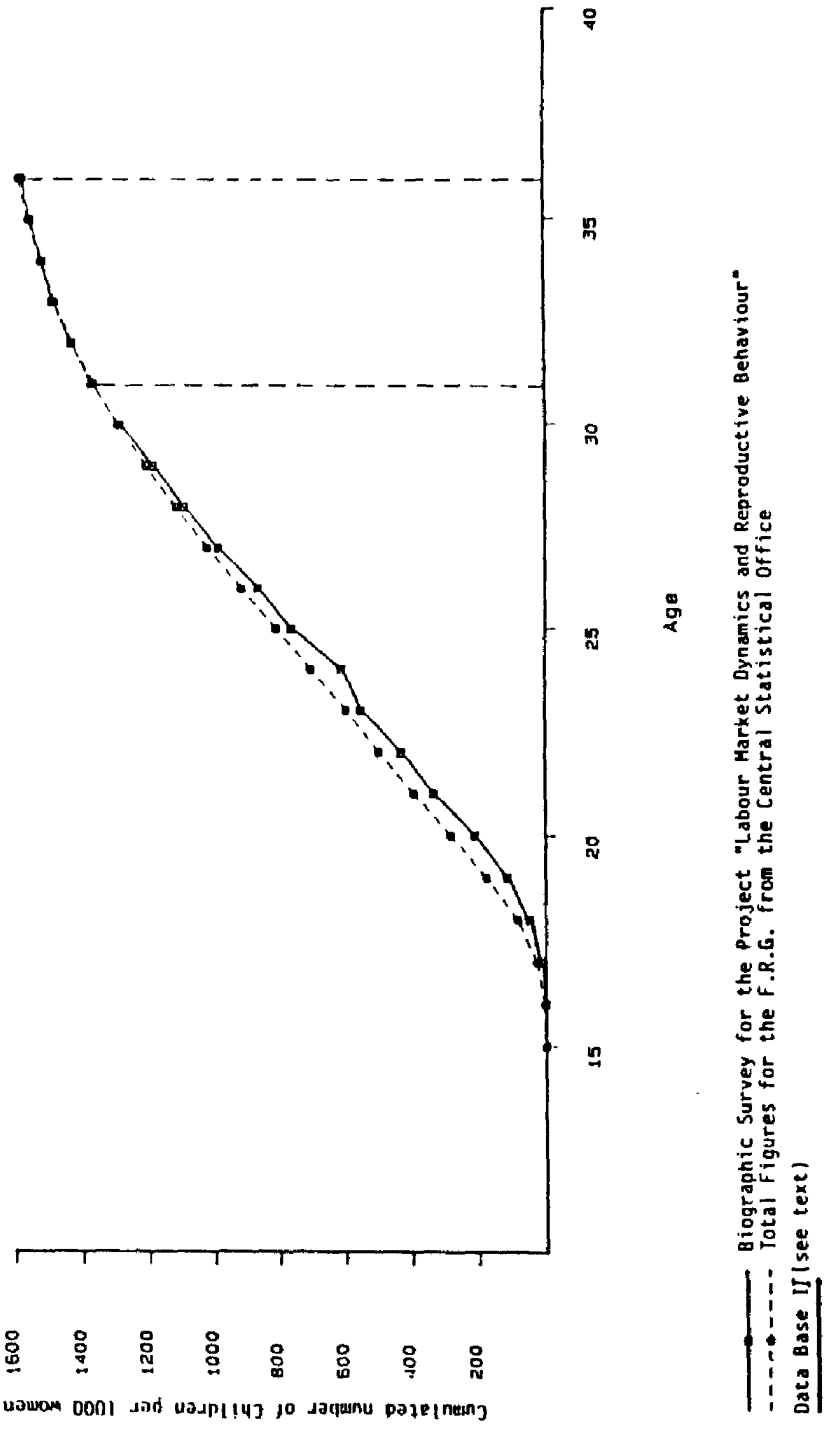
The proportion of the foreign population varies in the three types of regions. In order to assure and to improve comparability only Germans were interviewed. The interview technique used will not be discussed in detail here except to note that the standardized questionnaire was moduled to accommodate a large variety of biographies. The questionnaire was essentially job orientated, i.e. for each place of employment a separate module was used with the implication that the interview for a person who had had only three jobs in life was much shorter than that for someone who had had 10 or 20. A further characteristic of the questionnaire was that the questions to the occupational biography, the family biography and the residential biography were not separately grouped but posed intermingled with the deliberate intention that memory in one area would refresh - if necessary - memory in the others. On average each biography produced approximately 2.000 or even more pieces of information of both quantitative and qualitative natures.

## 5.4. Cohort analysis of fertility and nuptiality of the regional labour market cohorts

### 5.4.1. Representativity of the biographic survey

The demographic development - both in the Federal Republic of Germany and in other European countries - is characterized by a considerable decrease in marriage rates and birth rates. This so-called "second decrease in birth rates"[1] is striking in the Federal Republic of Germany where it reached its highest level between 1967 and 1978. In order to be able to make statements concerning an altered reproductive behaviour longitudinal data are unavoidable. We have collected such data for our biographic survey. Other biographic surveys also contain longitudinal data of individuals, for instance the project directed by K.U. Mayer (Max-Planck-Institute for Human Development, Berlin). Yet our survey is the only biographic-demographic investigation, which is not only representative for the Federal Republic on its whole but also for the selected types of regions. As the reproductive behaviour varies a great deal from region to region - much more than between cohorts - it is necessary to obtain representative data for cohorts in specific regions in order to interpret reproductive behaviour.

**Figure 4.** **Comparison of the completed fertility rates of the cohort 1950 in the sample with the total figures for the F.R.G. - Population of German nationality -**



The fertility rates of the communities in our survey can be compared with national figures in two different ways: either by taking into account the different numbers of interviews in the selected regions, i.e. indicating a weighted mean of the fertility rates of the 8 selected communities in the three regions (= data base I) or by forming the arithmetic mean of the fertility rates (= data base II). The weighted mean leads to lower fertility rates than the arithmetic mean due to the fact that more interviews were made in the large cities - characterized by fertility rates below average - than in rural regions with a higher fertility rate.

The weighted mean for the completed fertility rate of our cohort 1950 at the age of 36 amounts to 1.497 children per woman. The arithmetic mean comes to 1.588 and for the total of the Federal Republic it amounts to 1.594. Compared to this our survey shows a deviation of

6,1% for the weighted mean (data base I)
0,4% for the arithmetic mean (data base II).

As the arithmetic mean of the net reproduction rates of the three regions is the same as the net reproduction rate for West Germany, data base II reveals the correct values for a comparison with the survey.

The deviation of cohort 1955 increases that of cohort 1950, i.e. figuring a percentage of 9,1% instead of 0,4%. A possible explanation lies in the influence of the business cycle and the labour-market on the representativity of our sample. The following can be concluded: (a) Although having selected communities being typical for certain regions and not representative on a national level our survey is to a very high extent representative for the Federal Republic (see Figure 4). (b) The labour market situation in the selected areas - except in the two state capitals Düsseldorf and Hannover - is far less favourable than in the average of the Federal Republic. This implies that our sample is more representative in boom phases than in phases of economic recession.

The sample of our project is exclusively based on the German population whereas samples of other projects also include data of the foreign population. This is an important fact which should be taken into consideration when comparing the results of different surveys.

### 5.4.2. Regional fertility and nuptiality differentials

A comparison of the fertility of both cohorts at the same age of 31 shows a distinct change in their reproductive behaviour: The number of children per woman in the age of 31 for cohort 1950 is 1.29 and for cohort 1955 it is 1.07 (see Figure 5a,b and Table 1). The cumulated number of children per women of cohort 1955 is below that of cohort 1950 in all communities - except in the city of Bochum. The most intensive decrease in fertility was registered in the community of Leer where the number of children per woman at the age of 31 dropped approximately 40%, i.e. from 1.96 children per woman of cohort 1950 to 1.18 of cohort 1955. Conclusion: Differing reproductive behaviour is provable for both cohorts in all selected regions. The discrepancy between densely populated prosperous centers and remote rural regions seems to be declining, clearly indicating an approach of the rural areas towards the cities.

