

REPORT OF THE ROYAL COMMISSION ON POPULATION

THE following is an abstract of a discussion which took place at the Institute on 5 December 1949:

The President (Sir George Maddex, K.B.E.) said that their business that evening was to discuss the Report of the Royal Commission on Population.* They were fortunate in that several of those intimately concerned either with the Commission itself or with the Statistics Committee were present that evening. Their principal guest was Sir Hubert Henderson, the Chairman of the Royal Commission. They also had present Mr Hopkin, the Assistant Secretary to the Commission, and some members of the Institute who were members of the Statistics Committee. Another guest, not concerned with the Statistics Committee, but from whom they would be glad to hear if he was moved to speak, was Mr Roland Bird, of the *Economist*.

Mr B. Benjamin, in opening the discussion, said that it was easy to criticize destructively a report based upon so many shades of opinion, a report whose compilers had been handicapped by having to draw less upon fact than upon speculation. It was, however, imperative that he and those who followed him should try to be constructive. He was reminded of a quotation from Clifford Allbutt which could be found in the notebooks of many medical students:

our paths are encumbered by guesses and conjectures, the untimely and sterile fruitage of minds that cannot bear to wait for the truth and who are willing to forget that the use of hypothesis lies not in the display of ingenuity but in the labour of verification.

He hoped that that thought would colour the discussion.

The terms of reference of the Royal Commission on Population were:

to examine facts relating to the present population trends in Great Britain; to investigate the causes of these trends and to consider their probable consequences; to consider what measures, if any, should be taken in the national interest to influence the upward trend of population, and to make recommendations.

It was left to the Commissioners to decide what was connoted by the words 'national interest'. The Commission was appointed in March 1944, before that transition from hot to cold warfare which took place in the summer of 1945, and before the election which produced a sudden shift in the meaning of the phrase 'national interest'. Population influences—and, indeed, economic conditions generally—were marked by an instability which had continued and which still prevailed. There could not have been a worse time to examine population trends and his first point of criticism was in the timing of the investigation. Many of the facts available were of a temporary character. There could hardly have been any real sense of urgency and it ought to have been appreciated that a Commission sitting after the projected census of 1951 would be in a very much more favourable position.

What facts were available? The first British census was taken in 1801, and at decennial intervals since that date an instantaneous snapshot had been taken of the growing population of Great Britain. Taken together, those snapshots formed a moving picture of a century and a half of rapid growth involving a seven-fold increase in size. In the last half century the rate of growth of the population had sharply declined. Those changes had been experienced by many other countries, particularly those with highly developed industrial systems. The national statistics furnished annually by the Registrar-General indicated that since the middle of the nineteenth century mortality had been steadily

* Cmd. 7695.

declining, that the expectation of life at birth had increased from 43 years in 1870 to the current figure of 65 or more, but that the birth-rate declined continuously from a peak of about 35 per thousand in the decade 1865-75 to about 14.4 in the years before the war of 1939-45. The natural increase of population had been declining rapidly from 4,587,000 in 1901-11 to 1,160,000 in 1931-41. The census tabulations, with all their invaluable detailed pictures of the instantaneous sex, age and social distribution of the population, did little more than reflect the results of those changes, together with the effect of a swing in migration. They did not show how or why those movements developed. A great deal had been written about the effect of the industrial revolution on what might be described as the biology of man. An expanding industrial economy both encouraged and was encouraged by an expanding population, and the social and environmental conditions had reacted powerfully upon health and mortality. In an age of scientific progress in which atomic power was but a symbol, it might be confidently expected that the natural faculty of invention in man would for long withhold those checks on population growth which were envisaged by Malthus. The broad picture had been clear but broad movements over the longer term were not sufficient for the short-term problem of deciding where and how fast things were changing and whether action might be taken with a view to altering the direction or the pace. A great deal more detail was needed by the Commission. A closer study was necessary of the interaction between social conditions and family building, and certain special studies had been undertaken. In addition use was made of *ad hoc* studies which had already been completed. To mention the last first there were the pre-war analyses of household expenditure undertaken by the Ministry of Labour and by the Civil Service Statistical and Research Bureau, which provided pictures of the mode of life and the economic influences operating upon families in two broad sections of the population—the manual and the non-manual workers.

Of fresh studies initiated on behalf of the Commission one was associated with the practice of family limitation. Though certainly not a new factor it was possible and necessary to take it more specifically into account. To a greater degree than ever before there existed a distinction between fertility, the potentiality of childbearing, and fecundity, the actuality of childbearing. That complicated the simple biology of man. Birth control first depended upon educational and economic advantage, and contributed at least a part of the difference in the fertility of the various social strata. To investigate the modern role of that factor Dr Lewis-Fanning conducted an inquiry into the practice of family limitation and its influence on human fertility, of which only the broad results were referred to in Chapter 5 of the Report of the Commission. That chapter was unsatisfactory; in places it seemed to confuse cause and effect and the emphasis did not always seem to be on the most important features. The Commission made great play of the economic handicap of parenthood as a spur to the restriction of family size. They did not appear to recognize—at least such a recognition was not expressed in Chapter 5—that some parents might find real pleasure in children and might be willing to pay a price for that pleasure. There were, indeed, reasons for suggesting that to a small extent immediately prior to the war of 1939-45, and to a greater extent since the war, there had been a shift in the sense of values in the appraisement of the desirable standard of living, and that the middle and upper classes, whose first violent reaction against unrestricted procreation had spent itself, had rediscovered the delight of children. The statistical foundation for the suggestion was poor but there was an unmistakable impression of an improvement in the quality of mothers that could not be accounted for entirely by more effective medical or nutritional care or by enhanced health consciousness on the part of the women. Even before the National Health Service popularized the municipal maternity centres doctors had spoken of meeting young women whose counterparts a few years earlier preferred bridge parties to nursery games. That might possibly explain in part the dramatic fall in infant mortality. In the third quarter of 1949 in England and Wales the stillbirth rate was 21.9 per thousand total births, and deaths under one year of age were 26 per thousand live births, both rates being lower than in any previous quarter.

The phrase 'family planning' should not be taken too literally. Men and women were

creatures of impulse who might be impatient of the mechanics of contraception. Family planning was not entirely the deliberate process that the term would imply. The most that could be said was that (to quote from the Report):

(1) the great majority of married couples nowadays practise some form of birth control in order to limit their families and (2) that they are successful not in the sense that birth control never fails, but in the sense that it reduces the number of conceptions considerably below the number that would otherwise take place.

A second special study, a Survey of Child Bearing which had been separately published, had considered the relative importance of the various financial, medical and other stresses of maternity. The investigation attempted to answer the following questions (quoted from the preface to the special study):

What services are available to women bearing children,

How far are they used,

What are the factors affecting and how do they help women to regard child birth as a normal process,

How far do they prevent premature birth and infant death and promote the health of mothers and infants;

Finally, what do parents spend on pregnancy and child birth?

The general conclusion of the Commission was that 'social developments over the past seventy or eighty years have tended to accentuate the relative economic and other handicaps of parenthood, and that despite recent amelioration these handicaps at nearly all income levels are still substantial. In the process of social advance, until recently, the family has been overlooked or given only a minor place in social policy. On the economic side the most important effect is that for most families the addition of children involves a substantial reduction of the family's standard of living; on the non-economic side the worst effect is felt by mothers who have shared little, if at all, in the great growth of leisure in modern times; and the overall effect has been to lower the status of the family in the national life'. That was plausible and reasonable and it was right that those things should be said, but it should not be overlooked that many parents had large families either because they did not think about those handicaps, or did not consider them important, or anticipated that ultimately by virtue of a large family they might enjoy in later life a greater degree of happiness than they would otherwise have had.

The last remaining section of original data, made available to the Commission, was the Family Census. Throughout their report the Commission had stressed the importance of family size. The purpose of that census, which was taken on a sampling basis in 1946, was to obtain a picture of the building of families by persons married at specified ages in specified years, and belonging to specified social classes, throughout each stage of their fertile married life.

