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**Issues in the comparative analysis
of World Fertility Survey data**

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PREFACE

I began work on this paper during a brief stay at the London headquarters of the World Fertility Survey. An earlier draft was presented at a seminar at the Population Institute of the East-West Center in January 1979. The present revised draft was developed while I was a senior fellow at the East-West Population Institute. Funds for the publication of this Paper were provided by the Office of Population, Agency for International Development.

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ABSTRACT An important purpose of comparative analysis is to explain why countries do or do not differ with respect to the level of a demographic variable or the relationships between explanatory independent variables and dependent demographic variables. A simpler useful comparative reference is an atlas listing by country the principal parameters of the reproductive process. An important additional step is a series of analyses with microdata to establish how intracountry measures vary across specific countries. The desirable next step is to substitute for the names and associated histories of countries macrovariables that may explain the intercountry variations.

Quantitative comparative analysis may involve relating macrovariables derived from microanalysis to each other or to macrovariables from another source. Reference is made to a study by Hermalin and Mason that relates macrovariables as independent variables to net regressions for certain microlevel relations between social and demographic variables from the first ten World Fertility Survey country reports. Problems in such analyses are discussed. An example is given of comparative analysis done within a country (by regions). This example and other studies find that regional or country or provincial differences cannot be explained by the conventionally used social structural variables. Several kinds of comparative studies are then described. Problems and opportunities for comparative analyses of WFS data are described.

Because one broad objective of the World Fertility Survey (WFS)¹ is comparative analysis, it is appropriate to ask: What is comparative analysis and how is it done?² Broadly speaking, comparative analysis involves comparisons of populations as well as of individuals. While the term "comparative" generally refers to comparisons between countries, it may also refer to comparisons of regions, provinces, and similar units

1 The World Fertility Survey is a major research program involving nationwide sample surveys of some 50–60 developing countries, using a standard interview questionnaire, and a smaller number of developed countries, using a separate, somewhat less standardized questionnaire. The surveys, begun in 1974, were undertaken by the International Statistical Institute in collaboration with the United Nations and in cooperation with the International Union for the Scientific Study of Population.

2 This paper draws heavily on Przeworski and Teune (1970) and on Hermalin and Mason (1978).

within a country. What is distinctive about comparative analysis is that it involves macrolevel parameters measuring aspects of a political, social, economic, or cultural system or organization, or demographic parameters characterizing a population of individual units. In the following discussion, I will be dealing with intercountry comparisons unless I indicate otherwise.

I start with a strongly stated proposition that an important purpose of comparative analysis is to explain why countries do or do not differ either with respect to the level of some demographic variable or with respect to the relationships between explanatory independent variables and dependent demographic variables. Why is fertility higher in Pakistan and Bangladesh than in Sri Lanka and South Korea? Why does the net regression of education on fertility differ among countries? These are the kinds of questions that comparative analysis should aim to answer if it is to be most useful.

Before developing this idea, I begin with simpler valuable products of intercountry comparisons. At the simplest level, a useful comparative reference is an atlas or inventory, listing by country the principal parameters of the reproductive process, preferably with a few simple demographic controls, e.g. percentage of a sample population ever using an efficient contraceptive, by age of wife. An inventory of this sort could include:

- (1) The frequency distribution or such univariate measures as the mean or measures of dispersion of number of children ever born, number of children desired, the median number of months of breastfeeding, the proportion of mothers who breastfed their last child or who are using efficient contraception. The statistics may refer to the total sample of women of childbearing age or to a subsample—e.g., the proportion currently using efficient contraception among fecund wives who want no more children.
- (2) Bivariate or other multivariate measures of relationship, for example, the regression coefficient for the relation of wife's education to number of children ever born or the regression of education on fertility, net of the effect of marriage duration and wife's education and level of urbanization.

The United Nations Population Division has begun such an "atlas" for data from the early series of WFS First Country Reports. Apart from its utility as an easy reference for specific countries, the inventory provides the basis for a distribution of countries on many important variables. For example, what is the distribution, mean value, and range of less developed countries with respect to percentage of

younger and older wives having at least x children, breastfeeding for more than x months, etc. Such an atlas is valuable because it places a particular country with reference to all others or a subclass of others and because it provides data for various reproductive models.