Table 1. **Age and birth order specific fertility rates cumulated up to the age of 31* - per 1000 women -**

| | first born | second born | third born | total |
|---|---|---|---|---|
| | | - Cohort 1950 - | | |
| Region 1 | 658 | 336 | 82 | 1096 |
| Region 2 | 740 | 397 | 75 | 1219 |
| Region 3 | 875 | 694 | 208 | 1833 |
| Total | 734 | 431 | 104 | 1291 |
| | | - Cohort 1955 - | | |
| Region 1 | 516 | 252 | 45 | 813 |
| Region 2 | 754 | 366 | 77 | 1204 |
| Region 3 | 786 | 414 | 171 | 1386 |
| Total | 659 | 327 | 82 | 1074 |

* Age and birth order specific fertility rate = number of births of order n per woman of age x

Regional fertility differentials of a given cohort are higher for a high birth order than for a low birth order. The proportion of women with more than 3 children is three times as high in the rural communities of Ahaus and Vreden

**Figure 5a. Regional fertility differentials - cohort 1950.**

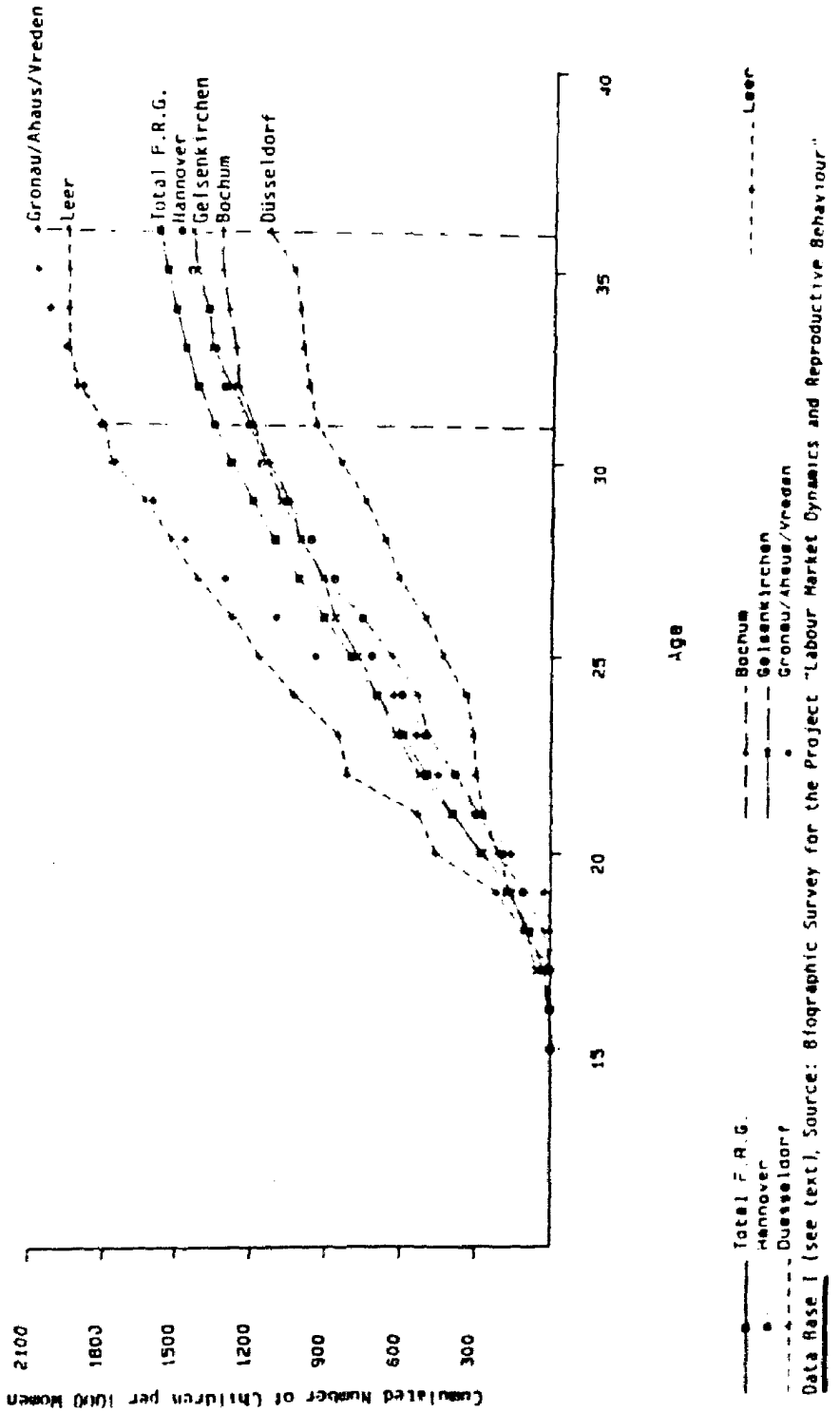
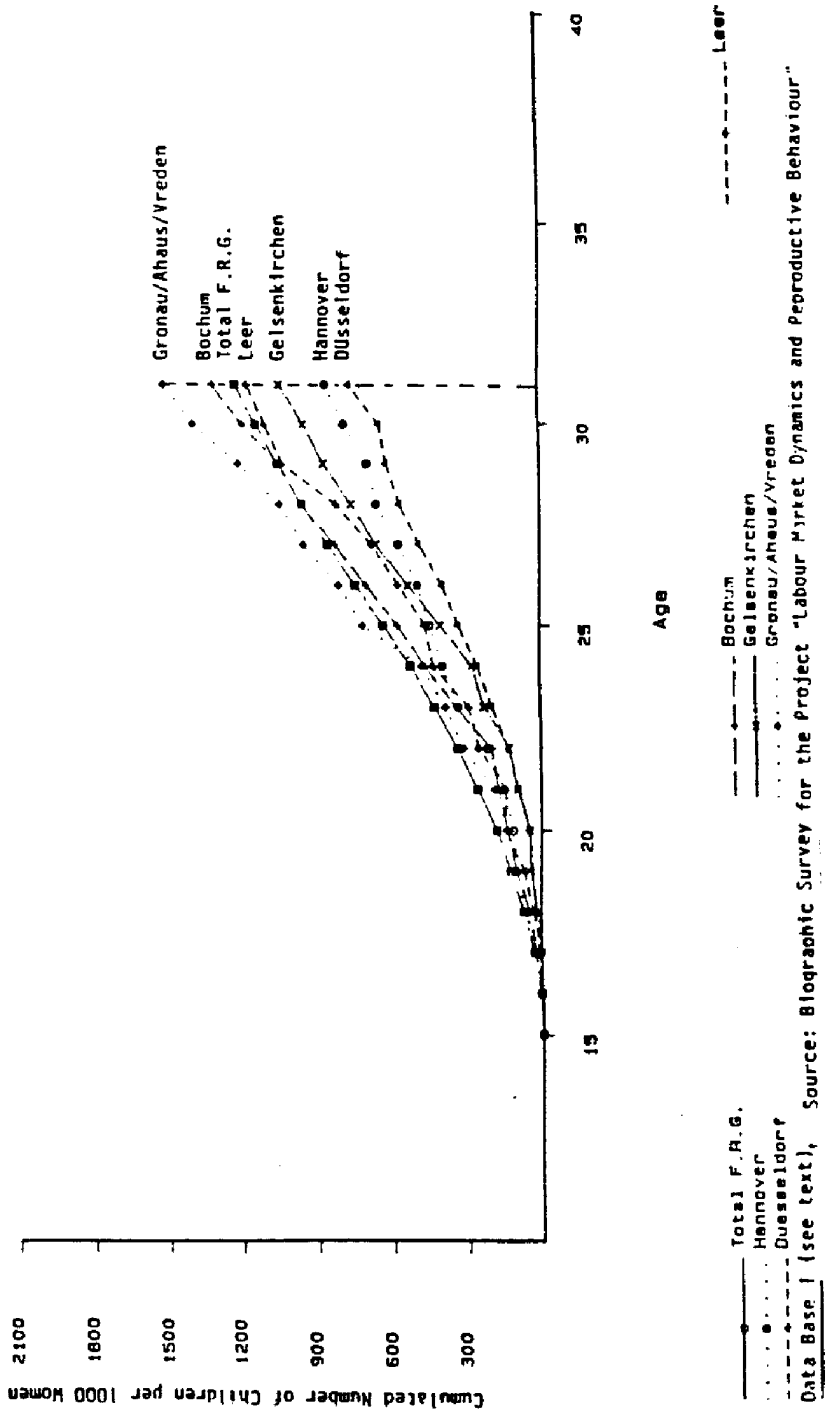