What use was made of the data available to the Commission? Chapter 3 reviewed succinctly the principal factors determining population growth namely (1) migration, (2) mortality, (3) marriage and (4) family size. Between 1871 and 1931 Great Britain sustained a continuous net loss by migration, which was reversed at the time of and after the depression of 1931. The effect of that reversal was to sustain artificially the growth of total numbers in the population and to affect its age and sex distribution. The most striking effect was an increase in the proportion of men to women. The Report reviewed the decline in mortality over the previous hundred years and discussed the causes. It reached the conclusion that 'most of the wastage of human life which formerly took place at young and middle ages has now been cut out. Only among the old could further reductions in mortality have really considerable effects on numbers'. Modern medicine was currently placing less and less emphasis on the 'accidents' of infection, and more and more on the process of ageing, upon degenerative disease. With regard to marriage the Commission distinguished between the proportion of people who marry and the age at which they marry; the latter tended to vary a great deal more than the former. In the most recent generations (i.e. those born since 1914) the proportion married in the age-group twenty to twenty-four had been unprecedentedly high, reflecting a considerable

reduction in the age at marriage. That had a powerful short-term effect on the number of marriages and of annual births. The chapter was completed by a picture of the decline in family size and of the different fall in different social classes.

The manner in which the movement of those factors should be summarized for the purpose of assessing population growth had been carefully considered by the Commission, and a valuable review of methods had been given in an Appendix by Mr W. A. B. Hopkin. The natural increase of population had long been discarded as an unreliable index of prospective long-term population growth because it obscured changes in the age structure. The next suggestion considered the stationary population which would ultimately emerge from the continuation of the current annual number of births, but that did not take account of a possibly abnormal proportion of people of childbearing age in the population, i.e. it gave no warning that a depression of that proportion might rapidly reduce the flow of births. An alternative was to consider the 'replacement' of parental age-groups only, but the picture remained coloured by the current age distribution over the childbearing ages. The logical extension of the method was to use fertility rates and mortality rates age by age, which could be applied to a generation of newborn babies to measure first their survival to and throughout the childbearing ages, and secondly the number of children they produced. The latter number was related to the original generation and if the ratio was less than unity the population would be said to be failing to replace itself. There were difficulties of detail such as the irreconcilability of measures based upon purely female and upon purely male data, and there was the major difficulty that the interpretation did not suggest itself immediately to the ordinary person by the nature of the figures. For example, should the rate persist indefinitely at 0.90 the usual interpretation was that *eventually* the population would undergo a steady decrease of 10% over a generation (an interval of time equal to the average difference in age between parents and children). No indication was given of the length of a generation or of the period of time after which the steady decrease would emerge. The net reproduction rate made use of age-specific mortality and fertility rates to correct for abnormalities in age distribution in the population; it did not correct for disturbances in current births arising from other temporary factors. Hopkin gave two examples: fluctuations in the proportion recently married, and in the rate at which married couples built up their families. The first factor was allowed for by marriage-standardized reproduction rates, but that introduced the difficulty of selecting marriage rates for the process of standardization. The second example, namely variations in the spacing of births of families of the same size, was an important factor. It compelled observation of the growth of the families of groups of couples married at different points of time. That was the important use of the Family Census. It meant a delay of at least ten years before any adequate idea could be formed of the family building experience of a particular group of couples, but that might not be a bad thing. It was better than making a hasty judgment on the basis of a 'reproduction rate'. For example, temporary postponement of births during an unemployment crisis might not seriously affect ultimate family size but it would upset 'reproduction rates'. Hajnal (*Population Studies*, 1947, 1, 150) quoted the experience of Germany after the Nazis came to power 'that the rates of those (marriages contracted before the dictatorship) who had postponed births to make up rose more than the fertility rates of those who had not' showing that 'family size changes fairly slowly'. Hajnal, dealing in the same article with the stability of family size, put an important point:

To establish that changes in fertility rates are not necessarily an indication of changes in family size it is not necessary to have any very extravagant idea as to the extent to which the number of children is planned and foreseen. It is not necessary to assume that all married couples begin their married life with a fixed idea (afterwards invariable) as to the number of children they want, that they are all completely successful in having this number of children, no less and no more, and in 'postponing' and 'anticipating' childbearing exactly when they wish. To take the last point first, it is only necessary to suppose that a substantial proportion of couples attempt to exercise control over the time at which they have children with such success that they can substantially

reduce the rate at which, as a group, they have children in a given period. A moderate degree of control attempted by, say, half the couples in a population would fully explain the fluctuations which are in fact found in fertility rates.

Nor is it necessary to assume that married couples never in the course of their lives modify their plans as to the number of children they intend to have. For example, in an economic depression there are no doubt some who put off having another child—which they might have had soon in favourable circumstances—so long that they never in fact have it at all. There will no doubt be some who will decide never to have any more. The argument for analysing fertility movements in terms of family size lies solely in the experience that changes in family size are far less irregular than fluctuations in fertility rates.

Hajnal's argument proceeded to show how preoccupation with fertility rates had led to many of the early prognostications turning out to be entirely at variance with the facts.

As a result of those considerations the Commission concluded that in Great Britain, allowing for further reduction in mortality, the average size of family resulting from marriages originating in 1927-38 was only 6% below replacement value.

There were two special features of those statistics which were worthy of consideration. Family size was related to the average age at marriage. Early marriage, especially for a woman, increased the number of years of 'exposure to risk' of birth of children. In recent years, the average age at marriage had fallen. It had fallen before 1939 and had remained low ever since 1940. The Commission considered it unlikely that there would be a complete reversal of that reduction in the average age at marriage. They recognized that it was probably, in part, associated with full employment, but they thought that it was also associated with the extension of contraception removing the need for family limitation by postponement of marriage. There appeared to be no statistical evidence for the latter belief except that the decline in average family size from 1875 to 1911 was accompanied by a rise in the average age at marriage. He felt that widespread unemployment would produce a considerable rise in the average age at marriage.

The second feature was the difference between the average family size of social classes. The Commission noted a difference between manual and non-manual workers, and a divergence in trend between the two groups. At the end of 1945 family sizes at durations up to fifteen years were, for non-manual workers, either slightly greater or about the same as at the same durations in 1939; among the manual workers, the 1945 figures were consistently below those of 1939. As the Commission put it:

in a large and important section of the population, the size of family seems to have been increasing. The section is one in which families had been most reduced and in which family limitation was particularly widespread. It seems likely that a change has been taking place in the attitudes of the married couples in this group, leading them to desire somewhat larger families. It is, of course, perfectly possible that a similar change in attitudes has also been taking place among the manual workers but has there been masked by further diminution of a proportion of unlimited families.

Mr Hopkin had kindly made available the page proof of the preliminary report of the Family Census but, even if consideration were limited to the first ten years of married life, it did not deal with marriages after 1935. At duration 10, average family size for the class broadly representing non-manual workers fell continuously from 1.92 for marriages of 1910 to 1.42 for marriages of 1930. For subsequent marriage years the figures were 1.41, 1.38, 1.33, 1.38, 1.41, suggesting a distinct turn in 1933. For manual workers, on the other hand, the fall had persisted up to marriages of 1935. The implication was that there might be compensating forces at work. The Commission was appointed too soon to tell the whole story and a further Family Census in a few years on a much more modest basis would be desirable. It seemed that the stability of average family size in the population as a whole might mask movements which were capable of producing important effects upon the constitution of the population.

The Commission crystallized their view of the possibilities inherent in the situation by a number of population projections. He found that section of the Report more satisfying

than others. In all, sixteen projections on various assumptions were made and in that sphere at least, no-one could accuse the Commission of a lack of thoroughness. The result of those calculations was that, notwithstanding the speculative nature of assumptions about age, marriage and family size, the Commission were confident that total numbers would grow perhaps for another generation, though only slowly. There would be a progressive ageing of the population, though the actual extent of the increase in the proportion of old people in the population would depend upon possible mortality improvement. The rest of the picture was more speculative. If the future family size were to be 6% higher than among the couples married in 1927-38, total numbers would stabilize and there would be no decline. If the change went slightly the other way, the decline and the ageing effects would be accelerated. Beyond establishing that things were not so bad as they were once thought to be, the Commission could only exhibit the effect of speculations about the permanence or impermanence of post-war features of those statistics.

The Commission provided a discussion of the advantages and disadvantages of growing numbers against the historical background. They noted that Britain's predominance as an exporting nation had been fading for a considerable time in the face of contracting markets and that it was necessary either to produce more or to consume less per head. They then said that the size of population had little effect on the magnitude of that problem, because smaller numbers would do little to correct the excess of consumption over production. If more was to be produced, the ageing effect of a declining population must be regarded as serious. Could immigration prevent a prospective fall in the working population? The Commission met this question by another. Could Britain afford to neglect the need for emigration to Commonwealth countries to maintain the role of British stock? Those questions were discussed at length. The Commission accepted the dictum of the Economics Committee that:

the stock of inherited capital equipment must be expected to grow progressively less useful and less appropriate as time passes and technical conditions change. If a plethora of industrial plant were to lead to a slower rate of replacement, the resulting theoretical economy might be dearly purchased at the cost of a retarded rate of technical progress. Indeed, the urge towards improvement and invention might thereby be subtly but powerfully weakened throughout our whole national life.

