The article suggests that the massive transformation of the political system often referred to as "political development" is responsible for the movement from high to low birth- and death rates in national populations. The effect of the changing political system is independent of (and in addition to) the effects of socioeconomic changes previously presented in the theory of the demographic transition. The article reports first the nature of the systematic connection between change in the political system on the one hand and change in vital rates on the other. Second, it presents a new empirical measure of the capacity and effectiveness of whole political systems.

POLITICAL DETERMINANTS OF POPULATION DYNAMICS

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Most political scientists have traditionally used demographic data to help account for political behavior, but few have analyzed the influence that political change has on demographic patterns and specifically on vital rates that are central to the field of political demography (see Organski and Organski, 1961; Choucri, 1974). We report here how the massive political transformations that most countries underwent in the last half century have influenced the mortality and fertility of their populations.

AUTHORS' NOTE: *This is a summary of portions of the analysis contained in A.F.K. Organski, Jacek Kugler, J. Timothy Johnson, and Youssef Cohen,* Births, Deaths, and Taxes *(forthcoming). We are grateful for the help of Ray Langesten, William Domke, Glenn Palmer, and Joseph Marlowe, and for the thoughtful criticism of two anonymous*

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THE DEMOGRAPHIC TRANSITION MODEL

A dramatic decline in death and birthrates has been empirically recorded across a variety of national populations in the past century. To account for this seemingly systematic decline, a "demographic transition" model was proposed that suggests that there is a straightforward, sequential, but uneven connection between socioeconomic growth and changes in fertility and mortality rates over time.[1] Figure 1 highlights the postulated relationship.

The demographic transition divides the process of demographic readjustment into three distinct stages. During the initial stage of potential growth, national populations display characteristically high death and birthrates but maintain a relatively stable population size. In the second, aptly named the transition stage, mortality undergoes rapid decline and produces sharp expansions in population size. As the process continues, birthrates start to decline as well, limiting the rate of population growth but still maintaining the expansion of population size. In the final stage of incipient decline, both fertility and mortality rates are low and the population is again stable or may even decline in size.

The demographic transition gained wide acceptance because, with broad and plausible strokes, the relationship between massive changes in population and socioeconomic structures is drawn. Still, plausibility is not sufficient: The picture must not only be convincing; it must also and above all agree with the facts. The jury is still out. While it is clear that most countries have undergone or are entering the process of demographic change roughly in step with the outline advanced in the demographic transition, a clear and systematic link between socioeconomic and population change has not been satisfactorily established, and recently, the model has come under considerable question.[2]

Despite the discrepancy between the pattern laid out by the model and empirical reality, the demographic transition is, in our view, a gross but effective representation of the underlying process of demographic change, but the original model is seriously underspecified because the effects on vital rates of the massive transformations in the political

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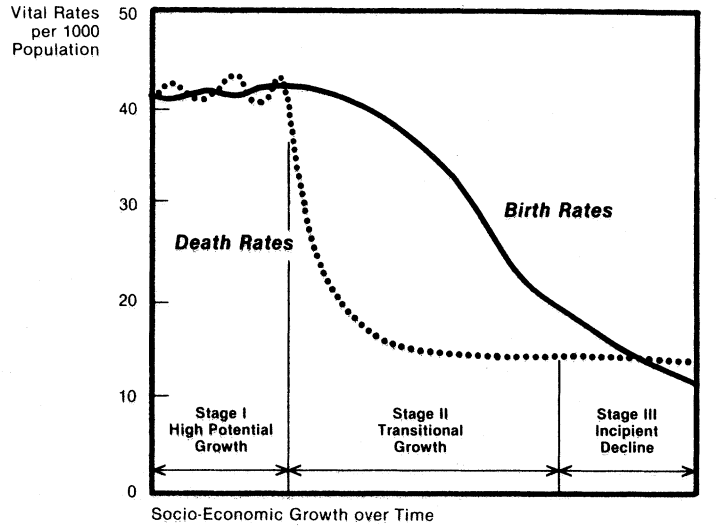


Figure 1: Idealized Demographic Transition

system are not treated. Let us briefly suggest why political structures are such an important determinant of changes in vital rates and why the temporal representation in the demographic transition, suggesting that mortality is affected first and fertility later, coincides with political expectations.

Consider the decline in death rates. The development of political capacity means the introduction of at least rudimentary political organization nationwide that, after an initial period of turbulence, will provide a measure of peace to the population by the slow eradication of fighting among competing groups and by the more effective protection from external attack. These actions lay the foundations for the growth of the state, but concurrently and indirectly, ensure a sharp decline in death rates. Mortality is profoundly affected by limitation of conflict, not simply, or even significantly, by the reduction of violent death, but rather by ensuring that fields will be tilled and that food will be safeguarded for times of want and distributed to avoid malnutrition. The connection between mortality and politics is probably stronger, even though less dramatically demonstrable, when relatively effective governments increase the infrastructure of society and introduce water and sanitary facilities, adopt modern public health and medical practices, or maintain effective communication and transportation systems. These

innovations do not require highly capable political systems. In many cases reductions in mortality were initiated during the colonial period by the intervention of nonindigenous governments, which, like many of the postcolonial governments, had little control over the population yet were sufficiently efficient to adapt and disseminate practices that dramatically limited death rates.

Let us turn to birthrates. We suggest that governmental interference has dramatic indirect consequences on the fertility of populations. Governments intrude in family life in many ways: The cost of children is raised by the introduction of child labor laws, the expansion of compulsory education, and the protection of a child's right to receive support from parents when they part; the structure of families is affected by the expansion of opportunity for women to seek work, pursue education, inherit property, or initiate divorce proceedings; the size and structure of populations is changed by encouraging or controlling internal and external migration, and so on. These political decisions have consequences far beyond those of explicit governmental programs that support family planning, allow the termination of pregnancies, or introduce incentives for birth control, which have already been extensively analyzed.[3] We are suggesting, in summary, that as governments penetrate and reshape their societies in the process of political growth, they indirectly change demographic structures. The intentions of governments that introduce most of the policies considered are related to state building and are far removed from explicit attempts to increase longevity or change reproductive behavior, but the political actions taken have important, unintended consequences for behavior of national populations.

Finally, consider the temporal effects of political capacity on demographic structures. The growth of the political system does not affect mortality and fertility evenly since the implementation of policies that affect fertility requires a far more effective government than is required to reduce mortality. This is partly because the preservation of life is more readily accepted than is the restriction of family size, which usually impinges on longstanding pronatalist values, yet the difference is far more fundamental than popular acceptance. Contrast, for example, the relative ease of introducing potable water and sanitary facilities with the obstacles facing the implementation of universal education, or the building of public health facilities with the effective implementation of child labor laws or efforts to eliminate discrimination by sex. These differences in the difficulty of implementing policies that affect mortality and fertility account, in part, for the temporal lag between the decline in death and birthrates so dramatically documented in historical studies.