**Figure 5b. Regional fertility differentials - cohort 1955.**



as in the cities of Düsseldorf and Hannover. There is a shift in the age of women at birth of their first child towards higher ages (Figure 6a, b). As a consequence of the shift in age when first children are born, the age of birth of children of second birth order, especially of women belonging to cohort 1955 moves to a much later age. Therefore, the average birth rates of women up to the age of 31 decline considerably.

It is again remarkable that the women in the city of Bochum do not follow the trend of the other regions. Concerning children of first birth order both cohorts differ only slightly from another, whereas up to the age of 31 there even is a small increase in the number of children of second birth order. The neighbour town Gelsenkirchen, however, shows the same decrease in the number of children of second birth order as in Düsseldorf and Hannover.

The decline in the number of births of second order up to the age of 31 is most striking in rural regions. Compared to cohort 1950 with 0.69 children per woman up to the age of 31 the corresponding value for cohort 1955 amounts to 0.41, i.e. is 40,3% lower.

The age of birth of children of third order - especially those of women belonging to cohort 1955 - moves on to a later stage in life in the same degree as for children of first and second order. In all communities the curves for women in the age of 31 of cohort 1955 lie below those of cohort 1950 - except the one for Bochum indicating a higher rate for cohort 1955. Although the proportion of children of third order has declined in the rural areas still more than 17% of the interviewed women of cohort 1955 aged 31 have at least 3 children. This value is only slightly beneath the corresponding value of 20% for women of cohort 1950. In densely populated areas the proportion of women of cohort 1955 aged 31 who have 3 children is very low. As children of forth and further birth order only represent individual cases in our sample these data will be neglected here.

Looking at the frequencies of marriage the cohort and regional specific differences were much smaller than the differences in reproductive behaviour.