The Commission produced many arguments to support that opinion. Few would be willing to abandon the nation's struggle to maintain and improve its position as an industrial power. Britain's position would probably be easier if the world were not divided into contending camps and if foreign markets could be sought more freely. The future held a challenge and he thought that the Commission were right to accept that challenge. If it were agreed that Britain should endeavour to maintain its industrial strength and such intimate links as it had with the Commonwealth countries, then the Commission's decision in favour of a 'replacement' population flowed naturally from an objective consideration of the economic facts. In considering the needs of the Commonwealth countries the Commission might, he thought, have made a closer study of Commonwealth demography, and some reference to world demography.

As to proposals for achieving the maintenance of the present population size, the Commission first considered an extension of recent economic action; assistance to families, as such, in cash and services. He could not review the details but he was troubled by one important difficulty. If the Commission were right in suggesting that family size was relatively stable in the face of economic disturbance, would family size be sufficiently sensitive to such measures as they suggested? The Commission stated that 'the experience of France suggests also that a well-founded policy of assistance to families may avert the need for more extreme measures in a later generation'. But the Commission, themselves, did not appear to have made an exhaustive study of the magnitude of the economic action that was necessary; rather they seemed to suggest what might be regarded as reasonable and acceptable, in the hope that it would also prove sufficient. He thought that they might have urged a bolder programme of study and experiment.

The Commission remarked that:

since the general movement of ideas in the community as well as material considerations enter into the trend of family size, it is important that the two-fold objects of family welfare—social equity and the maintenance of the population—should be widely understood and approved. Educational effort is needed to spread throughout the community some understanding of the broad facts of the population trend and its consequence.

From the standpoint of the Commission that was wise counsel, but the remainder of the Report and the experience, for example, of Germany, led him to think that full employment was more important for population growth than propaganda. Who was to conduct the propaganda? Beyond suggesting a bias towards family life in the educational system, the Report was vague.

The commission considered that there was no finality about their Report and they urged that research on population growth should be encouraged. They said that:

in Great Britain the arrangements for the collection and analysis of fertility statistics are not adequate to modern needs and apart from the work of a few voluntary bodies and individual research workers, there is no research into the social and economic, medical and psychological factors that enter into the trend of population.

The Report suggested that Family Census questions should be included in the General Census at regular intervals; that the statistical divisions of the General Register Offices should be strengthened; and that there should be regular analyses of fertility data. It was recommended that the Interdepartmental Committee on Social and Economic Research should be entrusted with the promotion of research. The Commission did not say who was to undertake the actual research, and he had some misgiving. He was not satisfied with the past record of some of those who had hitherto taken the unquestioned status of specialist; they had on occasions been more sensational than practical, more concerned with exaggerating the complexity of the problems than with getting to grips with those problems. It was only fair to say that others, such as Hajnal and Hopkin in their work for the Commission, had been intensely practical and had made invaluable contributions for which there could be nothing but the highest praise.

He suggested, however, that it was high time that the long experience and special training of actuaries (which found no mention in the Report) should receive wider recognition in relation to the field of demography. There was surely no problem in the analysis and interpretation of fertility and mortality data which was new to the actuary. Demography was not a separate science; it was only a part of actuarial science (and as such had taken its proper place in the Institute's examination syllabus). He understood that a demography study group was about to be formed by the Students' Society. With a broad background and a detailed study of the necessary statistical techniques the actuary of the future would, he was confident, not only exercise a beneficial influence in urging research workers to keep their feet planted on the ground but would make his own distinctive contribution to original research. Population projections, provided they were not taken to absurd limits of time, were useful in illustrating the effect of various assumptions about fertility and mortality changes; that was not so much a special study as part of the actuary's stock-in-trade and it was an immediate practical and valuable contribution which actuaries might make. In the forecasting of mortality and other factors they had long experience to draw upon and well developed techniques at their disposal. Many other statistical methods of demography were already part of their tradition. With due humility they had already contributed a great deal; he was sure that with the same humility they would contribute a great deal more.

Mr R. D. Clarke referred to the Introduction to the Report of the Royal Commission which promised the publication of a separate volume containing some of the special reports of the Statistics Committee. It was unfortunate that that volume had not appeared in time for the discussion that evening, because its absence to some extent limited the usefulness of any comments which it was possible to make. He wished,

however, to express appreciation of the admirable exposition of fertility indices contributed by Mr Hopkin in an appendix to the main report. For some time the limitations of the net reproduction rate had been increasingly recognized, and Mr Hopkin aptly summarized the current point of view in his statement that 'the construction of reproduction rates must not... be regarded as the main object of demographic analysis'.

Chapter 6 of the Report was entitled 'The recent increase in births'. In order to assess any genuine increase which might have taken place in reproductivity, the Commission had endeavoured to eliminate the effect of the births postponed from the war period and also of the recent reduction in the average age at marriage, which had led in turn to a substantial, though temporary, increase in the number of marriages taking place. Both these factors affected the age-specific fertility rates during the period in question, and seriously hindered attempts to get a clear picture of true reproductivity.

It was interesting, however, to notice another feature which, though it did not affect the fertility rates, had made a perceptible contribution to the increase in the absolute numbers of births which had occurred in recent years. He was referring to the arrival at the main reproductive ages of the large generation or cohort of women born in the three-year period 1920-22. If Table AA of Part II of the *Registrar-General's Statistical Review for England and Wales* was inspected for any of the years 1945, 1946 or 1947, a sharp rise in the live births would be observed as between mothers born in the years 1917-19 and those born in the years 1920-22. A summary of the totals might be of interest. In 1917-19, 987,000 female children were born in England and Wales, and they produced approximately 380,000 live births in 1945-47. In 1920-22, however, 1,261,000 female children were born, and in 1945-47 they produced approximately 490,000 live births. Those figures were the more noteworthy in so far as the older cohort were passing through the ages of maximum reproductivity during 1945-47.

He had drawn attention to that feature because, although it accounted for only 20 % of the extra births occurring in recent years, the time was not so far off when that numerically large cohort of women would be passing out of the peak reproductive period. The annual number of births, which was the figure most apt to appeal to popular imagination and to stimulate authority into action, would then be due to fall on that account alone. Even if there had been no war and no variation in the marital age, there would still have been a rise in the annual total of births during the 1940's, to be followed later by a fall.

There was another effect which the first world war had had on the demographic history of Great Britain. One of the reasons why the net reproduction rate was no longer regarded as a satisfactory index was the well-known discrepancy between the male and female rates. It seemed a little curious—though naturally it was always easy to 'job backwards'—that that feature should have caused surprise. It was fairly elementary that in any community in which the male population of reproductive age had previously been reduced by war mortality, as was the case in the 1920's and early 1930's, the index obtained by relating male births to men would be higher than that obtained by relating female births to women, and the difference would be accentuated if the male births exceeded the female births. Other factors were involved, of course, including the difference between the mean generation spans of the two sexes; but it was salutary to recall that concentration by pre-war demographers upon the female net reproduction rate led to a defective analysis of the population problem. Since major decisions of government policy might result from the conclusions reached by demographers, the need for further research and study called, as the opener had already indicated, for all possible emphasis.

Undoubtedly one of the biggest tasks for demography, as it was indeed for the Royal Commission itself, was the development of reliable indices for measuring the true reproductivity which so frequently lay obscured beneath purely ephemeral features. With that end in view, marriage-standardized indices had been proposed, and also a joint index which endeavoured to circumvent the discrepancy between the male and female rates. All those measures suffered from the drawback that they were based upon the age-specific fertility rates experienced within a limited period of time, and were thus unsuited to represent a generation effect.

The decision of the Royal Commission to emphasize the value of data on family size was therefore a logical and welcome development. It was true that data of that kind could not be known as swiftly as might be desired; but impatience could to some extent be mitigated by an examination of the Registrar-General's Table KK from year to year, which gave an analysis of maternities according to both the mother's age and the number of surviving previous children. Thus, if a comparison were made between 1946 and 1947 it would be seen that while first, second, third and fourth births showed an increase in the latter year, births of the fifth and all higher orders showed a decrease. From these observations it was at least possible to suspect that as yet there had not been any reaction in favour of the Victorian family size.