The link between the expansion of political capacity and the decline in vital rates has not been previously explored largely because there has been no way to measure in a systematic and rigorous fashion the political capacity of nations. In this article we suggest such a measure and show how it contributes to the further elucidation of the demographic transition.

VARIABLES

POLITICAL CAPACITY INDICATOR

Measures of population change have long been available, but estimates of variation in political capacity have been lacking. There has simply been no empirical way of determining political change over time, no way of measuring political variations across countries, and thus no way of assessing the effects of political change on vital rates. Available measures of political capacity were either confined to electoral systems, where votes and political attitudes could be gathered and related, or else relied heavily in a more general context upon the same socioeconomic indicators used to account for population changes by economists and demographers (Deutsch, 1966; Gurr, 1974; United Nations, 1972; Adelman and Morris, 1973; Russett et al., 1964; Taylor, 1978). Without an explicit and independent measure of political capacity, the effects of politics on vital rates could not be defined or evaluated. We submit that such an indicator has now been developed.

The capacity of political system refers simply to the government's ability to penetrate the society and extract resources from it.[4] It is the availability of resources that permits a government to carry out the tasks imposed on the political system by the competing national coalitions and the pressures of the international environment. Political capacity, as we define it, is not related conceptually to forms of political systems. Highly capable political systems need not be democratic, stable, orderly, representative, or participatory, desirable as such attributes might be from certain normative perspectives. The question we pose here is whether elites have the tools to extract human and material resources from their societies, gather the many contributions together into a national pool, and use these contributions for specific purposes of their choice. Thus, in short, the initial estimate of political capacity we are proposing measures the ability of governments to extract resources from the available national pool and redirect these resources in

accordance with governmental goals. We implicitly assume that governments are politically effective to the extent they are able to extract resources to further their goals.

The political factors that directly determine levels of political capacity cannot, yet, be specified adequately. To circumvent this limitation we construct indirect estimates of political capacity that trace the relative differences in political extraction in countries that have achieved similar levels of economic productivity. It should not be surprising that we turn to tax structures in our attempt to measure governmental extraction. The imposition of taxes is a direct indicator of governmental presence. Few operations of government depend so heavily on popular support or on fear of punishment. Few affect so directly the lives of individuals in society and few are so vigorously resisted. Without revenue there can be no control, no national unity, in fact, no government. Still, it should be clear that simple tax ratios have little utility for the evaluation of political performance. Both political and economic factors define the limits of extraction. The amount of revenue raised depends as much on the overall wealth of society and on governmental allocations to services as on the success of political institutions in collecting and allocating resources. It is enormously difficult to separate economic from political factors, but the indirect estimate of political capacity we propose here, to be valid, must be kept free of economic influences so that effects of politics and economics are not confounded in the analysis (for a methodological evaluation of the use of indirect evidence, see Kugler, 1983).

Constructing the Indicator

The index of political capacity is constructed in several steps specifically designed to isolate political factors. We start with two points of reference: One is the actual performance of a country in raising revenues; the other is the maximum amount of resources that would be raised if the political and economic systems operated at full throttle. Once these levels are established, separate economic controls are imposed to account for fundamental economic differences in the collection and allocation of resources. In the last step, the adjusted level of extraction achieved is subtracted from the adjusted maximum. This difference is a rough measure of the "incapacity" of the political system since the larger the value obtained, the greater are the resources left untouched by the government under similar economic constraints. Since

we prefer to think in terms of proportional capacity rather than incapacity, this value is multiplied by minus one hundred (-100), so that negative scores indicate the percentage of unused but available or slack political capacity. A politically capable country will have smaller negative values than a politically less capable one, and a fully mobilized society will approach zero. These steps can be summarized as follows:

$$\text{POLITICAL CAPACITY} = -100(\text{ADJ. MAX EXTRACTION RATIO}_{it} - \text{ADJ. TAX RATIO}_{it})$$

and

$$\text{ADJ. MAX EXTRACTION RATIO}_{it} = m_i[1 - (\text{MINERAL PROD}_{it}/\text{GNP}_{it} - \sum_t \text{MINERAL PROD}_{it}/\text{GNP}_{it}/it)]$$

$$\text{ADJ. TAX RATIO} = (\text{GENERAL GOVERNMENT REVENUE}_{it} - \text{SOCIAL SECURITY}_{it} - \text{NONTAX REVENUE}_{it})/\text{GNP}_{it}$$

The elements that reflect fiscal and economic performance are measured in national currency and defined as:

GNP: gross national product
MINERAL PROD: value of industrial output originating in mining
GENERAL GOVERNMENT REVENUE: Compulsory payments for public purpose by central, state, and local government. Transfers from foreign governments or international institutions and domestic or foreign borrowing are not included.
SOCIAL SECURITY: Social Security contributions to government funds (developing and underdeveloped nations) or Social Security expenditures by governmental institutions (developed nations).
NONTAX REVENUE: Residual category composed of noncomparable revenues including fees, fines, forefits, private donations, and like revenue.
i: nations in the sample
t: time (1959-1975)
m: Extraction weight approximating the ability of nations to obtain resources under political stress (developed nations: .55; developing and underdeveloped nations .40).

Maximum level of extraction. Each of these steps requires some elaboration. The maximum level of extraction is conceptually the most

a government could extract under extreme political stress. To approximate this limit we evaluated the performance of governments in wartime because in conflict, and specifically total conflict that involves a direct danger of loss of national sovereignty, the level of stress is dictated by political factors. It seemed reasonable that when countries have their very existence threatened by total war, governments will try to collect all available resources with which to carry on the fight. Previous work provided the necessary data to survey all countries involved in total wars in this century (Kugler and Domke, 1981; Organski and Kugler, 1978). Among them, two nations performed well above the rest within the developed and developing categories. One was North Vietnam, which in the recent war of reunification extracted over 40% of its gross national product for the war effort. This can be contrasted with less than 15% extracted by South Vietnam or with slightly under 40% extracted by Japan during the 1905 war against Russia. The other nation was Britain, which extracted 55% during World War II (more than any other country extracted either during World War I or World War II even though Germany ranked a close second in both).

It should again be noted that high performance is not related directly to the type of political system. Democratic Britain outperformed a totalitarian Nazi Germany, and North Vietnam's totalitarian dictatorship far outperformed South Vietnam's authoritarian regime despite extensive U.S. support. This is not to say that regime type is completely unimportant. It is still not possible, for example, to compare meaningfully the political changes in the Soviet Union and Eastern Europe because economic controls developed thus far are insufficient to adjust effectively the distortions produced by the massive governmental presence in completely controlled economies.