**Figure 6a.** **Regional and birth-order specific fertility differentials. First born, cohort 1950.**

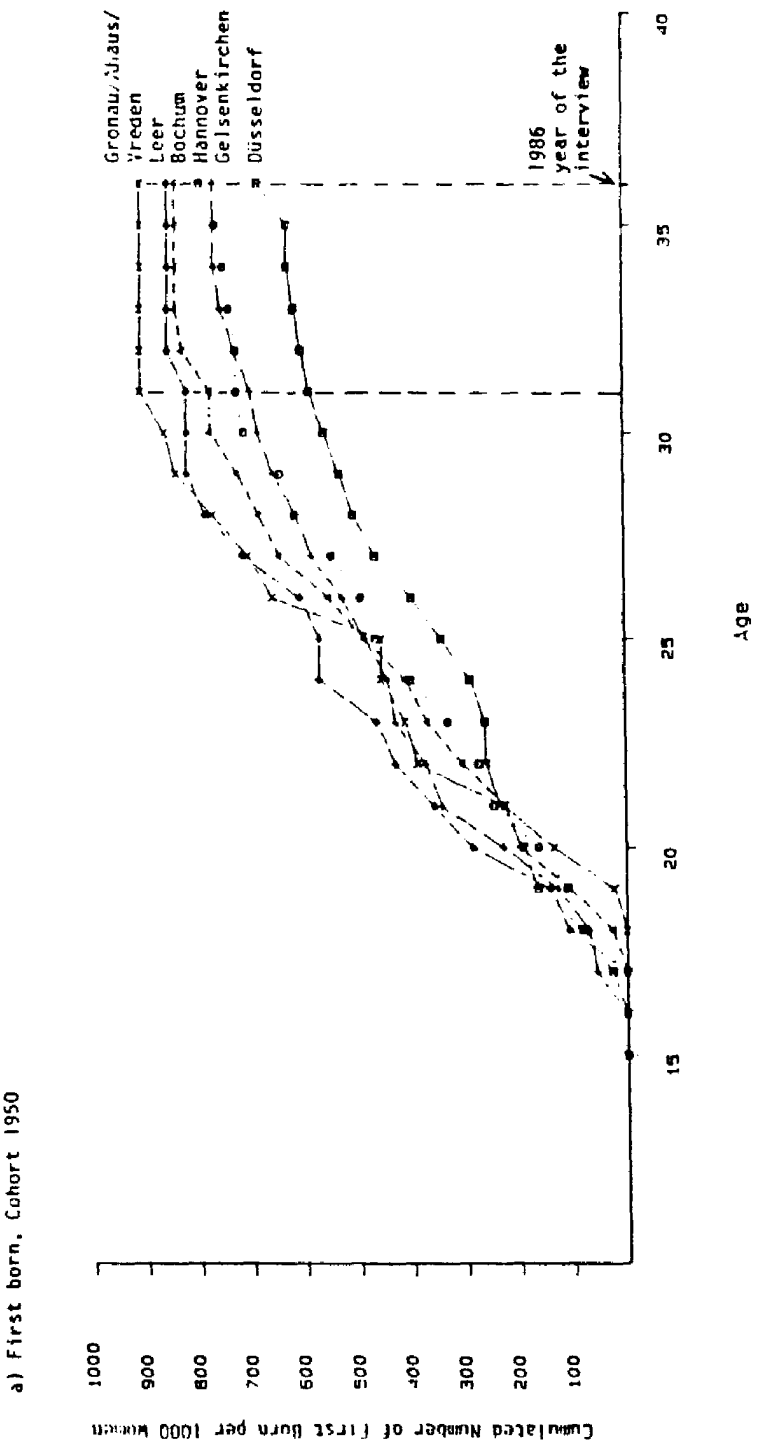


**Figure 6b.** **Regional and birth-order specific fertility differentials. Second born, cohort 1950.**

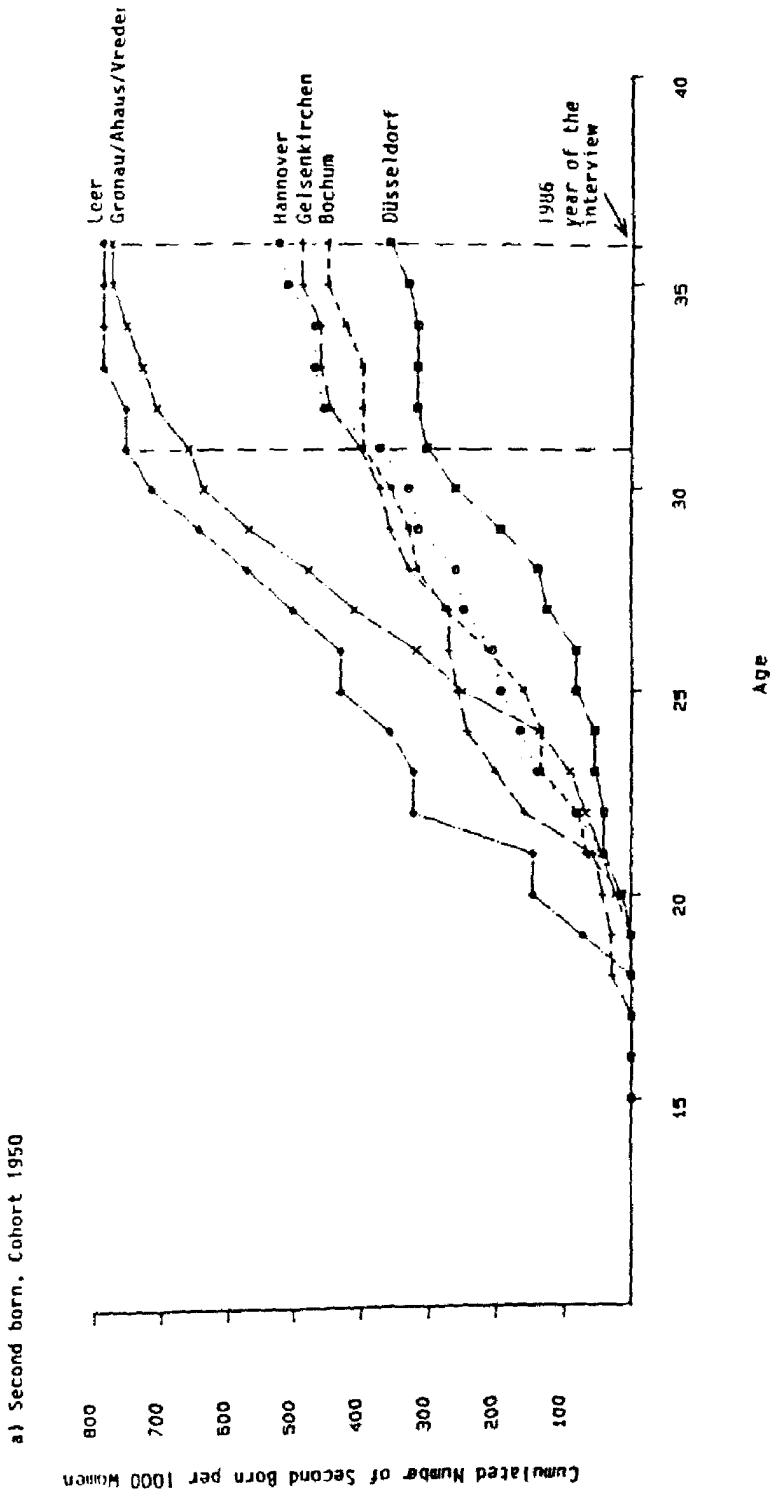


**Figure 7a.** **Regional nuptiality differentials.**
**Cumulated number of married women (first marriage), cohorts 1950 and 1955 in the cities of Düsseldorf and Hannover.**

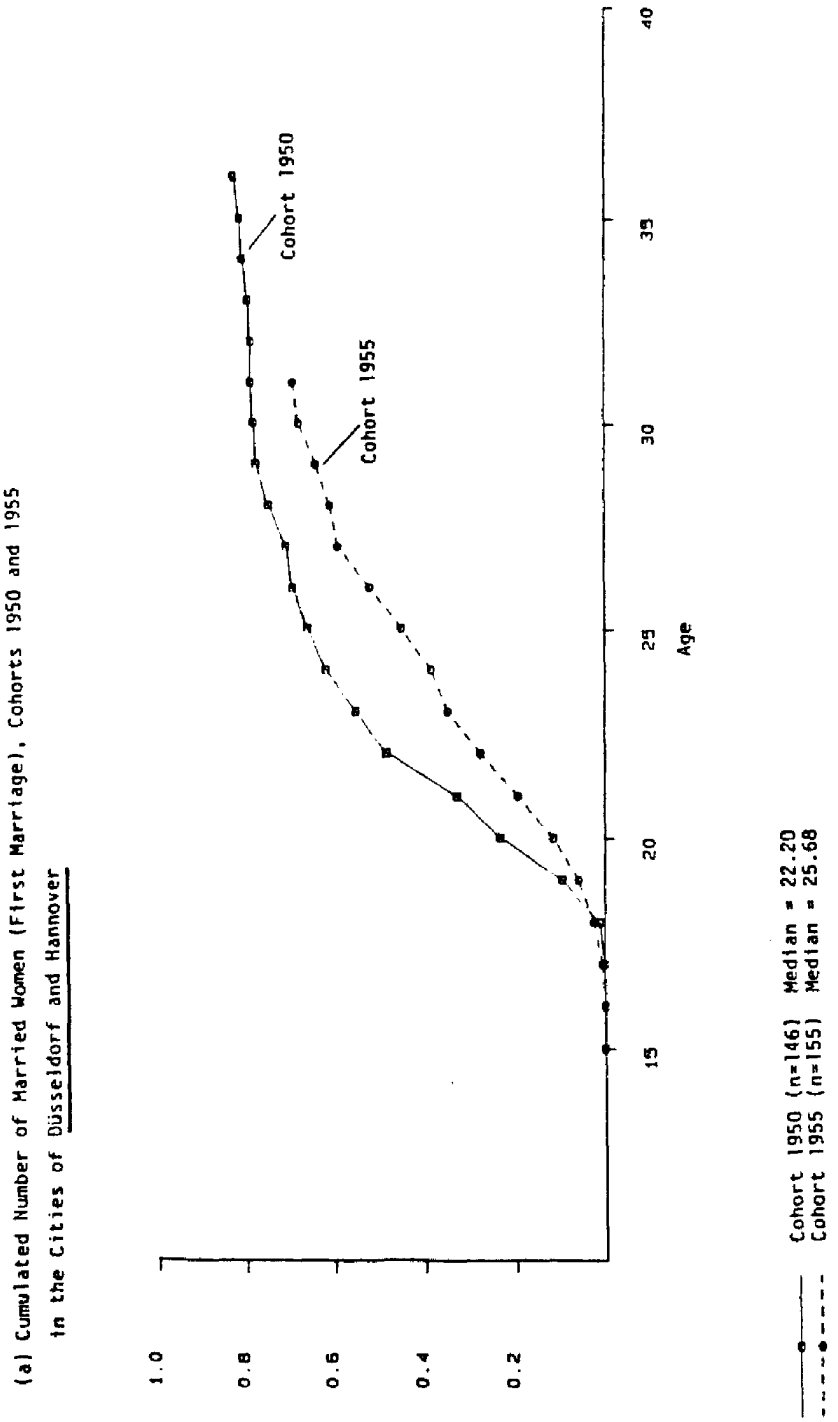


**Figure 7b.** **Regional nuptiality differentials.**
**Cumulated number of married women (first marriage), cohorts 1950 and 1955 in the cities of Bochum and Gelsenkirchen.**

