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CAUSALITY BETWEEN INFANT MORTALITY AND FERTILITY IN TIME
SERIES

City University of New York

Ph.D. 1981

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CAUSALITY BETWEEN INFANT MORTALITY AND FERTILITY
IN TIME SERIES

BY
TADASHI YAMADA

A DISSERTATION SUBMITTED TO THE GRADUATE FACULTY OF
THE DEPARTMENT OF ECONOMICS OF THE CITY UNIVERSITY OF NEW YORK
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for the degree of Doctor of Philosophy

July 24, 1981
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TO MY WIFE, NOBUKO

Abstract

CAUSALITY BETWEEN INFANT MORTALITY AND FERTILITY
IN TIME SERIES

by

Tadashi Yamada

Adviser: Professor Michael Grossman

The main focus of this dissertation is to empirically test causality between infant mortality and fertility by using annual data on seventeen countries in Western Europe, North America, Asia, and Oceania. The usual assumption of unidirectional causality from infant mortality to fertility is shown not to hold for most of these countries based on the techniques of Granger's and Sims's types of causality test. It is shown that infant mortality and fertility are not mutually independent at all, but jointly determined. Therefore, it is strongly suggested that one should estimate a fertility equation in which infant mortality rate is one of endogenous variables in a simultaneous equations system to avoid simultaneity bias.

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I was born in a country where the people respect "Simplicity" and study economics in a country where the people respect "Sophistication." However, I believe, it is common in both our countries for someone not to be able to express in words how deeply the help is appreciated which he has received from many people in both countries.

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CHAPTER I

INTRODUCTION

In empirical analyses of fertility behavior, the reseachers are often disturbed by specification problems of a fertility demand function. For there exist unknown interactions between fertility behavior and other factors in households and our society. Therefore, it is not unusual in this field to specify a fertility demand function in an arbitrary manner and sometimes ignore simultaneity bias among the relevant variables in the equation. For example, as Williams (1975) states, one who wants to explain fertility behavior often treats infant mortality rate as an exogenous variable. On the other hand, one who wants to explain mortality treats fertility rate as an exogenous variable. This fact urges the researchers to take new approaches to solve the specification problem in a fertility equation so that they can observe consistent and efficient estimates in the equation.

In a quantity-quality substitution model of fertility behavior, quantity (number of surviving children in a given household) and quality ¹ of children are treated as endogenous variables in a simultaneous equations system. From a theoretical

perspective, the quantity and quality of children are considered as non-market goods produced according to a given household production function by using parents' time and market goods as the inputs (Becker and Lewis 1974; Willis 1974; and De Tray 1974).

Similarly, one could treat infant mortality as quality of children in the sense that the degree to which each infant in a given household is exposed to its death might depend on parents' prenatal care as well as care after its birth. Parents usually devote their time, medical care and nutritious food to their children so as to improve children's health status. The amounts they can afford to give depend on costs, e.g., husband's and wife's wage rates, medical cost, and the price of food. Hence, parents would directly influence the level of children's health through their employment and consumption decisions. Also, children's health would be indirectly influenced by social programs and policies (Grossman and Jacobowitz 1980) and the environmental conditions in which parents and their children live, e.g., sanitation, water supply, transportation, urbanization and so on. These above points will rationalize why fertility and infant mortality should be considered as non-market goods, which are jointly determined by household behavior. However, surprisingly, little work has been done

to test direction of causality as well as simultaneity between infant mortality and fertility in the analysis of economic theory of fertility behavior.

The main issue of this dissertation is to study the sign and direction of causality between these two demographic variables - the infant mortality rate and the fertility rate - by using time series methodology. Granger (1969), Sims (1972), and Haugh (1976) have developed different statistical techniques to identify causality within a two-variable model. Their papers have sparked many empirical studies in the area of macroeconomics to test causality between money and income. One exceptional paper in the analysis of household behavior is about causation among labor force participation, divorce, and fertility on U.S. data by Michael (1977).

To my knowledge, except the above time series causality tests, there is few statistically operational causality tests. In usual multiple regression analyses, theoretical direction of causality is determined among variables a priori. That is to say, the variables in a right-hand-side equation are considered as the causal variables of a variable in the left-hand-side equation in the regression analysis. Hence, the analysis is not testing causality, but testing the strength of linearities

between the independent and dependent variables. However, it is not always possible to know a priori which variable causes which and/or whether variables are simultaneously determined on theoretical grounds, e.g., the relationship between infant mortality and fertility. Thus, it would be appropriate to test, at first, direction of causality between infant mortality and fertility on empirical grounds by using existing time series causality tests, before we specify a fertility demand function.

In this analysis, I utilize Granger's and Sims's techniques to test causality between the infant mortality rate and the fertility rate in seventeen countries. Although Sims's test is derived from Granger's definitions, the theoretical distinctions between these causality tests are currently a hot issue in economics. Therefore, to avoid, if any, loopholes, I use both tests to compare the results. The countries examined in this analysis include ten countries in Western Europe, Israel, Canada, the United States, Japan, Taiwan, Australia, and New Zealand. The periods analyzed are: 1936-1974 for the countries in Western Europe, Canada, Australia, and New Zealand; 1920-1977 for Whites and Nonwhites of the United States; 1920-1979 for Total (Whites and Nonwhites

are combined) of the United States; 1940-1974 for Israel; 1947-1977 for Japan; and 1947-1978 for Taiwan. These seventeen countries are chosen simply because the data - the infant mortality rate and the fertility rate - are consistent over the relatively long periods in the sources into which I inquired. Annual data are used throughout the analysis.

The analysis proceeds as follows. In the next two sections, I briefly outline the reasons for expecting relationships between infant mortality and fertility in the context of the modern economic theory of population and the Malthusian theory of population. In Chapter II, I show a theoretical model of fertility - infant mortality relation. In Chapter III, I define the versions of Granger's and Sims's causality tests. In Chapter IV and Chapter V, I describe the empirical results of Granger's and Sims's causality tests, respectively. In Chapter VI, I report the empirical results of causality between the neonatal mortality rate and the fertility rate. Finally, I summarize and conclude this analysis in Chapter VII. In Appendix, I present the sources of the data, notes, tables of empirical results, estimated lag profiles, estimated ARIMA structures, and figures.

1-1. Causality from Infant Mortality to Fertility

In general, the explanations of causality from infant mortality to fertility stand on at least economic, biological, and psychological reasons. The scholars related to this subject in different fields attempt to establish systematic relationships between infant mortality and fertility.

First, under the modern economic theory of population, a particular household utility function is assumed to consist of number of surviving children and a vector of consumption goods in a simple static partial replacement model. The number of surviving children is the product of number of births and $(1 - M)$, in which M represents, say, infant mortality rate. If each household faces different infant mortality, the household who expects a high infant mortality rate will have higher cost to have an additional birth than the household who expects a low infant mortality rate. This indicates that a higher infant mortality rate necessarily reflects a stronger price effect on consumption bundles in a given household. Generally, a reduction in infant mortality rate generates substitution and income effects among the consumption goods in the household. This static partial replacement model predicts that the number of births would fall as infant mortality rate falls, if the price elasticity of demand for the desired

number of surviving children is less than one (Ben-Porath 1980).² Amobi (1980) finds that births rise but surviving children fall as the infant mortality rate rises by using Kenyan data set.

Now, suppose that parents set their numerical target for their surviving children. To cope with an unexpected child's death, There are at least two strategies available for them:³

1) Replacement Strategy

Parents intend to have a certain number of children at the end of their reproductive period. If any child in the household dies during their reproductive period, they attempt to have another child so as to replace the dead child.

2) Insurance (Hoarding) Strategy

Parents intend to have a certain number of children at some point in future. Therefore, at the beginning of their family formation, they attempt to have more children than desired since they consider that some of their children will die in the future.

Ben-Porath (1980) gives two reasons why the distinction between replacement and insurance (hoarding) strategies is important:

"(a) quantitatively, the effect on fertility of hoarding in order to achieve a given target is greater than that of replacement...; (b) replacement is a quick response, and it is natural to expect replacement to generate a close, short-lagged, association between fertility and child mortality. Hoarding, based as it is on expectations, may respond sluggishly to child mortality, depending on the speed at which expected mortality is revised as actual mortality changes." ⁴

Concerning rate of replacement, the rate will depend on at least the following situations:

- 1) the birth order of the child who died;
- 2) the number of surviving children; and
- 3) the age of mother.

These above situations will necessarily stimulate parents to replace their in different degrees. If the marginal cost of having another birth is increasing as the parents increase their births, the replacement for their loss would be partial at current time given a prior child death and take place over a certain periods. For the parents may not be ready to have another birth in terms of their financial problems as well as physical conditions of the mother right after their child death.

The rate of replacement for a prior child death could be properly analyzed in a dynamic model of fertility behavior if the appropriate statistical observations are given. O'Hara (1975) theoretically shows, by using von Neuman-Morgenstern expected utility theory in a three-period uncertainty model, that a mortality decline generates a systematic shift in relative costs, reducing both the expected cost of quantity and quality of children relative to other goods, and the expected cost of quality of children relative to quantity of children. Parents choose a smaller quantity of children after a mortality decline if the substitution of quality for quantity is sufficiently great to outweigh the tendency to substitute quantity for other goods.

Secondly, following a biological reason, it is also explained that there is a causal linkage from infant mortality to fertility (Heer 1966; Heer and Smith 1968; Knodel 1968; and Preston 1980). For example, in the society where a large number of mothers breast-feed their children, a reduction in infant mortality makes the period of mother's lactation longer, and as the consequence, delays the next conception. Knodel (1978) studies the relation between infant mortality and birth intervals on the data of pre-industrial European population.

Although the result is a little inconclusive, he reports that the impact of an infant death on birth interval shortened the average time by 2 months until the next birth.

From his result, it is obvious that a reduction in infant mortality rate will cause a reduction in fertility rate during a given reproductive period.

Thirdly, there are some aspects of psychological and economic reasons why people in a given society reduce their family size in the process of social and economic development. For example, Davis (1945) explains the effect of economic development on the family size such that as the economy develops, people in the society become competitive and individualistic in the urban society. A large family can be considered to be, not a blessing, but a handicap. Consequently, parents have incentives to reduce the size of their families in the urban society. In so doing, the parents reduce their fertility rates in accordance with their optimal family sizes. Therefore, a fall in the infant mortality rate resulting from the economic development will lead to a reduction in their births. For a reduction in infant mortality rate will increase the economic cost of supporting a family with a given fertility in the society (Heer 1966; and Heer and Smith 1968).

The psychological and economic reasons (Davis 1945) will reflect the concept of demographic transition. The demographic transition is characterized by transitional movements of societies from their high infant mortality and fertility rates to their low rates. In the process of demographic transition, it is usually said that a reduction in infant mortality rate occurred before that in fertility rate in history of economic development (Notestein 1945; and Leibenstein 1957). A series of economic innovations improved many aspects of daily life such as the diets of people, sanitation, water supply, transportation, medical knowledge, clothing, housing and so on. Consequently, these modernization and industrialization of the economy brought control over disease and reduced infant mortality and general mortality rates. On the other hand, the response of fertility behavior to the series of social and economic developments took place more gradually than that of mortality because fertility behavior in the society was closely related to religious belief, social norms, and family organization. Hence, fertility rate started declining after a reduction in infant mortality rate.

As stated so far, the expecting relations in causality from infant mortality to fertility are well explained and studied in the different fields.

1-2. Causality from Fertility to Infant Mortality

The explanations of causality from fertility to infant mortality can be made at least from biological, genetic, and economic reasons.

First, with respect to the empirical observations on effects of fertility on infant mortality, when fertility rates are relatively high, there may be a relatively large percentage of high risk births. These include births to young mothers, births to old mothers, fourth and higher-order births, illegitimate births, and low birth-weight births. For example, an old mother by her late marriage is more likely to have birth defectives than a young mother at her ages 20s for the biological and genetic reasons. Therefore, newborn infants of old mothers would have a higher risk of their deaths during the period of infancy.

Secondly, by psychological and economic reasons, it is often considered that parents with many children in their household might give less attention and care to each child on the average than those with less children. Therefore, within a given household income, the average expenditure in dollars on each child would be smaller for the households with many children than those with less children, *ceteris paribus*.

Also, the cost of supporting a large family would be higher than a small family. Therefore, the more children per family the poorer their nutrition will be, holding other things constant. Then, higher fertility in a family will result in higher infant mortality (Heer 1966).⁵ Preston (1980) reports that there are significant effects of national income per capita on life expectancy at birth.

The relationship between fertility and infant mortality through changes in per capita income might originate in the arguments by Thomas Robert Malthus in the late 18th century. Malthus postulates in his famous essay: "First, That food is necessary to the existence of man. Secondly, That the passion between the sexes is necessary, and will remain nearly in its present state."⁶ On the basis of these postulates, he argued that when the level of economic well-being is above subsistence level, the disproportionate increase in population over the increase in the means of subsistence would eventually result in the increase in mortality. Hence, infant mortality is caused by the reduction in per capita income resulting from the increase in population through the mechanism of diminishing returns.

Thirdly, following biological reasons, if there are

successive births in a relatively short period, these births will weaken the mother and also influence the physical constitution of children. Perhaps, a physically weak mother could not give adequate care to each child during the critical period of infancy (Knodel 1968). Therefore, newborn infants in a relatively short period of interval would be considerably exposed to a higher risk of infant mortality.

The explanations of causality from fertility to infant mortality are not fully analyzed on its theoretical and empirical grounds. However, this fact will not justify the researchers in this field to treat infant mortality rate purely as the exogenous variable in a fertility demand function for the reasons stated above. Hence, it is empirically necessary to test causality from fertility to infant mortality so that the specification of a fertility demand function be improved.

FOOTNOTES TO CHAPTER I

1. Quality of children is empirically measured by investment per child in dollars as a proxy variable (see De Tray 1974). Also, it is measured by Child's health status and I.Q..

2. A relationship between fertility and infant mortality in a single-period static model is as follows:
Household maximizes its utility subject to its full family income,

$$L = U(N, X) + (I - P_x X - P_b B), \quad \dots (1)$$

where N = numbers of surviving children;

X = a vector of consumption goods in the household;

λ = a Lagrange multiplier;

I = household full income;

P_x = price per unit of X and here, $P_x = 1$;

B = numbers of births; and

P_b = cost of birth (ignoring the cost of rearing children).

Also, B is defined as follows:

$$B = N/P, \quad \dots (2)$$

where P is the survival rate of birth in a single period. Hence, $(1 - P)$ is the infant mortality rate. Maximizing the Lagrangian expression, (1), we obtain the equilibrium condition as follows:

$$\frac{U_n}{U_x} = \frac{P_b}{P} = P_b^*, \quad \dots (3)$$

where P_b^* is the shadow price of children, which is the relative price of children; and U_i is marginal utility of good i .

(continued)

The effect of infant mortality on fertility is as follows:

$$B = N/P$$

$$\ln B = \ln N - \ln P$$

$$\frac{\partial \ln B}{\partial \ln P} = \frac{\partial \ln N}{\partial \ln P_b^*} \cdot \frac{\partial \ln P_b^*}{\partial \ln P} - 1 \quad \dots (4)$$

Define

$$\frac{\partial \ln N}{\partial \ln P_b^*} = -\xi, \quad \dots (5)$$

where the expression (5) is the elasticity of demand for the number of surviving children with respect to its shadow price.

Since, from (3)

$$\frac{\partial \ln P_b^*}{\partial \ln P} = -1, \quad \dots (6)$$

equation (4) becomes

$$\frac{\partial \ln B}{\partial \ln P} = \xi - 1. \quad \dots (7)$$

Expression (7) becomes in terms of the infant mortality rate instead of the survival rate of birth as follows:

$$\frac{\partial \ln B}{\partial \ln (1-P)} = \frac{(1-P)}{P} (1 - \xi) \geq 0 \text{ as } \xi \leq 1 \quad \dots (8)$$

The result (8) predicts that fertility would decrease as infant mortality rate decreases, if the elasticity of demand for the number of surviving children is less than one.

3. See Preston (1978): pp.9 - 10.

4. From Ben-Porath (1980): p.153.

5. As the counter-argument, one might argue that if older children contribute cash income to the family, higher fertility may not necessarily result in higher infant mortality. This argument might be more relevant to developing countries than developed countries.

6. From Malthus (1966): p.11.

CHAPTER II

THEORETICAL MODEL

Suppose that a particular household utility function is defined in a single-period static model as follows:

$$U = U(B, \pi, X), \quad \dots \quad 2.1$$

where B represents the number of births;

π represents survival rate of a birth in a single period; and

X represents a Hicksian composite good (or the parents'

economic well-being). The price of the Hicksian

composite good is one dollar.

Let B' be defined as

$$B' = B^* - B, \quad \dots \quad 2.2$$

where B' is the number of births being averted by birth control; and

B^* is fecundary rate (= the maximum number of births without any birth control).

Then, the total cost to avert unwanted births is

$$F = f(B^* - B), \quad \dots \quad 2.3$$

where f is the cost of each birth averted.

Also, suppose that there is a fixed cost of a birth, which is denoted as g . Therefore, the total cost of having B is defined as follows:

$$G = g B, \quad \dots\dots 2.4$$

where g is assumed larger than f in equation 2.3;

g is assumed not to contain medical expenditures; and

g is assumed to have no impact on the production function of Π .

Concerning survival rate of birth during the relevant period, Π depends on the level of child's health:

$$\Pi = \Pi(H), \quad \dots\dots 2.5$$

where H is level of child's health.

H will be produced by parents' time, medical care, market goods with given child's inherited health and parents' level of education. The production function of child's health, H , is defined as follows:

$$H = H(t_m, t_f, m, X : H^*, E), \quad \dots\dots 2.6$$

where t_m = amount of time spent on child by father;

t_f = amount of time spent on child by mother;

m = amount medical care invested on child;

X = amount of market goods except medical care given to child;

H^* = inherited child's health when it is born, which may be measured to some degree by its birth weight and parents' physical conditions, say, the number of mother's sick days in a year; and

E = the parents' level of education.

Therefore, from 2.6, Π will be expressed as follows:

$$\Pi = \Pi'(t_m, t_f, m, X; H^*, E), \quad \dots \quad 2.7$$

where the first partial derivative of Π with respect to each exogenous variable in 2.7 will be positive and the second partial derivative is negative due to the law of diminishing marginal productivity.

When both parents are in labor market, the demand curve of Π may shift to the right as the prices of t_m and t_f (or their wage rates) increase, because of the increase in the household income. The supply curve of Π will shift to the left as these prices increase. The increase in the prices of t_m and t_f means an increase in the marginal cost to produce Π . However, if the increase in those prices is initially caused by an increase in productivity in their market and household,

the supply curve of π will shift back to the right to the degree as their productivity in the household increases.

The higher E and H^* , the lower the supply curve of π will be. That is, it is less costly for educated parents to produce the same level of π than less educated parents, *ceteris paribus*. Also, the larger initial endowment of child's health and the better initial endowment of child's health, the less costly the parents incorporate to attain their desired level of child's health.

For simplicity, suppose that survival rate of birth, π , in production function 2.7 is a function of medical care, m , only. The cost of medical care per treatment is given as constant such as p . Therefore, production function 2.7 can be expressed here as follows:

$$\pi = \pi(m), \quad \dots\dots 2.8$$

where the first derivative of π with respect to m is positive and the second derivative is negative:

$$\frac{\partial \pi}{\partial m} = \pi_m > 0; \quad \dots\dots 2.9$$

$$\frac{\partial^2 \pi}{\partial m^2} = \pi_{mm} < 0. \quad \dots\dots 2.10$$

From equations 2.2 through 2.8, the income constraint is defined as follows:

$$I = X + Bmp + F + G, \quad \dots\dots 2.11$$

where the amount of medical care invested on each child is assumed same for every child. In other words, there is no discrimination against each child in terms of the amount of medical care invested by parents.

Suppose that the household maximizes its utility function 2.1 with respect to its income constraint 2.11. The Lagrangian function is as follows:

$$L = U(B, \Pi, X) + \lambda [I - X - Bmp - f(B^* - B) - gB], \quad \dots\dots 2.12$$

where λ is the marginal utility of money income and is defined here as positive. We have the following first-order conditions for a maximum:

$$\begin{aligned} U_b - \lambda (mp - f + g) &= 0, \\ U_{\pi} \Pi_m - \lambda (Bp) &= 0, \\ U_x - \lambda &= 0, \text{ and} \end{aligned} \quad \dots\dots (A)$$

$$I - X - Bmp - f(B^* - B) - gB = 0,$$

where U_i is the marginal utility of good i .

From the first equation in the equilibrium conditions (A), the term $(mp - f + g)$ can be considered as the shadow price of birth such as:

$$S_b = (mp - f + g), \quad \dots\dots 2.13$$

where S_b is the shadow price of birth.

From the second equation in (A), the term $(Bp)/\pi_m$ can be considered as the shadow price of survival rate of birth such as:

$$S_\pi = (Bp)/\pi_m, \quad \dots\dots 2.14$$

where S_π is the shadow price of π .

The optimal combination of B and π will be as follows:

$$\frac{U_\pi}{U_b} = \frac{S_\pi}{S_b} = \frac{Bp}{\pi_m(mp - f + g)} \quad \dots\dots 2.15$$

From equation 2.15, we note that an increase in birth will increase the relative price of survival rate of birth. This will cause the substitution from π toward B. Hence, there will be an increase in infant mortality.

In this theoretical context, it is a little ambiguous how an exogenous change in π resulting from improvements of sanitation in the society affects the number of births.

B depends on whether the change in the quantity of π demanded with m fixed exceeds the change in the quantity of π supplied with m fixed.

The properties of demand functions (B, π , X) will be obtained by the total differentials of the first-order conditions (A) with respect to their prices (Willis 1974). Therefore, from these, the first-order and the second-order conditions, we note that fertility and infant mortality are simultaneously determined in the household behavior.

The interactions between infant mortality and fertility are further developed in a dynamic model such as a sequential model in Welch (1974). The model suggests a lagged relationship between infant mortality and fertility.

Now, suppose that relationships between infant mortality and fertility have the following forms:

$$B_t = F(B_{t-1}, M_{t-1} : T), \quad \dots \quad 2.16$$

$$M_t = G(M_{t-1}, B_{t-1} : E), \quad \dots \quad 2.17$$

where B_t is fertility rate at time t; M_t is infant mortality rate at time t; T reflects tradition, customs, social norms, which are influencing fertility behavior; and E represents environmental conditions (excluding factors in T) such as sanitation,

medical knowledge, and so on. However, T and E are not discrete but continuous. Therefore, it will be appropriate to consider that T and E are included in B and M, respectively. That is to say, fertility behavior, B, reflects household income constraint and also the social norms as well as traditional concepts in B itself. By the same manner, infant mortality rate is influenced directly by the household behavior and also indirectly by the medical knowledge like E in the society. Therefore, equations 2.16 and 2.17 should be presented as follows:

$$b_t = f(b_{t-1}, m_{t-1}), \quad \dots \quad 2.18$$

$$m_t = g(m_{t-1}, b_{t-1}), \quad \dots \quad 2.19$$

where b and m have the characteristics stated above; and be advised that m, here, is not medical care at all defined in equation 2.6 and 2.8, but infant mortality.

From equations 2.18 and 2.19, we note that each variable, b and m, can be expressed by autoregressive schemes of its own past series and/or another variable's autoregressive scheme.

From equation 2.18 for example, we know:

$$b_{t-1} = f(b_{t-2}, m_{t-2}), \quad \dots \quad 2.20$$

.

.

.

$$b_{t-i+1} = f(b_{t-i}, m_{t-i}). \quad \dots \quad 2.21$$

By substituting equations 2.20 through 2.21 into equation 2.19, we have an innovation of m such as:

$$m_t = h(m_{t-1}, m_{t-2}, \dots, m_{t-i}, b_{t-i}). \quad \dots \quad 2.22$$

Also, from equation 2.19, we know:

$$m_{t-1} = g(m_{t-2}, b_{t-2}), \quad \dots \quad 2.23$$

$$\vdots$$

$$m_{t-i+1} = g(m_{t-i}, b_{t-i}). \quad \dots \quad 2.24$$

By substituting equations 2.23 through 2.24 into equation 2.18, we have an innovation of b such as:

$$b_t = k(b_{t-1}, b_{t-2}, \dots, b_{t-i}, m_{t-i}). \quad \dots \quad 2.25$$

From equations 2.22 and 2.25, we note that b_{t-i} and m_{t-i} appear in the both equations. Since b_{t-i} affects $m_t (=h)$, by substituting m_t into equation 2.25, we have:

$$b_t = k(b_{t-1}, b_{t-2}, \dots, m_t, m_{t-i}). \quad \dots \quad 2.26$$

However, m_t in equation 2.26 can be expressed as equation 2.22.

Therefore, equation 2.26 can be expressed as follows:

$$b_t = q(b_{t-1}, \dots, b_{t-i}, m_{t-1}, \dots, m_{t-i}). \quad \dots \quad 2.27$$

By the same manner, we have:

$$m_t = r(m_{t-1}, \dots, m_{t-i}, b_{t-1}, \dots, b_{t-i}). \quad \dots \quad 2.28$$

From equations 2.27 and 2.28, we note that current value of time series of, say, b in equation 2.27 can be predicted by its own-past series of b and past series of m , if b and m are expressed in the forms like equations 2.18 and 2.19. This specification may be equivalent to Granger's specification in causality test, which is explained in Chapter III.

In this analysis, I will investigate causality based on equations 2.27 and 2.28 rather than fitting a simultaneous equations in a static model because:

- (a) Data on many exogenous variables in the model are lacking;
- (b) Identification restrictions are not obvious; and
- (c) Life cycle models of interdependent socio-economic decisions are practically intractable.

CHAPTER III

STATISTICAL TECHNIQUES OF CAUSALITY TEST

3-1. Granger's Model

Granger (1969) defines causality between two stationary stochastic time series, $X(t)$ and $Y(t)$, within a set of information in a universe as follows:

A time series X causes another time series Y if current value of Y , $Y(t)$, is more accurately predicted by using the information which includes at least the own-past series of Y , $\sum_{s=1}^{\infty} Y(t-s)$, and the past series of X , $\sum_{s=1}^{\infty} X(t-s)$, than by using the information which excludes the past series of X .

The operation empirically proceeds based on the assumption of linearity between X and Y . Hence, the word "causality" in Granger's model means "linear causality between X and Y within a given set of information in a universe" in the strict sense.¹

Following Granger (1969) and Granger and Newbold (1977), the following two rules are given:

- "(i) The future cannot cause the past. Strict causality can occur only with the past causing the present or future.
- (ii) It is sensible to discuss causality only for a group of

stochastic processes. It is not possible to detect causality between two deterministic processes." ²

Based on these rules, a possible definition of causality is as follows: Let $I(t)$ represent a vector time series in a universe at time t , which at least includes two stationary time series, $FE(t)$ and $MO(t)$, where FE and MO are stationary time series of fertility and infant mortality rates, respectively. Also, let $\bar{I}(t) = \{I(t-s): s > 0\}$, $\bar{\bar{I}}(t) = \{I(t-s): s \geq 0\}$, and $\bar{FE}(t)$, $\bar{\bar{FE}}(t)$, $\bar{MO}(t)$, $\bar{\bar{MO}}(t)$ be similarly defined. In other words, $\bar{\bar{I}}(t) = I(t) + \bar{I}(t)$, $FE(t) = I(t) + u(t)$, and $MO(t) = I(t) + v(t)$, where $u(t)$ and $v(t)$ are predictive errors.

Denote the optimum, unbiased, least-squares predictor of $FE(t)$ within a set of information, by $P(FE | I)$. Then, the variance of the predictive error series of $FE(t)$ will be defined as follows:

$$\sigma^2(FE | I) = E[FE(t) - P(FE | I)]^2. \quad \dots 3.1.1$$

Granger's definitions of causality are defined as follows:

1. MO causes FE if

$$\sigma^2(FE | \bar{I}) < \sigma^2(FE | \bar{I} - \bar{MO}). \quad \dots 3.1.2$$

The above statement 3.1.2 can be transformed as follows:

If $\bar{I}(t) = \{\bar{FE}(t), \bar{MO}(t)\}$, then

$$\sigma^2(FE | \bar{FE}, \bar{MO}) < \sigma^2(FE | \bar{FE}). \quad \dots 3.1.2'$$

The above statement 3.1.2' can be interpreted such that MO, infant mortality, causes FE, fertility, if the forecast error variance of FE(t) based on the own-past series of FE(t) and the past series of MO(t) is smaller than that of FE(t) based only on the own-past series of FE(t).

It should be noted, however, that satisfying the above criterion, 3.1.2 or 3.1.2', is a necessary but not sufficient condition to conclude that unidirectional causality from MO to FE exists. "Feedback causality" may also exist.

2. Feedback causality exists between MO and FE, if

$$\sigma^2(\text{FE} \mid \bar{\text{I}}) < \sigma^2(\text{FE} \mid \bar{\text{I}} - \overline{\text{MO}}), \text{ and also}$$

$$\sigma^2(\text{MO} \mid \bar{\text{I}}) < \sigma^2(\text{MO} \mid \bar{\text{I}} - \overline{\text{FE}}). \quad \dots \quad 3.1.3$$

The above statement 3.1.3 can be transformed as follows:

If $\bar{\text{I}}(t) = \{ \overline{\text{FE}}(t), \overline{\text{MO}}(t) \}$, then

$$\sigma^2(\text{FE} \mid \overline{\text{FE}}, \overline{\text{MO}}) < \sigma^2(\text{FE} \mid \overline{\text{FE}}), \text{ and also}$$

$$\sigma^2(\text{MO} \mid \overline{\text{MO}}, \overline{\text{FE}}) < \sigma^2(\text{MO} \mid \overline{\text{MO}}). \quad \dots \quad 3.1.3'$$

Since Granger's model utilizes stationary time series to identify causality between two variables, it is necessary to transform observed nonstationary time series, F(t) and M(t), to appropriate stationary time series, FE(t) and MO(t) respectively, by using transformation factors such as:

$$FE(t) = T_f * F(t), \text{ and}$$

$$MO(t) = T_m * M(t),$$

where T_f and T_m are transformation factors for fertility rate and infant mortality rate, respectively.

According to Pierce and Haugh (1977), transformation factors will often consist of first-difference or seasonal-difference operations. This type of transformation is necessary to render the observed time series stationary. Certain nonlinear transformations such as logarithms are also causality-preserving.³

Given the following assumptions: 1) The set of information, $I(t)$, consists of just $FE(t)$ and $MO(t)$; and 2) There exists linearity of stationary time series of $F(t)$ and $M(t)$, $FE(t)$ and $MO(t)$,⁴ the bivariate model for (FE, MO) can be defined to test strict causality as follows:

$$FE(t) = a_0 + \sum_{s=1}^{\infty} a(s)FE(t-s) + \sum_{s=1}^{\infty} b(s)MO(t-s) + u(t),$$

..... 3.1.4

$$MO(t) = c_0 + \sum_{s=1}^{\infty} c(s)MO(t-s) + \sum_{s=1}^{\infty} d(s)FE(t-s) + v(t),$$

..... 3.1.5

where $u(t)$ and $v(t)$ are white noise series defined as follows:

$$\begin{aligned}
E[u(t)] &= E[v(t)] = 0; \\
E[u(t)]^2 &= \text{a constant variance}; \\
E[u(t), u(t-i)] &= 0 \text{ for } i \neq 0; \\
E[v(t)]^2 &= \text{a constant variance}; \\
E[v(t), v(t-i)] &= 0 \text{ for } i \neq 0; \text{ and} \\
E[u(t), v(t-j)] &= E[u(t-j), v(t)] = 0 \\
&\text{for } j = 0, \pm 1, \dots, \quad .
\end{aligned}$$

Also, a_0 and c_0 in equations 3.1.4 and 3.1.5, respectively, are intercept terms.

Then, Granger's definitions become as follows:

1. MO(or M) causes FE(or F), if

$$\sum_{s=1}^{\infty} b(s) \neq 0 \text{ and also } \sum_{s=1}^{\infty} d(s) = 0.$$

2. FE(or F) causes MO(or M), if

$$\sum_{s=1}^{\infty} b(s) = 0 \text{ and also } \sum_{s=1}^{\infty} d(s) \neq 0.$$

3. Feedback causality exists between MO(or M) and FE(or F), if

$$\sum_{s=1}^{\infty} b(s) \neq 0 \text{ and also } \sum_{s=1}^{\infty} d(s) \neq 0.$$

In terms of the statistical test of significance of the set of $\sum_{s=1}^{\infty} b(s) \neq 0$, F test on the null hypothesis that MO does not

cause FE is used and defined as follows:

a) Unconstrained equation

$$FE(t) = a_0 + \sum_{s=1}^m a(s)FE(t-s) + \sum_{s=1}^n b(s)MO(t-s) + u(t), \quad \dots \quad 3.1.6$$

b) Constrained equation

$$FE(t) = a_0 + \sum_{s=1}^m a(s)FE(t-s) + u'(t), \quad \dots \quad 3.1.7$$

where a_0 is an intercept term, and m and n are the length of distributed lags of fertility rate and infant mortality rate, respectively. In this analysis, $m = n = 5$ is chosen for most equations based on the reasons explained in Ch. IV.

By identity, we have

$$TSS_i = ESS_i + USS_i, \quad \dots \quad 3.1.8$$

where TSS_i = total sum of squares in equation i ; ESS_i = explained sum of squares in equation i ; and USS_i = unexplained sum of squares in equation i . ESS_i is obtained as follows:

$$ESS_i = \frac{R_i^2 \cdot USS_i}{(1 - R_i^2)}, \quad \dots \quad 3.1.9$$

where R_i^2 is coefficient of determination in equation i .

The F test on the causal variable, MO, in equation 3.1.6 is as follows: ⁵

$$F(n, N-k) = \frac{\frac{ESS_u - ESS_c}{n}}{\frac{USS_u}{N-k}}, \quad \dots \quad 3.1.10$$

where subscript u is the unconstrained equation and c is the constrained equation. Concerning the degrees of freedom of the above F test, $F(n, N-k)$, n is the length of the distributed lags of MO and N-k is the total number of observations less the number of distributed lags of FE and MO less an intercept. In other words, $N-k = N - (m + n + 1)$. If the F value in equation 3.1.10 indicates the sum of MO in equation 3.1.6 significantly different from zero, it is said that MO, infant mortality, causes FE, fertility.

By the same manner, we can test the null hypothesis that $\sum_{s=1}^{\infty} d(s) = 0$ in equation 3.1.5. For the empirical test of causality from FE to MO, equation 3.1.5 is set as follows:

$$MO(t) = c_0 + \sum_{s=1}^m c(s)MO(t-s) + \sum_{s=1}^m d(s)FE(t-s) + v(t), \quad \dots \quad 3.1.11$$

$$M_0(t) = c_0 + \sum_{s=1}^m c(s)M_0(t-s) + v'(t), \quad \dots \quad 3.1.12$$

where equations 3.1.11 and 3.1.12 are called unconstrained and constrained equations, respectively.

In this analysis, for practical purposes, the finite distributed lags, 5 lags, are chosen in equations 3.1.6, 3.1.7, 3.1.11, and 3.1.12. Also, the originally observed time series of fertility rate, $F(t)$, and infant mortality rate, $M(t)$, are transformed to their stationary time series by taking the first-difference of the natural logarithms of each time series, e.g., $FE(t) = (1 - B) \cdot \log F(t)$, where $FE(t)$ is the stationary time series of $F(t)$; and B is the backshift operator defined as $(1 - B) \cdot \log F(t) = \log F(t) - \log F(t-1)$.

In addition to equations 3.1.6, 3.1.7, 3.1.11, and 3.1.12, another set of equations 3.1.6, 3.1.7, 3.1.11, and 3.1.12 with two dummy variables is also estimated to capture unnatural phenomena due to World War II and the postwar periods.

Dummy 1, D_1 , is used for the period during World War II from 1939 to 1945. Dummy 2, D_2 , is for the periods after the War from 1946 to 1950 for most of the sampled countries.

Equations including the dummy variables are defined as follows:

1. To test causality from MO to FE:

$$FE(t) = e_0 + \sum_{s=1}^m e(s)FE(t-s) + \sum_{s=1}^m f(s)MO(t-s) + D1 + D2 + u''(t),$$

..... 3.1.13

$$FE(t) = e_0 + \sum_{s=1}^m e(s)FE(t-s) + D1 + D2 + u'''(t). \dots 3.1.14$$

2. To test causality from FE to MO:

$$MO(t) = g_0 + \sum_{s=1}^m g(s)MO(t-s) + \sum_{s=1}^m h(s)FE(t-s) + D1 + D2 + v''(t),$$

..... 3.1.15

$$MO(t) = g_0 + \sum_{s=1}^m g(s)MO(t-s) + D1 + D2 + v'''(t). \dots 3.1.16$$

where e_0 and g_0 are intercepts; u 's and v 's are white noise series;

$D1 = 1$ for 1936 - 1945 and 0 otherwise;

$D2 = 1$ for 1946 - 1950 and 0 otherwise in most of the sampled

countries except Japan, Taiwan, and the United States;

$D2 = 1$ for 1947 - 1956 and 0 otherwise in Japan and Taiwan; and

$D2 = 1$ for 1920 - 1926 and 1946 - 1955 and 0 otherwise in

the United States.

3-2. Sims's Model

Sims (1972) shows that causality in Granger's sense within a two-variable model can be inferred by regressing current Y on past, current, and future values of X, if X and Y are jointly purely linearly indeterministic such as:

$$\begin{aligned} X(t) &= a u(t) + b v(t), \\ Y(t) &= c u(t) + d v(t), \end{aligned} \quad \text{.....} \quad 3.2.1$$

where $u(t)$ and $v(t)$ are mutually uncorrelated white noise processes with zero mean and unit variance; and, for example, $u(t)$ is defined as $u(t) = \sum_{s=0}^{\infty} a u(t-s)$.

Sims (1972) also shows that Y can be expressed as follows:

$$Y(t) = \sum_{s=0}^{\infty} g(s)X(t-s) + e(t), \quad \text{.....} \quad 3.2.2$$

if, and only if, Y does not cause X in Granger's sense, where X and Y have the properties stated in equation 3.2.1 and $e(t)$ is a serially uncorrelated residuals. Therefore, if causality does exist only from X to Y in the strict sense defined in Granger's definition, no future values of X would enter in equation 3.2.2.

Consequently, by regressing current value of Y on past, current, and future values of X such as:

$$Y(t) = \sum_{s=-m}^m g(s)X(t-s) + e'(t), \quad \dots\dots 3.2.3$$

where $e'(t)$ denotes serially uncorrelated residuals; and

$e'(t)$ is not correlated with any values of X .⁶

If causality runs from X to Y only, the future values of coefficients of X should be insignificantly different from zero as a group in equation 3.2.3. Hence, if the future values of coefficients of X in equation 3.2.3 are significantly different from zero as a group, it is said that Y causes X .⁷

Basically, the issue in Sims's model depends on how best to generate stationary stochastic time series in originally observed time series that yield linear regression like equation 3.2.3 with no serial correlation in residuals. Pierce (1977) argues that the jointly covariance-stationary pair of stochastic process X and Y in equation 3.2.1 can be obtained by using a univariate time series model such as:

$$X(t) = F(B)x(t), \quad \dots\dots 3.2.4$$

$$Y(t) = G(B)y(t), \quad \dots\dots 3.2.5$$

where $X(t)$ and $Y(t)$ have the properties stated in equation 3.2.1; $F(B)$ and $G(B)$ are stationary-white noise series-inducing transformation factors of x and y , respectively; and x and y are originally observed time series. These transformation factors

can be estimated by the forecasting methods of Box-Jenkins.⁸

In this analysis, originally observed fertility rate, $F(t)$, and infant mortality rate, $M(t)$, are whitened through filters of Integrated Autoregressive Moving-Average Process (ARIMA) of the forecasting methods of Box-Jenkins as follows:

$$FE^*(t) = H(B)F(t), \quad \dots \quad 3.2.6$$

$$MO^*(t) = I(B)M(t), \quad \dots \quad 3.2.7$$

where $FE^*(t)$ and $MO^*(t)$ are whitened series of $F(t)$ and $M(t)$, respectively; and $H(B)$ and $I(B)$ are ARIMA filters of $F(t)$ and $M(t)$, respectively.

By following equation 3.2.3, the procedure to test causality from fertility to infant mortality is defined as follows:

$$FE^*(t) = \sum_{s=-m}^m g(s)MO^*(t-s) + e'(t), \quad \dots \quad 3.2.8$$

$$FE^*(t) = \sum_{s=0}^m g(s)MO^*(t-s) + e''(t), \quad \dots \quad 3.2.9$$

where $e'(t)$ and $e''(t)$ are serially uncorrelated residuals and are not correlated with $g(s)MO^*(t-s)$ in their equations, 3.2.8 and 3.2.9, respectively. If causality runs from MO^* to FE^* only, the lead (future) coefficients of $MO(t-s)$, $s < 0$, in

equation 3.2.8 should be insignificantly different from zero as a group. The significance of the lead coefficients in equation 3.2.8 can be tested based on its F test by defining equation 3.2.8 as an unconstrained equation and equation 3.2.9 as a constrained equation. The procedures of F test are stated before in equations 3.1.8, 3.1.9, and 3.1.10.

In this analysis, the equations in Sims's model are estimated with intercept terms such as:

- 1) To test causality from FE* to MO*

$$FE^*(t) = g_0 + \sum_{s=-m}^m g(s)MO^*(t-s) + e'(t), \quad \dots \quad 3.2.10$$

$$FE^*(t) = g_0 + \sum_{s=0}^m g(s)MO^*(t-s) + e''(t), \quad \dots \quad 3.2.11$$

- 2) To test causality from MO* to FE*

$$MO^*(t) = h_0 + \sum_{s=-m}^m h(s)FE^*(t-s) + e'''(t), \quad \dots \quad 3.2.12$$

$$MO^*(t) = h_0 + \sum_{s=0}^m h(s)FE^*(t-s) + e''''(t), \quad \dots \quad 3.2.13$$

where all e's are serially uncorrelated residuals; and g_0 and h_0 are intercept terms.

In addition to the above equations, 3.2.10 through 3.2.13, another set of equations including two dummy variables are estimated to capture unnatural phenomena due to World War II and the postwar periods. Dummy 1, D1, is used for the period during World War from 1939 to 1945. Dummy 2, D2, is for the periods after the War from 1946 to 1950 for most of the sampled countries except Japan, Taiwan, and the United States. This procedure is explained in detail in section 3-1 Granger's Model.

Concerning the length of the two-sided distributed lags in equations 3.2.10 through 3.2.13 as well as the equations with the dummy variables, two different lead coefficients, namely 3 leads and 5 leads, are estimated because the different two-sided distributed lag equations might provide a different perspective of the causality test between infant mortality and fertility rates.⁹ For example, the equation with 5 leads is defined as follows:

$$FE^*(t) = g_0 + \sum_{s=-5}^5 g(s)MO^*(t-s) + e'(t), \dots \quad 3.2.14$$

where $e'(t)$ denotes serially uncorrelated residuals; and g_0 is an intercept term.

Also, the equation with 3 leads including the two dummy variables is defined as follows:

$$FE^*(t) = g_0 + \sum_{s=-3}^3 g(s)MO^*(t-s) + D1 + D2 + u(t),$$

..... 3.2.15

where $u(t)$ denotes serially uncorrelated residuals; $D1$ is a dummy variable during World War II; and $D2$ is a dummy variable for the first 5 years after World War II for most of the sampled countries. In the above equations, 3.2.14 and 3.2.15, there is no reason to assume the number of lead coefficients equal to the number of past coefficients of the two-sided distributed lags. However, the same number of lead and past coefficients are chosen in this analysis of the two-sided distributed lag equations because the behavior of different lag effects is not known a priori in this analysis.

3-3. General Aspects of Granger's and Sims's Models

In Granger's model, originally observed time series - infant mortality rate and fertility rate - are transformed to a non-singular, covariance stationary, purely nondeterministic time series by using appropriate transformation factors such as:

$$\begin{aligned} FE(t) &= T_f * F(t), \\ MO(t) &= T_m * M(t), \end{aligned} \quad \text{.....} \quad 3.3.1$$

where $[FE(t), MO(t)]$ is a non-singular, covariance stationary, purely nondeterministic time series; T_i is a transformation factor of time series i ; and $F(t)$ and $M(t)$ are fertility and infant mortality rates in their original data, respectively. Since transformations are linear, and since the optimal predicitions are linear in terms of causality defined in equations 3.1.4 and 3.1.5, the causality between infant mortality and fertility is defined as linear. If there should exist any non-linear relationships between the variables, the results obtained from equations 3.1.4 and 3.1.5 will be spurious.

Secondly, the specification in both 3.1.4 and 3.1.5 must be adequate so that the residual in each equation is indeed the white noise (serially uncorrelated residuals). Hence, if there should be omitting relevant lagged $FE(t-s)$ in

equation 3.1.4 (or lagged $MO(t-s)$ in equation 3.1.5), the omission of relevant lagged variable(s) will result in spurious regression results (Pierce and Haugh 1977). The appropriate correction may be to include all lagged FE in equation 3.1.4 (or all lagged MO in equation 3.1.5), which are non-negligibly non-zero.

Thirdly, the causality between FE (or F) and MO (or M) is "temporal causation" in the sense that the causality in the universe is relative to the information set consisting only of FE and MO. If there should exist a third variable relevant to the universe, which is unknown to the researchers, there will be spurious results in the causality test within the universe of only FE and MO.

The above third drawback in Granger's model is also equivalent to one of the drawbacks in Sims's model. In Sims's model, it is required to innovate white noise series of originally observed time series such as:

$$\begin{aligned} FE^*(t) &= H(B)F(t), \\ MO^*(t) &= I(B)M(t), \end{aligned} \quad \text{.....} \quad 3.3.2$$

where $FE^*(t)$ and $MO^*(t)$ are white noise series (serially uncorrelated residuals) of originally observed fertility, $F(t)$, and infant mortality rates, $M(t)$, respectively.

$H(B)$ and $I(B)$ in equations 3.3.2 are also defined as follows:

$$H(B) = \sum_{j=0}^{\infty} H(j)B^j,$$

$$I(B) = \sum_{j=0}^{\infty} I(j)B^j, \quad \dots \quad 3.3.3$$

where H and I are polynomial in the lag operator B , e.g., $B^j F(t) = F(t-j)$. The separate filters, $H(B)$ and $I(B)$, on $F(t)$ and $M(t)$ are obtained from the empirical processes of ARIMA structures, which ensure FE and MO nearly pre-whitened, and may be more appropriate than using a predetermined common filter, e.g., $(1 - 0.75B)^2$ in Sims (1972), in order to remove serial correlation in the residuals of a two-sided regression of FE^* (or MO^*) on MO^* (or FE^*) like equations 3.2.10 and 3.2.12.

On the other hand, to generate white noise series separately, which is called "the two-step procedure", will give an asymptotically biased result (Sims 1977). That is to say, the researchers are more likely to accept the null hypothesis of no causal relationship between FE^* and MO^* . The asymptotically biased result comes from the reason that one estimates $H(B)$ and $I(B)$ in equations 3.3.2 by holding $g(s)$ in equation 3.2.10 and $h(s)$ in equation 3.2.12

as zero, at first. Then, one estimates equations 3.2.10 and 3.2.12 by utilizing FE^* and MO^* in equations 3.3.2.

In addition, one should know the population univariate model filter of $H(B)$ and $I(B)$ in equations 3.3.2, which whiten $F(t)$ and $M(t)$, respectively. Since this is seldom the case in practice, one has to estimate the population $H(B)$ and $I(B)$. The white noise series obtained from the population filters can give population residual cross-correlations defined in Footnote 2 in Chap. IV. The population cross-correlations have the asymptotic distribution (Pierce and Haugh 1977). However, the sample residual cross-correlations are no longer asymptotically distributed as the population cross-correlations (Pierce and Haugh 1977). This is also true for $g(s)$ in equation 3.2.10 and $h(s)$ in equation 3.2.12 because the sample cross-correlations are the products of $g(s)$ and the ratio of the standard deviations of MO^* and FE^* in equation 3.2.10. In other words, there is the distribution problem of $g(s)$ and $h(s)$ in equations 3.2.10 and 3.2.12, respectively. This sort of spurious result might be reduced by finding appropriate prior filters in equations 3.3.2.

In both Granger's and Sims's model, there will be some feedback control rule which can control the empirical causal relationships between variables in interest. For example,

by having some informations on the weather of a given day, one might take an umbrella to go out on the day. If in fact it rains, there will be the empirical relationship in the causality from umbrella to rain, although the structural relationship is only from rain to umbrella.

Despite the problems mentioned in Granger's and Sims's models, these statistical innovations to test causality between variables of interest help to clarify empirically some theoretical conflicts in which one cannot specify a priori which variable is causing which.

FOOTNOTES TO CHAPTER III

1. See Granger (1969), p.430, and also Granger and Newbold (1977), p.226.
2. From Granger and Newbold (1977): pp.224 - 225.
3. See Pierce and Haugh (1977): p.269.
4. The assumptions of the linearity between $FE(t)$ and $MO(t)$, and $I(t) = \{FE(t), MO(t)\}$ would give spurious results, if there is a third variable which is causally and linearly related with $FE(t)$ and $MO(t)$, but $FE(t)$ and $MO(t)$ are not causally related each other.
5. See Johnston (1972): pp.135 - 155.
6. See Sims (1972): p.545.
7. According to Michael (1977), this evidence of feedback causality from Y to X is based on the logic that the future values of X could not have caused current value of Y in equation 3.2.3 except a certain situation such that expectations of future values of X with given information at current time, which is not yet incorporated in current value of X, might affect current value of Y.
8. See Box and Jenkins (1976) and Nelson (1973).
9. See Sims (1972), Mehra (1977), and Neftçi (1978).

CHAPTER IV

EMPIRICAL RESULTS FROM GRANGER'S TESTS

Causality tests between fertility rates and infant mortality rates are performed for the annual data on the 17 countries. These countries are Denmark, Finland, France, Italy, the Netherlands, Norway, Portugal, Sweden, Switzerland, the United Kingdom (England and Wales) in Western Europe; the United States of America (hereafter, denoted as U.S.A.), Canada in North America; Australia, New Zealand in Oceania; and Japan, Taiwan, Israel in Asia. The periods analyzed are : 1936-1974 for the countries in Western Europe, Canada, Australia, and New Zealand; 1920-1977 for Whites and Nonwhites in U.S.A.; 1920-1979 for Total (Whites and Nonwhites are combined) in U.S.A.; 1940-1974 for Israel; 1947-1977 for Japan; and 1947-1978 for Taiwan.

In the case of U.S.A., the causality tests are made on three different groups such as Total, Whites, and Nonwhites, because the fertility and infant mortality rates are dissimilar between Whites and Nonwhites. The levels of these rates of Nonwhites are much higher than those of Whites. The historical differentials in fertility and infant mortality rates between Whites and Nonwhites are shown in Table IV - 1 of the next page. For example, the fertility rate of Nonwhites is roughly

30 - 40% above the rate of Whites since 1935. The infant mortality rate of Nonwhites is roughly 60 - 80% above that of Whites during 1920 - 1975. These differentials are obtained based on the sample period of this analysis. One might also trace similar differentials or much larger differentials in both fertility and infant mortality rates between Whites and Nonwhites before 1920.

TABLE IV-1

HISTORICAL DIFFERENTIALS IN FERTILITY AND INFANT MORTALITY RATES
BETWEEN WHITES AND NONWHITES

FE: Year	1920	1935	1950	1960	1965	1975	
<u>Nonwhites</u>	19%	32%	34%	35%	46%	42%	above Whites' rate.

MO: Year	1920	1935	1950	1960	1965	1975	
<u>Nonwhites</u>	60%	60%	66%	89%	87%	71%	above Whites' rate.

Note: The base of the above figures is each corresponding rate of Whites in given year.
The above figures are obtained from Table 2-B in APPENDIX.

4-1. Results from Granger's Tests

For Granger's causality tests, two sets of equations are estimated. The first set of equations consists of equations 3.1.6 with 3.1.7 and 3.1.11 with 3.1.12, any one of which does not include the dummy variables to capture unnatural phenomena of World War II and the postwar. The other set consists of equations 3.1.13 with 3.1.14 and 3.1.15 with 3.1.16, which include two dummy variables such that D1 represents the dummy variable during the War and D2 the dummy variable during the first 5 (or 10) years of the postwar periods. In the case of U.S.A., D2 also includes the period 1920 - 1926. All above equations are specified in 3-1. Granger's Model. The above equations are estimated by using stationary time series of fertility and infant mortality rates. The stationary time series of those variables are generated by taking the first-difference of the natural logarithms. By so doing, I hope that the first order serial correlation in residuals is also taken care of in the estimated equations. The equations include five own lagged values and five lagged values of a causal variable.¹ The length of the lag distributions is truncated based on the following conditions:

- 1) Haugh's method (1976) ²;
- 2) the number of observations of each time series; and
- 3) the plotted figures of fertility and infant mortality rates.³

Table 4 in APPENDIX summarizes the F tests of equations without the dummy variables (being grouped as Equation I) and equations with the dummy variables (being grouped as Equation I + Dummy). In table 4, the issue of causality from infant mortality to fertility is denoted by M - F. M - F is a test of the null hypothesis that the parameters of five (or three) lagged values of the causal variable, infant mortality rate, are zero as a group. The issue of causality from fertility to infant mortality is denoted by F - M. F - M is a test of the null hypothesis that the parameters of five (or three) lagged values of the causal variable, fertility rate, are zero as a group.

The definition on fertility rate is the number of live births per 1,000 female population between the specified ages, e.g., the ages of 15-44 years, in specified race group. The definition on infant mortality rate is the number of deaths of infants under 1 year (exclusive of fetal deaths) per 1,000 live births in a given calendar year.

The results of Granger's test of causality are summarized as follows:

TABLE IV-2
SUMMARY OF CAUSALITY IN GRANGER'S TEST

Country	Causality		Causality		Feedback	Time Period
	M - F		F - M			
<u>EUROPE</u>						
Denmark		G	.....		.....	1936-'74
Finland		G	.....	G	Yes	1936-'74
France		G	.....	G	Yes	1936-'74
Italy		G	.....		.....	1936-'74
Netherlands		G	.....	G	Yes	1936-'74
Norway				G	.....	1936-'74
Portugal		G	.....		.....	1936-'74
Sweden		G	.....		.....	1936-'74
Switzerland				G	.....	1936-'74
U.K.		G	.....	G	Yes	1939-'74
<u>MID EAST(ASIA)</u>						
Israel		G3	.....	G3	Yes	1940-'74
<u>NORTH AMERICA</u>						
Canada				G	.....	1936-'74
U.S.A.						
Total						1920-'79
Whites						1920-'77
Nonwhites				G	.....	1920-'77
<u>ASIA</u>						
Japan				G3	.....	1947-'77
Taiwan						1947-'78
<u>OCEANIA</u>						
Australia				G	.....	1936-'74
New Zealand				G	.....	1936-'74

Note. M - F is causality from infant mortality to fertility, and
F - M is causality from fertility to infant mortality.

G is the significant result of the 5-lagged equation, and
G3 is that of the 3-lagged equation.

The above results are based on the significance level smaller
than or equal to 10%.

4-2. Causality from Infant Mortality to Fertility

Concerning the issue of causality from infant mortality to fertility denoted by $M - F$ in Table 4 of APPENDIX, the empirical results indicate that there are significant causalities in Denmark, France, the Netherlands, Portugal, the United Kingdom (hereafter, denoted as U.K.), and Israel in Equation I (the equations without the dummy variables). In Equation I + Dummy (the equations with the dummy variables), the results of Finland, Italy, and Sweden become significant. We note that the significant results concentrate in the countries of Western Europe as shown in Table IV-2 of the previous page. Especially, those countries like France, the Netherlands, and U.K. have relatively large F values of the causal variable, infant mortality rate. These large F values indicate that causality from infant mortality to fertility is significantly strong in those countries. On the other hand, none of the countries in North America, Asia (except Israel), and Oceania shows significant results and their F values are much smaller than those of the countries in Western Europe. We would consider that infant mortality is less important to affect fertility behavior in the countries of North America, Asia, and Oceania than the countries in Western Europe.

The dummy variables in the equations like 3.1.13 for the sampled countries show that D1 (the dummy during the period of World War II) is significant and positive for Denmark, Finland, France, Norway, and Sweden in the significant countries. The dummy variable (D1) is negative and significant for Italy. D2 (the dummy during the period of the first 5 or 10 years after the War) is insignificant for most of the countries in this analysis. New Zealand and France show significantly positive results in the unconstrained and constrained equations. Italy and U.K. have significantly positive and significantly negative results, respectively, in their unconstrained equations. These results of D1 and D2 are reported in Tables B-1 through B-4 of APPENDIX.

With respect to coefficients in the distributed lagged values of the causal variable, infant mortality rate, in equation, e.g., 3.1.6, we consider the sum of coefficients, $\sum_{s=1}^n b(s)$ where $n=5$, to reflect the degree of replacement of new births for prior infant's death. If the full replacement of new births is performed within 5 years because $n = 5$, the sum of coefficients must be one and positive.

In order to observe the sum of coefficients of the causal variable, infant mortality rate, in equation 3.1.6, suppose

all $MO(t-s)$ be equal to MO^* in the steady state equilibrium
such as:

$$FE(t) = a_0 + \sum_{s=1}^5 a(s)FE(t-s) + \sum_{s=1}^5 b(s)MO^* + u(t), \dots 4.2.1$$

where $MO^* = MO(t-s)$ for $s = 1, 2, \dots, 5$.

