"Modeling Zones of the World-Economy:
A Polynomial Regression Analysis (1964-1994)"

by

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The demise of socialist command economies in the former Soviet Union and Eastern Europe, along with the contemporaneous rise of several highly dynamic capitalist economies in East Asia -- a region of what was once called the Third World-- have been widely held as having far reaching implications for social theory in general, and development theory in particular. Thus, Shafer (1994: 1) notes that "[f]or decades we focused on North-South issues; today we must explain differentiation within the Third World." More recently, Jeffrey Alexander (1995) has claimed that the combination of the demise of socialism and the rise of East Asia has seriously damaged the plausibility of dependency and world-systems theories and created the conditions for a reappraisal of the once disgraced modernization perspective. The purpose of this paper is to question the validity of such a claim on the basis of an empirical investigation of the main tendencies of the world-economy before and after these two epoch-making events.

We shall begin by showing that three different hypotheses concerning the distribution of world population by the gross national product per capita (henceforth, GNPPC) of the state of residence, at any given time and over time, can be derived from modernization, dependency and world-systems theories of national development. We shall then proceed to assess the plausibility of the three hypotheses by fitting polynomials of ascending degrees to the relevant data and by analyzing changes over the period 1964-94 in the statistical significance of the regressions that correspond to the three hypotheses. Far from demonstrating an increasing plausibility of modernization theories, this particular test shows that, before and after the 1980s, the hypothesis derived from modernization theories is the least plausible of the three, while the hypothesis derived from world-systems theories is the most plausible.

A reappraisal of modernization theories, or for that matter of dependency and world-systems theories, in the light of the demise of Soviet communism and the rise of East Asian capitalism may still be justified on grounds other than the ones examined here. In order to be at all useful, however, such a reappraisal must take into account the remarkable stability of the division of the world economy into a three-tiered value-added structure, as hypothesized by world-systems theories and substantiated by this investigation. The stability of this structure poses as serious a

challenge to established theories of long-term, large-scale social change as any of the great upheavals that have punctuated the demise of the Cold War world order.

Modernization, Dependency and World-Systems Images of Development

The dependency and world-systems perspectives emerged in the 1960s and 1970s, respectively, as critiques of modernization theories of development. Contrary to a widespread tendency to conflate the two perspectives (e.g. Evans and Stephens 1988, Harrison 1988), the differences between dependency and world-systems critiques of modernization theories are substantial, and for our present purposes at least as significant as their similarities. Both perspectives denied validity on historical and theoretical grounds to the central claim of modernization theories that all nations have been or are passing through an essentially similar series of stages of political and economic development --stages that are said to lead from tradition-bound poverty to high-mass-consumption prosperity. According to this claim, most nations are still caught up in one or another of the early stages. But the diffusion of modernizing tendencies guarantees that late-comers would over time catch up with the standards of wealth established by the early-comers. As theorized in W. W. Rostow's classic and highly influential text (1960), this process of generalized catching-up was articulated in a precise dating scheme, which we reproduce in fig. 1 for future reference and elaboration.

[Figure 1 about here]

The dependency critique of modernization theories hinges upon the contention that, historically, the development of some countries and the underdevelopment of other countries are the obverse side of a single world-scale process of "circular and cumulative causation," to use Gunnar Myrdal's (1956) celebrated expression. The actual mechanisms through which this world-scale process engendered "development" in some countries and "underdevelopment" in others varied considerably from one variant to another of dependency theory (cf, for example, Frank 1967 and Amin 1974). But all variants rejected the image propagated by modernization theorists of a single developmental path "traveled" by country after country at different points in world-

historical time in favor of the image of a bifurcated path that polarized countries into peripheral and core locations.

The world-systems critique of modernization theories, as pioneered by Immanuel Wallerstein (1979, 1984), shared the dependentistas' rejection of the modernization image of development, as well as their emphasis on the polarizing tendencies of processes of capital accumulation on a world scale. Nevertheless, it departed from the dependency critique in two key respects. First, it advanced the hypothesis of a relatively stable intermediate stratum of countries ("semiperiphery") lying between the extremes of "core" and "periphery" (see, in particular, Wallerstein 1979: 60-1, 69-72). This hypothesis is as alien to dependency theories as it is to modernization theories.

> According to modernization theory, intermediate positions are temporary because they are transitional: States come to occupy intermediate positions on their way from backwardness to modernity. In contrast, according to dependency theory, intermediate positions are temporary because they are residual: The polarizing tendencies of the world-economy will ultimately pull states in intermediate positions toward the center or toward the periphery. Starting from different, indeed opposite premises, modernization and dependency theories thus agree on the essential instability of intermediate positions (Arrighi and Drangel 1986: 10)

Second, whereas dependency theorists tended to view core and peripheral positions as attributes of specific countries or locations, world-systems theorists tended to view these positions and the intermediate semiperipheral position as attributes, not of any specific country or location, but of the world economy as a whole. They did not rule out, indeed they envisaged as likely, the possibility that any particular state or group of states could change its position upward or downward in the three-tiered structure of core, semiperiphery and periphery. But this upward and downward mobility was conceived of as leaving the three-tiered structure unchanged.

> [O]ver time the loci of economic activities keep changing.... Hence some areas "progress" and others "regress." But the fact that particular states change their position in the world-economy, from semiperiphery to core say, or vice versa, does not in itself change the

> nature of the system. These shifts will be registered for individual states as "development" or "regression." The key factor to note is that within a capitalist world-economy, all states cannot "develop" simultaneously by definition, since the system functions by virtue of having unequal core and peripheral regions. (Wallerstein 1979: 60-61; emphasis in the original)

In the world-systems image, therefore, states are neither propelled along a single path in a generalized process of catching up with the standards of wealth established by early modernizers -- as in the modernization image-- nor are they propelled along two bifurcating paths, one leading to development and wealth the other to underdevelopment and poverty. Rather, they are engaged in a continual struggle to gain or stay in the higher reaches, and to avoid remaining or falling in the lower reaches of the stable hierarchy of wealth that is said to characterize processes of capital accumulation on a world-scale. In this struggle, some states succeed and appear to be "developing;" others fail, and appear to be "underdeveloping." But in fact they are simply moving up and down an essentially stable structure.

Such a characterization of the world-economy differs significantly from how world-system status is usually operationalized in the sociological literature. Most generally, world-system status is operationalized as a variable by using either the classification originally developed by Snyder and Kick (1979) or the slightly revised version of Snyder and Kick's classification later developed by Bollen (1983) and Bollen and Appold (1993), or (less often) the alternative classification presented in Nemeth and Smith (1985).[1] Several authors have used either the original or revised version of Snyder and Kick's classification to evaluate the impact of world-systemic variables on processes of social, economic, or political change (e.g., Crenshaw 1995; Muller 1988 and 1995; Rau and Roncek 1987). However, holding such a cross-sectional classification constant over time attributes to nations the stability that should only be characteristic, according to our discussion of world-systems theory above, of world-economic zones. As indicated earlier, the premise of world-systems theory (in contrast to the dependency approach) is not that individual nations fail to move up and down in a world-economic hierarchy, but that this movement of individual nations

does little to alter the overall structure of the world-economy. Efforts to operationalize world-system status should take into account these characteristics.