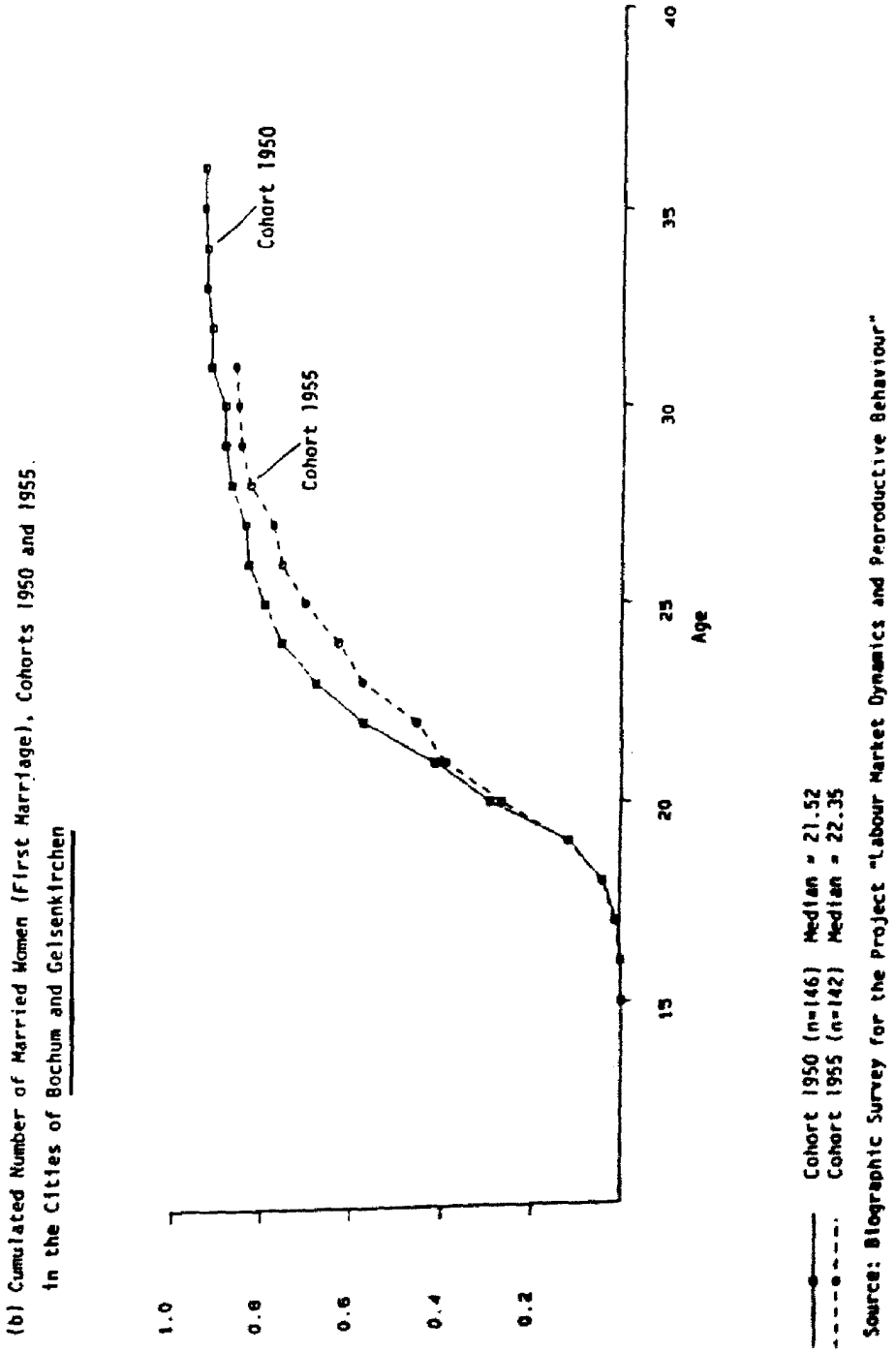


Figure 7 illustrate the cohort-specific nuptiality in the selected communities.

The frequency of marriage as well as the age at time of marriage varies from region to region between both cohorts:

Table 2. **Median of the age at first marriage of women.**

| | Cohort 1950 | Cohort 1955 |
|---|---|---|
| Düsseldorf/Hannover | 22.20 | 25.68 |
| Bochum/Gelsenkirchen | 21.52 | 22.35 |
| Gronau/Leer | 21.29 | 23.50 |
| Ahaus/Vreden | 21.86 | 21.25 |
| Total | 21.74 | 23.27 |

In Düsseldorf and Hannover cohort 1955 is marked by a lower proportion of married women up to age of 31 than women of cohort 1950. On an average, these women also married at a later age and altogether this region features the lowest proportion of married women. Only slight differences between cohort 1950 and cohort 1955 exist in the cities of Bochum and Gelsenkirchen. In the small communities of Gronau and Leer women of cohort 1955 married, on the average, at a later age than women of cohort 1950. Up to the age of 31 almost all interviewed women were married at least once.

### 5.4.3. Regional fertility differentials and migration

Biographic data enable us to subdivide the population of a certain region into a native population and an immigrated population. In addition, they allow us to clear the question whether regional fertility differentials are mainly based on regional differences in the reproductive behaviour of natives, in the corresponding behaviour of in-migrants or in both groups. The natives are understood to be that population which is born in a certain region or town and which has lived there without break up to the date of our interview. Here the result: If fertility is higher (lower) in a certain town than on a national level it can - at least for the districts of our survey - be attributed to a higher (lower) fertility of the natives in these regions. Regional fertility is also influenced by migration. But one cannot conclude that a low or high regional fertility rate

depends on the in-migrants alone, e.g. assume that fertility is being "imported" in the various regions, whereas fertility of the natives is more or less the same in all types of regions.

The analysis of women of cohort 1955 points out that it is the reproductive behaviour of the natives which is decisive for the regional fertility differentials. The "imported" fertility contributes to a levelling of the regional differences:

**Table 3. Number of children per woman, cohort 1955, age 31.**

| | Natives | In-Migrants | Total |
|---|---|---|---|
| Düsseldorf | 0.765 | 0.807 | 0.797 |
| Hannover | 0.808 | 0.907 | 0.875 |
| Bochum | 1.364 | 1.378 | 1.372 |
| Gelsenkirchen | 0.944 | 1.222 | 1.064 |
| Region 3 | 1.259 | 1.535 | 1.429 |
| F.R.G. (German population) | -- | -- | 1.228 |

The above table demonstrates that only because the native populations of Düsseldorf, Hannover and Gelsenkirchen have less children than the total German population there is a lower average number of children in these cities. Fertility of in-migrants is higher than fertility of natives. The low rates of fertility in Düsseldorf, Hannover and Gelsenkirchen thus mainly derive from the reproductive behaviour of the natives and not of the in-migrants. Also in Bochum where fertility is above average natives have more children compared to the total German population.

The analysis of women of cohort 1950 furnishes the same result, however, with one exception: In Hannover the natives represent the group with the highest number of children, i.e. figuring a value far above average. We will have to search for the reason.

**Table 4. Number of children, cohort 1950, age 36.**

| | Natives | In-Migrants | Total |
|---|---|---|---|
| Düsseldorf | 1.235 | 1.161 | 1.178 |
| Hannover | 2.053 | 1.370 | 1.548 |
| Bochum | 1.300 | 1.472 | 1.425 |
| Gelsenkirchen | 1.423 | 1.674 | 1.583 |
| Region 3 | 2.235 | 2.245 | 2.243 |
| F.R.G. (German population) | -- | -- | 1.594 |

Life-table-analysis used for the interpretation of migration reveals further interesting results concerning the relation between fertility and migration. In order to eliminate the number of removals/residences during childhood we will merely consider those migrations which occurred after the age of 15. It can be realized that the frequency of first migration after the age of 15 is higher for women without children than it is for women with children. Yet if the same procedure is applied to the second and third migration the result turns out to be the opposite: Women with children migrate more often than women without children. These findings show that, in general, the native population of a certain big city (without migrations) has less children than the in-migrants of that city. Further analysis will enable us to find out whether there is an influence of the direction of migration, described by the sequence of places of residence in the life course.

First results concerning the relationships between reproductive behaviour and spatial mobility are shown in Table 5. There is a very clear structure in the combined fertility/mobility processes in the life course of young women in the sample of the project.

Table 5. **The 10 most frequent processes of fertility/mobility for women of birth cohort 1950 in the sample of the project "Labour Market Dynamics and Reproductive Behaviour".**

| | Region 1 | | Region 2 | | Region 3 | |
|---|---|---|---|---|---|---|
| | percentage | process path | percentage | process path | percentage | process path |
| 1 | 13.8 | F | 21.3 | FF | 14.8 | FF |
| 2 | 12.3 | FF | 18.4 | F | 11.5 | MFF |
| 3 | 10.0 | MM | 8.1 | - | 6.6 | F |
| 4 | 6.2 | - | 5.1 | MMF | 6.6 | MMFF |
| 5 | 6.2 | MF | 5.1 | MFF | 4.9 | MMF |
| 6 | 4.6 | FFF | 4.4 | MMFF | 4.9 | MFMFF |
| 7 | 4.6 | MM | 3.7 | FFF | 3.3 | FFF |
| 8 | 4.6 | MMM | 3.7 | M | 3.3 | MMM |
| 9 | 4.6 | MMFF | 3.7 | MFM | 3.3 | MFFM |
| 10 | 3.1 | MMF | 2.9 | MF | 3.3 | MMMMFF |
| total | 70.0 | | 76.4 | | 62.5 | |

F - Birth of a child
M - Moves after the age of 16 years

Region 1 - State capitals Düsseldorf and Hannover
Region 2 - old industrial cities Bochum and Gelsenkirchen
Region 3 - rural communities of Gronau, Ahaus, Vreden, Leer

Women without a change in residence since the age of 16 years but with one or two children dominate in each regional type. As a matter of fact those process paths seem to be predominant which are characterized by changes in residence before birth of a child. Process paths indicating changes in residence after the birth of children only appear twice among the most frequent process paths.