It was interesting to speculate both on the causes and on the effects of the recent reduction in the average age at marriage. If it was believed that the cause was economic, and that the likely effect was a larger family size, it would behove a Government which decided to promote population growth—or at least to stem its decline—to see that economic conditions for the age-group twenty to twenty-five continued to be favourable. At the same time, it should not be overlooked that the cause might be as much sociological as economic. Was it possible, for example, that military service, by removing young men from their parental homes, encouraged independence and a desire to found their own households earlier than they might otherwise have done? He offered no opinion on that question, but it might not be wise always to assume that the economic hypothesis was the right one.

Paragraph 417 of the Report emphasized the need for further research into the effect of differential fertility upon national intelligence, a subject whose importance could hardly be overestimated. The evidence which had been assembled was inconclusive, and the experts did not agree. If it was correct that intelligence was hereditary, and that the most intelligent showed the lowest reproductivity, the outcome for the country would in the course of time be disastrous. Demography could render no greater service to the nation than by searching out the full truth on that all-important question.

Mr V. P. A. Derrick said that he did not intend to emulate the opener of the discussion by attempting to cover the whole of the complex and bewildering Report of the Commission, but would confine himself to one very narrow issue which related to the subject of fertility measurement, as used by the Commission. He wished first of all to enter a mild caveat against the too ready acceptance of the implications concerning the relative merits of the reproduction rate and the method used by the Commission, because he did not think that the two were really comparable; they were not alternatives. The reproduction rate dealt exclusively with the past, while the Commission's measurement was solely concerned with the future.

The reproduction rate measured the degree of replacement which was actually taking place in an actual birth experience; *per se* it contained no implication whatever concerning the future. It was true that, if over a series of years a trend could be discerned, common-sense suggested that it was not unreasonable, in the absence of contrary indications, to expect it to continue for a few immediate years; but only a short-term expectation would be justified, and it would rely solely on the general experience of continuity. The Commission even disliked that degree of inference, because they said that the reproduction rate might be distorted through variations in marriage rates carrying with them differential issue rates. He did not think, however, that that argument should be over-emphasized, because, after all, the number and ages of marriages were known, so that any distortion could be measured, and could be allowed for in considering the fundamental trend. He thought that the element of distortion was of minor consequence in ordinary peace-time experience.

In further justification of their approach, the Commission took the view that it was not so much the immediately forthcoming period which was of interest, but rather the years of the long-term future—an understandable view which many no doubt would share. But if immediate events could not be foreseen with any confidence, how much more hazardous must be any attempt to envisage the more distant future! His personal conviction was that the Commission had attempted the impossible. Having regard to

the complexity and degree of variation of the factors which influenced the birth-rate—some measurable, but others quite imponderable, as the opener had indicated—he felt that the possibility of arriving at a long-term conclusion worthy of the slightest credence was almost non-existent.

However, the Commission thought differently, and felt able to assert very positively, and without any reservations, that from the long-term point of view the current birth production was definitely below replacement level. The positiveness of such an assertion must evoke the utmost scepticism, because it was bound to be subject to the widest margin of uncertainty—so wide that he would have expected no two independent investigators to reach the same conclusion. But a speculative projection of that kind was exposed to a more insidious defect than mere uncertainty; a far greater danger was that it might be subject to bias, and in his opinion the Commission's construction was seriously biased.

It had been his departmental duty, when the Report was issued, to review its statistical conclusions. As a result of careful examination—not an altogether easy task, as might be gathered from the appendix to the Report—he formed the view that the deficiency construction was highly biased from beginning to end. In the assessment of current family-building habits, several classes of births were omitted which should have been taken into account. In deciding that family habits had been stationary for twenty years, evidence that the present phase was not a stationary but a rising one had been disregarded, notwithstanding that it was every whit as good as the tenuous material relied on by the Commission. Finally, in applying the alleged stability of the past to the future, the Commission decided to make no allowance for the increase in family size to be expected as the result of the much younger ages at which marriages were taking place, thereby rejecting well-documented statistical evidence of an opposing character.

He would summarize the accumulated effect of the bias by asserting that within the scope of the Commission's construction, and using hypotheses no less valid than those actually employed, it would be just as easy to deduce that the current birth production was 6% above replacement level as to arrive at the 6% deficiency which was the conclusion of the Commission.

He was a member of the Statistics Committee—the body set up to advise the Commission on statistical matters—and had attended most of its meetings. So far as he knew, the Commission's deficiency conclusion had not been considered by the Committee and he accordingly set out his criticisms in detail and submitted them to the Statistics Committee for their formal consideration. He thought it probable that the report of the Statistics Committee, when published, would contain a statement that responsibility for the conclusion rested solely upon the Royal Commission.

The Royal Commission owed its very existence to public apprehension concerning the possible insufficiency of the birth-rate, so that the Commission's pronouncement on that matter was obviously one of the focal points of its inquiry. The matter was one of the highest technical complexity, and it was impossible for it to be dealt with satisfactorily otherwise than by a technically qualified body. The significant-deficiency conclusion had been issued under the guise of the authority of an important Commission, buttressed by all the technical support which the Government could provide for it, and it would no doubt be used to the full by protagonists and pressure groups determined on the implementation of the Commission's recommendations. That result was a thoroughly undesirable one and he suggested that the whole situation should be considered by the Council of the Institute.

He did not think that the matter would remain where it was, because he felt that the public would want to know whether anything definite could be said about the birth-rate and, if so, what it was. His view was that the matter ought to be and would have to be reconsidered by some independent court of reference. If his opinion were of any consequence, he could not be more satisfied than with a tribunal drawn from members of the Institute whose technical equipment eminently fitted them to distinguish between uncertainty on the one hand and bias on the other.

Mr W. Perks referred to the circumstances of the appointment of the Royal Commission. It was as far back as March 1944. At that time, the population alarmists had done their work. The Registrar-General had endeavoured, in 1942, to preserve a sense of balance by issuing a White Paper on Population, Cmd. 6338, but he had been violently attacked by the late Dr Kuczynski in his pamphlet *The New Population Statistics*. It was highly instructive to read those two publications in the light both of subsequent events and of the Commission's Report. It seemed to him that the Registrar-General had been completely vindicated.

The Report of the Royal Commission might, he thought, be summed up as saying, in effect, 'The position of the population is not nearly as bad as we had hoped'. They went on, in effect, to say 'There is little that need be done about it, but there are certain ameliorations of the financial burdens of parenthood which, for quite other reasons than the population problem, might well be given effect to'.

Much of the technical work on fertility in the Report was concerned with minimizing the significance of the great increase in births in recent years. He had no faith—and it was a matter of faith, not proof—in the fundamental conclusion of the Report, that the average family size in recent times had been stable at about 2·2. Any statistical stability was, to his mind, due partly to the fact that it was a grand average over a wide range of variables, but also, and particularly, to a temporary balance of conflicting tendencies amongst different groups of the population. He did not believe that the observed stability had any special predictive value. It was right to think in terms of family size and generation effects, but a single over-all average was quite inadequate.

He had a strong personal impression, supported by conversations with many friends, that recently married couples had adopted a fundamentally different attitude towards families. If a substantial proportion of what would formerly have been childless and one-child families became one-child and two-children families respectively, a significant effect would result. Prediction of fertility was far too hazardous to be attempted. The Royal Commission, after five years' deliberations, had not been able to explain the recent changes in the fertility figures with any great confidence; how, then, was it possible to attempt with any greater confidence to predict the future, or to advocate measures to influence future fertility? He believed that the almost completely materialistic approach of the Royal Commission was fundamentally wrong. It seemed to him to arise out of the climate of a naïve faith in planning which fortunately was rapidly coming to an end.

Much of the technical work on fertility in the Report involved the process of marriage-standardization. That was a fallacious proceeding, as it ignored the phenomenon of differential fertility for the marginal marriages. The phenomenon of differential fertility was particularly important for the large number of extra marriages in 1939 and 1940, which took place in conditions and for reasons which clearly forbade the bringing of children into the world at that time. Marriage rates and fertility rates were interdependent, and fertility rates associated with one set of marriage rates ought not to be applied to another set of significantly different marriage rates.

On the other hand, he was sure that to ignore age at marriage in what were called 'duration-specific' fertility rates was also wrong. It seemed to him that, just as it was wrong to maximize the significance of the low birth figures before the war, so it was wrong to endeavour, by various standardizing devices, to minimize the significance of the recent higher level of births.