Furthermore, the prevalent classifications of world-system status, as well as most efforts to operationalize such a variable through alternative indicators (e.g., rates of foreign investment, or the relative degree of specialization in the production/export of raw materials as opposed to manufactures), generally assume that if anything, the world-economy should be bounded primarily by direct mechanisms for the appropriation of peripheral wealth.[2] Again, world-systems theory, as discussed above, differs fundamentally from the dependency approach in that no assumption is made regarding the specific types of economic activities (e.g., the production of computers as opposed to apples) or specific mechanisms that serve to reproduce a world-economic hierarchy over time. In fact, major contributors to world-systems theory have always maintained that both the spatial distribution of production processes, as well as the linkages among these processes, are likely to undergo substantial transformations over time (cf, Wallerstein 1979; Arrighi and Drangel 1986).

From Images to Testable Hypotheses

Our purpose here is not to examine critically the historical and theoretical foundations of the contrasting images of national development and underdevelopment advanced by each of the approaches reviewed in the previous section. More modestly, our purpose is to show that these images can be translated into alternative hypotheses that can be subjected to a simple test against the actual tendencies of the world economy. The test we propose is based on the consideration that modernization, dependency and world-systems theories generate different expectations concerning the distribution of the world's population by the GNPPC of the state of residence.

If the modernization image of a lagged but general movement of all countries from tradition-bound poverty to high-mass-consumption prosperity corresponds at all to actual trends, then the distribution in question would have the following two characteristics: 1) it would either be uni-modal or tend to become uni-modal and 2) from being skewed in the direction of low levels of

GNPPC it would become increasingly skewed in the direction of high levels of GNPPC (see fig. 2). That is to say, as one country after another enters the "take-off stage," as shown in fig. 1, a growing proportion of the world's population acquires the higher income levels that were initially the prerogative of earlier modernizers.

[Figure 2 about here]

The dependency image of a strong polarizing tendency of processes of capital accumulation on a world scale, whereby some countries "develop" and others "underdevelop," leads to altogether different expectations. For this image to correspond at all to actual trends, the distribution of the world's population by GNPPC must have the following two characteristics: 1) it must either be bi-modal or tend to become bi-modal and 2) the difference between the two modal GNPPCs must increase over time (see fig. 3). That is to say, as the development (enrichment) of some countries leads to the underdevelopment (impoverishment) of other countries, a growing proportion of the world's population would cluster towards the opposite and divergent ends of the GNPPC range.

[Figure 3 about here]

The world-systems image of a stable three-tiered structure of the world economy generates expectations concerning the distribution in question that resemble in some respects and differ in others from those generated by the dependency image. Like the dependency image, it leads us to expect a high-income ("core") mode or cluster and a low-income ("peripheral") mode or cluster, as well as a widening gap between the two. Unlike the dependency image, however, it does not lead us to expect intermediate positions between the high and low modal GNPPCs to be residuals destined to disappear under the impact of the polarizing tendencies of processes of capital accumulation on a world scale. On the contrary, it leads us to expect such intermediate positions to constitute or tend to constitute a third ("semiperipheral") mode or cluster, which loses ground relative to the higher modal GNPPC but gains ground relative to the lower. Hence, the expectation of a distribution of the world's population by GNPPC with the following two characteristics: 1) the distribution is tri-modal or tends to become trimodal, and 2) both gaps that separate the three modal GNPPCs tend to increase (see fig. 4).

[Figure 4 about here]

Polynomial regression analysis provides us with a simple device with which to rank these three different expectations by the extent to which they fit or do not fit the actual distribution of world population by GNPPC at any given time and over time. "Polynomial" means multiterm and a polynomial function has the general form

(1) $y = a_0+a_1x+a_2x^2+\ldots+a_nx^n$

in which each term contains a coefficient as well as a nonnegative-integer n power of the variable x. Depending on the value of the integer n--which specifies the highest power of x and is referred to as the degree of the polynomial--we have a whole sequence of polynomial functions:

Degree	Function
0	$y = a_0$ (constant)
1	$y = a_0+a_1x$ (linear)
2	$y = a_0+a_1x+a_2x^2$ (quadratic)
3	$y = a_0+a_1x+a_2x^2+a_3x^3$ (cubic)
4	$y = a_0+a_2x+a_2x^2+a_3x^3+a_4x^4$

and so forth.

The property of this sequence that interests us here is that the number of bumps or maxima in the curves described by these functions increases with the degree of the polynomial. Thus, the curves described by polynomials of degree 0 or 1, being straight lines, have no built-in bump. The curve described by polynomials of second degree, being parabolas, have a single built-in bump if $a_2 < 0$. If $a_2 > 0$, it will have a minimum instead of a maximum (see fig. 5). The curve described by polynomials of third degree will, in general, have both a maximum and a minimum. Only polynomials of fourth or fifth degree will be described by curves with two built-in bumps, and only polynomials of sixth or seventh degree will be described by curves with three built-in bumps.

[Figure 5 about here]

This property of polynomial functions enables us to assess the comparative plausibility of the hypotheses that we have derived from the modernization, dependency and world-systems images

of development. We can first of all determine whether a uni-modal (one maximum) or a bi-modal (two maxima) or a tri-modal (three maxima) distribution is statistically most significant by fitting polynomials of ascending degree to the distribution of world population by GNPPC at different points in time, and by evaluating the goodness of each fit by means of the squared correlation coefficient (R^2). We can then proceed to analyze variations over time in the statistically most significant polynomials in order to detect changes in their form that can be interpreted as being consistent or inconsistent with modernization, dependency and world-systems hypotheses.

Thus, as figure 2 suggests, the strongest evidence that we can find in support of the modernization hypothesis is that, at any given time, the statistically most significant polynomial regression has a single maximum and that, over time, the modal GNPPC tends to shift from the lower to the higher values of the GNPPC range. As figure 3 suggests, in contrast, the strongest evidence that we can find in support of the dependency hypothesis is that, at any given time, the statistically most significant polynomial regression has two maxima in the relevant GNPPC range and, over time, the gap between the two modal GNPPC tends to increase. Finally, as figure 4 suggests, the strongest evidence that we can find in support of the world-systems hypothesis is that, at any given time, the statistically most significant polynomial has three maxima in the relevant GNPPC range and, over time, both gaps between the modal GNPs per capita tend to increase.