The fertility differentials between different types of migrants proven for France by Courgeau only partially agree with the results presented here. Precondition for an exact comparison of both research projects is a differentiation of the

French data material, i.e. a separation of cohorts, single communities and types of biographic sequences[2].

## 5.5. Analysis of biographic sequences

### 5.5.1. General results

The model of permutational sequences would consist of 3.6 million different sequences even if only 10 biographic elements were considered, the model of variational sequences would have even more. For empirical analysis we were thus forced to reduce the number of elements. We aggregated the elements into the following three groups:

L = professional/occupational/vocational training,
E = phase of work,
F = family phase.

The empirical analysis is based on a model of variational sequences with two restrictions:

Restriction 1: Each sequence has a maximum number of 6 elements.
Restriction 2: Each element can occur more than once in a given sequence but without following one another in position.

The biographic universe of this model consists of exactly 189 different possibilities, formally:

$$N = 3 \cdot \sum_{i=1}^{6} 2^{i-1} = 3 \cdot \sum_{i=0}^{6} 2^{i} = 3(2^6 - 1) = 189$$

From the 189 theoretically possible sequences only 57 (=30 %) occurred in reality. Many of the registered 57 sequences occurred only once or twice. Approximately 60% of the biographies of women concentrated on the following three main sequences:

LE
LEF
LEFE.

Men show a smaller variety of sequences. Approximately 85 % of males had only two sequences: LE, LELE.

The following table informs about the concentration of sequences, i.e. shows the 10 most common sequences for women and men of cohort 1950 in the three regions.

Table 6. **Relative frequencies of the most important sequences for cohort 1950.**

| Type of sequence | Women Cohort 1950 | | | Men Cohort 1950 | | |
|---|---|---|---|---|---|---|
| | Region 1 | Region 2 | Region 3 | Region 1 | Region 2 | Region 3 |
| LELE | 5.5 | 4.8 | -- | 26.8 | 21.2 | 23.1 |
| LELEF | 3.4 | 2.8 | 4.3 | -- | -- | -- |
| LE | 24.0 | 17.2 | 21.4 | 61.3 | 65.8 | 53.8 |
| LEF | 22.6 | 26.2 | 35.7 | -- | -- | -- |
| LEFE | 14.4 | 13.8 | 5.7 | -- | -- | -- |
| LEFEF | 2.1 | 7.6 | 4.3 | -- | -- | -- |
| LEFEFE | 3.4 | 6.2 | 2.9 | -- | -- | -- |
| LFE | 2.7 | -- | 1.4 | -- | -- | -- |
| ELE | 2.7 | 0.7 | 2.9 | 5.6 | 4.1 | 7.7 |
| E | 4.8 | 0.7 | -- | 0.7 | 1.4 | 3.1 |
| Others | 14.4 | 20.0 | 21.4 | 5.6 | 7.5 | 12.3 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Following is a short summary of the main results. We restrict our description here to women because their biographies are more differentiated than those of men owing to their double role in family and professional life. Due to limited space we also only present the results for cohort 1950 although differences between cohorts 1950 and 1955 have emerged.

(1) Each of the 57 sequences is rooted in one of the elements L, E or F. The total number of sequences beginning with element L made up of 86,8 % of all sequences whereas the total number of elements beginning with element E amounted to only 11,7 %. In Düsseldorf and Hannover (= region 1) there was

not a single women with a biographic sequence beginning with the family phase. The number of F-sequences was likewise extremely low in Bochum and Gelsenkirchen (= region 2): The biographies of only three women started with the family phase. In the rural region we found not more than two women starting their life courses with a family phase.

(2) The most common types of sequences are LE, LEF and LEFE. In region 1 they represent 61 %, in region 2 57 % and region 2 63 % of all sequences.

(3) The proportion of women with high education is twice as high in region 1 (favourable labour market conditions) as it is in regions 2 and 3 (unfavourable conditions). Most of the women with high qualifications have a sequence beginning with LEL ..., i.e. a biography with two phases of occupational training. The most common sequences for women with a medium or a low level of education are LE and LEF. The biographies of women with lowest qualifications are very frequently combined with sequence LEFE. Summarizing the main findings: all types of biographic sequences systematically correlate with different types of education. However, the correlation between level of education and type of sequence varies from region to region depending on the regional labour market conditions.

(4) Analyzing the number of children for each of the three main sequences LE, LEF and LEFE according to three levels of education we receive 9 different figures for the number of children per woman. Graphically these 9 figures can be compared with the "roofage" of a building the basement of which comprises the two dimensions "level of education" and "type of biographic sequence" (Figure 9). At first we will examine the relationship between education and number of children.

(4.1) Women with a medium level of education have the lowest number of children, women with lowest qualifications have the highest number of children (see Figure 9). The connection between education and number of children, however, is much more complicated than suspected because it highly depends on the type of biographic sequence: The average number of children for sequence LE is characterized by the well-known U-shaped curve: it declines as the level of education declines and starts climbing again at a medium level of education. Sequence LEF reveals a linear curve: The higher the level of education the lower is the number of children. Sequence LEFE shows the

opposite relation to sequence LE: the average number of children climbs from a low level of education to a medium level and drops from a medium to a high level. All three types of relation U-shaped (= sequence LE), linear (= sequence LEF) and roof-shaped (= sequence LEFE) move in the same direction in all three regions. But although they have the same direction they deviate from one another in the levels and slopes of the curves.

(4.2) If we look at the same relationship in direction of the dimension "type of sequence" we achieve a "roof-shaped" relation between the average number of children and the type of sequence for each of the three levels of education: sequence LE reveals the lowest average number of children, in sequence LEF it climbs and in sequence LEFE it declines again. The observed reduction in the average number of children will be denoted by re-entry effect of the labour market. We assume that those women who had the sequence LEFE when they were interviewed already had less children in the phase F of the sequence LEF than those women who had remained in the phase F of the sequence LEF up to the date of the interview. This can be interpreted in the following way: In sequence LEF women already decide on the actual number of their children according to their plans concerning a future re-entrance into the labour market. This re-entry effect can be calculated as follows:

$$r = \frac{\text{Children per woman of sequence LEFE}}{\text{Children per woman of sequence LEF}}$$

The re-entry effect was r = 0.690. This means that all women who re-enter the labour market after a family phase have 31 % less children than those women who do not return to the labour market. The greatest effect is observable for women with low and high levels of education:

| low level | medium level | high level |
|---|---|---|
| r = 0.659 | r = 0.786 | r = 0.588 |

The re-entry effect also differs regionally. The largest reduction in the number of children (1 - r) appears in the cities of Düsseldorf and Hannover with a prosperous labour market, the smallest reduction appears in Bochum, Gelsenkirchen and region 3 with unfavourable conditions:

| | r (all levels of education) |
|---|---|
| Düsseldorf | 0.619 |
| Hannover | 0.667 |
| Bochum | 0.867 |
| Gelsenkirchen | 0.706 |
| Region 3 | 0.742 |

For economically active women with children the phases E and F occur at the same time. F/E-phases are defined in the following way:
a) women with children who have been employed during the last phase, i.e. were still employed at time of the interview, b) women who were employed after the birth of a child but were in either phase F or L at time of the interview.

Table 7 gives a first estimation of the frequency of F/E-phases . In the big cities more than 50% of the women with children are economically active. In the rural communities the proportion is less than 50%.