With regard to fertility and intelligence, he had no faith in the power of the 'Intelligence Quotient' to separate the effects of nature and nurture; but he could see that as between intelligent and unintelligent parents there must have been a time-lag in the spread of birth control. It was in his view, however, a fundamental error to speak of a single fall in average intelligence over one generation (which might well be reversed in the next generation) as a fall of so much per generation, and to talk about a 'trend'. The word 'trend' simply asked for fallacious extrapolation into the future. A great deal of error in the demographic field would be avoided if the word 'trend' were studiously excluded from the vocabulary.

The Report of the Royal Commission had been concerned with a number of questions

which were quite unanswerable, even if they were of first-rate importance. He would take as an example the question of an optimum population. That was a completely nonsensical idea, because at the best it would depend essentially on the unknown conditions which would prevail in successive future periods. What might be optimum in 1960 might well be quite incompatible with the optimum for 1970, and optima in peace and in war might be quite irreconcilable. That was only one example of the essential conflict in the idea of an optimum population.

His general conclusion was that it would be folly, or worse, to try to control the population of the country. He held that view for two very good reasons: first, no one knew how to do it, and secondly, there was not and could not be any agreed target.

Mr N. E. Coe believed it was Goethe who said that the truth is so simple it nettles man to find it so. He could not avoid the conclusion that some people had been nettled by the simple truth that when future conditions were themselves unpredictable it was not possible to forecast human behaviour in those conditions. If that was generally true, how much more was it true of the matter under discussion!

It was possible to have a fairly good idea of the factors which influenced mortality, and it was possible to have at any rate some idea of how those factors were likely to operate in the future. The factors which influenced fertility were not known, or at least were only partially known. It was not possible to say how those factors would operate in the future, and there was, he thought, no other statistical study which was so much subject to human control, to the operation of individual 'free will'.

For that reason, he could only concur with the remarks which had been made already on the question of the forecasts in the Report. As arithmetical exercises they had a certain charm, but, since they were based on a number of different assumptions, and there was no means whatever of deciding which of those assumptions was likely to be correct, he could not see that they had any practical use. It was of course true, as the opener had pointed out, that all the forecasts did produce certain common features; but the features which were common were those which any member of the Institute could have stated would be common, without going to the trouble of doing all that amount of arithmetic.

He felt that it would have been better to spend the time on getting more detailed analyses of past data. For example, it had been suggested that parents might influence their children; that mothers of large families, worn out with childbearing and hard work, might well advise their children not to have large families, and only children, perhaps remembering the loneliness of their childhood, might well decide that, if they had any children at all, they would have more than one. From conversations with friends and acquaintances, he had formed the strong impression that such a factor was operating. If that was so, it seemed likely that it would introduce a cycle into the question of family size, and it would certainly seem to explain, partly at least, the experience of the past fifty years. It might, if it could be substantiated, form some guide for, or give some hint about, the future.

It seemed to him that that was a matter which could have been investigated by obtaining correlations between the current size of families and the size of the families of the parents of those families. In point of fact, the data to do that were not obtained, but they could have been obtained quite simply, and he thought that the results might have been illuminating. They might also have thrown some light on the question whether people were in fact open to suggestion at all on this matter—in other words, whether propaganda one way or the other was likely to have any effect.

He did not think that any reliable data could be obtained by questioning people themselves. It was a very personal and intimate matter, and not one which people were likely to discuss freely with complete strangers. It was well known, of course, that biases were obtained in any census, and actuaries were familiar with the age bias in ordinary censuses, but the problem went much deeper than that. It was not that one would get a certain percentage of incorrect answers; he doubted whether many of the answers would be reliable. It seemed to him that it might be possible to get more reliable and more illuminating information not by asking the people themselves why

they had no children or why they had six, and whether they intended to have any more or whether they did not, but by asking their next-door neighbours.

Mr W. A. B. Hopkin (Assistant Secretary to the Royal Commission, a visitor) apologized for the fact that he found some difficulty in replying to what had been said. He had known what the opener was going to say; it was, on the whole, very complimentary and he did not seriously disagree with any of his remarks. On the other hand, many remarks had been made by subsequent speakers with which he did disagree.

It had been said that it was hopeless to try to predict births. That might be so; but he imagined that there had been a time when it was felt to be impossible to predict deaths, yet not much hesitation was felt about that, because a good deal more was known about the subject than had been known three or four hundred years ago. He thought that it was much too soon to say what could or could not be predicted in respect of such phenomena of human action, and he certainly did not think that the fact that births were largely under human control made it impossible to try to predict them. There were many actions under human control the incidence of which it was nevertheless possible to predict with a certain degree of accuracy. It was a voluntary act when a man went to get his new ration book, but the Ministry of Food succeeded in predicting fairly accurately what would be the number of applications for new ration books in the middle of the following year. That was, no doubt, a particularly favourable example; he gave it merely to show that there was nothing essential in the fact of an action being under deliberate control which made it impossible to study it with greater confidence in the efforts at predictions than if no sort of study had been made.

Throughout the lives of the Royal Commission and the Statistics Committee there had been a great deal of direct and indirect discussion of problems between them, and in the mental activity which went to the drafting of the Royal Commission's Report there was no lack of knowledge of the opinions of the Statistics Committee. That Committee's Report would contain a discussion of the whole problem of how reproductivity ought to be measured, and he was content to leave it to members of the Institute to discover for themselves, when the Report came out, how far there was a general inconsistency on matters of principle between the various views. He would only make the comment that, after what had been said that evening, he thought that most members would be surprised to find that the inconsistency on matters of principle was not as far-reaching as they might have been led to expect.

A certain time had elapsed since the Report of the Royal Commission came out. It was four years since the end of the war, and the time should be approaching when the 'boom' in births would be over. If there was anything in the Commission's ideas it would be interesting to apply their method in order to estimate the births for 1949. He had therefore applied the technique which was summarily described in Appendix 3 to the Report. He took the known figures for marriages existing in the year 1949 and applied to them the fertility rates which corresponded to the 'present' size of family as defined by the Royal Commission for the purpose of measuring reproductivity. If he understood Mr Derrick's argument correctly, the Royal Commission's measurements had very seriously understated current fertility; if that were true, he would have expected that their measurements would produce a forecast of births in 1949 which was far below the reality. In actual fact, however, he got something which was just about the level of what the 1949 figures were going to be. That led him to believe that the end of the 'boom' in births had in fact been reached and that the rapid post-war drop in the birth-rate had also come to an end. Figures based on the applications for ration books for expectant mothers, with which it was possible to forecast births, had recently produced a figure for the first quarter of 1950 which supported that view; the big drop was over. He did not say that that was important; he mentioned it to show that the Royal Commission's point of view did not produce absurd results when applied to the current situation, as it seemed that it should do if Mr Derrick were correct.

Sir Hubert Henderson (Chairman of the Royal Commission, a visitor) could not help feeling that there was a certain unreasonableness in some of the criticisms

which had been made, and he had in mind particularly those of Mr Derrick and Mr Perks.

What did they expect the Commission to do? He did not think that he misrepresented their complaints as being that the Royal Commission had tried to predict what could not possibly be predicted, and in making that attempt had been animated by bias. On behalf of the Commission, he repudiated any suggestion of bias. They were not biased; they were trying to weigh the evidence which they obtained from several sources.

Mr Perks had suggested that the Commission's attitude was that the population position was not as bad as they had hoped. He did not know why Mr Perks should accuse the Commission of hoping to find the population position in a very bad state; personally, he thought that their hopes were rather the other way. Certainly, they had no desire to be alarmist. He had heard elsewhere the opposite criticism that they seemed determined to make out that the existing position was quite satisfactory and that nothing very much need therefore be done.

On the question of prediction, Mr Hopkin had said something which was highly pertinent, but it should be pointed out that the Commission did not in their Report refrain from indicating the uncertainties which made any definite prediction on many of those matters quite impossible. Mr Derrick suggested that the Commission's attempts at replacement calculations entailed making predictions of the future, in contrast to reproduction rates which, he said, dealt only with the past and had no element of prediction in them. On reference to the Report, however, it would be found that the Commission said:

Our calculation that the present average size of the family in Great Britain is about 6% below replacement level implies, therefore, no prediction, however tentative, that total numbers are likely to decline at this rate during any period for which it is profitable to look ahead.