Following the above method, we obtain the sum of coefficients
of infant mortality rate and the standard deviation of the sum
of coefficients for the significant countries. The results are
as follows:

TABLE IV-3

STATISTICS

Country	(d.f.)	Sum of Coefficients	SD of the Sum**
Denmark	(5,22)	 0.107	 0.421
Finland*	(5,20)	 -0.796	 0.476
France	(5,22)	 1.079	 0.219
Italy*	(5,20)	 2.270	 0.451
Netherlands	(5,22)	 0.237	 0.281
Portugal	(5,22)	 1.080	 0.384
Sweden*	(5,20)	 1.619	 0.413
U.K.	(5,19)	 -0.101	 0.333
Israel	(3,24)	 0.347	 0.204

Note: * is the result from the equation with the dummy
variables. ** See Footnote 4 for the calculation of
standard deviation (SD) of the sum of coefficients.

Based on the above results in Table IV-3, we can statistically
test the hypothesis that the rate of replacement of new births
due to prior infant's deaths is fully performed by the parents

in a particular household. In other words, the null hypothesis is set that the sum of coefficients is insignificantly different from positive one. The statistical test indicates that the rate of replacement is one for the results of France, Portugal, and Sweden on the basis of a two-tailed test with $\alpha = 5\%$. The result of Italy has the sum significantly different from one and in fact greater than one on the basis of a one-tailed test with $\alpha = 1\%$.

Among the coefficients of the lag distributions of infant mortality rate, we may be able to see how the effects of shocks on fertility rate are distributed over time due to lags in the system. The shocks represent the change in infant mortality. Significant coefficients among the distributed lags of infant mortality might individually give some idea about the marginal costs to replace new births for infant's deaths.

The significant coefficients in the lag distributions are shown in Table IV-4 of the next page. The results show that the effects on fertility of infant mortality are distributed over time for France, Italy, Portugal, Sweden, and U.K.. The frequency of significant lag is the highest for Lag 1 and Lag 3, and the second for Lag 4.

The strong effect of infant's death at time $t-1$ on current births is reasonable since parents would quickly revise their

TABLE IV-4

SIGNIFICANT LAGS

M - F

<u>Country</u>		<u>Significant Lag</u>	<u>Coefficient</u>	<u>t-statistic (d.f.)</u>
Denmark	....	Lag 1	0.315	2.582 (22)
Finland*	....	Lag 3	-0.370	-2.430 (20)
France	....	Lag 1	0.355	4.810 (22)
		2	0.293	5.079
		3	0.250	4.167
		4	0.173	2.640
Italy*	....	Lag 1	0.469	2.559 (20)
		3	0.477	2.665
		4	0.428	2.658
		5	0.431	3.342
Netherlands ..		Lag 1	0.385	4.831 (22)
Portugal	....	Lag 3	0.430	3.364 (22)
		4	0.291	2.081
Sweden*	....	Lag 2	0.311	2.442 (20)
		3	0.538	3.971
		4	0.475	3.770
U.K.	....	Lag 1	0.980	3.085 (19)
		3	-0.400	-2.292
		4	-0.644	-3.399
		5	-0.547	-3.053
Israel	....	Lag 1	0.295	2.377 (24)

Note: The critical t-statistic is conventionally at the 5% significance level.

* is the result from the equations with the dummy variables.

d.f. is degrees of freedom.

M - F is the issue of causality from infant mortality to fertility.

fertility behavior and try to make up their unexpected loss while they are capable of doing so. If the marginal cost of having another birth is increasing as the parents increase their births, the coefficient of infant mortality rate at time $t-1$, the rate of replacement at time $t-1$, is not necessarily one. The replacement will be partial at current time t and be distributed over time. The partial replacement suggests that the parents would not be ready to have another birth in terms of financial problems as well as physical conditions of the mother. One might argue that those problems to solve take 2 or 3 years. Therefore, the significant lags on fertility of infant mortality become Lag 3 and/or Lag 4.

4-3. Causality from Fertility to Infant Mortality

The empirical results of causality from fertility to infant mortality denoted by $F - M$ in Table 4 of APPENDIX indicate that the results are significant for Finland, France, the Netherlands, Switzerland, U.K., Canada, Australia, and New Zealand in Equation I (the equations without the dummy variables). In Equation I + Dummy, the results of Norway, Israel, Nonwhites (U.S.A.), and Japan become significant but weak in terms of their F values. The inclusion of the dummy variables reduces the significance for France, the Netherlands, Switzerland, U.K., and Canada. In fact, the results of Switzerland and Canada become insignificant in Equation I + Dummy.

In terms of the number of significant countries, there are more significant countries under the issue of $F - M$ than those under the issue of $M - F$. The significant countries are observed not only in Western Europe but also in North America, Asia, and Oceania. However, concerning the values of F ratio, the F values under the issue of $F - M$ are relatively smaller in the countries of Western Europe than those under the issue of $M - F$ in the same countries of Western Europe. A conceivable explanation for the above results under the issue of $F - M$ is that causality from fertility to infant mortality does exist, but the length of

lag distributions, e.g., 5 years in this analysis, may not be sufficient to fully realize the effects of fertility on infant mortality.

The dummy variables in the equation like 3.1.15 for the sampled countries show that D1 (the dummy variable during World War II) is significantly positive for the Netherlands in both the unconstrained and constrained equations, and significantly negative for Nonwhites (U.S.A.) and Australia in their unconstrained equations among the significant countries under the issue of F - M. D2 (the dummy variable during the first 5 or 10 years of the postwar) is significantly negative for the Netherlands and U.K. in both their unconstrained and constrained equations, and significantly positive for Israel in the unconstrained equation. In the constrained equation of France, D1 and D2 are significantly positive and negative, respectively. The results of D1 and D2 are reported in Table D-1 through D-4 of APPENDIX.

4-4. Sign of Direction of Causality

Knowing the possible existence of different lag effects on the dependent variable of the distributed lags of the causal variable under the issues of both $M - F$ and $F - M$, it will not be inappropriate to use the sum of the coefficients in the distributed lagged values of the causal variable in a specified equation as an aggregate effect on the basis of an assumption of steady state equilibrium.

Under the issue of causality from infant mortality to fertility, $M - F$, a reduction in infant mortality rate gives two different effects on parents' fertility behavior: the substitution and income effects. First, the substitution effect occurs through the change in relative cost of birth resulting from the reduction in infant mortality rate. Secondly, the reduction in infant mortality rate will increase the parents' opportunity with a given household income. The increase in real income of the household will lead the parents to have more children if the number of surviving children is a normal good. Generally in the context of the modern economic theory of population, a reduction in infant mortality rate is expected to cause a reduction in fertility rate with a lag. Therefore, the sign of direction of causality from infant mortality to fertility is considered as positive.

To determine the sign of direction of causality under the issue of M - F, suppose all $FE(t-s)$ and $MO(t-s)$ be equal to FE^* and MO^* , respectively, in the steady state equilibrium. Then, equation 3.1.6 in section 3-1. Granger's Model becomes as follows:

$$FE^* = a_0 + \sum_{s=1}^5 a(s)FE^* + \sum_{s=1}^5 b(s)MO^* + u(t), \quad \dots 4.4.1$$

where $FE^* = FE(t-s)$ for $s = 0, 1, \dots, 5$ and $MO^* = MO(t-s)$ for $s = 1, \dots, 5$.

From the above equation 4.4.1, the effect of infant mortality on fertility is as follows:

$$\frac{\partial FE^*}{\partial MO^*} = \frac{\sum_{s=1}^5 b(s)}{1 - \sum_{s=1}^5 a(s)} \quad \dots 4.4.2$$

The value obtained from equation 4.4.2 is considered as a sort of long-run effect and is called as a long-run multiplier in this analysis.⁵

In order to determine the sign of direction of causality, the null hypothesis is set that a long-run multiplier is insignificantly different from zero, whereas the alternative hypothesis is that a long-run multiplier is greater than zero. The results are as follows:

TABLE IV-5

M - F Test on Sign of Direction of Causality
Long-Run Multiplier

<u>Country</u>	<u>Long-run multiplier</u>	<u>standard deviation</u>	<u>t (d.f.)</u>
Denmark	0.216	0.465	0.464 (22)
Finland***	-0.385	---	--- (20)
France	1.710	0.787	2.172* (22)
Italy***	1.354	0.593	2.283* (20)
Netherlands	-1.560	8.907	-0.175 (22)
Portugal	0.531	0.261	2.034* (22)
Sweden***	1.356	0.232	5.844** (20)
U.K.	-0.456	4.778	-0.095 (19)
Israel	0.390	0.293	1.331 (24)

Note: * Significant at a one-tailed test with $\alpha = 5\%$

** Significant at a one-tailed test with $\alpha = 1\%$

*** the result from the equation with the dummy variables.

t = t-statistic

(d.f.) = degrees of freedom

Standard deviation is of long-run multiplier. See Footnote 4 for the calculation.

--- is not possible to obtain because of a negative variance of the long-run multiplier.

From the results in Table IV-5, we note that France, Italy, Portugal, and Sweden have significantly positive sign of direction of causality from infant mortality to fertility.

Under the issue of causality from fertility to infant mortality, the sign of direction of causality is expected to be positive in the context of the Malthusian theory of population.

By following the method stated before, in the steady state equilibrium, equation 3.1.11 is defined as follows:

$$MO^* = c_0 + \sum_{s=1}^5 c(s)MO^* + \sum_{s=1}^5 d(s)FE^* + v(t), \dots 4.4.3$$

where $MO^* = MO(t-s)$ for $s = 0, 1, \dots, 5$ and $FE^* = FE(t-s)$ for $s = 1, \dots, 5$.

From equation 4.4.3, the long-run effect (long-run multiplier) of fertility on infant mortality is obtained as follows:

$$\frac{\partial MO^*}{\partial FE^*} = \frac{\sum_{s=1}^5 d(s)}{1 - \sum_{s=1}^5 c(s)} \dots 4.4.4$$

Based on equation 4.4.4, among the significant countries under the issue of causality from fertility to infant mortality, the following long-run multipliers are obtained:

TABLE IV-6

F - M Test on Sign of Direction of Causality
Long-Run Multiplier

<u>Country</u>	<u>Long-run multiplier</u>	<u>standard deviation</u>	<u>t (d.f.)</u>
Finland	-0.061	0.377	-0.161 (22)
France	-1.256	1.216	-1.032 (22)
Netherlands	11.546	6.033	1.913* (22)
Norway**	0.683	1.908	0.358 (20)
Switzerland	0.308	1.398	0.220 (22)
U.K.	-0.583	0.579	-1.008 (19)
Israel**	-0.983	0.609	-1.614 (23)
Canada	0.106	0.288	0.369 (22)
Nonwhites(U.S.A.)**	0.719	0.364	1.977* (39)
Japan**	0.496	0.582	0.853 (19)
Australia	-0.403	1.567	-0.257 (22)
New Zealand	0.240	1.435	0.167 (22)

Note: * Significant at a one-tailed test with $\alpha = 5\%$

** the result from the equation with the dummy variables.

t = t-statistic

(d.f.) = degrees of freedom

Standard deviation is of long-run multiplier. See Footnote 4 for the calculation.

For the sign of direction of causality, the null hypothesis is set that a long-run multiplier is not significantly different from zero. The alternative is significantly positive.

The test indicates that the results of the Netherlands and Nonwhites (U.S.A.) are significantly positive. However, we have such a general impression from the above statistical test that the long-run effect of fertility on infant mortality is almost negligible.

4-5. Summary of Results of Granger's Test

Testing causality between infant mortality and fertility based on Granger's model, the empirical results indicate that nine countries out of 17 countries are significant under the issue of causality from infant mortality to fertility. Those are the countries in Western Europe such as Denmark, Finland, France, Italy, the Netherlands, Portugal, Sweden, the United Kingdom (U.K.), and only Israel in Asia. Especially, the results of France, Italy, Portugal, Sweden, and U.K. suggest that there are significant and different lag effects on fertility of infant mortality.

Concerning causality from fertility to infant mortality, there are 12 significant countries among the 17 countries. However, those significant countries in Western Europe have smaller F values than those under the issue of causality from infant mortality to fertility. As a general impression, the significant countries under the issue of causality from fertility to infant mortality are distributed over the countries in Western Europe, North America, Asia, and Oceania.

The sign of direction of causality is statistically tested. The statistical test indicates that there is significantly positive effect on fertility of infant mortality for France, Italy, Portugal, and Sweden. On the other hand, under the issue of

causality from fertility to infant mortality, only the results of the Netherlands and Nonwhites in the United States are significantly positive among the 12 countries. Therefore, it is considered that the long-run effect from fertility to infant mortality would be almost negligible.

FOOTNOTES TO CHAPTER IV

1. The equations of Israel, Japan, and Taiwan are estimated only with 3 own lagged values and 3 lagged values of the causal variable because of the relatively small number of observations.

2. See Haugh (1976). Haugh's method is another test to detect causality between two variables by using cross correlations of their white noise series. Haugh shows that

$$S_m = N \sum_{k=-m}^m r_{uv}(k)^2 \quad \dots (1)$$

has the Chi-square distribution with $2m + 1$ degrees of freedom. In the above equation, N = the number of observations and r_{uv} is estimated cross correlation between two white noise series of u and v . r_{uv} is defined as follows:

$$r_{uv}(k) = \sum_t u_t v_{t+k} / \left[\sum_t u_t^2 \sum_t v_t^2 \right]^{1/2} \quad \dots (2)$$

where u_t and v_t are white noise series of, say, variables X and Y , respectively. From equation (1), it is clear that the larger cross correlation with given k , the more it will contribute the significance to the Chi-square distribution. Hence, by checking each cross correlation, $k = -1, -2, \dots, -m$, it would be possible to find which past lag of Y affects X the most among the m lagged values of Y . Then, the length of lags in Granger's model is determined by including relatively large cross correlations' lags starting from $k = -1$. In equation (1), S_m ($k = \pm m$) is the Chi-square under the null hypothesis that variables X and Y are not causally related: S_m ($k < 0$) is one under the null hypothesis that variable Y does not cause variable X ; and S_m ($k > 0$) is one under the null hypothesis that variable X does not cause variable Y .

3. See Figures of APPENDIX.

4. See Kmenta (1971): p.444. Standard deviation of sum can be obtained as follows: An estimator, say a , is a function of k other estimators such as $b_1, b_2, \dots, b_k$:

$$a = f(b_1, b_2, \dots, b_k). \quad \dots (3)$$

Then the large-sample variance of a can be approximated as

$$\begin{aligned} \text{Var}(a) \doteq \sum_k \left[\frac{\partial f}{\partial b_k} \right]^2 \text{Var}(b_k) + 2 \sum_{j < k} \left[\frac{\partial f}{\partial b_j} \right] \left[\frac{\partial f}{\partial b_k} \right] \text{Cov}(b_j, b_k) \\ \dots (4) \\ (j, k = 1, 2, \dots, k; j < k). \end{aligned}$$

For example,

$$\text{if } a = \frac{b_1}{1 - b_2} \quad \text{is given,}$$

we have the variance of a as follows:

$$\begin{aligned} \text{Var}(a) \doteq \left[\frac{1}{1 - b_2} \right]^2 \text{Var}(b_1) + \left[\frac{b_1}{(1 - b_2)^2} \right]^2 \text{Var}(b_2) \\ + 2 \left[\frac{1}{1 - b_2} \right] \left[\frac{b_1}{(1 - b_2)^2} \right] \text{Cov}(b_1, b_2). \end{aligned}$$

5. In my mind, a short-run effect is the value obtained by summing only $b(s)$, $s = 1, \dots, 5$, in equation 4.4.1. The results of short-run effect from infant mortality to fertility are as follows:

TABLE

M - F Test on Sign of Direction of Causality

<u>Country</u>	<u>(d.f.)</u>	<u>t-statistic</u>
Denmark	22	0.254
Finland*	20	-1.672
France	22	4.926**
Italy*	20	5.033**
Netherlands	22	0.843
Portugal	22	2.812**
Sweden*	20	3.920**
U.K.	19	-0.303
Israel	24	1.700

Note: * is the result from the equation with the dummy variables.

** Significant at a one-tailed test with $\alpha = 0.01$.

(d.f.) is degrees of freedom.

The above t-statistics are calculated from Table IV-3 in the text.

To test the sign of direction of causality, the null hypothesis is set that sum of the coefficients, $b(s)$ for $s = 1, \dots, 5$, is not significantly different from zero. The alternative is that sum of the coefficients is positive. Testing the hypothesis indicates that France, Italy, Portugal, and Sweden give the results of significantly positive effect of infant mortality on fertility.

CHAPTER V

EMPIRICAL RESULTS FROM SIMS'S TESTS

Causality tests between fertility rates and infant mortality rates are performed for the annual data on the 17 countries. All those annual time series data are transformed to their white noise time series through the filters obtained by forecasting methods of Box-Jenkins - ARIMA models.¹ Obtaining whitened time series is a necessary condition based on the assumption of jointly covariance-stationarity between two time series in Sims's model.² By utilizing white noise time series of infant mortality and fertility rates, two-sided distributed lag equations are estimated to test causality between infant mortality and fertility. Those equations are represented as equations 3.2.10 with 3.2.11 under the issue of causality from fertility to infant mortality and equations 3.2.12 with 3.2.13 under the issue of causality from infant mortality to fertility in section 3-2. Sims's Model. In addition to the above equations, the same equations with two dummy variables are estimated to capture unnatural phenomena resulting from World War II and the postwar periods. The former is represented as Dummy 1, D1, and the latter as Dummy 2, D2.

In Sims's model, two different lead coefficients, namely 3 and 5 leads, are estimated to differentiate the effect of relationship between infant mortality and fertility. These different two-sided distributed lag equations would provide a different perspective of the causality test.³

The empirical results of the 3 and the 5 leads are given in the following tables.

TABLE V-1

3 Leads' Result of Causality

<u>Country</u>	<u>M - F</u>	<u>F - M</u>	<u>Feedback</u>	<u>Time Period</u>
Denmark ...	S ...			... 1936-'74
Finland ...	S ...	S*	Yes	... 1936-'74
France ...	S ...	S*	Yes	... 1936-'74
Italy ...				... 1936-'74
Netherlands ..	S ...	S*	Yes	... 1936-'74
Norway ...				... 1936-'74
Portugal ...				... 1936-'74
Sweden ...				... 1936-'74
Switzerland ..	S ...			... 1936-'74
U.K. ...				... 1939-'74
Israel ...	S ...			... 1940-'74
Canada ...				... 1936-'74
U.S.A.				
Total ...				... 1920-'79
Whites ...				... 1920-'77
Nonwhites ...				... 1920-'77
Japan ...				... 1947-'77
Taiwan ...				... 1947-'78
Australia ...		S		... 1936-'74
New Zealand ..		S		... 1936-'74

Note: * The result from the equation with the dummy variables.

S represents significant result.

(continued)

TABLE V-2

5 Leads' Result of Causality

<u>Country</u>		<u>M - F</u>	<u>F - M</u>	<u>Feedback</u>	<u>Time Period</u>
Denmark	...	...		...	1936-'74
Finland	...	S	S	Yes	1936-'74
France	...	S	S	Yes	1936-'74
Italy	...	...		...	1936-'74
Netherlands	..	S	S	Yes	1936-'74
Norway	...	...	S	...	1936-'74
Portugal	...	...		...	1936-'74
Sweden	...	...		...	1936-'74
Switzerland	..	...		...	1936-'74
U.K.	...	S*	S	Yes	1939-'74
Israel	...	S*	S	Yes	1940-'74
Canada	...	...		...	1936-'74
U.S.A. Total	.	...		...	1920-'79
Whites		...		...	1920-'77
Nonwhites	S*	...		...	1920-'77
Japan	...	...		...	1947-'77
Taiwan	...	...	S*	...	1947-'78
Australia	...	S		...	1936-'74
New Zealand	..	...	S	...	1936-'74

Note. S represents significant result based on the significance level smaller than or equal to 10% with no serial correlation.

M - F is causality from infant mortality to fertility.

F - M is causality from fertility to infant mortality.

* Significant result after correction of serial correlation.

5-1. Causality from Infant Mortality to Fertility

First, concerning the equations with 3 leads in the two-sided distributed lag relation like equation 3.2.12 with $m = 3$, the empirical results, under M - F of Equation III in Table 5 of APPENDIX, show that there exists significant causality from infant mortality to fertility for Denmark, Finland, France, the Netherlands, Switzerland, the United Kingdom (U.K.), and Israel. The significant result of U.K. has serial correlation in the 1st, 2nd, 3rd, and 4th order. There are no significant countries except Israel in North America, Asia, and Oceania.

Among the significant countries, it can be noted in Table 5 of APPENDIX that the results of Finland and the Netherlands have large F values of 13.76 and 23.65, respectively, which indicate the existence of strong causality from infant mortality to fertility. Checking the 3 leads coefficients of these countries, we note that lead 1 among the 3 leads is significantly positive for both countries.

TABLE V-3

M - F		Coefficients of 3 Leads	
<u>Country</u>	<u>Lead</u>	<u>Coefficient</u>	<u>t-statistic (d.f.)</u>
Finland	1	0.850	5.931 (24)
	2	-0.548	-2.553
	3	-0.203	-0.940
Netherlands	1	1.133	8.270 (24)
	2	0.224	1.665
	3	-0.089	-0.665

In addition to the above two countries, the results of Denmark, France, Switzerland, and Israel also have significantly positive effect of infant mortality on fertility as follows:

TABLE V-4

M - F		Coefficient of Lead 1		
<u>Country</u>	<u>Lead</u>	<u>Coefficient</u>	<u>t-statistic (d.f.)</u>	
Denmark	1	0.373	2.061 (24)	
France	1	1.697	3.518 (24)	
Switzerland	1	0.437	3.040 (24)	
Israel	1	0.350	3.351 (20)	

In the causality from infant mortality to fertility, the exclusively significant and positive coefficient of lead 1 might reflect a systematic behavioral pattern such that parents in a particular household revise their fertility behavior consistently and quickly corresponding to prevailing infant mortality rate.

Secondly, concerning the equations of 5 leads under the issue of causality from infant mortality to fertility, M - F, in Table 6-A of APPENDIX, significant results are obtained for Finland, France, the Netherlands, U.K., Israel, Nonwhites (U.S.A.), and Australia. The significant results of U.K., Israel, and Nonwhites (U.S.A.) have serial correlation and remain significant after the correction.⁴

By comparing the F values of 3 leads in Table 5 with those of 5 leads in Table 6-A of APPENDIX, it may possible to observe the additional contributions from 3 leads to 5 leads.

The changes in their F values are as follows:

TABLE V-5

M - F F-Values on Leads

<u>Country</u>	<u>F value of 3 leads</u>		<u>F value of 5 leads</u>	
		(d.f.)		(d.f.)
Denmark	3.34	(3,24)	1.46*	(5,14)
Finland	13.76	(3,24)	2.90	(5,16)
France	5.59	(3,24)	15.75	(5,16)
Netherlands	23.65	(3,24)	60.74	(5,16)
Switzerland	3.96	(3,24)	1.89	(5,16)
U.K.	---	(3,21)	5.75**	(5,12)
Israel	4.44	(3,20)	7.32**	(5,12)
U.S.A.				
Nonwhites	---	(3,43)	4.00**	(5,24)
Australia	1.67	(3,24)	2.96	(5,16)

Note: * the result from the equation with the dummy variables.

** the result after the correction of serial correlation.

--- represents ambiguous result because of serial correlation in the estimated equation.

(d.f.) is degrees of freedom.

From the 3 leads to the 5 leads, the results of Denmark, Finland, and Switzerland become smaller F values. On the other hand, the F values substantially increase for the results of France and the Netherlands. Hence, it is less obvious to always increase F value from 3

to 5 leads in the two-sided distributed lag equation of Sims's model.

The data of the United States allow to see whether any significant contribution in explanatory power can be detected by increasing the length of lags to 8 leads and lags in the two-sided lag equation. The results of the 8 leads for each group in the United States are as follows:

TABLE V-6

M - F F-Value of 8 Leads of U.S.A.

<u>U.S.A.</u>	<u>F value of 8 leads</u>	<u>(d.f.)</u>	<u>Time Period</u>
Total	2.141*	(8,25)	1920-'79
Whites	1.372 r	(8,23)	1920-'77
Nonwhites	2.328*r	(8,23)	1920-'77

Note: * Significant at $\alpha = 10\%$.
 r result with serial correlation.
 (d.f.) is degrees of freedom.

The results in Table V-6 indicate that as far as the U.S.A.'s data are concerned, the increase of the length of lags does not contribute so greatly to the explanatory power under the issue of causality from infant mortality to fertility.

5-2. Causality from Fertility to Infant Mortality

First, with respect to the equations with 3 leads under the issue of causality from fertility to infant mortality, F - M, in Table 5 of APPENDIX, it is found that the results of Finland, the Netherlands, U.K., Canada, Australia, and New Zealand are significant in Equation III (the equations without the dummy variables). Among these countries, only the results of Australia and New Zealand are significant with no serial correlation. However, by including the dummy variables in equation III (Equation III + Dummy in Table 5 of APPENDIX), Finland, France, and the Netherlands indicate significant results with no serial correlation.

Secondly, by increasing the number of leads from the 3 to the 5 leads in the two-sided distributed lag equation, the number of significant countries substantially increases with no serial correlation under the F - M of Equation IV in Table 6-A of APPENDIX. Those countries are Finland, France, the Netherlands, Norway, U.K., Israel, and New Zealand. After the correction of serial correlation for the significant results of Canada, Nonwhites (U.S.A.) and Taiwan, only the result of Taiwan remains significant as shown in Table 6-B of APPENDIX.⁵

By comparing the results of 5 leads with those of 3 leads, one will note that serial correlation disappears in the 5 leads' equations for many countries as well as some increase in their F values. Therefore, this would suggest that the additional 4th and 5th leads and lags are not negligible to explain causality from fertility to infant mortality.

5-3. Sign of Direction of Causality

The sign of direction of causality from infant mortality to fertility could be either positive or negative, whereas that from fertility to infant mortality would be positive in the context of the Malthusian theory of population.

In order to determine the sign of direction of causality in Sims's model, I follow the method used by Neftçi (1978).

Sims's model is expressed as follows:

- 1) Testing causality from fertility to infant mortality

$$FE(t) = a_0 + \sum_{s=-5}^5 a(s)MO(t-s) + u(t) \quad \dots\dots 5.3.1$$

- 2) Testing causality from infant mortality to fertility

$$MO(t) = b_0 + \sum_{s=-5}^5 b(s)FE(t-s) + v(t) \quad \dots\dots 5.3.2$$

where FE and MO are pre-filtered fertility and infant mortality rates, respectively; $u(t)$ and $v(t)$ are mutually uncorrelated white noise series; and a_0 and b_0 are intercept terms.

In the above equations 5.3.1 and 5.3.2, if MO causes FE, but FE does not cause MO, the lead coefficients of MO, $s < 0$, should be zero as a group and the current and past coefficients of MO, $s \geq 0$, should be significantly different from zero as

a group in equation 5.3.1. In addition, in equation 5.3.2, the lead coefficients of FE should be significantly different from zero as a group whereas the current and past coefficients of FE should be zero as a group. By the same token, we can define the case in which FE causes MO, but MO does not cause FE. Then, we have the following structural forms:

3) MO causes FE, but FE does not cause MO.

$$FE(t) = a_0 + \sum_{s=0}^5 a(s)MO(t-s) + u'(t) \quad \dots\dots 5.3.3$$

4) FE causes MO, but MO does not cause FE.

$$MO(t) = b_0 + \sum_{s=0}^5 b(s)FE(t-s) + v'(t) \quad \dots\dots 5.3.4$$

where all symbols in the above equations have the same properties in equations 5.3.1 and 5.3.2.

To observe sign of direction of causality, I sum the past values of $a(s)$, $s > 0$, in equation 5.3.3 when MO causes FE only. By the same manner, I sum the past values of $b(s)$, $s > 0$, in equation 5.3.4 when FE causes MO only. The reason why I sum only the past values of $a(s)$ and $b(s)$ by excluding $a(s=0)$ and $b(s=0)$ comes from that "Instantaneous Causality" is not tested

in this analysis.⁶ If there is a feedback relationship between infant mortality and fertility, that is, infant mortality causes fertility and vice versa, I sum the lead coefficients in equation 5.3.1 to obtain the sign of direction from fertility and infant mortality and also the lead coefficients in equation 5.3.2 to obtain the sign of direction from infant mortality to fertility.⁷

On the basis of the method stated above, sum of coefficients and its standard deviation are obtained as follows:

TABLE V-7

Country	Sum of Coefficients in Sims's Model					
	M - F			F - M		
	Sum	SD	t(d.f.)	Sum	SD	t(d.f.)
Denmark	-0.207	0.255	-0.811 (27)		-----	
Finland	-0.484	0.279	-1.734 (16)	-1.209	0.178	-6.792*(16)
France	3.455	0.913	3.784*(16)	-0.446	0.127	-3.511*(16)
Netherlands	1.410	0.331	4.259*(16)	-0.114	0.179	-0.636 (16)
Norway		-----		-0.092	0.112	-0.821 (21)
Switzerland	0.137	0.311	0.440 (27)		-----	
U.K.	0.106	0.179	0.592 (12)	-0.187	1.528	-0.122 (13)
Israel	0.241	0.232	1.038 (10)	-0.078	1.400	-0.055 (12)
U.S.A.						
Total	-1.093	0.733	1.491 (33)		-----	
Nonwhites	-0.657	0.270	-2.433*(29)		-----	
Taiwan		-----		0.037	0.249	0.148 (12)
Australia	-0.125	0.218	0.573 (16)	-1.616	0.685	-2.359*(24)
New Zealand		-----		0.127	0.228	0.557 (21)

Note: * Significant at a one-tailed test with $\alpha = 5\%$

Sum is the sum of coefficients.

SD is the standard deviation of sum of coefficients.

t is t-statistic.

(d.f.) is degrees of freedom.

Figures in the table report the first three decimals.

M - F represents that infant mortality causes fertility.

F - M represents that fertility causes infant mortality.

To test the relevant hypotheses under the issues of M - F and F - M, the null hypothesis is set that sum of coefficients is insignificantly different from zero. The alternative is set that the sum of coefficients is either negative or positive at a one-tailed test with a 5% significance level.

As we note in Table V-7, the effect of infant mortality on fertility is significantly positive for the results of France and the Netherlands and negative for Nonwhites (U.S.A.). Under the issue of causality from fertility to infant mortality, the results of Finland, France, and Australia are significantly negative, whose sign is counter-intuitive.

5-4. Summary of Results of Sims's Test

In order to test causality between infant mortality and fertility based on Sims's model, two different lead equations are estimated in the two-sided distributed lag relation because those different two-sided distributed lag equations would provide a different perspective of the causality tests.

Under the issue of causality from infant mortality to fertility, the results of 3 leads' equations indicate that there are significant causalities for Denmark, Finland, France, the Netherlands, Switzerland, and Israel. By increasing the length of leads to the 5 leads, the results of the United Kingdom (U.K.), Nonwhites (U.S.A.), and Australia become significant. On the other hand, the significant results of Denmark and Switzerland become insignificant at their 5 leads' equations. As a whole, the basic results between the 3 and the 5 leads' equations seem not to differ in terms of the number of significant countries and their F values.

The statistical test on the sign of direction from infant mortality to fertility indicates that the former has a significantly positive effect on the latter for France and the Netherlands, and negative for Nonwhites in the United States in their 5 leads' equations.

Under the issue of causality from fertility to infant mortality, the results of 3 leads' equations indicate significant causalities for Finland, France, the Netherlands, Australia, and New Zealand. By increasing the length of leads to the 5 leads, the results of Norway, U.K., Israel, and Taiwan become significant whereas that of Australia becomes insignificant.

By comparing the F values of the 5 leads' equations with those of the 3 leads' equations, the increase in the number of leads and lags eliminates serial correlation and substantially increase F values for a few countries among the significant countries. Therefore, it can be considered that the additional 4th and 5th leads and lags would not be negligible to explain causality from fertility to infant mortality.

The statistical test on sign of direction of causality from fertility to infant mortality indicates that there are significantly negative effects for Finland, France, and Australia among the significant countries in the 5 leads' equations. This negative sign contradicts the assumption on the sign of direction in the context of the Malthusian theory of population.

5-5. Correction for Serial Correlation

Serial correlation is estimated by autocorrelation function of ARIMA model. The autocorrelation function is substituted by its estimated sample autocorrelation function, which is defined as follows:

$$r_s = \frac{\text{Cov}[u(t), u(t-s)]}{\text{Var}[u(t)]}, \quad \dots \quad 5.5.1$$

where $u(t)$ is residuals of an estimated equation and $0 \leq s < \infty$.

When the s th order of serial correlation exists, r_s is significantly different from zero. That is to say, the estimated s th order of sample autocorrelation is larger than two times its estimated standard error in absolute value, $2/\sqrt{T}$, where T is the number of observations (Pindyck and Rubinfeld 1976).

One advantage of this estimation of serial correlation is that one does not need to assume any order of serial correlation a priori. The sample autocorrelation function does provide the first 24 serial correlations. r_s in equation 5.5.1 is theoretically equivalent to serial correlation estimated in a linear autoregressive scheme of residuals in the s th order such as:

$$u(t) = r_s \cdot u(t-s) + e''(t), \quad \dots \quad 5.5.2$$

where $e''(t)$ denotes serially uncorrelated residuals.

In Sims's model, the estimated equations are theoretically free from the problem of serial correlation if variables, say, the infant mortality rate and the fertility rate, are fully prewhitened by using some appropriate methods such as spectral density function of residuals (Sims 1972). However, the method of ARIMA used in this analysis to generate white noise series may not be free from the problem of serial correlation.

This ARIMA method to generate white noise series is called "the two-step procedure" by Sims's comment on Pierce (1977).

In addition, if the specification of the length of lag distribution in Sims's model is not right, there may be the problem of serial correlation in residuals. Therefore, equation 5.5.1 is used.

If the sth order of serial correlation exists in 3.2.10, the generalized difference equation in Sims's model is as follows:

$$(1 - r_s B^s) FE^*(t) = g_0' + \sum_{i=-5}^5 g(i) (1 - r_s B^s) MO^*(t-i) + e^*(t),$$

..... 5.5.3

where r_s is an estimated coefficient of serial correlation in the sth order from the sample autocorrelation function; and B^s is the backshift operator at s lag, e.g., $(1 - B^s) FE^*(t) = FE^*(t) - FE^*(t-s)$. Equation 5.5.3 is a serially corrected equation.

Based on the above method, the significant results with serial correlation of 5 leads' equation in Sims's model are corrected for the following countries in Table 6 - A of APPENDIX: U.K., Israel., Nonwhites (U.S.A.) under M - F; and Canada, Nonwhites (U.S.A.), Taiwan under F - M.

First, with respect to the results of U.K., Israel, and Nonwhites (U.S.A.) under the issue of causality from infant mortality to fertility, the estimated lag profiles after the correction of serial correlation are listed in Table N - 1 & 2 of APPENDIX. The new F values are as follows:

TABLE V-8

M - F	Correction of Serial Correlation	
Country	(d.f.) Original F value	(d.f.) New F value
U.K.	(5,13) 6.50*** $r_1=0.45$	(5,12) 5.756***
Israel	(5,12) 3.36** $r_2=-0.52$	(5,10) 7.320***
Nonwhites (U.S.A.)	(5,32) 2.80** $r_2,4,6,9$	(5,24) 4.007***

Note: ** Significant at $\alpha = 5\%$

*** Significant at $\alpha = 1\%$

M - F is the issue of causality from infant mortality to fertility.

Secondly, with respect to the results of Canada, Nonwhites (U.S.A.), and Taiwan, the estimated lag profiles after the correction of serial correlation are reported in Table N - 3 of APPENDIX. The new F values are as follows:

TABLE V-9

F - M Correction of Serial Correlation			
Country	(d.f.)	Original F value	(d.f.) New F value
Canada	(5,16)	2.27*r10=0.41	(5, 6) 0.640 r4=-0.54
Nonwhites (U.S.A.)	(5,35)	2.21*r11=-0.34	(5,24) 1.502
Taiwan	(5, 9)	4.56**r1=-0.69 r2= 0.49	(5, 7) 9.095***

Note: * Significant at $\alpha = 10\%$

** Significant at $\alpha = 5\%$

*** Significant at $\alpha = 1\%$

F - M is the issue of causality from fertility to infant mortality.

As we note from Tables V-8 and V-9, about a half of the serially corrected countries retains their significance in their causality tests. This summary is listed in Table 6 - B of APPENDIX.

5-6. Results of ARIMA Structure

In Sims's paper (1972), he uses a filter, $(1 - 0.75B)^2$, to whiten his economic time series: B in the filter is the backshift operator. In his paper (1972), he states that "This filter approximately flattens the spectral density of most economic time series, and ..." ⁸ However, the time series in my analysis are not pure economic time series, but demographic time series. Hence, it would not be appropriate to take the filter for granted so as to whiten the demographic time series: fertility rates; infant mortality rates; and neonatal mortality rates. In this analysis, these demographic time series are whitened through the filters derived by the Box-Jenkins forecasting method (ARIMA model).

Different ARIMA models necessarily give various filters, all of which, however, might generate whitened time series to different degrees. Therefore, among these alternatives for an appropriate filter I aim to construct ARIMA models to meet the requirement of "diagnostic checks."

The diagnostic checks require that, in order to identify and estimate an ARIMA (p,d,q), ⁹ one should test other ARIMA models, which are at least one order higher ARIMA models in the autoregressive process and/or moving-average process than the ARIMA (p,d,q).

For example, to accept ARIMA (2,1,1) such as:

$$(1 + a_1 B^1 + a_2 B^2)(1 - B) X(t) = c + u(t) - b_1 u(t-1), \text{..5.6.1}$$

where $X(t)$ is an originally observed time series; $u(t)$ denotes serially uncorrelated residuals; and B is the backshift operator, one should test at least the following ARIMA models after agreed upon $d = 1$ (the first difference of the time series):

1) ARIMA (2,1,2)

$$(1 + a_1 B^1 + a_2 B^2)(1-B)X(t) = c + u(t) - b_1 u(t-1) - b_2 u(t-2) \text{..5.6.2}$$

2) ARIMA (3,1,1)

$$(1 + a_1 B^1 + a_2 B^2 + a_3 B^3)(1-B)X(t) = c + u(t) - b_1 u(t-1) \text{..5.6.3}$$

3) ARIMA (3,1,2)

$$(1 + a_1 B^1 + a_2 B^2 + a_3 B^3)(1-B)X(t) = c + u(t) - b_1 u(t-1) - b_2 u(t-2), \text{.... 5.6.4}$$

where a_i is the parameter of autoregressive process; b_i is the parameter of moving-average process; and c is a constant term.

If the parameters, a_3 and b_2 , are necessarily zero in the above ARIMA models, 5.6.2, 5.6.3, and 5.6.4, one would accept ARIMA (2,1,1), 5.6.1, as an appropriate forecasting model for the time series of $X(t)$ with the given conditions:

a_1 , a_2 , and b_1 are significantly different from zero in 5.6.1.

On the other hand, all the above ARIMA models might generate white noise series of residuals.

In the identification and estimation process, I note that a higher order of ARIMA model does not necessarily give the most whitened time series. When I can not identify an ARIMA model to satisfy the diagnostic checks for a given time series, I retain the series whitened to the greatest degree and containing the simplest ARIMA model. Due to the number of ARIMA models estimated in this essay, I can not discuss all of them, but shall submit one example of Denmark.

Concerning the data of Denmark, the fertility rate, FE, is identified and estimated as having ARIMA (1,1,0), and the infant mortality rate, MO, as having ARIMA (1,1,1) reported in table 0-1. The parameter of the moving-average process of MO, -0.506, is not significantly different from zero. But, this ARIMA (1,1,1) of MO is accepted because the exclusion of the moving-average process does make the parameter of the autoregressive process insignificant. That is, ARIMA (1,1,0) is insignificant.

In the process of identifying and estimating the ARIMA (1,1,0) of FE, the fertility rate, the following tests are necessary: ARIMA (1,1,0) of FE is expressed as follows:

$$(1 + 0.559B)(1 - B) F(t) = -0.036 + u(t) \quad \dots \quad 5.6.5$$

where $F(t)$ is the original time series of fertility rate; B in $(1-B)$ is the backshift operator; and $u(t)$ denotes a white noise series.

Test 1: The null hypothesis that there is no serial correlation in the residuals, $u(t)$, is tested and accepted at the 5% significance level.

The observed X^2 (read as Chi-square) is 13.5, which is significantly smaller than the critical $X^2 = 33.9$ with the degrees of freedom = 22.

Test 2: The forecasting model, ARIMA (1,1,0) is stationary.

If $\sum_{i=1}^p \phi_i = 1$, where ϕ_i is the parameters of autoregressive process, the first difference, $d = 1$, would be nonstationary.¹⁰

The test can be proceeded as follows:

The null hypothesis : $\sum_{i=1}^p \phi_i = 1$

The alternative hypothesis : $\sum_{i=1}^p \phi_i < 1$

$$\frac{\sum_{i=1}^p \phi_i - 1}{\text{SEE } \phi_i} = \frac{0.559 - 1}{0.137} = -3.218 \quad (\text{d.f.} = 36)$$

where $\text{SEE } \phi_i$ is the standard error of estimate, $\sum_{i=1}^p \phi_i$.

The $\text{SEE } \phi_i$ is not listed in Table 0 - 1, but can be obtained such that $\phi_i / \text{the t-ratio of } \phi_i = \text{SEE } \phi_i$, which is $0.559 / 4.055 = 0.137$. From the above result, the null hypothesis is strongly rejected in favor of $\sum_{i=1}^p \phi_i < 1$.

Test 3: There is no drift in the series (or nonzero mean in the series). The test is as follows:

The null hypothesis : $c = 0$, where c is a constant term.

The alternative hypothesis : $c \neq 0$

$$\frac{c - 0}{SEE_c} = \frac{-0.036 - 0}{0.367} = -0.098 \text{ with (d.f.= 36)}$$

where SEE_c is the standard error of the constant term.

Hence, the null hypothesis that there is no drift in the estimated series is accepted at the 5% significance level.

Most of the ARIMA models in tables 0-1 through 0-25 are obtained by satisfying at least Test 1. For the purpose of Sims's type of causality test, it is necessary to satisfy the null hypothesis of Test 1 that there is no serial correlation in the residuals of the estimated ARIMA models. The estimated X^2 tells the degree of the whitened time series, which is listed to the left of the critical X^2 . By following these above procedures, the socioeconomic time series, fertility rates, infant mortality rates, and neonatal mortality rates, are transformed to their whitened time series.

FOOTNOTES TO CHAPTER V

1. See section 5-6. Results of ARIMA structure.

2. The stochastic processes $\{X_t\}$ and $\{Y_t\}$ are jointly weakly stationary if

1) $E(X_t)$ and $E(Y_t)$ are constant, and

2) $E(X_t X_{t+m})$, $E(Y_t Y_{t+m})$, and $E(X_t Y_{t+m})$ depend

only on m , $m = \pm 1, \pm 2, \dots$

For jointly covariance stationary processes $\{X_t\}$ and $\{Y_t\}$, the covariances

$$\text{Cov}(X_t X_{t+j}) = \text{Cov}(X_{t+m} X_{t+m+j}) ,$$

$$\text{Cov}(Y_t Y_{t+j}) = \text{Cov}(Y_{t+m} Y_{t+m+j}) ,$$

and

$$\text{Cov}(X_t Y_{t+j}) = \text{Cov}(X_{t+m} Y_{t+m+j})$$

do not depend on t .

3. See Sims (1972), Mehra (1977), and Neftçi (1978).

4. See Table 6 - B of APPENDIX for these results and section 5-5. Correction for Serial Correlation in Chapter V.

5. Same as the above Footnote 4.

6. See Granger (1969): p.431. The general model with instantaneous causality test between two stationary time series, say X and Y , is defined as follows:

$$X(t) + b_0 Y(t) = \sum_{j=1}^m a(j)X(t-j) + \sum_{j=1}^m b(j)Y(t-j) + u(t)$$

$$Y(t) + c_0 X(t) = \sum_{j=1}^m c(j)X(t-j) + \sum_{j=1}^m d(j)Y(t-j) + v(t)$$

where $u(t)$ and $v(t)$ are residuals.

(continued)

(continued)

In the above expressions, if $b_0 \neq 0$ and $c_0 = 0$, then Y causes X, instantaneously. By the same token, X causes Y, instantaneously, if $b_0 = 0$ and $c_0 \neq 0$.

7. The reason why I sum the lead coefficients is that whenever there is feedback relationship between FF and MO , equations 5.3.1 and 5.3.2 would not be reduced to their unidirectional structural forms like equations 5.3.3 and 5.3.4.

8. From Sims (1972): p.545.

9. The general form of the ARIMA (p,d,q) is defined as follows:

$$(1-B)^d X_t = c + \phi_1 (1-B)^d X_{t-1} + \dots + \phi_p (1-B)^d X_{t-p} \\ - u_t - \theta_1 u_{t-1} - \dots - \theta_q u_{t-q}.$$

In the above ARIMA model, the process has the p th order of autoregressive part and q th order of moving-average part with the d th difference of time series X.

10. See Nelson (1973): p.107.

CHAPTER VI

CAUSALITY BETWEEN NEONATAL MORTALITY AND FERTILITY

Infant mortality is decomposed into two components: neonatal mortality and postneonatal mortality. Neonatal mortality refers to deaths of infants within the first 27 days of birth.¹ Postneonatal mortality refers to deaths of infants between the 28 and 364 days after birth. Neonatal mortality is usually caused by congenital anomalies, prematurity, and complications of delivery whereas postneonatal mortality is usually caused by infectious diseases and accidents.² According to Grossman and Jacobowitz (1980), their empirical analysis of neonatal mortality rate indicates that the substantial reduction in neonatal mortality rate between 1971 and 1977 was due primarily to the literal explosion of the abortion rate. Their results implicitly indicate an important role of social programs and policies to reduce infant mortality.

Historical proportion of neonatal mortality rate out of infant mortality rate gives some interesting figures in the United States and Japan, which are given in Table VI-1 of the next page. We note that the neonatal mortality became significantly important in infant mortality in Japan since

World War II. However, the proportion of neonatal mortality rate out of infant mortality rate was relatively stable, but important, in the postwar period in the United States.

TABLE VI-1

Historical Proportion of Neonatal Mortality Rate
out of Infant Mortality Rate

Country	1920	1930	1940	1950	1960	1970	1975
U.S.A.							
Total	48%	55%	61%	68%	72%	76%	72%
Whites	49%	57%	63%	72%	75%	78%	73%
Nonwhites	42%	47%	54%	62%	62%	69%	69%
Japan	42%	40%	43%	46%	55%	66%	68%

Note: See Tables 2-A and 2-B of APPENDIX for the source.

Since the proportion of neonatal mortality rate to infant mortality rate is so dominant in the both countries in the recent years that public programs and policies to affect fertility behavior in the households might reduce the infant mortality rates further.

In this chapter, the analysis is exclusively concerned with the detection of causality between neonatal mortality rate and fertility rate. I utilize Granger's and Sims's techniques

to test causality between these variables.³ The analysis is made on the annual data of the United States (Total, Whites and Nonwhites) and Japan. The periods covered are: 1920-1979 for Total (U.S.A.); 1920-1977 for Whites and Nonwhites (U.S.A.); and 1947-1976 for Japan.

6-1. Causality from Neonatal Mortality to Fertility

Concerning the issue of causality from neonatal mortality to fertility, denoted by N - F in Table 8 of APPENDIX, the empirical results of Granger's tests indicate that there are significant causalities for Total, Whites, and Nonwhites in the United States (hereafter, denoted as U.S.A.) whereas the result of Japan is insignificant.

The significant results in the causality from neonatal mortality to fertility in U.S.A. are worth-while to note compared with the insignificant results in the causality from the infant mortality to fertility rates in Granger's test in U.S.A.. The comparison of the F values between the issues of N - F and M - F is as follows:

TABLE VI-2

Comparison of F Values
Granger's Test

Country	N - F F value	M - F F value	Time Period
U.S.A.			
Total	2.31*	0.92	1920-'79
Whites	2.28*	0.82	1920-'77
Nonwhites	2.11*	1.03	1920-'77

Note: * Significant at $\alpha = 10\%$

N-F is causality from neonatal mortality to fertility.

M-F is causality from infant mortality to fertility.

From the above results in Table VI-2, we note that the F values under N - F are much larger than those under M - F in U.S.A.. Therefore, it indicates that the neonatal mortality rates would be one of the important factors to affect the fertility behaviors in U.S.A..

Concerning the sign of direction of causality for Total, Whites, and Nonwhites in U.S.A., ⁴ we have the following results:

TABLE VI-3

N - F Test on Sign of Direction of Causality Granger's Test			
U.S.A.	Sum of Coefficients	SD of Sum	t-statistic (d.f.)
Total	-1.596	2.301	-0.693 (43)
Whites	-1.801	2.469	-0.729 (41)
Nonwhites	-1.268	2.274	-0.557 (41)

Note: (d.f.) is degrees of freedom.

SD of Sum is standard deviation of the sum of coefficients. See Footnote 4 in Chapter IV.

The statistical test of sign of direction indicates that none of them is significant based on the null hypothesis that the sum of coefficients (long-run multiplier) is insignificantly different from zero. The alternative is significantly less than zero. This result of insignificantly different from zero in the sign is possible, although there exist causalities for Total, Whites, and Nonwhites in U.S.A.. The signs of positive

and negative will cancel out each other among different lag effects.

Now, concerning the issue of the same causality, N - F, but under Sims's test, the null hypothesis is set such that the lead coefficients on fertility rate in the two-sided distributed lag are insignificantly different from zero as a group. The empirical results of U.S.A. (Total, Whites, and Nonwhites) are listed in Tables 9-A, B, and C. In the results of the 3 leads in Table 9 - A of APPENDIX, only the result of Nonwhites (U.S.A.) is significant at $\alpha = 5\%$ under N - F of Equation V. However, the results of Total and Whites (U.S.A.) become significant at $\alpha = 5\%$ in the 5 leads' equations in Table 9 - B of APPENDIX.

In the case of Japan, the result of 3 leads is insignificant and the result of 5 leads becomes significant at $\alpha = 5\%$ in Table 10 - B of APPENDIX.

By comparing the F values of the results of the 3 leads with those of the 5 leads, the F values of the latter are much larger than those of the former for both U.S.A. and Japan. These results indicate that the lagged effects on fertility behavior of neonatal mortality are significantly influential within the first 5 years after neonatal death.

In terms of the sign of direction of causality from neonatal mortality to fertility under the 5 leads in Table 9 - B of APPENDIX, since there is no feedback for U.S.A. (Total, Whites, and Nonwhites), the sum of coefficients comes from the past 5 years coefficients in the structural form like equation 5.3.3 in section 5-3 of Chapter V. The results are as follows:

TABLE VI-4

N - F Test on Sign of Direction of Causality Sims's Test			
Country	Sum of Coefficients	SD of Sum	t-statistic (d.f.)
U.S.A.			
Total	-3.903	1.943	-2.008* (42)
Whites	-3.876	2.190	-1.769* (40)
Nonwhites	-1.807	0.886	-2.039* (40)
Japan	-0.034	0.125	-0.277 (7)

Note: * Significant with a one-tailed test at $\alpha = 5\%$.
SD of Sum is standard deviation of the sum of coefficients.
(d.f.) is degrees of freedom.

The results of the statistical test of the sign of direction in Table VI-4 indicate that the effect of neonatal mortality on fertility is significantly negative for Total, Whites, and Nonwhites in U.S.A.. However, those negative values are insignificantly different from negative one with a two-tailed test at $\alpha = 5\%$.

6-2. Causality from Fertility to Neonatal Mortality

First, with respect to the issue of causality from fertility to neonatal mortality, denoted by F - N in Table 8 of APPENDIX, under Granger's test, the empirical results indicate that only the result of Whites (U.S.A.) is significant in Equation II (the equation without the dummy variables). By including the dummy variables, the result of Japan becomes significant while all other results are insignificant in U.S.A.. The significant results of Whites (U.S.A.) and Japan are relatively weak in terms of their F values: they are significant at $\alpha = 10\%$.

Concerning the sign of direction of causality for Whites (U.S.A.) and Japan, the results are as follows:

TABLE VI-5

F - N		Test on Sign of Direction of Causality Granger's Test		
Country	Sum of Coefficients	SD of Sum	t-statistic (d.f.)	
U.S.A.				
Whites	-9.171	267.7	-0.034 (41)	
Japan	0.440	0.411	1.070 (18)	

Note: Sum of Coefficients is long-run multiplier defined as equation 4.4.4 in section 4-4 of Chapter IV.
SD of Sum is standard deviation of the long-run multiplier.
(d.f.) is degrees of freedom.

Second, with respect to the same issue of causality as above, but under Sims's test, the results of U.S.A. are reported in Tables 9 - A, B, and C of APPENDIX and those of Japan in Tables 10 - A and B of APPENDIX. As we note, there are no significant results for Total, Whites, and Nonwhites of U.S.A. under F - N in both the 3 leads and the 5 leads in the two-sided distributed lag. By increasing the length of leads to 8 leads for the case of U.S.A., Total and Whites (U.S.A.) become significant, but almost no change for Nonwhites (U.S.A.).

In the case of Japan, the causality from fertility to neonatal mortality is significant even on the 3 leads reported in Table 10 - A of APPENDIX. By increasing the length of lags to 5 leads reported in Table 10 - B, the F value become smaller than that of the 3 leads. Concerning the result of the 3 leads of Japan, the effect on neonatal mortality of fertility is about triple of that on infant mortality of fertility in terms of their F values.

In terms of the sign of direction of causality for Total, Whites of U.S.A. under the 8 leads' results and for Japan under the 3 leads' result, the results, shown in Table VI-6 of the next page, indicate that the sign of direction is significantly positive only for Japan. In fact, the positive

value, 8.101 in Table VI-6, is insignificantly different from positive two with a two-tailed test at $\alpha = 5\%$.

TABLE VI-6

F - N Test on Sign of Direction of Causality
Sims's Test

Country	Sum of Coefficients	SD of Sum	t-statistic (d.f.)
U.S.A.			
Total	0.037	0.047	0.787 (33)
Whites	0.055	0.039	1.410 (31)
Japan	8.101	2.579	3.141* (15)

Note: * Significant with a one-tailed test at $\alpha = 1\%$
SD of Sum is standard deviation of the sum of
coefficients.
(d.f.) is degrees of freedom.

6-3. Summary of Causality between Neonatal Mortality and Fertility

Neonatal mortality refers to deaths of infants within the first 27 days of birth. In the recent years, this neonatal mortality rate explains about 70% of infant mortality rate in the United States and Japan. Therefore, to investigate possible factors which affect the neonatal mortality rates would be one of the prime assignments in order to reduce the infant mortality rates in future.

In this chapter, causality test between the neonatal mortality rate and the fertility rate is performed by using Granger's and Sims's techniques. The analysis is made on the annual data of the United States (Total, Whites, and Nonwhites) and Japan. The periods covered are: 1920-1979 for Total (U.S.A.); 1920-1977 for Whites and Nonwhites (U.S.A.); and 1947-1976 for Japan.

The empirical results of causality from neonatal mortality to fertility show significantly stronger relation than those from infant mortality to fertility on the data of U.S.A. and Japan. The sign of direction of causality from neonatal mortality to fertility is significantly negative for Total, Whites, and Nonwhites in Sims's tests, but not in Granger's tests.

Concerning the issue of causality from fertility to neonatal mortality, the empirical results in Granger's test show weak relationship in terms of their F values:

Whites (U.S.A.) and Japan are significant at the significance level 10%. In Sims's test, the results of Total, Whites, and Nonwhites of U.S.A. are not significant on the 3 leads and the 5 leads in the two-sided distributed lag equations. By increasing the length of leads from the 5 to the 8 leads on the data of U.S.A., the results of Total and Whites become significant while the sign of direction of causality is not significantly positive. On the other hand, the causality from fertility to neonatal mortality in Japan is significantly positive even on the 3 leads in the two-sided distributed lag equation.

As a whole, there is a significant feedback relationship between neonatal mortality and fertility for Total and Whites of the United States and Japan. The relationship is much stronger than that between infant mortality and fertility.

FOOTNOTES TO CHAPTER VI

1. Neonatal mortality rate is defined as the number of deaths of infants within the first 27 days of birth per 1,000 live births in a give year.
2. See Grossman and Jacobowitz (1980).
3. See Chapter III for Granger's and Sims's techniques of causality test.
4. See section 4-4 in Chapter IV for the sign of direction of causality in Granger's test.

CHAPTER VII

SUMMARY AND CONCLUSION

7-1. Summary

The main issue of this dissertation is to study the sign and direction of causality between the infant mortality rate and the fertility rate, and also the neonatal mortality rate and the fertility rate, by using time series methodology. Two statistical techniques of the methodology are used to identify causality between the variables: Granger's test and Sims's test.

In Granger's test, causality is defined such that, within a set of information in a universe, variable X causes variable Y. This occurs when current value of time series of Y is more accurately predicted by using the information set which includes at least own-past series of Y and past series of X, than by using only the information set which excludes the past series of X. Only if the above condition is met, will X cause Y. Also, this condition, (X causes Y, and Y causes X), is defined as a feedback relationship between X and Y.

In Sims's test, X causes Y if lead (future) coefficients of Y are significantly different from zero as a group by regressing a suitably transformed series of X on lead, current, and past values of a suitably transformed series of Y in the two-sided distributed lag relationship. This definition of causality follows from the assumption that future would not affect past.

By utilizing Granger's and Sims's techniques, causality between infant mortality rate and fertility rate is tested in seventeen countries. These include ten countries in Western Europe (the period covered is 1936-1974), Israel (1940-'74), Canada (1936-'74), the United States [Total (1920-'79), Whites (1920-'77), and Nonwhites (1920-'77)], Japan (1947-'77), Taiwan (1947-'78), Australia (1936-'74), and New Zealand (1936-'74).