**Table 7. Women without and with F/E-phases according to cohorts and regions.**

| | without F/E-phases | | total | with F/E-phases | number of cases | with F/E |
|---|---|---|---|---|---|---|
| | without children | with 1 child and not employed since birth of that child | | | | women with children |
| Cohort 1950 | | | | | | |
| Region 1 | 39 | 9 | 48 | 58 | 146 | 54% |
| Region 2 | 22 | 22 | 44 | 62 | 145 | 50% |
| Region 3 | 5 | 4 | 9 | 25 | 70 | 38% |
| Cohort 1955 | | 6 | | | | |
| Region 1 | 73 | 18 | 91 | 34 | 154 | 42% |
| Region 2 | 33 | 23 | 56 | 44 | 141 | 41% |
| Region 3 | 14 | 9 | 23 | 21 | 70 | 38% |

### 5.5.2. Impact of the structure of the biographies of women on the regional fertility differentials

If a biographic sequence indicating a high average number of children occurs more often in a given region than a sequence indicating a low average number of children this will increase the average number of children per woman in that region. The corresponding effect will be called "sequence pattern effect". If there is a concentration of women on a sub-group with lower education then there will also be an increase in the number of children per woman in that region and vice versa. This effect will be denoted by "education effect". Finally, should the number of children in a certain region be higher or lower for a specific sequence as well as for a specific level of education then we will use the expression "sequence pattern education effect" or joint-effect.

All three effects can either be positive or negative and their relative weight can be high or low. A compensation of positive and negative effects would lead to a levelling of the average number of children in all regions. Such a levelling does not allow us to believe in an equal reproductive behaviour for all regions.

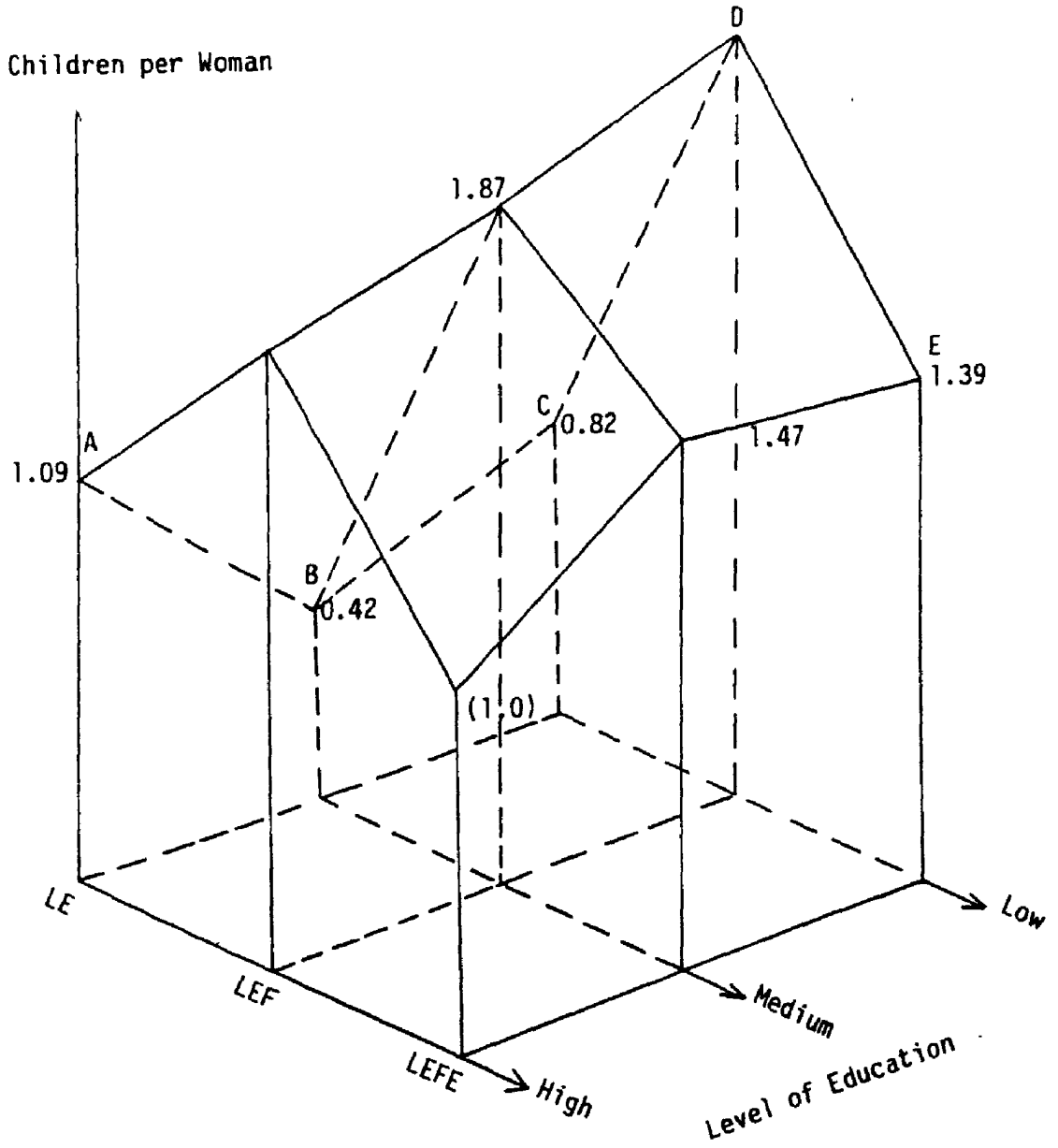
To find out whether a compensation of negative and positive effects has appeared it is necessary to calculate the average number of children for each sequence and, separately, define it for each level of education within each sequence. We have made these calculations analogous to the sample of Figure 9, reflecting the following. (I) Sequence pattern effect: More LE-sequences occur in region 1 than in region 2 leading to a decrease in the average number of children in region 1. (II) Education effect: The number of sequences characteristic for the category "high education" is twice as high in region 1 as it is in region 2. This effect, too, results in a reduced average number of children in region 1. (III) Sequence pattern education effect: a) In region 1 the number of children per woman in sequence LEF is remarkably higher than in region 2. This applies to all levels of education but shows itself more markedly for women with a low and medium level of education. So this partial effect (a) results in an increase in the average number of children in region 1. b) The number of children per woman in the sequence group "others" (= total of sequences excluding the three main sequences LE, LEF and LEFE) is much lower in region 1 than in regions 2 and 3. Consequently, this partial effect (b) leads to a decrease in the average number of children in region 1.