It seems reasonable to argue that Britain was able to obtain higher levels of resources from its population than North Vietnam during times of extreme political stress because of vast differences in productivity in the two economies. Britain was a relatively rich society, which during World War II had a per capita income of about $1500, while North Vietnam had a per capita income of slightly over $100. Thus we decide to accept 55% and 40% as the maximum levels of extraction possible for developed and less developed nations, respectively. These maximum levels reached under wartime conditions are much higher than the levels observed in peacetime and cannot be maintained indefinitely, but they indicate what governments can do when put to the ultimate test of their resolve and ability.

General government revenue. A second component of political capacity is the level of achieved extraction indicated by the actual

revenue obtained by each society. The aggregate includes direct and indirect taxes and profits from governmental enterprises but excludes revenues obtained from unspecified sources. The object is to identify elements where the avoidance of taxation is an important issue since such evasion indicates an unwillingness on the part of the population, for the sake of personal profit, to help shoulder the collective burden of government (for the rational involved in the particular selections, see Bahl, 1971). After economic adjustments are made, relatively low or high extraction suggests the respective political weakness or strength of governmental structures.

Political versus economic capacity. Let us now turn to the adjustments necessary to separate economic from political influences in the political capacity measures. In developing countries, one needs to concentrate mainly on the revenue side of the equation since total revenues fall far short of desired government income. Fiscal economists have effectively documented that in developing nations, governments extract to the limit of available resources; thus differences in the revenue base alone account for most of the economically induced differences in tax rates (for details on the underlying fiscal structures, see Lotz and Morss, 1967; Chelliah, 1971; Bahl, 1971; Chelliah et al., 1974; Tait et al., 1979). Specifically, controls for the share of GNP in agriculture, mining, and exports will account for most differences in revenues due to purely economic differences among less developed nations.

Development specialists will not be surprised by such results. A developing country with a large foreign trade sector or large deposits of minerals has a substantial advantage in collecting revenues because it obtains such resources from other countries, not its own people, and also because it is much easier for the government to tax the few enterprises producing mineral resources or to collect custom duties. The immense revenues of the OPEC nations are an obvious example of what we are talking about. Indeed, when controls for the mineral contribution to the generation of revenue are introduced, most OPEC countries fall toward the bottom of any comparison of governmental performance. In this study, we found that adjusting for mineral resources was sufficient to control for differences in the revenue base, since export and per capita income are already reflected by the variations in the maximum extraction levels.

At the developed level, it is crucial to adjust concurrently for governmental expenditures as well as revenues. It is simply not possible to assume that developed societies extract all the resources they can from their populations, for taxation is effectively constrained by policy

preferences. In Sweden, for example, health services are provided to the population by the public sector, while in the United States, similar services are still largely delivered by the private sector. Thus Swedish government must tax its citizens to cover health expenditures, while the United States needs to tax Americans much less. The difference in the level of extraction will, to a degree, reflect a difference not in capacity, but in policy. In comparing the performance of American and Swedish societies, then, one must adjust for policy preferences before estimating differences in political capacity.

To avoid giving credit unjustly to a country with a higher level of extraction despite the possibility that it may, in fact, perform less ably, we adjust for key governmental expenditures, which vary with the levels of governmental services. The likely sources of major differences in taxation caused by varying preferences in patterns of public and private expenditure are levels of health, education, social security, and welfare. For developing nations, it was sufficient to subtract revenues collected for social security from the total revenues. For developed nations, social security contributions were added to the excess expended on social services and that total was then subtracted from achieved revenue. These controls proved effective, but certainly they should not be considered final.

The measure of political capacity we have constructed gauges the political level nations have achieved. This measure can be used to compare political structures at similar levels of economic development, but it is not an independent measure for political performance. It tells us, in other words, how effective a government is in using the resources at its disposal relative to other governments facing similar socioeconomic constraints, but does not indicate directly the absolute level of political capacity achieved. In a related work, we indicated how this measure varies with levels of economic development, but for our purpose here, a relative measure of political capacity is sufficient (for a full elaboration, see Organski et al., forthcoming).

SOCIOECONOMIC VARIABLES

We have just described how our measure of political capacity is constructed. But the transformation of the political system is only one of the structural changes that brings down vital rates in the demographic

transition. Other factors are also important causes of the decrease: education, including particularly the education of women; urbanization; increases in income; technological advances in the health sciences; improved sanitation and transport facilities; and changes in family structure. All play a demonstrable role in the movement of vital rates. How was one to go about introducing them into the overall model required to test our central hypothesis?

There are two alternatives in dealing with this problem. One is to develop a sophisticated model that concurrently considers all contending variables while determining the impact of political change within this overall context. We did not choose this approach for two main reasons. Most of the available socioeconomic variables used in population analysis were known to reflect similar effects. Levels of health, income, urbanization, and sanitation are all highly correlated (United Nations, 1972). It was not essential, therefore, to develop a complex model that would use them all.

A second reason for not choosing a complex approach was that, as the reader will recall, we can measure political capacity only indirectly. Thus, only elements that are explicitly included in the estimate of political capacity can be used in the analysis without again distorting the effects of politics. We reasoned that the expansion of water or sanitary facilities, the building of roads, the reduction of violent death by civil or international strife, and the adoption of universal education are partly independent elements. Still, they largely result from and hence reflect increasing levels of political capacity and, if included concurrently, could distort measures of political effects.

Consider, for example, the case of education, which is often associated with demographic change. The introduction of universal education or the extension of minimal levels of compulsory education is not an economic or educational necessity. Rather, it reflects political acts that enforce governmental choices on the family. For example, in Cuba, or Malaysia, governmental pressure to expand educational access has contributed to the disruption of traditional values, and in so doing, has also contributed to changed fertility norms and practices. In such cases, the resulting changes in fertility are ultimately due as much to politics as to the more proximate, and more commonly measured, factor of education.

To determine whether the addition of political capacity substantially adds to the overall explanatory power of the demographic transition

model, the simple alternative model we chose uses a single, all encompassing summary measure of the social and economic changes that affect vital rates. Per capita total product, not surprisingly, was chosen as this single indicator, since it is an all-inclusive variable that encompasses the effect of many social and economic factors. In adopting this strategy, we were reassured by noting, as others have, that while GNP per capita and other socioeconomic factors were substantially interrelated, the relation to the political capacity indicator waas weak.[5] The simplicity of the proposed model was clearly in advantage: The relation between our dependent and independent variables would stand out in bold relief, and, of course, if no relation were present, this too would be readily apparent.

We were naturally aware of the difficulties imbedded in any use of per capita product. Severe distortions result in any comparison over time from the many transformations required in translating national currencies into current and constant dollars, from the use of indices when direct estimates would be preferable, and from the unavoidable errors introduced by changes in technology that affect the composition of goods produced, over time and across nations. We did not attempt to improve this measure, but simply relied on the World Bank data, where a sophisticated attempt to minimize such distortions had already been made (data from World Bank, 1979; for details and problems, see Gilbert and Kravis, 1954; Gilbert et al., 1958; Beckerman, 1966; for developing countries, see Kravis et al., 1975, 1979). The reason is simple: we knew that whatever error one had to contend with on the economic side would be smaller than the error contained in our political variable. Undue precision seemed unwarranted.