There is no reason, of course, why the results of the regression analysis should support so unequivocally any of the three hypotheses. They may be inconsistent with all of them, or they may be consistent with one of them synchronically and with another diachronically. The polynomial with the highest R^2 at any given time, for example, may have two or three maxima in the relevant GNPPC range, as "predicted" by the dependency and world-systems hypotheses; and yet, the gap(s) between the modal GNPPCs may be narrowing instead of widening, thereby lending support to the modernization hypothesis of a widespread process of catching up of high- by low-income countries. The synchronic identification of the polynomials with the highest R^2, in other words, is only a preliminary step toward the diachronic identification of changes in the form of the polynomials. Hypotheses that appear most plausible in the first stage, may well be rejected in the

second, and vice versa.

Data and Methods

The relevant longitudinal data include two variables: GNPPC and population. These data have generally been easily available (at least after the 1950s) through the World Bank (1988 and various years). For missing observations on the Soviet Union, we have followed the procedures described in Korzeniewicz and Martin (1994).

GNPPC data are widely recognized as providing the most acceptable relative indicator of income (e.g., Berry et al. 1983a; Kravis et al. 1978; Morawetz 1977; Whalley 1979). As a measure of relative command over world income, national product data are preferable to domestic product data (or similar indicators of output), because the latter indicator fails to capture changes in terms of trade or net receipts from abroad (both of which are relevant components of this study's variable).[3]

We have made no attempt to take into account differences in purchasing power parities (PPPs) in the calculation of GNPPC. Indeed, some authors object to the use of national incomes converted to U.S. dollars at official exchange rates (arguing that these are distorted indicators of income levels) (Berry et al. 1983a: 331), and propose instead that GNPPC be converted into a an indicator of relative welfare (using, for example, the purchasing power parities (PPPs) reported by Summers et al. 1980 and Summers and Heston 1984 and 1988).[4] But data on PPPs are not available for most countries for most of the years examined. More importantly, GNPPC at current exchange rates is as valuable an indicator of national income and wealth as any other. Discounting GNPPC data for differences in PPPs would give us a better estimate than data at current exchange rates of the goods and services that the residents of different countries command in their respective domestic markets. But GNPPC at current exchange rates gives us the best available estimate of the goods and services that the residents of different countries command on world markets. In other words, while PPPs may provide a better approximation to welfare conditions by taking into account relative price differences in goods and services, GNPPC at market prices itself provides a

better relational indicator of command over income, or the relative command that inhabitants of different countries have "over the human and natural resources" of each other (Arrighi 1991: 106). These are two different kinds of measurements, neither of which can be held a priori to be more useful than the other.

Ideally, future investigations aimed at comparing the empirical plausibility of hypotheses that focus both on national developments in their domestic repercussions --as the modernization hypothesis does-- and on the stability of a global hierarchy of wealth --as the world-systems hypothesis does-- would run regressions on both kinds of data, to interpret similarities and discrepancies in the results in the light of the different properties of the two data sets. Nevertheless, the significance of results based on GNPPC at current exchange rates only should not be underestimated. Command over goods and services in world markets is in itself an important component of economic command in general, and the more so at times like ours when national economies are being integrated ever more closely into a single global economy.

We take the (natural) log of GNPPC, not only to reduce the influence of outliers in what, as a rule, are highly skewed distributions, but mainly because our primary interest lies in relative rather than absolute differences in incomes among countries and group of countries. What matters for the purposes of our investigation is that the residents of one particular country have a command over goods and services in world markets that is so many times greater than that of the residents of another country, regardless of the absolute amount of the difference in US dollars.

We use the logarithm of the ratio of GNP per capita to the world GNP per capita in the polynomial regression equations. This is done for several reasons. First, this allows for comparison of GNP per capita over time without regard for absolute increases or decreases in global GNP per capita. Secondly, since our interest is in the relative position of countries, this conversion places GNP per capita into a form more suited to these interests, i.e., each countries GNP per capita as it relates to the rest of the world. Finally, the statistical significance and shape of the regression lines are not affected by this numerical transformation, leaving all interpretations of the regression models unaltered. We also use three year moving means for all population and

GNP per capita figures, so as to reduce the amount of year to year variation found in GNP per capita without a significant loss in precision or trends.

In sum, the basic polynomial equation we have used in the regression analysis is

$$\%WP = b_0 + b_1*[Ln(GNPPC/WGNPPC)] + b2*[Ln(GNPPC/WGNPPC)]^2 + \ldots + bn*[Ln(GNPPC/WGNPPC)]^n$$

Where, %WP is the percentage of the world population, GNPPC is the GNP per capita for each individual country, and WGNPPC is the GNP per capita for all the countries included in the study.

Findings

The main results of the regression analysis are summed up in Table I and figures 6-9. Table I and fig. 6 show the Adjusted R^2 (ARS) for the polynomial of second and fourth degree and for the polynomial with the highest ARS--a polynomial, which always happens to be of a degree higher than the sixth. This finding concerning the statistical significance of polynomials of ascending degrees has to be assessed in conjunction with the shape of the curves described by these polynomials in the relevant range of GNPPC.

[Table I and figure 6 about here]

Figure 7 illustrates for the three-year period 1989-91 the main features of the curves in question in all the other three-year periods examined. First, the polynomials of second degree always have a positive a_2 coefficient and, therefore, they describe a concave curve with no built-in maximum. Second, the polynomials of fourth degree always have two maxima in the relevant range of GNPPC. And third, the polynomials with the highest ARS always have three maxima in the relevant range of GNPPC, regardless of their degree.

[Figure 7 about here]

It follows that, in so far as the synchronic identification of the best-fitting polynomials is concerned, we find 1) strong evidence in support of the world-systems hypothesis of tri-modality, 2) weaker but still fairly significant evidence in support of the dependency hypothesis of bi-

modality, and 3) no evidence at all in support of the modernization hypothesis of uni-modality. As previously noted, however, the synchronic identification of the best-fitting polynomials is only a preliminary step towards the diachronic identification of changes in the form of these polynomials--changes, which may or may not confirm and may even reverse the conclusions reached on the basis of the synchronic analysis. Two such changes are particularly germane to our concerns: changes in the gaps that separate the three modal GNPs per capita and changes in the distribution of world population among the three clusters identified by the modes.

Thus, the plausibility of the world-systems hypothesis would be lessened if, over time, either gap between the modal GNPs per capita were to narrow significantly, or if the proportion of world population clustering around the outlying modal GNPs per capita were to increase significantly relative to that clustering around the intermediate modal GNPPC. Conversely, if over time the lower and intermediate modal GNPs per capita were to approach the higher modal GNPPC, or if the proportion of world population clustering around the latter were to increase significantly relatively to that clustering around the lower modal GNPPCs, the modernization hypothesis would gain in plausibility. But if the gap between the outlying modal GNPPCs were to increase over time, while the proportion of world population clustering around the intermediate mode decreased, then it would be the dependency hypothesis that gained in plausibility.