An important step beyond this is to do a series of intracountry analyses with microdata to establish how intracountry univariate or multivariate measures vary across specific countries. The first such published analyses based on WFS analysis were those by Cho (1978) and Westoff (1978) on fertility preferences and the unmet need for birth control in five Asian countries. Essentially, the purpose of such studies is to consider what the range or central tendency or direction of parameters is across countries. The comparative results take the form of statements like the following:

- (1) The percentage of all women (or subgroups of women) who want no more children varies from P_1 to P_x , with the low values in countries A and B and the high values in countries Y and Z.
- Or, (2) the percentage of women who want no more children increases with age or parity in all countries, but the percentage and the strength of the relationship varies across countries for women of a given age or parity. At a given age or parity, the percentage is low in countries A and B, and high in countries X and Y. At older ages and parities the values converge to very high levels for all countries, except country Q.
- Or, (3) a majority of women in all countries want no more children if they have at least four living children or two living sons, or if they are over 35 years old.
- Or, (4) the percentage of exposed women who want no more children or the percentage who use contraception varies considerably across countries, but the percentage who want no more and are not using contraception varies rather little among countries because the percentage who want no more and the percentage among them using contraception are highly correlated across these countries.

Although the relationship between two variables (e.g., parity and percentage wanting no more children) may be similar in direction for all countries considered, when (as in this case) the strength and form of the relationship is quite different from country to country, the next interesting question is: What determines this difference among

countries? Questions of this kind are covered plausibly in the cited articles by reference ad hoc to specific known or hypothesized differences between the countries. In effect, country-specific historical facts about the countries are introduced as explanations.

These statements are very useful. To know, for example, that in all countries considered a majority of respondents say they want no more children at later stages of family life has important scientific and policy implications. Cho and Westoff necessarily were limited in what they could do, because they had to work with what was available in a few of the First Country Reports. However, similar analyses might and should be done when data are available for many WFS country studies.

Most comparative studies in demography (including mine) follow this form. The important next step is to explain similarities and differences. For example, while the relationship between two variables (e.g., parity and percentage wanting no more children) may be similar in direction for all countries considered, they vary in the strength of the relationship and sometimes even in form. What is desirable as the next step is to substitute for the names and associated histories of countries macrovariables (from the WFS or other sources) that on theoretical grounds may explain at least part of the intercountry variations in question. Part of the intercountry variation may still quite legitimately be explained on distinctive, nonquantitative, historical and cultural grounds. It is important that this be done explicitly, however, and with some knowledge of the countries involved. Otherwise "history" and "culture" may too easily be invoked to stand for unexplained residual variance. It is desirable, wherever possible, to specify just what it is about the history or culture that produces the observed effect.

Comparative microlevel multivariate analysis can be more definitive when it is possible to work directly from the data tapes for the countries. An interesting example is the intensive multivariate analysis by Rodríguez (1978) on "Family Planning Availability and Contraceptive Practice" for five countries. The problem, as indicated by the title, is very important. In some analyses the results are rather similar across countries, and the next question is whether the generalization will apply to a wider range of countries. In other cases, however, a result takes this form: "Although educational categories are not strictly comparable, the results do indicate varying degrees of success in making services available to the least educated: Korea is the most successful and Nepal is by far the least successful" (p. 104). Here again the

interesting next question is whether we can substitute for the names of countries a macrovariable that helps to explain the observed variation. Further, can the observed intracountry relationships be stated in such a form (e.g., as net regression coefficients or some other measure of net relation) that they become values of a macrolevel dependent variable to be related to other macrolevel variables when a large number of countries are available?

Quantitative comparative analysis may involve relating macrovariables, derived from microanalysis, to each other or to macrovariables from another source. The derived macrovariables may be the independent or dependent variables.

A study by Bulatao (1978) illustrates the use of variables derived from microstudies to "explain" macrolevel variables. In this case proportions of respondents reporting specific kinds of advantages (benefits) or disadvantages (costs) of having smaller or larger numbers of children (based on a series of microstudies) were related to birth rates (from another source) and to fertility preferences (from the studies) or to each other. This was done to test a set of hypotheses about how perceived specific benefits and costs of children were related to high or low actual and preferred fertility in a demographic transition framework. Bulatao carefully indicates that his analysis, based on cross-sectional surveys, can only be suggestive of what might be found in a time series of cross-sectional studies or longitudinal studies. The general character of his findings (cited without his careful, detailed qualifications) is indicated in the following passage:

The essential conclusions . . . were that economic benefits from children decline in salience in the fertility transition; that rising aspirations lead to heightened concern about restrictions on parents and greater interest in psychological appreciation values in childbearing; that financial costs and childbearing demands do not vary systematically across fertility levels; that rewarding interaction values increase in salience in relation to the growing prevalence of the conjugal family; and that values involving cultural props for high fertility show no decline (p. 34).

Apart from these potentially important substantive findings, Bulatao (1978:35) indicates that "these conclusions were based on open-ended questions on advantages and disadvantages of having children. It is notable that the coding schemes used for comparing responses across surveys were generally applicable and did allow conclusions to be drawn." This statement indicates that an important aspect of Bulatao's study was to test the utility of a common coding scheme across countries with quite different cultures.