DEMOGRAPHIC VARIABLES

The last step in preparing for our analysis required the measurement of the vital rates we wished to use as the dependent variable. For this purpose we chose crude birth- and death rates as the basic indicators, obtained by counting the number of children born and the number of deaths occurring in a given year, per 1000 total midyear population.

The decision to use crude rates, standardized to correct for differing national age distributions, was based on three factors. First, data for crude fertility and mortality rates were much more readily available than were the more refined measures such as gross or net reproduction

rates, or infant mortality rates. Second, to the extent that political leaders are aware of demographic rates, they tend to take note of crude birth- and death rates and the crude rate of natural increase, derived by subtracting the death from the birthrates. Third, even if we had adequate series of the more refined indicators, it is doubtful that the level of analysis with which we were dealing would have justified the use of such refinements, particularly when we note the very high correlations existing between the crude measures and more refined variants.

Despite the decision to use crude rates as our basic dependent variable, we did choose to adjust the crude rates to overcome the distortions that might arise from substantially differing population age distributions among nations. We used two separate adjustments to minimize the distortions in question (for an effective treatment of these problems, see Keyfitz, 1977).

A relatively orthodox standardization procedure was used to adjust death rates in order to eliminate the effects of variation in the age structure. Using a standard population, we computed what the crude rates would be if there were no variations in age structure. For each time point, the age-specific mortality rate of a given country is multiplied by the equivalent age-specific death rate in a standard population. The adjusted crude death rate is obtained by multiplying the ratio between the cumulative total mortality rate across age groups in the standard population and the size of the standard population. The standard population used throughout is that of England and Wales in 1960. All adjustments are made at five-year intervals (see Appendix A).

In the case of birthrates, the objective is again to take out variations introduced by age structures. Unlike the adjustments of crude death rates, an orthodox procedure to standardize fertility is not readily available. Our concern is to reduce the differential impact of the number of couples of childbearing age which, in a relatively young population, will increase and, in an old one, depress fertility rates. To this end we determined, at five-year intervals, the ratio between the number of women ages 15 to 44 in each nation and the same group in the standard population, that of England and Wales in 1960. The adjusted crude birthrate was obtained by multiplying the original crude rates by this ratio (see Appendix B).

As expected, the adjusted mortality rates increased and fertility rates decreased everywhere except among a few highly developed societies. Further, in relatively young populations, the effect of standardization is strong while in the relatively older population the adjustments are weak. Thus, the age distribution adjustments desired have been achieved.

ANALYSIS

THE SAMPLE

The demographic transition model depicts the process that nations undergo as they modernize. To capture the dynamics of this process, we attempt to cover the full range of national development over the time span for which data are available. A thumbnail sketch of the data we worked with will be useful.[6] The data are confined to the 1950-1975 period, which is not sufficient to span the full demographic transition in most nations. National coverage is limited by missing data. Some nations are entirely excluded due to lack of information, others are included only after they become independent and have a government of their own, and still others, including the centralized communist governments and small city-states, are excluded because we cannot yet measure their political capacity.

Two notable drawbacks of the sample, detailed in Appendix C, deserve special emphasis. Because of the temporal limits of this study and the limitations on data availability among the poorest nations in the sample, it was impossible to obtain a fair and complete portrait of the demographic transition at its earliest stages. The poorest nations are the least likely to keep adequate statistics on national accounts, fiscal resources, or population dynamics. Moreover, most countries have already managed to reduce at least the death rate and only a few still have not started to affect the birthrates. In our analysis of the population changes, we are therefore limited by data availability.

A second group not represented are the Communist countries of Eastern Europe and the Soviet Union. One cannot measure at the present time the political capacity of these governments because the economic structures in their societies are too different from those of the non-Communist nations. This exclusion creates a gap between the developed and the developing nations, where most of these centralized nations would fit on the basis of economic development. Despite these limitations, our sample is entirely sufficient to explore the relationship between political capacity and vital rates.

THE MODEL

To analyze the process of demographic transition, we constructed a model that would capture the different curvilinear patterns traced by fertility and mortality rates on the one hand, and by economic and

political factors on the other. We anticipated that, propeled by economic and political growth, death rates would fall dramatically while birthrates would initially be sustained at high levels. Subsequently death rates would level off while fertility came down, and eventually these two rates would converge again at an absolute level lower than at the start of the process.

Some adjustments were required to translate this complex picture into a testable proposition. Recall that the rough shape of the demographic transition process is known, but that one cannot predict with accuracy the points of inflection or the exact linkage, if any, between changes in birth- and death rates and the variation in economic and political development. This lack of theoretical specificity prevents the use of advanced non-linear models whose stability depends to a large degree on the correct specification of the structure analyzed, and it is obvious that simple linear models cannot adequately capture the relationship under study. To solve this problem, we use a model that breaks the process into linear segments but still allows them to be considered concurrently. This approach reflects our rudimentary specification of the underlying curvilinear trajectories, but still provides estimates that can be easily interpreted, disaggregated, and restructured. The linear approximation of the nonlinear pattern we expected to find in the demographic transition can only be effective provided the data are roughly grouped at the inflection points. For the purpose of analysis, we distinguished three such groups. The most advanced nations, labeled "developed," incorporate societies that have, in general, completed the demographic transition stage and have entered the period of potential decline. We distinguish this group simply by placing in it all members of the OECD: They are the developed Western bloc nations, including Japan.

The remaining two groups are drawn from the nations excluded from the developed category. We hoped to reproduce the two intermediate phases of the transition, first when mortality drops while fertility remains high, and then when both mortality and fertility decline. There was no simple, consistent way to determine exactly where to make a split. Yet clearly, very different patterns of economic, political, and demographic performances are present in such countries as Nepal and Brazil and should not be lumped together. The nondeveloped nations are divided into "underdeveloped" and "developing" groups by splitting this sample in half for each year of the series (see Appendix C). This minimizes the distortions produced by the inclusion or exclusion of different nations over time and diminishes the effect of overall growth in

relative wealth over time. The sample is evenly distributed among the two groups and shows that most nations remain relatively economically static, and only a few show rapid and sustained growth. Consider now the exact structure under consideration, in a linear model broken into the three groups:

$$Y_{kt} = \beta_0 + \beta_1 d_{1t} + \beta_2 d_{2t} + \gamma_1 (d_{1t} x_t) + \gamma_2 (d_{2t} x_t) + \lambda_1 (d_{1t} z_t) + \delta x_t + \omega z_t + \epsilon + \lambda_2 (d_{2t} z_t)$$

collecting terms:

k = 1 Underdeveloped

$$Y_{1t} = (\beta_0 + \beta_1) + (\delta + \gamma_1) x_t + (\omega + \lambda_1) z_t + \epsilon$$

k = 2 Developing

$$Y_{2t} = (\beta_0 + \beta_2) + (\delta + \gamma_2) x_t + (\omega + \lambda_2) z_t + \epsilon$$

k = 3 Developed

$$Y_{3t} = \beta_0 + \delta x_t + \omega z_t + \epsilon$$

where:

- Y = birthrates or death rates
- k = type of nation: 1 = undeveloped, 2 = developing, 3 = developed
- t = time: 1950, 1951, . . . , 1975
- x = political capacity
- z = economic output
- $\beta, \delta, \gamma, \omega, \lambda$ = regression coefficients
- ϵ_t = error term

This representation of the transition process has important advantages. The static cross-national model captures to some degree the dynamics of a demographic transition by ordering across time the short temporal segments available for each country. Note, further, that a linear approximation to a nonlinear pattern is provided by estimating

concurrently but separately each regression coefficient in this model for the three groups defined. Finally, it is possible to disaggregate the levels of association achieved by economics and politics and separate their individual effects on vital rates for each group or combination of groups desired.

For our purpose, this ability to disaggregate levels of association is of central importance. By construction it is possible to analyze any combination of groups and explanatory elements without affecting the regression coefficients but obtaining for each cut levels of association that vary in accordance with the strength of the relationship encountered. Two important implications follow. First, the demographic transition phase is over in most developed nations but affects in its full force the societies still in the process of early development. Thus the impact of political and economic variables on populations where the process of demographic transition is strongest and presently still in full swing can be directly determined for each group by reestimating the full model for the appropriate cases. Second, we note that while the effects of economics and politics are calculated concurrently, their respective, separate impacts can be directly estimated. Thus uncontaminated measures of the effects of politics are derived by subtracting the levels of association obtained from similar models including economics and politics together, and then economics alone.

CHANGE IN VITAL RATES

Our basic hypothesis is that the greater the political capacity of a nation, the greater and more rapid the reduction in birth- and death rates will be. We expect to find a negative relationship between political capacity and vital rates at every level of economic development. In other words, the greater the political effectiveness, the lower we expect vital rates to be. However, we expect that the strength of this relationship will vary across levels of economic development. We further expect to observe particularly substantial effects on mortality in the initial transition phase when mortality should decline rapidly, prior to the delayed effects on fertility. As the process continues through the second phase, we expect more accentuated effects on fertility, while mortality starts to level off. We also expect that political effects will be minimal once the transition stage is complete.

The results of our analysis can be presented simply in two parts. Consider fertility first.

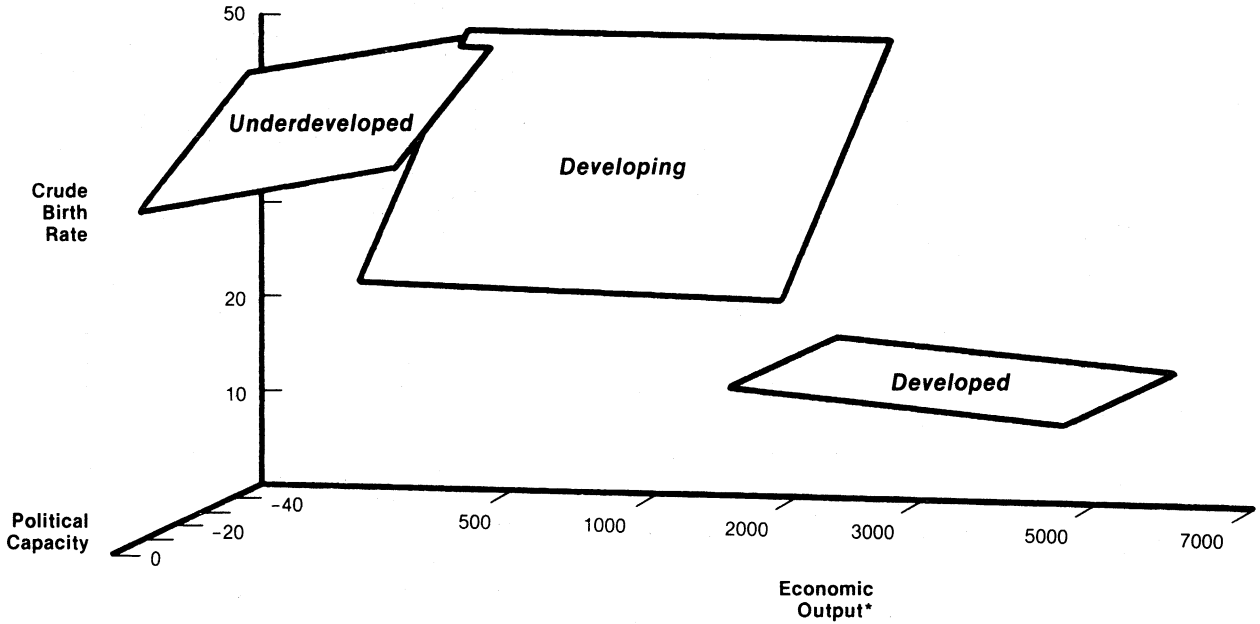
Fertility

Politics plays an important role in reducing the fertility of underdeveloped countries. First, note that the effects of economic wealth on the very poor group is contrary to original expectations.[7] An initial increase in income is associated with an increase in fertility. But political growth acts as a countervailing force and results in an overall decline in fertility. Moving next to the developing group, where the state structure is more fully in place and where governmental power and control are more effectively institutionalized, politics combines with increasing wealth to account for drastic reductions in fertility. In the developed nations, as expected, the political effects are weak and change almost entirely absent.

Close observation of Figure 2 reveals a wide gap between the developing and the developed world. We believe that the discontinuity between the developing countries and the developed world as represented here reflects deficiencies in the composition of our sample. The reader will recall that a small number of centralized Eastern European countries, lodged in an economic development level between the developing and developed world, were omitted from our study since we found ourselves unable yet to estimate how politically capable their governments are. We believe that, if and when they are included, the disparity between the expectations of the demographic transition and the graphs will be reduced, providing a smoother, more symmetrical curve.

Let us now attempt to attach some meaning to the coefficients of political capacity. We have established that levels of extraction reach their absolute limit at approximately 40% and 55% for underdeveloped and developing nations, respectively. Few nations fit to be called organized communities have adjusted tax rates below 10% of total output. Therefore, disregarding mineral output, the effective range of political capacity for less developed nations is between 10 and 40, or a total of 30 units. Note that the unstandardized regression coefficients for underdeveloped and for developing nations imply that for each point of political development increase, we can expect an associated decrease of 0.27 and 0.84 points, respectively, in fertility rates. The corresponding decrease due to politics in developed nations is a trivial 0.006.