Their replacement calculation was intended to have the same sort of significance that was formerly attached to the net reproduction rate. He repudiated, therefore, the idea that they were making predictions in any improper sense or that they were animated by bias.

He would like to ask Mr Perks in particular what he thought the Commission should have done. Nobody suggested that in relation to population trends the only practicable course was to be content with the crude figures of the rate of natural increase. He thought that it was generally admitted that the figures of natural increase might conceal significant changes. It was necessary to get behind the superficial figures of natural increase, which raised all the troubles about age composition being abnormal, and so on, and to try to discern the significance of the reality behind them, what the underlying trend was and whether it would continue.

What were the main factors in the appraisalment of the fundamental trend underlying the superficial facts? The Commission had taken the view that the main relevant factors were mortality rates, rates of marriage, and the average size of the family. Up to a point, Mr Perks did not seem to quarrel with taking the size of the family as a relevant factor, and it was difficult to see what his complaint was. At any rate, the general proposition which he himself wished to make, and which it was perhaps pertinent to put to a body of actuaries, was that nature, in this matter as in various others, abhorred a vacuum. No one was more conscious than the Royal Commission that those matters could not be measured with precision, whether on a short view or a long-distant view; but views had been and would be formed about the past and current trend, and it was the duty of the Commission to present a picture in as good a perspective as possible. As Mr Derrick had said, the Commission had been set up because of widespread apprehensions concerning the possible deficiency of the birth-rate and they could not just ignore that question. They had to present a picture in perspective, and, in spite of everything that had been said, he thought that their broad picture would be shown by the facts to be in fairly good perspective.

At least, the essential conclusion which they reached was one of which Mr Perks, he thought rather unreasonably, complained. In effect, the Commission said, with regard

to the bearing of what was happening on policy, that there was nothing in the current rate of replacement, based on the size of the family, to cause any serious alarm or mis-giving; there was nothing in it to justify any population policy as such—that is to say, a policy based primarily on stimulating the birth-rate. The position was not clear enough; if there were a deficiency—and they thought that there was—it was too slight to justify any policy primarily designed to stimulate the birth-rate.

They did feel, however, that the position was one which made it reasonable and desirable to press ahead with measures for the relief of the family which were justifiable on other grounds. Mr Perks complained of that as if it were an illogical attitude for the Commission to take up, but in his own view it was a proper and reasonable one. Certainly, policy could not really be neutral in relation to the size of the family. Whatever measures were taken under one heading or another of public policy, they were likely to have some influence, whether intentional or unintentional, on the rate at which people had children, on the size of the family. The Commission reached the conclusion, with which he thought that Mr Perks did not quarrel, that the current trends of vital statistics, so far as they could be assessed, did not supply any strong positive argument for a policy designed to stimulate the birth-rate, but they did remove all the objections which might have been raised on the score of population considerations a hundred years ago against a policy which might incidentally do something to increase the size of the family.

Mr Roland Bird (a visitor) suggested that there was one general attitude of mind emerging from the discussion which ought to be clarified. It had already been brought out by what Sir Hubert Henderson and Mr Hopkin had said so effectively by way of reply. The hammer-and-tongs criticism of the Report of the Royal Commission might, for all he knew, have exposed serious weaknesses in that Report. That was a matter upon which he did not pronounce at all; he was in no position to do so. It seemed to be suggested, however, by one or two of the earlier critics of the Report that there was virtually nothing useful that could be done. He thought that it would be a serious reflexion on the scientific apparatus of the actuary, if it could only be said of him that he could tell to a certainty when the undertaker was likely to knock on the door, but that he had no interest in, and denied that anybody could have any useful knowledge of, the date when the midwife was likely to arrive.

He supposed that in the problem of population half of the variables were quite unknown, and would probably always remain unknown; but he thought, like Sir Hubert, that, without going very far into the future, there were useful summaries of evidence which could be presented, and useful guesses which could be made, about population movements over the short term. He would hazard the guess that in that particular field there was enormous scope for technical progress, and for improving the apparatus of assembling and measuring evidence which so far had scarcely been touched. Perhaps one of the most useful services which the Institute, and actuaries in general, could provide, would be to reach agreed conclusions about the assembly and manipulation (in the scientific sense) of such evidence.

Mr F. A. A. Menzler, in closing the discussion, described the meeting as a special occasion, of a kind which arose all too infrequently, when actuaries were able to look out on the world at large and to endeavour to make a few helpful comments towards the solution of its problems. He did not propose to traverse all the technical points which had been raised. He could give the assurance that there were answers to Mr Derrick's criticisms though it was impossible, in the time available, to produce for the edification of the members all the evidence which existed to controvert them.

The opener had said that there was no reference to actuaries in the Report. Personally, he thought that that was a subtle compliment; it meant that they had been assimilated to the general body of statisticians, and had therefore achieved a major objective of their policy. In the Report of the Statistics Committee, which was in the press, there was the following footnote:

Here and elsewhere in this Report, statistical qualifications are to be read as including actuarial qualifications.

There were four actuaries on the Statistics Committee, whose names would be found at the end of the Report. In addition to those four, there were actuaries outside who made major contributions; there were Mr Perks and those who collaborated with him, who helped the Committee very considerably. There were also the actuaries in the Government Actuary's Department, who by the conventions of the Civil Service remained anonymous. All those actuaries, as he thought that Sir Hubert and the secretariat would agree, had helped the work of the Statistics Committee.

He reminded the meeting that the Statistics Committee had in its title the word 'Advisory'. They met about a hundred times, and produced over a hundred documents. The majority of the Committee were in agreement with the Commission in what the Commission did. The line of approach which was adopted in the 'replacement' chapter of the Report, the approach through the average family, was, rightly or wrongly, endorsed by the Committee with one or two exceptions, and by all the actuaries present with one exception. But there was one statement in the Report which he and other members of the Statistics Committee did not like in the Report as it was published. As the Commission had finished, and as the Committee had finished too, he proposed to draw attention to that one word. It was the word 'certainly', where the Commission said that there was 'certainly' some deficiency in relation to a full replacement level. He boggled at that word. He would have preferred some such wording as 'The probability is that there is some deficiency', because that was his considered judgment on the statistics available. It might have been a wrong judgment, but that was the judgment to which he came.

He would like to say a few words about the reproduction rate. Here he agreed with Mr Perks. There was a fundamental need for single indices, whether index numbers of prices, or correlation coefficients and ratios, or the expectation of life. Given the crude birth-rates and death-rates, the mind instinctively sought some generalization, something which would give the picture in a better way than could be got merely from those figures. It was forty years since Sir George Hardy worked out select and aggregate issue rates—as actuaries called them, in their mistaken way—and those were used for a practical purpose. Demographers who had since followed the path had done no more than re-discover what actuaries had used successfully in about 1912. It was true that actuaries left the matter there, because they had a practical instrument and did not want, for their purposes, these generalized indices which did not permit the making of a single practical calculation of any use to anybody. Unfortunately demographers, who had rediscovered issue rates, as he insisted on calling them, had invented the horrible terms 'age-specific' and 'duration-specific', which he hoped would be abolished.

The reproduction rates purported to give a summary of the way things were working out at a given point in time, if all the forces then operating continued to operate unchanged in future. It was only necessary to say that for it to be realized that reproduction rates had a very limited use for purposes of prediction. There were three of them: the gross, the net, and the effective. The gross rate assumed that there was no mortality, and he thought that the best description of that index was that it was just amusing. It was also open to a statistical objection, because why should people, if they never died at all, have the same fertility rates as a population subject to death? One fortunate thing about the gross reproduction rate was that the politicians and the press seemed to have avoided it. The index which had really dominated public discussion was the net reproduction rate, which reflected for a particular year the current issue rates, the current mortality rates, and, incidentally, the current sex ratio. Actuaries had not had high respect for the expectation of life, as having no computational value, and instinctively, therefore, they looked askance at the net reproduction rate. Moreover, it simply reflected the distribution of marriages by duration according to the position obtaining in a particular year. Like the expectation of life, it had no computational value whatever when it was a question of predicting what was going to be the population in the next ten or twenty years, but it was a very elegant summary, and one eminent person had even described it as 'beautiful'. It was subject, of course, to two important sources of disturbance, which the Commissioners rightly pointed out: the increase in number of young married couples due to war-time conditions and the accompanying fall in the age of marriage, and the making up

of births postponed from earlier war years. With those two abnormal influences at work, it was not surprising that the net reproduction rate, which in 1942 was 0.85, rose in 1947 to 1.2, though it was common sense that it must come down again, because it was not possible to keep up the number of marriages at ever lower ages. So, in 1948, it was down to 1.07, and it was even money that it would be down to unity in 1949. The net reproduction rate was not a predictive instrument, and in fairness it had to be admitted that its advocates never claimed that it was.