Hermalin and Mason (1978) have provided an illustration of a com-

parative analysis relating macrolevel country variables as independent variables to net regression coefficients for certain microlevel relationships studied from the first ten First Country Reports. The authors caution the readers about the obvious limitations of working with a sample of ten countries, both as to nonrandom selection of countries and the large sampling errors likely with such a small number of cases. Nevertheless, the results are substantively interesting and indicate the potential value of the WFS data for quantitative comparative analysis. A number of interesting points are made and illustrated with two sets of comparative analyses. One involves the relation of education to fertility and the other, the relation of marriage duration to fertility.

The authors first develop in detail a specification for the micro-relation of education to fertility in each country, net of the effect of marriage duration. For each country (except Nepal) they find a negative relation of education to fertility (net of marriage duration), which varies considerably across countries. They also find a significant macrolevel relation of mean educational level to fertility. Then they regress macrovariables, some derived from the World Fertility Survey itself, on the net regression coefficients and the mean level of education. An especially interesting finding is that the greater the mean number of years of education in the country, the stronger is the negative relation of education to fertility. Further, in addition to the expected positive relation of indices of modernization to the level of education, they find that the higher the level of modernization indices, the greater is the negative regression of education on fertility—an important finding, if it is sustained in studies with larger numbers of countries.

A similar macro- and microlevel analysis is carried out with the regression between duration of marriage as the independent variable and fertility as the dependent variable. Here they find, as they should, that the positive relation between marriage duration and fertility is negatively related at the macrolevel to WFS-derived measures of contraceptive practice, percentage sterilized, and mean age at marriage, and positively related to mean duration of breastfeeding. An especially interesting finding is the strong negative relation between a measure of family planning effort (Mauldin and Berelson, 1978) and the regression of marriage duration and fertility. A by-product of further interest is that “among the ten countries, contraceptive use is inversely related to duration of breastfeeding and directly related to age at marriage, *all according to WFS data*” (Hermalin and Mason, 1978:73). Before presenting this analysis, Hermalin and Mason make

the following qualifying statements, which are quoted for their general relevance to WFS comparative analyses:

The major impediment to country-level analysis is clear from the outset—a small number of observations both in absolute terms and relative to the number of potential explanatory variables. This restriction will only be slightly alleviated with time, since there will not be more than 50 WFS countries, and on a regional basis few will have as many countries as we present in this sample. The small number of observations suggests the following strategy:

1. Emphasis should be on description and general patterns, with careful attention to the nature and effect of outliers.
2. Estimation and testing of models will be highly restricted. There will be little opportunity to use multivariable and multivariate techniques and even tests applied to simple measures of association will be limited by the non-random nature of the countries sampled.
3. As a consequence, it will be difficult to discriminate between competing hypotheses. Quite different explanations may appear to be relatively well-confirmed (or disconfirmed), and it is well to recognize this if errors of inference are to be avoided. In general, one will have to be content with fairly broad conclusions supported by the general weight of evidence (p. 62).

In addition, Hermalin and Mason make the point that the specification of model used at the microlevel may have an important effect on the results of the macrolevel comparative analysis. For example, in studying the variation in the effect of marriage duration on fertility they found that a logarithmic form produced larger and more consistent relations with other macrovariables than a linear specification of the initial microrelation.

I have made this rather lengthy reference to the Hermalin and Mason report because it is the first example of a *quantitative* comparative analysis linking the macro- and microlevels of WFS data. As the authors indicate, it is only one of various models for such analyses. It has the merit of carrying the reader through the reasons for each step of a concrete empirical analysis with a rather full discussion of the problems and limitations of the analysis. It is made more useful by the fact that it contains both expected and unexpected results of interest. It also illustrates an important point about the potential value in WFS comparative analysis: a problem that has been studied many times before (e.g., the relation of education to fertility) can be usefully approached afresh with the comparable, good-quality WFS data for a number of countries. If one were asked to summarize all the previous work on this problem, one might state that education is usually negatively related to fertility, but the size and form of the relationships vary considerably, and sometimes there is no relation or even a positive relation.

Hermalin and Mason first of all provide net regression coefficients for the relation of education which verify the broad generalization that the negative relation varies in amount but may be positive. But the crucial next step is to try to explain *why* the net regressions vary as they do across countries. This is the aim of the macrolevel investigation briefly discussed above.

Hermalin and Mason devote considerable attention to the problem of how to measure education so that it will be both conceptually meaningful and plausibly comparable across countries. Similar attention needs to be given to other background variables as well as to the macrovariables derived from other sources.

As stated at the outset of this paper, comparative analysis can be done within a country as well as between countries. A good example of intracountry analysis is a paper by Cleland, Little, and Pitaktesombati (1979) on socioeconomic determinants of contraceptive use in Thailand. In a preliminary analysis they had found that region of residence was the most powerful independent variable to explain variation in contraceptive use among currently married nonpregnant women of childbearing age who believed themselves to be fecund (sterilized couples were counted as fecund current users). In that initial analysis they were able to establish that demographic variables could not account for any significant part of the interregional contraceptive use differentials. Three measures of socioeconomic status—husband's education, husband's occupation, and the household standard of living—accounted for about one-fifth of the interregional variation. Urbanization mainly affected Bangkok but had little effect on the other regions. A rural-urban difference in contraceptive use of 13 percent across regions was explained almost entirely by concomitant differences in education and occupation. Urbanity as such had little independent effect.