Under the issue of causality from infant mortality to fertility, the following countries are significant: Denmark, Finland, France, Italy, the Netherlands, Portugal, Sweden, Switzerland, the United Kingdom (England and Wales), Israel, Total (Whites and Nonwhites are combined in U.S.A.), Nonwhites (U.S.A.), and Australia. The sign of direction of

causality is positive for France, Italy, the Netherlands, Portugal, and Sweden, but negative for Nonwhites (U.S.A.).

Under the issue of causality from fertility to infant mortality, these countries are significant: Finland, France, the Netherlands, Norway, Switzerland, the United Kingdom, Israel, Canada, Nonwhites (U.S.A.), Japan, Taiwan, Australia, and New Zealand. The sign of direction is positive for the Netherlands and Nonwhites (U.S.A.), but negative for Finland, France, and Australia. Among the above countries, the feedback relationship between infant mortality and fertility exists for Finland, France, the Netherlands, Switzerland, the United Kingdom, Israel, Nonwhites (U.S.A.), and Australia.

In addition to the above causality test, causality between neonatal mortality rate and fertility rate is also examined on the data of the United States [Total (1920-'79), Whites (1920-'77), and Nonwhites (1920-'77)] and Japan (1947-'76).

Under the issue of causality from neonatal mortality to fertility, the relationship is robust and much stronger than the relationship between infant mortality and fertility. All of Total, Whites, Nonwhites in U.S.A. and Japan are significant. The sign of direction of causality is statistically negative for Total, Whites, and Nonwhites in U.S.A..

With respect to the issue of causality from fertility to neonatal mortality, Total and Whites in U.S.A. and Japan are significant on their results. The sign of direction of causality is statistically positive for the result of Japan. On the basis of the above results, it is noted that Total and Whites in U.S.A. and Japan have the feedback relationship between neonatal mortality and fertility. This result implies that neonatal mortality and fertility are jointly determined in the household behavior.

As a whole, Granger's and Sims's tests basically present the same sort of results in their causality tests. Most of the countries examined in this analysis have the causal relationship between infant mortality and fertility in either direction, or in both directions. The sign of direction of causality is positive from infant mortality to fertility for many countries in Western Europe. The long-run sign of direction from fertility to infant mortality is very weak, and statistically positive only for two countries among the significant 12 countries. This finding, the weak relationship, does not conform the long-run relationship predicted in the Malthusian theory of population.

7-2. Conclusion

One of the general findings from this study is that infant mortality and fertility are not mutually independent at all, but jointly determined in many countries. This is also true for the relationship between neonatal mortality and fertility. Hence, special care should be taken when one specifies a fertility-infant mortality regression model. It is strongly suggested that one should estimate a fertility equation in which infant mortality rate (and/or neonatal mortality rate) is one of endogenous variables in a simultaneous equations system to avoid simultaneity bias.

Given the above result, it requires additional studies of other relevant variables in detail, but which are beyond its scope in this analysis.

APPENDIX

FE fertility rate

U.S.A. data: the number of live births per 1,000 female population between the ages of 15-44 years in specified race group.

Taiwan data: the number of live births registered in the calendar year per 1,000 female population between the ages of 15-49 years at the estimated mid-point of the year.

Other data: the number of live births per 1,000 female population between the ages of 10-49 years in a specified age group.

MO infant mortality rate

All data : the number of deaths under 1 year(exclusive of fetal deaths) per 1,000 live births.

NE neonatal mortality rate

U.S.A. data: the number of deaths of infants under 28 days
Japan (exclusive of fetal deaths) per 1,000 live births.

SEE standard error of estimated coefficients of lagged variables

R^2 coefficient of determination

e^2 sum of squared residuals

C constant term

D1 dummy variable during World War II from 1939 to 1945

D2 dummy variable after World War II from 1946 to 1950;
in Japan and Taiwan's regressions from 1947 to 1956;
in U.S.A.'s regressions from 1920 to 1926 and from 1946 to 1955.

r_i the i -th order of autocorrelation in residuals in equations,
e.g., r_1 is the 1st order of autocorrelation in residuals listed
as PDQ of residuals. This is for the purpose of tests for
serial correlation in residuals.

SE estimated standard error of autocorrelation in residuals from
 r_1 to r_{12} : when r_i is greater than $2SE$, it is assumed that there
is (are) serial correlation(s) with given r_i in equations.

SOURCE OF DATA

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The Republic of China

OTHER DATA : Demographic Yearbook,
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Department of Economic and Social Affairs
United Nations N.Y.

Statistical Yearbook,
the 23rd issue(1972) - the 30th issue(1979)

Department of International Economic and Social Affairs
Statistical Office
United Nations N.Y.

CHARACTERISTICS OF DATA

Denmark: Faeroe Islands are excluded.

Finland: Prior to 1951, Finnish nationals in Finland are only.

Netherlands: Prior to 1949, villages of Elten and Tüddern are excluded. Rates include births occurring outside country if one or both parents are listed in a Netherlands population register.

Norway: Rates also include births to Norwegian residents temporarily in Sweden.

U.K. : Rates are computed on civilian population 1940 through 1945. England and Wales are in and data do not include Scotland.

Israel: Jewish population; Prior to 1946, rates are based on confinements resulting in live births. Prior to 1948, Jewish population of Palestine.

Canada: Prior to 1950, Yukon and Northwest Territories, and Newfoundland are excluded. Rates include Canadian residents temporarily in the United States and exclude those among U.S. residents temporarily in Canada.

Australia: Data are known to by year of registration rather than by year of occurrence. Prior to 1946, rates are based on confinements resulting in live births. Full-blooded aborigines are excluded.

New Zealand: European population excluding Maoris; Data are known to be by year of registration rather than by year of occurrence.

Note. see the text in detail, Demographic Yearbook.

TABLE 1 - A

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SUMMARY STATISTICS

Country	variable	mean	standard deviation	coefficient of variation	simple correlation	time period
<u>EUROPE</u>						
Denmark	FE	62.03	6.67	0.10		1936-'74
	MO	30.92	16.2	0.52	0.29	1936-'74
Finland	FE	64.46	12.8	0.19		1936-'74
	MO	36.60	22.0	0.60	0.45	1936-'74
France	FE	63.12	9.04	0.14		1936-'74
	MO	45.26	24.6	0.54	-0.47	1936-'74
Italy	FE	63.84	6.31	0.09		1936-'74
	MO	62.38	30.4	0.48	0.59	1936-'74
Netherlands	FE	72.37	9.40	0.12		1936-'74
	MO	25.47	13.8	0.54	0.26	
Norway	FE	62.98	7.19	0.11		1936-'74
	MO	24.47	10.1	0.41	-0.53	1936-'74
Portugal	FE	77.69	5.94	0.07		1936-'74
	MO	92.03	30.9	0.33	0.75	1936-'74
Sweden	FE	55.62	6.24	0.11		1936-'74
	MO	21.60	10.2	0.47	-0.04	1936-'74
Switzerland	FE	59.30	6.66	0.11		1936-'74
	MO	28.14	11.0	0.39	-0.21	1936-'74
U.K.	FE	58.95	6.67	0.11		1939-'74
	MO	29.09	12.7	0.43	-0.51	1939-'74
<u>MID EAST</u>						
Israel	FE	90.74	9.38	0.10		1940-'74
	MO	34.62	10.3	0.29	-0.38	1940-'74
<u>NORTH AMERICA</u>						
Canada	FE	79.74	16.1	0.20		1936-'74
	MO	36.87	16.1	0.43	0.11	1936-'74

Simple correlation is correlation between FE and MO.

TABLE 1 - B (continued)

SUMMARY STATISTICS

Country	variable	mean	standard deviation	coefficient of variation	simple correlation	time period
U.S.A.						
Total	FE	91.66	13.9	0.15		1920-'45
	MO	59.64	13.2	0.22	0.69	1920-'45
	NE	33.38	5.19	0.15	0.63*	1920-'45
	FE	97.65	19.9	0.20		1946-'79
	MO	23.70	5.64	0.23	0.85	1946-'79
	NE	17.01	3.92	0.23	0.86*	1946-'79
	FE	95.06	17.7	0.18		1920-'79
	MO	39.28	20.3	0.51	0.15	1920-'79
	NE	24.10	9.32	0.38	0.19*	1920-'79
	FE	89.10	13.8	0.15		1920-'45
	MO	55.78	13.1	0.23	0.72	1920-'45
	NE	32.08	5.26	0.16	0.66*	1920-'45
White	FE	95.38	18.8	0.19		1946-'77
	MO	21.79	4.97	0.22	0.81	1946-'77
	NE	16.17	3.48	0.21	0.84*	1946-'77
	FE	95.56	16.9	0.18		1920-'77
	MO	37.03	19.4	0.52	0.13	1920-'77
	NE	23.30	9.08	0.38	0.17*	1920-'77
	FE	112.3	14.5	0.12		1920-'45
	MO	91.41	19.5	0.21	0.69	1920-'45
	NE	43.90	6.21	0.14	0.60*	1920-'45
	FE	129.7	23.8	0.18		1946-'77
	MO	38.49	8.30	0.21	0.81	1946-'77
	NE	24.70	4.51	0.18	0.80*	1946-'77
Nonwhite	FE	121.9	21.8	0.17		1920-'77
	MO	62.21	30.1	0.48	-0.08	1920-'77
	NE	33.31	10.9	0.32	-0.05*	1920-'77

Note. Simple correlation with no asterisk is correlation between FE and MO. Simple correlation with asterisk is correlation between FE and NE.

TABLE 1 - C (cont'd)

SUMMARY STATISTICS

Country	variable	mean	standard deviation	coefficient of variation	simple correlation	time period
<u>ASIA</u>						
Japan	FE	63.94	17.3	0.27		1947-'77
	MO	30.61	19.3	0.63	0.80	1947-'77
	NE	16.68	7.89	0.47	0.69*	1947-'76
Taiwan	FE	153.0	37.7	0.24		1947-'78
	MO	29.36	14.3	0.48	0.70	1947-'78
<u>OCEANIA</u>						
Australia	FE	73.11	9.29	0.12		1936-'74
	MO	25.11	7.99	0.31	-0.58	1936-'74
New Zealand	FE	81.35	11.6	0.14		1936-'74
	MO	24.08	5.42	0.22	-0.38	1936-'74

Note. Simple correlation with no asterisk is correlation between FE and MO. Simple correlation with an asterisk is correlation between FE and NE.

TABLE 2 - A

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Fertility rate(FE), Infant Mortality rate(MO)
and Neonatal Mortality rate(NE)

Country	Denmark		Finland		France		Italy		Netherlands		Norway		Portugal	
Year	FE	MO	FE	MO	FE	MO	FE	MO	FE	MO	FE	MO	FE	MO
1936	56.4	67.3	59.8	65.9	52.2	67.0	73.5	100.4	65.1	38.9	45.5	42.0	91.3	139.7
1940	58.4	50.2	55.6	88.3	46.4	91.6	76.9	102.7	67.5	39.1	50.5	38.7	79.1	126.1
1945	78.3	48.3	79.4	63.2	54.4	112.	57.5	103.1	74.4	79.7	65.0	36.4	82.9	114.9
1950	65.3	30.7	80.4	43.5	73.3	52.0	63.5	63.8	78.3	25.2	67.0	28.2	78.4	94.1
1955	61.3	25.2	72.1	29.7	70.8	38.6	59.9	50.9	76.0	21.6	67.7	20.6	77.8	90.2
1960	59.0	21.5	62.6	21.0	68.4	27.4	60.2	43.9	74.0	17.9	63.8	18.9	79.8	77.5
1965	65.6	18.7	57.1	17.6	66.5	21.9	66.1	36.0	71.4	14.4	67.1	16.8	77.0	64.9
1970*	53.2	14.2	47.5	13.2	60.5	18.2	58.4	29.5	68.0	12.7	64.0	12.7	61.9	58.0
1974*	52.8	10.7	45.1	10.2	56.2	12.1	56.6	22.6	48.1	11.0	58.0	10.5	66.1	38.4

Country	Sweden		Switzerland		U.K.		Israel		Canada		Australia		New Zealand	
Year	FE	MO	FE	MO	FE	MO	FE	MO	FE	MO	FE	MO	FE	MO
1936	46.0	43.4	48.9	46.5	—	—	—	—	66.3	66.1	54.4	41.2	54.3	31.0
1940	49.5	39.2	47.9	46.2	46.7	57.4	71.9	59.1	70.5	56.4	57.5	38.4	69.7	30.2
1945	70.0	29.9	66.0	40.7	54.7	47.0	94.1	35.8	79.7	51.3	72.6	29.4	77.5	28.0
1950	59.0	21.0	62.6	31.2	55.5	29.9	105.	45.6	92.7	41.3	82.5	24.5	88.9	27.6
1955	53.2	17.4	59.4	26.5	54.2	24.9	94.2	37.3	99.0	31.3	81.9	22.0	91.8	24.5
1960	49.6	16.6	61.6	21.1	62.7	21.8	94.8	31.0	95.1	27.3	80.6	20.2	92.4	22.6
1965	59.3	13.3	67.8	17.8	68.9	19.0	90.6	27.4	74.7	23.6	70.3	18.5	83.6	19.5
1970*	53.5	10.8	56.9	15.1	61.3	18.1	91.4	22.9	58.7	18.8	72.4	17.9	78.8	16.7
1974*	52.3	9.2	46.2	12.5	50.1	15.9	97.3	23.5	50.7	15.0	64.1	14.3	67.3	16.3

Country	Japan			Taiwan	
Year	FE	MO	NE	FE	MO
1947	109.	76.7	31.4	162	77.4
1950	91.4	60.1	27.4	181	39.8
1955	61.9	39.8	22.3	197	36.9
1960	52.5	30.7	17.0	180	32.4
1965	56.2	18.5	11.7	152	23.7
1970	58.2	13.1	8.7	120	17.4
1975	55.5	10.0	6.8	94	13.9
1977	51.5	8.9	—	95	12.4

Sources: refer to SOURCE OF DATA.

* Data of these years are calculated by the author in order to be consistent with the definition of fertility rate prior to 1966, since Demographic Yearbooks from 1966 list fertility rate defined as the number of live births per 1,000 female population between the ages 15-49 years. Prior to 1966, female ages are defined as between 10 and 49 years old.

TABLE 2 - B

Fertility rate(FE), Infant Mortality rate (MO),
and Neonatal Mortality rate(NE)

U.S.A.: Total, White, Nonwhite.									
	Total			White			Nonwhite**		
	FE	MO	NE	FE	MO	NE	FE	MO	NE
1920	117.	85.8	41.5	115.	82.1	40.4	137.	131.	55.0
1925	106.	71.7	37.8	103.	68.3	36.8	134.	110.	49.5
1930	89.2	64.6	35.7	87.1	60.1	34.2	105.	99.9	47.4
1935	77.2	55.7	32.4	74.5	51.9	31.0	98.4	83.2	42.7
1940	79.9	47.0	28.8	77.1	43.2	27.2	102.	73.8	39.7
1945	85.9	38.3	24.3	83.4	35.6	23.3	106.	57.0	32.0
1950	106.	29.2	20.5	102.	26.8	19.4	137.	44.5	27.5
1955	118.	26.4	19.1	113.	23.6	17.7	155.	42.8	27.2
1960*	118.	26.0	18.7	113.	22.9	17.2	153.	43.2	26.9
1965	96.6	24.7	17.7	91.4	21.5	16.1	133.	40.3	25.4
1970	87.9	20.0	15.1	84.1	17.8	13.8	113.	30.9	21.4
1975	66.7	16.1	11.6	63.0	14.2	10.4	89.3	24.2	16.8
1977	67.8	14.1	9.9	64.0	12.3	8.7	89.9	21.7	14.7

Source: 1920-1970: Historical Statistics of the United States,
Colonial Times to 1970;
FE: Series B 5-10, p.49;
MO & NE: Series B 136-147, p.57.
Refer to SOURCE OF DATA.

1975-1977: Statistical Abstract of the United States,
and Monthly Vital Statistics Report.
Refer to SOURCE OF DATA.

*Denotes first year for which figures include Alaska and Hawaii.

** Nonwhite is listed as Negro and Other in the text.

TABLE 3

Summary of Causality between Infant Mortality and Fertility

M = Infant Mortality				F = Fertility					
Country	Causality from M to F			Causality from F to M		Feedback	Time Period		
<u>EUROPE</u>									
Denmark		G	S	.....		....	....	1936-'74	
Finland		G	S	.....	G	S(-)	 Yes	....	1936-'74
France		G(+)	S(+)	.....	G	S(-)	 Yes	....	1936-'74
Italy		G(+)		.....			....	....	1936-'74
Netherlands	..	G	S(+)	.....	G(+)	S	 Yes	....	1936-'74
Norway					G	S	....	....	1936-'74
Portugal		G(+)		.....			....	....	1936-'74
Sweden		G(+)		.....			....	....	1936-'74
Switzerland	..		S	.....	G		 Yes	....	1936-'74
U.K.		G	S	.....	G	S	 Yes	....	1939-'74
<u>MID EAST (ASIA)</u>									
Israel		G	S	.....	G	S	 Yes	....	1940-'74
<u>NORTH AMERICA</u>									
Canada					G		....	....	1936-'74
U.S.A.									
Total			S	.....			....	....	1920-'79
Whites									1920-'77
Nonwhites			S(-)	.....	G(+)		 Yes	....	1920-'77
<u>ASIA</u>									
Japan					G		....	....	1947-'77
Taiwan						S	....	....	1947-'78
<u>OCEANIA</u>									
Australia			S	.....	G	S(-)	 Yes	....	1936-'74
New Zealand	..				G	S	....	....	1936-'74

Note. G is significant result of Granger's test and S is significant result of Sims's test based on the significance level smaller than or equal to 10% with no serial correlation.

The plus and minus signs in parentheses are statistically significant sign of direction of causality with a one-tailed test at $\alpha = 5\%$.

The signs after G under "Causality from F to M" represent sign of long-run effect.

TABLE 4

Granger's Test of Causality
F-Statistics on Lagged Causal Variable

Country	Equation I			Equation I + Dummy			Time Period
	(d.f.)	M - F	F - M	(d.f.)	M - F	F - M	
<u>EUROPE</u>							
Denmark	(5,22)	3.10**	0.52	(5,20)	2.73**	0.48	1936-'74
Finland	(5,22)	1.67	2.23*	(5,20)	2.79**	2.16*	1936-'74
France	(5,22)	10.80***	6.39***	(5,20)	10.06***	2.66*	1936-'74
Italy	(5,22)	0.96	1.17	(5,20)	4.54***	1.98	1936-'74
Netherlands	(5,22)	8.93***	6.19***	(5,20)	7.36***	2.77**	1936-'74
Norway	(5,22)	1.66	2.07	(5,20)	0.92	2.38*	1936-'74
Portugal	(5,22)	2.36*	0.43	(5,20)	2.00	0.42	1936-'74
Sweden	(5,22)	0.64	0.49	(5,20)	4.12***	0.75	1936-'74
Switzerland	(5,22)	0.57	2.24*	(5,20)	0.69	1.22	1936-'74
U.K.	(5,19)	9.45***	2.81**	(5,17)	11.13***	2.49*	1939-'74
<u>MID EAST (ASIA)</u>							
Israel	(3,24)	2.47*	2.20	(3,23)	1.84	3.16**	1940-'74
<u>NORTH AMERICA</u>							
Canada	(5,22)	1.09	2.27*	(5,20)	0.91	2.09	1936-'74
U.S.A.							
Total	(5,43)	0.92	1.50	(5,41)	0.59	1.83	1920-'79
Whites	(5,41)	0.82	1.32	(5,39)	0.48	1.66	1920-'77
Nonwhites	(5,41)	1.03	1.43	(5,39)	0.61	2.16*	1920-'77
<u>ASIA</u>							
Japan	(3,20)	0.29	1.66	(3,19)	0.19	2.398*	1947-'77
Taiwan	(3,21)	0.78	0.13	(3,20)	0.44	0.47	1947-'78
<u>OCEANIA</u>							
Australia	(5,22)	1.44	2.45*	(5,20)	1.56	2.64*	1936-'74
New Zealand	(5,22)	0.89	5.60***	(5,20)	1.12	5.49***	1936-'74

Note. M - F represents the issue of causality from infant mortality to fertility and F - M represents the issue of causality from fertility to infant mortality.

* Significant at $\alpha = 10\%$

** Significant at $\alpha = 5\%$

*** Significant at $\alpha = 1\%$

(d.f.) is degrees of freedom.

TABLE 5

Sims's Test of Causality
F-Statistics on 3 Leads in Two-Sided Distributed Lags

Country	Equation III (d.f.)	M - F	F - M	Equation III + Dummy (d.f.)	M - F	F - M	Time Period
<u>EUROPE</u>							
Denmark	(3,24)	3.34**	1.17	(3,22)	3.80**	1.62 r4	1936-'74
Finland	(3,24)	13.76***	2.78*r1	(3,22)	9.22***r2	5.73***	1936-'74
France	(3,24)	5.59***	0.27	(3,22)	0.95 r5	2.65*	1936-'74
Italy	(3,24)	0.56 r2,9	0.93	(3,22)	2.06	0.73	1936-'74
Netherlands	(3,24)	23.65***	9.23***r9	(3,22)	10.56***	6.73***	1936-'74
Norway	(3,24)	0.31	1.68	(3,22)	0.50	1.64	1936-'74
Portugal	(3,24)	0.72	0.19	(3,22)	0.61	0.46	1936-'74
Sweden	(3,24)	0.71	0.65	(3,22)	0.42 r9	0.21	1936-'74
Switzerland	(3,24)	3.96**	1.02	(3,22)	4.27**	0.68	1936-'74
U.K.	(3,21)	4.94***	14.09***r4	(3,19)	5.16***r4	9.20***	1939-'74
		r1,2,3,4				r4	
<u>MID EAST (ASIA)</u>							
Israel	(3,20)	4.44***	2.05	(3,18)	2.80*	2.36	1940-'74
<u>NORTH AMERICA</u>							
Canada	(3,24)	0.94	3.05**r10	(3,22)	0.91	2.39*r10	1936-'74
U.S.A.							
Total	(3,45)	2.11	1.11 r5	(3,43)	1.80	0.56 r17	1920-'79
Whites	(3,43)	2.10	1.00	(3,41)	1.84	0.52 r17	1920-'77
Nonwhites	(3,43)	1.10 r4	1.47	(3,41)	0.82	1.53	1920-'77
<u>ASIA</u>							
Japan	(3,16)	0.23	2.16	(3,15)	0.45	2.19	1947-'77
Taiwan	(3,17)	1.34 r8	0.48	(3,16)	1.39	0.46	1947-'78
<u>OCEANIA</u>							
Australia	(3,24)	1.67	2.76*	(3,22)	2.10	1.07	1936-'74
New Zealand	(3,24)	1.56 r5	3.02**	(3,22)	1.57 r2,5	2.77*r2	1936-'74

Note. M - F represents the issue of causality from infant mortality to fertility and F - M represents the issue of causality from fertility to infant mortality.

* Significant at $\alpha = 10\%$

** Significant at $\alpha = 5\%$

*** Significant at $\alpha = 1\%$

(d.f.) is degrees of freedom.

TABLE 6 - A

Sims's Test of Causality
F-Statistics on 5 Leads in Two-Sided Distributed Lags

Country	Equation IV			Equation IV + Dummy		
	(d.f.)	M - F	F - M	(d.f.)	M - F	F - M
<u>EUROPE</u>						
Denmark	(5,16)	1.41 r5	1.52	(5,14)	1.46	0.90
Finland	(5,16)	2.90**	35.33***	(5,14)	3.35**	16.37***
France	(5,16)	15.75***	8.70***	(5,14)	7.13***r1,8	4.40***r1
Italy	(5,16)	1.18	0.83	(5,14)	1.01 r1	1.51
Netherlands	(5,16)	60.74***	10.71***	(5,14)	28.55***	5.30***
Norway	(5,16)	2.08 r1	3.69**	(5,14)	0.69	1.62 r2,7,9
Portugal	(5,16)	1.23 r3	1.99	(5,14)	1.36 r6	1.98
Sweden	(5,16)	0.70	0.51	(5,14)	0.49 r9	0.77
Switzerland	(5,16)	1.89	0.48	(5,14)	1.86	0.74
U.K.	(5,13)	6.50***r1	2.51*	(5,11)	5.64***	2.08
<u>MID EAST (ASIA)</u>						
Israel	(5,12)	3.36**r2	2.69*	(5,10)	1.83 r2	5.98***r7
<u>NORTH AMERICA</u>						
Canada	(5,16)	1.87 r2	2.27*r10	(5,14)	1.54 r2	2.30 r10
U.S.A.						
Total	(5,37)	1.67	0.66	(5,35)	1.40	0.25 r17
Whites	(5,35)	1.89	0.57	(5,33)	1.60	0.28 r2,17
Nonwhites	(5,35)	2.80** r2,4,6,9	2.21*r11	(5,33)	1.75 r2,4,6,9,11	2.19*r11
<u>ASIA</u>						
Japan	(5, 8)	0.50	1.95 r1	(5, 7)	0.34	2.23 r1,3
Taiwan	(5, 9)	0.46	4.56**r1,2	(5, 8)	0.32	4.14**r1,2
<u>OCEANIA</u>						
Australia	(5,16)	2.96*	1.36 r5	(5,14)	2.29 r1	1.07 r5
New Zealand	(5,16)	0.77 r5	5.93***	(5,14)	0.70 r5	4.61**

Note. M - F represents the issue of causality from infant mortality to fertility and F - M represents the issue of causality from fertility to infant mortality.

* Significant at $\alpha = 10\%$

** Significant at $\alpha = 5\%$

*** Significant at $\alpha = 1\%$

(d.f.) is degrees of freedom.

The examined time periods of 5 leads are the same as those of 3 leads.

TABLE 6 - B

Sims's Test of Causality
F-Statistics on 5 Leads after Correction of Serial Correlation

Country	(d.f.)	M - F	(d.f.)	F - M
U.K.	(5,12)	5.75***		-----
Israel	(5,10)	7.32***		-----
Canada		-----	(5, 6)	0.64 r4
Nonwhites (U.S.A.)	(5,24)	4.00***	(5,24)	1.50
Taiwan		-----	(5, 7)	9.09***

Note. M - F represents the issue of causality from infant mortality to fertility and F - M represents the issue of causality from fertility to infant mortality.

*** Significant at $\alpha = 1\%$
(d.f.) is degrees of freedom.

TABLE 7

Summary of Causality between Neonatal Mortality and Fertility

N = Neonatal Mortality F = Fertility										
Country	Causality from N to F			Causality from F to N			Feedback	Time Period		
<u>NORTH AMERICA</u>										
U.S.A.										
Total		G	S(-)	...	S	.....	Yes	...	1920-'79	
Whites		G	S(-)	...	G	S		Yes	...	1920-'77
Nonwhites		G	S(-)	...		.....		...	1920-'77	
<u>ASIA</u>										
Japan			S	...	G	S(+)	..	Yes	...	1947-'76

Note: G is significant result of Granger's test and S is significant result of Sims's test based on the significance level smaller than or equal to 10% with no serial correlation. The plus and minus signs in parentheses are statistically significant signs of direction of causality with a one-tailed test at $\alpha = 5\%$.

TABLE 8

Granger's Test of Causality
F-Statistics on Lagged Causal Variable

Country	Equation II			Equation II + Dummy			Time Period
	(d.f.)	N - F	F - N	(d.f.)	N - F	F - N	
<u>NORTH AMERICA</u>							
U.S.A.							
Total	(5,43)	2.31*	1.58	(5,41)	1.77	0.98	1920-'79
Whites	(5,41)	2.28*	2.23*	(5,39)	1.72	1.63	1920-'77
Nonwhites	(5,41)	2.11*	0.87	(5,39)	1.45	0.67	1920-'77
<u>ASIA</u>							
Japan	(3,19)	0.99	0.98	(3,18)	0.99	2.50*	1947-'76

Note. N - F represents the issue of causality from neonatal mortality to fertility and F - N represents the issue of causality from fertility to neonatal mortality.

* Significant at $\alpha = 10\%$
(d.f.) is degrees of freedom.

TABLE 9 - A

Sims's Test of Causality

F-Statistics on 3 Leads in Two-Sided Distributed Lags							
Country	Equation V			Equation V + Dummy			Time Period
	(d.f.)	N - F	F - N	(d.f.)	N - F	F - N	
U.S.A.							
Total	(3,45)	0.70 r9	1.33 r16	(3,43)	0.89	1.22	1920-'79
Whites	(3,43)	1.07	1.62 r4,16	(3,41)	1.22	1.14	1920-'77
Nonwhites	(3,43)	2.85**	0.19	(3,41)	2.48*	0.31	1920-'77

TABLE 9 - B

F-Statistics on 5 Leads in Two-Sided Distributed Lags							
Country	Equation VI			Equation VI + Dummy			Time Period
	(d.f.)	N - F	F - N	(d.f.)	N - F	F - N	
U.S.A							
Total	(5,37)	2.64**	0.86	(5,35)	2.48*	0.84	1920-'79
Whites	(5,35)	2.81**	1.03	(5,33)	2.81**	0.83r2	1920-'77
Nonwhites	(5,35)	3.64**	0.16	(5,33)	2.65**	0.11	1920-'77

TABLE 9 - C

F-Statistics on 8 Leads in Two-Sided Distributed Lags				
Equation VII				
Country	(d.f.)	N - F	F - N	
U.S.A.				
Total	(8,25)	1.55	2.31*	* Significant at $\alpha = 10\%$
Whites	(8,23)	1.07	3.74***	** Significant at $\alpha = 5\%$
Nonwhites	(8,23)	4.08***	0.39	*** Significant at $\alpha = 1\%$
(d.f.) is degrees of freedom.				

Note. N - F represents the issue of causality from neonatal mortality to fertility and F - N represents the issue of causality from fertility to neonatal mortality.

TABLE 10 - A

Sims's Test of Causality

F-Statistics on 3 Leads in Two-Sided Distributed Lags							
Country	Equation V			Equation V + Dummy			Time Period
	(d.f.)	N - F	F - N	(d.f.)	N - F	F - N	
Japan	(3,15)	0.89 r9	6.94***	(3,14)	0.66 r9	4.09**	1947-'76

TABLE 10 - B

F-Statistics on 5 Leads in Two-Sided Distributed Lags							
Country	Equation VI			Equation VI + Dummy			Time Period
	(d.f.)	N - F	F - N	(d.f.)	N - F	F - N	
Japan	(5, 7)	6.36**	4.10**r4	(5, 6)	5.81**	3.73* r2	1947-'76

Note. N - F represents the issue of causality from neonatal mortality to fertility and F - N represents the issue of causality from fertility to neonatal mortality.

* Significant at $\alpha = 10\%$

** Significant at $\alpha = 5\%$

*** Significant at $\alpha = 1\%$

(d.f.) is degrees of freedom.

ESTIMATED LAG PROFILES

Granger's Test

M - F		Table
Equation I		A-1 through A-6
Equation I + Dummy	.....	B-1 through B-6
F - M		
Equation I	.....	C-1 through C-6
Equation I + Dummy	.....	D-1 through D-6
N - F		
Equation II	.....	E-1 and E-2
Equation II + Dummy	.....	E-3 and E-4
F - N		
Equation II	.....	F-1 and F-2
Equation II + Dummy	.....	F-3 and F-4

Sims's Test

M - F (3 leads)		
Equation III	.....	G-1 through G-7
Equation III + Dummy	.....	G-8 through G-15
F - M (3 leads)		
Equation III	.....	H-1 through H-7
Equation III + Dummy	.....	H-8 through H-15
M - F (5 leads)		
Equation IV	.....	I-1 through I-8
Equation IV + Dummy	.....	I-9 through I-16
F - M (5 leads)		
Equation IV	.....	J-1 through J-8
Equation IV + Dummy	.....	J-9 through J-16
N - F (3 leads; and 5 leads)		
Equation V and Equation V + Dummy	...	K-1 through K-6
Equation VI and Equation VI + Dummy	..	K-7 through K-12
F - N (3 leads; and 5 leads)		
Equation V and Equation V + Dummy	...	L-1 through L-6
Equation VI and Equation VI + Dummy	..	L-7 through L-12

TABLE A - 1

Granger's Test

Estimated Lag Profiles

FE = f(FE: 5 past, MO: 5 past) & FE = g(FE: 5 past)												
		FE(Lag)					MO(Lag)					
Country	C	-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	
<u>EUROPE</u>												
Denmark	A	0.00	0.81	-0.34	0.19	-0.34	0.23	0.31	-0.19	0.06	-0.13	0.05
	B	-0.00	0.57	-0.00	-0.02	-0.29	0.13					
Finland	A	-0.02	-0.08	0.45	0.20	-0.24	-0.12	0.20	-0.17	-0.25	-0.09	0.05
	B	-0.01	-0.22	0.44	0.06	-0.27	-0.16					
France	A	0.54	0.01	-0.07	0.23	0.20	-0.00	0.35	0.29	0.25	0.17	0.00
	B	0.00	0.25	0.01	0.05	0.21	-0.39					
Italy	A	0.00	0.25	-0.29	0.00	-0.26	-0.05	0.26	-0.30	-0.04	0.02	0.27
	B	-0.01	0.03	-0.08	-0.16	-0.06	-0.37					
Netherlands	A	0.00	0.46	-0.18	0.82	0.05	-0.00	0.38	-0.02	0.19	-0.19	-0.11
	B	-0.00	0.27	0.07	0.09	-0.02	-0.11					
Norway	A	0.02	0.16	0.26	-0.02	0.12	-0.25	0.16	0.33	0.17	-0.10	0.10
	B	0.00	0.11	0.24	0.12	0.25	-0.35					
Portugal	A	0.02	-0.57	-0.46	-0.05	-0.10	0.17	0.03	0.12	0.43	0.29	0.20
	B	-0.00	-0.40	-0.28	-0.13	0.04	0.00					

TABLE A - 2 (cont'd)
Estimated Lag Profiles

Country	C	FE(Lag)						MO(Lag)				
		-1	-2	-3	-4	-5		-1	-2	-3	-4	-5
Sweden	A	0.02	0.71	-0.24	0.24	-0.08	-0.11	-0.12	0.26	0.20	0.21	0.06
	B	-0.00	0.78	-0.32	0.15	-0.10	-0.03					
Switzerland	A	-0.00	0.71	0.16	-0.17	0.09	-0.07	0.12	-0.01	-0.04	-0.09	-0.01
	B	-0.00	0.66	0.16	-0.18	0.18	-0.14					
U.K.	A	-0.02	-0.06	-0.03	0.57	0.27	0.03	0.98	0.51	-0.40	-0.64	-0.54
	B	-0.00	0.02	-0.05	0.14	0.22	-0.30					
<u>MID EAST(ASIA)</u>												
Israel	A	0.01	-0.04	0.29	-0.14			0.29	0.11	-0.06		
	B	0.00	-0.10	0.00	-0.17							
<u>NORTH AMERICA</u>												
Canada	A	-0.01	0.50	-0.07	0.07	-0.01	0.26	0.01	0.11	0.02	-0.32	0.06
	B	-0.00	0.49	-0.09	0.07	0.13	0.16					
U.S.A. Total	A'	-0.02	0.47	0.09	-0.24			0.05	-0.14	-0.42		
	B'	-0.00	0.41	-0.07	0.11							
	A''	-0.01	0.62	-0.09	-0.02			0.01	0.01	-0.24		
	B''	-0.00	0.62	-0.09	-0.01							

TABLE A - 3 (cont'd)
Estimated Lag Profiles

Country	C	FE(Lag)					MO(Lag)					
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	
U.S.A.												
Total	A	-0.02	0.43	-0.28	0.08	0.14	0.14	0.02	0.01	-0.29	-0.11	-0.24
	B	-0.00	0.43	-0.27	0.15	0.17	0.13					
White	A'	-0.02	0.44	0.02	-0.14			-0.00	-0.10	-0.37		
	B'	-0.00	0.42	-0.10	0.10							
	A''	-0.01	0.66	-0.17	0.00			-0.13	-0.11	-0.09		
	B''	-0.00	0.69	-0.20	-0.03							
	A	-0.02	0.43	-0.32	0.09	0.16	0.09	-0.00	-0.00	-0.30	-0.13	-0.28
	B	-0.00	0.45	-0.31	0.15	0.18	0.11					
Nonwhite	A'	-0.01	0.33	0.31	-0.20			0.16	-0.10	-0.24		
	B'	-0.00	0.29	0.03	0.08							
	A''	-0.00	0.79	-0.08	0.00			0.08	0.07	-0.12		
	B''	-0.00	0.75	-0.06	0.03							
	A	-0.01	0.52	-0.03	-0.01	0.05	0.20	0.00	-0.05	-0.16	-0.04	-0.14
	B	-0.00	0.54	-0.00	0.01	-0.00	0.18					

TABLE A - 4 (cont'd)

Estimated Lag Profiles

Country	C	FE(Lag)					MO(Lag)					
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	
<u>ASIA</u>												
Japan	A	0.00	-0.40	0.25	0.37			-0.12	0.14	0.36		
	B	-0.01	-0.31	0.16	0.23							
Taiwan	A	-0.03	-0.21	0.24	0.09			0.02	-0.24	-0.04		
	B	-0.01	-0.18	0.23	0.18							
<u>OCEANIA</u>												
Australia	A	-0.00	0.41	0.05	0.25	-0.10	-0.18	-0.13	-0.09	-0.25	0.33	0.00
	B	-0.00	0.41	0.01	0.25	-0.09	-0.05					
New Zealand	A	-0.00	0.46	-0.12	-0.17	0.26	0.08	-0.04	0.03	0.21	0.00	-0.07
	B	-0.00	0.45	-0.17	-0.18	0.12	0.16					

TABLE A - 5

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Statistics
(Granger's Test)

Country	Equation	SEE		R ²	e ²	range
		Smallest	Largest			
<u>EUROPE</u>						
Denmark	A	0.122	0.303	0.619	0.025	1936-'74
	B	0.192	0.236	0.350	0.043	1936-'74
Finland	A	0.141	0.200	0.564	0.118	1936-'74
	B	0.151	0.176	0.398	0.163	1936-'74
France	A	0.057	0.129	0.774	0.022	1936-'74
	B	0.172	0.177	0.221	0.076	1936-'74
Italy	A	0.172	0.240	0.350	0.057	1936-'74
	B	0.161	0.166	0.208	0.070	1936-'74
Netherlands	A	0.079	0.379	0.676	0.053	1936-'74
	B	0.192	0.224	0.020	0.161	1936-'74
Norway	A	0.152	0.213	0.466	0.036	1936-'74
	B	0.175	0.185	0.263	0.050	1936-'74
Portugal	A	0.095	0.207	0.462	0.037	1936-'74
	B	0.193	0.228	0.172	0.057	1936-'74
Sweden	A	0.142	0.283	0.509	0.034	1936-'74
	B	0.186	0.234	0.437	0.039	1936-'74
Switzerland	A	0.102	0.223	0.756	0.009	1936-'74
	B	0.126	0.155	0.725	0.010	1936-'74
U.K.	A	0.123	0.317	0.739	0.024	1939-'74
	B	0.180	0.192	0.091	0.083	1939-'74
<u>MID EAST(ASIA)</u>						
Israel	A	0.110	0.180	0.280	0.094	1940-'74
	B	0.147	0.156	0.058	0.123	1940-'74
<u>NORTH AMERICA</u>						
Canada	A	0.169	0.278	0.521	0.033	1936-'74
	B	0.186	0.213	0.402	0.042	1936-'74
U.S.A.						
Total	A'	0.239	0.304	0.333	0.023	1920-'45
	B'	0.229	0.239	0.173	0.029	1920-'45
	A''	0.184	0.338	0.344	0.024	1946-'79
	B''	0.149	0.201	0.322	0.025	1946-'79
	A	0.154	0.188	0.366	0.076	1920-'79
	B	0.143	0.161	0.299	0.085	1920-'79

TABLE A - 6 (cont'd)

Statistics
(Granger's Test)

Country	Equation	SEE		R ²	e ²	range
		Smallest	Largest			
<u>U.S.A.</u>						
White	A'	0.243	0.285	0.296	0.027	1920-'45
	B'	0.231	0.245	0.174	0.032	1920-'45
	A''	0.185	0.399	0.371	0.024	1946-'77
	B''	0.145	0.201	0.353	0.025	1946-'77
	A	0.157	0.212	0.371	0.084	1920-'77
	B	0.147	0.163	0.308	0.093	1920-'77
Nonwhite	A'	0.151	0.262	0.339	0.018	1920-'45
	B'	0.216	0.233	0.113	0.024	1920-'45
	A''	0.141	0.318	0.558	0.013	1946-'77
	B''	0.185	0.272	0.534	0.013	1946-'77
	A	0.091	0.171	0.459	0.042	1920-'77
	B	0.135	0.164	0.390	0.047	1920-'77
<u>ASIA</u>						
Japan	A	0.289	0.577	0.212	0.201	1947-'77
	B	0.195	0.203	0.177	0.210	1947-'77
Taiwan	A	0.156	0.233	0.205	0.070	1947-'78
	B	0.192	0.217	0.116	0.078	1947-'78
<u>OCEANIA</u>						
Australia	A	0.169	0.254	0.425	0.027	1936-'74
	B	0.185	0.237	0.236	0.036	1936-'74
New Zealand	A	0.116	0.229	0.429	0.041	1936-'74
	B	0.184	0.205	0.313	0.049	1936-'74

TABLE B - 1

Granger's Test

Estimated Lag Profiles

FE = f(FE: 5 past, MO: 5 past, D1, D2) & FE = g(FE: 5 past, D1, D2)														
Country	C	FE(Lag)					MO(Lag)					D1	D2	
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5			
<u>EUROPE</u>														
Denmark	A	0.01	0.45	-0.38	0.13	-0.51	0.09	0.34	0.05	0.22	-0.04	0.14	0.07*	0.00
	B	-0.01	0.32	-0.08	-0.08	-0.20	0.01						0.06*	-0.00
Finland	A	-0.10	-0.46	0.08	0.02	-0.33	-0.37	0.18	-0.16	-0.37	-0.25	-0.18	0.14*	0.14
	B	-0.06	-0.49	0.07	-0.25	-0.55	-0.35						0.10*	0.15
France	A	-0.04	-0.15	-0.23	-0.29	-0.65	-0.34	0.10	0.05	-0.04	-0.21	-0.26	0.09*	0.25*
	B	-0.02	-0.26	-0.42	-0.44	-0.53	-0.22						0.05*	0.23*
Italy	A	0.09	-0.21	-0.21	-0.00	-0.30	0.06	0.46	0.46	0.47	0.42	0.43	-0.20*	0.07*
	B	-0.01	-0.17	-0.19	-0.25	-0.18	-0.30						-0.06*	0.02
Netherlands	A	-0.00	0.36	-0.26	0.35	-0.22	-0.06	0.38	0.01	0.15	-0.13	-0.08	0.01	0.07
	B	-0.04	-0.11	-0.20	-0.40	-0.58	-0.31						0.09	0.13
Norway	A	-0.00	-0.16	0.14	0.02	0.30	-0.17	0.00	0.15	0.04	-0.24	-0.02	0.08*	-0.01
	B	-0.00	-0.23	-0.01	0.12	0.53	-0.25						0.09*	-0.02
Portugal	A	0.19	-0.63	-0.53	-0.10	-0.17	0.12	0.02	0.12	0.45	0.33	0.22	0.00	0.02
	B	-0.00	-0.41	-0.24	-0.04	0.14	0.11						0.03	-0.00

* Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE B - 2 (cont'd)

Estimated Lag Profiles

Country	C	FE(Lag)					MO(Lag)					D1	D2	
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5			
Sweden	A	0.04	0.15	-0.02	-0.00	0.00	-0.31	0.09	0.31	0.53	0.47	0.19	0.13*	0.01
	B	-0.00	0.46	-0.28	0.01	0.01	-0.06						0.06*	-0.01
Switzerland	A	-0.01	0.73	0.21	-0.15	0.09	-0.19	0.11	-0.03	-0.09	-0.13	-0.05	-0.00	0.01
	B	-0.00	0.67	0.16	-0.18	0.18	-0.15						-0.00	0.00
U.K.	A	-0.03	-0.01	0.13	0.73	0.45	0.03	0.58	0.40	-0.50	-0.85	-0.45	-0.09	-0.07*
	B	-0.00	0.14	0.05	0.41	0.26	-0.06						-0.16*	-0.03
<u>MID EAST(ASIA)</u>														
Israel	A	0.01	-0.05	0.29	-0.14			0.28	0.11	-0.05				0.00
	B	-0.00	-0.10	0.04	-0.21									0.03
<u>NORTH AMERICA</u>														
Canada	A	-0.01	0.43	-0.08	0.15	-0.59	0.27	0.03	0.10	0.01	-0.33	0.03	0.01	0.02
	B	-0.01	0.41	-0.12	-0.00	0.07	0.18						0.02	0.02
U.S.A. Total	A'	-0.03	0.33	-0.08	-0.37			0.15	-0.02	-0.31			0.03	-0.00
	B'	-0.02	0.24	-0.32	-0.10								0.04	-0.00

* Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE B - 3 (cont'd)

Estimated Lag Profiles

Country	C	FE(Lag)					MO(Lag)					D1	D2	
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5			
U.S.A.														
Total	A''	-0.01	0.51	-0.09	-0.13		0.11	0.00	-0.25				0.02	
	B''	-0.01	0.49	-0.07	-0.09								0.02	
	A	-0.02	0.36	-0.32	-0.02	0.11	0.04	0.07	0.08	-0.23	-0.04	-0.19	0.02	0.03
	B	-0.01	0.33	-0.33	0.02	0.12	0.03						0.03	0.03
White	A'	-0.03	0.28	-0.21	-0.34		0.15	0.05	-0.22				0.05	-0.00
	B'	-0.03	0.24	-0.36	-0.14								0.05	-0.00
	A''	-0.02	0.55	-0.18	-0.11		0.05	-0.04	-0.10					0.02
	B''	-0.01	0.56	-0.17	-0.10									0.02
	A	-0.02	0.35	-0.37	-0.03	0.10	-0.00	0.08	0.15	-0.16	-0.03	-0.22	0.04	0.04
	B	-0.02	0.33	-0.40	0.01	0.12	0.00						0.03	0.04*
Nonwhite	A'	-0.01	0.24	0.21	-0.22		0.18	-0.05	-0.20				0.01	0.00
	B'	-0.02	0.17	-0.11	-0.01								0.02	0.01
	A''	-0.01	0.65	-0.07	-0.11		0.12	0.10	-0.14					0.02
	B''	-0.01	0.62	-0.04	-0.04									0.02
	A	-0.01	0.43	-0.08	-0.09	0.03	0.09	0.05	-0.01	-0.13	0.00	-0.08	0.01	0.03
	B	-0.01	0.41	-0.09	-0.04	-0.01	0.07						0.01	0.03*

* Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE B - 4 (cont'd)

Estimated Lag Profiles

Country	C	FE(Lag)					MO(Lag)					D1	D2	
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5			
<u>ASIA</u>														
Japan	A	-0.02	-0.71	-0.06	0.09		-0.35	-0.03	0.14				-0.12	
	B	-0.01	-0.57	-0.16	0.02								-0.12	
Taiwan	A	-0.04	-0.28	0.13	-0.03		-0.00	-0.20	0.01				0.04	
	B	-0.03	-0.30	0.08	0.01								0.05	
<u>OCEANIA</u>														
Australia	A	-0.01	0.20	-0.05	-0.03	-0.32	-0.28	-0.07	-0.11	-0.22	0.28	0.08	0.05	0.06
	B	-0.01	0.21	-0.12	-0.04	-0.33	-0.14						0.06*	0.06*
New Zealand	A	-0.00	0.14	-0.34	-0.34	0.09	-0.07	-0.07	0.12	0.26	0.10	-0.01	0.04	0.08*
	B	-0.01	0.21	-0.33	-0.37	-0.06	0.04						0.04	0.07*

* Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE B - 5

Statistics
(Granger's Test)

Country	Equation	SEE		R ²	e ²	range
		Smallest	Largest			
<u>EUROPE</u>						
Denmark	A	0.114	0.286	0.715	0.018	1936-'74
	B	0.190	0.225	0.521	0.031	1936-'74
Finland	A	0.121	0.306	0.716	0.077	1936-'74
	B	0.167	0.283	0.519	0.130	1936-'74
France	A	0.075	0.275	0.875	0.012	1936-'74
	B	0.139	0.269	0.563	0.042	1936-'74
Italy	A	0.133	0.228	0.690	0.027	1936-'74
	B	0.158	0.185	0.338	0.059	1936-'74
Netherlands	A	0.089	0.526	0.706	0.048	1936-'74
	B	0.197	0.378	0.165	0.137	1936-'74
Norway	A	0.135	0.283	0.681	0.022	1936-'74
	B	0.154	0.256	0.578	0.029	1936-'74
Portugal	A	0.104	0.261	0.481	0.036	1936-'74
	B	0.192	0.256	0.221	0.054	1936-'74
Sweden	A	0.104	0.208	0.774	0.015	1936-'74
	B	0.198	0.227	0.542	0.031	1936-'74
Switzerland	A	0.111	0.230	0.765	0.009	1936-'74
	B	0.146	0.179	0.725	0.010	1936-'74
U.K.	A	0.123	0.299	0.833	0.030	1939-'74
	B	0.176	0.207	0.290	0.065	1939-'74
<u>MID EAST(ASIA)</u>						
Israel	A	0.119	0.184	0.281	0.094	1940-'74
	B	0.152	0.156	0.096	0.118	1940-'74
<u>NORTH AMERICA</u>						
Canada	A	0.184	0.294	0.539	0.032	1936-'74
	B	0.189	0.226	0.434	0.040	1936-'74

TABLE B - 6 (cont'd)

Statistics
(Granger's Test)

Country	Equation	SEE		R ²	e ²	range
		Smallest	Largest			
<u>U.S.A.</u>						
Total	A'	0.270	0.338	0.394	0.021	1920-'45
	B'	0.264	0.300	0.265	0.026	1920-'45
	A''	0.193	0.329	0.405	0.022	1946-'79
	B''	0.155	0.207	0.381	0.023	1946-'79
	A	0.160	0.196	0.400	0.072	1920-'79
	B	0.146	0.171	0.356	0.078	1920-'79
White	A'	0.281	0.334	0.383	0.024	1920-'45
	B'	0.261	0.298	0.285	0.028	1920-'45
	A''	0.204	0.402	0.418	0.023	1946-'77
	B''	0.150	0.213	0.414	0.232	1946-'77
	A	0.163	0.233	0.413	0.079	1920-'77
	B	0.149	0.172	0.376	0.084	1920-'77
Nonwhite	A'	0.176	0.314	0.361	0.017	1920-'45
	B'	0.239	0.264	0.179	0.022	1920-'45
	A''	0.137	0.307	0.609	0.011	1946-'77
	B''	0.191	0.268	0.569	0.012	1946-'77
	A	0.097	0.177	0.494	0.039	1920-'77
	B	0.139	0.165	0.454	0.042	1920-'77
<u>ASIA</u>						
Japan	A	0.307	0.552	0.344	0.167	1947-'77
	B	0.206	0.242	0.323	0.173	1947-'77
Taiwan	A	0.162	0.255	0.257	0.066	1947-'78
	B	0.206	0.235	0.208	0.070	1947-'78
<u>OCEANIA</u>						
Australia	A	0.185	0.252	0.569	0.020	1936-'74
	B	0.186	0.245	0.401	0.028	1936-'74
New Zealand	A	0.111	0.230	0.566	0.031	1936-'74
	B	0.184	0.208	0.444	0.040	1936-'74

TABLE C - 1

Granger's Test

Estimated Lag Profiles

MO = f(MO: 5 past, FE: 5 past) & MO = g(MO: 5 past)												
		MO(lag)					FE(lag)					
Country	C	-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	
<u>EUROPE</u>												
Denmark	A	-0.06	-0.23	-0.11	-0.08	-0.00	0.04	-0.00	0.41	-0.09	-0.08	-0.08
	B	-0.06	-0.18	-0.08	0.00	-0.06	-0.00					
Finland	A	-0.11	-0.76	-0.50	-0.33	0.20	0.18	0.62	0.20	-0.16	-0.32	-0.48
	B	-0.11	-0.73	-0.21	-0.27	-0.04	0.17					
France	A	-0.03	0.00	0.01	-0.19	-0.03	0.67	0.44	-0.67	0.18	-1.63	1.01
	B	-0.05	-0.34	0.05	-0.18	0.07	0.41					
Italy	A	-0.04	-0.11	0.15	0.02	-0.06	0.08	0.08	-0.16	0.38	-0.14	0.37
	B	-0.05	-0.22	0.37	-0.14	-0.10	-0.05					
Netherlands	A	0.00	-0.23	0.27	-0.76	0.74	1.27	0.52	0.36	-4.42	-1.72	1.84
	B	-0.06	-0.28	-0.19	-0.15	0.03	-0.08					
Norway	A	-0.06	-0.32	-0.20	-0.29	0.20	-0.04	0.48	-0.07	-0.10	0.32	-0.41
	B	-0.06	-0.44	-0.18	-0.10	0.15	-0.05					
Portugal	A	-0.05	-0.52	-0.11	0.03	-0.08	-0.05	0.22	0.24	-0.02	0.41	0.25
	B	-0.05	-0.56	-0.14	0.12	0.02	0.00					

TABLE C - 2 (cont'd)

		Estimated Lag Profiles										
Country	C	MO(Lag)					FE(Lag)					
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	
Sweden	A	-0.07	-0.26	-0.38	-0.18	0.07	-0.11	-0.05	0.32	-0.53	0.35	-0.34
	B	-0.07	-0.25	-0.43	-0.10	0.02	-0.03					
Switzerland	A	-0.08	-0.18	-0.46	-0.11	-0.18	-0.37	0.20	-0.16	0.71	0.06	-0.10
	B	-0.05	-0.03	-0.20	-0.02	0.04	-0.22					
U.K.	A	-0.01	0.23	0.19	-0.25	0.38	0.07	0.21	-0.31	0.05	-0.09	-0.07
	B	-0.01	0.05	0.39	-0.22	0.25	0.07					
<u>MID EAST(ASIA)</u>												
Israel	A	-0.01	0.06	-0.09	0.05			-0.64	0.01	-0.13		
	B	-0.02	0.15	-0.20	0.02							
<u>NORTH AMERICA</u>												
Canada	A	-0.06	0.10	-0.53	0.06	-0.06	-0.23	0.06	-0.33	0.62	-0.50	0.32
	B	-0.06	-0.11	-0.28	-0.09	0.01	-0.19					
U.S.A. Total	A'	-0.06	-0.63	-0.36	0.10			-0.48	-0.01	-0.07		
	B'	-0.04	-0.43	-0.25	0.18							
	A''	-0.00	0.39	-0.01	0.38			0.18	0.15	-0.09		
	B''	-0.00	0.43	-0.13	0.43							

TABLE C - 3 (cont'd)

Estimated Lag Profiles

Country	C	MO(Lag)					FE(Lag)					
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	
U.S.A.												
Total	A	-0.01	-0.16	0.00	0.30	0.13	0.20	-0.18	0.29	0.00	-0.07	0.14
	B	-0.02	-0.11	-0.12	0.27	0.17	0.17					
White	A'	-0.05	-0.47	-0.30	0.13			-0.31	0.12	-0.14		
	B'	-0.04	-0.39	-0.26	0.21							
	A''	-0.00	0.34	0.15	0.37			0.16	0.15	-0.08		
	B''	-0.00	0.43	0.01	0.38							
	A	-0.01	-0.07	0.00	0.30	0.00	0.17	-0.12	0.24	0.00	-0.13	0.14
	B	-0.02	-0.05	-0.15	0.28	0.07	0.16					
Nonwhite	A'	-0.06	-0.53	-0.30	-0.07			-0.40	-0.10	-0.20		
	B'	-0.05	-0.45	-0.26	-0.03							
	A''	-0.01	0.12	-0.02	0.12			0.50	-0.01	-0.03		
	B''	-0.01	0.20	0.02	0.20							
	A	-0.02	-0.17	-0.07	0.14	0.19	0.08	-0.14	0.44	-0.27	0.41	-0.07
	B	-0.02	-0.18	-0.03	0.16	0.15	0.07					

TABLE C - 4 (cont'd)

Estimated Lag Profiles

Country	C	MO(Lag)					FE(Lag)					
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	
<u>ASIA</u>												
Japan	A	-0.08	-0.13	-0.03	-0.12			0.35	-0.01	-0.17		
	B	-0.12	-0.60	-0.22	-0.01							
Taiwan	A	-0.05	-0.05	0.02	-0.12			-0.12	0.06	-0.01		
	B	-0.05	-0.09	0.04	-0.10							
<u>OCEANIA</u>												
Australia	A	-0.04	-0.17	-0.27	-0.10	-0.30	-0.12	0.14	0.01	-0.71	-0.25	0.01
	B	-0.03	0.10	-0.22	0.06	-0.24	0.09					
New Zealand	A	-0.06	-0.63	-0.37	-0.14	-0.18	-0.29	-0.61	0.09	0.62	-0.43	0.96
	B	-0.05	-0.58	-0.28	-0.25	-0.49	-0.42					

TABLE C - 5

Statistics
(Granger's Test)