Figure 8 shows the three modal GNPs per capita for the entire period 1961-1994. The overall picture that emerges is one of a sharp widening of the gap between the higher and the lower mode in 1975-76 and between the higher and the intermediate mode in 1976-79, preceded and followed by a substantial stability of both gaps. From this standpoint, therefore, we once again find no evidence whatsoever of any tendency on the part of the poorer countries to catch up with the standards of wealth of the richer countries, as hypothesized by modernization theories, and more evidence in support of the world-systems hypothesis of a stable division of the world into a three-tiered value-added hierarchy.

[Figure 8 about here]

Similar considerations follow from an examination of the tendencies depicted in figure 9. The

figure shows for the period 1961-94 the distribution of world population into five distinct strata or classes of countries determined on the basis of their GNPPC in relation to the three modes of the polynomials with the highest ARS. The three modes are divided into five strata; three representing the peaks of the modes, referred to as low, medium and high income countries, and two representing the area between the peaks, referred to as low-middle and high-middle income countries. We first separated the countries into three groups based on their position relative the minimum points. The GNP per capita for each group is then used as the average point. Countries with a GNP per capita less than the GNP per capita plus one standard deviation for Group 1 (the lowest income group) are determined to be low income countries. Countries within one standard deviation of GNP per capita of Group 2 are considered middle income countries. Countries that fall between these two strata are low-middle income. Countries with GNP per capita greater than the GNP per capita minus one standard deviation for Group 3 are considered high income countries. All countries that fall between the middle income and high income strata are considered high-middle income (Figure 10 illustrates these criteria).

[Figures 9 and 10 about here]

The two most striking tendencies revealed by Figure 9 above are 1) a sharp increase of the size of the low income stratum relative to the high income stratum from the mid 1980s onwards, and 2) an expansion, also from the mid 1980s onwards, of the middle income stratum at the expense of the upper-middle income stratum and, to a lesser extent, of the lower-middle income stratum. Once again, both findings are most damning for the modernization hypothesis of a generalized catching-up process. It is not a growing but a declining proportion of world population that enjoys the standards of wealth of the richer countries--from a peak of slightly more than 20 per cent in 1969 to slightly more than 10 per cent in 1994. At the same time, the proportion of world population in the low income stratum has increased from slightly less than 50 per cent in 1964 to about 65 per cent in 1994.

Equally damning for the modernization hypothesis is the contraction of the demographic size of the upper-middle stratum from more than 15 per cent of world population in the mid 1960s to less

than 5 per cent in the early 1990s. This stratum consists of states that are within reach of the standards of wealth of the high income stratum. The sharp contraction in its relative size, therefore, is tantamount to a reduction in the chances that a greater proportion of world population will catch up with those standards in the foreseeable future.

In short, whichever way we look at the patterns latent in the data, we find evidence that invalidates the catching-up hypothesis shared by all variants of modernization theory. Interestingly, the hypothesis has become even less plausible from the mid 1980s onwards, that is, precisely when the rise of highly dynamic capitalist economies in East Asia and the demise of Soviet communism have led many to declare the dependency and world-systems perspectives obsolete and to advocate a revival of the modernization perspective. In fact, the evidence presented here shows that, not just the world-systems perspective, but also the dependency perspective has predicted the basic trends of the world economy in the 1980s and 1990s far more accurately than the modernization perspective. A bi-modal pattern is indeed latent in the data, and polarizing tendencies between rich and poor countries are evident both in the widening gap between the outlying modal GNPs per capita and, even more clearly, in the growing demographic size of the low income stratum relative to the high income stratum. Nevertheless, contrary to the expectations of dependency theories, and in agreement with the expectations of world-systems theories, these tendencies do not appear to have eroded intermediate positions, as witnessed by the fact that tri-modal curves account for a consistently higher percentage of variance than bi-modal curves (see fig. 6). For all that has changed over the last 10-15 years, the hierarchy of wealth of the global economy has remained pretty much the same, as truly predicted, and not just "retrodicted," by world-systems theorists.

Footnotes

[1]Snyder and Kick (1979) conducted a blockmodel analysis using multiple networks of association (trade flows, military interventions, diplomatic exchanges, and conjoint treaty memberships) to locate the position of states in the world-system circa 1965. Later, Nemeth and Smith (1985) developed an alternative classification based on trade networks of various commodities types, but use of their classification is considerably less prevalent in the literature (although see Peacock, Hoover, and Killian 1988).

[2]For research conducted along these lines, see for example Bornschier and Chase-Dunn (1985); Bornschier, Chase-Dunn, and Rubinson (1978); Chase-Dunn (1975); Firebaugh and Beck (1994); Moaddel (1994); Wimberley (1990 and 1991); and Wimberley and Bello (1992).

[3]Other research uses measures of industrial production, but as suggested by some studies (e.g., Rau and Roncek 1987), the relationship between industrial production/exports and GNPPC might not be straightforward.

[4]The assumption is that wage and productivity differentials in high- and low-income countries result in distinct price structures, wherein the real GDP levels of low-income countries tend to be higher than their nominal levels (and vice versa for high-income nations) (Kravis, Heston and Summers 1978). By weighting price structures independent of fluctuating exchange rates, so as to compensate for price distortions and informal economic activities, a better approximation can be reached of relative wealth levels among nations. Overall, the use of such measures as GDP adjusted by PPPs tend to lower the gap between rich and poor nations (see, for example, Levy and Chowdhury 1994).

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TABLE I

Adjusted R Squared			
	Degree of Polynomial		
Year	Highest	Fourth	Second
1964	0.8437	0.4407	0.3722
1965	0.5631	0.2533	0.1787
1966	0.5357	0.2288	0.1355
1967	0.5025	0.1993	0.1171
1968	0.4858	0.2190	0.0992
1969	0.5305	0.2412	0.1145
1970	0.7669	0.4571	0.2467
1971	0.7480	0.4145	0.2367
1972	0.4087	0.1856	0.0667
1973	0.3648	0.1620	0.0523
1974	0.4048	0.2263	0.0914
1975	0.4527	0.1984	0.0758
1976	0.4606	0.1941	0.1289
1977	0.5329	0.2558	0.1707
1978	0.4243	0.1888	0.1239
1979	0.3567	0.1636	0.1103
1980	0.7291	0.3836	0.2042
1981	0.5203	0.1893	0.0863
1982	0.3041	0.1267	0.0482
1983	0.4258	0.2208	0.0851
1984	0.6087	0.3308	0.1413
1985	0.6300	0.3815	0.1711
1986	0.8128	0.4439	0.1582
1987	0.8130	0.5828	0.2105
1988	0.7113	0.4697	0.1704
1989	0.6307	0.3328	0.1053
1990	0.5454	0.2706	0.1036
1991	0.6322	0.2673	0.1276
1992	0.7708	0.3108	0.1337
1993	0.7956	0.3263	0.1093
1994	0.7812	0.3750	0.1543
Mean	0.5836	0.2916	0.1397