In the analysis across regions husband's education was marginally more closely related than wife's education to contraceptive use, in large part because husbands' education was much less skewed or concentrated in a single category than was the case for wives. This is a phenomenon that may occur in other less developed countries where wives are so concentrated at the lower end of the education scale that this variable can have little explanatory power for intracountry differences in reproductive behavior.

In the Thai study the authors proceeded to analyze the net relationship to contraceptive use of demographic and socioeconomic factors within each of the regions. They approached this as a problem of

interaction between regions and the relationship of the other variables to contraceptive use. They found different patterns of relationship within regions. This is equivalent to finding at the country level that the net relation of variables x and y differs among countries. With reference to the article by Cleland, Little, and Pitaktepsombati, one might pose as an important question for further research *why* the relationships vary among regions. One possibility is that the rather successful Thai family planning program differs significantly in inputs and outputs by region, in a way that might account for some of the residual regional variation and possibly also account for the regional differences in the patterns of relations among the variables studied.³

Again, one might find that historical and cultural factors can be invoked to explain the regional differences. As indicated earlier, it is desirable to try to establish what specific historical and cultural factors present in some regions and not in others explain the observed variation.

It is not new to find that there are country or regional or provincial differences that cannot be explained very well by the kind of social structural variables usually associated with the theory of demographic transition (e.g., urbanization, industrialization, nonfamilial employment, nuclearization of the family). This is one of the principal findings of the Princeton studies of the demographic transition in Europe (Coale, 1973). Similar findings from WFS analyses will be important in themselves. In the case of the European studies, attempts are being made to go beyond the finding of residual, cultural, regional, and ethnic differences. For example, Lesteaeghe (1977) first established that there were substantial differences in fertility patterns between Flemish and Walloon areas. He then found that a measure of secularism helped to explain why fertility was higher in the Flemish areas. He also found that education did not have the expected negative effect on Flemish fertility because Flemish schools were run by the Catholic Church, which promoted religious rather than secular values. This is a concrete illustration of what I mean when I suggest that investigators try to specify what it is about specific cultural or historical differences that affects reproductive patterns.

In comparative analysis, the macrovariables used as independent variables may come from the World Fertility Survey, but a much wider

³ Knodel and Debavalya (1978:44) found that ranking of the Thailand rural districts of residence on family planning program acceptor rates was correlated to the proportions reporting ever using contraception and the marital birth rate per 1,000 wives from the World Fertility Survey.

range is available from outside sources. At this level we are not limited to WFS data. A large number of macrovariables available at the country level may be pertinent to comparative fertility analysis: average GNP per capita; inequality of income distribution; such educational measures as proportion of school-age children in school by sex, or educational expenditures per pupil; such communication indices as letters mailed per capita, telephones, radios, television sets per household, motorable roads per capita, number of passenger trips by bus per capita, etc.; measures of the capacity of the government to mobilize its population for national purposes; measures of the effectiveness of the family planning program; and so forth. There are obviously many such variables. Their choice depends on some theoretical or empirical reason for expecting a relationship between them and a fertility parameter.

Macrolevel variables are of several kinds. "Contextual" variables are aggregations of individual characteristics. For example, the mean educational level of women of childbearing age is an aggregation of the educational level of individual women. Hermalin and Mason (1978) found that the negative relation of education to fertility depended in part on the mean educational level of the country. Contextual variables may arise from aggregating microlevel relationships rather than univariate values. For example, a measure of equality of the income distribution may be conceptualized as the aggregation of pairs of relationships with respect to income.

Setting variables are characteristics of the whole population that are not based on aggregating individual characteristics—for example, whether a village has an electricity service or is linked to larger market centers by motorable roads. These are the kinds of variables for which Lazarsfeld and Rosenberg (1955:287) use the term "global." Przeworski and Teune (1970:49–57) indicate that such variables may be (1) historical: e.g., characterized by whether a country has a French or British colonial background, or whether it has a history of strong centralized control of village taxation, or whether it had "natural fertility" over a recent historical period; (2) institutional: e.g., characterized by whether the country has laws against imports of contraceptives or whether it has a population policy with demographic objectives; (3) external: e.g., relating to whether a country has a family planning association affiliated with the International Planned Parenthood Federation; (4) behavioral: e.g., relating to the efficiency of the government and its ability to mobilize the village population for national purposes; (5) physical: characterized, e.g., by whether the country has a terrain

that makes internal communication difficult or whether it is an island, attributes suggested by Mauldin and Berelson (1978) and others as leading to lower fertility through perception of limited resources.

