Dennis L. Peck and Philip H. Kuhn

On the Applicability of the Demographic Transition Model to Population Projections*

THE Demographic Transition Model, as a model of population change, was useful as a mechanism to describe the secular sequence of changing death and birth rates over several hundred years in Western Europe. It sought to explain complicated processes not easily explainable by singular variables (e.g., population density or growth of agricultural output). **By** considering a number of social and economic factors within the general framework of the transition model, proponents sought to explain the growth of population and the changing rates which occurred in loose conjunction with the industrial revolution.

The model suggests that decreased fertility in modern industrial society is the result of environmental control over mortality giving way to improvements in transportation, communication, technology and medicine. The transition then, is based upon social, economic and, in some expositions, psychological factors affecting mortality and fertility rather than any particular environmental factors. Generally, this phenomenon is loosely documented in the experience of certain western nations during the course of economic and technological development. The mortality rate gradually declines over an extended period. As mortality recedes down significantly from the fertility level, a period of rapid growth or "explosion" follows. **Over** an extended period of adjustment to which western

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nations were generally treated, the fertility levels gradually experienced a parallel decline. In the model, fertility declines lag somewhat behind the mortality decline. The result is a rapid increase in population for a society experiencing transition.

Westoff (1960) notes the usefulness of the transition model as a classification scheme as well as a model of social change possessing some empirical validity. He summarizes the theory as:

> .moving from an approximate balance of high birth rates and high death rates, through a transitional stage during which death rates are reduced substantially but birth rates remain high, and presumably culminating in a new balance of low death rates accompanied by sharply reduced birth rates."

With a lag between the decline of death and birth rates where the mortality rates decline precedes that of fertility (an example of Ogburn's cultural lag concept in action) the process of transition may be characterized by three stages:

I. high death rate, high birth rate (mortality dominant);

II. declining death rate, followed at an interval by high but declining birth rate (transition—high potential growth);

III. low death rate, low birth rate (fertility dominant).

This model describes what Cowgill (1949) calls the modern population cycle and observed population data seem to support it as the actual experience of certain European and American populations. The model is actually intended as a deductively derived explainer and predictor generalized from the historical pattern. The purpose, ostensibly, was to predict the experience of lesser developed nations as modernization was achieved. In this context, the transition model has been acclaimed as the modern population theory of the World War II era and the decade following.

Hernandez (1974 : 107-108) states that the transition model is partially based upon the premise that a near-zero population growth condition is a socially desired goal of modern industrial populations. Smaller family size has become a desired value of the modern family. Alternatively, and at a different level, the consequences of unbridled growth exert pressures to limit fertility at the population level. However, the possession of a value for smaller family size, especially dependent upon socio-economic factors, is seen by some demographers as the causal force in lowering fertility.

The Swedish data in Table 1 lend support to the model as descriptive of the course of events in at least one European nation. The Swedish data, among the

TABLE 1—CRUDE POPULATION RATES PER 1,000 FOR SWEDEN, 1*7 50-1970

Time Period	*Average Crude Birth Rate*	*Average Crude Death Rate*
1750-1759	35.8	27.3
1800-1809	30.5	25-2
1850-1859	32.6	22.2
1900-1909	26.3	15.2
1950-1954	15.5	9.7
1970	13.7	9.9

SOURCES : Thomas, Dorothy Swaine, *Social and Economic Aspects of Swedish Population Movements, 1750-1933.* New York : Macmillan Publishing Co., Inc., 1941. Also see *Population Index* (July, 1965) and (July, 1975).

longest data series available, indicate a consistently lower death rate declining earlier and more quickly than the birth rate. In the last data series presented, both the birth and death rates are low and are more parallel to one another than at any other time. But the decline in mortality clearly seems to be under way by the time represented by the first data series shown.

However, that not all European data fit the model so well. In France, for instance, the decline in fertility was simultaneous with that of mortality. In both

TABLE 2—CRUDE POPULATION RATES PER 1,003 FOR FRANCE 1808 TO 1973

Time Period	*Average Crude Birth Rate*	*Average Crude Death Rate*
1808-1812	31.4	25.7
1848-1852	27.0	23.5
19081912	19.4	18.5
1918-1922	17.3	20.0
1928-1932	17.7	16.4
1935-1939	14.9	15.6
1950-1954	19.4	12.6
1960-1964	18,0	11.2
1973	16.5	10.7

SOURCES : Borrie, W. D., *The Growth and Control of World Population.* London : Weiden, Feld, and Nicholson, 1970, Also see *Population Index* (July, 1965) and ***(July,*** 1975).

instances, declines somewhat preceded the rather limited and slow industrialization of that country (Teitelbaum, 1975). Since the 1950*s the accuracy of the transition model has been questioned owing to inconsistent population growth rates observed for both highly and less developed nations. For example, the post-war "baby boom" in developed nations appears anomalous to the predictions of the transition model (Robinson, 1969). However, in the earliest statement of the transition model, Thompson (1929) notes that the rates would fluctuate in the final stage of the model, In later statements, Thompson (1946) and Notestein (1950) both suggest that the rational control of fertility in the final stage of the model allows for fertility as a volatile variable given that fertility rates could either rise, stablize, or decline. The post-war "baby boom" experienced in developed nations, then, was not a contrary evidence but rather a cautionary proof of the potential for growth in the final stage of the model.