Figure 1

Source:
Rostow 1960, xii

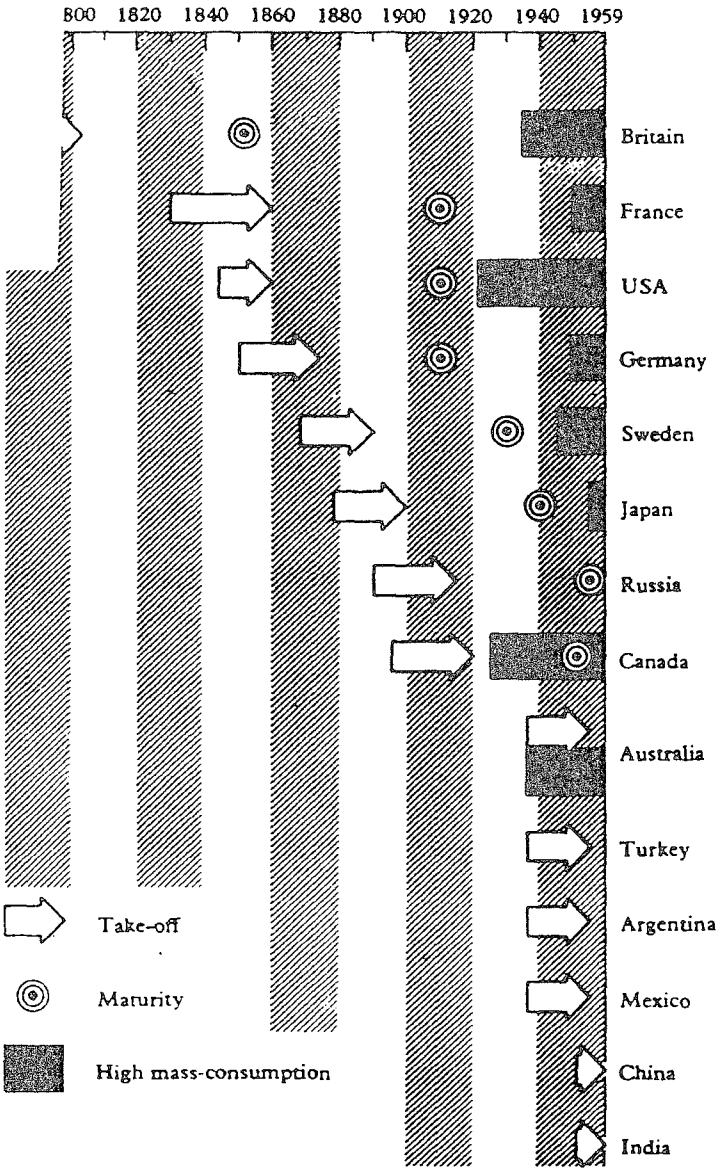


Chart of the stages of economic growth in selected countries. Note that Canada and Australia have entered the stage of high mass-consumption before reaching maturity. [By courtesy of the *Economist*.]