Przeworski and Teune also distinguish diffusional patterns as an important kind of macrovariable. Here the question is whether some aspect of a society is a result of diffusion from the outside or a result of independent structural development within the country. Does modern economic development diffuse to developing countries from its Western origin or must each society go through its own sequence of development, or is the true situation some combination of the two? This is an important issue in the population field. To what extent is the idea of limiting family size an innovative concept that spreads from one place to another, and to what extent does it depend on each developing country going through broad socioeconomic structural changes that will incidentally produce both the demand for family limitation and its supply. Caldwell (1976:358) has suggested that the idea of the small nuclear family may be diffused from the West as a result of Western influence on education in developing countries and on the content of the mass media. Knodel (1977) and Freedman (1979) have discussed the possible role of the legitimation of family planning partly independent of socioeconomic structural factors.

It is not so simple to characterize a country trait as "diffusional" in origin as to measure, for example, its educational level. Probably what are required are inferences from a set of historical data. Thus a sharp discontinuity in the use of contraception that is not paralleled by a similar discontinuity in socioeconomic development might be taken as evidence of a diffusional element. For example, in Hong Kong the level of family planning acceptances rose sharply following the introduction from outside of the intrauterine device (IUD), which was made available through family planning clinics. Because there was not a sudden sharp acceleration in socioeconomic changes at that time, it is plausible provisionally to classify the adoption of contraception in Hong Kong as having a "diffusional" element. This is not to deny that Hong Kong had previously undergone socioeconomic changes that provided a favorable environment for the diffusion to take root.

A large number of socioeconomic macro-indicators have been suggested as plausible explanations for variation in reproductive behavior. Many of these are associated with the theory of demographic transition. However, in a number of less developed countries fertility decline apparently is occurring in populations that are poor and rural and without many of the hallmarks of the Western modern-industrial

complex. Examples are Sri Lanka, Kerala (India), the People's Republic of China, and Indonesia. In the first three of these instances, it can be argued that health and education programs and social welfare provisions (especially food) for the poor may be decisive without the rest of the Western complex. But, in the case of Indonesia, even health, education, and social welfare measures for the poor masses are in question. I suggest that other aspects of the society may be important—e.g., the capacity of the government to mobilize its population and resources to meet national goals; the involvement of the population in a communication-transportation system that links it to the worldwide system of ideas, models, and things; dissemination in the population of modern consumer goods owned by some and desired by many (bicycles, sewing machines, radios, water pumps, blue jeans, etc.); the extent to which the population is increasingly dependent on nonfamilial institutions that are regional or national rather than local in character. Finding measures of such social-system variables may be difficult but is possible in principle. Political scientists, for example Organski and Kugler (1978), have been experimenting with scales to measure the capacity of a government to mobilize its population and resources for such national purposes as war or a family planning program.

It is important that in WFS comparative studies, the range of variables that can be introduced is very broad. The WFS itself has rather few explanatory variables; but at the comparative level, if dependent variables are obtained from the WFS, the independent variables from other sources are rich and varied and offer greater possibilities for introducing theory. We should not, however, ignore the fact that WFS itself is a source of important macrolevel variables when microlevel data are aggregated. For example, Hermalin and Mason (1978) were encouraged to find that aggregate WFS educational data correlated highly with independent estimates from national educational statistics assembled by UNESCO. Beyond that, however, such parameters as the percentage of women breastfeeding or percentage breastfeeding for x months, or the percentage currently using contraception derived from WFS data, can be explanatory—at least as intermediate variables. The aggregate discrepancy between desired and actual fertility may be a dependent variable that can be related, for example, to either the whole Mauldin and Berelson program-effort index or that part of it that relates to communication and field visits by which the population might learn “expected responses” on desired family size.

In many cases WFS comparative analyses will involve a relatively small number of countries, too few for the kinds of quantitative anal-

ysis suggested by Hermalin and Mason. That they dealt with only ten countries severely limits the character of their analysis and the kinds of inferences possible. This is not a cause for despair, however. For many of the substantive problems at issue, even to have five countries with reasonably comparable data of good quality is a major advance. It should still be possible to distinguish the countries by both qualitative and quantitative macrovariables believed to be relevant on theoretical grounds. It is likely that there will be more such plausible explanatory variables than countries, so it will be difficult to choose among competing hypotheses by multivariate procedures. It may be possible to pursue the matter further by studying intracountry regional variations or by analyzing the weight of different pieces of evidence, each alone insufficient to provide a definitive statistical answer.