Country	Equation	SEE		R ²	e ²	range
		Smallest	Largest			
<u>EUROPE</u>						
Denmark	A	0.200	0.497	0.150	0.068	1936-'74
	B	0.169	0.184	0.048	0.076	1936-'74
Finland	A	0.199	0.281	0.646	0.233	1936-'74
	B	0.184	0.232	0.466	0.352	1936-'74
France	A	0.171	0.383	0.750	0.119	1936-'74
	B	0.144	0.177	0.386	0.293	1936-'74
Italy	A	0.154	0.214	0.490	0.046	1936-'74
	B	0.135	0.156	0.353	0.058	1936-'74
Netherlands	A	0.199	0.945	0.633	0.331	1936-'74
	B	0.184	0.191	0.116	0.797	1936-'74
Norway	A	0.165	0.231	0.529	0.043	1936-'74
	B	0.158	0.165	0.308	0.064	1936-'74
Portugal	A	0.187	0.428	0.407	0.145	1936-'74
	B	0.169	0.218	0.348	0.160	1936-'74
Sweden	A	0.224	0.446	0.282	0.084	1936-'74
	B	0.189	0.215	0.200	0.094	1936-'74
Switzerland	A	0.180	0.394	0.443	0.029	1936-'74
	B	0.162	0.180	0.159	0.045	1936-'74
U.K.	A	0.101	0.261	0.742	0.016	1939-'74
	B	0.122	0.208	0.552	0.028	1939-'74
<u>MID EAST(ASIA)</u>						
Israel	A	0.178	0.292	0.271	0.248	1940-'74
	B	0.173	0.176	0.070	0.317	1940-'74
<u>NORTH AMERICA</u>						
Canada	A	0.131	0.215	0.453	0.020	1936-'74
	B	0.140	0.186	0.171	0.030	1936-'74
U.S.A.						
Total	A'	0.251	0.318	0.469	0.025	1920-'45
	B'	0.214	0.240	0.314	0.033	1920-'45
	A''	0.107	0.198	0.497	0.008	1946-'79
	B''	0.179	0.184	0.339	0.011	1946-'79
	A	0.128	0.156	0.257	0.052	1920-'79
	B	0.133	0.140	0.126	0.061	1920-'79

TABLE C - 6 (cont'd)

Statistics
(Granger's Test)

Country	Equation	SEE		R ²	e ²	range
		Smallest	Largest			
<u>U.S.A.</u>						
White	A'	0.252	0.295	0.394	0.029	1920-'45
	B'	0.217	0.236	0.318	0.033	1920-'45
	A''	0.099	0.214	0.529	0.007	1946-'77
	B''	0.192	0.208	0.353	0.009	1946-'77
	A	0.119	0.161	0.245	0.049	1920-'77
	B	0.137	0.146	0.123	0.057	1920-'77
Nonwhite	A'	0.237	0.410	0.328	0.044	1920-'45
	B'	0.197	0.232	0.215	0.052	1920-'45
	A''	0.197	0.444	0.267	0.025	1946-'77
	B''	0.200	0.203	0.101	0.031	1946-'77
	A	0.135	0.252	0.210	0.091	1920-'77
	B	0.129	0.148	0.072	0.107	1920-'77
<u>ASIA</u>						
Japan	A	0.155	0.309	0.430	0.057	1947-'77
	B	0.188	0.231	0.287	0.056	1947-'77
Taiwan	A	0.177	0.265	0.057	0.091	1947-'78
	B	0.149	0.190	0.039	0.093	1947-'78
<u>OCEANIA</u>						
Australia	A	0.190	0.285	0.411	0.034	1936-'74
	B	0.204	0.213	0.081	0.053	1936-'74
New Zealand	A	0.132	0.261	0.735	0.053	1936-'74
	B	0.161	0.182	0.399	0.121	1936-'74

TABLE D - 1

Granger's Test

Estimated Lag Profiles

MO = f(MO: 5 past, FE: 5 past, D1, D2) & MO = g(MO: 5 past, D1, D2)														
Country	C	MO(Lag)					FE(Lag)					D1	D2	
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5			
<u>EUROPE</u>														
Denmark	A	-0.06	-0.33	-0.23	-0.16	-0.04	0.09	0.05	0.41	-0.01	0.14	0.20	-0.01	-0.08*
	B	-0.04	-0.26	-0.06	0.09	0.03	0.14						0.02	-0.05*
Finland	A	-0.16	-0.79	-0.52	-0.37	0.24	0.12	0.43	-0.15	-0.57	-0.50	-0.69	0.04	0.15
	B	-0.13	-0.74	-0.22	-0.32	-0.12	0.08						0.07	0.00
France	A	-0.08	-0.23	-0.15	-0.28	-0.18	0.34	0.66	-0.17	0.60	-0.78	0.48	0.13	-0.12
	B	-0.09	-0.46	-0.14	-0.30	-0.04	0.29						0.17*	-0.10*
Italy	A	-0.09	-0.33	-0.41	-0.35	-0.30	0.04	0.42	-0.20	0.39	-0.02	0.22	0.22*	-0.09*
	B	-0.10	-0.52	-0.11	-0.43	-0.29	-0.02						0.09*	-0.07*
Netherlands	A	-0.02	-0.48	-0.11	-0.58	0.08	0.83	0.48	0.60	-1.64	-1.04	1.38	0.18*	-0.25*
	B	-0.07	-0.57	-0.41	-0.29	-0.07	0.10						0.28*	-0.26*
Norway	A	-0.06	-0.46	-0.26	-0.24	0.19	0.01	0.39	0.02	0.17	0.76	-0.14	-0.02	-0.08
	B	-0.06	-0.49	-0.21	-0.11	0.11	-0.05						0.01	-0.01
Portugal	A	-0.06	-0.54	-0.17	-0.04	-0.18	-0.10	0.30	0.34	0.07	0.55	0.38	0.02	-0.02
	B	-0.05	-0.54	-0.10	0.16	0.06	0.01						-0.01	0.01

* Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE D - 2 (cont'd)

Estimated Lag Profiles

Country	C	MO(Lag)					FE(Lag)					D1	D2	
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5			
Sweden	A	-0.10	-0.45	-0.74	-0.60	-0.30	-0.22	0.39	0.13	-0.26	0.32	0.11	-0.14*	-0.08
	B	-0.10	-0.50	-0.76	-0.46	-0.24	-0.13						-0.09*	-0.06*
Switzerland	A	-0.08	-0.21	-0.43	-0.06	-0.12	-0.37	-0.00	-0.27	0.61	0.04	0.13	0.04	-0.01
	B	-0.07	-0.12	-0.28	-0.13	-0.01	-0.34						0.06*	0.00
U.K.	A	-0.02	0.05	0.05	0.07	0.12	-0.29	0.00	-0.25	0.29	0.07	0.12	0.11	-0.07*
	B	-0.02	-0.27	0.25	-0.00	0.07	-0.04						0.05	-0.05*
<u>MID EAST(ASIA)</u>														
Israel	A	-0.02	-0.07	-0.10	0.18			-0.70	-0.03	-0.23				0.11*
	B	-0.03	0.07	-0.19	0.11									0.08
<u>NORTH AMERICA</u>														
Canada	A	-0.06	0.06	-0.54	0.06	-0.05	-0.20	0.09	-0.34	0.65	-0.46	0.32	0.00	-0.01
	B	-0.07	-0.15	-0.29	-0.09	0.03	-0.18						0.01	0.00
U.S.A.														
Total	A'	-0.05	-0.73	-0.47	-0.00			-0.36	0.16	0.04			-0.03	0.01
	B'	-0.06	-0.74	-0.61	-0.07								-0.04	0.01

* Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE D - 3 (cont'd)

Estimated Lag Profiles

Country		C	MO(Lag)					FE(Lag)					D1	D2
			-1	-2	-3	-4	-5	-1	-2	-3	-4	-5		
U.S.A.	A''	-0.00	0.37	-0.01	0.38			0.20	0.15	-0.07				-0.00
	B''	-0.00	0.44	-0.14	0.43									0.00
	A	-0.01	-0.21	-0.06	0.24	0.08	0.19	-0.14	0.33	0.07	-0.05	0.20	-0.02	-0.01
	B	-0.01	-0.12	-0.13	0.26	0.18	0.19					-0.00	0.00	
White	A'	-0.04	-0.62	-0.44	0.00			-0.17	0.34	0.04			-0.04	0.01
	B'	-0.05	-0.57	-0.47	0.04							-0.03	0.01	
	A''	-0.00	0.30	0.13	0.38			0.18	0.15	-0.06				-0.00
	B''	-0.00	0.44	0.00	0.40									0.00
	A	-0.01	-0.13	-0.10	0.21	-0.05	0.14	-0.07	0.27	0.07	-0.09	0.20	-0.03	-0.02
	B	-0.02	-0.07	-0.17	0.26	0.06	0.16					-0.00	-0.00	
	A'	-0.08	-0.79	-0.63	-0.24			-0.30	-0.01	-0.21			-0.03	0.06
	B'	-0.06	-0.80	-0.65	-0.23								-0.05*	0.05
Nonwhite	A''	-0.00	0.08	-0.06	0.15			0.64	-0.01	0.08				-0.02
	B''	-0.01	0.19	0.02	0.19									0.00
	A	-0.01	-0.29	-0.17	0.08	0.13	0.03	-0.05	0.56	-0.15	0.42	0.09	-0.05*	-0.03
	B	-0.02	-0.20	-0.06	0.15	0.17	0.10						-0.01	0.01

* Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE D - 4 (cont'd)

Estimated Lag Profiles

Country	C	MO(Lag)					FE(Lag)					D1	D2	
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5			
<u>ASIA</u>														
Japan	A	-0.07	-0.04	0.00	-0.03		0.47	0.11	-0.05				0.05	
	B	-0.13	-0.60	-0.23	-0.01								0.00	
Taiwan	A	-0.07	-0.10	0.09	-0.04		-0.21	-0.09	-0.19				0.06	
	B	-0.05	-0.13	0.09	-0.02								0.03	
<u>OCEANIA</u>														
Australia	A	-0.01	-0.12	-0.00	0.24	0.07	0.06	0.35	0.28	-0.77	-0.30	0.10	-0.07*	0.03
	B	-0.03	-0.08	-0.26	-0.02	-0.25	-0.03						-0.04	-0.03
New Zealand	A	-0.05	-0.63	-0.37	-0.13	-0.15	-0.27	-0.56	0.08	0.70	-0.35	1.06	-0.04	-0.00
	B	-0.06	-0.60	-0.27	-0.22	-0.48	-0.42						0.02	0.01

* Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE D - 5

Statistics
(Granger's Test)

Country	Equation	SEE		R ²	e ²	range
		Smallest	Largest			
<u>EUROPE</u>						
Denmark	A	0.194	0.486	0.319	0.054	1936-'74
	B	0.168	0.174	0.237	0.061	1936-'74
Finland	A	0.205	0.517	0.666	0.219	1936-'74
	B	0.200	0.255	0.486	0.338	1936-'74
France	A	0.203	0.737	0.816	0.087	1936-'74
	B	0.134	0.154	0.694	0.145	1936-'74
Italy	A	0.129	0.221	0.712	0.026	1936-'74
	B	0.125	0.192	0.570	0.039	1936-'74
Netherlands	A	0.159	0.941	0.828	0.154	1936-'74
	B	0.119	0.128	0.710	0.261	1936-'74
Norway	A	0.180	0.378	0.577	0.039	1936-'74
	B	0.175	0.194	0.325	0.062	1936-'74
Portugal	A	0.207	0.519	0.414	0.143	1936-'74
	B	0.186	0.253	0.352	0.158	1936-'74
Sweden	A	0.202	0.405	0.501	0.058	1936-'74
	B	0.173	0.238	0.406	0.070	1936-'74
Switzerland	A	0.188	0.389	0.509	0.026	1936-'74
	B	0.164	0.196	0.359	0.034	1936-'74
U.K.	A	0.102	0.248	0.832	0.010	1939-'74
	B	0.149	0.209	0.709	0.018	1939-'74
<u>MID EAST(ASIA)</u>						
Israel	A	0.177	0.274	0.390	0.208	1940-'74
	B	0.170	0.185	0.139	0.294	1940-'74
<u>NORTH AMERICA</u>						
Canada	A	0.144	0.230	0.465	0.019	1936-'74
	B	0.149	0.200	0.185	0.030	1936-'74

TABLE D - 6 (cont'd)

Statistics
(Granger's Test)

Country	Equation	SEE		R ²	e ²	range
		Smallest	Largest			
U.S.A.						
Total	A'	0.279	0.349	0.529	0.023	1920-'45
	B'	0.245	0.293	0.457	0.026	1920-'45
	A''	0.118	0.201	0.502	0.008	1946-'79
	B''	0.182	0.195	0.344	0.011	1946-'79
	A	0.133	0.163	0.293	0.050	1920-'79
	B	0.144	0.150	0.135	0.061	1920-'79
White	A'	0.291	0.347	0.465	0.026	1920-'45
	B'	0.251	0.286	0.403	0.029	1920-'45
	A''	0.113	0.223	0.532	0.532	1946-'77
	B''	0.199	0.211	0.362	0.009	1946-'77
	A	0.130	0.179	0.280	0.046	1920-'77
	B	0.151	0.162	0.127	0.056	1920-'77
Nonwhite	A'	0.237	0.421	0.523	0.031	1920-'45
	B'	0.183	0.242	0.480	0.034	1920-'45
	A''	0.197	0.441	0.312	0.023	1946-'77
	B''	0.206	0.208	0.107	0.030	1946-'77
	A	0.140	0.255	0.296	0.081	1920-'77
	B	0.140	0.152	0.100	0.104	1920-'77
ASIA						
Japan	A	0.171	0.308	0.484	0.052	1947-'77
	B	0.192	0.238	0.289	0.072	1947-'77
Taiwan	A	0.180	0.284	0.154	0.081	1947-'78
	B	0.162	0.191	0.094	0.087	1947-'78
OCEANIA						
Australia	A	0.213	0.290	0.537	0.026	1936-'74
	B	0.222	0.263	0.231	0.044	1936-'74
New Zealand	A	0.141	0.290	0.752	0.050	1936-'74
	B	0.166	0.197	0.413	0.118	1936-'74

TABLE E - 1

Granger's Test

Estimated Lag Profiles

		FE = f[FE: 3(5) past, NE: 3(5) past] & FE = g[FE: 3(5) past]										
Country	C	FE(Lag)					NE(Lag)					
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	
<u>ASIA</u>												
Japan	A	-0.04	-0.69	0.33	0.36			-1.07	0.14	0.39		
	B	-0.01	-0.31	0.16	0.23							
<u>NORTH AMERICA</u>												
<u>U.S.A.</u>												
Total	A'	0.01	0.63	0.32	-0.09			0.80	0.40	-0.31		
	B'	-0.00	0.41	-0.07	0.11							
	A''	-0.05	-0.67	-0.47	-0.17			-0.46	-0.12	-0.13		
	B''	-0.02	-0.07	-0.20	0.05							
White	A	-0.01	0.37	-0.19	0.12	0.18	0.04	0.47	0.06	-0.20	-0.53	-0.55
	B	-0.00	0.43	-0.27	0.15	0.17	0.13					
	A'	-0.00	0.57	0.10	-0.18			0.58	0.06	-0.52		
	B'	-0.00	0.42	-0.10	0.10							
Nonwhite	A''	-0.01	0.66	-0.20	-0.03			0.62	-0.55	-0.38		
	B''	-0.00	0.69	-0.20	-0.03							
	A	-0.02	0.38	-0.22	0.09	0.22	0.00	0.59	-0.03	-0.21	-0.66	-0.62
	B	-0.00	0.45	-0.31	0.15	0.18	0.11					
Nonwhite	A'	-0.00	0.33	0.23	0.02			0.20	0.16	-0.25		
	B'	-0.00	0.29	0.03	0.08							
	A''	-0.00	0.75	-0.09	0.05			0.09	0.01	-0.14		
	B''	-0.00	0.75	-0.06	0.03							
Nonwhite	A	-0.00	0.53	0.01	0.05	0.04	0.07	0.18	0.07	-0.23	-0.10	-0.29
	B	-0.00	0.54	-0.00	0.01	-0.00	0.18					

TABLE E - 2

Statistics
(Granger's Test)

Country	Equation	SEE		R ²	e ²	range
		Smallest	Largest			
<u>ASIA</u>						
Japan	A	0.331	0.775	0.288	0.181	1947-'76
	B	0.199	0.209	0.176	0.210	1947-'76
<u>NORTH AMERICA</u>						
<u>U.S.A.</u>						
Total	A'	0.288	0.603	0.332	0.023	1920-'45
	B'	0.229	0.239	0.173	0.029	1920-'45
	A''	0.159	0.333	0.471	0.007	1946-'79
	B''	0.228	0.233	0.054	0.012	1946-'79
White	A	0.143	0.293	0.447	0.066	1920-'79
	B	0.140	0.161	0.299	0.085	1920-'79
	A'	0.279	0.621	0.279	0.028	1920-'45
	B'	0.231	0.245	0.174	0.032	1920-'45
	A''	0.169	0.496	0.437	0.022	1946-'77
	B''	0.145	0.201	0.353	0.025	1946-'77
	A	0.148	0.340	0.459	0.073	1920-'77
	B	0.144	0.163	0.308	0.093	1920-'77
Nonwhite	A'	0.223	0.264	0.288	0.019	1920-'45
	B'	0.216	0.233	0.113	0.024	1920-'45
	A''	0.172	0.308	0.553	0.013	1946-'77
	B''	0.185	0.272	0.534	0.023	1946-'77
	A	0.130	0.164	0.515	0.037	1920-'77
	B	0.146	0.164	0.390	0.047	1920-'77

TABLE E - 3

Granger's Test
Estimated Lag Profiles

FE = f[FE: 3(5) past, NE: 3(5) past, D1,D2] & FE = g[FE: 3(5) past, D1,D2]														
Country	C	FE(Lag)					NE(Lag)					D1	D2	
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5			
<u>ASIA</u>														
Japan	A	-0.02	-0.88	0.03	0.11			-0.92	0.32	0.37			-0.13*	
	B	-0.00	-0.59	-0.20	-0.00								-0.13*	
<u>NORTH AMERICA</u>														
<u>U.S.A.</u>														
Total	A'	0.00	0.45	0.13	-0.15			0.81	0.58	-0.09		0.03	-0.01	
	B'	-0.02	0.24	-0.32	-0.10							0.04	-0.00	
	A''	-0.01	0.56	-0.18	-0.06			0.58	-0.57	-0.13			0.02	
	B''	-0.01	0.49	-0.07	-0.09								0.02	
	A	-0.02	0.31	-0.25	0.02	0.16	-0.03	0.49	0.06	-0.16	-0.45	-0.50	0.02	0.02
	B	-0.01	0.33	-0.33	0.02	0.12	0.03						0.03	0.03
White	A'	-0.00	0.37	-0.09	-0.28			0.71	0.38	-0.18			0.05	-0.00
	B'	-0.03	0.24	-0.36	-0.14								0.05	-0.00
	A''	-0.02	0.55	-0.21	-0.11			0.64	-0.49	-0.29				0.02
	B''	-0.01	0.56	-0.17	-0.10									0.02
	A	-0.02	0.29	-0.30	-0.01	0.18	-0.07	0.62	0.06	-0.10	-0.54	-0.56	0.03	0.03
	B	-0.02	0.33	-0.40	0.01	0.12	0.00						0.03	0.04*
Nonwhite	A'	-0.00	0.24	0.11	0.00			0.25	0.25	-0.16			0.02	0.00
	B'	-0.02	0.17	-0.11	-0.01								0.02	0.01
	A''	-0.01	0.61	-0.09	-0.03			0.13	0.06	-0.11				0.02
	B''	-0.01	0.62	-0.04	-0.04									0.02
	A	-0.01	0.44	-0.05	-0.02	0.02	-0.00	0.23	0.11	-0.17	-0.01	-0.20	0.02	0.02
	B	-0.01	0.41	-0.09	-0.04	-0.01	0.07						0.01	0.03*

* Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE E - 4

Statistics
(Granger's Test)

Country	Equation	SEE		R ²	e ²	range
		Smallest	Largest			
<u>ASIA</u>						
Japan	A	0.323	0.717	0.432	0.145	1947-'76
	B	0.212	0.253	0.338	0.169	1947-'76
<u>NORTH AMERICA</u>						
<u>U.S.A.</u>						
Total	A'	0.336	0.630	0.405	0.021	1920-'45
	B'	0.264	0.300	0.265	0.026	1920-'45
	A''	0.163	0.431	0.481	0.019	1946-'79
	B''	0.155	0.207	0.381	0.023	1946-'79
	A	0.153	0.305	0.471	0.064	1920-'79
	B	0.146	0.171	0.356	0.078	1920-'79
White	A'	0.316	0.661	0.378	0.024	1920-'45
	B'	0.261	0.298	0.285	0.028	1920-'45
	A''	0.177	0.492	0.479	0.020	1946-'77
	B''	0.150	0.213	0.414	0.023	1946-'77
	A	0.158	0.348	0.489	0.068	1920-'77
	B	0.149	0.172	0.376	0.084	1920-'77
Nonwhite	A'	0.252	0.299	0.331	0.018	1920-'45
	B'	0.239	0.264	0.179	0.022	1920-'45
	A''	0.171	0.303	0.589	0.012	1946-'77
	B''	0.191	0.268	0.569	0.012	1946-'77
	A	0.136	0.172	0.540	0.035	1920-'77
	B	0.139	0.165	0.454	0.042	1920-'77

TABLE F - 1

Granger's Test
Estimated Lag Profiles

		NE = f[NE: 3(5) past, FE: 3(5) past] & NE = g[NE: 3(5) past]										
Country	C	NE(Lag)					FE(Lag)					
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5	
<u>ASIA</u>												
Japan	A	-0.05	0.11	-0.07	-0.05		0.21	-0.11	-0.06			
	B	-0.06	-0.29	0.01	0.08							
<u>NORTH AMERICA</u>												
<u>U.S.A.</u>												
Total	A'	-0.05	-0.67	-0.47	-0.17		-0.46	-0.12	-0.13			
	B'	-0.02	-0.07	-0.20	0.05							
	A''	-0.00	0.26	0.34	0.36		0.19	0.00	-0.00			
	B''	-0.00	0.30	0.40	0.25							
White	A	-0.00	0.12	0.16	0.16	0.11	0.37	-0.09	0.15	-0.03	0.03	0.13
	B	-0.00	0.18	0.10	0.26	0.08	0.32					
	A'	-0.04	-0.49	-0.27	-0.04		-0.35	0.02	-0.07			
	B'	-0.02	-0.11	-0.18	0.10							
Nonwhite	A''	0.00	0.44	0.34	0.33		0.10	0.04	-0.02			
	B''	0.00	0.52	0.34	0.30							
	A	-0.00	0.24	0.26	0.15	0.04	0.31	-0.13	0.18	-0.04	0.02	0.14
	B	-0.00	0.25	0.15	0.31	0.03	0.28					
Nonwhite	A'	-0.05	-0.42	-0.47	-0.27		-0.35	-0.24	-0.26			
	B'	-0.03	-0.17	-0.31	-0.18							
	A''	-0.01	0.18	0.01	0.14		0.51	-0.28	0.14			
	B''	-0.01	0.27	0.09	0.17							
Nonwhite	A	-0.01	-0.00	-0.09	0.10	0.12	0.16	-0.09	0.06	-0.07	0.20	0.13
	B	-0.01	0.06	-0.08	0.10	0.10	0.17					

TABLE F - 2

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Statistics
(Granger's Test)

Country	Equation	SEE		R ²	e ²	range
		Smallest	Largest			
<u>ASIA</u>						
Japan	A	0.157	0.368	0.227	0.041	1947-'76
	B	0.190	0.207	0.107	0.047	1947-'76
<u>NORTH AMERICA</u>						
<u>U.S.A.</u>						
Total	A'	0.159	0.333	0.471	0.007	1920-'45
	B'	0.228	0.233	0.054	0.012	1920-'45
	A''	0.092	0.257	0.637	0.007	1946-'79
	B''	0.197	0.242	0.571	0.008	1946-'79
	A	0.080	0.165	0.409	0.021	1920-'79
	B	0.140	0.153	0.300	0.025	1920-'79
White	A'	0.137	0.305	0.379	0.006	1920-'45
	B'	0.225	0.232	0.068	0.010	1920-'45
	A''	0.087	0.256	0.683	0.005	1946-'77
	B''	0.214	0.230	0.650	0.006	1946-'77
	A	0.073	0.168	0.447	0.017	1920-'77
	B	0.151	0.159	0.296	0.022	1920-'77
Nonwhite	A'	0.238	0.281	0.356	0.022	1920-'45
	B'	0.219	0.231	0.127	0.030	1920-'45
	A''	0.214	0.382	0.293	0.020	1946-'77
	B''	0.219	0.223	0.132	0.024	1946-'77
	A	0.154	0.194	0.152	0.053	1920-'77
	B	0.146	0.152	0.062	0.058	1920-'77

TABLE F - 3

Granger's Test
Estimated Lag Profiles

NE = f[NE: 3(5) past, FE: 3(5) past,D1,D2] & NE = g[NE: 3(5) past, D1,D2]														
Country	C	NE(Lag)					FE(Lag)					D1	D2	
		-1	-2	-3	-4	-5	-1	-2	-3	-4	-5			
<u>ASIA</u>														
Japan	A	-0.07	0.01	-0.19	-0.03			0.34	0.08	0.10				0.08*
	B	-0.12	-0.53	-0.31	-0.14									0.06*
<u>NORTH AMERICA</u>														
<u>U.S.A.</u>														
Total	A'	-0.06	-0.72	-0.56	-0.23			-0.47	-0.14	-0.16			0.00	0.01
	B'	-0.03	-0.36	-0.55	-0.22								-0.03	0.00
	A''	-0.00	0.26	0.33	0.39			0.14	0.00	-0.03				0.01
	B''	-0.00	0.26	0.34	0.37									0.01
White	A	-0.00	0.13	0.15	0.17	0.14	0.41	-0.12	0.12	-0.08	0.02	0.10	0.00	0.01
	B	-0.00	0.17	0.08	0.27	0.14	0.41						0.01	0.01
	A'	-0.05	-0.54	-0.37	-0.15			-0.32	0.04	-0.09			-0.00	0.01
	B'	-0.04	-0.39	-0.53	-0.18								-0.02	0.01
	A''	-0.00	0.46	0.39	0.40			0.01	0.04	-0.08				0.01
	B''	-0.00	0.44	0.31	0.47									0.01*
	A	-0.00	0.25	0.29	0.20	0.08	0.34	-0.17	0.15	-0.09	0.00	0.10	0.01	0.01
	B	-0.00	0.25	0.17	0.34	0.09	0.35						0.01	0.01
Nonwhite	A'	-0.05	-0.53	-0.59	-0.30			-0.38	-0.23	-0.25			-0.01	0.03
	B'	-0.03	-0.40	-0.55	-0.33								-0.04	0.01
	A''	-0.00	0.17	0.00	0.13			0.56	-0.28	0.17				-0.00
	B''	-0.01	0.23	0.10	0.17									0.01
	A	-0.01	-0.02	-0.12	0.08	0.12	0.18	-0.09	0.08	-0.08	0.20	0.13	-0.01	0.00
	B	-0.01	0.04	-0.10	0.10	0.14	0.24						-0.00	0.01

* Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE F - 4
Statistics
(Granger's Test)

Country	Equation	SEE		R ²	e ²	range
		Smallest	Largest			
<u>ASIA</u>						
Japan	A	0.134	0.296	0.532	0.024	1947-'76
	B	0.187	0.219	0.337	0.035	1947-'76
<u>NORTH AMERICA</u>						
U.S.A.						
Total	A'	0.187	0.351	0.522	0.006	1920-'45
	B'	0.262	0.279	0.242	0.010	1920-'45
	A''	0.127	0.259	0.653	0.007	1946-'79
	B''	0.192	0.243	0.618	0.007	1946-'79
	A	0.086	0.172	0.427	0.020	1920-'79
	B	0.138	0.156	0.359	0.023	1920-'79
White	A'	0.159	0.332	0.439	0.006	1920-'45
	B'	0.271	0.292	0.236	0.008	1920-'45
	A''	0.087	0.241	0.734	0.004	1946-'77
	B''	0.205	0.211	0.717	0.005	1946-'77
	A	0.078	0.175	0.468	0.017	1920-'77
	B	0.152	0.161	0.357	0.020	1920-'77
Nonwhite	A'	0.256	0.303	0.450	0.018	1920-'45
	B'	0.219	0.243	0.316	0.023	1920-'45
	A''	0.220	0.391	0.297	0.020	1946-'77
	B''	0.218	0.231	0.170	0.023	1946-'77
	A	0.164	0.208	0.168	0.052	1920-'77
	B	0.151	0.155	0.096	0.056	1920-'77

TABLE G - 1

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past) & MO = g(FE: current, 3 past)

Country	C	+3	+2	+1	0	-1	-2	-3	SEE		R ²	e ²	
									Smallest	Largest			
EUROPE													
Denmark	0.10	-0.02	-0.44	0.37	0.04	-0.02	0.06	0.06	0.171	0.199	0.325	121.447	
	0.16				0.03	0.04	0.19	-0.04	0.191	0.198	0.043	179.292	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.08	-0.09	0.17	-0.03	0.17	0.03	0.07	0.20	0.01	-0.08	-0.05	-0.03
Finland	-0.76	-0.20	-0.54	0.85	-0.04	-0.06	-0.27	0.03	0.127	0.216	0.679	429.953	
	-0.41				-0.16	0.29	-0.16	-0.12	0.191	0.192	0.128	1169.80	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.06	-0.29	0.14	0.24	0.10	-0.14	-0.09	0.04	0.10	0.03	-0.21	-0.06
France	-0.49	0.47	0.84	1.69	-1.15	-0.65	-0.53	0.27	0.461	0.521	0.515	1718.76	
	0.38				-1.20	-0.52	-0.35	0.30	0.563	0.564	0.177	2920.39	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	-0.14	-0.14	-0.07	-0.22	0.31	0.07	-0.02	-0.09	0.06	0.07	-0.04	-0.03
Italy	-0.11	0.00	-0.31	-0.12	-0.58	-0.14	-0.09	0.15	0.216	0.261	0.343	462.258	
	-0.12				-0.55	-0.09	-0.05	0.29	0.204	0.211	0.296	495.203	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.27	0.37*	0.01	0.18	0.01	0.13	-0.29	-0.20	-0.37*	-0.18	-0.09	-0.14

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE G - 2 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past) & MO = g(FE: current, 3 past)

Country	C	+3	+2	+1	0	-1	-2	-3	SEE		R ²	e ²	
									Smallest	Largest			
Netherlands	-0.75	-0.08	0.22	1.13	-0.30	0.39	0.24	0.08	0.134	0.146	0.791	435.428	
	-0.49				-0.42	0.36	0.28	0.02	0.271	0.273	0.174	1722.91	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.23	-0.09	-0.19	0.10	0.23	0.17	0.02	-0.08	-0.13	-0.05	-0.12	-0.08
Norway	0.03	0.98	0.03	0.03	-0.10	0.16	-0.00	-0.10	0.106	0.130	0.219	54.9947	
	0.01				-0.09	0.19	-0.03	-0.11	0.096	0.099	0.188	57.1924	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.20	0.18	0.09	-0.08	-0.00	0.13	-0.09	-0.04	-0.04	-0.25	-0.06	-0.10
Portugal	0.50	0.47	0.51	0.18	-0.29	0.25	-0.72	-0.07	0.373	0.452	0.189	995.261	
	0.65				-0.31	0.37	-0.62	-0.08	0.362	0.438	0.115	1085.88	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	-0.06	0.03	0.15	0.17	0.11	-0.03	0.17	-0.11	-0.10	0.02	-0.05	-0.06
Sweden	0.01	0.18	-0.10	-0.01	-0.36	0.10	0.05	-0.10	0.131	0.155	0.319	53.4972	
	-0.03				-0.36	0.08	0.04	-0.10	0.126	0.131	0.259	58.2435	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.06	0.24	0.08	0.27	0.07	0.21	0.11	0.34	-0.22	0.07	-0.01	-0.01
Switzerland	-0.29	-0.40	-0.24	0.43	-0.37	-0.17	0.20	0.07	0.140	0.202	0.484	37.6777	
	-0.19				-0.36	-0.13	0.22	0.17	0.159	0.163	0.229	56.3301	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.01	-0.22	0.22	-0.04	-0.28	0.07	0.12	0.03	0.06	-0.02	-0.18	-0.11

TABLE G - 3 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past) & MO = g(FE: current, 3 past)

Country	C	+3	+2	+1	0	-1	-2	-3	SEE		R ²	e ²	
									Smallest	Largest			
U.K.	-0.11	-0.13	0.06	0.18	-0.01	0.10	-0.24	0.01	0.066	0.073	0.537	30.1509	
	-0.11				-0.07	0.10	-0.19	0.01	0.077	0.078	0.287	46.4415	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.19	0.62*	0.72*	0.47*	0.61*	0.36	0.32	0.12	0.12	0.01	-0.10	-0.12	-0.20
MID EAST													
Israel	0.61	-0.05	0.21	0.35	0.04	-0.28	0.14	0.06	0.087	0.107	0.610	177.975	
	0.19				-0.04	-0.34	0.06	-0.06	0.096	0.115	0.350	296.736	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.19	-0.11	-0.18	-0.27	0.30	0.10	-0.08	-0.24	0.12	-0.08	0.05	-0.06	0.09
NORTH AMERICA													
Canada	0.17	-0.13	0.07	0.00	-0.27	-0.07	-0.13	0.05	0.089	0.096	0.423	55.8875	
	0.20				-0.30	-0.08	-0.15	0.05	0.087	0.089	0.356	62.4466	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	-0.03	-0.21	-0.00	-0.24	0.15	-0.04	0.01	-0.04	-0.14	0.01	-0.14	0.07

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE G - 4 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past) & MO = g(FE: current, 3 past)

Country	C	+3	+2	+1	0	-1	-2	-3	SEE		R ²	e ²	
									Smallest	Largest			
U.S.A.													
Total	A'	-0.32	0.04	0.02	-0.36	0.06	-0.29	-0.02	-0.18	0.154	0.222	0.338	51.47
		0.08				0.01	-0.14	0.19	0.03	0.176	0.189	0.139	66.96
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.23	0.06	0.07	-0.23	-0.27	-0.23	-0.15	-0.04	0.13	0.14	0.08	-0.03	0.03
	A''	0.01	-0.04	-0.00	-0.00	-0.04	0.05	0.04	-0.04	0.026	0.042	0.393	4.244
		0.04				-0.04	0.05	0.04	-0.04	0.024	0.034	0.335	4.647
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.19	-0.02	0.12	0.05	-0.24	0.15	0.02	0.00	0.04	-0.01	0.01	-0.19	-0.14
	A	0.10	-0.15	0.03	-0.07	-0.09	-0.02	0.02	0.11	0.064	0.068	0.215	150.7
		0.08				-0.10	-0.06	0.00	0.09	0.063	0.065	0.105	172.0
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.14	-0.13	-0.05	0.06	0.04	0.11	-0.00	0.09	0.11	-0.15	0.18	-0.00	-0.00

Range: A' = 1920 - 1945; A'' = 1946 - 1979; A = 1920 - 1979.

TABLE G - 5 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past) & MO = g(FE: current, 3 past)

Country	C	+3	+2	+1	0	-1	-2	-3	SEE		R ²	e ²		
									Smallest	Largest				
White	A'	-0.01	-0.02	-0.04	0.16	-0.09	-0.17	0.13	-0.04	0.162	0.260	0.214	58.59	
		0.14				-0.11	-0.12	0.22	0.05	0.169	0.187	0.161	62.56	
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.23	0.14	-0.04	-0.24	-0.27	-0.19	-0.11	-0.09	0.10	0.17	0.09	-0.02	0.03
	A''	0.03	-0.04	0.00	-0.06	0.00	-0.01	0.06	0.01	0.026	0.031	0.387	2.074	
		0.11				-0.01	-0.00	0.05	0.02	0.025	0.027	0.216	2.652	
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.20	-0.01	0.03	-0.02	-0.18	0.15	-0.09	-0.10	-0.07	-0.02	0.04	0.02	-0.18
	A	0.11	-0.15	0.02	-0.08	-0.08	0.01	0.02	0.12	0.059	0.065	0.218	126.9	
		0.08				-0.09	-0.03	0.00	0.08	0.058	0.060	0.103	145.5	
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.14	-0.08	-0.06	0.05	-0.01	0.08	0.01	0.09	0.13	-0.09	0.21	-0.05	0.01

Range: A' = 1920-1945; A'' = 1946-1977; A = 1920-1977.

TABLE G - 6 (cont'd)

Sims's Test															
Estimated Lag Profiles and PDQ of Residuals															
MO = f(FE: 3 lead, current, 3 past) & MO = g(FE: current, 3 past)															
Country	C	+3	+2	+1	0	-1	-2	-3	SEE		R ²	e ²			
									Smallest	Largest					
Nonwhite	A'	1.46	-0.04	-0.35	0.41	0.14	-0.36	-0.01	0.13	0.231	0.320	0.251	167.9		
		1.41				0.10	-0.18	-0.05	0.09	0.224	0.267	0.044	214.4		
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
		0.23	-0.23	-0.01	-0.06	-0.01	-0.09	-0.20	-0.03	0.04	-0.07	0.10	0.12	-0.06	
	A''	-0.33	-0.08	-0.05	-0.08	-0.23	0.01	0.01	-0.12	0.110	0.124	0.293	34.31		
		-0.05				-0.18	0.07	0.06	-0.08	0.098	0.101	0.258	36.00		
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
		0.20	0.23	-0.06	-0.11	0.02	0.18	0.43*	-0.14	-0.16	-0.13	-0.10	0.09	0.05	
A		0.18	-0.22	-0.11	0.05	-0.05	-0.19	0.14	0.00	0.120	0.140	0.143	505.2		
		0.17				-0.06	-0.19	0.11	-0.05	0.118	0.133	0.077	544.2		
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
		0.14	0.06	-0.05	0.11	0.30*	0.07	-0.01	0.22	0.05	-0.19	0.08	0.08	-0.08	
	ASIA														
	Japan		0.20	-0.05	0.00	0.02	-0.07	0.18	0.18	0.01	0.061	0.093	0.596	45.22	
			0.16				-0.08	0.18	0.19	0.02	0.054	0.064	0.578	47.24	
		PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
			0.20	-0.06	-0.20	0.30	-0.16	-0.07	0.13	-0.27	-0.05	-0.09	-0.10	0.18	-0.17

* Correlation is greater than two times its estimated standard error in absolute value.

Range: A' = 1920-1945; A'' = 1946-1977; A = 1920-1977.

TABLE G - 7 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past) & MO = g(FE: current, 3 past)

Country	C	+3	+2	+1	0	-1	-2	-3	SEE		R ²	e ²	
									Smallest	Largest			
Taiwan	0.33	0.02	-0.15	0.01	0.17	0.01	0.06	0.00	0.057	0.092	0.473	97.8694	
	0.56				0.17	0.01	0.04	-0.02	0.055	0.058	0.348	121.165	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.20	-0.02	-0.21	-0.05	0.01	0.01	0.26	-0.05	-0.46*	-0.16	0.17	0.08	-0.07
OCEANIA													
Australia	0.09	-0.15	-0.04	-0.05	-0.00	0.02	-0.06	-0.16	0.074	0.086	0.298	25.8331	
	0.12				-0.02	0.01	-0.06	-0.17	0.086	0.088	0.151	31.2266	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	-0.07	-0.07	-0.22	-0.33	0.14	0.08	-0.02	0.14	-0.04	-0.08	0.11	-0.13
New Zealand	-0.08	0.20	0.00	-0.02	0.02	-0.16	-0.23	0.16	0.092	0.095	0.451	60.7115	
	-0.13				-0.01	-0.16	-0.18	0.18	0.091	0.094	0.344	72.5977	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	-0.02	-0.27	0.21	-0.06	-0.46*	0.03	0.10	-0.13	-0.02	0.20	0.03	0.08

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE G - 8

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past, D1, D2) & MO = g(FE: current, 3 past, D1, D2)														
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²
											Smallest	Largest		
EUROPE														
Denmark	0.75	-0.06	-0.43	0.33	-0.04	-0.08	-0.01	0.02	-0.90	-2.95**	0.163	0.198	0.499	90.10
	0.87				-0.04	0.00	0.12	-0.06	-1.07	-3.06**	0.195	0.206	0.240	136.8
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.18	-0.18	-0.36	0.11	-0.21	0.12	0.04	-0.01	0.09	0.00	-0.02	-0.06	0.03
Finland	1.12	-0.01	-0.53	0.94	-0.00	-0.01	-0.11	0.22	-4.79	-5.75	0.138	0.382	0.729	363.3
	0.63				-0.22	0.30	0.00	0.07	-0.50	-6.67	0.198	0.242	0.192	1084.
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.18	-0.20	-0.42*	0.18	0.21	-0.02	-0.12	-0.06	0.06	0.05	0.05	-0.19	0.04
France	-0.01	0.24	0.19	1.00	-1.74	-0.26	-0.00	0.72	6.90	-10.1	0.489	0.702	0.595	1437.
	-0.51				-2.11	-0.18	0.12	0.95	12.56**	12.0**	0.478	0.497	0.542	1624.
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.18	-0.16	-0.19	-0.19	-0.25	0.38*	0.10	-0.00	-0.17	-0.08	0.05	0.08	0.04
Italy	0.86	-0.02	-0.47	-0.24	-0.77	-0.00	0.04	0.21	0.93	-7.53**	0.197	0.212	0.621	266.0
	0.56				-0.69	0.06	0.12	0.41	1.38	-6.30**	0.184	0.189	0.515	341.1
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.18	-0.02	0.11	-0.36	0.00	-0.14	0.20	-0.28	-0.07	-0.24	0.18	0.29	0.14

* Correlation is greater than two times its estimated standard error in absolute value.

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE G - 9 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past, D1, D2) & MO = g(FE: current, 3 past, D1, D2)															
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²	
											Smallest	Largest			
Netherlands	-1.55	-0.22	0.00	0.83	-0.68	0.27	0.08	0.01	7.21	2.43	0.146	0.231	0.825	364.9	
	-1.91				-1.12	0.15	0.03	-0.02	13.52**	-5.66	0.211	0.249	0.573	890.6	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
	0.18	0.19	-0.13	-0.35	-0.06	0.14	0.16	0.04	-0.04	-0.20	-0.03	-0.09	-0.02		
Norway	0.18	0.07	-0.01	-0.12	-0.34	0.11	-0.03	-0.08	1.38	-2.59**	0.089	0.127	0.550	31.65	
	0.22				-0.28	0.12	-0.05	-0.08	0.93	-2.37**	0.085	0.100	0.513	34.28	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
	0.18	-0.21	-0.09	-0.07	-0.25	-0.04	0.17	-0.01	0.12	0.16	-0.14	-0.04	-0.16		
Portugal	-0.29	0.44	0.45	0.36	-0.08	0.44	-0.45	0.20	6.18	-1.79	0.380	0.449	0.331	820.3	
	0.38				-0.18	0.47	-0.41	0.19	4.88	-3.86	0.359	0.435	0.275	889.2	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
	0.18	-0.22	0.17	0.07	-0.11	0.03	0.15	-0.12	0.12	0.03	-0.17	-0.07	0.04		
Sweden	0.59	0.15	-0.03	0.05	-0.31	0.18	0.19	0.04	-2.15**	-0.54	0.121	0.147	0.519	37.77	
	0.57				-0.32	0.14	0.16	0.02	-2.12**	-0.78	0.116	0.131	0.491	39.96	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
	0.18	-0.30	-0.03	-0.12	0.03	-0.11	0.01	-0.07	0.35	-0.38*	0.08	0.11	0.06		
Switzerland	-0.33	-0.38	-0.26	0.40	-0.48	-0.29	0.05	-0.04	1.22	-0.95	0.132	0.183	0.612	28.33	
	-0.31				-0.49	-0.27	0.06	0.03	1.52**	-0.80	0.157	0.162	0.386	44.84	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
	0.18	-0.20	-0.33	0.23	-0.03	-0.21	0.02	-0.10	0.07	0.11	-0.00	-0.04	0.03		

* Correlation is greater than two times its estimated standard error in absolute value.

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE G - 10 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past, D1, D2) & MO = g(FE: current, 3 past, D1, D2)														
Country	C	SEE												R ²
		+3	+2	+1	0	-1	-2	-3	D1	D2	Smallest	Largest	R ²	e ²
U.K.	0.44	-0.11	0.04	0.14	-0.06	0.10	-0.24	0.03	-1.46**	-2.10**	0.041	0.054	0.849	9.774
	0.49				-0.16	0.09	-0.22	0.05	-0.82	-2.79**	0.050	0.058	0.727	17.75
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.19	-0.27	0.34	-0.27	0.48*	-0.26	0.05	-0.12	0.21	-0.02	-0.23	0.11	-0.14	
<u>MID EAST</u>														
Israel	0.36	-0.05	0.14	0.32	0.01	-0.28	0.15	0.07	-1.33	1.73	0.100	0.133	0.638	165.2
	-0.58				-0.09	-0.37	0.05	-0.05	0.68	3.85**	0.099	0.113	0.469	242.4
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.19	-0.24	-0.25	-0.29	0.37	0.07	-0.08	-0.18	0.18	-0.12	0.04	-0.06	0.13	
<u>NORTH AMERICA</u>														
Canada	0.40	-0.10	0.10	0.03	-0.25	-0.05	-0.11	0.06	-0.38	-0.83	0.097	0.117	0.443	53.96
	0.33				-0.30	-0.06	-0.14	0.06	-0.10	-0.70	0.094	0.095	0.374	60.68
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	-0.06	-0.23	-0.05	-0.31	0.15	0.02	0.07	-0.01	-0.13	0.03	-0.14	0.10	

* Correlation is greater than two times its estimated standard error in absolute value.

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE G - 11 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past, D1,D2) & MO = g(FE: current, 3 past, D1,D2)															
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²	
											Smallest	Largest			
U.S.A.															
Total	A'	0.61	0.00	0.06	0.47	0.18	-0.12	0.15	-0.06	-3.64	-0.32	0.157	0.255	0.521	37.19
		1.09				0.02	-0.02	0.30	0.15	-2.15	-1.98	0.179	0.213	0.327	52.29
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
		0.23	-0.05	-0.01	-0.26	-0.05	-0.04	-0.14	-0.27	0.04	0.21	0.11	0.06	-0.07	
	A''	0.00	-0.04	-0.00	-0.00	-0.04	0.05	0.04	-0.04		0.02	0.030	0.047	0.393	4.242
		0.07				-0.04	0.05	0.04	-0.04		-0.08	0.027	0.041	0.338	4.625
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
		0.19	-0.02	0.12	0.06	-0.24	0.15	0.02	-0.01	0.03	-0.02	0.01	-0.19	-0.14	
	A	0.29	-0.14	0.05	-0.04	-0.06	-0.01	0.03	0.12	-0.96	-0.22	0.069	0.075	0.230	147.8
		0.28				-0.06	-0.04	0.02	0.11	-1.15	-0.14	0.068	0.075	0.133	166.4
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
		0.14	-0.17	-0.08	0.04	-0.01	-0.09	-0.03	0.11	0.15	-0.15	0.21	0.01	0.01	

Range: A' = 1920-1945; A'' = 1946-1979; A = 1920-1979.

TABLE G - 12 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

M0 = f(FE: 3 lead, current, 3 past, D1,D2) & M0 = g(FE: current, 3 past, D1,D2)															
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²	
											Smallest	Largest			
U.S.A.															
White	A'	0.84	-0.03	0.00	0.31	0.04	0.00	0.30	0.05	-3.87	0.01	0.166	0.274	0.415	43.65
		1.05				-0.04	0.03	0.39	0.19	-2.75	-0.76	0.177	0.225	0.296	52.47
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
		0.23	0.02	-0.14	-0.29	-0.04	0.06	-0.06	-0.32	0.00	0.21	0.13	0.05	-0.08	
	A''	0.29	-0.02	0.02	-0.02	0.03	0.01	0.08	0.02		-0.45	0.026	0.037	0.467	1.803
		0.34				0.02	0.02	0.07	0.03		-0.52**	0.024	0.028	0.424	1.949
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
		0.20	-0.03	0.03	0.01	-0.18	0.10	-0.20	-0.06	0.00	0.03	0.08	0.08	-0.13	
	A	0.33	-0.14	0.04	-0.06	-0.05	0.03	0.03	0.13	-0.79	-0.45	0.066	0.071	0.231	124.6
		0.33				-0.05	-0.01	0.02	0.11	-1.04	-0.40	0.064	0.070	0.128	141.5
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
		0.14	-0.11	-0.08	0.04	-0.05	0.07	-0.01	0.10	0.17	-0.08	0.24	-0.03	0.00	

Range: A' = 1920-1945; A'' = 1946-1977; A = 1920-1977.

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE G - 13 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past, D1,D2) & MO = g(FE: current, 3 past, D1,D2)															
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²	
											Smallest	Largest			
U.S.A.															
Nonwhite	A'	2.50	-0.18	-0.38	0.49	0.20	-0.32	0.13	0.28	-3.42	-1.79	0.309	0.489	0.331	150.1
		1.96				0.13	-0.13	0.02	0.15	-1.97	-1.04	0.262	0.299	0.076	207.3
PDQ		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
		0.23	-0.21	-0.14	-0.13	0.01	0.08	-0.12	-0.05	-0.07	-0.07	0.12	0.14	-0.10	
	A''	-0.93	-0.12	-0.09	-0.16	-0.31	-0.06	-0.06	-0.17		0.95	0.112	0.138	0.354	31.35
		-0.25				-0.21	0.05	0.04	-0.09		0.48	0.103	0.105	0.279	35.00
PDQ		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
		0.20	0.07	-0.27	-0.24	-0.08	0.21	0.46*	-0.27	-0.26	-0.12	-0.01	0.23	0.09	
	A	0.44	-0.17	-0.06	0.11	-0.02	-0.19	0.14	0.01	-2.31	0.27	0.130	0.143	0.192	476.5
		0.38				-0.02	-0.20	0.11	-0.03	-2.38	0.43	0.127	0.142	0.143	505.3
PDQ		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
		0.14	0.00	-0.14	0.06	0.26	0.03	-0.03	0.26	0.09	-0.19	0.09	0.11	-0.03	

Range: A' = 1920-1945; A' 1946-1977; A = 1920-1977.

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE G - 14 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past, D2)										& MO = g(FE: current, 3 past, D2)			
Country	C	+3	+2	+1	0	-1	-2	-3	D2	SEE		R ²	e ²
										Smallest	Largest		
<u>ASIA</u>													
Japan	-0.82	-0.05	0.02	0.06	0.01	0.27	0.26	0.08	3.16**	0.062	0.084	0.692	34.49
	-0.71				-0.01	0.28	0.28	0.08	2.90**	0.059	0.067	0.664	37.64
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.20	-0.16	-0.26	0.25	-0.28	-0.03	0.22	-0.14	0.10	0.02	-0.18	0.06	-0.14
Taiwan	-0.32	0.01	-0.16	0.00	0.15	-0.02	0.02	-0.02	1.83	0.062	0.092	0.511	90.80
	0.00				0.15	-0.01	0.00	-0.05	1.75	0.060	0.065	0.384	114.5
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.20	-0.03	-0.28	0.03	0.01	0.00	0.31	-0.01	-0.40	-0.12	0.17	0.02	-0.14

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE G - 15 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

MO = f(FE: 3 lead, current, 3 past, D1, D2) & MO = g(FE: current, 3 past, D1, D2)														
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²
											Smallest	Largest		
<u>OCEANIA</u>														
Australia	-0.20	-0.20	-0.09	-0.14	-0.08	-0.04	-0.12	-0.20	1.18	0.50	0.084	0.116	0.346	24.03
	0.17				0.00	0.02	-0.05	-0.16	-0.28	0.02	0.096	0.104	0.159	30.94
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	-0.04	-0.02	-0.22	-0.34	0.06	0.08	-0.00	0.05	-0.08	-0.09	0.10	-0.09	
New Zealand	-0.09	0.22	0.03	-0.00	0.06	-0.14	-0.22	0.13	-0.46	0.78	0.102	0.121	0.483	57.20
	-0.34				-0.03	-0.18	-0.19	0.14	0.35	0.95	0.095	0.104	0.372	69.48
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	-0.16	-0.40*	0.31	-0.00	-0.50*	0.10	0.17	-0.14	-0.01	0.20	0.01	0.09	

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE H - 1

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(MO: 3 lead, current, 3 past) & FE = g(MO: current, 3 past)

Country	C	+3	+2	+1	0	-1	-2	-3	SEE		R ²	e ²	
									Smallest	Largest			
EUROPE													
Denmark	-0.07	-0.05	0.36	0.04	0.13	0.25	-0.42	-0.16	0.151	0.273	0.405	109.90	
	0.00				0.08	0.30	-0.42	-0.09	0.146	0.158	0.318	121.49	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.20	0.06	0.01	-0.31	-0.12	-0.02	-0.15	0.07	-0.08	0.04	-0.02	-0.14
Finland	0.09	-0.29	-0.34	0.48	-0.24	0.53	0.01	-0.15	0.147	0.242	0.553	570.98	
	-0.31				-0.22	0.49	-0.22	-0.18	0.145	0.151	0.398	769.42	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.45*	0.33	0.22	-0.05	-0.05	-0.02	-0.13	-0.01	-0.01	-0.03	-0.11	-0.09
France	0.18	-0.02	-0.04	-0.02	-0.10	0.15	0.04	0.05	0.050	0.064	0.438	193.19	
	0.26				-0.09	0.16	0.03	0.04	0.046	0.047	0.419	199.75	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	-0.05	-0.17	0.23	0.02	-0.30	0.06	0.14	-0.14	-0.01	0.05	-0.01	0.05
Italy	0.24	0.30	0.17	-0.07	-0.41	0.00	0.06	0.10	0.123	0.225	0.327	290.55	
	-0.13				-0.38	-0.03	0.02	0.05	0.117	0.134	0.248	324.65	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	-0.09	-0.15	-0.22	0.06	-0.03	0.25	-0.20	-0.04	-0.18	0.03	-0.02	0.09

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE H - 2 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(MO: 3 lead, current, 3 past) & FE = g(MO: current, 3 past)

Country	C	+3	+2	+1	0	-1	-2	-3	SEE		R ²	e ²	
									Smallest	Largest			
Netherlands	0.79	-0.07	0.10	0.16	-0.17	0.54	0.11	-0.08	0.037	0.038	0.917	71.965	
	0.73				-0.17	0.53	0.12	-0.07	0.052	0.052	0.821	155.66	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.28	0.07	0.01	-0.01	0.03	-0.06	-0.16	-0.10	-0.43*	-0.28	-0.08	-0.13
Norway	0.17	-0.78	0.01	0.69	-0.37	0.17	0.12	0.57	0.340	0.549	0.339	165.71	
	0.27				-0.50	0.33	0.33	0.52	0.320	0.335	0.200	200.69	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.08	0.17	-0.09	-0.11	-0.24	-0.24	-0.08	0.15	0.20	0.25	0.11	0.06
Portugal	-0.20	-0.06	-0.06	0.02	-0.05	0.06	0.09	0.06	0.087	0.130	0.129	272.93	
	-0.15				-0.08	0.06	0.10	0.06	0.083	0.092	0.108	279.49	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	-0.06	0.03	0.15	0.17	0.11	-0.03	0.17	-0.11	-0.10	0.02	-0.05	-0.06
Sweden	-0.02	-0.08	0.30	0.12	-0.68	-0.12	-0.06	0.19	0.235	0.448	0.296	98.700	
	-0.01				-0.65	-0.09	0.03	0.16	0.217	0.229	0.239	106.75	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.14	-0.02	0.05	-0.07	-0.30	-0.20	0.04	0.12	0.02	-0.16	0.19	-0.07
Switzerland	0.05	0.38	-0.19	0.10	-0.48	0.37	-0.16	-0.08	0.174	0.239	0.433	44.792	
	0.02				-0.44	0.43	-0.23	-0.05	0.164	0.174	0.361	50.542	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.17	0.16	-0.16	-0.08	-0.05	0.03	0.18	-0.18	-0.13	-0.09	-0.04	-0.05

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE H - 3 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(M0: 3 lead, current, 3 past) & FE = g(M0: current, 3 past)

Country	C	+3	+2	+1	0	-1	-2	-3	SEE		R ²	e ²	
									Smallest	Largest			
U.K.	0.75	-0.66	-2.30	1.31	0.44	-0.07	0.82	0.39	0.179	0.419	0.703	99.365	
	0.41				-0.28	0.27	0.12	0.31	0.243	0.539	0.105	299.45	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.19	0.15	-0.02	0.05	0.42*	-0.13	0.05	-0.06	0.07	-0.25	-0.10	-0.26	-0.12
<u>MID EAST</u>													
Israel	-0.63	-0.01	0.31	-0.57	0.16	0.51	0.49	0.09	0.272	0.303	0.435	577.32	
	-0.77				0.12	0.62	0.50	0.07	0.273	0.279	0.261	754.87	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.19	-0.25	0.08	-0.05	0.01	0.01	0.11	-0.23	0.09	-0.09	-0.02	0.04	-0.01
<u>NORTH AMERICA</u>													
Canada	0.12	0.93	-1.37	0.65	-1.50	0.25	0.01	-0.45	0.239	0.567	0.499	154.26	
	0.14				-0.76	-0.24	0.12	-0.37	0.257	0.357	0.308	213.16	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.00	-0.28	-0.16	-0.16	0.22	0.04	0.04	-0.34	-0.15	0.38*	-0.10	0.02

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE H - 4 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(MO: 3 lead, current, 3 past) & FE = g(MO: current, 3 past)

										SEE		R ²	e ²	
Country	C	+3	+2	+1	0	-1	-2	-3	Smallest	Largest				
U.S.A.														
Total	A'	0.21	-0.01	0.06	-0.27	0.15	0.70	0.07	-0.04	0.447	0.493	0.234	153.2	
		0.21				0.11	0.75	0.00	0.01	0.386	0.400	0.210	157.9	
PDQ		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.23	0.12	0.28	-0.13	0.20	-0.08	0.09	-0.07	0.22	-0.15	-0.04	-0.29	-0.04
	A''	-0.69	-0.34	1.59	2.59	-0.18	-1.42	-1.34	-0.87	1.010	1.245	0.303	139.1	
		-0.44				-0.65	-1.20	-1.00	-0.61	1.062	1.132	0.090	181.5	
PDQ		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.19	0.28	-0.21	-0.27	-0.14	-0.07	0.14	0.09	0.04	0.17	0.13	-0.17	-0.21
	A	-0.08	0.47	0.11	-0.23	-0.50	-0.30	0.23	-0.46	0.282	0.311	0.191	661.1	
		-0.53				-0.42	-0.14	0.27	-0.47	0.269	0.279	0.131	710.3	
PDQ		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.14	0.01	-0.05	0.03	0.08	0.29*	0.04	0.14	-0.06	-0.03	0.18	-0.19	0.03

Range: A' = 1920-1945; A'' = 1946-1979; A = 1920-1979.