**Figure 8.** **Dendrogram of the biographic sequences of women of cohort 1950 in Region 1, 2, and 3.**

| No. | Type of Sequence | Frequency of Sequence | | | | % | % | % | |
|---|---|---|---|---|---|---|---|---|---|
| | | Region 1 | Region 2 | Region 3 | Total | Region 1 | Region 2 | Region 3 | Total |
| 1 | LELELE | 3 | 3 | | 6 | 2.1 | 2.1 | | 1.7 |
| 2 | LELEL | 1 | 2 | | 3 | 0.7 | 1.4 | | 0.8 |
| 3 | LELELF | | | | | | | | |
| 4 | LELE | 8 | 7 | | 15 | 5.5 | 4.8 | | 4.2 |
| 5 | LELEF | 5 | 4 | 3 | 12 | 3.4 | 2.8 | 4.3 | 3.3 |
| 6 | LELEFE | 2 | 2 | | 4 | 1.4 | 1.4 | | 1.1 |
| 7 | LEL | 3 | | | 3 | 2.1 | | | 0.8 |
| 8 | LELFLF | | | | | | | | |
| 9 | LELF | 2 | | | 2 | 1.4 | | | 0.6 |
| 10 | LELFE | 2 | | | 2 | 1.4 | | | 0.6 |
| 11 | LE | 35 | 25 | 15 | 75 | 24.0 | 17.2 | 21.4 | 20.8 |
| 12 | LEFLE | | | | | | | | |
| 13 | LEFLEF | | | 1 | 1 | | | 1.4 | 0.3 |
| 14 | LEFLF | | | | | | | | |
| 15 | LEFLFE | | 1 | | 1 | | 0.7 | | 0.3 |
| 16 | LEF | 33 | 38 | 25 | 96 | 22.6 | 26.2 | 35.7 | 26.6 |
| 17 | LEFELE | | | | | | | | |
| 18 | LEFE | 21 | 20 | 4 | 45 | 14.4 | 13.8 | 5.7 | 12.5 |
| 19 | LEFEF | 3 | 11 | 3 | 17 | 2.1 | 7.6 | 4.3 | 4.7 |
| 20 | LEFEFE | 5 | 9 | 2 | 16 | 3.4 | 6.2 | 2.9 | 4.4 |
| 21 | L | | | | | | | | |
| 22 | LFLE | 2 | | | 2 | 1.4 | | | 0.6 |
| 23 | LFLEF | 1 | | | 1 | 0.7 | | | 0.3 |
| 24 | LFL | | | | | | | | |
| 25 | LFLFLE | | | 1 | 1 | | | 1.4 | 0.3 |
| 26 | LFLFL | | | | | | | | |
| 27 | LF | | 3 | 2 | 5 | | 2.1 | 2.9 | 1.4 |
| 28 | LFELEL | | | | | | | | |
| 29 | LFE | 4 | | 1 | 5 | 2.7 | | 1.4 | 1.4 |
| 30 | LFEFL | | | | | | | | |
| 31 | LFEF | | | | | | | | |
| 32 | LFEFE | | | 1 | 1 | | | 1.4 | 0.3 |
| 33 | LFEFEF | | | 1 | 1 | | | 1.4 | 0.3 |
| 34 | ELELE | | 1 | | 1 | | 0.7 | | 0.3 |
| 35 | ELELEF | | | 1 | 1 | | | 1.4 | 0.3 |
| 36 | ELEL | | | | | | | | |
| 37 | ELE | 4 | 1 | 2 | 7 | 2.7 | 0.7 | 2.9 | 1.9 |
| 38 | ELEF | 2 | | | 2 | 1.4 | | | 0.6 |
| 39 | ELEFE | 1 | | | 1 | 0.7 | | | 0.3 |
| 40 | EL | | | | | | | | |
| 41 | ELFLE | | | | | | | | |
| 42 | ELFL | | | | | | | | |
| 43 | ELF | | | | | | | | |
| 44 | ELFE | | | | | | | | |
| 45 | E | 7 | 1 | | 8 | | 4.8 | 0.7 | 2.2 |
| 46 | EFLFE | | | | | | | | |
| 47 | EF | 2 | 6 | 3 | 11 | 1.4 | 4.1 | 4.3 | 3.0 |
| 48 | EFE | | 5 | 2 | 7 | | 3.4 | 2.9 | 1.9 |
| 49 | EFEF | | 1 | 1 | 2 | | 0.7 | 1.4 | 0.6 |
| 50 | EFEFE | | 2 | | 2 | | 1.4 | | 0.6 |
| 51 | FLELEF | | | 1 | 1 | | | 1.4 | 0.3 |
| 52 | FLE | | | | | | | | |
| 53 | FLFEF | | | 1 | 1 | | | 1.4 | 0.3 |
| 54 | FLFEFE | | 1 | | 1 | | 0.7 | | 0.3 |
| 55 | F | | 1 | | 1 | | 0.7 | | 0.3 |
| 56 | FEF | | 1 | | 1 | | 0.7 | | 0.3 |
| 57 | FEFEF | | | | | | | | |
| Total | | 146 | 145 | 70 | 361 | 40.4 | 40.2 | 19.4 | 100.0 |

L = professional training, E = phase of work and F = family phase
About 40-50% of the elements E are combined with F. See text.

**Figure 9.** **Fertility of women according to type of biographic sequence and level of education - Cohort 1950, Regions 1, 2 and 3 - late.**




L = vocational/professional training
E = working phase
F = family phase

## NOTES

1. Contrary to the so-called "first decrease in birth rates" between the end of the last century and the third decade of this century.

2. Courgeau, D.: Constitution de la Famille et Urbanisation. In: Population (Paris) 1, 1987.

## REFERENCES

Baltes, P.B. and O.G. Brim jr. [1979],
*Life-Span Development and Behaviour*, Vol. 2, New York, San Francisco, London.

Birg, H. [1987],
"A Biography Approach to Theoretical Demography". *Materialien of the Institute for Population Research and Social Policy*, Vol. 23, Bielefeld (University of Bielefeld).

Birg, H. [April 1989],
*A Biographic-Demographic Analysis of the Relationship between Fertility and Occupational Activity for Women and Married Couples.* Paper prepared for the Workshop on "Female Labour Market Behaviour and Fertility: Preferences, Restrictions and Behaviour", The Hague (Netherlands Interuniversity Demographic Institute [NIDI]).

Birg, H.; W. Felber and E.-J. Flöthmann [1984],
"Arbeitsmarktdynamik, Familienentwicklung und generatives Verhalten - Eine biographietheoretische Konzeption für Untersuchungen demographisch relevanter Verhaltensweisen", *Materialien of the Institute for Population Research and Social Policy*, Vol. 16, Bielefeld (University of Bielefeld).

Birg, H.; E.-J. Flöthmann and D. Filip [1990],
"Paritätsspezifisch Kohortenanalyse des generativen Verhaltens in der bundesrepublik Deutschland nach dem Zweiten Weltkrieg" (Cohort and parity-specific Fertility in West Germany after the Second World War). *Materialien des Instituts für Bevölkerungsforschung und Sozialpolitik*, Bd. 30, Universität Bielefeld.

Birg, H.; E.-J. Flöthmann [1990],
"Regionsspezifische Wechselwirkungen zwischen Migration und Fertilität im Lebenslauf", in: *Acta Demographica, Deutsche Gesellschaft für Bevölkerungswissenschaft*, Bd. 1, Heidelberg.

Birg, H.; E.-J. Flöthmann and I. Reiter [1991],
"Biografische Theorie der demographischen Reproduktion", Frankfurt/New York (Campus).

Bühler, Ch. [1969],
"Der Lebenslauf als eine Ganzheit", in: Bühler, Ch./Massarik, F. (Ed.): *Lebenslauf und Lebensziele*, Stuttgart.

Courgeau, D. [September 1985],
"Interaction between spatial mobility, family and career life-cycle: A French survey", in: *European Sociological Review*, Vol. 1, No. 2.

Courgeau, D. [1987],
"Constitution de la Famille et Urbanisation", *Population*, Vol. 1.

Kaa, D.J. van de [March 1987],
"Europe's Second Demographic Transition", *Population Bulletin*, Vol. 42, No. 1, Washington D.C.

Klijzing, E. [1986],
"Relatievorming, huishoudens - ontwikkeling en vruchtbaarheid", *Programmeringscollege demografisch onderzoek*, publicatie nr. 5, The Hague.

Mayer, K.U. and E. Brückner [1989],
"Lebensverläufe und Wohlfahrtsentwicklung", *Materialien des Instituts für Bildungsforschung*, Nr. 35, Berlin.

Uhlenberg, P.R. [1969],
"A Study of Cohort Life Cycles. Cohorts of Native Born Massachusetts women 1830-1920", *Population Studies*, Vol. 23.

Uhlenberg, P.R. [1974],
"Cohort Variations in Family Life Cycle Experiences of US Females", *Journal of Marriages and the Family*, Vol. 36.

Vosgens, W. (Ed.) [1987],
*Methoden der Biographie- und Lebenslaufforschung*, Opladen.

Willekens, F. [April 1989],
*Understanding the Interdependence between Parallel Careers*. Paper prepared for the Workshop on "Female Labour Market Behaviour and Fertility: Preferences, Restrictions and Behaviour", The Hague (Netherlands Interuniversity Demographic Institute [NIDI]).