One approach is to try to minimize the number of relevant macrovariables by studying societies with a similar cultural or historical background. If either macro- and microlevel relationships or strictly microlevel relationships can be established distinctively for Latin American countries and a different set of relationships can be ascertained for Asian countries, that is a step forward. It is possible to indicate at that point that the two sets of areas differ in their culture and history. The next challenging step, however, is to try to find out what there is about the two cultural systems that explains their different patterns of relationships. The goal is to be able to merge data for the two areas by adding to the analysis either a microlevel or a macrolevel variable that will explain the different patterns of behavior in the two sets of countries.

Since the sample size for macrolevel WFS analysis will necessarily be small, it is important to explain as much as possible at the microlevel, where sample size is not so constraining in WFS studies. For example, Hermalin and Mason (1978) found that the regression coefficients for education on fertility net of duration varied considerably. But they could use only one socioeconomic variable at a time because they were limited to what was available in the First Country Reports. When such work can be replicated directly from country tapes and with more countries, it will be possible to test whether introduction of other variables at the microlevel reduces the variation in the net regression coefficients. For example, is the relationship of education to fertility at the microlevel affected not only by marriage duration but also by the sex composition of early births (an indication of sex preference), or by whether effective contraception was used, or by whether the wife worked for pay outside the home? Thorough and insightful

microlevel analysis may change the problem to be investigated at the macrolevel.

An interesting example can be cited from another field, political science, where comparative work is more common than in demography. Converse and Dupeux (1966:233–34) found that 75 percent of Americans and 45 percent of French people identified themselves as members of a political party. Converse and Dupeux then proceeded on the hypothesis that political socialization in the family affected self-identification with a party. They used as an index of socialization whether the respondent knew his or her father's political identification. They found that among those who knew their father's political identification, virtually the same proportion (79 percent in France and 82 percent in the United States) identified themselves with a party. The explanation, then, is that the French were much less likely than Americans to know their father's political identification. This finding shifts the comparative problem to explaining why the French have less political socialization than Americans. As the authors put it, the basic relationship between variables was the same on a microlevel—and the problem was shifted to the marginals of the table. An investigator may be satisfied with knowing that the initial difference is explained by differences in political socialization, or he or she may want to pursue the question of why political socialization differs between the two countries.

Political scientists are by the nature of their subject concerned both with the macrocharacteristics of nations and other collective units on the one hand and with the microcharacteristics of the citizen or voter on the other.⁴ Therefore, they have done a great deal of comparative work, often involving comparisons of small numbers of countries (e.g., two to eight). The study by Converse and Dupeux compares two countries. A study by Alford (1967) examines the extent of class-based voting in four Anglo-American countries (Great Britain, Australia, the United States, and Canada). Alford found that several indices of class-based voting ranked these countries consistently in the order listed above. He also found that the rank order did not change when he introduced plausible controls at the microlevel (age, religion, ethnicity, city/other residence). Several possible explanations suggested by Alford for the differences between countries in the extent of class-based voting were that parties in countries where class-based

⁴ Two journals in the field of political science that deal with these issues are *Comparative Political Studies* and *Comparative Politics*.

voting was high (1) represented or appealed to class interests, (2) historically appealed to or represented specific classes, or (3) were found in situations that led social classes to differential perceptions of their apparent class interests.

In their work with small numbers of countries, political scientists often attempt to explain intercountry differences by introducing additional variables at the microlevel (e.g., Converse and Dupeux, 1966). When the explanation is put forward at the macrolevel—e.g., distinctive institutional or historical differences between a small number of countries—the explanation obviously cannot be statistically definitive. In studies with a small number of country cases, establishing that one set of macrovariables is plausible rather than another generally depends on a plausible basis in social theory for the variables said to be explanatory or the possibility of making testable microlevel inferences from the presumed macrolevel relationships, or both.

In all of the examples cited thus far at least one of the macrovariables was derived from microlevel analysis. Comparative analysis can, however, be done entirely at the macrolevel. Mauldin and Berelson's (1978) article is a recent important illustration and includes an annotated bibliography of other studies of this type. Such studies raise several important issues. One is the problem of "ecological correlation" and possible errors of microlevel inferences from macrolevel relationships. Thus, correlations between socioeconomic variables (e.g., education or income) and fertility generally are much higher at the macrolevel than at the microlevel. It can be demonstrated that whenever the within-system (country) relationships are very low, the relationships observed at the system (country) level will be larger than the total relationship (Przeworski and Teune, 1970:62). Total relationship here refers to the relationship for the pooled populations across countries.

It can also be demonstrated that when the within-system net regressions are very similar, it is unnecessary to introduce system-level (macro) variables because the "difference between-within systems and ecological regressions stem from differences of the context" (Przeworski and Teune, 1970:68). In this case the differences in context are measured by the differences in the intercepts of the regressions—the difference in the means of the dependent variable when the independent variable is zero. If the net regressions for education were similar, the explanation of differences between countries in the levels of fertility would be that fertility was different at the microlevel prior to the influence of education. Thus, for example, there may be differences in natural fertility levels in preindustrial countries when almost no one has formal education.