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE H - 5 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(MO: 3 lead, current, 3 past) & FE = g(MO: current, 3 past)

										SEE		R ²	e ²	
Country	C	+3	+2	+1	0	-1	-2	-3	Smallest	Largest				
U.S.A.														
White	A'	0.46	-0.32	-0.18	-0.57	-0.18	-0.00	-0.42	-0.61	0.478	0.616	0.224	158.5	
		0.39				-0.20	0.28	-0.34	-0.27	0.430	0.439	0.131	177.6	
PDQ		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.23	0.30	0.45	0.21	0.38	0.11	0.05	-0.16	0.00	-0.28	-0.25	-0.34	-0.21
	A''	-0.94	1.07	4.85	-0.61	-0.41	-2.34	0.08	-2.84	1.134	1.760	0.564	88.83	
		-0.55				0.38	-2.20	0.31	-2.20	1.262	1.567	0.250	152.8	
PDQ		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.20	0.02	-0.45*	0.05	-0.14	-0.23	0.20	0.02	-0.11	0.29	0.10	-0.11	-0.09
	A	0.04	0.54	0.16	-0.20	-0.56	-0.18	0.28	-0.53	0.326	0.355	0.180	722.4	
		0.09				-0.49	-0.04	0.35	-0.48	0.312	0.323	0.123	773.4	
PDQ		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.14	0.09	-0.14	0.02	0.22	0.23	0.06	0.11	-0.01	-0.00	0.15	-0.14	-0.05

Range: A' = 1920-1945; A'' = 1946-1977; A = 1920-1977.

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE H - 6 (cont'd)

Sims's Test
Estimated Lag Profiles and PDQ of Residuals

FE = f(MO: 3 lead, current, 3 past) & FE = g(MO: current, 3 past)

Country	C	+3	+2	+1	0	-1	-2	-3	SEE		R ²	e ²	
									Smallest	Largest			
U.S.A.													
Nonwhite	A'	1.39	-0.11	-0.24	-0.21	-0.05	0.18	-0.27	-0.04	0.213	0.340	0.258	184.3
		0.43				0.05	0.30	-0.24	-0.01	0.194	0.292	0.174	205.4
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.23	0.36	0.59*	0.06	0.12	-0.08	-0.05	-0.08	-0.18	-0.17	-0.35	-0.20	-0.27
	A''	-0.69	-0.00	0.24	0.41	-0.84	-0.06	0.16	-0.29	0.432	0.604	0.274	151.6
		-0.63				-0.83	-0.07	0.16	-0.34	0.395	0.412	0.218	163.1
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.20	-0.08	-0.20	-0.19	-0.13	0.11	-0.02	0.08	0.02	0.07	-0.02	-0.22	-0.02
	A	-0.10	-0.02	0.26	-0.17	-0.07	0.05	-0.18	-0.21	0.121	0.161	0.200	552.5
		-0.08				-0.08	0.08	-0.17	-0.19	0.119	0.151	0.118	609.2
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.14	0.12	-0.11	0.05	0.08	0.05	0.12	0.25	0.02	-0.04	0.15	-0.14	-0.23
ASIA													
Japan		0.13	0.70	-0.23	1.45	-1.07	1.11	-0.18	0.24	0.434	0.735	0.545	330.7
		1.22				-0.75	1.11	0.49	0.78	0.396	0.537	0.361	464.7
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.20	-0.22	-0.05	0.00	0.00	0.02	0.05	-0.28	0.19	-0.17	-0.16	0.01	-0.17

Range: A' = 1920-1945; A'' = 1946-1977; A = 1920- 1977.

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE H - 7 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(M0: 3 lead, current, 3 past) & FE = g(M0: current, 3 past)

Country	C	+3	+2	+1	0	-1	-2	-3	SEE		R ²	e ²	
									Smallest	Largest			
Taiwan	-2.18	-0.63	0.73	-0.03	1.75	0.73	-0.01	-0.10	0.550	1.080	0.431	1050.7	
	-2.08				1.55	0.52	0.25	-0.33	0.440	0.583	0.383	1140.1	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.20	-0.06	-0.05	-0.11	0.09	0.13	-0.15	-0.16	-0.08	-0.05	0.15	-0.09	0.07
OCEANIA													
Australia	0.36	-0.97	-0.36	-0.26	-0.42	-0.57	-0.18	-0.55	0.336	0.370	0.360	102.57	
	0.35				-0.31	-0.37	-0.24	-0.60	0.353	0.374	0.139	137.99	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	-0.21	0.04	-0.02	-0.00	-0.17	-0.08	0.13	-0.27	0.19	-0.08	0.15	-0.14
New Zealand	0.19	0.76	-0.23	-0.48	-0.02	0.39	0.48	0.15	0.300	0.344	0.451	196.08	
	0.22				0.01	0.23	0.60	0.57	0.274	0.308	0.243	270.29	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
	0.18	0.08	-0.26	-0.05	0.15	0.16	-0.07	-0.15	-0.12	-0.05	0.16	0.05	0.04

TABLE H - 8

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(MO: 3 lead, current, 3 past, D1, D2) & FE = g(MO: current, 3 past, D1, D2)														
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²
											Smallest	Largest		
EUROPE														
Denmark	-0.01	-0.02	0.43	-0.05	0.01	0.11	-0.43	-0.07	1.38	-2.04	0.156	0.368	0.545	80.99
	0.36				-0.09	0.14	-0.47	-0.05	0.44	-2.67	0.153	0.178	0.444	98.89
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	0.15	-0.09	-0.13	-0.47*	-0.05	-0.09	-0.10	0.12	-0.03	0.20	0.11	-0.04	
Finland	-2.12	-0.01	-0.07	0.84	-0.02	0.65	0.03	-0.19	7.93**	7.72	0.123	0.239	0.735	338.3
	-1.76				-0.23	0.44	-0.25	-0.20	5.73**	0.96	0.135	0.144	0.528	602.9
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	0.04	0.02	-0.06	-0.29	-0.03	-0.04	-0.01	0.13	-0.02	0.02	-0.06	0.02	
France	-0.59	-0.05	-0.09	-0.16	-0.31	-0.12	-0.09	-0.06	6.80**	-5.95**	0.056	0.093	0.637	124.5
	-0.34				-0.17	0.05	-0.01	-0.02	3.73**	-1.44	0.051	0.073	0.506	169.5
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	-0.00	-0.10	0.09	-0.08	-0.14	0.04	0.06	-0.01	-0.08	-0.20	-0.05	0.15	
Italy	0.37	0.17	0.27	0.06	-0.61	-0.20	-0.12	-0.22	3.54	-6.84**	0.121	0.252	0.591	176.6
	0.61				-0.50	-0.26	-0.17	-0.24	1.59	-8.12**	0.111	0.123	0.550	194.4
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	-0.13	-0.11	0.01	-0.07	-0.04	0.04	-0.31	-0.05	0.01	-0.14	0.21	0.22	

* Correlation is greater than two times its estimated standard error in absolute value.

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE H - 9 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(MO: 3 lead, current, 3 past, D1, D2) & FE = g(MO: current, 3 past, D1, D2)														
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²
											Smallest	Largest		
Netherlands	0.51	-0.11	0.04	0.08	-0.25	0.43	0.12	-0.05	2.60	-2.63**	0.034	0.051	0.944	48.24
	0.42				-0.27	0.40	0.12	-0.03	3.27**	3.01**	0.043	0.053	0.894	91.97
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	0.07	-0.15	-0.10	-0.06	0.02	-0.01	-0.06	0.20	-0.17	-0.16	0.03	0.01	
Norway	0.70	-0.40	-0.96	-0.39	-0.96	-0.03	-0.18	0.12	1.82	-7.46**	0.271	0.539	0.660	85.17
	0.02				-0.90	-0.05	0.05	0.29	3.20**	3.55**	0.244	0.278	0.584	104.3
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	-0.17	-0.16	-0.23	0.20	-0.05	-0.26	-0.13	0.20	0.15	0.02	-0.11	0.09	
Portugal	0.71	-0.11	-0.08	0.08	0.00	0.09	0.12	0.10	-3.32	-1.91	0.085	0.139	0.284	224.2
	0.66				-0.04	0.09	0.14	0.10	-3.02	-1.46	0.082	0.098	0.239	238.5
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	-0.18	-0.09	0.02	0.00	0.09	-0.11	0.11	-0.13	-0.14	0.03	-0.06	-0.04	
Sweden	1.07	-0.24	0.03	-0.10	-0.90	-0.44	-0.26	-0.03	-2.81	-3.26	0.287	0.446	0.417	81.72
	0.90				-0.87	-0.45	-0.27	-0.09	-2.52	-3.07**	0.235	0.264	0.400	84.10
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	0.02	-0.07	-0.06	-0.13	-0.28	-0.19	0.10	0.10	0.05	-0.15	0.20	0.00	
Switzerland	-0.28	0.17	-0.26	-0.06	-0.63	0.28	-0.24	-0.05	1.40	-0.70	0.174	0.240	0.533	36.93
	-0.22				-0.60	0.33	-0.32	-0.03	1.30	-0.64	0.159	0.174	0.489	40.40
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	0.01	-0.01	-0.31	-0.24	-0.13	0.05	0.22	0.00	-0.09	-0.04	0.03	-0.01	

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE H - 10 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(M0: 3 lead, current, 3 past, D1, D2) & FE = g(M0: current, 3 past, D1, D2)														
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²
											Smallest	Largest		
U.K.	1.05	-0.48	-2.34	1.09	0.24	-0.24	0.71	0.31	-0.73	-2.10	0.212	0.843	0.714	95.66
	0.05				-0.29	0.57	0.37	0.27	4.84	-0.37	0.283	0.644	0.298	234.6
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.19	0.12	-0.10	-0.01	0.42*	-0.11	0.02	-0.07	0.05	-0.20	-0.02	-0.25	-0.13
<u>MID EAST</u>														
Israel	-1.16	-0.21	-0.09	-1.22	-0.44	-0.03	-0.18	-0.16	0.03	9.97	0.356	0.606	0.491	519.2
	-1.00				0.26	0.73	0.63	0.11	3.54	-1.45	0.283	0.355	0.292	723.6
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.19	-0.16	0.05	0.02	0.00	0.11	0.15	-0.14	0.06	-0.05	-0.02	-0.01	-0.04
<u>NORTH AMERICA</u>														
Canada	-0.65	1.13	-1.22	0.81	-1.36	0.36	0.09	-0.34	2.44	0.68	0.263	0.664	0.538	142.3
	-0.18				-0.66	-0.17	0.20	-0.29	2.06	-0.70	0.269	0.365	0.386	188.9
	PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
		0.19	-0.02	-0.29	-0.17	-0.18	0.26	0.05	0.09	-0.34	-0.17	0.39*	-0.10	0.02

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE H - 11 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(MO: 3 lead, current, 3 past, D1,D2) & FE = g(MO: current, 3 past, D1,D2)															
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²	
											Smallest	Largest			
U.S.A.															
Total	A'	-0.73	0.18	0.19	-0.23	0.27	0.51	-0.24	-0.62	5.48**	-1.23	0.390	0.423	0.583	83.35
		-0.64				0.23	0.54	-0.33	-0.55	5.19**	-1.27	0.332	0.371	0.544	91.24
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
		0.23	-0.33	0.06	-0.30	0.38	-0.06	0.02	-0.36	0.27	-0.07	0.08	-0.24	0.04	
	A''	-1.13	-0.93	0.61	2.00	0.00	-0.94	-0.75	-0.44		1.93	1.064	1.463	0.352	129.2
		-1.18				-0.42	-0.72	-0.48	-0.17		2.58	1.015	1.063	0.242	151.2
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
		0.19	0.21	-0.25	-0.30	-0.21	-0.19	0.14	0.10	0.06	0.19	0.13	-0.17	-0.19	
	A	-1.12	0.30	0.18	-0.14	-0.29	-0.01	0.47	-0.19	4.82**	1.47	0.280	0.315	0.301	571.8
		-1.26				-0.23	0.12	0.57	-0.16	5.20**	1.95	0.269	0.277	0.273	594.1
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
		0.14	-0.07	-0.12	-0.08	0.02	0.19	-0.11	0.04	-0.11	-0.07	0.12	-0.25	0.06	

Range: A' = 1920-1945; A'' = 1946-1979; A = 1920-1979.

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE H - 12 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(M0: 3 lead, current, 3 past, D1,D2) & FE = g(M0: current, 3 past, D1,D2)															
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²	
											Smallest	Largest			
U.S.A.															
White	A'	-0.35	0.15	0.20	-0.21	0.14	0.32	-0.28	-0.71	5.39**	-1.33	0.417	0.528	0.583	85.26
		-0.32				0.06	0.32	-0.42	-0.67	5.18**	-1.31	0.337	0.359	0.554	91.13
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
		0.23	-0.36	-0.01	-0.27	0.43	-0.04	0.01	-0.34	0.26	-0.04	-0.01	-0.21	0.01	
	A''	-0.58	1.90	6.00	-0.26	-0.97	-2.90	-0.74	-3.39		-1.53	1.417	2.282	0.575	86.48
		-1.43				0.76	-1.37	1.30	-1.39		2.52	1.30	1.51	0.345	133.3
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
		0.20	0.06	-0.44*	0.04	-0.12	-0.19	0.21	0.01	-0.11	0.30	0.10	-0.16	-0.11	
	A	-1.14	0.34	0.22	-0.11	-0.37	0.07	0.54	-0.22	5.11**	1.77	0.315	0.350	0.304	612.9
		-1.26				-0.32	0.19	0.64	-0.15	5.44**	2.22	0.305	0.311	0.278	636.6
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12		
		0.14	-0.00	-0.25	-0.09	0.16	0.10	-0.12	0.00	-0.07	-0.06	0.08	-0.16	0.03	

Range: A' = 1920-1945; A'' = 1946-1977; A = 1920-1977.

* Correlation is greater than two times its estimated standard error in absolute value.

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE H - 13 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(MO: 3 lead, current, 3 past, D1,D2) & FE = g(MO: current, 3 past, D1,D2)														
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²
											Smallest	Largest		
U.S.A.														
Nonwhite A'	0.39	0.14	-0.06	-0.06	0.04	0.26	-0.31	-0.17	3.74	-2.22	0.228	0.337	0.417	144.8
	0.22				0.08	0.30	-0.26	-0.16	3.39	-2.17	0.198	0.270	0.393	150.9
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.23	-0.03	0.28	-0.32	-0.01	-0.10	0.02	0.09	-0.10	-0.16	-0.31	0.03	-0.03	
A''	-1.17	-0.21	0.01	0.26	-0.90	-0.12	0.15	-0.24		1.72	0.435	0.551	0.320	141.9
	-1.15				-0.86	-0.14	0.15	-0.38		1.87	0.383	0.401	0.302	145.8
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.20	-0.12	-0.28	-0.17	-0.11	0.12	0.04	0.10	-0.01	0.04	-0.02	-0.24	-0.01	
A	-0.92	-0.07	0.26	-0.16	-0.03	0.09	-0.12	-0.15	2.44	1.74	0.124	0.164	0.262	510.1
	-0.89				-0.04	0.10	-0.13	-0.14	2.12	1.85	0.121	0.154	0.179	567.4
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.14	0.09	-0.17	-0.06	-0.02	-0.06	0.02	0.18	-0.02	-0.05	0.12	-0.21	-0.24	

Range: A' = 1920-1945; A'' = 1946-1977; A = 1920- 1977.

TABLE H - 14 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(M0: 3 lead, current, 3 past, D2) & FE = g(M0: current, 3 past, D2)														
Country	C	+3	+2	+1	0	-1	-2	-3	D2	SEE			R ²	e ²
										Smallest	Largest			
<u>ASIA</u>														
Japan	1.18	0.60	-0.29	1.47	-1.10	0.84	-0.53	0.02	-3.90	0.463	0.729	0.585	301.3	
	2.20				-0.82	0.80	0.15	0.54	-3.99	0.446	0.579	0.404	433.3	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.20	-0.37	-0.19	0.16	-0.02	0.02	0.07	-0.25	0.27	-0.15	-0.03	0.11	-0.09	
Taiwan	-2.02	-0.77	0.70	-0.04	1.81	0.81	0.06	-0.00	-1.37	0.668	0.987	0.432	1048.	
	-2.20				1.52	0.49	0.20	-0.37	0.80	0.499	0.640	0.383	1138.	
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.20	-0.04	-0.06	-0.09	0.12	0.15	-0.13	-0.17	-0.08	-0.06	0.12	-0.09	0.05	

TABLE H - 15 (cont'd)

Sims's Test

Estimated Lag Profiles and PDQ of Residuals

FE = f(MO: 3 lead, current, 3 past, D1, D2) & FE = g(MO: current, 3 past, D1, D2)														
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	SEE		R ²	e ²
											Smallest	Largest		
<u>OCEANIA</u>														
Australia	0.73	-0.97	-0.43	-0.41	-0.47	-0.67	-0.30	-0.69	-0.27	-1.17	0.356	0.596	0.422	92.59
	0.01				-0.13	-0.19	-0.15	-0.62	2.13**	-1.03	0.332	0.358	0.337	106.2
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	-0.20	0.06	-0.09	-0.05	-0.14	-0.07	0.12	-0.23	0.18	-0.08	0.15	-0.17	
New Zealand	-0.27	0.77	-0.12	-0.43	0.03	0.45	0.50	0.16	2.01	0.37	0.297	0.491	0.506	176.2
	-0.25				0.07	0.27	0.56	0.53	2.28	-0.02	0.271	0.310	0.319	242.9
PDQ	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12	
	0.18	-0.01	-0.37*	-0.13	0.06	0.11	-0.11	-0.15	-0.11	-0.04	0.21	0.06	0.05	

* Correlation is greater than two times its estimated standard error in absolute value.

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE I - 1

Sims's Test

Estimated Lag Profiles

MO = f(FE: 5 lead, current, 5 past) & MO = g(FE: current, 5 past)															
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	SEE		
													Smallest	Largest	
<u>EUROPE</u>															
Denmark	A	0.42	0.52	-0.22	0.24	-0.34	0.54	-0.06	-0.14	0.29	0.12	0.22	-0.59	0.198	0.293
	B	0.16						-0.00	-0.18	0.31	0.16	-0.05	-0.42	0.182	0.231
Finland	A	-1.32	-0.12	-0.43	-0.41	0.80	-0.31	0.14	0.02	-0.36	0.12	0.13	-0.47	0.082	0.347
	B	-0.41						0.39	-0.10	-0.39	0.17	0.06	-0.44	0.091	0.115
France	A	-0.19	0.86	-0.77	0.24	0.63	2.47	-0.82	-0.99	-0.75	0.02	-0.03	-0.30	0.265	0.718
	B	0.22						-1.07	-0.33	-0.25	0.34	-0.83	-0.95	0.494	0.546
Italy	A	-1.20	0.35	0.22	0.43	-0.00	0.34	-0.09	0.05	0.10	0.22	0.17	0.18	0.204	0.459
	B	-0.95						-0.29	-0.05	-0.08	0.24	0.09	0.15	0.185	0.226
Nether-lands	A	-1.71	0.06	-0.34	-0.06	0.39	1.36	-0.29	0.35	0.21	0.14	0.03	0.08	0.077	0.189
	B	-0.57						-0.42	0.37	0.26	-0.00	-0.19	0.01	0.306	0.310
Norway	A	-0.13	0.01	0.14	-0.02	-0.09	-0.24	-0.08	0.40	-0.01	-0.08	-0.12	-0.25	0.064	0.122
	B	-0.17						-0.11	0.27	-0.03	-0.08	-0.01	-0.23	0.059	0.066
Portugal	A	-0.15	0.02	-0.57	0.29	0.29	0.27	0.12	1.08	-0.65	-0.09	-0.10	-0.04	0.323	0.394
	B	-0.06						-0.03	1.07	-0.50	-0.16	-0.00	-0.05	0.342	0.388

TABLE I - 2 (cont'd)

Sims's Test

Estimated Lag Profiles

MO = f(FE: 5 lead, current, 5 past) & MO = g(FE: current, 5 past)															
														SEE	
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	Smallest	Largest	
Sweden	A	0.19	0.01	0.25	0.26	0.07	0.06	-0.38	0.14	0.17	-0.00	-0.10	-0.02	0.154	0.196
	B	-0.05						-0.43	0.06	0.10	-0.04	-0.14	-0.05	0.142	0.151
Switzer- land	A	-0.50	-0.18	-0.30	-0.09	-0.39	0.17	0.02	-0.21	0.13	0.30	-0.01	0.18	0.150	0.296
	B	-0.38						-0.14	-0.09	0.08	0.28	0.06	0.08	0.144	0.204
U.K.	A	-0.09	-0.28	-0.06	-0.06	0.45	0.05	0.14	0.09	-0.13	-0.02	-0.04	0.00	0.059	0.156
	B	-0.00						-0.02	0.14	-0.19	-0.00	-0.09	-0.00	0.083	0.087
<u>MID EAST</u>															
Israel	A	0.43	-0.46	0.27	-0.15	0.20	0.21	0.09	-0.20	0.10	0.11	-0.08	0.10	0.091	0.202
	B	0.34						0.02	-0.30	0.10	-0.02	-0.09	0.22	0.104	0.133
<u>NORTH AMERICA</u>															
Canada	A	0.04	-0.07	-0.15	-0.16	0.13	-0.03	-0.14	-0.15	0.00	-0.02	0.02	-0.09	0.087	0.118
	B	0.14						-0.24	-0.15	-0.10	-0.00	0.01	-0.05	0.090	0.100

TABLE I - 3 (cont'd)

Sims's Test

Estimated Lag Profiles

MO = f(FE: 5 lead, current, 5 past) & MO = g(FE: current, 5 past)

Country		C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	SEE	
														Smallest	Largest
U.S.A.															
Total	A"	0.04	-0.04	0.05	-0.06	-0.01	0.03	-0.10	0.10	-0.00	-0.02	0.06	0.02	0.029	0.047
	B"	0.09						-0.07	0.08	0.00	-0.01	0.04	0.02	0.027	0.039
	A	0.14	-0.07	-0.03	-0.18	0.28	-0.05	-0.07	-0.01	0.07	0.09	0.01	-0.01	0.072	0.078
	B	0.08						-0.10	-0.07	0.03	0.06	-0.01	-0.00	0.069	0.074
White	A"	0.10	0.00	-0.02	-0.00	-0.01	-0.04	0.01	-0.00	0.03	0.01	-0.02	0.08	0.032	0.057
	B"	0.20						0.01	0.00	0.00	0.00	-0.01	0.08	0.022	0.023
	A	0.15	-0.10	-0.03	-0.19	0.01	-0.04	-0.04	0.04	0.07	0.10	-0.01	-0.01	0.069	0.078
	B	0.09						-0.08	-0.04	0.02	0.07	-0.02	0.00	0.066	0.072
Nonwhite	A"	-0.58	-0.16	-0.03	-0.16	-0.24	-0.05	-0.34	0.04	0.02	0.05	0.02	0.15	0.160	0.195
	B"	0.03						-0.21	0.09	0.06	0.01	0.02	0.06	0.120	0.133
	A	0.22	-0.31	-0.11	-0.32	-0.21	-0.04	-0.08	-0.15	0.29	0.06	0.33	0.23	0.116	0.135
	B	0.10						-0.14	-0.24	0.18	-0.06	0.22	0.19	0.121	0.139

Range: Total {A''=1946-1979, A =1920-1979; White & Nonwhite {A''=1946-1977, A =1920-1977.
{B''=1946-1979, B =1920-1979 {B''=1946-1977, B =1920-1977.

TABLE I - 4 (cont'd)

Sims's Test

Estimated Lag Profiles

MO = f(FE: 5 lead, current, 5 past) & MO = g(FE: current, 5 past)														SEE	
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	Smallest	Largest	
<u>ASIA</u>															
Japan	A	0.24	-0.09	-0.15	-0.05	0.11	0.15	-0.01	0.12	0.05	-0.02	0.01	0.03	0.070	0.176
	B	0.48						-0.15	0.06	0.09	0.06	0.08	0.04	0.058	0.088
Taiwan	A	-0.10	0.06	0.13	0.02	-0.12	0.01	-0.00	-0.11	0.02	-0.03	0.06	0.01	0.081	0.145
	B	-0.51						-0.02	-0.12	-0.02	-0.03	0.10	-0.00	0.055	0.117
<u>OCEANIA</u>															
Australia	A	-0.01	-0.06	0.13	-0.25	-0.08	-0.13	-0.02	0.03	-0.06	-0.14	0.01	0.00	0.078	0.096
	B	0.01						-0.05	0.00	-0.08	-0.17	-0.01	0.05	0.094	0.096
New Zealand	A	-0.34	-0.05	-0.23	0.14	0.02	-0.10	-0.05	-0.07	-0.14	0.22	-0.02	0.31	0.098	0.163
	B	-0.21						-0.03	-0.18	-0.12	0.25	-0.11	0.29	0.083	0.089

TABLE I - 5

202

Sims's Test
StatisticsA: MO = f(FE:5 lead, current, 5 past) & B: MO = g(FE: current, 5 past)

Country	Equation	R ²	e ²
<u>EUROPE</u>			
Denmark	A	0.464	70.44
	B	0.227	101.5
Finland	A	0.836	97.87
	B	0.688	186.6
France	A	0.890	291.2
	B	0.350	1724.
Italy	A	0.467	211.8
	B	0.270	290.1
Netherlands	A	0.959	83.47
	B	0.186	1666.
Norway	A	0.769	9.351
	B	0.620	15.43
Portugal	A	0.525	361.2
	B	0.342	500.1
Sweden	A	0.453	40.20
	B	0.332	15.43
Switzerland	A	0.514	21.31
	B	0.226	33.94
U.K.	A	0.817	10.45
	B	0.362	36.58
<u>MID EAST(ASIA)</u>			
Israel	A	0.777	92.27
	B	0.464	221.5
<u>NORTH AMERICA</u>			
Canada	A	0.616	28.52
	B	0.392	45.18
U.S.A.			
Total	A''	0.609	1.961
	B''	0.381	3.107
	A	0.276	131.9
	B	0.112	161.7
White	A''	0.732	0.614
	B''	0.593	0.934
	A	0.295	110.1
	B	0.107	139.6
Nonwhite	A''	0.459	22.86
	B''	0.308	29.25
	A	0.445	326.5
	B	0.223	457.5

Sims's Test

Statistics

Equation A

Equation B

$$MO = f(FE: 5 \text{ lead, current, 5 past}) \text{ \& } MO = g(FE: \text{current, 5 past})$$

Country	Equation	R^2	e^2
<u>ASIA</u>			
Japan	A	0.6299	23.1069
	B	0.5125	30.4355
Taiwan	A	0.4258	59.2212
	B	0.2756	74.7049
<u>OCEANIA</u>			
Australia	A	0.5815	14.0168
	B	0.1933	27.0177
New Zealand	A	0.6902	33.0668
	B	0.6149	41.0952

TABLE I - 7

Sims's Test
 PDQ of Residuals:
 Test for Serial Correlation in Residuals
 A, A" : MO = f(FE: 5 lead, current, 5 past)

Country		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>EUROPE</u>														
Denmark	A	0.19	0.23	-0.30	-0.24	0.10	0.40*	0.18	0.03	-0.09	-0.03	-0.01	0.07	0.08
Finland	A	0.19	0.07	-0.19	-0.02	0.10	0.26	-0.17	-0.20	0.14	0.13	-0.15	-0.02	0.10
France	A	0.19	-0.06	0.23	-0.23	0.06	0.21	-0.12	0.10	-0.32	0.11	-0.11	-0.15	-0.11
Italy	A	0.19	-0.30	0.10	-0.16	0.08	0.03	0.10	-0.29	0.11	-0.08	0.05	-0.12	0.04
Netherlands	A	0.19	0.28	0.21	-0.13	-0.16	-0.15	-0.01	-0.21	-0.14	-0.23	-0.15	-0.03	0.03
Norway	A	0.19	0.40*	0.25	0.13	0.08	-0.01	0.03	0.00	-0.16	-0.07	-0.29	-0.15	-0.19
Portugal	A	0.19	0.25	0.06	0.42*	-0.08	-0.03	0.24	-0.27	-0.22	0.10	-0.32	-0.26	-0.10
Sweden	A	0.19	-0.17	0.08	-0.03	0.13	-0.01	0.10	-0.04	0.38	-0.26	0.10	-0.14	0.18
Switzerland	A	0.19	-0.07	-0.17	0.22	-0.14	-0.26	0.29	-0.12	-0.05	0.20	-0.01	-0.14	-0.02
U.K.	A	0.20	0.41*	0.18	0.16	0.10	-0.11	-0.06	0.09	0.10	-0.00	0.03	0.02	-0.10
<u>MID EAST(ASIA)</u>														
Israel	A	0.20	0.01	-0.52*	-0.09	0.28	-0.07	-0.05	-0.09	-0.04	-0.08	-0.08	0.09	0.21
<u>NORTH AMERICA</u>														
Canada	A	0.19	0.25	-0.41*	-0.38	-0.16	0.06	0.31	0.11	-0.09	-0.12	-0.10	-0.21	-0.06
U.S.A.														
Total	A"	0.21	-0.10	-0.13	-0.35	-0.14	0.15	0.35	-0.13	-0.12	-0.05	0.15	-0.07	0.13
	A	0.14	-0.09	-0.24	0.07	0.00	0.08	-0.19	0.06	0.23	-0.15	0.05	0.08	-0.10
White	A"	0.22	0.13	-0.22	-0.46*	-0.17	0.27	0.20	-0.07	-0.05	-0.13	0.07	0.13	-0.01
	A	0.15	-0.05	-0.22	0.05	-0.12	0.05	-0.13	0.02	0.20	-0.11	0.10	0.04	-0.06
Nonwhite	A"	0.22	-0.02	0.01	-0.38	0.09	0.12	0.44	-0.33	-0.12	-0.16	0.11	0.22	0.10
	A	0.15	-0.06	-0.45*	0.05	0.37*	-0.14	-0.37*	0.19	0.18	-0.32*	-0.16	0.25	0.10

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE I - 8 (cont'd)

Sims's Test
 PDQ of Residuals:
 Test for Serial Correlation in Residuals
 Equation A
 $MO = f(FE: 5 \text{ lead, current, } 5 \text{ past})$

Country	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>ASIA</u>													
Japan	A 0.22	-0.04	-0.42	0.24	-0.05	-0.27	-0.12	0.10	0.06	-0.14	0.07	0.14	-0.11
Taiwan	A 0.22	-0.08	-0.31	-0.32	-0.14	0.22	0.42	-0.03	-0.30	-0.21	0.12	0.16	0.07
<u>OCEANIA</u>													
Australia	A 0.19	-0.32	0.00	0.04	-0.05	-0.11	-0.02	-0.08	0.05	-0.03	0.01	0.07	-0.08
New Zealand	A 0.19	-0.08	-0.30	0.28	-0.05	-0.43*	0.12	-0.01	-0.13	0.18	-0.06	-0.00	0.17

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE I - 9

Sims's Test

Estimated Lag Profiles

MO = f(FE: 5 lead, current, 5 past, D1, D2) & MO = g(FE: current, 5 past, D1, D2)														
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	D1	D2
<u>EUROPE</u>														
Denmark	A	0.70	0.27	-0.21	-0.09	-0.42	0.25	-0.16	-0.27	0.02	-0.18	-0.01	-0.27	0.10 -3.21
	B	0.74						-0.03	-0.17	0.19	0.01	-0.05	-0.20	-0.63 -2.62
Finland	A	-1.36	-0.12	-0.53	-0.57	0.78	-0.30	-0.00	-0.00	-0.31	0.25	0.25	-0.45	2.68 -4.29
	B	0.26						0.44	-0.05	-0.37	0.20	0.12	-0.38	-2.04 -2.22
France	A	-1.83	0.49	-1.18	-0.38	-0.17	1.48	-2.05	-1.11	-0.62	0.27	0.24	0.03	17.64 -5.03
	B	-0.01						-3.28	-0.44	0.64	1.88	1.33	1.16	22.32** -28.14
Italy	A	0.29	-0.09	0.05	0.35	-0.24	0.13	-0.33	-0.04	0.06	0.19	0.14	0.13	-2.66 -4.92**
	B	0.33						-0.40	-0.00	-0.01	0.30	0.14	0.20	-1.75 -5.34**
Nether- landa	A	-2.41	0.16	-0.50	-0.26	-0.02	0.73	-1.01	0.11	-0.03	-0.01	-0.01	0.11	13.94** -3.62
	B	-1.91						-1.38	0.11	-0.03	0.00	-0.01	0.26	18.71** -8.55
Norway	A	0.40	0.05	0.09	0.03	0.02	-0.11	-0.08	0.33	0.00	-0.00	0.08	-0.03	-1.30 -2.36**
	B	0.38						0.00	0.30	0.00	-0.01	0.12	0.00	-2.07** -2.38**
Portugal	A	-1.67	0.28	-0.18	0.55	0.34	0.33	0.01	1.09	-0.30	0.32	0.42	0.41	9.21 0.69
	B	-0.83						-0.05	1.06	-0.22	0.18	0.34	0.27	7.25** -1.56

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE I - 10 (cont'd)

Sims's Test

Estimated Lag Profiles

MO = f(FE: 5 lead, current, 5 past, D1, D2) & MO = g(FE: current, 5 past, D1, D2)															
Country		C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	D1	D2
Sweden	A	0.54	-0.11	0.17	0.16	0.08	0.07	-0.30	0.24	0.33	0.13	0.06	0.01	-2.59	0.06
	B	0.48						-0.34	0.18	0.24	0.07	-0.00	0.01	-2.49**	-0.51
Switzer- land	A	-0.47	-0.09	-0.33	-0.02	-0.34	0.15	-0.01	-0.35	-0.02	0.20	-0.23	0.03	1.59	-0.57
	B	-0.35						-0.23	-0.25	-0.05	0.14	-0.14	-0.08	1.67	-0.70
U.K.	A	0.35	-0.03	0.02	-0.15	0.36	-0.06	0.00	0.04	-0.19	0.05	0.07	0.08	0.39	-2.65**
	B	0.47						-0.15	0.11	-0.26	0.07	0.05	0.12	0.36	-3.32**
<u>MID EAST</u>															
Israel	A	0.13	-0.39	0.40	-0.07	0.07	0.24	0.03	-0.27	0.03	0.13	-0.09	0.03	-7.18	2.46
	B	-1.51						-0.22	-0.52	-0.01	-0.00	-0.25	0.01	-0.65	6.47**
<u>NORTH AMERICA</u>															
Canada	A	-0.00	-0.07	-0.16	-0.17	0.12	-0.04	-0.15	-0.15	-0.00	-0.02	0.02	-0.09	0.25	-0.22
	B	0.33						-0.23	-0.14	-0.07	0.01	0.05	-0.01	-0.46	-0.72

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE I - 11 (cont'd)

Sims's Test

Estimated Lag Profiles

M0 = f(FE: 5 lead, current, 5 past, D1,D2) & M0 = g(FE: current, 5 past, D1,D2)														
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	D1	D2
U.S.A.														
Total	A"	0.24	-0.03	0.06	-0.05	-0.00	0.05	-0.08	0.12	0.00	-0.01	0.07	0.02	-0.39
	B"	0.19						-0.05	0.08	0.01	-0.00	0.05	0.03	-0.28
	A	0.15	-0.07	-0.03	-0.18	0.03	-0.04	-0.06	-0.01	0.06	0.08	0.00	-0.01	-0.36
	B	0.19						-0.07	-0.06	0.04	0.08	-0.00	-0.01	-0.95
White	A"	0.40	0.01	0.00	0.01	0.00	-0.01	0.04	0.01	0.03	0.01	-0.00	0.01	-0.41
	B"	0.36						0.03	0.02	0.03	0.01	-0.00	0.08	-0.39**
	A	0.21	-0.10	-0.03	-0.19	0.01	-0.03	-0.04	0.05	0.07	0.11	-0.00	-0.01	-0.18
	B	0.26						-0.05	-0.02	0.04	0.09	-0.01	0.00	-0.88
Nonwhite	A"	-1.63	-0.09	-0.04	-0.17	-0.28	-0.20	-0.50	-0.11	-0.14	-0.09	-0.05	0.05	1.44
	B"	-0.27						-0.25	0.05	0.01	-0.01	0.01	0.04	0.72
	A	0.60	-0.28	-0.10	-0.29	-0.19	-0.01	-0.05	-0.13	0.31	0.10	0.34	0.24	-1.31
	B	0.88						-0.05	-0.20	0.24	0.02	0.28	0.22	-3.49**

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

Range: Total {A" & B" = 1946-1979; White & Nonwhite {A" & B" = 1946-1977
 {A & B = 1920-1979 {A & B = 1920-1977.

TABLE I - 12 (cont'd)

Sims's Test

Estimated Lag Profiles

$$M0 = f(\text{FE: 5 lead, current, 5 past, D1, D2}) \text{ \& } M0 = g(\text{FE: current, 5 past, D1, D2})$$

Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	D1	D2	
<u>ASIA</u>															
Japan	A	-1.11	-0.03	-0.05	0.02	0.13	0.13	-0.01	0.15	0.13	0.10	0.12	0.08		
	B	-0.60						-0.10	0.14	0.19	0.19	0.17	0.08	4.21** 4.42**	
Taiwan	A	-0.90	0.04	0.09	0.01	-0.15	0.00	0.01	-0.14	-0.00	-0.04	0.03	-0.01	1.92	
	B	-1.17						-0.00	-0.16	-0.06	-0.07	0.06	-0.04	2.41	
<u>OCEANIA</u>															
Australia	A	0.27	-0.02	0.19	-0.21	-0.03	-0.04	0.08	0.10	-0.01	-0.10	0.01	0.00	-1.33	-0.16
	B	0.38						0.05	0.10	0.00	-0.09	0.05	0.13	-1.67	-0.78
New Zealand	A	-0.19	-0.05	-0.21	0.16	0.08	-0.04	-0.01	-0.05	-0.10	0.21	-0.03	0.32	-0.88	-0.01
	B	-0.16						-0.01	-0.18	-0.11	0.24	-0.11	0.30	-0.40	0.11

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE I - 14 (cont'd)

Sims's Test
Statistics

Country	Equation	SEE		R ²	e ²
		Smallest	Largest		
<u>ASIA</u>					
Japan	A	0.054	0.129	0.825	10.88
	B	0.042	0.064	0.783	13.54
Taiwan	A	0.093	0.151	0.457	55.91
	B	0.061	0.117	0.348	67.15
<u>OCEANIA</u>					
Australia	A	0.096	0.139	0.616	12.85
	B	0.106	0.127	0.301	23.38
New Zealand	A	0.119	0.173	0.697	32.25
	B	0.099	0.107	0.621	40.40

TABLE I - 13

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Sims's Test
Statistics

Country	Equation	SEE		R ²	e ²
		Smallest	Largest		
<u>EUROPE</u>					
Denmark	A	0.216	0.328	0.582	54.86
	B	0.204	0.246	0.364	83.49
Finland	A	0.113	0.389	0.864	81.41
	B	0.116	0.140	0.701	178.8
France	A	0.371	0.734	0.915	224.2
	B	0.435	0.969	0.699	796.7
Italy	A	0.189	0.548	0.650	138.9
	B	0.170	0.196	0.523	189.2
Netherlands	A	0.091	0.292	0.972	56.18
	B	0.210	0.322	0.693	628.1
Norway	A	0.062	0.121	0.875	5.056
	B	0.044	0.083	0.844	6.311
Portugal	A	0.315	0.413	0.685	239.0
	B	0.333	0.352	0.532	355.7
Sweden	A	0.155	0.214	0.593	29.91
	B	0.137	0.160	0.522	35.14
Switzerland	A	0.164	0.289	0.608	17.16
	B	0.161	0.205	0.348	28.60
U.K.	A	0.037	0.093	0.950	2.817
	B	0.046	0.053	0.824	10.06
<u>MID EAST (ASIA)</u>					
Israel	A	0.117	0.231	0.802	81.71
	B	0.112	0.156	0.621	156.7
<u>NORTH AMERICA</u>					
Canada	A	0.101	0.134	0.618	28.37
	B	0.100	0.115	0.407	44.06
U.S.A.	A	0.029	0.052	0.638	1.818
	B	0.029	0.043	0.411	2.958
Total	A	0.074	0.089	0.282	130.8
	B	0.074	0.083	0.138	156.9
White	A	0.031	0.057	0.776	0.514
	B	0.019	0.022	0.724	0.633
	A	0.072	0.088	0.296	110.0
	B	0.072	0.080	0.124	136.8
Nonwhite	A	0.163	0.251	0.517	20.40
	B	0.131	0.140	0.341	27.83
	A	0.120	0.146	0.455	320.9
	B	0.121	0.150	0.310	406.3

TABLE I - 15

Sims's Test
PDQ of Residuals:
Test for Serial Correlation in Residuals
A, A" : $MO = f(FE: 5 \text{ lead, current, 5 past, D1 and/or D2})$

Country		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>EUROPE</u>														
Denmark	A	0.19	0.04	-0.32	-0.27	-0.07	0.27	0.02	-0.00	-0.17	-0.03	0.01	0.05	0.18
Finland	A	0.19	-0.07	-0.24	-0.04	-0.11	0.20	0.00	-0.22	0.05	0.11	-0.09	0.07	0.09
France	A	0.19	-0.51*	0.26	-0.34	0.03	0.31	-0.26	0.29	-0.42*	0.32	-0.09	-0.10	0.09
Italy	A	0.19	-0.61*	0.27	-0.33	0.22	-0.17	0.37	-0.37	0.26	-0.37	0.32	-0.07	0.03
Netherlands	A	0.19	-0.24	0.05	-0.29	-0.01	-0.15	0.31	-0.16	0.08	-0.17	-0.07	0.02	0.11
Norway	A	0.19	-0.12	-0.02	-0.22	-0.03	-0.08	0.05	0.14	-0.19	0.19	-0.16	-0.02	-0.25
Portugal	A	0.19	-0.12	-0.37	0.31	-0.29	-0.05	0.42*	-0.23	-0.16	0.29	-0.21	-0.12	0.23
Sweden	A	0.19	-0.36	-0.01	-0.11	-0.06	0.01	0.05	-0.11	0.37	-0.41*	0.17	-0.17	0.23
Switzerland	A	0.19	-0.36	-0.32	0.30	-0.02	-0.28	0.36	-0.20	-0.08	0.17	0.02	-0.11	0.08
U.K.	A	0.20	-0.16	-0.27	-0.21	0.31	0.03	-0.15	-0.20	0.22	-0.04	0.01	-0.08	-0.09
<u>MID EAST(ASIA)</u>														
Israel	A	0.20	-0.16	-0.44*	-0.00	0.37	-0.20	-0.07	-0.11	0.10	0.04	-0.04	-0.08	0.15
<u>NORTH AMERICA</u>														
Canada	A	0.19	0.24	-0.43*	-0.38	-0.17	0.06	0.31	0.12	-0.08	-0.10	-0.08	-0.20	-0.06
U.S.A.														
Total	A"	0.21	-0.10	-0.03	-0.31	-0.11	0.07	0.28	-0.18	-0.08	-0.06	0.17	-0.08	0.18
	A	0.14	-0.11	-0.26	0.05	-0.02	0.09	-0.18	0.07	0.25	-0.15	0.07	0.08	-0.10
White	A"	0.22	0.01	-0.11	-0.39	-0.05	0.30	0.16	-0.23	-0.14	-0.12	0.10	0.15	0.00
	A	0.15	-0.06	-0.22	0.05	-0.13	0.04	-0.13	0.03	0.21	-0.11	0.10	0.05	-0.06
Nonwhite	A"	0.22	-0.09	-0.21	-0.41	-0.05	0.23	0.54*	-0.33	-0.17	-0.14	0.07	0.28	0.09
	A	0.15	-0.10	-0.48*	0.06	0.37*	-0.17	-0.38*	0.25	0.20	-0.31*	-0.11	0.31*	0.11

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE I - 16 (cont'd)

Sims's Test

PDQ of Residuals:

Test for Serial Correlation in Residuals

A : MO = f(FE: 5 lead, current, 5 past, D1 and/or D2)

Country		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>ASIA</u>														
Japan	A	0.22	0.06	-0.03	0.18	-0.30	-0.29	-0.20	-0.06	0.05	-0.05	0.11	0.12	-0.08
Taiwan	A	0.22	-0.12	-0.28	-0.18	-0.21	0.18	0.43	-0.09	-0.27	-0.19	0.10	0.16	0.08
<u>OCEANIA</u>														
Australia	A	0.19	-0.42*	-0.10	0.11	-0.01	-0.03	0.03	-0.08	0.08	-0.03	-0.01	0.09	-0.10
New Zealand	A	0.19	-0.16	-0.38	0.31	-0.02	-0.42*	0.19	0.02	-0.15	0.18	-0.07	-0.01	0.23

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE J - 1

Sims's Test

Estimated Lag Profiles

FE = f(MO: 5 lead, current, 5 past) & FE = g(MO: current, 5 past)															
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	SEE		
													Smallest	Largest	
<u>EUROPE</u>															
Denmark	A	-0.37	0.07	-0.63	0.04	0.44	0.06	0.11	0.44	-0.44	-0.09	0.02	0.00	0.194	0.416
	B	-0.26						0.07	0.31	-0.43	-0.12	-0.20	-0.02	0.148	0.196
Finland	A	-0.21	-0.38	-0.93	-0.48	-0.08	0.68	0.13	0.43	-0.00	-0.16	-0.13	0.14	0.060	0.191
	B	0.00						0.23	0.32	-0.19	-0.10	-0.11	-0.08	0.162	0.267
France	A	-0.26	0.28	-0.52	0.01	-0.00	-0.20	-0.07	0.24	-0.02	0.03	0.03	0.00	0.025	0.314
	B	0.69						-0.10	0.27	0.06	0.06	0.05	0.05	0.035	0.045
Italy	A	0.27	0.08	0.25	0.27	0.09	-0.21	-0.39	0.18	0.01	0.00	0.02	0.33	0.117	0.256
	B	0.09						-0.21	0.06	-0.12	0.02	0.04	0.33	0.107	0.194
Nether-lands	A	0.18	-0.14	-0.07	-0.10	0.08	0.13	-0.17	0.55	0.11	-0.09	-0.11	-0.08	0.025	0.440
	B	0.59						-0.17	0.55	0.13	-0.07	-0.11	-0.09	0.045	0.046
Norway	A	0.26	-1.06	-0.42	0.11	0.27	0.77	-0.76	0.28	0.28	0.36	-0.84	0.41	0.294	0.581
	B	0.38						-0.13	0.27	0.28	0.42	-0.80	0.81	0.264	0.404
Portugal	A	0.15	0.05	0.02	0.00	-0.05	0.25	-0.04	-0.08	0.05	0.08	-0.03	-0.05	0.068	0.117
	B	0.08						-0.08	-0.02	0.11	0.07	-0.07	-0.05	0.066	0.098

TABLE J - 2 (cont'd)

Sims's Test

Estimated Lag Profiles

		FE = f(MO: 5 lead, current, 5 past) & FE = g(MO: current, 5 past)												SEE	
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	Smallest	Largest	
Sweden	A	0.09	0.65	0.29	-0.79	-0.57	0.07	-0.78	-0.35	-0.00	0.27	0.59	0.32	0.274	0.675
	B	-0.02						-0.75	-0.23	-0.11	0.16	0.46	0.18	0.207	0.225
Switzer- land	A	-0.13	0.17	0.03	0.01	-0.35	0.27	-0.17	0.17	-0.26	-0.09	-0.30	0.15	0.186	0.385
	B	-0.18						-0.22	0.20	-0.27	-0.02	-0.28	0.06	0.159	0.215
U.K.	A	-0.13	0.09	0.52	-0.14	-1.64	0.98	0.49	0.10	1.07	-0.20	-0.69	0.00	0.273	1.132
	B	-0.34						0.21	0.47	1.31	-0.28	-1.13	-0.06	0.210	0.464
<u>MID EAST</u>															
Israel	A	-1.63	0.62	-0.39	-0.26	0.39	-0.44	0.20	0.66	0.47	0.02	0.44	-0.51	0.224	0.560
	B	-1.65						0.12	0.71	0.61	-0.03	0.41	-0.48	0.252	0.276
<u>NORTH AMERICA</u>															
Canada	A	-0.14	1.18	-1.84	2.55	-2.74	1.51	-2.00	0.60	0.16	-0.69	0.14	-0.05	0.383	1.144
	B	-0.11						-0.71	0.13	0.27	-0.29	-0.17	0.03	0.282	0.556

TABLE J - 3 (cont'd)

Sims's Test

Estimated Lag Profiles

FE = f(MO: 5 lead, current, 5 past) & FE = g(MO: current, 5 past)															
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	SEE		
													Smallest	Largest	
U.S.A.															
Total	A''	-1.15	3.24	1.64	-0.21	1.34	2.65	-1.73	-1.25	-0.80	-0.46	0.72	0.27	1.062	1.514
	B''	-0.79						-1.04	0.20	-0.32	-1.14	0.04	0.25	1.088	1.344
	A	-0.07	-0.00	0.14	0.57	0.15	-0.09	-0.50	-0.17	0.17	-0.59	-0.21	-0.42	0.319	0.358
	B	0.01						-0.41	-0.00	0.25	-0.54	-0.16	-0.34	0.290	0.311
White	A''	-1.62	4.51	-1.96	1.82	4.90	0.17	-3.09	-0.26	0.06	-1.81	0.91	0.75	1.552	2.925
	B''	-0.87						1.45	-1.08	-0.56	-1.70	-0.53	0.10	1.426	2.118
	A	0.02	0.04	-0.02	0.65	0.18	-0.02	-0.50	-0.06	0.24	-0.65	-0.24	-0.51	0.367	0.434
	B	0.16						-0.46	0.06	0.31	-0.55	-0.21	-0.38	0.334	0.351
Nonwhite	A''	-1.26	0.14	0.62	-0.28	0.74	-0.31	-1.28	0.47	-0.29	0.12	0.13	1.14	0.498	0.716
	B''	-1.28						-1.21	0.52	-0.10	0.09	0.35	0.83	0.397	0.448
	A	-0.19	0.13	0.51	-0.07	0.25	-0.25	-0.21	0.01	-0.14	-0.28	-0.02	-0.06	0.125	0.192
	B	-0.04						-0.02	0.12	-0.09	-0.24	-0.08	-0.17	0.125	0.161

Range: Total A" & B" = 1946-1979, A & B = 1920-1979; White & Nonwhite A"&B"= 1946-1977, A&B= 1920-1977.