Having said so much about that index, he thought he must concede that it had served, and would continue to serve, a useful purpose, because it dramatized the consequences of the demographic position obtaining from time to time. It was not possible to hand to a politician or administrator a set of mortality rates, or fertility rates by reference to duration of marriage and age at marriage, and to say 'That is the way the population is going at the present time'. It was necessary to summarize it for him, and that had been the chief use of the net reproduction rate. It had served an important purpose in making it possible to explain to the more or less informed public the way things were going demographically.

There was another reproduction rate about which he wished to say a word, because it was the official one, and it was always necessary to be respectful to what came from official quarters. It was called the effective reproduction rate. Someone might imagine, in his innocence, that statisticians had gone a stage further and discovered a genuinely effective rate; but in fact the so-called effective rate was obtained from the net reproduction rate by allowing for forecast mortality, so that it had all the appearance of a hybrid. No attempt was made to forecast fertility, because it was too difficult, but a forecast was made of mortality. That sort of thing had a bemusing effect on those who looked for guidance on demographic matters, because they were told at one moment 'We are not using this for prediction purposes', and then, by introducing forecast mortality, it was implied that the calculation was being so used. He thought that that was a serious criticism from a purely statistical point of view. There was, however, a much more important practical criticism, which was that it made only one, two or three points' difference in the third decimal place, so that it was a waste of time anyway and was not worth doing. He would suggest to his official colleagues that it should be called the 'partially effective reproduction rate'.

He was not a reactionary in regard to research at all, and he was not going to suggest that the quest of the *absolute* reproduction rate should be abandoned. That kind of research did help towards a tidy mind. It was, however, best left to a 'working party'. The Institute had one in the Students' Society which he hoped would take note of what had been said that evening.

In order to summarize the reproductive habits of the community, the Royal Commission had adopted the criterion of the average size of family for completed fertility. He would not enter into all the arguments for that criterion, but behind it there was the whole array of rates related to age and duration of marriage, and it was those underlying rates which had been used for projection purposes by the Commissioners. The average size of family had the important advantage, as a criterion, that it was free from the wide fluctuations inherent in the net reproduction rate. What was the value of a rate which could fluctuate in five years from 0.85 to 1.2, and then back to 1.07?

He wished to add a word about research, to which the opener had referred. It was unfortunate, from the point of view of the development of the technique of forecasting national fertility, that it had never been necessary for the life offices to be also birth offices, and to quote rates of premium for the payment of sums of money on the occurrence of births. If they had had to do so, what an elaboration of technique there would have been! In parenthesis, with regard to research and the forecasting of mortality, he had an opportunity of paying a compliment to Mr Derrick, who had made the only significant contribution to the subject in recent years by his conception of generation mortality. He always thought that Mr Derrick had something there, and he still thought so.

What did it all come to from a national point of view? What was the true lesson to be derived from the Commission's Report? The future of the nation was not going to be

settled in 2007 or 2047, but in the next generation, and it was important to have some idea what was going to happen in the next thirty years. All that was necessary, as Mr Benjamin pointed out, was to do some plain arithmetic. There his heart warmed to Mr Benjamin, who was in the direct Eldertonian tradition of working out some practical examples. What were the figures which could be obtained from the Report of the Royal Commission? The projections on the Commission's three alternative bases—the very pessimistic, the mildly pessimistic and the mildly optimistic—produced some arresting figures. It was found that whichever assumption was adopted the working population—defined for simplicity as those between ages fifteen and sixty-five—would be more or less stable for thirty years to come at about a figure of 33 millions. It was also found—and the birth-rate did not affect the question—that the 5 million people over sixty-five would become 7½ millions if mortality did not improve, and 8½ millions if it improved in the way it had done in the past. Next, it appeared that the number of those under fifteen who were going to recruit the 33 millions was likely to fall; it was about 11 millions, and might come down to 10 millions or even less. That concerned everybody, and governed the economic life of the country for the next thirty years. It did not matter what assumptions were made, and whether the net reproduction rate was right or wrong; the results would not be very far from those figures.

That had very important consequences. Mr Perks had spoken about optimum population. Personally, he would put it differently. There would be some 50 million people in Great Britain—subject to the migration factor, which had been ignored—who had to be supported over the next thirty years by the efforts of 33 million, and, owing to the increase in those over sixty-five, that 33 million was a diminishing proportion of the total population. How was it to be done? Britain could not produce more than half the food required for its population; it had to have imports of raw materials to keep its industries going; and it had to export to pay for the raw materials and for the food without which the population would starve. There was the problem. It was all in the Royal Commission's Report, but not in clarendon type, so that it did not catch the attention of the press. It was something of prime importance, which must engage the attention of the Government of the country, rather than the question of reproduction rates. In one sense it was not necessary to have a Royal Commission to get the figures at all, but it was necessary in another sense, because a Royal Commission could speak in an authoritative manner which should catch the attention of those who governed the country. That was his opinion of what the Report of the Royal Commission had taught them.

The President, in concluding the meeting, said that he, as another member of the Statistics Committee, agreed with most of what Mr Menzler had said. The discussion had been a puzzling one; he had been surprised at the apparent agnosticism of a number of members of the Institute, which had led them into a position which, he thought, would surprise them if they began to consider where they stood, because it seemed largely a denial of the validity of statistical investigations and conclusions. As had been pointed out by one or two speakers, the main requirement was research—disinterested research, research backed by a good technical equipment. If actuaries did not play an important part in that, it would be their own fault, because the field was there and it was for members of the Institute to show that the title of demographic statistician was one of the attributes of an actuary.

He thanked the visitors most especially for coming to the meeting and for contributing to a most interesting discussion.

Mr Menzler had to curtail his remarks because of the lateness of the hour and several members were unable to take part in the discussion. We have received the following written contributions:

Mr F. A. A. Menzler: I had intended, if time had permitted, to mention the following in my concluding remarks.

It is not sufficiently appreciated that, allowing for the demands of education and defence policy, the number available for entry into employment at the familiar recruitment ages

of, say, fifteen to eighteen is now two-thirds of the number of juveniles at those ages available before the war, and must in the next few years fall to one-third of the pre-war supply, even though there will be a partial but temporary recovery as a consequence of the recent upsurge in the number of births. On the other hand, there is the ever-growing burden in respect of the maintenance of the aged at the improved standards which the spirit of the age demands.

There is no need to dilate upon the implications of such figures to actuaries. Pension schemes with an optional retiring age of sixty have become economic nonsense and, indeed, anti-social, unless everybody is prepared to face the possibility of a lower standard of living. The diminishing supply of recruits to industry will enforce a reconsideration of traditional attitudes towards recruitment, training, promotion, and age at retirement. The Royal Commission thought that the aged 'top executive' might be retained in a consulting capacity so that promotion should not be denied to those at the more youthful and creative ages. A technique of 'demotion' may need to be developed.

To meet these difficulties some have contemplated a marked reduction in population by a systematic policy of emigration. The effects on initiative and national psychology of taking away the most active elements of the population must, however, be kept in mind. There would be an acceleration of the ageing of the population, a general slowing down and perhaps cessation of new development—in short, the onset of an economic ice age.

It is upon these wider issues that the attention of our governors should be concentrated.

Mr P. R. Cox: Perhaps the most interesting part of the Report technically is the analysis of recent fertility data. Considerable ingenuity has been brought to the study of this complex subject and to the search for the most stable elements in a variable field. The natural reaction of the actuary on reading this section is to wish to examine the essential statistical information for himself. It is disappointing, however, to find that there is not much up-to-date material available for an independent appraisal. The Report of the Statistical Committee and that on the Family Census are not yet published and the only useful information is that arising from the operation of the Population (Statistics) Act, 1938.

In the Civil Volumes of the Annual Reviews of the Registrar-General for England and Wales there are statements analysing maternities according to duration of marriage and family size, subdivided according to geographical region; and the figures are illuminating though they relate only to a period of considerable social disturbance. It is a pity that no paper has been submitted to the Institute in which these data are fully examined.