If we consider these equations predictive, and a difference of 30 points the limit, the maximum range of change in political effectiveness would result in an 8-point difference in fertility rates for the underdeveloped group compared with a 25-point reduction for developing



*Scale = square root of GNP per capita to collapse range of values.

Figure 2: Relation of Fertility to Political Capacity and Wealth, 1950-1975

nations, where the response to political change had been postulated to be more sensitive, and the effect of economic change is both stronger and in the same direction.

Carrying this discussion further, we note that, in reality, few nations are able to demonstrate an increase in political performance by more than 10 points over the 25-year retrospect. Thus the predicted effect of increases in politics is to reduce crude fertility rates by 2.7 and 8.4 per 1000 for underdeveloped and developing countries, respectively. Over time, politics would then account for about one-third of the total fertility change in the process of demographic transition.

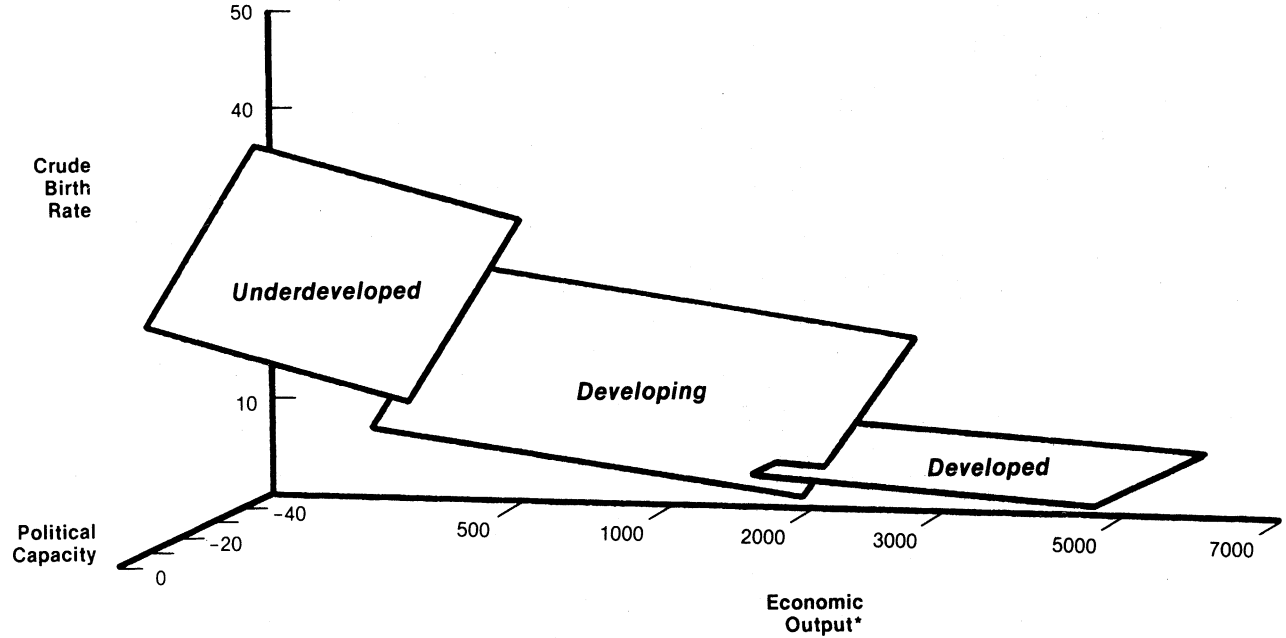
Political capacity affects fertility rates negatively but with uneven strength within each of the less developed groups considered. In the poorest underdeveloped countries, the path to a balanced population will be discouragingly difficult because economic advances result in fertility increases that compensate for the reduction achieved with improved political capacity. The outlook is brighter for the group of developing nations, where both economic and political improvements lead to reductions in fertility.

Let us now turn to death rates.

Mortality

The strongest effects on death rates, both from politics and economics, occur at the early stages. Here again we must note the difficulty caused by the unavoidable deficiencies in our sample. The curvilinear trajectory of mortality rates, moving from high to low, is foreshortened because of the limited time period explored and the omission of a number of very poor countries from our sample. The representation of countries still in the initial stages of nation building is poor not because they are absent but because the data are sparse. Given the theoretical structure under investigation, we speculate that the effects of politics are considerably attenuated because of these sample constraints and suggest that in a more complete presentation, the political effects registered in the first group would be even more pronounced (see Figure 3).

Despite these limitations, the effects of politics on mortality are consistent with our expectations. Note that in the initial period both economic and political change contribute to the potentially disastrous demographic imbalance. Among underdeveloped countries, mortality falls rapidly even under weak political and economic stimuli, creating a substantial gap between levels of reproduction and mortality. In the developing nations, the combined effects of economics and politics are



*Scale = square root of GNP per capita to collapse range of values.

Figure 3: Relation of Mortality to Political Capacity and Wealth, 1950-1975

still strong, though less so than at the outset, when much of the reduction is actually achieved. Among the developed groups, economic effects remain significant while politics has only an insignificant impact.

Consider, once more, the coefficients attached to politics. A predictive interpretation of our equations, using again a 10-point increase in political capacity, would give us a reduction of between 3 and 4 points in our adjusted crude death rates for both the underdeveloped and developing groups. For the developed nations, politics has only a negligible impact on deaths, as it had had with births. For the range of nations considered, politics is a less important determinant of change in mortality than in fertility rates. In general, these results conform to expectations.

The prospect for reduced mortality seems bright since both economics and politics operate to reduce mortality. It is clear though, that, especially among the underdeveloped group, mortality exceeds the fertility decline. Birth- and death rates initially diverge because political change affects mortality as much as fertility, while economic change increases the expansion of population. The danger of rapid population growth is present. Only when nations reach the productivity levels of the developing group do changes in political capacity have the effect of altering fertility far more than mortality, thus contributing to the reimposition of a stable population.

There are, however, still important unanswered questions for which only plausible suggestions can be advanced. We must determine why politics is such an important driving force in reducing mortality and fertility rates in the less developed world, but loses importance among developed societies. We suggest two factors, without, however, implying that they constitute a complete picture. First, as both mortality and fertility approach the low levels typical of developed nations, the range for further reductions is substantially reduced by the limits on life expectation. Second, it is clear that governments may try to raise fertility that is falling to or below replacement levels. Paradoxically then, to the extent that the unintended effects of growth in political capacity had been a factor in reducing vital rates, one might expect the intended effects of policy to work toward the reversal of fertility reduction trends among developed countries. It is too early to say to what extent such policy efforts will be successful.