TABLE J - 4 (cont'd)

Sims's Test

Estimated Lag Profiles

FE = f(MO: 5 lead, current, 5 past) & FE = g(MO: current, 5 past)															
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	SEE		
													Smallest	Largest	
ASIA															
Japan	A	-0.64	1.98	0.66	-0.17	-0.64	0.90	-2.68	1.77	-0.12	0.99	-1.23	-0.34	0.425	1.129
	B	-2.32						-1.75	1.54	0.55	0.95	-0.62	0.19	0.399	0.673
Taiwan	A	-4.03	1.51	3.09	1.49	1.79	-2.41	-0.14	-1.20	-1.30	0.60	0.80	2.02	0.343	1.259
	B	-3.37						0.03	0.25	-0.56	0.27	0.51	0.25	0.341	0.617
OCEANIA															
Australia	A	0.53	0.40	-1.02	-1.66	-0.35	-0.07	-0.54	-0.27	0.33	-0.71	0.29	0.85	0.316	0.999
	B	0.03						-0.57	-0.41	-0.24	-0.77	0.45	0.67	0.321	0.352
New Zealand	A	-0.00	1.23	0.36	0.89	-0.18	-0.09	0.24	0.21	0.37	-0.15	-0.33	0.06	0.252	0.383
	B	-0.06						-0.31	0.02	0.27	0.37	-0.59	-0.25	0.331	0.378

TABLE J - 5

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Sims's Test
StatisticsA: FE = f(MO: 5 lead, current, 5 past) & B: FE = g(MO: current, 5past)

Country	Equation	R ²	e ²
<u>EUROPE</u>			
Denmark	A	0.599	63.92
	B	0.408	94.42
Finland	A	0.943	52.54
	B	0.318	632.9
France	A	0.924	23.72
	B	0.720	88.44
Italy	A	0.557	158.5
	B	0.442	199.6
Netherlands	A	0.975	20.97
	B	0.895	90.64
Norway	A	0.796	46.20
	B	0.561	99.59
Portugal	A	0.506	83.45
	B	0.199	135.4
Sweden	A	0.508	59.63
	B	0.429	69.19
Switzerland	A	0.354	28.70
	B	0.255	33.09
U.K.	A	0.807	58.09
	B	0.621	114.3
<u>MID EAST(ASIA)</u>			
Israel	A	0.778	209.9
	B	0.529	445.4
<u>NORTH AMERICA</u>			
Canada	A	0.616	109.1
	B	0.343	186.6
U.S.A.			
Total	A''	0.569	65.17
	B''	0.113	134.1
	A	0.245	608.9
	B	0.177	663.3
White	A''	0.646	53.92
	B''	0.161	127.8
	A	0.231	667.0
	B	0.168	721.6
Nonwhite	A''	0.608	71.29
	B''	0.474	95.70
	A	0.353	415.7
	B	0.131	558.2

Sims's Test

Statistics

A: $FE = f(MO: 5 \text{ lead, current, 5 past})$ & B: $FE = g(MO: \text{current, 5 past})$

Country	Equation	R^2	e^2
<u>ASIA</u>			
Japan	A	0.801	115.78
	B	0.560	256.90
Taiwan	A	0.802	119.81
	B	0.303	423.33
<u>OCEANIA</u>			
Australia	A	0.608	56.389
	B	0.441	80.428
New Zealand	A	0.756	75.476
	B	0.303	215.42

TABLE J - 7

Sims's Test
 PDQ of Residuals:
 Test for Serial Correlation in Residuals
 A, A'' : FE = f(MO: 5 lead, current, 5 past)

Country		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>EUROPE</u>														
Denmark	A	0.19	0.04	0.05	0.05	-0.22	-0.13	-0.09	-0.22	0.06	-0.04	0.03	0.03	-0.14
Finland	A	0.19	0.14	0.20	-0.14	0.12	-0.12	-0.08	-0.24	-0.36	-0.09	-0.08	0.06	-0.13
France	A	0.19	-0.31	0.25	-0.26	-0.18	0.23	-0.36	0.32	-0.32	0.25	0.01	-0.01	-0.02
Italy	A	0.19	-0.30	0.10	-0.16	0.08	0.03	0.10	-0.29	0.11	-0.08	0.05	-0.12	0.04
Netherlands	A	0.19	0.14	0.09	-0.13	-0.26	-0.05	-0.03	-0.27	-0.12	-0.20	-0.05	0.06	0.06
Norway	A	0.19	0.20	0.18	-0.29	0.03	-0.30	0.00	-0.15	0.22	-0.01	0.05	-0.09	-0.03
Portugal	A	0.19	-0.09	0.06	0.03	-0.20	0.05	-0.00	-0.21	0.07	-0.07	-0.11	0.13	-0.09
Sweden	A	0.19	0.11	0.21	-0.09	-0.03	-0.07	-0.30	-0.11	-0.09	-0.02	-0.17	-0.04	-0.12
Switzerland	A	0.19	-0.10	0.19	-0.31	-0.08	-0.07	0.06	0.16	-0.01	-0.16	-0.15	0.02	0.01
U.K.	A	0.20	0.20	0.03	0.07	0.23	-0.24	-0.05	-0.04	-0.23	-0.29	0.03	-0.18	-0.26
<u>MID EAST(ASIA)</u>														
Israel	A	0.20	-0.16	-0.15	-0.30	-0.02	0.29	0.11	-0.25	-0.21	0.05	0.25	0.20	-0.02
<u>NORTH AMERICA</u>														
Canada	A	0.19	-0.10	-0.04	-0.15	-0.23	0.12	-0.11	0.02	-0.12	-0.24	0.41*	-0.21	0.12
U.S.A.														
Total	A''	0.21	0.17	-0.39	-0.49*	0.07	0.12	0.10	-0.19	-0.07	0.11	0.17	0.00	0.02
	A	0.14	-0.01	-0.15	-0.02	0.04	0.27	-0.01	0.03	-0.05	-0.02	0.06	-0.16	0.02
White	A''	0.22	-0.02	-0.35	0.08	-0.22	-0.14	0.25	-0.28	-0.10	0.33	-0.04	0.07	0.13
	A	0.15	0.08	-0.23	0.00	0.18	0.22	0.01	0.04	-0.01	-0.02	0.05	-0.10	0.02
Nonwhite	A''	0.22	-0.20	-0.21	-0.00	-0.07	0.25	-0.22	-0.19	-0.00	0.15	0.01	-0.14	0.16
	A	0.15	0.08	-0.18	0.07	0.11	0.02	0.10	0.02	-0.15	0.04	0.13	-0.34*	-0.13

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE J - 8 (cont'd)

Sims's Test

PDQ of Residuals:

Test for Serial Correlation in Residuals

A:FE = f(M0: 5 lead, current, 5 past)

Country		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>ASIA</u>														
Japan	A	0.22	-0.49*	-0.18	0.41	-0.34	0.07	0.09	-0.17	0.30	-0.24	-0.03	0.27	-0.30
Taiwan	A	0.22	-0.69*	0.49*	-0.30	0.01	0.19	-0.37	0.31	-0.34	0.28	-0.15	0.04	0.09
<u>OCEANIA</u>														
Australia	A	0.19	-0.09	-0.01	0.17	-0.06	-0.39*	0.15	0.02	-0.32	0.10	-0.10	-0.10	-0.01
New Zealand	A	0.19	0.21	-0.05	-0.14	0.18	0.10	-0.13	-0.18	-0.14	0.03	-0.24	-0.10	0.08

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE J - 9

Sims's Test

Estimated Lag Profiles

FE = f(MO: 5 lead, current, 5 past, D1, D2) & FE = g(MO: current, 5 past, D1, D2)

Country		C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	D1	D2
<u>EUROPE</u>															
Denmark	A	-0.73	0.99	-0.19	0.17	0.40	0.03	-0.33	0.11	-0.63	-0.18	0.03	-0.00	3.87	-3.01
	B	0.52						-0.30	0.01	-0.63	-0.12	-0.14	0.08	0.41	-3.80**
Finland	A	-1.33	-0.07	-0.83	-0.40	0.10	0.96	0.27	0.48	0.04	-0.25	-0.23	0.10	3.15	5.81
	B	-2.34						0.47	0.39	-0.22	-0.05	-0.19	-0.27	10.31**	3.79
France	A	-0.49	0.28	-0.26	0.03	-0.00	-0.20	-0.17	0.09	-0.06	-0.00	0.02	0.00	5.30	-2.02
	B	-0.30						-0.15	0.17	0.00	0.00	0.00	0.02	4.45**	0.05
Italy	A	-1.89	0.63	1.12	0.85	0.74	0.43	-0.14	-0.14	-0.19	-0.25	-0.32	0.00	24.50**	-0.55
	B	0.58						-0.48	-0.24	-0.21	-0.30	-0.22	0.16	1.97	-9.03**
Nether-lands	A	-0.30	-0.14	0.14	-0.09	0.01	0.04	-0.27	0.41	0.07	-0.09	-0.10	-0.07	5.05	-0.67
	B	-0.16						-0.26	0.40	0.09	-0.07	-0.09	-0.07	4.57**	-0.95
Norway	A	-0.74	0.05	0.50	0.18	-0.16	0.74	0.44	0.20	-0.31	0.06	-0.57	0.61	6.30**	1.45
	B	-0.22						-0.05	0.06	-0.10	0.17	-0.79	0.52	4.51**	-1.61
Portugal	A	0.22	0.05	0.07	0.06	-0.06	0.27	-0.01	-0.02	0.09	0.10	-0.03	-0.06	-1.77	1.30
	B	0.61						-0.08	0.02	0.16	0.09	-0.05	-0.03	-2.02	-1.34

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE J - 10 (cont'd)

Sims's Test

Estimated Lag Profiles

FE = f(MO: 5 lead, current, 5 past, D1, D2) & FE = g(MO: current, 5 past, D1, D2)															
Country		C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	D1	D2
Sweden	A	-0.32	0.92	0.90	-0.41	-0.71	-0.27	-0.83	-0.40	-0.00	0.42	0.86	0.30	2.57	-1.06
	B	0.05						-0.73	-0.21	-0.05	0.25	0.60	0.08	1.16	-1.37
Switzer- land	A	-0.86	0.49	0.38	0.07	-0.60	0.05	-0.17	0.21	-0.46	-0.32	-0.59	0.00	1.90	1.58
	B	-0.28						-0.31	0.20	-0.31	-0.03	-0.24	0.05	0.53	-0.12
U.K.	A	-1.92	0.64	0.80	0.51	-0.56	0.99	0.71	0.16	1.35	-0.05	-0.92	-0.19	9.59	3.75
	B	-0.70						0.56	0.54	1.29	0.08	-1.00	-0.24	4.91	1.54
<u>MID EAST</u>															
Israel	A	-1.18	0.07	-0.24	0.81	0.76	-0.65	-0.18	0.34	0.02	-0.08	0.13	-0.84	-27.07**	4.90
	B	-1.44						0.02	0.69	0.50	-0.08	0.42	-0.53	-4.75	0.50
<u>NORTH AMERICA</u>															
Canada	A	-2.00	1.78	-1.59	3.06	-2.35	1.55	-1.48	0.16	0.45	-0.90	0.31	0.01	4.88	2.39
	B	-0.39						-0.57	0.02	0.33	-0.22	-0.08	0.13	1.91	0.02

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE J - 11 (cont'd)

Sims's Test

Estimated Lag Profiles

FE = f(M0: 5 lead, current, 5 past, D1,D2) & FE = g(M0: current, 5 past, D1,D2)														
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	D1	D2
U.S.A.														
Total	A"	-0.88	3.49	2.09	0.37	1.95	2.88	-1.82	-1.40	-1.25	-0.83	0.60	0.16	-1.44
	B"	-1.48						-1.19	0.09	0.18	-0.51	0.48	0.77	2.69
	A	-1.13	-0.15	-0.00	0.30	0.14	-0.05	-0.35	0.08	0.49	-0.19	0.11	-0.23	4.86
	B	-1.31						-0.34	0.17	0.55	-0.18	0.17	-0.15	5.30**
White	A"	-0.83	5.31	-0.98	3.26	7.13	0.74	-4.04	-1.26	-1.27	-3.17	0.63	0.19	-3.91
	B"	-2.07						1.27	-0.83	0.56	-0.57	0.54	1.38	3.55
	A	-1.13	-0.11	-0.17	0.37	0.17	-0.00	-0.37	0.16	0.55	-0.24	0.09	-0.32	5.07**
	B	-1.26						-0.39	0.23	0.59	-0.19	0.10	-0.23	5.35**
Nonwhite	A"	-1.76	0.07	0.35	-0.57	0.47	-0.30	-1.32	0.39	-0.14	0.20	0.14	1.09	1.97
	B"	-1.75						-1.28	0.43	-0.08	0.02	0.26	0.86	2.16
	A	-0.76	0.10	0.50	-0.10	0.26	-0.24	-0.18	0.04	-0.09	-0.23	-0.00	-0.01	2.08
	B	-0.80						-0.02	0.12	-0.06	-0.19	-0.05	-0.10	1.99

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

Range: Total {A" & B" = 1946-1979; White & Nonwhite {A" & B" = 1946-1977
 {A & B = 1920-1979 {A & B = 1920-1977

TABLE J - 12 (cont'd)

Sims's Test

Estimated Lag Profiles

FE = f(M0: 5 lead, current, 5 past, D1,D2) & FE = g(M0: current, 5 past, D1,D2)														
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	D1	D2
<u>ASIA</u>														
Japan	A	-1.37	2.68	0.84	-0.29	-1.08	0.49	-3.13	2.12	0.47	1.62	-1.08	-0.05	5.94
	B	2.16						-1.83	1.62	0.73	1.14	-0.52	0.28	1.88
Taiwan	A	-4.30	1.66	3.23	1.85	2.06	-2.38	-0.23	-1.42	-1.60	0.48	0.66	1.94	3.60
	B	-2.92						0.25	0.44	-0.20	0.38	0.64	0.47	-4.13
<u>OCEANIA</u>														
Australia	A	-1.11	0.56	-0.43	-0.64	0.63	0.87	0.22	0.36	0.87	-0.52	0.27	0.77	4.86
	B	-0.31						-0.28	-0.20	-0.05	-0.69	0.37	0.59	1.74
New Zealand	A	0.19	1.25	0.42	1.04	0.17	0.15	0.46	0.41	0.58	-0.04	-0.30	0.08	1.07
	B	-0.47						-0.27	0.01	0.25	0.39	-0.58	-0.28	2.39

TABLE J - 13

Sims's Test
Statistics

Country	Equation	SEE		R ²	e ²
		Smallest	Largest		
<u>EUROPE</u>					
Denmark	A	0.206	0.717	0.672	52.29
	B	0.144	0.233	0.566	69.20
Finland	A	0.073	0.240	0.956	40.90
	B	0.116	0.200	0.699	279.0
France	A	0.026	0.384	0.934	20.80
	B	0.034	0.061	0.830	53.47
Italy	A	0.119	0.432	0.791	74.55
	B	0.108	0.185	0.679	114.8
Netherlands	A	0.032	0.501	0.977	19.65
	B	0.043	0.059	0.934	57.43
Norway	A	0.180	0.393	0.940	13.61
	B	0.132	0.274	0.904	21.58
Portugal	A	0.071	0.130	0.573	72.24
	B	0.069	0.107	0.270	123.4
Sweden	A	0.271	0.976	0.635	44.17
	B	0.212	0.320	0.534	56.42
Switzerland	A	0.247	0.455	0.427	25.45
	B	0.189	0.255	0.276	32.16
U.K.	A	0.391	1.303	0.824	53.01
	B	0.335	0.639	0.658	103.1
<u>MID EAST(ASIA)</u>					
Israel	A	0.205	0.556	0.886	107.6
	B	0.265	0.353	0.546	429.1
<u>NORTH AMERICA</u>					
Canada	A	0.392	1.247	0.656	97.67
	B	0.315	0.576	0.374	177.9
U.S.A.					
Total	A''	1.123	1.822	0.581	63.32
	B''	1.070	1.569	0.259	112.2
	A	0.335	0.413	0.329	540.8
	B	0.294	0.312	0.304	560.8
White	A''	1.559	3.604	0.691	46.98
	B''	1.537	2.281	0.293	107.7
	A	0.363	0.445	0.334	578.2
	B	0.325	0.342	0.305	603.2
Nonwhite	A''	0.534	0.780	0.640	65.59
	B''	0.378	0.425	0.565	79.15
	A	0.150	0.195	0.381	397.3
	B	0.139	0.165	0.176	529.4

TABLE J - 14 (cont'd)

Sims's Test
Statistics

Country	Equation	SEE		R ²	e ²
		Smallest	Largest		
<u>ASIA</u>					
Japan	A	0.491	0.791	0.832	97.84
	B	0.480	0.767	0.565	253.9
Taiwan	A	0.403	1.327	0.811	114.6
	B	0.448	0.765	0.322	411.8
<u>OCEANIA</u>					
Australia	A	0.416	1.583	0.628	53.52
	B	0.366	0.425	0.485	74.07
New Zealand	A	0.270	0.651	0.765	72.44
	B	0.333	0.377	0.380	191.8

TABLE J - 15

Sims's Test
 PDQ of Residuals:
 Test for Serial Correlation in Residuals
 A, A'' : FE = f(MO: 5 lead, current, 5 past, D1 and/or D2)

Country		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>EUROPE</u>														
Denmark	A	0.19	0.18	0.03	0.09	-0.25	-0.12	-0.28	-0.29	-0.05	-0.06	0.04	0.09	-0.03
Finland	A	0.19	0.06	0.29	-0.21	0.06	-0.21	-0.20	-0.21	-0.34	0.01	-0.01	0.09	-0.05
France	A	0.19	-0.44*	0.22	-0.21	-0.27	0.25	-0.33	0.36	-0.21	0.22	0.00	-0.09	0.08
Italy	A	0.19	0.13	0.22	-0.13	-0.17	-0.13	-0.38	-0.30	-0.11	0.10	0.15	-0.03	0.17
Netherlands	A	0.19	0.05	0.04	-0.22	-0.27	-0.06	0.01	-0.25	0.03	-0.11	0.09	0.10	0.09
Norway	A	0.19	-0.15	0.47*	-0.28	0.12	-0.35	0.16	-0.45*	0.28	-0.39*	0.15	-0.20	0.18
Portugal	A	0.19	-0.27	-0.00	-0.00	-0.17	0.11	0.02	-0.21	0.09	0.01	-0.06	0.18	-0.18
Sweden	A	0.19	0.02	0.21	-0.05	-0.10	0.07	-0.33	-0.10	-0.03	0.09	-0.03	-0.02	-0.08
Switzerland	A	0.19	-0.32	0.16	-0.33	-0.05	0.02	-0.02	0.10	0.07	-0.07	-0.06	-0.03	-0.03
U.K.	A	0.20	0.37	0.14	0.13	0.20	-0.19	-0.06	-0.13	-0.27	-0.32	-0.03	-0.14	-0.25
<u>MID EAST(ASIA)</u>														
Israel	A	0.20	-0.07	-0.36	-0.19	0.13	0.40	-0.13	-0.42*	-0.12	0.27	0.09	-0.04	-0.13
<u>NORTH AMERICA</u>														
Canada	A	0.19	-0.24	-0.06	-0.08	-0.24	0.16	-0.12	0.13	-0.05	-0.21	0.44*	-0.28	0.13
U.S.A.														
Total	A''	0.21	0.15	-0.37	-0.50*	0.11	0.14	0.09	-0.24	-0.08	0.11	0.20	-0.03	0.01
	A	0.14	-0.05	-0.21	-0.09	0.01	0.21	-0.10	-0.01	-0.07	-0.06	0.05	-0.15	0.04
White	A''	0.22	-0.12	-0.32	-0.04	0.01	-0.04	0.21	-0.29	-0.18	0.31	-0.05	0.01	0.06
	A	0.15	0.02	-0.33*	-0.08	0.13	0.11	-0.12	-0.02	-0.04	-0.06	0.04	-0.07	0.05
Nonwhite	A''	0.22	-0.27	-0.27	0.05	-0.14	0.27	-0.09	-0.17	0.02	0.18	-0.01	-0.13	0.10
	A	0.15	0.06	-0.21	0.03	0.09	-0.02	0.05	-0.01	-0.15	0.03	0.12	-0.36*	-0.15

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE J - 16 (cont'd)

Sims's Test
 PDQ of Residuals:
 Test for Serial Correlation in Residuals
 A : FE = f(M0: 5 lead, current, 5 past, D1 and/or D2)

Country		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>ASIA</u>														
Japan	A	0.22	-0.50*	-0.16	0.48*	-0.40	0.14	0.03	-0.19	0.33	-0.28	-0.06	0.31	-0.34
Taiwan	A	0.22	-0.70*	0.53*	-0.27	-0.03	0.17	-0.40	0.32	-0.34	0.28	-0.12	0.04	0.09
<u>OCEANIA</u>														
Australia	A	0.19	-0.09	-0.01	0.17	-0.06	-0.39*	0.15	0.02	-0.32	0.10	-0.10	-0.10	-0.01
New Zealand	A	0.19	0.21	-0.10	-0.15	0.18	0.14	-0.07	-0.16	-0.17	0.01	-0.23	-0.14	0.04

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE K - 1

Sims's Test

Estimated Lag Profiles

		A: NE = f(FE: 3 lead, current, 3 past)								B: NE = g(FE: current, 3 past)	
										SEE	
Country		C	+3	+2	+1	0	-1	-2	-3	Smallest	Largest
<u>ASIA</u>											
Japan	A	0.06	0.02	-0.02	-0.05	-0.06	0.01	0.02	0.06	0.027	0.043
	B	-0.00				-0.04	0.00	0.00	0.05	0.025	0.030
<u>NORTH AMERICA</u>											
<u>U.S.A.</u>											
Total	A'	0.00	-0.00	0.03	0.14	-0.06	-0.18	-0.08	-0.09	0.042	0.060
	B'	0.17				-0.08	-0.12	0.00	-0.00	0.055	0.059
	A''	0.07	-0.00	-0.01	0.02	-0.00	0.03	0.02	-0.01	0.014	0.023
	B''	0.07				0.00	0.02	0.02	-0.00	0.013	0.018
	A	0.02	-0.02	-0.00	0.01	-0.02	-0.03	0.02	0.00	0.020	0.021
	B	0.01				-0.02	-0.03	0.01	0.00	0.019	0.020
White	A'	-0.01	0.01	0.00	0.12	-0.04	-0.15	-0.06	-0.10	0.040	0.064
	B'	0.14				-0.06	-0.09	0.01	-0.01	0.049	0.054
	A''	0.03	-0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.016	0.019
	B''	0.04				0.00	0.00	0.00	0.01	0.014	0.015
	A	0.02	-0.01	-0.02	0.02	-0.01	-0.02	0.02	-0.00	0.018	0.020
	B	0.02				-0.01	-0.03	0.01	-0.00	0.017	0.018
Nonwhite	A'	0.44	-0.12	-0.06	0.20	-0.14	-0.15	-0.06	0.01	0.063	0.087
	B'	0.38				-0.13	-0.05	-0.09	-0.01	0.067	0.081
	A''	0.05	-0.00	0.01	-0.01	-0.06	0.03	0.02	0.00	0.055	0.062
	B''	0.05				-0.06	0.03	0.02	0.00	0.048	0.049
	A	0.06	-0.12	-0.02	0.03	0.01	0.00	0.02	0.01	0.037	0.044
	B	0.05				0.01	0.00	0.00	-0.01	0.039	0.044

TABLE K - 2

Statistics
(Sims's Test)

Country	Equation	R ²	e ²	F-statistic (d.f.)	range
<u>ASIA</u>					
Japan	A	0.360	8.222	1.206 (7,15)	1947-'76
	B	0.245	9.700	1.461 (4,18)	1947-'76
<u>NORTH AMERICA</u>					
<u>U.S.A.</u>					
Total	A'	0.654	3.821	2.973 (7,11)	1920-'45
	B'	0.400	6.626	2.337 (4,14)	1920-'45
	A''	0.302	1.234	1.178 (7,19)	1946-'79
	B''	0.230	1.362	1.650 (4,22)	1946-'79
	A	0.143	15.45	1.076 (7,45)	1920-'79
	B	0.103	16.17	1.385 (4,48)	1920-'79
White	A'	0.565	3.554	2.048 (7,11)	1920-'45
	B'	0.357	5.259	1.949 (4,14)	1920-'45
	A''	0.102	0.785	0.276 (7,17)	1946-'77
	B''	0.058	0.824	0.307 (4,20)	1946-'77
	A	0.181	12.33	1.358 (7,43)	1920-'77
	B	0.119	13.25	1.562 (4,46)	1920-'77
Nonwhite	A'	0.596	12.47	2.320 (7,11)	1920-'45
	B'	0.362	19.70	1.988 (4,14)	1920-'45
	A''	0.155	8.606	0.448 (7,17)	1946-'77
	B''	0.148	8.681	0.871 (4,20)	1946-'77
	A	0.171	49.89	1.275 (7,43)	1920-'77
	B	0.007	59.83	0.080 (4,46)	1920-'77

TABLE K - 3

Sims's Test
 PDQ of Residuals:
 Test for Serial Correlation in Residuals

Country	Equation	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>ASIA</u>														
Japan	A	0.21	-0.14	-0.05	0.15	-0.16	0.19	-0.09	0.05	-0.17	-0.46*	0.25	-0.12	-0.04
<u>NORTH AMERICA</u>														
U.S.A.														
Total	A'	0.23	-0.47*	0.36	-0.18	-0.09	-0.12	0.04	-0.29	0.12	-0.04	0.11	0.07	0.03
	A''	0.19	0.04	-0.19	-0.15	-0.17	0.13	0.11	-0.03	0.03	0.05	0.12	0.03	0.03
	A	0.14	-0.00	-0.04	0.11	-0.03	0.22	0.13	0.09	0.04	-0.29*	0.10	0.12	0.00
White	A'	0.23	-0.30	0.33	-0.34	-0.13	-0.10	-0.03	-0.15	0.11	-0.02	0.13	0.00	0.02
	A''	0.20	0.06	-0.30	-0.33	-0.11	0.20	0.02	0.21	-0.14	-0.33	0.01	0.09	0.21
	A	0.14	0.03	-0.00	0.11	-0.07	0.21	0.12	0.08	0.07	-0.21	0.17	0.17	0.02
Nonwhite	A'	0.23	-0.08	0.09	-0.02	0.07	-0.25	-0.15	-0.20	-0.23	0.04	0.14	0.03	-0.08
	A''	0.20	0.09	0.21	0.46*	-0.03	-0.06	0.38	-0.31	0.03	0.12	-0.26	-0.03	0.05
	A	0.14	0.05	-0.03	0.17	0.07	-0.09	0.06	0.06	0.07	-0.15	-0.01	-0.06	-0.18

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE K - 4

Sims's Test
Estimated Lag Profiles

A:										B:			
NE = f(FE: 3 lead, current, 3 past, D1 and/or D2) & NE = g(FE: current, 3 past, D1 and/or D2)													
SEE													
Country	C	+3	+2	+1	0	-1	-2	-3	D1	D2	Smallest	Largest	
<u>ASIA</u>													
Japan	A	-0.21	0.02	-0.01	-0.04	-0.04	0.04	0.04	0.08		0.82	0.030	0.042
	B	-0.30				-0.02	0.03	0.04	0.07		0.99	0.029	0.033
<u>NORTH AMERICA</u>													
<u>U.S.A.</u>													
Total	A'	0.06	-0.00	0.03	0.15	-0.05	-0.17	-0.07	-0.08	-0.27	0.00	0.050	0.081
	B'	0.23				-0.10	-0.14	-0.01	-0.01	0.25	-0.58	0.058	0.069
	A''	-0.00	-0.00	-0.01	0.02	-0.01	0.02	0.01	-0.02		0.17	0.016	0.025
	B''	0.01				-0.00	0.02	0.01	-0.01		0.16	0.014	0.022
White	A	0.11	-0.01	-0.00	0.02	-0.00	-0.02	0.02	0.00	-0.39	-0.15	0.022	0.023
	B	0.08				-0.01	-0.03	0.02	0.00	-0.25	-0.10	0.021	0.023
	A'	0.14	0.00	0.01	0.13	-0.02	-0.12	-0.03	-0.08	-0.54	-0.09	0.045	0.074
	B'	0.26				-0.07	-0.09	0.01	-0.01	-0.07	-0.49	0.052	0.066
	A''	0.07	-0.01	0.01	0.00	0.01	0.00	0.00	0.01		-0.05	0.017	0.024
	B''	0.04				0.00	0.00	0.00	0.01		-0.01	0.015	0.018
	A	0.13	-0.01	-0.01	0.02	-0.00	-0.01	0.03	0.00	-0.32	-0.23	0.020	0.021
	B	0.10				-0.00	-0.02	0.02	0.00	-0.23	-0.19	0.019	0.021
Non-white	A'	0.49	-0.13	-0.00	0.31	-0.13	-0.16	-0.00	0.05	-1.49	0.63	0.069	0.120
	B'	0.50				-0.12	-0.03	-0.07	-0.00	-0.50	-0.17	0.079	0.091
	A''	-0.30	-0.02	-0.01	-0.05	-0.12	-0.01	-0.02	-0.02		0.57	0.054	0.067
	B''	-0.11				-0.09	0.01	0.00	-0.00		0.42	0.049	0.050
	A	0.10	-0.10	-0.01	0.05	0.02	-0.00	0.01	0.00	-0.83	0.28	0.039	0.043
	B	0.06				0.02	-0.00	-0.00	-0.01	-0.85	0.36	0.041	0.046

TABLE K - 5

Statistics
(Sims's Test)

Country	Equation	R ²	e ²	F-statistic	range
<u>ASIA</u>					
Japan	A	0.415	7.507	1.245 (8,14)	1947-'76
	B	0.332	8.581	1.691 (5,17)	1947-'76
<u>NORTH AMERICA</u>					
<u>U.S.A.</u>					
Total	A'	0.661	3.743	1.952 (9, 9)	1920-'45
	B'	0.504	5.479	2.034 (6,12)	1920-'45
	A''	0.333	1.180	1.125 (8,18)	1946-'79
	B''	0.273	1.286	1.581 (5,21)	1946-'79
White	A	0.169	14.97	0.976 (9,43)	1920-'79
	B	0.117	15.91	1.021 (6,46)	1920-'79
	A'	0.607	3.213	1.547 (9, 9)	1920-'45
	B'	0.441	5.571	1.582 (6,12)	1920-'45
	A''	0.107	0.781	0.241 (8,16)	1946-'77
	B''	0.058	0.823	0.237 (5,19)	1946-'77
	A	0.210	11.88	1.215 (9,41)	1920-'77
	B	0.139	12.95	1.190 (6,44)	1920-'77
	A'	0.708	9.021	2.424 (9, 9)	1920-'45
	B'	0.376	19.26	1.206 (6,12)	1920-'45
Nonwhite	A''	0.261	7.525	0.709 (8,16)	1946-'77
	B''	0.223	7.921	1.090 (5,19)	1946-'77
	A	0.254	44.92	1.553 (9,41)	1920-'77
	B	0.118	53.09	0.988 (6,44)	1920-'77

TABLE K - 6

Sims's Test
PDQ of Residuals:
Test for Serial Correlation in Residuals

Country	Equation	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>ASIA</u>														
Japan	A	0.21	-0.33	-0.05	0.21	-0.25	0.27	-0.13	0.14	-0.05	-0.45*	0.32	-0.16	-0.05
<u>NORTH AMERICA</u>														
U.S.A.														
Total	A'	0.23	-0.53*	0.31	-0.16	-0.06	-0.06	0.13	-0.28	0.12	-0.06	0.06	0.09	0.00
	A''	0.19	-0.03	-0.26	-0.11	-0.13	0.16	0.16	-0.10	-0.03	0.01	0.09	0.03	0.04
	A	0.14	-0.01	-0.06	0.10	-0.05	0.16	0.10	0.10	0.03	-0.28	0.11	0.11	0.05
White	A'	0.23	-0.39	0.23	-0.32	-0.04	0.05	0.07	-0.24	0.07	-0.06	0.12	0.07	-0.03
	A''	0.20	0.08	-0.27	-0.30	-0.13	0.16	-0.01	0.20	-0.16	-0.35	0.01	0.09	0.23
	A	0.14	0.05	-0.00	0.10	-0.08	0.15	0.08	0.09	0.06	-0.19	0.19	0.16	0.04
Nonwhite	A'	0.23	-0.36	-0.15	-0.18	0.25	0.02	0.09	-0.15	-0.22	0.18	0.11	0.00	-0.28
	A''	0.20	-0.10	0.03	0.35	-0.22	-0.15	0.40	-0.43*	0.02	0.17	-0.31	-0.01	0.12
	A	0.14	-0.05	-0.15	0.10	-0.02	-0.16	0.03	0.05	0.08	-0.13	0.04	0.01	-0.05

TABLE K - 7

Sims's Test
Estimated Lag Profiles

A: NE = f(FE: 5 lead, current, 5 past) & B: NE = g(FE: current, 5 past)

Country		C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5
<u>ASIA</u>													
Japan	A	-0.02	-0.12	-0.06	0.04	0.06	0.04	0.00	0.01	-0.04	0.00	0.00	-0.00
	B	-0.09						-0.02	0.01	-0.01	0.05	0.00	-0.02
<u>NORTH AMERICA</u>													
U.S.A.													
Total	A"	0.12	-0.00	0.02	-0.00	-0.00	0.03	-0.01	0.04	0.02	-0.02	0.02	0.01
	B"	0.08						0.00	0.02	0.02	-0.01	0.01	0.01
	A	0.06	-0.04	-0.05	-0.03	-0.01	0.02	-0.00	-0.02	0.03	0.00	0.00	0.02
	B	0.03						-0.03	-0.04	0.01	-0.00	0.00	0.03
White	A"	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.01	-0.00	0.01	-0.04	0.00
	B"	0.00						-0.00	0.01	0.00	0.01	-0.04	0.00
	A	0.06	-0.04	-0.04	-0.02	-0.03	0.02	-0.00	-0.02	0.03	-0.00	0.00	0.03
	B	0.04						-0.02	-0.05	0.01	-0.00	0.00	0.04
Nonwhite	A"	0.16	-0.07	-0.09	-0.00	-0.05	0.01	-0.06	0.05	0.00	0.08	0.05	0.11
	B"	0.29						-0.02	0.02	-0.00	0.02	0.07	0.07
	A	0.10	-0.11	-0.03	-0.14	-0.04	0.02	0.01	0.01	0.07	0.00	0.06	0.00
	B	0.06						-0.00	-0.01	0.03	-0.03	0.03	0.00

Range: Total $\begin{cases} A'' \& B'' = 1946-1979 \\ A \& B = 1920-1979 \end{cases}$; White & Nonwhite $\begin{cases} A'' \& B'' = 1946-1977 \\ A \& B = 1920-1977. \end{cases}$

TABLE K - 8

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Statistics
(Sims's Test)

Country	Equation	SEE		R ²	e ²	F-statistic (d.f.)
		Smallest	Largest			
<u>ASIA</u>						
Japan	A	0.023	0.045	0.876	1.188	4.516 (11, 7)
	B	0.032	0.042	0.314	6.593	0.918 (6,12)
<u>NORTH AMERICA</u>						
U.S.A.						
Total	A''	0.020	0.032	0.434	0.936	0.768 (11,11)
	B''	0.017	0.024	0.272	1.204	0.999 (6,16)
	A	0.020	0.022	0.381	10.98	2.075 (11,37)
	B	0.020	0.022	0.160	14.92	1.335 (6,42)
White	A''	0.027	0.049	0.456	0.447	0.686 (11, 9)
	B''	0.015	0.016	0.427	0.471	1.739 (6,14)
	A	0.019	0.021	0.427	8.351	2.377 (11,35)
	B	0.019	0.020	0.197	11.71	1.637 (6,40)
Nonwhite	A''	0.076	0.091	0.365	5.238	0.470 (11, 9)
	B''	0.056	0.062	0.2118	6.503	0.627 (6,14)
	A	0.038	0.044	0.372	35.95	1.888 (11,35)
	B	0.042	0.048	0.045	54.68	0.318 (6,40)

TABLE K - 9

Sims's Test
PDQ of Residuals:
Test for Serial Correlation in Residuals

Country	Equation	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>ASIA</u>														
Japan	A	0.23	0.17	0.43	-0.34	-0.21	-0.41	-0.16	-0.11	0.09	-0.01	0.07	-0.05	-0.04
<u>NORTH AMERICA</u>														
U.S.A.														
Total	A"	0.21	-0.10	-0.36	-0.05	-0.15	0.14	0.28	-0.19	-0.20	0.06	0.08	0.06	0.18
	A	0.14	-0.15	-0.21	0.08	-0.19	0.11	-0.08	-0.09	0.22	-0.22	0.07	0.10	-0.05
White	A"	0.22	0.15	-0.23	-0.30	0.06	0.16	-0.04	-0.01	-0.00	-0.14	-0.05	0.09	0.08
	A	0.15	-0.11	-0.16	0.00	-0.22	0.06	-0.16	-0.10	0.19	-0.15	0.18	0.11	0.07
Nonwhite	A"	0.22	-0.15	0.20	0.23	-0.27	-0.21	0.14	-0.33	0.03	0.25	-0.11	0.18	0.16
	A	0.15	0.11	-0.11	0.07	-0.08	-0.21	-0.04	0.09	0.19	-0.16	-0.06	0.05	-0.06

TABLE K - 10

Sims's Test
Estimated Lag Profiles

A:		B:													
NE = f(FE: 5 lead, current, 5 past, D1 and/or D2) & NE = g(FE: current, 5 past, D1 and/or D2)															
Country		C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	D1	D2
<u>ASIA</u>															
Japan	A	-0.18	-0.11	-0.05	0.05	0.06	0.04	0.00	0.01	-0.03	0.02	0.02	0.00		0.55
	B	-0.32						-0.01	0.03	0.01	0.07	0.03	-0.00		1.05
<u>NORTH AMERICA</u>															
U.S.A.															
Total	A"	0.15	-0.00	0.02	-0.00	-0.00	0.04	-0.01	0.04	0.02	-0.02	0.02	0.01		-0.05
	B"	0.04						-0.00	0.02	0.02	-0.02	0.01	0.01		0.12
	A	0.14	-0.04	-0.05	-0.03	-0.01	0.03	0.00	-0.01	0.03	0.00	0.00	0.02	-0.24	-0.18
	B	0.11						-0.02	-0.04	0.02	0.00	0.01	0.03	-0.30	-0.15
White	A"	0.28	0.02	0.03	0.01	0.01	0.02	0.02	0.03	0.00	0.01	-0.03	0.01		-0.32
	B"	0.02						0.00	0.01	0.01	0.02	-0.04	-0.00		-0.03
	A	0.14	-0.04	-0.04	-0.03	-0.03	0.03	0.00	-0.01	0.04	0.00	0.01	0.03	-0.13	-0.28
	B	0.13						-0.01	-0.04	0.02	0.00	0.01	0.04	-0.27	-0.24
Nonwhite	A"	-0.64	-0.02	-0.09	-0.01	-0.09	-0.09	-0.18	-0.06	-0.12	-0.03	-0.00	0.03		1.12
	B"	-0.02						-0.07	-0.01	-0.05	-0.00	0.06	0.05		0.73
	A	0.07	-0.10	-0.02	-0.13	-0.03	0.03	0.01	0.00	0.05	-0.00	0.05	0.00	-0.32	0.33
	B	0.13						0.00	-0.01	0.02	-0.03	0.04	0.00	-0.91	0.26

Range: Total {A" & B" = 1946-1979; White & Nonwhite {A" & B" = 1946-1977
 {A & B = 1920-1979 {A & B = 1920-1977.

TABLE K - 11

Statistics
(Sims's Test)

Country	Equation	SEE		R ²	e ²	F-statistic (d.f.)
		Smallest	Largest			
<u>ASIA</u>						
Japan	A	0.024	0.044	0.898	0.980	4.404 (12, 6)
	B	0.036	0.040	0.404	5.733	1.065 (7,11)
<u>NORTH AMERICA</u>						
<u>U.S.A.</u>						
Total	A''	0.021	0.037	0.436	0.933	0.644 (12,10)
	B''	0.018	0.026	0.289	1.176	0.871 (7,15)
	A	0.021	0.025	0.392	10.79	1.740 (13,35)
	B	0.022	0.025	0.177	14.62	1.076 (8,40)
White	A''	0.027	0.049	0.530	0.386	0.753 (12, 8)
	B''	0.017	0.019	0.430	0.469	1.404 (7,13)
	A	0.019	0.023	0.452	7.985	2.100 (13,33)
	B	0.021	0.023	0.219	11.39	1.332 (8,38)
Nonwhite	A''	0.070	0.107	0.544	3.759	0.796 (12, 8)
	B''	0.055	0.059	0.388	5.047	1.178 (7,13)
	A	0.039	0.047	0.398	34.49	1.678 (13,33)
	B	0.041	0.051	0.156	48.34	0.880 (8,38)

TABLE K - 12

Sims's Test
PDQ of Residuals:
Test for Serial Correlation in Residuals

Country	Equation	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>ASIA</u>														
Japan	A	0.23	-0.33	0.48*	-0.32	-0.04	-0.31	-0.05	-0.10	0.14	-0.05	0.12	-0.03	-0.03
<u>NORTH AMERICA</u>														
U.S.A.														
Total	A"	0.21	-0.09	-0.33	-0.04	-0.17	0.13	0.27	-0.20	-0.19	0.06	0.08	0.06	0.18
	A	0.14	-0.13	-0.19	0.07	-0.22	0.05	-0.08	-0.05	0.23	-0.20	0.10	0.10	-0.02
White	A"	0.22	0.11	-0.12	-0.17	0.14	0.14	-0.17	-0.16	-0.04	-0.15	-0.03	0.07	0.15
	A	0.15	-0.09	-0.11	0.01	-0.27	-0.01	-0.18	-0.06	0.22	-0.13	0.22	0.10	0.07
Nonwhite	A"	0.22	-0.51*	-0.14	0.44	-0.40	-0.05	0.41	-0.33	-0.03	0.31	-0.34	0.17	0.22
	A	0.15	0.04	-0.20	0.04	-0.11	-0.22	-0.05	0.09	0.21	-0.12	-0.03	0.10	0.01

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE L - 1

Sims's Test
Estimated Lag Profiles

		A: FE = f(NE: 3 lead, current, 3 past) & B: FE = g(NE: current, 3 past)								SEE	
Country		C	+3	+2	+1	0	-1	-2	-3	Smallest	Largest
<u>ASIA</u>											
Japan	A	0.73	5.20	-0.44	3.34	-2.37	-0.92	-2.80	0.43	1.131	1.372
	B	0.73				-1.38	-0.44	-0.91	1.45	1.476	1.716
<u>NORTH AMERICA</u>											
<u>U.S.A.</u>											
Total	A'	1.02	-1.08	-0.34	-2.34	-1.59	0.50	-0.05	-0.90	0.731	0.978
	B'	0.83				-1.78	0.59	-0.71	-1.08	0.980	1.186
	A''	-0.96	-1.06	2.86	3.60	1.81	1.93	-0.00	-0.16	2.024	2.256
	B''	-0.76				1.81	1.84	0.05	0.44	2.061	2.217
White	A	-0.04	0.13	0.95	-1.64	-0.81	0.74	-0.02	-1.18	0.937	1.011
	B	-0.04				-0.94	0.98	-0.20	-0.95	0.904	0.948
	A'	1.23	-0.99	-0.42	-2.57	-1.60	0.26	-0.60	-1.42	0.975	1.233
	B'	0.99				-1.92	0.43	-1.26	-1.23	1.175	1.374
Nonwhite	A''	-1.06	6.15	5.14	3.73	5.25	4.11	2.51	-1.76	2.568	3.552
	B''	-0.95				2.91	2.09	4.18	-1.57	2.575	3.145
	A	0.14	0.64	1.05	-2.14	-0.72	1.10	-0.35	-1.67	1.073	1.181
	B	0.11				-0.79	1.31	-0.66	-1.26	1.052	1.110
Nonwhite	A'	1.07	-0.23	-1.00	-1.03	-1.00	0.87	-0.30	-0.35	0.540	0.627
	B'	1.42				-1.22	0.42	-0.83	-0.68	0.611	0.676
	A''	-0.70	1.28	0.83	0.06	-2.73	-0.55	1.31	0.46	1.080	1.208
	B''	-0.69				-2.10	-0.12	1.20	0.60	0.925	1.099
Nonwhite	A	-0.07	-0.13	0.34	0.00	0.18	0.38	-0.25	-1.32	0.447	0.487
	B	-0.06				0.18	0.42	-0.25	-1.35	0.424	0.455

TABLE L - 2

Statistics
(Sims's Test)

Country	Equation	R ²	e ²	F-statistic (d.f.)	range
<u>ASIA</u>					
Japan	A	0.633	266.5	3.703 (7,15)	1947-'76
	B	0.124	636.8	0.638 (4,18)	1947-'76
<u>NORTH AMERICA</u>					
<u>U.S.A.</u>					
Total	A'	0.663	67.33	3.098 (7,11)	1920-'45
	B'	0.300	139.9	1.505 (4,14)	1920-'45
	A''	0.280	143.5	1.059 (7,19)	1946-'79
	B''	0.065	186.6	0.383 (4,22)	1946-'79
	A	0.148	696.9	1.117 (7,45)	1920-'79
	B	0.072	759.1	0.931 (4,48)	1920-'79
White	A'	0.588	84.15	2.246 (7,11)	1920-'45
	B'	0.280	147.1	1.364 (4,14)	1920-'45
	A''	0.349	132.6	1.303 (7,17)	1946-'77
	B''	0.176	167.9	1.068 (4,20)	1946-'77
	A	0.181	722.0	1.359 (7,43)	1920-'77
	B	0.088	804.0	1.112 (4,46)	1920-'77
Nonwhite	A'	0.621	94.19	2.578 (7,11)	1920-'45
	B'	0.368	157.0	2.042 (4,14)	1920-'45
	A''	0.290	148.1	0.995 (7,17)	1946-'77
	B''	0.201	166.7	1.263 (4,20)	1946-'77
	A	0.209	546.7	1.624 (7,43)	1920-'77
	B	0.198	554.1	2.848 (4,46)	1920-'77

TABLE L - 3

Sims's Test
 PDQ of Residuals:
 Test for Serial Correlation in Residuals

Country	Equation	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>ASIA</u>														
Japan	A	0.21	0.01	-0.27	0.07	-0.21	0.20	0.00	-0.22	0.15	-0.19	-0.09	0.32	0.05
<u>NORTH AMERICA</u>														
U.S.A.														
Total	A'	0.23	-0.15	0.37	-0.15	0.24	-0.19	0.16	-0.25	0.01	-0.11	0.01	-0.16	-0.00
	A''	0.19	0.21	-0.28	-0.22	-0.19	-0.17	0.14	0.05	0.03	0.25	0.13	-0.24	-0.21
	A	0.14	-0.01	-0.03	0.05	0.21	0.16	0.10	0.11	-0.03	0.07	0.12	-0.05	-0.10
White	A'	0.23	-0.04	0.33	-0.17	0.21	-0.09	0.11	-0.17	0.13	-0.09	-0.12	-0.19	-0.08
	A''	0.20	0.19	-0.25	0.07	-0.12	-0.23	0.01	0.01	-0.05	0.08	-0.05	-0.23	-0.01
	A	0.14	0.02	-0.14	0.00	0.32*	0.15	0.03	0.09	0.03	0.07	0.08	-0.02	-0.12
Nonwhite	A'	0.23	0.06	0.21	-0.31	-0.17	-0.13	-0.22	-0.16	-0.14	0.09	0.22	0.00	0.00
	A''	0.20	-0.23	-0.12	0.08	-0.30	0.06	0.01	0.16	-0.01	-0.27	0.04	-0.07	-0.01
	A	0.14	0.06	-0.05	0.17	0.09	0.04	0.02	0.20	0.01	-0.01	0.26	-0.16	-0.16

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE L - 4

Sims's Test
Estimated Lag Profiles

A: FE = f(NE: 3 lead, current, 3 past, D1 and/or D2) & B: FE = g(NE: current, 3 past, D1 and/or D2)											SEE		
Country		C	+3	+2	+1	0	-1	-2	-3	D1	D2	Smallest	Largest
<u>ASIA</u>													
Japan	A	1.94	3.67	-1.57	2.69	-1.83	0.02	-1.71	1.08		-3.62	1.222	1.806
	B	2.81				-0.97	0.41	-0.19	1.65		-6.43**	1.278	1.518
<u>NORTH AMERICA</u>													
<u>U.S.A.</u>													
Total	A'	2.03	-0.61	0.03	-2.16	-1.99	0.05	-0.79	-1.56	-0.21	-2.80	0.926	1.386
	B'	0.10				-1.28	1.30	-0.09	-1.13	3.47	-1.85	1.026	1.365
White	A''	-1.30	-2.36	0.51	1.64	0.60	0.76	-0.19	-0.08		2.42	2.051	3.788
	B''	-1.30				0.24	0.50	-1.13	-0.27		2.94**	1.939	2.179
	A	-1.46	-0.86	0.65	-1.42	-0.25	1.38	1.30	0.34	5.82**	2.10	0.899	1.012
	B	-1.36				-0.48	1.56	0.85	0.33	5.85**	1.70	0.888	0.929
	A'	2.17	-0.54	0.02	-2.41	-1.98	-0.00	-1.24	-2.08	-0.18	-3.01	1.188	1.761
	B'	0.36				-1.25	1.34	-0.60	-1.44	3.35	-2.15	1.178	1.518
	A''	-1.42	3.69	2.46	1.17	2.81	1.10	0.98	-3.99		2.61	2.943	4.041
	B''	-1.57				1.14	-0.55	1.11	-4.86		3.62**	2.685	2.919
	A	-1.18	-0.23	0.83	-1.79	-0.35	1.64	0.82	-0.19	5.25**	1.84	1.052	1.202
	B	-1.27				-0.52	1.91	0.44	0.10	5.70**	1.86	1.026	1.088
Nonwhite	A'	2.04	-0.47	-1.17	-1.25	-1.30	0.37	-0.75	-0.38	-2.93	0.31	0.657	1.213
	B'	0.07				-0.73	1.22	-0.08	-0.50	3.70	-0.65	0.722	1.167
	A''	-1.74	0.16	-0.53	-0.83	-3.13	-0.53	1.89	1.51		3.91	1.047	1.272
	B''	-1.55				-3.04	-0.80	1.46	1.54		3.16**	0.836	1.060
	A	-0.83	-0.35	0.36	-0.01	0.26	0.43	-0.05	-1.01	2.35	1.53	0.486	0.510
	B	-0.75				0.22	0.45	-0.08	-1.12	1.95	1.43	0.454	0.490

** Significant at $\alpha = 5\%$ (This significance is applied only for dummy variables.)

TABLE L - 5

Statistics
(Sims's Test)

Country	Equation	R ²	e ²	F-statistic (d.f.)	range
<u>ASIA</u>					
Japan	A	0.671	239.2	3.569 (8,14)	1947-'76
	B	0.382	449.2	2.103 (5,17)	1947-'76
<u>NORTH AMERICA</u>					
<u>U.S.A.</u>					
Total	A'	0.737	52.49	2.812 (9, 9)	1920-'45
	B'	0.564	87.09	2.595 (6,12)	1920-'45
	A''	0.302	139.3	0.974 (8,18)	1946-'79
	B''	0.233	152.9	1.282 (5,21)	1946-'79
	A	0.299	572.9	2.044 (9,43)	1920-'79
	B	0.239	621.8	2.420 (6,46)	1920-'79
White	A'	0.685	64.33	2.177 (9, 9)	1920-'45
	B'	0.540	93.92	2.353 (6,12)	1920-'45
	A''	0.404	121.4	1.357 (8,16)	1946-'77
	B''	0.368	128.6	2.219 (5,19)	1946-'77
	A	0.297	619.9	1.924 (9,41)	1920-'77
	B	0.238	671.7	2.293 (6,44)	1920-'77
Nonwhite	A'	0.635	90.68	1.743 (9, 9)	1920-'45
	B'	0.425	142.8	1.483 (6,12)	1920-'45
	A''	0.411	122.9	1.399 (8,16)	1946-'77
	B''	0.389	127.4	2.428 (5,19)	1946-'77
	A	0.255	514.7	1.563 (9,41)	1920-'77
	B	0.238	526.8	2.291 (6,44)	1920-'77

TABLE L - 6

Sims's Test
 PDQ of Residuals:
 Test for Serial Correlation in Residuals

Country	Equation	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>ASIA</u>														
Japan	A	0.21	-0.13	-0.34	0.03	-0.19	0.22	-0.02	-0.18	0.26	-0.17	-0.20	0.24	0.08
<u>NORTH AMERICA</u>														
U.S.A.														
Total	A'	0.23	-0.33	0.37	-0.17	0.06	-0.41	0.18	-0.21	0.05	0.05	0.09	-0.13	0.06
	A''	0.19	0.18	-0.27	-0.20	-0.23	-0.27	0.17	0.11	0.03	0.24	0.13	-0.23	-0.17
	A	0.14	-0.07	-0.10	-0.05	0.14	0.05	-0.01	0.00	-0.08	-0.02	-0.03	-0.18	-0.12
White	A'	0.23	-0.18	0.35	-0.26	0.02	-0.30	0.06	-0.21	0.17	0.07	-0.02	-0.05	-0.03
	A''	0.20	0.09	-0.33	0.05	-0.23	-0.30	0.01	0.04	0.03	0.25	0.08	-0.15	-0.01
	A	0.14	-0.01	-0.22	-0.07	0.28	0.04	-0.10	-0.02	-0.02	-0.02	-0.03	-0.09	-0.09
Nonwhite	A'	0.23	0.04	0.13	-0.37	-0.14	-0.04	-0.18	-0.15	-0.14	0.15	0.26	-0.00	-0.06
	A''	0.20	-0.31	-0.13	0.14	-0.30	0.05	-0.03	0.19	0.07	-0.15	0.10	-0.13	-0.04
	A	0.14	0.02	-0.11	0.07	-0.00	-0.06	-0.07	0.14	-0.03	-0.04	0.20	-0.23	-0.19

TABLE L - 7

Sims's Test
Estimated Lag Profiles

A:

B:

$$FE = f(NE: 5 \text{ lead, current, 5 past}) \text{ \& } FE = g(NE: \text{current, 5 past})$$

Country		C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5
<u>ASIA</u>													
Japan	A	0.38	-1.98	-3.51	2.93	-0.65	6.52	0.85	1.58	-3.40	-1.09	-5.69	-2.28
	B	0.22						-0.38	0.74	-1.71	0.15	-2.31	-2.34
<u>NORTH AMERICA</u>													
U.S.A.													
Total	A"	-1.18	2.49	2.39	0.04	2.84	2.73	-0.12	1.16	-0.22	-1.18	1.36	1.37
	B"	-1.39						0.26	2.76	0.30	-0.26	2.06	1.96
	A	0.20	-1.65	1.56	-0.36	1.90	-0.84	-0.08	0.72	0.11	-1.69	-3.00	-0.98
	B	0.22						-0.61	1.29	-0.00	-1.20	-2.43	-1.55
White	A"	-1.89	-0.08	-3.98	-2.72	0.59	-3.68	1.32	2.08	4.73	0.16	8.54	1.28
	B"	-1.92						1.84	2.04	4.41	-0.04	7.52	2.76
	A	0.30	-0.87	1.78	-0.86	2.61	-1.98	-0.34	1.01	0.30	-2.45	-2.60	-0.66
	B	0.35						-0.84	1.84	-0.29	-1.47	-2.73	-1.22
Nonwhite	A"	-0.51	0.35	0.83	0.11	0.65	0.60	-3.32	-0.99	2.06	2.28	-1.08	-2.09
	B"	-0.52						-2.97	-0.18	2.55	1.72	-1.27	-2.21
	A	0.07	-0.17	0.08	0.34	0.16	0.16	-0.00	0.61	-0.28	-1.23	-0.22	-0.85
	B	0.07						0.07	0.59	-0.26	-1.22	-0.15	-0.76

Range: Total { A"&B" = 1946-1979; White & Nonwhite { A"&B" = 1946-1977
A & B = 1920-1979 A & B = 1920-1977.

TABLE L - 8

Statistics
(Sims's Test)

Country	Equation	SEE		R ²	e ²	F-statistic (d.f.)
		Smallest	Largest			
<u>ASIA</u>						
Japan	A	1.573	2.709	0.802	114.8	2.585 (11, 7)
	B	1.794	2.227	0.223	451.6	0.574 (6,12)
<u>NORTH AMERICA</u>						
U.S.A.						
Total	A''	2.577	3.011	0.343	99.41	0.523 (11,11)
	B''	2.134	2.262	0.182	123.7	0.596 (6,16)
	A	0.990	1.417	0.340	531.8	1.736 (11,37)
	B	0.889	0.934	0.263	594.2	2.500 (6,42)
White	A''	3.379	5.469	0.583	63.53	1.145 (11, 9)
	B''	2.307	2.902	0.488	78.02	2.225 (6,14)
	A	1.127	1.703	0.345	568.3	1.678 (11,35)
	B	1.047	1.109	0.249	652.0	2.209 (6,40)
Nonwhite	A''	1.692	2.044	0.383	112.4	0.508 (11, 9)
	B''	1.313	1.508	0.304	126.6	1.023 (6,14)
	A	0.500	0.621	0.258	476.9	1.106 (11,35)
	B	0.430	0.470	0.240	488.3	2.109 (6,40)

TABLE L - 9

Sims's Test
 PDQ of Residuals:
 Test for Serial Correlation in Residuals

Country	Equation	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>ASIA</u>														
Japan	A	0.23	-0.02	0.04	0.04	-0.47*	-0.07	-0.15	-0.21	0.12	0.01	-0.01	0.32	0.05
<u>NORTH AMERICA</u>														
U.S.A.														
Total	A''	0.21	0.11	-0.37	-0.13	-0.07	-0.11	0.09	-0.12	-0.20	0.26	0.10	-0.11	-0.03
	A	0.14	-0.05	-0.11	-0.01	0.03	-0.05	0.13	-0.03	-0.02	0.14	0.08	-0.12	-0.17
White	A''	0.22	0.07	-0.48*	0.01	-0.04	0.14	0.22	-0.33	-0.10	0.30	-0.06	-0.16	-0.04
	A	0.15	0.05	-0.29	0.00	0.20	-0.02	0.03	-0.05	0.01	0.15	0.10	-0.11	-0.14
Nonwhite	A''	0.22	-0.23	-0.04	-0.02	-0.53*	0.18	0.12	0.14	0.15	-0.33	-0.02	-0.06	-0.11
	A	0.15	0.07	-0.07	-0.00	0.02	0.02	-0.07	0.21	-0.04	0.03	0.17	-0.18	-0.16

* Correlation is greater than two times its estimated standard error in absolute value.

TABLE L - 10

Sims's Test
Estimated Lag Profiles

A:

B:

FE = f(NE: 5 lead, current, 5 past, D1 and/or D2) & FE = g(NE: current, 5past, D1 and/ or D2)

Country		C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	D1	D2
<u>ASIA</u>															
Japan	A	2.93	-3.05	-5.58	-0.35	-2.09	7.00	3.11	4.44	-1.16	-0.09	-5.55	-2.95		-5.84
	B	2.08						-0.55	1.16	-0.69	1.17	-1.03	-1.68		-4.65
<u>NORTH AMERICA</u>															
U.S.A.															
Total	A''	-1.58	2.19	1.87	-1.09	0.28	0.92	-1.41	0.32	-0.35	-0.89	1.69	2.20		2.30
	B''	-1.69						-1.12	1.32	-0.52	-1.12	1.28	2.54		2.58
	A	-1.24	-2.05	1.23	-1.63	1.42	-1.20	0.32	1.24	1.42	-0.22	-1.97	0.04	4.62	2.50
	B	-0.84						-0.48	1.58	0.67	-0.20	-1.70	-0.77	3.94	1.53
White	A''	-1.91	0.38	-4.18	-3.46	-0.31	-4.83	0.26	0.75	3.51	-1.17	7.92	0.46		1.03
	B''	-1.91						1.87	2.13	4.50	0.10	7.64	2.86		-0.11
	A	-0.86	-1.16	1.59	-1.57	2.17	-2.02	-0.05	1.37	1.19	-1.19	-1.78	0.10	3.89	1.88
	B	-0.87						-0.71	2.10	0.42	-0.34	-1.90	-0.40	4.16	1.90
Nonwhite	A''	-2.90	-0.03	-0.05	-0.88	-1.43	-0.25	-3.11	-1.89	1.80	3.36	1.49	-0.44		6.97
	B''	-1.99						-3.37	-1.74	2.01	2.68	0.52	-0.83		4.25
	A	-0.37	-0.26	0.06	0.22	0.24	0.16	0.09	0.68	-0.11	-1.02	-0.13	-0.73	1.72	0.49
	B	-0.48						0.11	0.61	-0.13	-1.05	-0.01	-0.57	1.57	1.07

Range: Total { A"&B" = 1946-1979; White & Nonwhite { A"&B" = 1946-1977
{ A & B = 1920-1979 { A & B = 1920-1977.

TABLE L - 11

Statistics
(Sims's Test)

Country	Equation	SEE		R ²	e ²	F-statistic (d.f.)
		Smallest	Largest			
<u>ASIA</u>						
Japan	A	1.824	3.628	0.834	96.32	2.518 (12, 6)
	B	1.834	2.261	0.319	395.7	0.737 (7,11)
<u>NORTH AMERICA</u>						
<u>U.S.A.</u>						
Total	A''	2.778	6.872	0.354	97.72	0.457 (12,10)
	B''	2.115	2.379	0.285	108.1	0.858 (7,15)
	A	1.062	1.545	0.389	492.3	1.717 (13,35)
	B	0.906	1.062	0.315	551.7	2.308 (8,40)
White	A''	4.319	7.284	0.587	62.90	0.949 (12, 8)
	B''	2.985	4.122	0.488	78.01	1.772 (7,13)
	A	1.237	1.795	0.386	532.8	1.597 (13,33)
	B	1.077	1.231	0.308	600.3	2.118 (8,38)
Nonwhite	A''	1.582	2.495	0.524	86.61	0.736 (12, 8)
	B''	1.207	1.527	0.484	94.04	1.741 (7,13)
	A	0.542	0.682	0.270	468.9	0.941 (13,33)
	B	0.487	0.514	0.257	477.2	1.648 (8,38)

TABLE L - 12

Sims's Test
PDQ of Residuals:
Test for Serial Correlation in Residuals

Country	Equation	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
<u>ASIA</u>														
Japan	A	0.23	-0.30	0.03	-0.07	-0.43	0.22	0.05	-0.01	0.09	-0.10	-0.24	0.29	-0.12
<u>NORTH AMERICA</u>														
U.S.A.														
Total	A"	0.21	0.05	-0.36	-0.11	-0.08	-0.10	0.14	-0.09	-0.21	0.27	0.07	-0.11	-0.03
	A	0.14	-0.06	-0.18	-0.04	0.07	-0.08	0.10	-0.08	-0.04	0.11	0.03	-0.14	-0.16
White	A"	0.22	0.07	-0.45*	0.04	-0.07	0.10	0.24	-0.30	-0.09	0.30	-0.07	-0.15	-0.03
	A	0.15	0.03	-0.36*	-0.03	0.21	-0.08	-0.04	-0.09	0.00	0.11	0.07	-0.11	-0.13
Nonwhite	A"	0.22	-0.30	-0.13	0.33	-0.45*	0.07	0.04	0.00	0.12	-0.25	0.14	-0.03	-0.27
	A	0.15	0.06	-0.09	-0.03	-0.00	-0.02	-0.11	0.19	-0.05	0.02	0.16	-0.19	-0.16

* Correlation is greater than two times its estimated standard error in absolute value.