The function which is given special prominence in the Commission's Report is the average number of children per family. The corresponding dispersion has not, however, been given the same amount of consideration. Although average family size may not have varied much in recent years, the relative numbers of large and small families have done so. Mr Clarke has drawn attention to the fall in the numbers of higher order maternities, and the rapidity of the change is certainly striking. Since 1938 the numbers of fifth maternities in England and Wales have diminished by about 5 %, sixth maternities by 20 % approximately, seventh by 25 %, eighth by 30 %, ninth and tenth by 40 %, and these falls are no doubt a continuation of the trend observed in the previous fertility data of the last hundred years. The extent of the drop varies from region to region; it has been greater in London, for instance, and smaller in Wales than in the whole country. The corresponding numbers of marriages, which constitute the exposed to risk, have been fairly constant.

The rise in smaller families which has compensated the fall in larger ones is a war-time phenomenon associated to some extent with exceptionally high numbers of young marriages. Though the couples married in the later 1930's had reasonably similar families in the first ten years of married life—the period during which most children are born—those married since 1941 have started an increased rate of family building and have already improved on the pre-war level of fertility; this improvement is unlikely to be lost even if fertility now falls, as most of the families are already well founded. The details of the rise in the smaller families are interesting. It began in 1942 with the first children

of the early war marriages, but by 1943 it had spread to higher marriage durations and even to second births. These developments have not only been maintained for some years in this country but have also been experienced in many other countries, including those not directly affected by the war. The recovery has been greater in the metropolitan area than in Wales.

Thus the apparent stability in the family size over the last few years has really been the result of a balance of forces which have operated with varying effect in different parts of the country. In this connexion, it may be noticed that even to-day the contribution of 'higher order' maternities to total families is far from negligible. The numbers of children in excess of four constituted over 30% of all children in 1939 and since then the drop in their proportions has lost us 6% of all children.

The long-continued fall in the numbers of children in the really large families is unlikely to be suddenly reversed. The increased rate of smaller family building, however, is much more subject to fluctuation. The couples concerned have had their children in a relatively favourable period economically and it cannot be assumed that those married after the war will necessarily do so well. If they do not, the balance of the last few years will be upset and average family size will not remain constant.

Mr M. E. Ogborn: As one of those who was unable to take part in the discussion on the Report of the Royal Commission because of the pressure of time, I would like to add a few remarks in the *Journal*.

My plea is for the discussion of this subject on a larger historical foundation than has so far been adopted. Though the Report is better in this respect than some other investigations it does not attempt to go back beyond the middle of the nineteenth century.

For the sake of brevity I will confine my remarks to Tables XV and XVI of the Report. These show the average size of a completed family of women married in various periods from 1900 to 1924, together with statistics for the average number of births to women born in the years 1841-65. As is mentioned in the Report, the latter figures are not strictly comparable with the former figures.

The average size of a completed family per marriage can be roughly estimated by the proportion of the births to the marriages but various adjustments have to be made particularly for any increase there may have been in the marriages. The problem is discussed by Farr in his collected papers on *Vital Statistics*, pp. 93-100, and he comes to the conclusion that round about the year 1863 the average size of a completed family was 4.3. This figure was an understatement and may be compared with an average of about 5 found by Charles Ansell, jun., for families of the upper classes in the middle of the nineteenth century (*Statistics of Families in the Upper and Professional Classes*, pp. 50-56), and with the average of between 5½ and 6 referred to in the Report.

The statistics of the eighteenth century are defective, but those quoted by Milne in 1815 do not suggest that the eighteenth century family was much smaller than the nineteenth-century family when allowance is made for unrecorded births.

When considering the size of family the important question is not so much the number of children born as the number of children who survive. Judging by the meagre statistics available it seems likely that fewer than one half of the births in the eighteenth century survived to the age of twenty. During the nineteenth century this proportion seems to have improved from about 60% to about 70% and in the first half of the twentieth century to over 90%.

The decrease in infant mortality in the eighteenth century would have led to an increase in the actual size of family, assuming that the average number of births per marriage remained about constant, and the tendency to an increase in the actual size of family may have continued into Victorian times. The evidence does not suggest that there was much difference between the average number of births per marriage for the upper and lower classes in Victorian times and the difference in mortality between the children of the upper and of the lower classes may have produced rather larger families among the former. In modern times that relationship has been reversed and this would repay investigation.

The transformation of the English scene between the eighteenth and the twentieth centuries provides a fascinating subject for historical studies and the analysis of population trends can illuminate the study of this period. We may recognize three distinct periods.

In period I, which would roughly correspond to the latter half of the eighteenth century and would extend into the nineteenth century, the fall in mortality, particularly in the towns and among children, removed the restraining hand of death from the natural increase of population. It is, I think, significant that it was in this period that Malthus published his famous *Essay on the Principle of Population* which assumed that 'population, when unchecked, increases in a geometrical ratio'.

In period II, which would roughly correspond with the nineteenth century, there seems to have been only a comparatively small decrease in the mortality in England and Wales as a whole, but the natural increase of population arising from the increase in births because of the larger numbers surviving to the reproductive ages brought about a vast increase in the total population.

In period III, which would start somewhere in the late nineteenth century and extend through the twentieth century to the present time, a considerable fall in the mortality of infancy and childhood has been accompanied by a conscious limitation of size of family which seems to have been the main factor in reducing the natural increase of population almost to zero. Malthus had postulated:

That the passion between the sexes is necessary, and will remain nearly in its present state.

This postulate has been invalidated in period III and the circumstances which have brought this about are those which constitute the demographic problem of to-day. It seems possible that we are now entering a new period in which Malthus's postulate may once more be effective and this is, I assume, the belief of those who think that the gloomy forecasts that have been made on the basis of reproduction rates are unlikely to be fulfilled.

Mr R. C. B. Lane: There is one possible explanation of the fall in the observed birth-rate that has not received the attention it deserves, the more particularly as it is one of the few which also gives solid grounds for believing that a future rise may be probable. By common consent, the fall in the birth-rate is the direct result of the wide and progressive adoption of contraceptive practices. Today most births are both deliberate and desired by the parents. Formerly they were not, and many persons must have had quite large families who today would have had none.

Now, if we attempt to divide the population at any point of time into two classes, the one which particularly wishes to reproduce itself and generally desires children, and the other which has no great desire to reproduce itself and has no genuine love for children, and if we further assume that the genuine desire to have children is at least partly a hereditary character, then under present-day conditions the one group will tend to persist while the other will tend to be eliminated. If, in the genetical constitution of the human race, there are any genes which are associated with a lack of a desire for children they are today lethal; fifty years ago they were not.

During the change of environment (since that is what it amounts to in a Darwinian sense) the one class is dying out and the other is reproducing itself normally, but the reproductive rate measured over the whole population will be low and that is what has been observed. Later, when the first class has been eliminated, there will be only the second left and that will still be reproducing itself normally. The reproductive rate when measured for the whole community will then be the higher reproductive rate characteristic of the second class. It will have risen once more to a normal figure for a population that is maintaining itself.

There are of course reasons why the two phases are unlikely to be sharply separated. In the first place, the general adoption of contraceptive methods has been gradual, not sudden; in the second place, it is only when a gene or a combination of genes becomes dominant that it can have this effect—lethal or otherwise—and that means that in the

normal reshuffling of fertilization there must be many cases of lethal genes, formerly recessive, becoming dominant again. It will clearly take several generations before these lethal genes are for all practical purposes eliminated.

These ideas can amount to no more than a hypothesis because it is difficult to see how direct observational evidence can be found to support them. I believe, however, that it is a hypothesis which is likely to contain a large element of truth and that in the face of the possible heterogeneity of the community in this respect it is very difficult to take seriously any estimates of future reproductive rates, or any calculations of future populations based upon any such estimates assuming the population to be homogeneous.

When to heterogeneity there is added the possibility of cyclical influences such as those mentioned by Mr Coe, it seems to me that very little good can result from the attempt to estimate the future—as opposed to the simple arithmetical exercise of indicating the consequences of this or that set of assumptions. I think, too, that the weight of actuarial opinion can best serve the community by revealing the insubstantial grounding of all such calculations, when considered as estimates of the future, and by concentrating attention on the measurement of this or that short-term influence and trend so that possibly, over a much longer period, enough may be learnt of these long-term effects to make useful predictions on a limited scale. May it not fairly be said that, whereas a statistician is concerned purely with the measurement, and the assessment of the significance, of what has happened, an actuary is compelled by commercial necessity, if not to predict the future, at least to ‘take a view’. In the present case neither an actuary nor anyone else has the basic knowledge on which that can be done intelligently and for the present the attempt is, in my opinion, better not made.