Equally important is the sequence in which political change affects vital rates. Political capacity affects mortality rates directly and powerfully in each of the less-developed groups but changes fertility rates only after some delay. Again this pattern has a plausible

explanation. The desirability of reducing sickness and death is a generally accepted goal. Not so with fertility. Thus mortality can react much more readily to the introduction of centralized governmental organization through, for instance, introduction of simple public health measures that can control potentially devastating epidemics. The more complex and ingrained patterns associated with fertility are affected only when the political system is more highly developed, when universal education becomes an accepted norm, and when the political system provides women with potential roles outside of the home environment, and when these opportunities are enhanced to the point that they interfere with reproductive behavior and increase the cost of rearing children.[8] The reader should bear in mind, however, that we are talking here, not about policies specifically directed at population control, but rather about changes in demographic trends brought about by variations in national political capacity as a whole, irrespective of whether the governments involved have pursued explicit population policies.

RELATIVE EFFECTS OF POLITICS

One more point needs to be made. It concerns the relative impact of the political and economic structures on demographic change during the process of political development. To provide a partial answer, we isolated the relative contribution of politics versus that of economics and broke the process of demographic transition down into its different stages. Recall that, by construction, regression coefficients do not vary, but levels of association will change when the model is estimated separately with economic and with political factors, or when effects are reestimated for component subgroups. This allows us to look at the independent contributions of politics and economics for every phase of the demographic transition (see Table 1).

When all nations are considered concurrently, the direct contribution of politics to the understanding of demographic change is .07 for fertility and .05 for mortality. This total represents slightly over 10% of the total variance accounted for in births and less than 8% in death rates. Why should one be concerned with such weak findings? One important reason springs immediately to mind. At this level of aggregation, the impact of wealth on population change is overemphasized. The importance given to economic factors is based, to a large extent, on the static differences in levels of income between the underdeveloped, the developing, and developed groups, which we can not yet isolate from

TABLE 1
Effects of Political Capacity on Vital Rates: Summary, 1950-1975

	Cases	Fertility Rates R^2	Fertility Rates R^2 imp.*	Mortality Rates R^2	Mortality Rates R^2 imp.*
All Groups	1868	.72	.07	.72	.05
Underdeveloped and Developing Groups	1455	.29	.19	.50	.09
Underdeveloped	726	.12	.07	.26	.17
Developing	729	.27	.24	.18	.13
Developed	413	.09	.00	.46	.02

*R^2 imp: improvement is calculated by subtracting the variance explained with a model using political and economic factors from the same model using only economic factors.

politics. Note that when we consider underdeveloped and developing nations alone, the overall variance explained drops to 29% and 50% for birth-and death rates, respectively, while the relative contribution of politics increases markedly. While in the whole sample, less than 10% of the change in vital rates accounted for was due to politics, now the percentage is 65 for births and 18 for death rates. In fact, when we begin to unravel the fundamental dynamics of the demographic process, we find that economics does not perform better than politics. The effects of politics are magnified in the underdeveloped and developing groups by further disaggregation. Politics contributes as much as, if not more than, economics to the decline in population rates predicted by the demographic transition model. By combining societies during and beyond the transition stage, it is difficult to avoid the conclusion that too much impact is attributed to the levels of wealth achieved.

However, one must be cautious. Note that at this aggregate level, much of the variance in the process of demographic change for underdeveloped and developing nations *remains unexplained.* For the world as a whole, over 70% of the variance in vital rates falls into the predicted pattern. But when developed and developing groups are considered separately, barely 30% of the variance for births and 50% of the variance for the death rates can be attributed to economic and political variables. Further disaggregation again reduces the overall power of the model. Undoubtedly, the point made by the critics of the demographic transition is still valid: The bulk of the variance in population structures remains to be explained. It does appear, however, that this first step in integrating politics and economics shows promise of increasing our understanding of the dynamics of demographic change.

CONCLUSION

The results obtained are mixed. It is evident that political capacity does in fact affect fertility and mortality rates and that, as postulated, these effects are substantially more important while the process of change is under way than after the process has been completed. Further, we have demonstrated that when one disaggregates demographic change into its component stages, part of the overall explanatory power is lost—but politics emerges as a major driving force of demographic change. In addition, we have shown that, while too much weight seems to be attributed to economics when the sample is aggregated at the world level, these two powerful factors, politics and economics, between them account for about half of the total variation in the vital rates and hence in the structure of populations.

It is premature to claim that a field of aggregate political demography has emerged, but perhaps it is not too presumptuous to claim that a step in the right direction has finally been taken. Our analysis shows that political capacity is an integral component of the process of political development and a major contributor to secular changes in vital rates. When national development starts, political capacity contributes to the lowering of death rates and subsequently helps to stabilize the population's structure through lowered birthrates. Nations whose governmental capacity begins to decay, or fails to improve further once initial gains have been made, will, in effect, suffer substantially more and for far longer periods of time from a population imbalance. In sum, politically capable nations do have an edge over their less organized counterparts. The implications of this observation, particularly for the countries caught in the backwaters of low political capacity, cannot be lost on developmental planners.

APPENDIX A

The actual adjustments imposed on mortality are:

$$SDA_{it} = ASMR_{it} \times ASP$$

$$ADJ.CDR_{it} = \frac{\Sigma_k SDA_{it}}{\Sigma_k ASP}$$

where:

k = age
i = nation
t = time

SDA = standardized number of deaths by age
ASMR = age-specific mortality rate (when unavailable, calculated using model life tables)
ASP = age-specific standard population (England, Wales, 1960)
ADJ.DCR = age standardized crude death rates

APPENDIX B

The actual adjustments imposed on birthrates are:

$$ADJ.CBR_{it} = (PWP_{it}/PWSP)\, CBR_{it}$$

where:

PWP_{it} = percentage women 15-44 in national population

PWSP = percentage women 15-44 in standard population (England, Wales, 1960)

CBR = crude birthrates

APPENDIX C: SAMPLE SIZE AND COMPOSITION

UNDERDEVELOPED

Country	Cases	Years
Angola	17	1955-1963 1967-1974
* Bolivia	3	1957-1959
* Brazil	5	1953-1957
Burma	23	1953-1975
Burundi	16	1960-1975
Cameroon	16	1960-1975
Central African Rep.	16	1960-1975
Chad	16	1960-1975
* Colombia	3	1957-1959

APPENDIX C (Continued)

	Country	Cases	Years
*	Dominican Republic	4	1953, 1955-56 1965
*	Ecuador	1	1959
	Egypt	23	1953-1975
*	El Salvador	10	1953-1961, 1963
	Ethiopia	20	1956-1975
	Gabon	16	1960-1975
*	Ghana	16	1955-1959 1965-1975
	Honduras	23	1953-1975
	India	23	1953-1975
*	Iran	3	1953-1955
*	Jordan	1	1960
	Kenya	23	1953-1975
	Lenotho	12	1964-1975
	Liberia	16	1960-1975
	Malagasy Republic	16	1960-1975
	Malawi	16	1960-1975
	Mauritania	16	1960-1975
	Morocco	16	1960-1975
	Mozambique	16	1960-1975
	Nepal	16	1960-1975
	Niger	16	1960-1975
	Nigeria	23	1953-1975
	Pakistan	11	1965-1975
	Papua New Guinea	15	1961-1975
	Philippines	23	1953-1975
*	Republic of China	7	1953-1959
*	Republic of Korea	16	1955-1970