A partial explanation for the lack of explanatory power of the transition model appears to be a lack of rigorous formulation. The model is based upon one view of the historical experience in Europe and overseas extensions thereof. Tabbarah (1971: 257) points to two tests of the validity of the model: (1) whether the model was the characteristic pattern for developed Western European nations; and (2) whether the experience of those nations is applicable to currently developing nations. As Tabbarah (1971), Teitelbaum (1975), and Wrong (1961) note the model maybe faulted on both points. The French experience (van de Walle and Knodel, 1967) and a rise in the fertility rate in England prior to a declining mortality rate (Wrigley, 1969) are two examples of the model's failure to fit the European experience. The precipitous decline of the death rate in economically developing third world nations (Robinson, 1969) is only one indication of a difference between these two distinctive sets of experiences. Nevertheless, Tabbarah and Teitelbaum observe that the model lies behind every set of "confident" population forecasts currently being made for developing nations whether such sentiments are explicitly noted or not.

The utility of the model is particulary questionable owing to a failure to indicate plausible causes of fertility decline and a failure to allow for predictive precision regarding the onset of fertility decline. Writers, such as Hawley (1973), who do address such causes and timing note that these factors are dependent upon societal change and a subsequent impingement upon couples in the period of fecundity. Those interested in population projections must look at the likelihood that societal change such as increasing personal aspirations, greater popular

participation in political life, and an increase in individual self importance are plausible variables affecting fertility decline. Of course, such changes in the social temperament are predicated on assumptions based on western developmental patterns even while many currently developing nations espouse anti-western ideologies. The applicability of these criteria may be as questionable as is the model itself. Population projectors may be well advised to generate several sets of assumptions and, in turn, to carry out projections to accommodate such differences as may arise.

Table 3 presents crude birth and death rates for Columbia and India which indicate the great disparity presently existing in the fertility and mortality rates for these two less developed countries. The data for India, which are available for a more extended period, more readily exemplify a declining mortality rate.

TABLE **3-CRUDE** POPULATION RATES PER 1,000 FOR COLUMBIA AND **INDIA,** 1916 TO 1970

Approximate Time Period	*Columbia*		*India*	
	Average Crude Birth Rate	*Average Ctude Death Rate*	*Average Crude Birth Rate*	*Average Crude Death Rate*
About 1916	—	—	37	34
About 1926	—	—	33	25
About 1936	—	—	34	23
About 1950	36.9	13.4	40	27
About 1960	39.1	15.0	38	19
About 1970	44.0	10.0	41	IS

SOURCES : Borrie, W. D., *The Growth am} Control of World Population.* London : Weiden,, Feld, and Nicholson, 1970, Also see *Population fmlex* (July, 1965) and (July 1975).

Although neither country exhibits any tendency to lower its birth rate at present, the two nations do experience a somewhat different developmental environment than experienced by some nations at the time of the European transition. In addition, Columbia and India are themselves experiencing dissimilar developmental environments. For example, it has been noted that Columbia and India differ environmentally with respect to (I) life expectancy at age zero; (2) dietary energy supplies; and (3) per capita gross national product (World Population

Data Sheet, 1975). The environmental differences observed for the data in Table 4 lend some credence to the position that differential environments not only pose **problems** of interest to the demographic forecaster but also problems of great challenge to policy makers.

TABLE 4—SELECTED DEVELOPMENT ENVIRONMENTAL DIFFERENCES

	Columbia	*India*
Life Expectancy at Birth (in years)	61	50
Dietary Energy Supplies (in kilo calories per person per day)	2020	2070
Per Capita Gross National Product (in U. S. dollars)	400	110

SOURCE : World Population Data Sheet, Population Reference Bureau Inc., Washington, **D. C., 1975.**

Demographers such as Goldscheider (1971) suggest that it is necessary not only to identify mechanisms causing fertility decline, but also to specify the historical period and the circumstances of the environment in which a nation approaches its potential transition. Such environmental differences may be more important for explaining possible causal factors affecting fertility decline among currently developing nations than the differences predicted on sacred or profane philosophy.

The transition model arose partly as a reaction to the Malthusian population model. Yet another model or at least a drastic reformulation of the transition model seems now needed. A possible alternative is to recognize the transition model as an approximate representation of the European experience. At this time, however, it is necessary to go beyond the circumstances of previous periods in which the transition had occurred for a better understanding of the possible transition of currently developing nations. The traditional transition model is, then, an ideal type, not entirely applicable to the current demographic situation. The overall description and classification are most likely applicable. However, causal factors applicable to the contemporary experience remain unexplored.

Conclusion

Population forecasters are left to play a game of educated guess work. Until such time as needed knowledge is accumulated, the transition model will continue

to be used as a tool for population analysis and projection. While serving as a useful conceptual tool, the model is far from a sufficient universal population explanator and predictor resource. Just as the demographic transition model arose as a reaction to the Malthusian theory of population growth and was deductively formulated to account for declining population rates observed for Europe and America, it is obvious that sufficient post-war anomalies have been observed to warrant a reformulation of *the* population theory.

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