ESTIMATED LAG PROFILES AFTER CORRECTION FOR SERIAL CORRELATION

Sims's Test

Equation IV [M - F]: 5 leads Table

U.K., Israel, and Nonwhites (U.S.A.) N-1

Nonwhites (1920-'77) [U.S.A.] N-2

Equation IV [F - M]: 5 leads

Canada, Nonwhites (1920-'77), and Taiwan .. N-3

TABLE N - 1

Sims's Test
Estimated Lag Profiles

A: MO = f(FE: 5 lead, current, 5 past) & B: MO = g(FE: current, 5 past)

Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	SEE		
													Smallest	Largest	
U.K.	A	-0.00	-0.15	-0.06	-0.21	0.40	0.13	0.12	0.11	-0.14	0.00	-0.04	-0.02	0.048	0.120
	B	-0.05						-0.06	0.09	-0.23	-0.02	-0.08	0.00	0.067	0.080
Israel	A	1.78	-0.47	0.42	0.10	0.16	0.02	0.23	0.00	0.11	0.06	0.04	0.19	0.075	0.150
	B	1.37						0.17	-0.10	0.14	-0.00	0.09	0.33	0.101	0.119
U.S.A.															
Nonwhite (1920-'77)	A	-1.30	-0.44	-0.09	-0.23	-0.04	-0.26	0.20	-0.12	0.30	0.13	0.48	0.28	0.137	0.164
	B	-2.68						0.17	-0.26	0.18	0.12	0.48	0.34	0.153	0.188

PDQ of Residuals:
Test for Serial Correlation in Residuals

Country		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
U.K.	A	0.20	0.09	0.15	-0.21	0.01	-0.07	0.04	-0.10	0.22	-0.01	0.04	-0.09	-0.09
Israel	A	0.21	-0.15	0.34	-0.33	0.13	-0.37	0.07	-0.22	-0.00	-0.17	-0.02	-0.11	0.11
Nonwhite (1920-'77)	A	0.19	-0.11	-0.44*	0.13	0.19	-0.08	-0.42*	0.15	0.21	-0.15	-0.05	0.20	0.14

* Correlation is greater than two times its estimated standard error in absolute value.

				<u>Statistics</u>					
		R ²	e ²	F-statistic(d.f.)		R ²	e ²	F-statistic(d.f.)	
U.K.	A	0.877	6.636	7.797 (11,12)	Israel	A	0.904	36.26	8.562 (11,10)
	B	0.583	22.54	3.962 (6,17)		B	0.552	169.0	3.086 (6,15)
Nonwhite	A	0.739	164.3	3.867 (11,15)					
(1920-'77)	B	0.457	341.6	2.815 (6,20)					

TABLE N - 2

Sims's Test
Estimated Lag Profiles

		A: MO = f(FE: 5 lead, current, 5 past) & MO = g(FE: current, 5 past)											B: SEE	
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	Smallest	Largest
U.S.A.														
Nonwhite	A	0.23	-0.14	-0.33	-0.53	0.10	-0.22	-0.07	-0.09	0.31	0.20	0.21	0.16	0.139
(1920-'77)	B	0.40						-0.21	-0.25	0.08	-0.04	0.17	0.13	0.158
														0.169
														0.192

PDQ of Residuals:
Test for Serial Correlation in Residuals

Country	SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
U.S.A.													
Nonwhite	A	0.17	-0.02	-0.28	-0.08	0.18	-0.08	-0.15	0.10	0.18	-0.25	-0.05	0.08
(1920-'77)	B												0.17

Statistics

U.S.A.		R ²	e ²	F-statistic(d.f.)
Nonwhite	A	0.539	193.8	2.552 (11,24)
(1920-'77)	B	0.154	355.7	0.882 (6,29)

TABLE N - 3

Sims's Test
Estimated Lag Profiles

A: FE = f(MO: 5 lead, current, 5 past) & B: FE = g(MO: current, 5 past)

1970-79 (Nov 5 lead, current, 5 pass), & 1970-79 (Nov 5 lead, current, 5 pass)														SEE	
Country	C	+5	+4	+3	+2	+1	0	-1	-2	-3	-4	-5	Smallest	Largest	
Canada	A	1.19	-1.11	-0.21	1.54	-1.94	1.46	-1.70	0.89	-0.59	-0.67	-0.09	-0.67	0.868	2.205
	B	0.18						-0.57	-0.02	0.12	-0.59	-0.03	-0.40	0.273	0.448
U.S.A.															
Nonwhite	A	0.41	0.05	0.50	-0.36	0.20	-0.02	-0.37	0.29	0.06	-0.42	-0.09	-0.32	0.141	0.244
(1920-'77)	B	0.66						-0.01	0.17	0.17	-0.31	-0.28	-0.39	0.128	0.173
Taiwan	A	-4.65	0.23	3.72	0.56	2.60	-2.56	0.03	-0.75	-1.41	0.79	0.55	2.13	0.393	1.126
	B	-4.09						-0.46	0.61	-0.76	0.65	0.63	0.31	0.381	0.823

PDQ of Residuals:
Test for Serial Correlation in Residuals

Test for Serial Correlation in Residuals														
Country		SE	r1	r2	r3	r4	r5	r6	r7	r8	r9	r10	r11	r12
Canada	A	0.24	0.32	0.11	-0.35	-0.54*	-0.27	-0.20	0.10	0.22	0.16	0.29	0.08	-0.10
Nonwhite	A	0.17	0.21	-0.16	-0.29	-0.17	-0.02	0.27	0.22	-0.09	-0.11	0.02	-0.14	-0.05
Taiwan	A	0.23	-0.34	0.15	-0.11	-0.07	0.29	-0.37	0.14	-0.09	0.16	-0.21	-0.05	0.02

* Correlation is greater than two times its estimated standard error in absolute value.

Statistics									
	R ²	e ²	F-statistic (d.f.)			R ²	e ²	F-statistic (d.f.)	
Canada	A	0.613	30.82	0.866 (11, 6)	Taiwan	A	0.931	61.26	8.666 (11, 7)
	B	0.407	47.25	1.262 (6,11)		B	0.487	459.1	1.901 (6,12)
Nonwhite	A	0.525	206.4	2.419 (11,24)					
(1920-'77)	B	0.377	271.0	2.930 (6,29)					

ESTIMATED ARIMA STRUCTURES

LIST OF SYMBOLS

FE fertility rate

MO mortality rate

NE neonatal mortality rate

ARIMA an integrated autoregressive moving-average process
 with difference

AR autoregressive process

MA moving-average process

σ^2 estimated variance of residuals

χ^2 Chi-square

TABLE 0 - 1
ESTIMATED ARIMA STRUCTURES

Denmark												
Panel A: PDQ; lags 1 through 5 years												
Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	$(1 - B)^0$	0.88*	0.67*	0.44*	0.22	0.02	0.88*	-0.47*	-0.08	-0.15	-0.04	1936-'74
	$(1 - B)^1$	0.56*	0.23	-0.02	-0.24	-0.21	0.56*	-0.12	-0.14	-0.21	0.08	1936-'74
MO	$(1 - B)^0$	0.90*	0.80*	0.72*	0.63*	0.57*	0.90*	-0.03	0.03	-0.04	0.07	1936-'74
	$(1 - B)^1$	-0.28	0.23	-0.12	0.10	0.08	-0.28	0.16	-0.03	0.04	0.15	1936-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)							
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha=0.05$
FE t-ratio	(1,1,0)	-0.036 (-0.098)	0.559* (4.055)	0	5.42	13.5 **	33.9(22)
MO t-ratio	(1,1,1)	-2.635* (-3.735)	-0.746* (-3.143)	-0.506 (-1.565)	6.16	8.3**	32.7(21)

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 2

ESTIMATED ARIMA STRUCTURES
Finland

Panel A: PDQ: lags 1 through 5 years												
Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.84*	0.77*	0.61*	0.50*	0.38*	0.84*	0.24	-0.29	-0.07	0.03	1936-'74
	(1 - B) ¹	-0.42*	0.40*	-0.17	0.00	-0.08	-0.42*	0.27	0.09	-0.17	-0.14	1936-'74
MO	(1 - B) ⁰	0.90*	0.86*	0.78*	0.72*	0.62*	0.90*	0.31	-0.17	-0.02	-0.21	1936-'74
	(1 - B) ¹	-0.60*	0.34*	-0.28	0.09	0.12	-0.60*	-0.02	-0.14	-0.21	0.17	1936-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)							
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \quad \alpha = 0.05$
FE	(1,1,0)	-0.635	-0.430*	0	37.36	7.7**	33.9(22)
t-ratio		(-0.634)	(-2.853)				
MO	(1,1,0)	-2.350*	-0.608*	0	39.53	7.4**	33.9(22)
t-ratio		(-2.246)	(-4.589)				

* Significant at $\alpha=5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 3

ESTIMATED ARIMA STRUCTURES
France

Panel A: PDQ; lags 1 through 5 years												
Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.92*	0.80*	0.66*	0.51*	0.32	0.92*	-0.27	-0.11	-0.20	-0.28	1936-'74
	(1 - B) ¹	0.26	0.09	0.14	0.13	-0.25	0.26	0.02	0.12	0.07	-0.34*	1936-'74
MO	(1 - B) ⁰	0.87*	0.83*	0.75*	0.71*	0.65*	0.87*	0.28	-0.05	0.09	-0.06	1936-'74
	(1 - B) ¹	-0.44*	0.15	-0.20	0.00	0.34*	-0.44*	-0.05	-0.19	-0.21	0.34*	1936-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)							
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha = 0.05$
FE	(1,1,0)	0.035	0.282	0	10.11	6.1**	33.9(22)
t-ratio		(0.069)	(1.730)				
MO	(1,1,0)	-2.055	-0.440*	0	98.79	10.3**	33.9(22)
t-ratio		(-1.254)	(-2.936)				

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 4

ESTIMATED ARIMA STRUCTURES
Italy

Panel A: PDQ; lags 1 through 5 years												
Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	$(1 - B)^0$	0.80*	0.56*	0.30	0.10	-0.05	0.80*	-0.23	-0.21	0.02	-0.08	1936-'74
	$(1 - B)^1$	0.10	0.00	-0.23	-0.16	-0.38*	0.10	-0.01	-0.23	-0.12	-0.38*	1936-'74
MO	$(1 - B)^0$	0.94*	0.87*	0.80*	0.74*	0.66*	0.94*	-0.09	-0.10	0.08	-0.21	1936-'74
	$(1 - B)^1$	-0.14	0.26	-0.20	0.30	-0.26	-0.14	0.25	-0.15	0.23	-0.17	1936-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)							
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha = 0.05$
FE	(1,1,0)	-0.393	0.103	0	12.39	12.1**	33.9(22)
t-ratio		(-0.685)	(0.627)				
MO	(1,1,1)	-4.154*	-0.996*	-0.897*	25.32	5.5**	32.7(21)
t-ratio		(-2.681)	(-146.9)	(-12.13)			

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 5

ESTIMATED ARIMA STRUCTURES
Netherlands

Panel A: PDQ; lags 1 through 5 years

Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	$(1 - B)^0$	0.75*	0.54*	0.37*	0.27	0.17	0.75*	-0.05	-0.03	0.02	-0.04	1936-'74
	$(1 - B)^1$	-0.08	0.01	0.05	-0.04	-0.09	-0.08	0.00	0.05	-0.03	-0.10	1936-'74
MO	$(1 - B)^0$	0.77*	0.67*	0.60*	0.57*	0.48*	0.77*	0.18	0.11	0.11	-0.08	1936-'74
	$(1 - B)^1$	-0.31	-0.10	-0.07	0.10	-0.04	-0.31	-0.22	-0.20	-0.02	-0.06	1936-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)

Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha = 0.05$
FE t-ratio	(1,1,0)	-0.474 (-0.541)	-0.078 (-0.472)	0	28.92	2.2**	33.9(22)
MO t-ratio	(1,1,1)	-0.505* (-2.896)	0.435* (2.722)	0.989* (32.25)	61.52	1.6**	32.7(21)

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 6

ESTIMATED ARIMA STRUCTURES
Norway

		Panel A: PDQ; lags 1 through 5 years										
Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	$(1 - B)^0$	0.84*	0.70*	0.53*	0.36*	0.17	0.84*	-0.06	-0.17	-0.09	-0.22	1936-'74
	$(1 - B)^1$	0.05	0.29	0.04	0.24	-0.29	0.05	0.29	0.01	0.16	-0.36*	1936-'74
MO	$(1 - B)^0$	0.92*	0.84*	0.78*	0.73*	0.65*	0.92*	-0.01	0.10	-0.02	-0.16	1936-'74
	$(1 - B)^1$	-0.23	-0.22	-0.08	0.30	-0.12	-0.23	-0.29	-0.24	0.17	-0.06	1936-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)

Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.})$	$\alpha = 0.05$
FE	(1,1,0)	0.309	5.395	0	7.66	11.0**	33.9(22)	
t-ratio		(0.682)	(0.321)					
MO	(2,1,2)	-0.885*	0.612* -0.746*	1.161* -0.924*	2.48	11.3**	30.1(19)	
t-ratio		(-4.049)	(5.130) (-6.598)	(16.03) (-20.64)				

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 7

ESTIMATED ARIMA STRUCTURES
Portugal

		Panel A: PDQ; lags 1 through 5 years										
Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	$(1 - B)^0$	0.72*	0.55*	0.45*	0.35*	0.19	0.72*	0.08	0.05	-0.00	-0.18	1936-'74
	$(1 - B)^1$	-0.23	-0.14	0.05	0.09	-0.03	-0.23	-0.20	-0.04	0.07	0.02	1936-'74
MO	$(1 - B)^0$	0.88*	0.78*	0.71*	0.65*	0.59*	0.88*	0.03	0.07	0.06	-0.04	1936-'74
	$(1 - B)^1$	-0.38*	-0.24	0.13	0.07	-0.10	-0.38*	-0.44*	-0.24	-0.12	-0.14	1936-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)							
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha = 0.05$
FE	(1,1,1)	-0.179*	0.685*	1.052*	9.49	11.1**	32.7(21)
t-ratio		(-2.201)	(5.295)	(69.85)			
MO	(1,1,1)	-2.254*	0.133*	1.130*	46.97	11.9**	32.7(21)
t-ratio		(63.17)	(11.60)	(217.6)			

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 8
ESTIMATED ARIMA STRUCTURES
Sweden

Panel A: PDQ; lags 1 through 5 years												
Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	$(1 - B)^0$	0.88*	0.67*	0.43*	0.19	-0.05	0.88*	-0.50*	-0.09	-0.14	-0.24	1936-'74
	$(1 - B)^1$	0.62*	0.24	0.06	-0.06	-0.13	0.62*	-0.23	0.03	-0.11	-0.05	1936-'74
MO	$(1 - B)^0$	0.90*	0.79*	0.70*	0.61*	0.51*	0.90*	-0.14	0.04	-0.04	-0.12	1936-'74
	$(1 - B)^1$	-0.01	-0.30	0.19	0.26	-0.16	-0.01	-0.30	0.20	0.18	-0.07	1936-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)							
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha = 0.05$
FE	(1,1,0)	0.068	0.621*	0	4.12	8.7**	33.9(22)
t-ratio		(0.215)	(4.764)				
MO	(2,1,0)	-1.208*	0.009 -0.341*	0	2.57	12.7**	32.7(21)
t-ratio		(-3.666)	(0.059)(-2.271)				

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 9

ESTIMATED ARIMA STRUCTURES
Switzerland

		Panel A: PDQ; lags 1 through 5 years										
		Autocorrelation					Partial Autocorrelation					
Variable	Difference	1	2	3	4	5	1	2	3	4	5	Range
FE	(1 - B) ⁰	0.86*	0.67*	0.44*	0.21	-0.01	0.86*	-0.32	-0.19	-0.15	-0.16	1936-'74
	(1 - B) ¹	0.68*	0.50*	0.29	0.11	-0.04	0.68*	0.08	-0.15	-0.10	-0.09	1936-'74
MO	(1 - B) ⁰	0.92*	0.85*	0.79*	0.72*	0.63*	0.92*	-0.05	0.08	-0.08	-0.17	1936-'74
	(1 - B) ¹	-0.14	-0.42*	0.19	0.17	-0.23	-0.14	-0.45*	0.05	0.04	-0.11	1936-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)

Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha=0.05$
FE t-ratio	(1,1,0)	-0.095 (-0.398)	0.723* (6.164)	0	2.49	14.4**	33.9(22)
MO t-ratio	(1,1,1)	-0.303* (-2.218)	0.674* (4.676)	0.979* (34.13)	2.39	13.5**	32.7(21)

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 10

ESTIMATED ARIMA STRUCTURES
U.K.

Panel A: PDQ; lags 1 through 5 years												
Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.80*	0.57*	0.36*	0.18	-0.00	0.80*	-0.18	-0.10	-0.05	-0.20	1939-'74
	(1 - B) ¹	0.11	-0.00	0.11	0.13	-0.05	0.11	-0.02	0.12	0.10	-0.07	1939-'74
MO	(1 - B) ⁰	0.92*	0.81*	0.69*	0.61*	0.51*	0.92*	-0.17	-0.19	0.26	-0.23	1939-'74
	(1 - B) ¹	-0.20	0.14	-0.27	0.29	-0.08	-0.20	0.11	-0.24	0.22	0.05	1939-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)							
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha = 0.05$
FE	(1,1,0)	0.048	0.115	0	12.82	4.9**	33.9(22)
t-ratio		(0.079)	(0.664)				
MO	(1,1,1)	-1.888*	-0.915*	-0.771*	7.36	5.0**	32.7(21)
t-ratio		(-2.302)	(-8.320)	(-4.321)			

* Significant at $\alpha = 5\%$ ** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 11

ESTIMATED ARIMA STRUCTURES
Israel

Panel A: PDQ; lags 1 through 5 years												
Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.67*	0.29	0.01	-0.06	-0.02	0.67*	-0.29	-0.09	0.10	0.04	1940-'74
	(1 - B) ¹	-0.02	-0.13	-0.17	-0.15	-0.16	-0.02	-0.13	-0.18	-0.19	-0.24	1940-'74
MO	(1 - B) ⁰	0.81*	0.61*	0.40*	0.28	0.21	0.81*	-0.12	-0.13	0.08	0.07	1940-'74
	(1 - B) ¹	0.08	-0.15	0.03	-0.03	-0.32	0.08	-0.16	0.06	-0.07	-0.31	1940-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)

Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha = 0.05$
FE	(1,1,0)	0,782	-0.021	0	47.84	12.8**	33.9(22)
t-ratio		(0.655)	(-0.127)				
MO	(1,1,0)	-0.961	0.083	0	20.71	9.7**	33.9(22)
t-ratio		(-1.198)	(0.474)				

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 12

ESTIMATED ARIMA STRUCTURES
Canada

Panel A: PDQ; lags 1 through 5 years												
Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	$(1 - B)^0$	0.92*	0.83*	0.72*	0.60*	0.49*	0.92*	-0.20	-0.11	-0.07	-0.10	1936-'74
	$(1 - B)^1$	0.54*	0.30	0.31	0.34*	0.39*	0.54*	0.00	0.21	0.13	0.20	1936-'74
MO	$(1 - B)^0$	0.91*	0.80*	0.72*	0.65*	0.59*	0.91*	-0.18	0.16	-0.05	-0.01	1936-'74
	$(1 - B)^1$	-0.40*	0.02	-0.19	0.29	-0.20	-0.40*	-0.17	-0.30	0.11	-0.08	1936-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)

Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha=0.05$
FE	(1,1,0)	-0.204	0.543*	0	9.15	7.9**	33.9(22)
t-ratio		(-0.427)	(3.876)				
MO	(1,1,0)	-2.405*	-0.637*	0	7.12	18.5**	33.9(22)
t-ratio		(-5.179)	(-6.052)				

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 13

ESTIMATED ARIMA STRUCTURES
U.S.A.: Total 1920-1945

		Panel A: PDQ; lags 1 through 5 years										
Variable	Difference	Autocorrelation					Partial Autocorrelation					range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.89*	0.74*	0.63*	0.51*	0.35	0.89*	-0.22	0.14	-0.22	-0.16	1920-'45
	(1 - B) ¹	0.26	0.10	0.18	0.17	0.07	0.26	0.03	0.16	0.09	-0.00	1920-'45
MO	(1 - B) ⁰	0.83*	0.73*	0.64*	0.49*	0.40	0.83*	0.15	-0.02	-0.21	0.05	1920-'45
	(1 - B) ¹	-0.38	-0.24	0.40	-0.27	-0.07	-0.38	-0.45*	0.15	-0.15	-0.10	1920-'45
NE	(1 - B) ⁰	0.87*	0.76*	0.63*	0.50*	0.40	0.87*	-0.00	-0.11	-0.09	0.02	1920-'45
	(1 - B) ¹	-0.20	-0.25	0.07	-0.07	0.14	-0.20	-0.31	-0.07	-0.17	0.09	1920-'45

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)							
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(d.f.) \alpha=0.05$
FE	(1,1,0)	-0.913	0.273	0	13.75	6.0**	33.9 (22)
t-ratio		(-1.192)	(1.377)				
MO	(0,1,1)	-1.719*	0	1.131*	4.962	7.4**	33.9 (22)
t-ratio		(-2.9.9)		(49.80)			
NE	(1,1,1)	-0.265*	0.608*	0.945*	0.615	9.3**	32.7 (21)
t-ratio		(-2.102)	(3.308)	(16.22)			

* Significant at $\alpha = 5\%$ ** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 14

ESTIMATED ARIMA STRUCTURES
U.S.A.: Total 1946-1979

Panel A: PDQ; lags 1 through 5 years												
Variable	Difference	Autocorrelation					Partial Autocorrelation					range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.95*	0.87*	0.79*	0.70*	0.60*	0.95*	-0.21	-0.07	-0.14	-0.11	1946-'79
	(1 - B) ¹	0.24	0.21	0.09	0.20	0.13	0.24	0.17	0.01	0.16	0.05	1946-'79
MO	(1 - B) ⁰	0.89*	0.78*	0.67*	0.57*	0.48*	0.89*	-0.02	-0.08	-0.04	0.02	1946-'79
	(1 - B) ¹	0.20	-0.06	0.26	0.12	0.06	0.20	-0.10	0.31	-0.02	0.12	1946-'79
NE	(1 - B) ⁰	0.87*	0.76*	0.65*	0.55*	0.46*	0.87*	-0.01	-0.06	-0.01	-0.01	1946-'79
	(1 - B) ¹	0.48*	0.44*	0.38*	0.24	0.24	0.48*	0.27	0.13	-0.06	0.05	1946-'79

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)							
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha=0.05$
FE	(1,1,0)	-0.500	0.359*	0	14.85	9.7**	33.9 (22)
t-ratio		(-0.745)	(2.459)				
MO	(0,1,1)	-0.647*	0	-0.506*	0.283	11.2**	33.9 (22)
t-ratio		(-4.689)		(-3.384)			
NE	(1,1,1)	-0.054	0.908*	0.487*	0.081	9.6**	32.7 (21)
t-ratio		(-0.921)	(9.641)	(2.491)			

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 15

ESTIMATED ARIMA STRUCTURES
U.S.A.: Total 1920-1979

		Panel A: PDQ; lags 1 through 5 years										
Variable	Difference	Autocorrelation					Partial Autocorrelation					range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.93*	0.84*	0.76*	0.67*	0.55*	0.93*	-0.25	0.10	-0.20	-0.17	1920-'79
	(1 - B) ¹	0.34*	-0.04	0.12	0.34*	0.32*	0.34*	-0.18	0.24	0.24	0.18	1920-'79
MO	(1 - B) ⁰	0.93*	0.89*	0.84*	0.78*	0.74*	0.93*	0.12	-0.02	-0.10	0.04	1920-'79
	(1 - B) ¹	-0.26	-0.16	0.40*	-0.12	0.01	-0.26	-0.25	0.33*	0.05	0.13	1920-'79
NE	(1 - B) ⁰	0.94*	0.89*	0.84*	0.79*	0.74*	0.94*	0.02	-0.04	-0.03	-0.01	1920-'79
	(1 - B) ¹	-0.04	-0.07	0.14	0.01	0.22	-0.04	-0.07	0.13	0.02	0.24	1920-'79

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)								
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	χ^2 (d.f.)	$\alpha=0.05$
FE	(0,1,1)	-0.765	0	-0.505*	16.43	20.8**	33.9	(22)
t-ratio		(-0.969)		(-4.596)				
MO	(2,1,2)	-3.802*	-1.233* -0.994*	-1.007* -0.625*	3.86	19.1**	30.1	(19)
t-ratio		(-5.615)	(-30.81) (-117.8)	(-10.21) (-6.416)				
NE	(1,1,0)	-0.580*	-0.046	0	0.35	22.0**	33.9	(22)
t-ratio		(-5.540)	(-0.365)					

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$

TABLE 0 - 16

ESTIMATED ARIMA STRUCTURES
U.S.A. : White 1920-1945

		Panel A: PDQ; lags 1 through 5 years										
		Autocorrelation					Partial Autocorrelation					
Variable	Difference	1	2	3	4	5	1	2	3	4	5	range
FE	(1 - B) ⁰	0.88*	0.73*	0.63*	0.50*	0.35	0.88*	-0.22	0.14	-0.21	-0.16	1920-'45
	(1 - B) ¹	0.27	0.08	0.15	0.18	0.06	0.27	0.01	0.14	0.11	-0.03	1920-'45
MO	(1 - B) ⁰	0.83*	0.74*	0.64*	0.49*	0.41*	0.83*	0.14	-0.02	-0.21	0.06	1920-'45
	(1 - B) ¹	-0.37	-0.26	0.45*	-0.30	-0.11	-0.37	-0.46*	0.20	-0.18	-0.13	1920-'45
NE	(1 - B) ⁰	0.88*	0.77*	0.65*	0.52*	0.41*	0.88*	-0.01	-0.11	0.02	-0.03	1920-'45
	(1 - B) ¹	-0.26	-0.26	0.18	-0.18	0.06	-0.26	-0.35	-0.00	-0.26	-0.02	1920-'45

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)							
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha = 0.05$
FE	(1,1,0)	-0.899	0.284	0	14.00	5.5**	33.9 (22)
t-ratio		(-1.165)	(1.437)				
MO	(0.1,1)	-1.627*	0	1.072*	5.119	8.4**	33.9 (22)
t-ratio		(-54.20)		(21.52)			
NE	(1,1,1)	-0.361*	0.470*	0.940*	0.464	8.4**	32.7 (21)
t-ratio		(-2.628)	(2.384)	(15.52)			

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 17

ESTIMATED ARIMA STRUCTURES
U.S.A. : White 1946-1977

		Panel A: PDQ; lags 1 through 5 years										
Variable	Difference	Autocorrelation					Partial Autocorrelation					range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.93*	0.83*	0.73*	0.63*	0.52*	0.93*	-0.21	-0.07	-0.05	-0.14	1946-'77
	(1 - B) ¹	0.17	0.15	0.03	0.16	0.10	0.17	0.13	-0.02	0.15	0.05	1946-'77
MO	(1 - B) ⁰	0.86*	0.74*	0.62*	0.51*	0.42*	0.86*	-0.00	-0.07	-0.06	0.03	1946-'77
	(1 - B) ¹	0.22	0.08	0.32	0.16	0.14	0.22	0.03	0.31	0.03	0.10	1946-'77
NE	(1 - B) ⁰	0.85*	0.72*	0.60*	0.50*	0.41*	0.85*	0.01	-0.05	-0.02	-0.00	1946-'77
	(1 - B) ¹	0.42*	0.44*	0.40*	0.23	0.21	0.42*	0.33	0.20	-0.09	-0.03	1946-'77

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)

Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(d.f.)$	$\alpha = 0.05$
FE	(1,1,2)	-0.169	-0.878*	-1.448*	-1.111*	11.18	16.0**	31.4 (20)
t-ratio		(-0.333)	(-12.04)	(-22.76)	(-21.35)			
MO	(1,1,1)	-0.899*	-0.403*	-0.942*		0.208	11.4**	32.7 (21)
t-ratio		(-4.674)	(-2.405)	(-27.48)				
NE	(2,1,2)	-0.024	1.673*	-0.709*	1.570*	-0.893*	0.057	12.2**
t-ratio		(-1.176)	(51.17)	(-19.60)	(22.88)	(-16.63)		30.1 (19)

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 18

ESTIMATED ARIMA STRUCTURES
U.S.A.: White 1920-1977

Panel A: PDQ; lags 1 through 5 years												
Variable	Difference	Autocorrelation					Partial Autocorrelation					range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.92*	0.81*	0.72*	0.62*	0.50*	0.92*	-0.25	0.11	-0.15	-0.20	1920-'77
	(1 - B) ¹	0.32*	-0.11	0.08	0.34*	0.31*	0.32*	-0.23	0.23	0.24	0.18	1920-'77
MO	(1 - B) ⁰	0.93*	0.88*	0.83*	0.77*	0.73*	0.93*	0.12	-0.01	-0.10	0.05	1920-'77
	(1 - B) ¹	-0.26	-0.18	0.46*	-0.17	-0.02	-0.26	-0.26	0.39*	0.01	0.11	1920-'77
NE	(1 - B) ⁰	0.94*	0.89*	0.84*	0.78*	0.73*	0.94*	0.02	-0.04	-0.04	-0.00	1920-'77
	(1 - B) ¹	-0.08	-0.05	0.24	-0.06	0.16	-0.08	-0.06	0.23	-0.03	0.19	1920-'77

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)							
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha=0.05$
FE	(0,1,1)	-0.826	0	-0.504*	17.87	18.8**	33.9 (22)
t-ratio		(-0.987)		(-4.530)			
MO	(2,1,2)	-3.737*	-1.211* -0.995*	-1.008* -0.605*	3.379	16.8**	30.1 (19)
t-ratio		(-5.841)	(-28.26) (-9.611)	(-122.7) (-5.838)			
NE	(1,1,0)	-0.604*	-0.090	0	0.311	19.6**	33.9 (22)
t-ratio		(-5.886)	(-0.698)				

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 19

ESTIMATED ARIMA STRUCTURES
U.S.A.: Nonwhite 1920-1945

Panel A: PDQ; lags 1 through 5 years

Variable	Difference	Autocorrelation					Partial Autocorrelation					range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.89*	0.75*	0.64*	0.51*	0.36	0.89*	-0.24	0.14	-0.23	-0.16	1920-'45
	(1 - B) ¹	0.19	0.08	0.10	-0.05	0.13	0.19	0.05	0.08	-0.09	0.15	1920-'45
MO	(1 - B) ⁰	0.79*	0.70*	0.62*	0.49*	0.41*	0.79*	0.21	0.07	-0.16	-0.02	1920-'45
	(1 - B) ¹	-0.28	-0.26	0.12	-0.08	0.03	-0.28	-0.37	-0.10	-0.21	-0.07	1920-'45
NE	(1 - B) ⁰	0.81*	0.68*	0.56*	0.45*	0.36	0.81*	0.05	-0.02	-0.02	-0.02	1920-'45
	(1 - B) ¹	-0.15	-0.28	-0.15	0.15	0.13	-0.15	-0.31	-0.28	-0.05	0.03	1920-'45

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)

Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha=0.05$
FE	(1,1,1)	-3.754*	-0.739*	-1.050*	17.82	7.8**	32.7 (21)
t-ratio		(-2.243)	(-5.500)	(-17.77)			
MO	(0,1,1)	-2.510*	0	0.958*	24.42	8.3**	33.9 (22)
t-ratio		(-19.41)		(20.69)			
NE	(2,1,2)	-0.960*	0.702* -0.793*	1.333* -0.902*	2.22	10.2**	30.1 (19)
t-ratio		(-4.532)	(5.271)(-5.976)	(13.18)(-12.81)			

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 20

ESTIMATED ARIMA STRUCTURES
U.S.A.: Nonwhite 1946-1977

		Panel A: PDQ; lags 1 through 5 years										
Variable	Difference	Autocorrelation					Partial Autocorrelation					range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.93*	0.83*	0.72*	0.60*	0.47*	0.93*	-0.20	-0.12	-0.13	-0.11	1946-'77
	(1 - B) ¹	0.67*	0.50*	0.40*	0.36	0.30	0.67*	0.08	0.08	0.07	0.01	1946-'77
MO	(1 - B) ⁰	0.89*	0.78*	0.68*	0.57*	0.48*	0.89*	-0.03	-0.02	-0.11	0.02	1946-'77
	(1 - B) ¹	0.04	-0.05	0.09	-0.15	0.12	0.04	-0.06	0.09	-0.17	0.16	1946-'77
NE	(1 - B) ⁰	0.86*	0.74*	0.64*	0.53*	0.43*	0.86*	-0.02	-0.01	-0.07	-0.01	1946-'77
	(1 - B) ¹	0.18	0.08	0.08	-0.05	0.12	0.18	0.05	0.06	-0.09	0.15	1946-'77

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)								
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	χ^2 (d.f.)	$\alpha=0.05$
FE	(1,1,0)	0.206	0.883*	0	9.85	14.2**	33.9 (22)	
t-ratio		(0.429)	(11.93)					
MO	(0,1,1)	-0.898*	0	-0.050*	1.85	11.2**	33.9 (22)	
t-ratio		(-3.505)		(-0.267)				
NE	(2,1,2)	-0.556*	0.940* -0.999*	0.805* -0.919*	0.46	25.1**	30.1 (19)	
t-ratio		(-3.909)	(14.15) (-130.1)	(71.55) (-14.18)				

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 21

ESTIMATED ARIMA STRUCTURES
U.S.A.: Nonwhite 1920-1977

		Panel A: PDQ; lags 1 through 5 years										
Variable	Difference	Autocorrelation					Partial Autocorrelation					range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.95*	0.88*	0.79*	0.69*	0.58*	0.95*	-0.36*	-0.03	-0.18	-0.13	1920-'77
	(1 - B) ¹	0.54*	0.33*	0.30*	0.26	0.33*	0.54*	0.06	0.15	0.05	0.20	1920-'77
MO	(1 - B) ⁰	0.92*	0.88*	0.84*	0.78*	0.73*	0.92*	0.19	0.03	-0.13	-0.06	1920-'77
	(1 - B) ¹	-0.21	-0.19	0.14	-0.01	0.04	-0.21	-0.25	0.04	-0.01	0.08	1920-'77
NE	(1 - B) ⁰	0.93*	0.88*	0.83*	0.78*	0.72*	0.93*	0.09	0.00	-0.03	-0.09	1920-'77
	(1 - B) ¹	-0.07	-0.20	-0.10	0.11	0.15	-0.07	-0.20	-0.13	0.05	0.12	1920-'77

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)								
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	χ^2 (d.f.)	$\alpha=0.05$
FE	(1,1,0)	-0.308	0.549*	0	15.97	21.6**	33.9	(22)
t-ratio		(-0.586)	(4.894)					
MO	(0,1,1)	-1.793*	0	0.437*	19.16	15.9**	33.9	(22)
t-ratio		(-5.428)		(3.948)				
NE	(2,1,2)	-0.630*	0.902* -0.827*	1.248* -0.949*	1.40	19.7**	30.1	(19)
t-ratio		(-5.072)	(11.03)(-10.92)	(18.68)(-15.74)				

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 22

ESTIMATED ARIMA STRUCTURES
Japan

Panel A: PDQ; lags 1 through 5 years												
Variable	Difference	Autocorrelation					Partial Autocorrelation					range
		1	2	3	4	5	1	2	3	4	5	
FE	(1 - B) ⁰	0.82*	0.65*	0.45*	0.31	0.19	0.82*	-0.06	-0.21	0.04	0.01	1947-'77
	(1 - B) ¹	-0.10	0.26	0.18	0.12	0.06	-0.10	0.25	0.25	0.12	-0.02	1947-'77
MO	(1 - B) ⁰	0.86*	0.78*	0.69*	0.59*	0.49*	0.86*	0.15	-0.06	-0.08	-0.10	1947-'77
	(1 - B) ¹	-0.17	0.06	0.12	0.29	-0.10	-0.17	0.03	0.14	0.35	0.00	1947-'77
NE	(1 - B) ⁰	0.90*	0.82*	0.74*	0.65*	0.55*	0.90*	0.08	-0.03	-0.12	-0.13	1947-'76
	(1 - B) ¹	-0.14	-0.18	0.10	0.05	-0.01	-0.14	-0.20	0.05	0.04	0.04	1947-'76

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)									
Variable	ARIMA	constant	AR	ϕ	MA:	θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha=0.05$
FE	(1,1,0)	-2.117	-0.103		0		33.08	12.7**	33.9 (22)
t-ratio		(-1.902)	(-0.549)						
MO	(1,1,0)	-3.027*	-0.405*		0		9.63	18.5**	33.9 (22)
t-ratio		(-4.686)	(-2.970)						
NE	(2,1,2)	-2.293*	-0.843*	-0.997*	-0.701*	-0.960*	0.85	8.1**	30.1 (19)
t-ratio		(-5.564)	(-12.64)	(-159.6)	(-6.557)	(-9.226)			

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 23

ESTIMATED ARIMA STRUCTURES
Taiwan

		Panel A: PDQ; lags 1 through 5 years										
Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	$(1 - B)^0$	0.93*	0.86*	0.79*	0.69*	0.58*	0.93*	-0.07	-0.07	-0.23	-0.16	1947-'78
	$(1 - B)^1$	-0.03	0.21	0.08	0.10	0.14	-0.03	0.21	0.10	0.06	0.12	1947-'78
MO	$(1 - B)^0$	0.74*	0.60*	0.49*	0.44*	0.36	0.74*	0.11	0.03	0.09	-0.03	1947-'78
	$(1 - B)^1$	0.31	0.26	-0.06	0.12	-0.07	0.31	0.18	-0.20	0.17	-0.10	1947-'78

* Correlation is greater than two times its estimated standard error.

		Panel B: ESTIMATE (ARIMA structures)						
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.})$	$\alpha=0.05$
FE	(1,1,0)	-2.202	-3.029		0	81.97	11.1**	33.9(22)
t-ratio		(-1.312)	(-0.164)					
MO	(2,1,0)	0.147	0.547*	0.459*	0	12.21	8.0**	32.7(21)
t-ratio		(0.219)	(4.267)	(3.276)				

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 24

ESTIMATED ARIMA STRUCTURES
Australia

Panel A: PDQ; lags 1 through 5 years											
Variable	Difference	Autocorrelation					Partial Autocorrelation				
		1	2	3	4	5	1	2	3	4	5
FE	$(1 - B)^0$	0.89*	0.76*	0.64*	0.51*	0.37*	0.89*	-0.17	-0.05	-0.09	-0.14
	$(1 - B)^1$	0.42*	0.16	0.19	0.09	0.02	0.42*	-0.01	0.15	-0.05	-0.01
MO	$(1 - B)^0$	0.91*	0.83*	0.75*	0.67*	0.59*	0.91*	0.05	-0.06	-0.05	-0.05
	$(1 - B)^1$	0.26	-0.10	-0.14	-0.19	0.06	0.26	-0.18	-0.07	-0.17	0.15

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)							
Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha = 0.05$
FE	(1,1,0)	0.134	0.425*	0	5.99	6.0**	33.9(22)
t-ratio		(0.342)	(2.799)				
MO	(0,1,1)	-0.769*	0	-0.536*	1.33	6.1**	33.9(22)
t-ratio		(-2.698)		(-3.984)			

* Significant at $\alpha = 5\%$ ** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

TABLE 0 - 25

ESTIMATED ARIMA STRUCTURES
New Zealand

Panel A: PDQ; lags 1 through 5 years												
Variable	Difference	Autocorrelation					Partial Autocorrelation					Range
		1	2	3	4	5	1	2	3	4	5	
FE	$(1 - B)^0$	0.86*	0.69*	0.55*	0.45*	0.39*	0.86*	-0.18	0.01	0.07	0.05	1936-'74
	$(1 - B)^1$	0.47*	-0.02	-0.18	-0.01	0.22	0.47*	-0.30	-0.04	0.16	0.16	1936-'74
MO	$(1 - B)^0$	0.87*	0.80*	0.68*	0.59*	0.55*	0.87*	0.14	-0.16	-0.01	0.18	1936-'74
	$(1 - B)^1$	-0.37*	-0.02	0.04	-0.28	-0.03	-0.37*	-0.18	-0.05	-0.35*	-0.40*	1936-'74

* Correlation is greater than two times its estimated standard error.

Panel B: ESTIMATE (ARIMA structures)

Variable	ARIMA	constant	AR: ϕ	MA: θ	σ^2	χ^2	$\chi^2(\text{d.f.}) \alpha = 0.05$
FE	(1,1,0)	0.152	0.485*	0	11.36	13.1**	33.9(22)
t-ratio		(0.283)	(3.283)				
MO	(1,1,0)	-0.542	-0.374*	0	3.99	16.1**	33.9(22)
t-ratio		(-1.633)	(-2.424)				