Figure 2

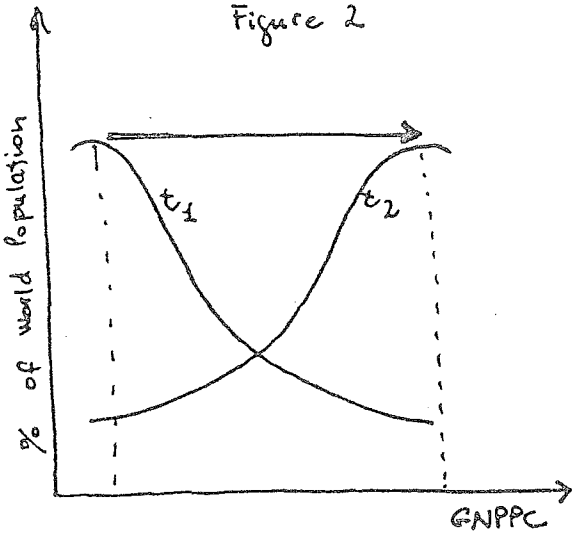


Figure 3

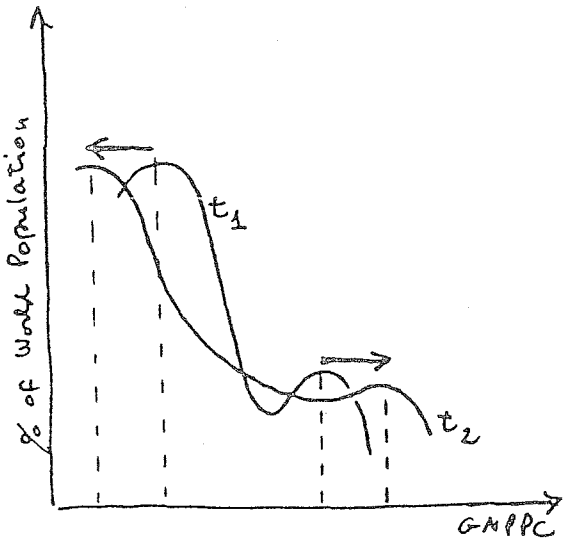


Figure 4

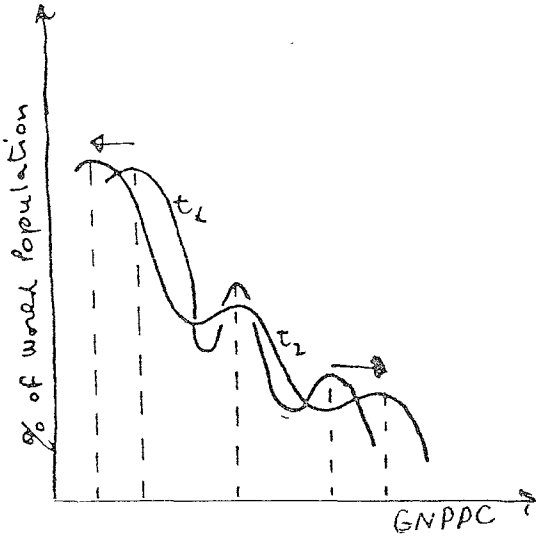


Figure 5

Polynomials of second degree
$y = a_0 + a_1 x + a_2 x^2$

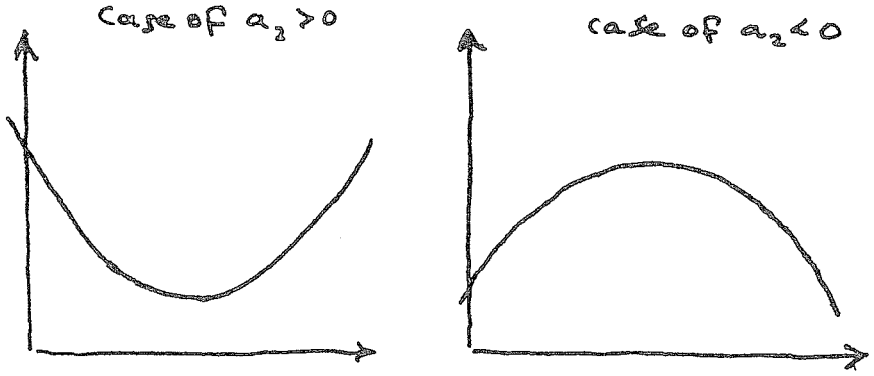


FIGURE 6·

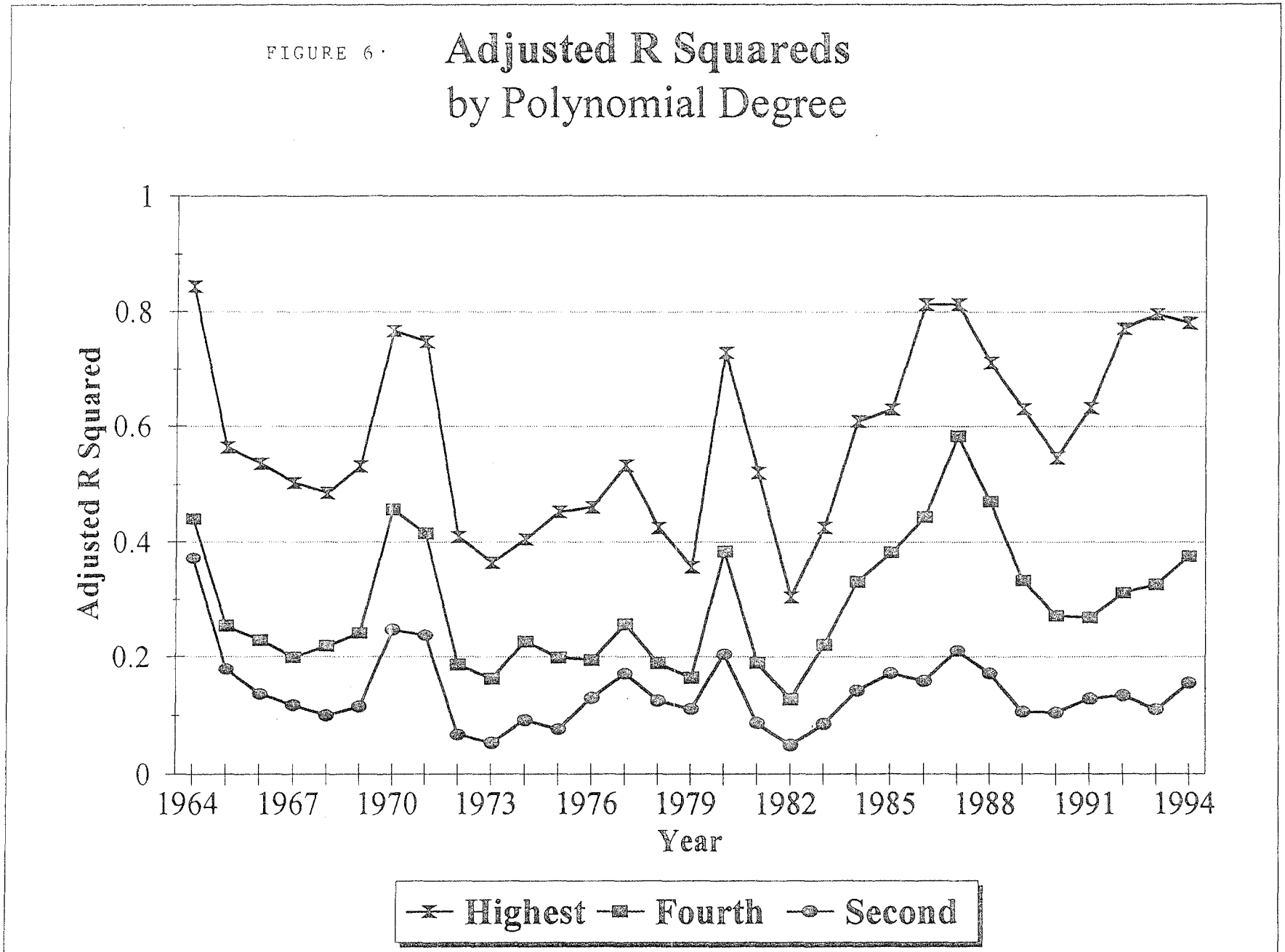

Adjusted R Squareds
by Polynomial Degree
Adjusted R Squared
1
0.8
0.6
0.4
0.2
0
1964
1967
1970
1973
1976
1979
1982
1985
1988
1991
1994
Year
Highest
Fourth
Second