The case for macrovariables—e.g. whether the country is an island, or the degree of strength of its national family planning program, or whether the country has an efficient administrative system—is clearest when they are “global” in character. Even such global variables, which do not have a direct individual-level counterpart, can lead to micro-level investigations about how the global variables affect fertility. For example, do individuals living on islands distinctively perceive some limitation in resources and opportunities as compared with those not living on islands? Is the strength of the family planning program reflected at the individual level in greater knowledge of birth control or perceptions that convenient and safe services are conveniently available?

Questions of how to interpret various kinds of macrorelationships are complex and deserve special attention by the World Fertility Survey. There is an unusual opportunity in the WFS, because its surveys can generate both microlevel and macrolevel variables where the various possibilities can be considered directly.

Charles Westoff has suggested to me that the rich WFS data on various aspects of the reproductive process itself should be utilized for comparative studies of the structure of fertility. All WFS studies have data on such variables as age at marriage, mother's age at birth of each child, numbers of births in successive five-year periods after marriage, whether more children are wanted at interview, and knowledge of and current or recent use of contraception. Consider, for example, all women married 10–14 years. What is the relation between their age at marriage and their fertility in the first and second five years of marriage? How are these in turn related to whether more children are wanted and to the current use of contraception? In countries where marriage age is early, does the pattern of childbearing by duration of marriage differ from that in countries with later age at marriage? In countries with little use of contraception, does age at marriage have an effect on duration-specific fertility independent of the purely physiological effect of the wife's age during that period? A whole series of questions can be posed that involve the relationships among factors immediately affecting fertility and among the components of fertility itself. An examination of such relationships across countries may indicate that there are different typical patterns of relationships by which reproductive patterns may be classified in “families” like those used for grouping life tables and mortality patterns.

James Palmore has suggested to me that attention should not be restricted to measures of central tendency such as means, medians, and

proportions. Measures of the character of the dispersion about the mean—variance, skewness, and kurtosis—may be of value in themselves. If two countries have similar mean values but quite different distributions about the mean, what are the significance and basis for these distributional differences?

Although this paper has emphasized the important potential of introducing macrolevel variables to explain differing relationships established at the microlevel, this does not diminish the great value of either macrolevel analyses or of comparisons in which the central tendency or range of variation of such relations is examined across countries identified by name rather than by a conceptual macrolevel variable. A great deal is to be learned from such studies as those by Cho (1978), Westoff (1978), and Rodríguez (1978). Such studies will become increasingly valuable as the number of WFS data sets increases. Eventually it should be possible to establish a useful descriptive taxonomy of how key reproductive parameters vary across all countries or for countries grouped by general cultural area or simple macrovariables. Although most of the comparative work with WFS data will be of this useful variety, it is desirable that significant efforts be made also to do studies that involve the relation of macrolevel variables to variables and relationships generated from microdata. As indicated in the opening paragraphs of this paper, many of the important policy and scientific questions in population require studies at that level.

The central WFS staff can facilitate comparative studies of various kinds in several ways. First, they can work out mechanisms for making a large number of the country tapes available for comparative analysis by responsible scholars and research institutes. Second, they can prepare a list of sources of macrovariables that are potentially relevant for WFS comparative analysis. As one step in this direction, the Appendix contains an illustrative partial list of such sources. Third, they can commission work on the problems of making key WFS background and other variables comparable across countries. Hermalin and Mason (1978), for example, devote a chapter to problems of constructing and choosing among several different measures of education for comparative analysis. Finally, central WFS staff can bring together in a working seminar a multidisciplinary group of scholars concerned with the models for comparative work involving the range of permutations of macro- and microvariables when the microlevel relationships are different across countries.

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 1978 The unmet need for birth control in five Asian countries. *International Family Planning Perspectives and Digest* 4(1):9–17.

APPENDIX: Sources of macrovariables useful for WFS comparative analysis

Angell, R.C.

- 1973 National support for world order. *Journal of Conflict Resolution* 17(3):429–54.
Data for 114 nations for 1966–67; contains 36 variables measuring national support for world order.

Banks, Arthur S.

- 1976 *Cross National Time Series, 1815–1973*. Ann Arbor: Institute for Social Research.
Available as ICPSR 5002 and ICPSR 7412. Longitudinal data set for 167 nations with 169 variables on demographic, social, political, and economic topics.
- 1974 *Domestic Conflict Behavior, 1919–1966*. Ann Arbor: Institute for Social Research.
Available as ICPSR 5003. Data on domestic conflict for 111 countries, 1919–39 and 1946–66 (riots, demonstrations, purges, crises, strikes, etc.).

Banks, Arthur S., and Robert B. Textor

- 1968 *Cross-Polity Survey*. Ann Arbor: Institute for Social Research.
Available as ICPSR 5004. Data for 115 polities with nominal and ordinal data on 59 raw characteristics and 194 “finished characteristics,” economic, demographic, and subjective measures each as degree of political modernization and interest articulation. Several articles on data in Gillespie and Nesvold (1971).