* Significant at $\alpha = 5\%$

** The null hypothesis (no serial correlation) is accepted at $\alpha = 5\%$.

FIGURES

Figure 1

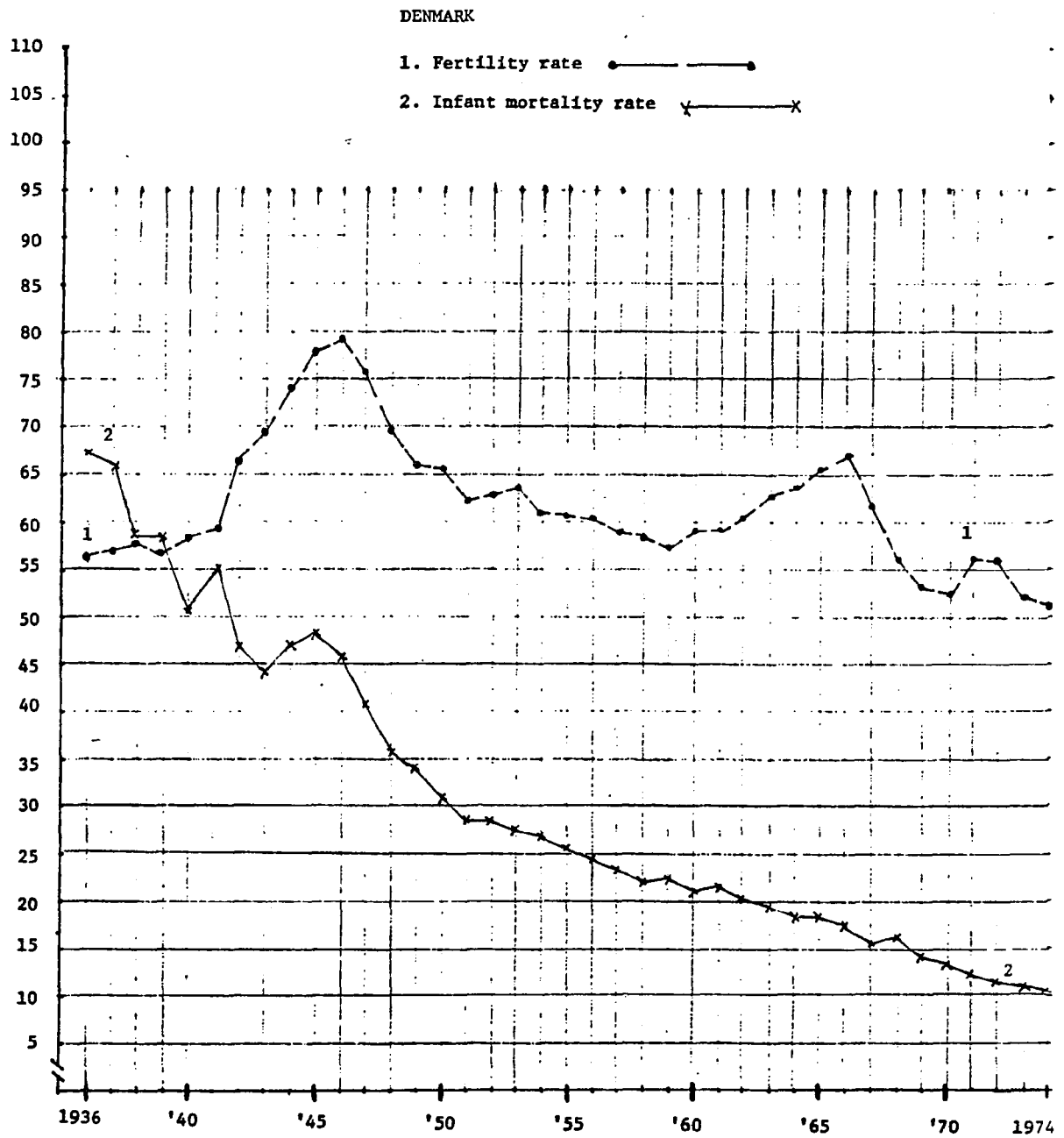


Figure 2

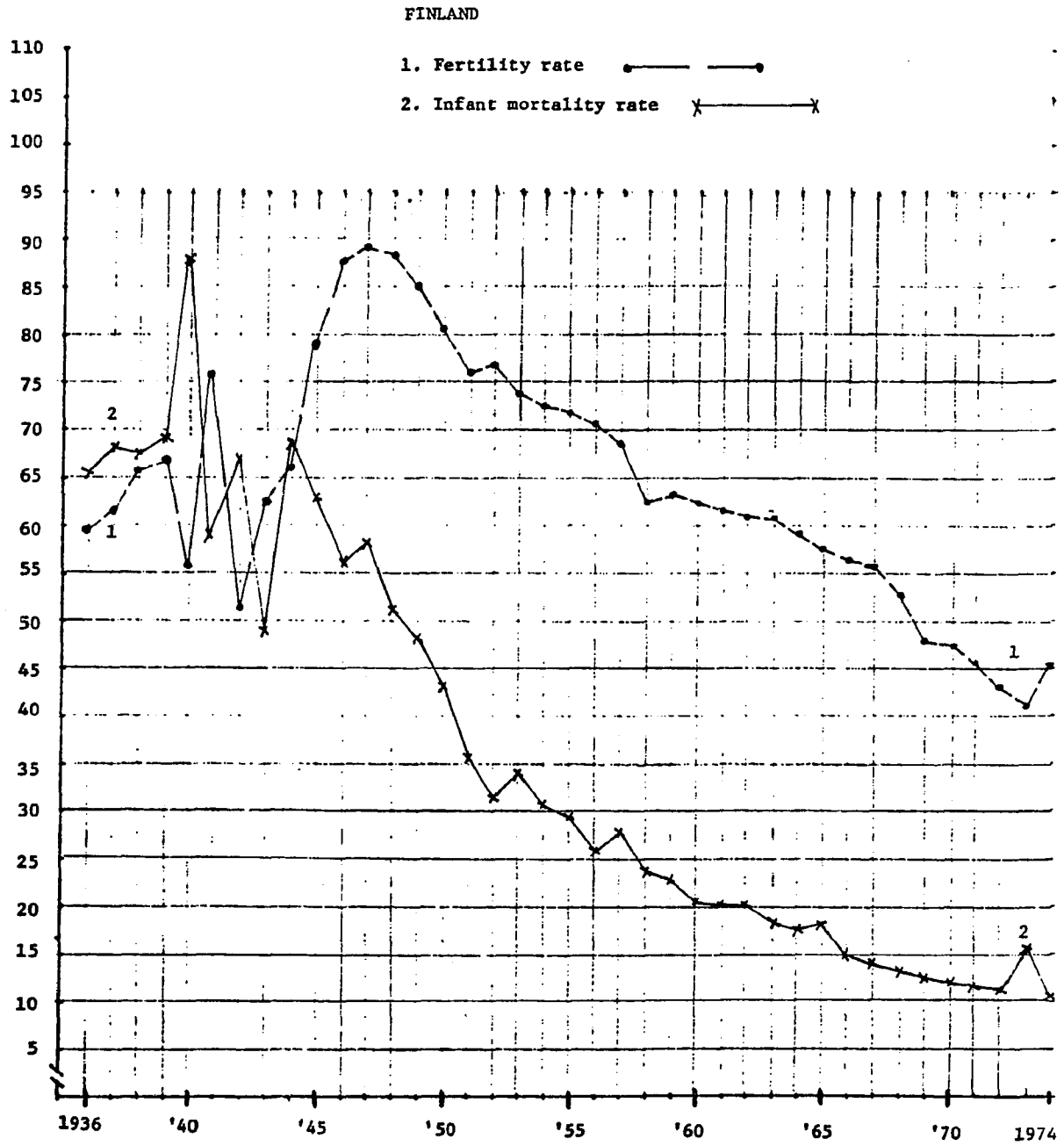


Figure 3

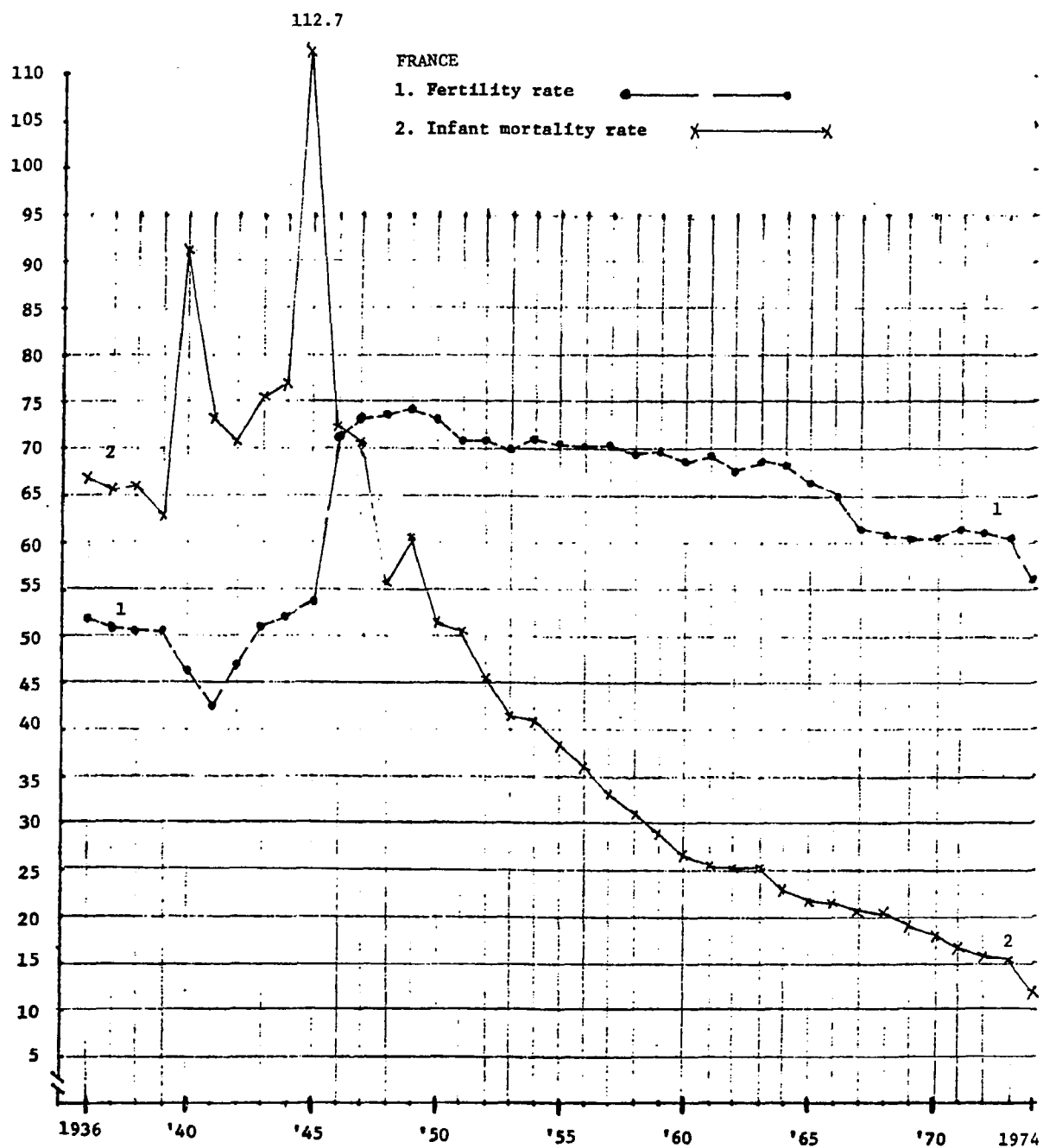


Figure 4

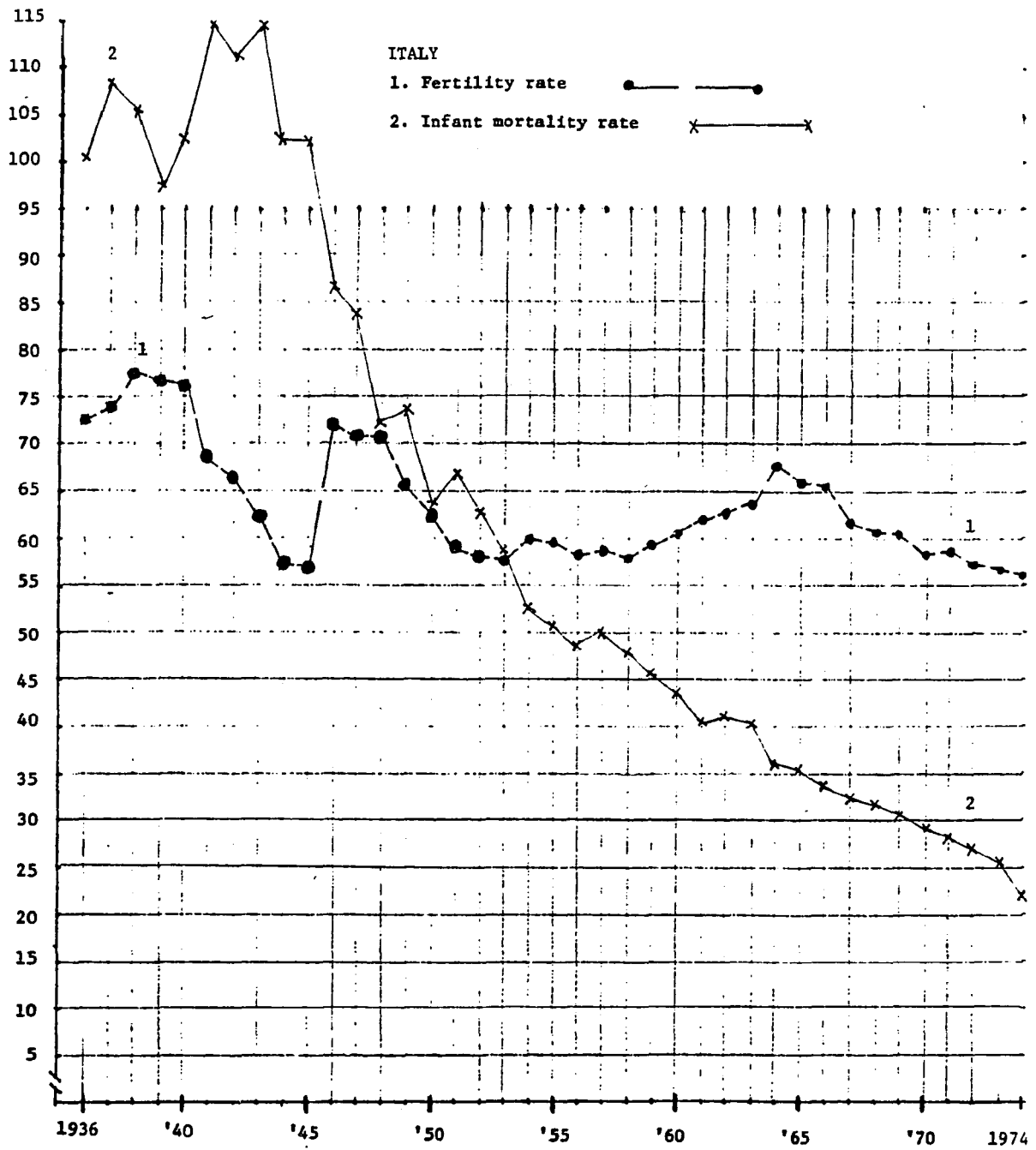


Figure 5

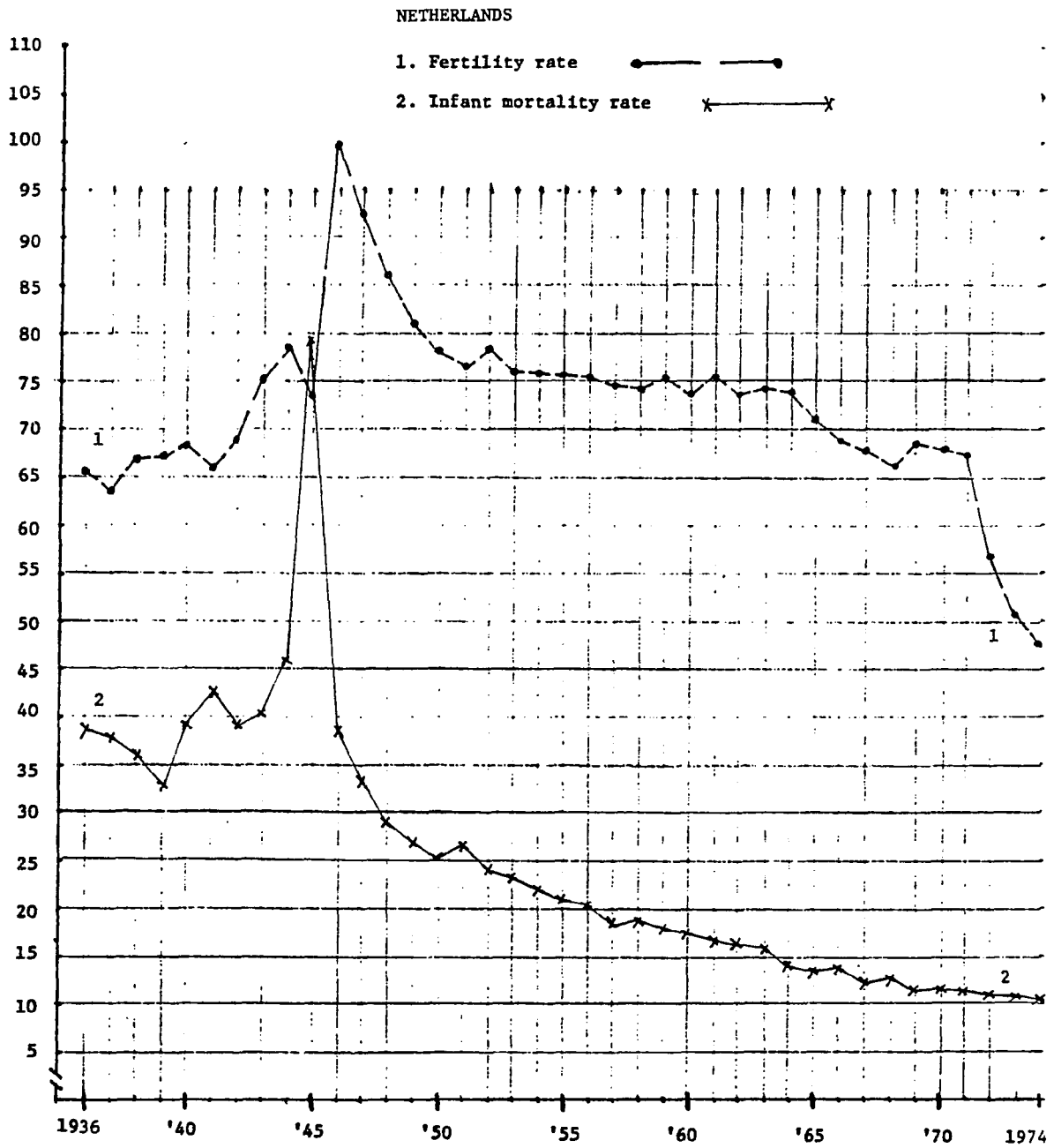


Figure 6

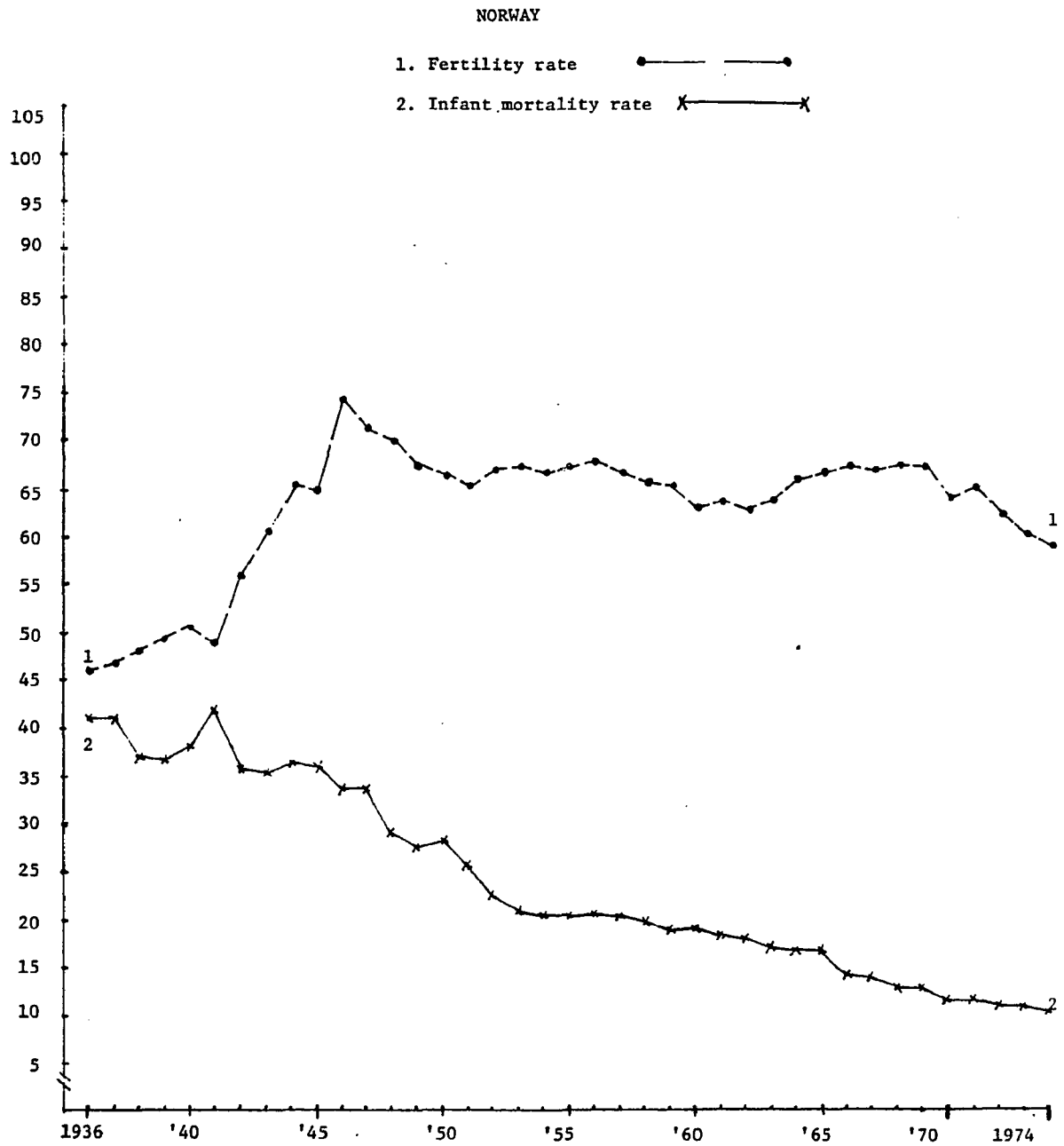


Figure 7

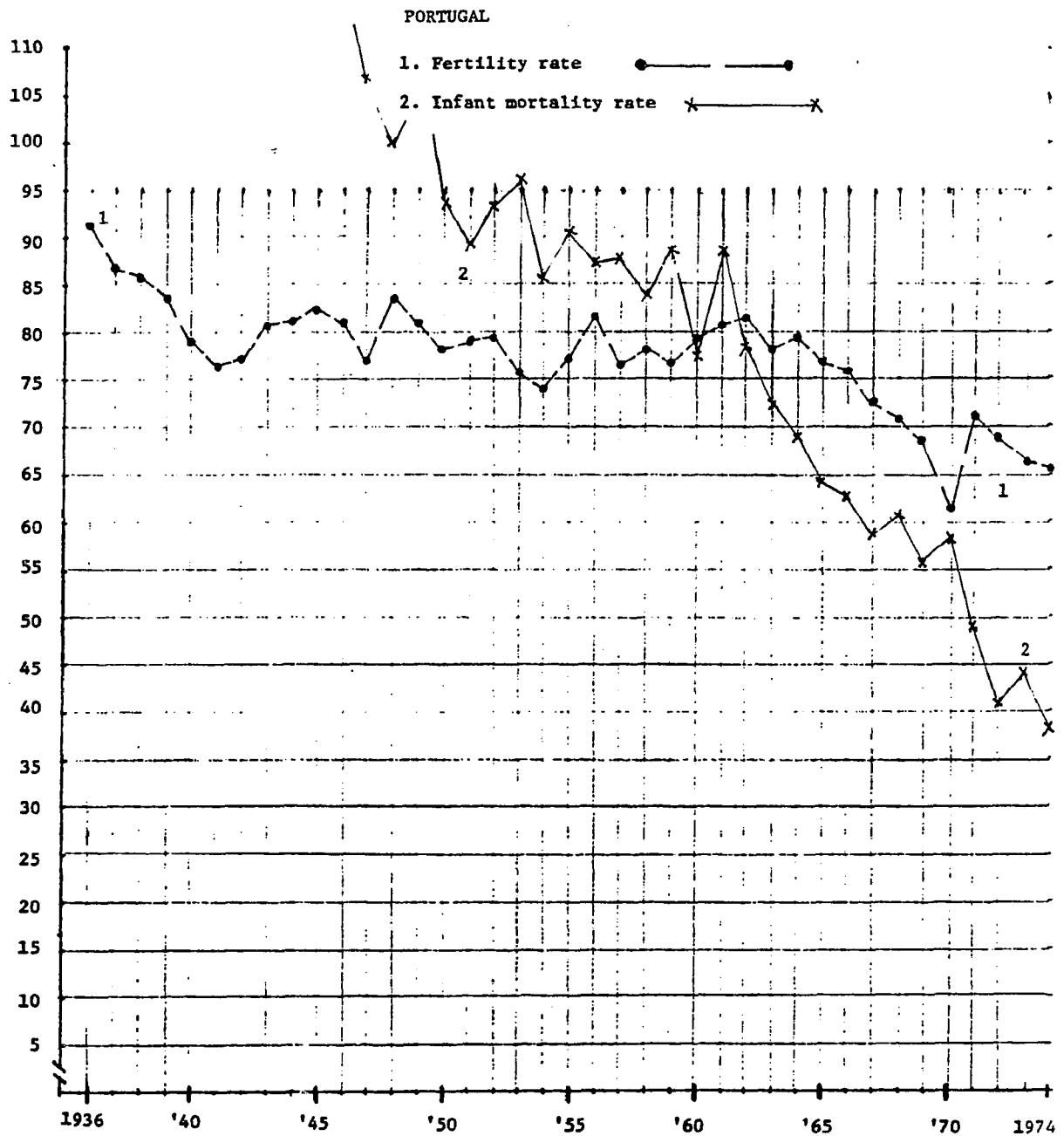


Figure 8

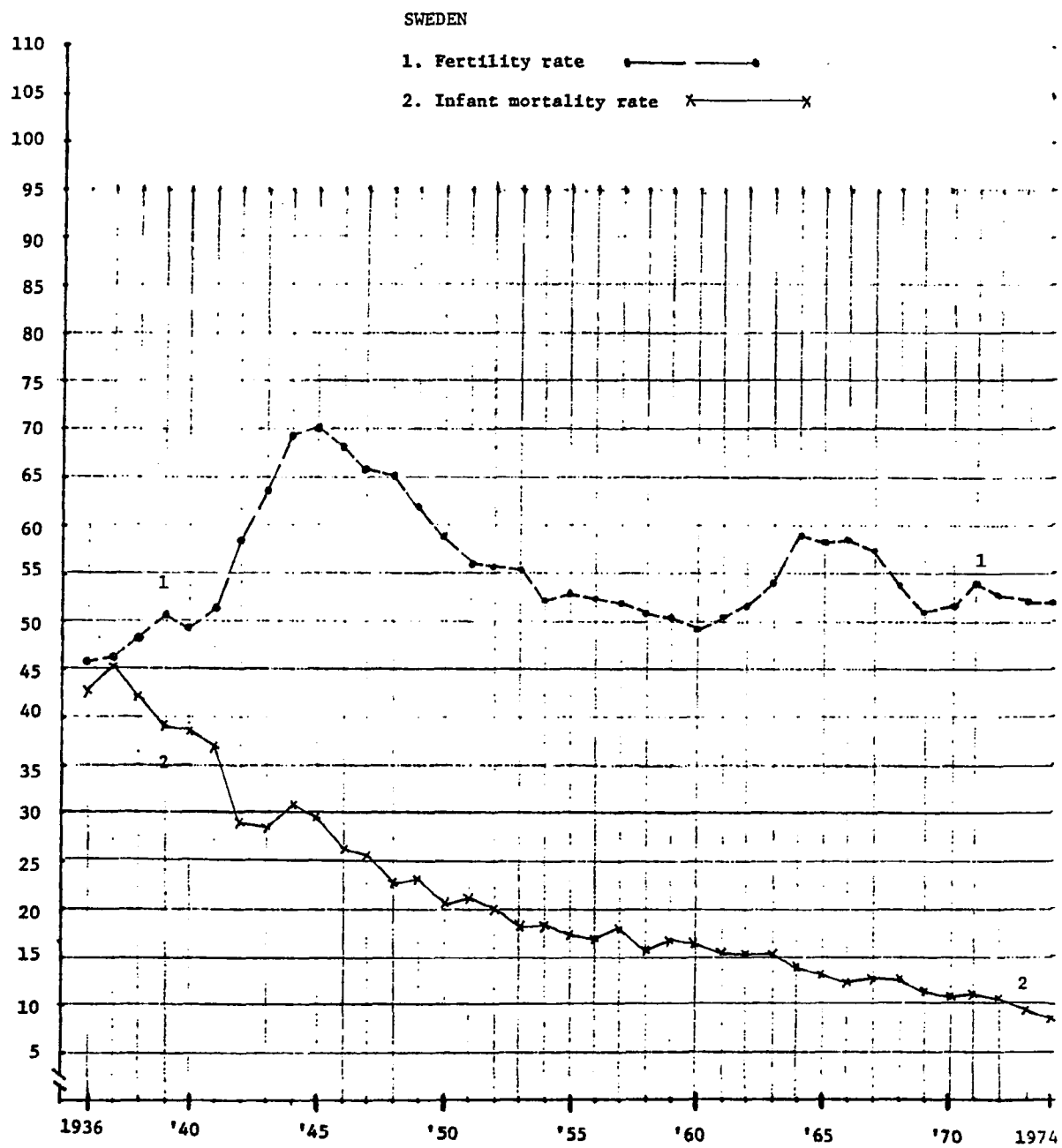


Figure 9

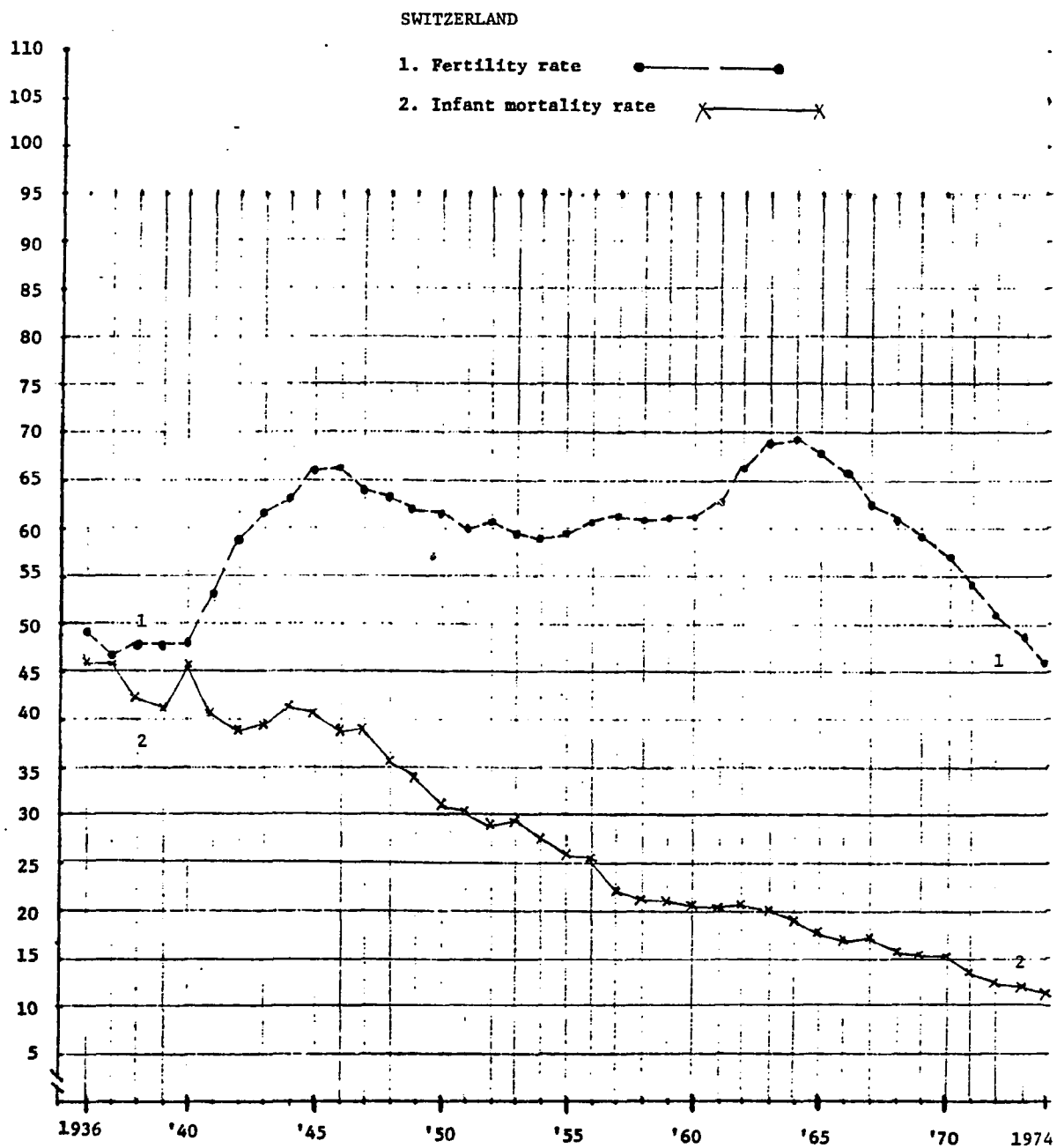


Figure 10

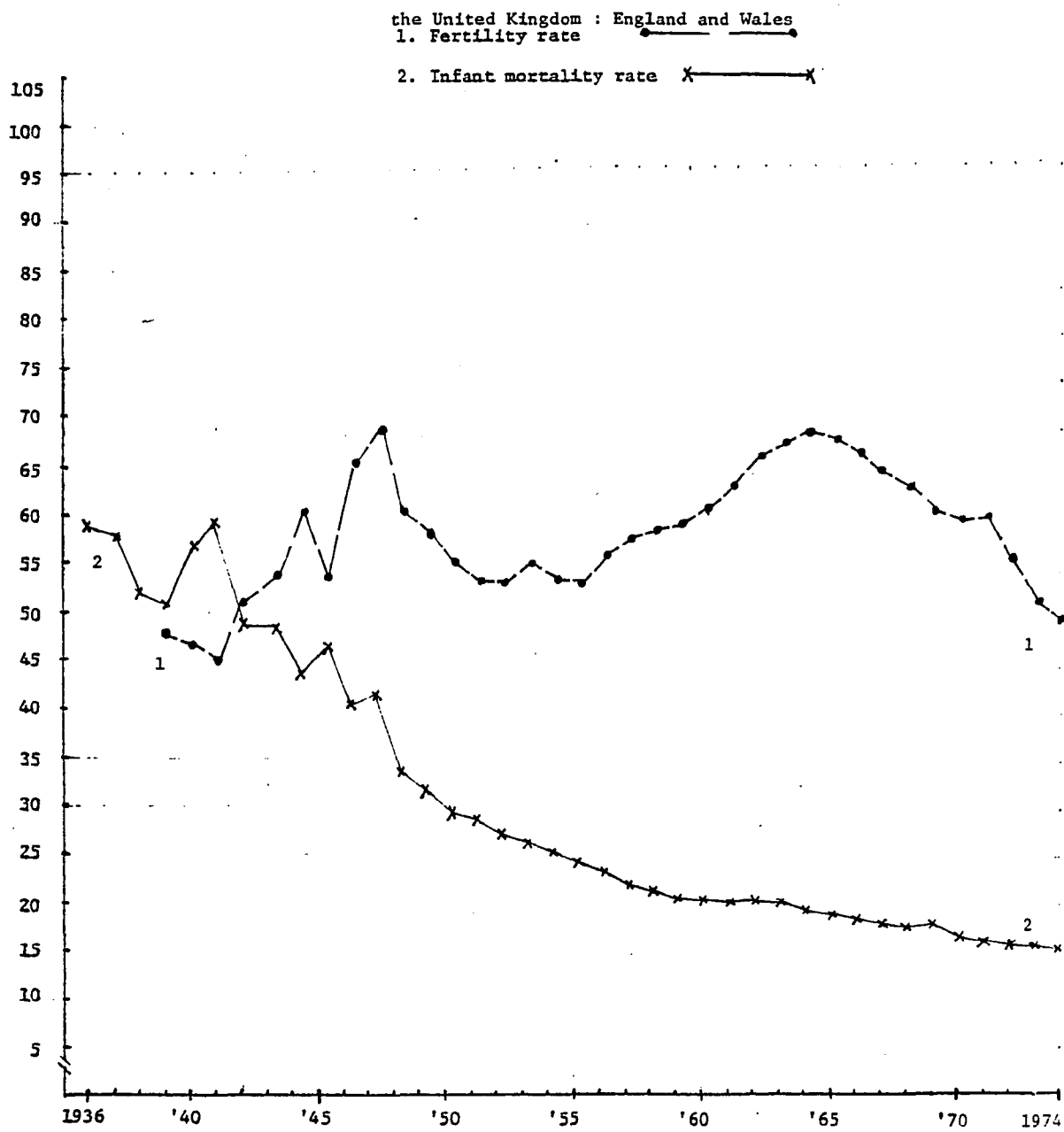


Figure 11

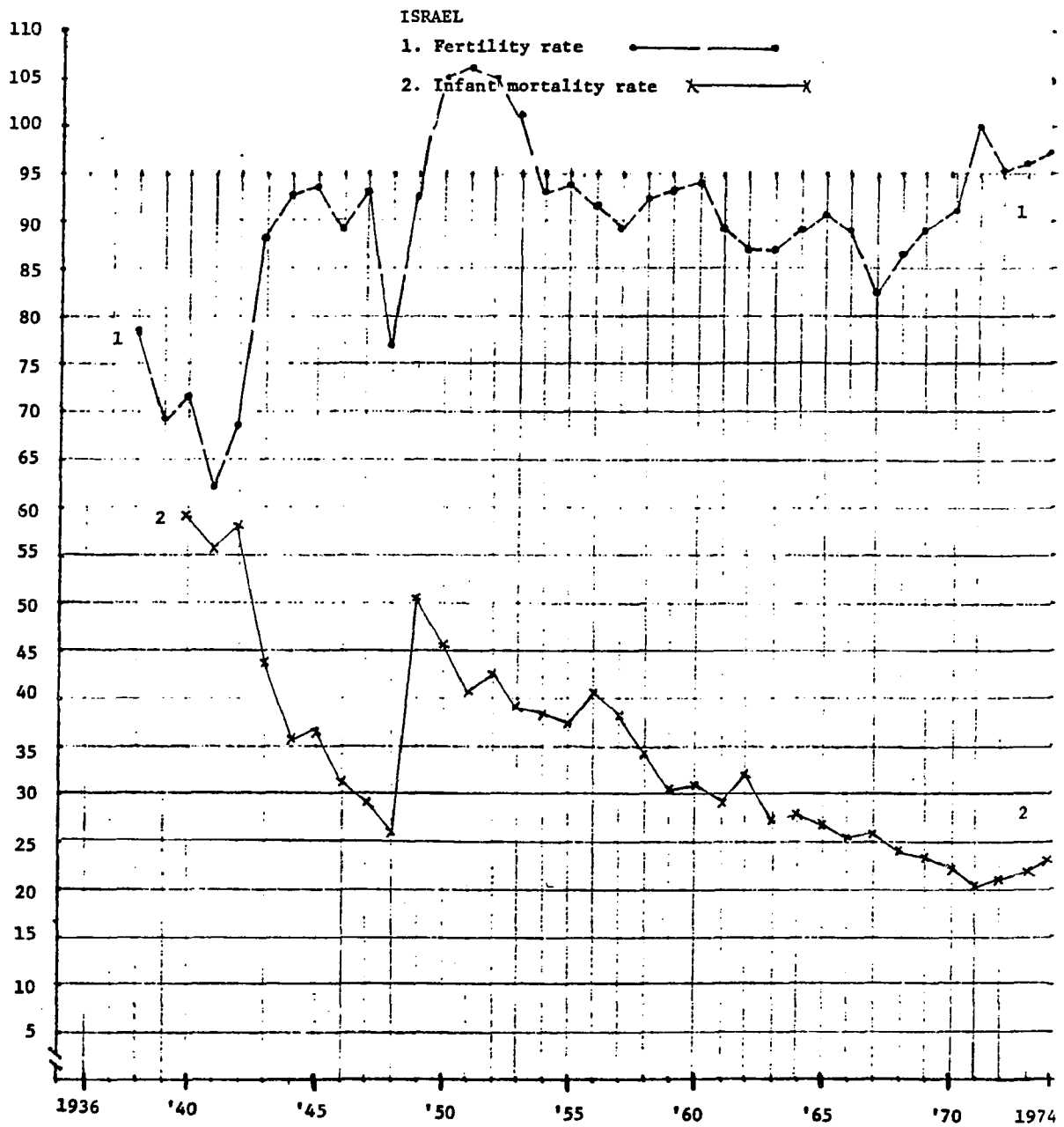


Figure 12

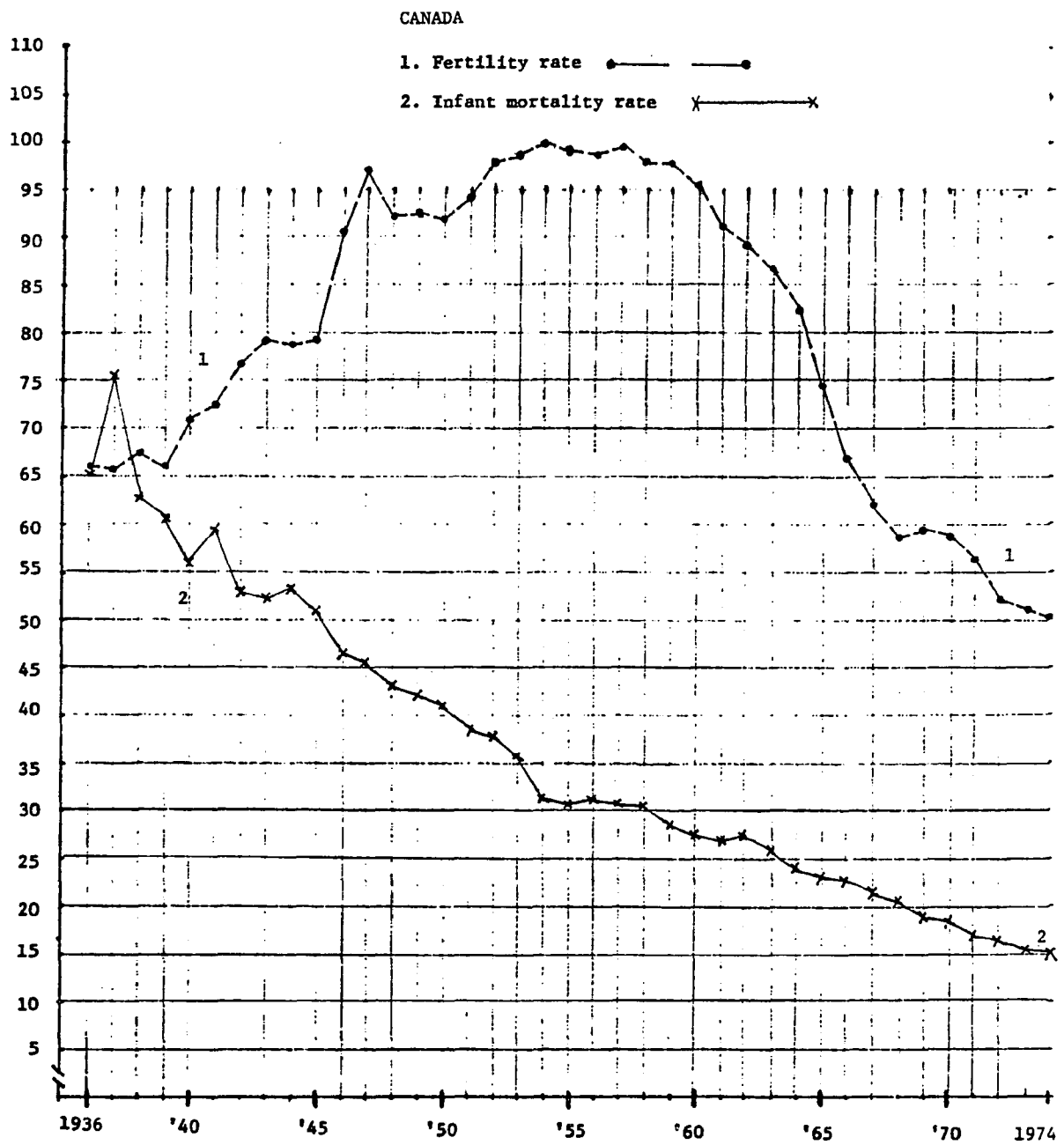


Figure 13

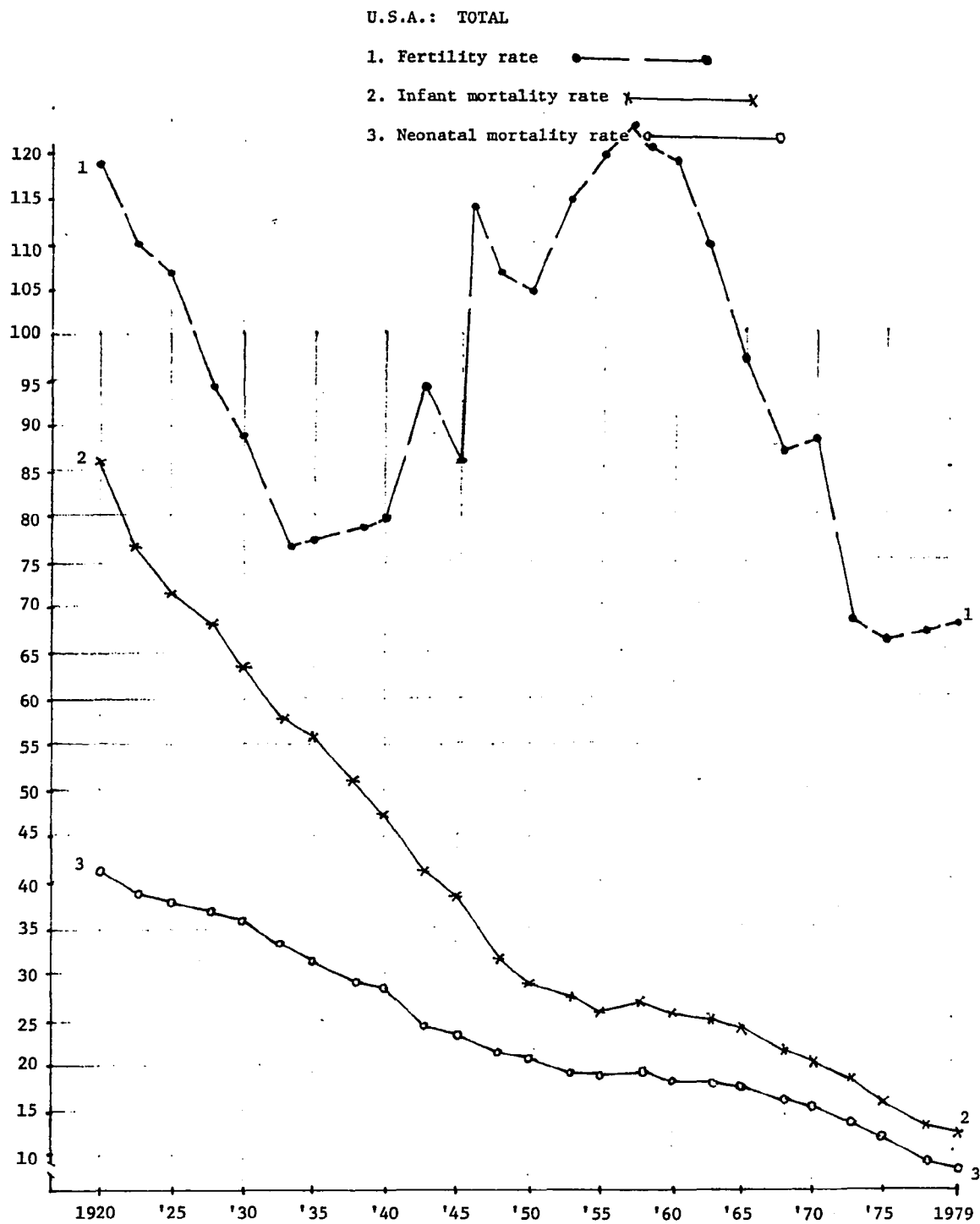


Figure 14

U.S.A.: WHITE

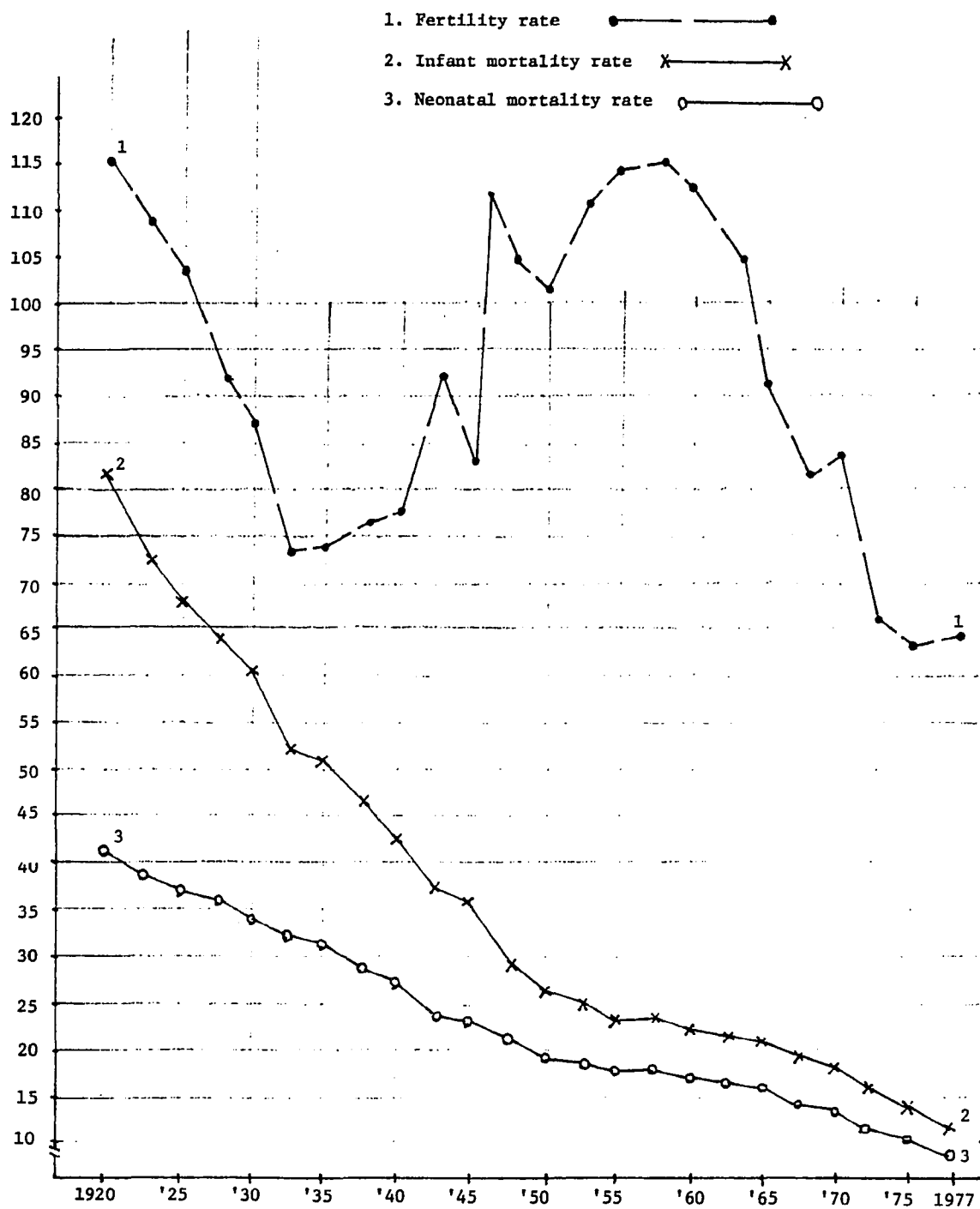


Figure 15

U.S.A.: NONWHITE

- 1. Fertility rate ● — ●
- 2. Infant mortality rate x — x
- 3. Neonatal mortality rate ○ — ○

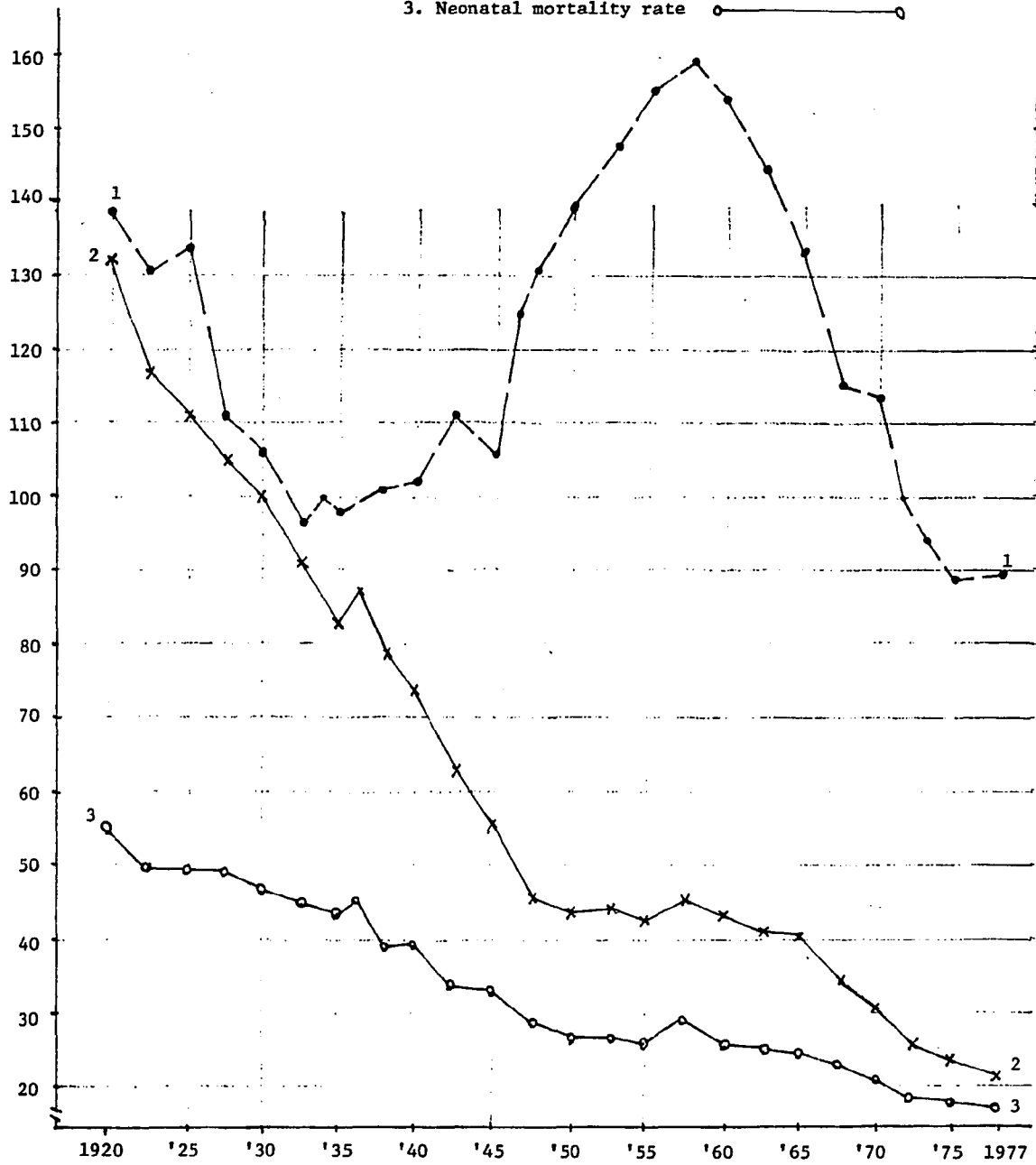


Figure 16

JAPAN

- 1. Fertility rate —●—●—
- 2. Infant mortality rate ×—×—×
- 3. Neonatal mortality rate ○—○—○
- 4. Crude birth rate ◊—◊—◊

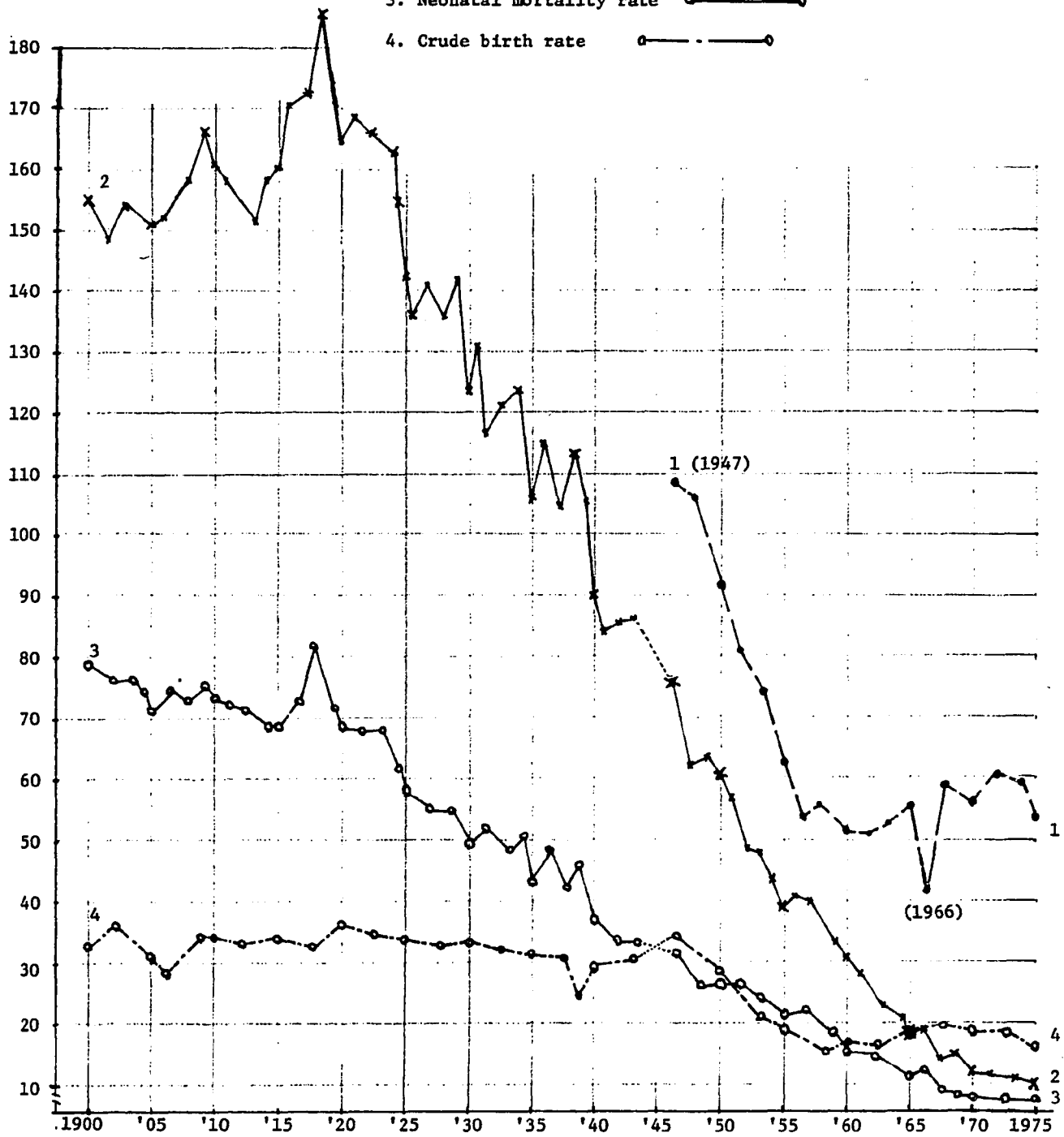


Figure 17

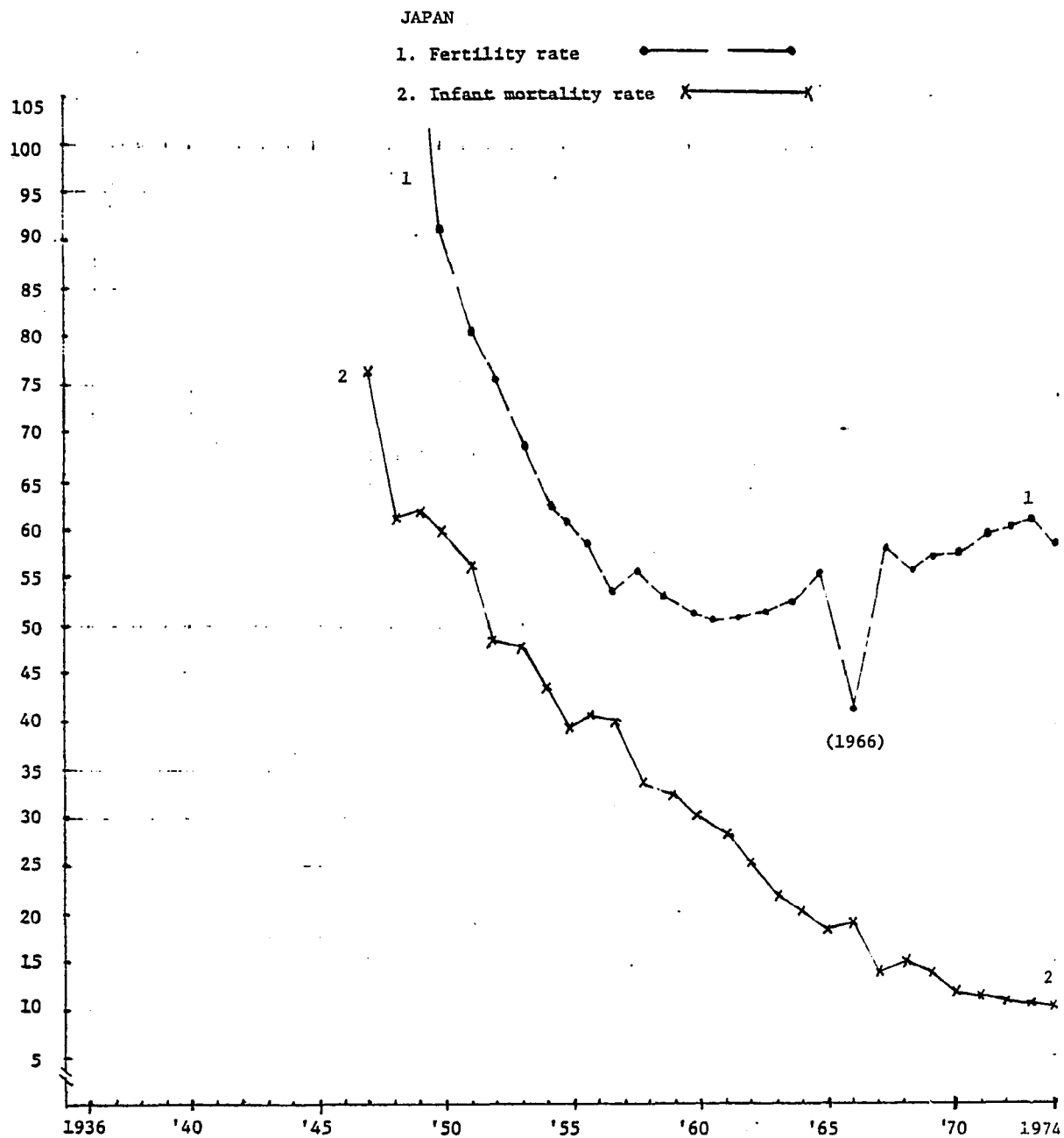


Figure 18

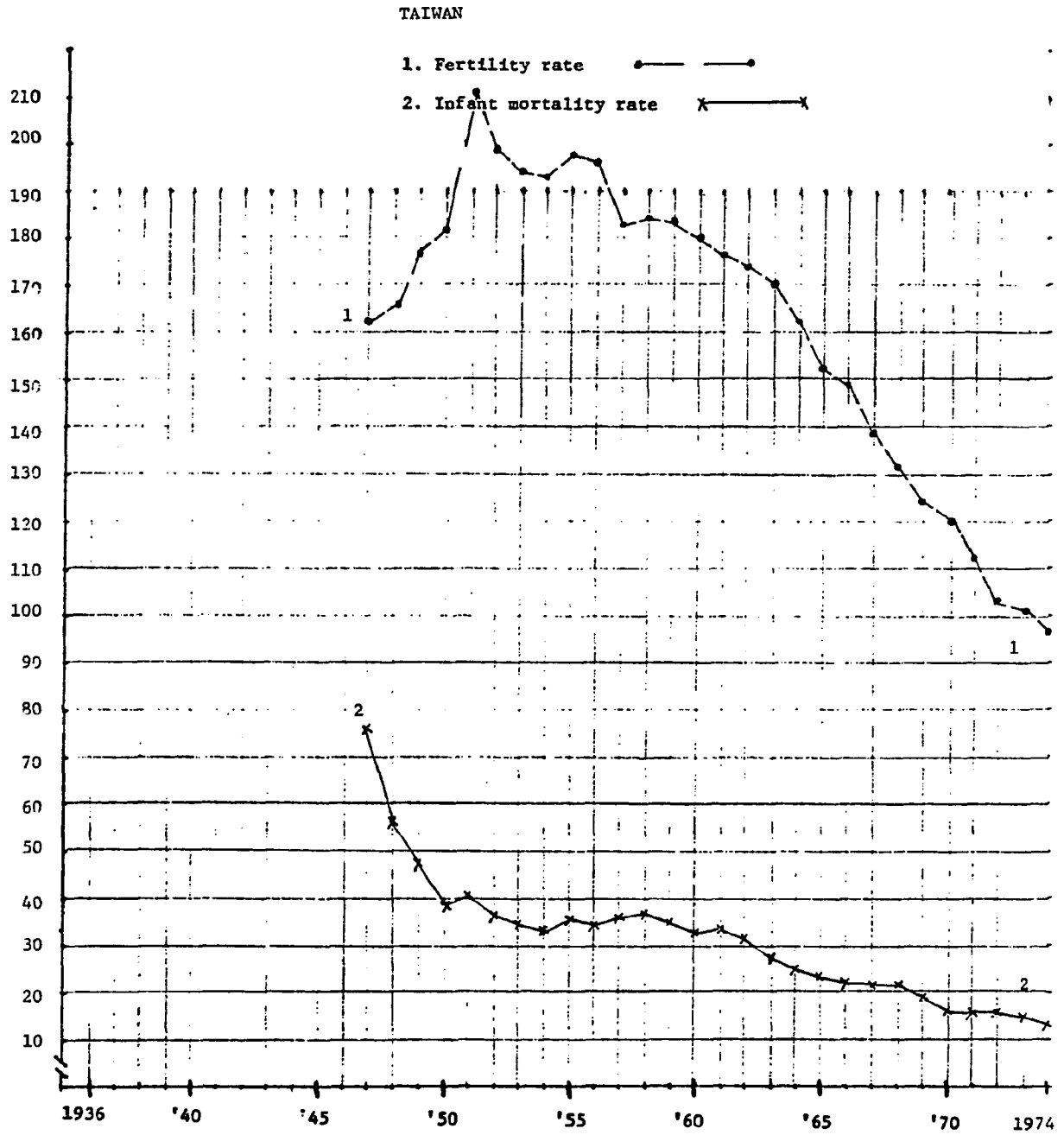


Figure 19

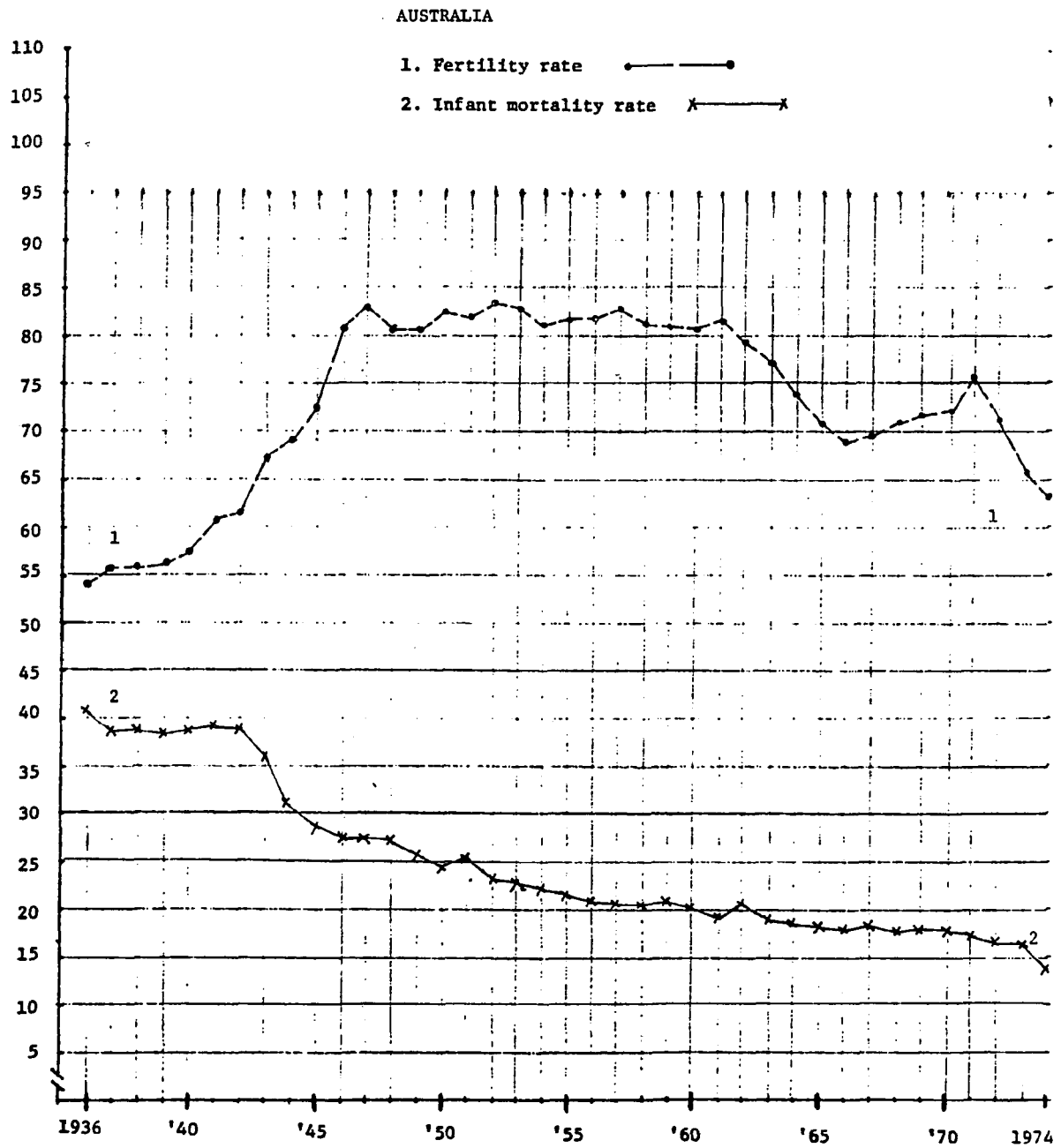
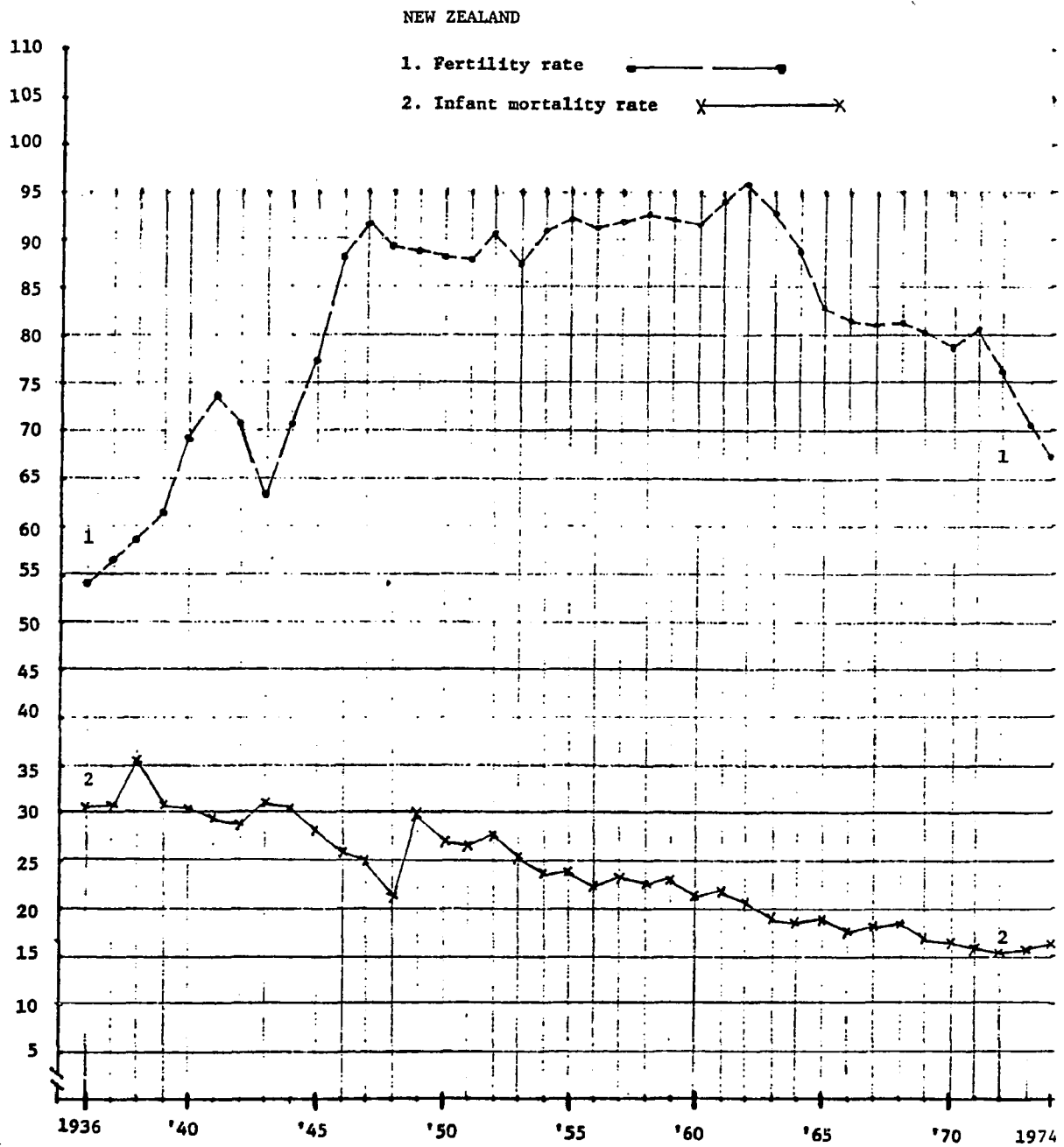


Figure 20



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