Figure 7

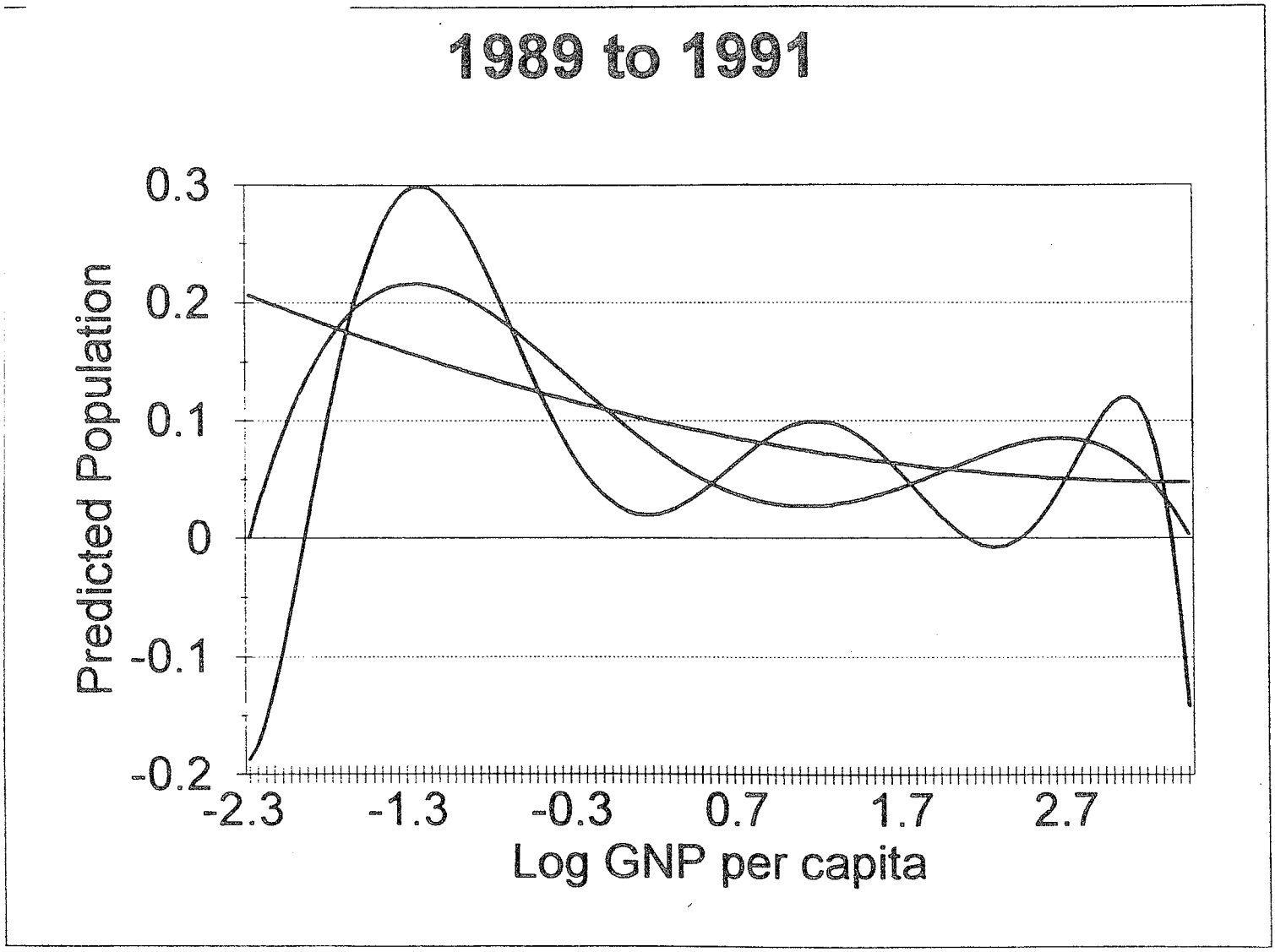

1989 to 1991
Predicted Population
0.3
0.2
0.1
0
-0.1
-0.2
-2.3
-1.3
-0.3
0.7
1.7
2.7
Log GNP per capita

FIGURE 8: **Strata Limits**
with Modal GNP Per Capita

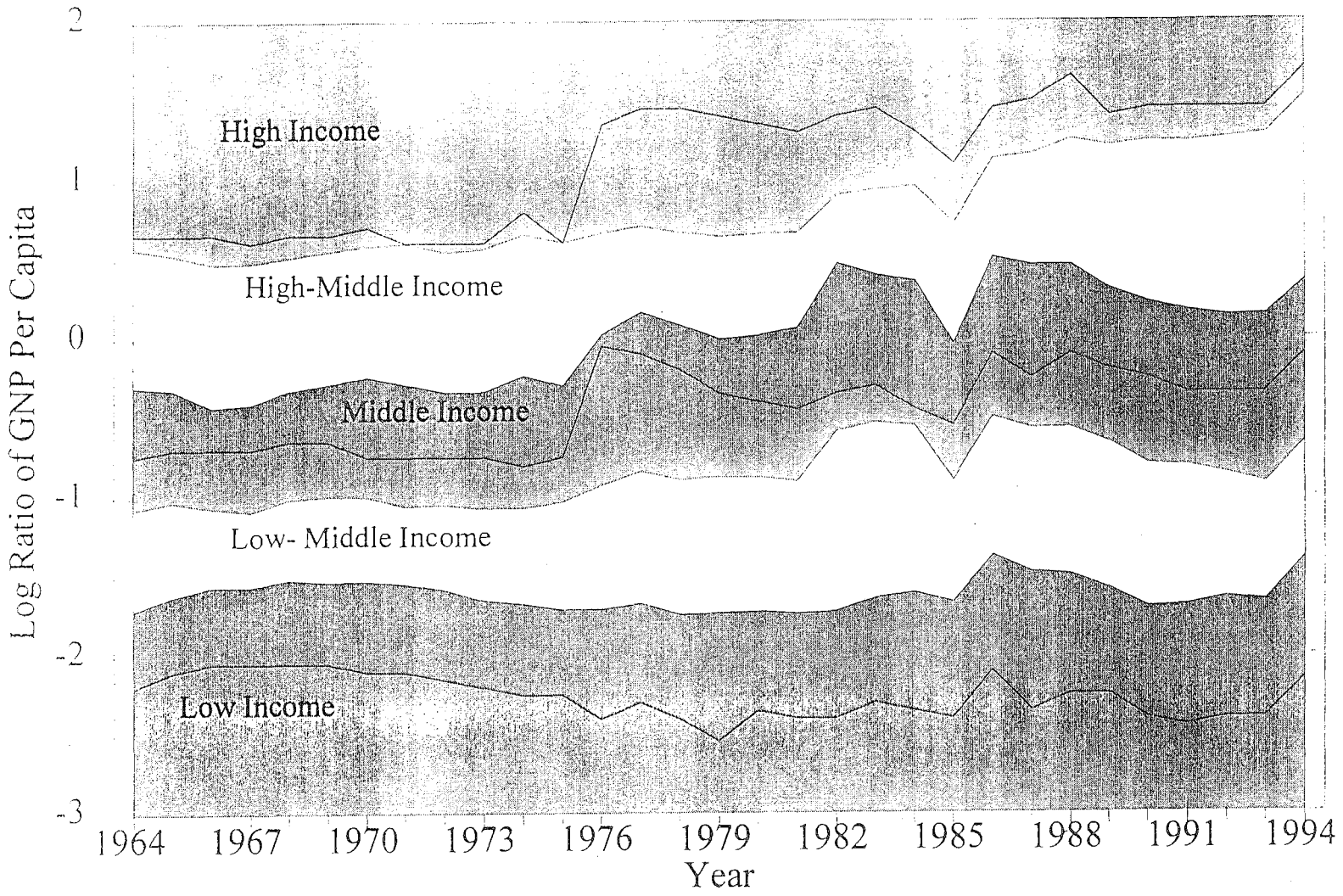


FIGURE 9:

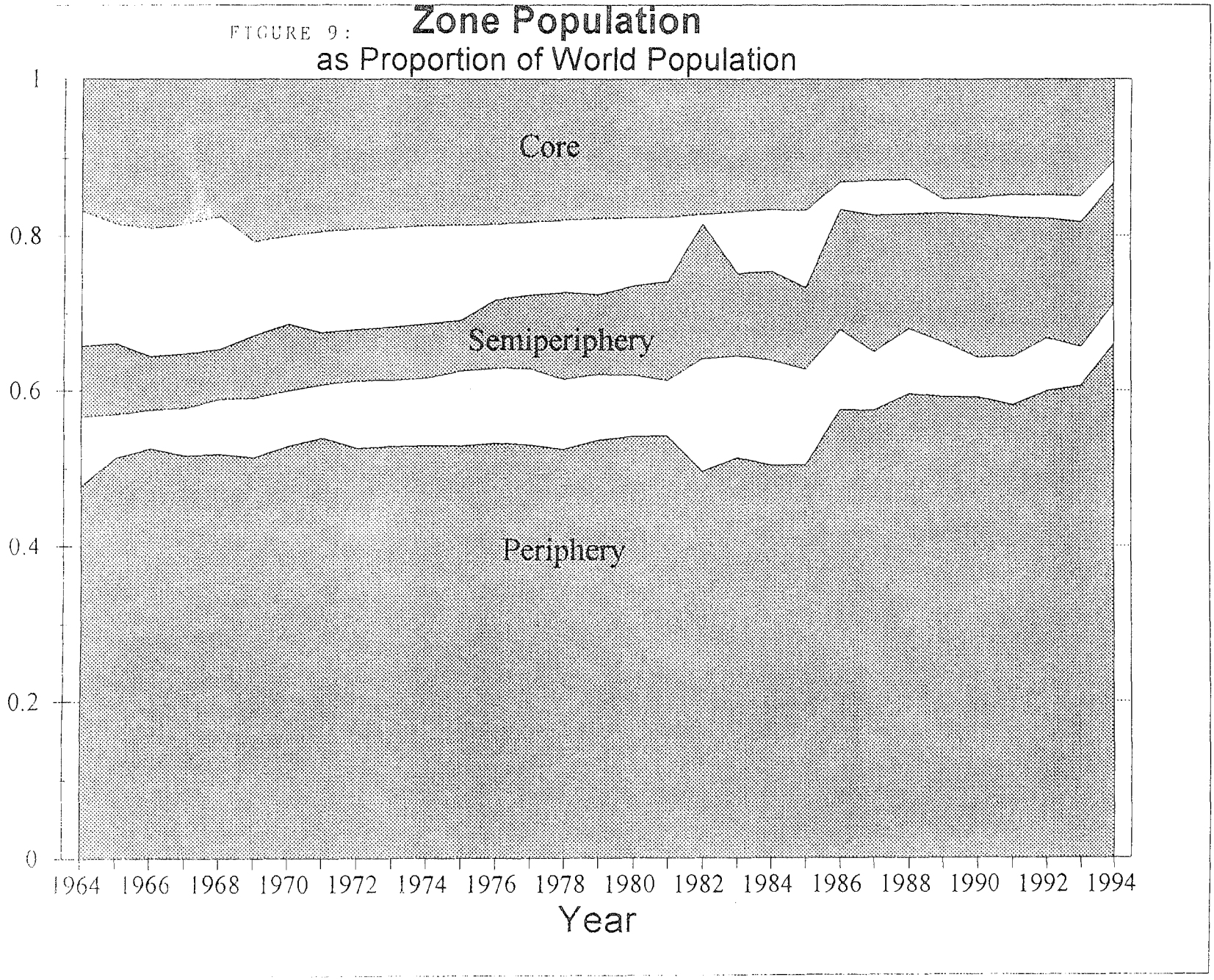
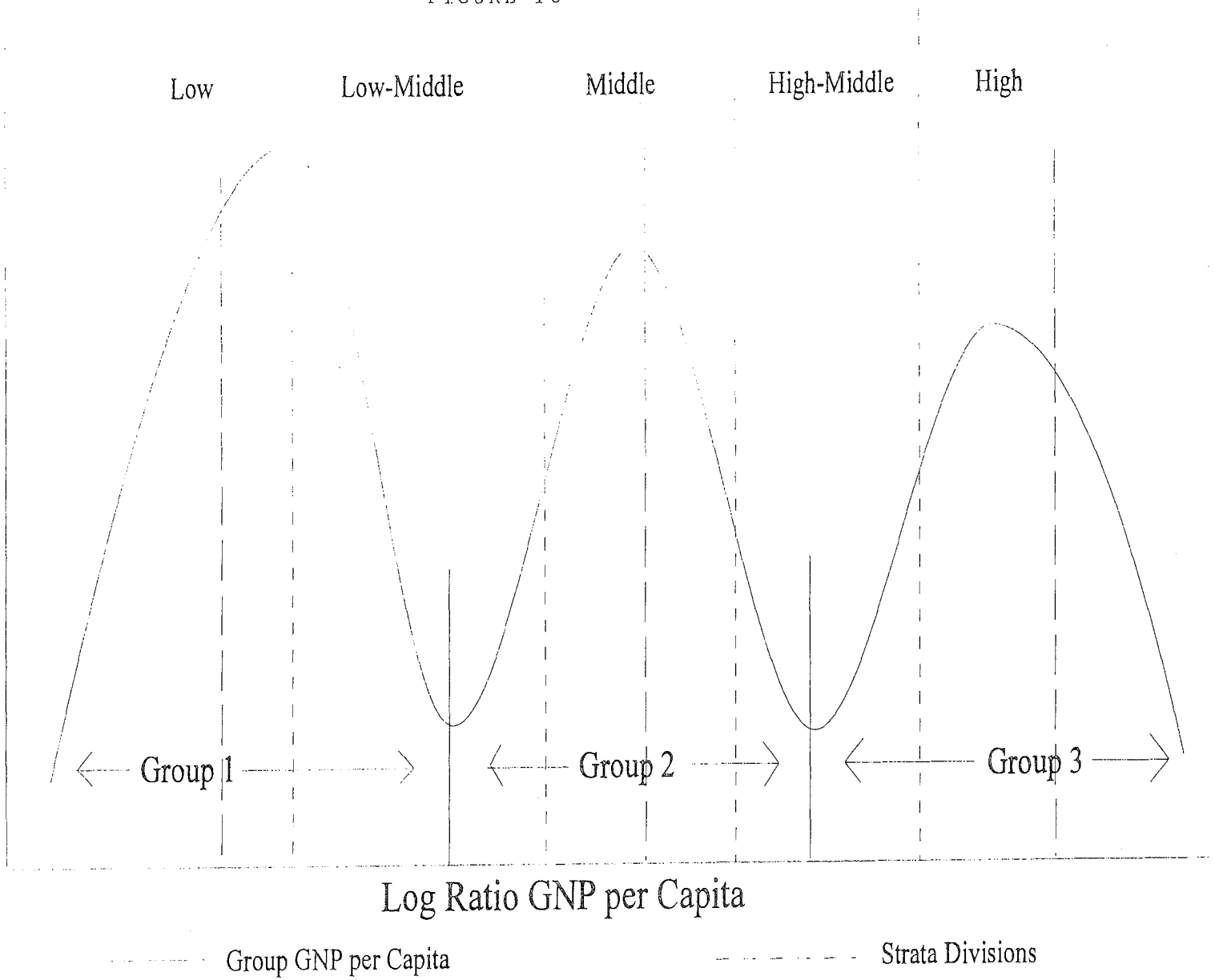

Zone Population
as Proportion of World Population
1
0.8
0.6
0.4
0.2
0
Core
Semiperiphery
Periphery
1964 1966 1968 1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994
Year

FIGURE 10


Low
Low-Middle
Middle
High-Middle
High
Group 1
Group 2
Group 3
Log Ratio GNP per Capita
Group GNP per Capita
Strata Divisions