Boulding, Elise, et al.

- 1976 *Handbook of International Data on Women*. New York: Wiley; Beverly Hills, Calif.: Sage Publications.

Gillespie, John, and Betty Nesvold, eds.

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Inter-University Consortium for Political and Social Research (ICPSR)

- 1978 *Guide to Resources and Services, 1978–1979*. Ann Arbor: Institute for Social Research.
Pages 45–310 contain an annotated list of archival holdings.

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 Issued annually.
- Russett, Bruce
 1967 *International Regions and the International Systems: A Study in Political Ecology*. Chicago: Rand-McNally.
 Data sets on regions of social and cultural and political homogeneity and interdependence in 18 data files. Data available from Institute for Social Research, Ann Arbor, as ICPSR 5652.
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 1964 *World Handbook of Political and Social Indicators*. New Haven: Yale University Press.
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 1977 *World Military and Social Expenditures, 1977*. Leesburg, Virginia: WMSE Publications.
 Data set on absolute and comparative expenditures for 132 countries on 35 social, economic, and military expenditures. Available from Institute for Social Research, Ann Arbor, as ICPSR 5033.
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 1972 *World Handbook of Political and Social Indicators*. New Haven: Yale University Press.

United Nations

- 1949— *Demographic Yearbook*. New York.
Issued annually.
- 1949— *Statistical Yearbook*. New York.
Issued annually.
- 1975 *Selected World Demographic Indicators by Countries, 1950–2000*.
New York. ESA/8/WP.55.

United Nations Educational, Scientific, and Cultural Organization (UNESCO)

- 1955 *Handbook of Educational Organizations and Statistics*. Paris.
- 1958 *World Survey of Education*. Vol. II, *Primary Education*. Paris.
- 1961 *World Survey of Education*. Vol. III, *Secondary Education*. New York: International Documents Service, A Division of Columbia University Press.
- 1963— *Statistical Yearbook*. Paris.
Issued annually.
- 1966 *World Survey of Education*. Vol. IV, *Higher Education*. New York: UNESCO Publication Center.
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United Nations Food and Agriculture Organization (FAO)

- 1947— *Production Yearbook*. Rome.
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United Nations Research Institute for Social Development

- 1976 *Research Data Bank of Development Indicators*. Report No. 76.3.
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- 43 The fertility of migrants to urban places in Thailand, by Sidney Goldstein and Penporn Tirasawat, April 1977, 49 + v pp.
- 44 The demographic situation in the Philippines: an assessment in 1977, by Mercedes B. Concepción and Peter C. Smith, June 1977, 75 + vii pp.
- 45 The demographic situation in Thailand, by Fred Arnold, Robert D. Retherford, and Anuri Wanglee, July 1977, 35 + vii pp.
- 46 The role of migration and population distribution in Japan's demographic transition, by Toshio Kuroda, July 1977, 17 + v pp.
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- 50 The economic value of children in Asia and Africa: comparative perspectives, by Helen Ware, April 1978, 36 + v pp.
- 51 Rural-urban migration and social mobility: studies of three South Korean cities, by Man-Gap Lee and Herbert R. Barringer, May 1978, 44 + vii pp.
- 52 Preliminary estimates of Indonesian fertility based on the 1976 Intercensal Population Survey, by Sam Suharto and Lee-Jay Cho, May 1978, 21 + v pp.
- 53 Circulation in the context of total mobility in Southeast Asia, by Sidney Goldstein, August 1978, 69 + v pp.
- 54 Effects of program contraception on fertility: a comparison of three Asian countries, by Siew-Ean Khoo, September 1978, 58 + ix pp.
- 55 Population projections for planning and policy, by William Brass, September 1978, 16 + v pp.
- 56 Spatial fertility analysis in a limited data situation: the case of Pakistan, by Gary Fuller and Mohammad M. Khan, October 1978, 20 + vii pp.
- 57 Infant and child mortality in Thailand: levels, trends, and differentials as derived through indirect estimation techniques, by John Knodel and Apichat Chamrathirong, November 1978, 40 + vii pp.
- 58 Regression estimates of changes in fertility, 1955-60 to 1965-75, for most major nations and territories, by James A. Palmore, December 1978, 59 + vii pp.
- 59 Comparison of three acceptance strategies: a progress report, by Robert G. Potter, Frances E. Koorin, and Raymond L. Langsten, February 1979, 16 + vii pp.
- 60-A On the nature of the transition in the value of children, by Rodolfo A. Bulatao, March 1979, 104 + xvi pp.
- 61 Prediction of family planning and family size from modernity value orientations of Indian women, by Bishwa Nath Mukherjee, April 1979, 50 + v pp.

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