APPENDIX C (Continued)

Underdeveloped (continued)

Country	Cases	Years
Rwanda	16	1960-1975
* Senegal	7	1966-1967 1969-1973
Sierre Leone	12	1964-1975
Somalia	16	1960-1975
Srl Lanka	23	1953-1975
Sudan	21	1955-1975
Tanzania	16	1960-1975
Thailand	23	1953-1975
Togo	16	1960-1975
Uganda	21	1955-1975
Upper Volta	12	1962-1973
Zaire	17	1953-1956 1963-1975
* Zambia	13	1955-1960 1962-1964, 1972-1975

DEVELOPING

Country	Cases	Years
Algeria	16	1955, 1959-1960 1963-1975
* Bolivia	18	1955-1956 1960-1975
* Brazil	18	1958-1975
Chile	23	1953-1975
* Colombia	20	1953-1956 1960-1975
Congo	16	1960-1975
Costa Rica	21	1955-1975
* Dominican Republic	19	1954, 1957-1964 1966-1975
* Ecuador	22	1953-1958 1960-1975

APPENDIX C (Continued)

Developing (continued)

	Country	Cases	Years
*	El Salvador	13	1962, 1964-1975
	Greece	23	1953-1975
*	Ghana	5	1960-1964
	Guatemala	21	1953-1973
	Iraq	23	1953-1975
*	Iran	20	1956-1975
	Israel	23	1953-1975
	Ivory Coast	16	1960-1975
	Jamaica	23	1953-1975
*	Jordan	15	1961-1975
	Libya	13	1963-1975
	Malaysia	21	1955-1975
	Mexico	16	1960-1975
	Nicaragua	16	1960-1975
	Panama	23	1953-1975
	Paraguay	21	1955-1975
	Peru	23	1953-1975
	Portugal	23	1953-1975
	Puerto Rico	7	1960, 1965, 1970 1972-1975
*	Republic of China	14	1960-1973
*	Republic of Korea	5	1971-1975
	Saudi Arabia	16	1960-1975
*	Senegal	4	1963-1965, 1968
	South Africa	23	1953-1975
	Spain	21	1955-1975
	Syria	21	1955-1975
	Trinidad & Tobago	23	1953-1975
	Tunisia	14	1960-1973

APPENDIX C (Continued)

DEVELOPED

Country	Cases	Years
Turkey	23	1953-1975
Uraguay	23	1953-1975
Venezuela	16	1960-1975
* Zambia	8	1961, 1965-1971
Australia	23	1953-1975
Austria	23	1953-1975
Belgium	23	1953-1975
Canada	23	1953-1975
Denmark	23	1953-1975
Finland	23	1953-1975
France	23	1953-1975
Germany	23	1953-1975
Ireland	23	1953-1975
Italy	23	1953-1975
Japan	23	1953-1975
Netherlands	23	1953-1975
New Zealand	23	1953-1975
Norway	23	1953-1975
Sweden	23	1953-1975
Switzerland	23	1953-1975
UK	23	1953-1975
USA	23	1953-1975

The sample is not random because data from many nations are not available for the time period covered by the study. The sample used covers over 90 nations and of these 42 have a complete series. The list of nations grouped into the categories used in this study is as follows.

*Country represented in both the developing and underdeveloped categories.

NOTES

1. The paternity of the demographic transition is in some dispute. The first use of the term and a full-blown elaboration appear in Notestein (1945). Notestein elaborated the proposition extensively in his 1953 work. Much of it is based on Thompson (1929: 22-35).

2. A most comprehensive evaluation of the complex relationship between socioeconomic structures and population is provided in Mouldin (1978) and Mouldin et al. (1978). Important benchmarks in the debate surrounding the demographic transition center on whether the relationship between socioeconomic and population change found in cross-sectional analysis holds in longitudinal and subnational evaluations. Important benchmarks are Tsui and Borgue (1978), Demeny (1979), Janowitz (1971), Coale (1973), and Teitelbaum (1975). Effective summaries of the issues are contained in Keyfitz (1976) and Freedman (1979: 1-17).

3. Echoes of this argument, albeit cast in a family planning program context, were found in the late 1960s "beyond family planning" debate (see, for example, Davis, 1967; Berelson, 1969).

4. We would have preferred to use the expression "political development," but this notion has become thoroughly muddled. Some define political change as a transformation of population from subject to citizen; others believe it is the spread of political participation, the building of armies, and civil administration subsystems; still others contend that it is the development of national cohesion or the differentiation of institutions. Each such definition is to some degree defensible, but the sum is far too encompassing. Our conception of political capacity is not completely novel. Portions can be found in Huntington (1967), Binder and La Palombara (1974), and Tilly (1973). For an evaluation of the interaction between their conceptions of politics and ours, see Organski and Kugler (1980: 71-74) and Organski et al. (forthcoming: chap. 1).

5. At the initial stages of this project, we collected for a sample of nations selected socioeconomic characteristics that could be included in a complex model. These data were available only for a cross-section of the subsample of national eventually used in this analysis, but the patterns that emerged are quite clear. GNP per capita is correlated with education ($R = .66$), urbanization ($R = .66$), and population density ($R = -.72$), while political capacity never reaches $R = .10$ (see Mouldin, 1978).

6. The population data used are from United Nations (1978); the aggregate national accounts statistics are from World Bank (1975, 1976, 1980) and United Nations (1968). The fiscal data used in addition to the above are from IMF (1980, Vol. 2), OECD *Revenue Statistics,* and Chellian et al. (1974). Most countries are also supplemented by their respective national sources. For details see the data see ICPSR at the Center for Political Studies, University of Michigan.

7. The economic impact is not entirely unexpected. Variations in the direction of the relationship between fertility and income levels have been reported by Friedlander and Silver (1967) and Heer (1966).

8. The arguments we make here are not new; most demographers tend to make similar arguments, but disregard the political basis for such changes. Note the similarity in our argument with the powerful summary of Notestein (1953: 18) in his classic early accounting of the demographic transition:

> The economic organization of relatively self-sufficient agrarian communities turns almost wholly upon the family, and the perpetuation of the family is the main

guarantee of support and elemental security. When death rates are high, the individual's status in life tends to be that which he was born. There is, therefore, rather little striving for advancement. Education is brief, and children begin their economic contribution early in life. In such societies, moreover, there is scant opportunity for women to achieve either economic support or personal prestige outside the roles of wife and mother, and women's economic functions are organized in ways that are compatible with continuous childbearing.

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