Linguistic Fragmentation and the Wealth of Nations: The Fishman-Pool Hypothesis Reexamined*

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I. Introduction

One of the oldest concerns of social science has been to explain the different levels of wealth of different nations. This problem, originally posed by Adam Smith in a mainly European context, has become increasingly salient again as debates over the prospects for economic growth in the developing world have come to the fore.[1] Many researchers thus have become interested in cross-national studies of the geographical and societal correlates of economic development.[2]

A societal variable that has been frequently discussed in such studies is the extent to which a polity is linguistically or ethnically heterogeneous. It has been argued that linguistic and ethnic fragmentation relates to low levels of economic development, since it is associated with societal divisions and conflict, low mobility, limited trade, imperfect markets, and poor communications in general. The causal nexus in this alleged relationship points sometimes one way, sometimes the other. For example, for Joseph Greenberg, it is the level of economic development that determines the level of linguistic diversity: ''Our general expectation . . . is that areas of high linguistic diversity will be those in which communication is poor, and that the increase of communication that goes with greater economic productivity and more extensive political organisation will typically lead to . . . the ultimate disappearance of all except a single language.''[3]

G. Dalton, by contrast, attributes the small scale of the traditional African economy to the ''absence of widely shared language.''[4] Likewise for Lenin, ''the uniformity of language . . . is one of the most important presuppositions of a truly free and all-encompassing modern capitalism . . . and eventually a presupposition of the close relation of the market with every entrepreneur, even the pettiest, with every seller and

buyer.''[5] Thus, for these authors, it is the degree of linguistic homogeneity that determines economic performance.

There are two famous studies that set out to test the correlation between linguistic fragmentation and poverty. Joshua Fishman, drawing on earlier cross-national studies, used a global sample of countries that were divided into a linguistically homogeneous group and a linguistically heterogeneous group. The two groups were then compared using a large number of social and economic indicators. The results are fairly overwhelming: linguistically heterogeneous countries are found, on average, to have higher death rates, higher infant mortality rates, lower female life expectancy, lower gross national products (GNP), lower government revenues, fewer students enrolled in higher education, lower literacy, more totalitarian and less participatory government, and fewer TVs, radios, and newspapers per capita than linguistically homogeneous ones. Fishman concludes that ''one cannot help but come away from this recitation of findings with the decided impression that linguistic homogeneity is currently related to many more of the 'good' and 'desirable' characteristics of polities than is linguistic heterogeneity. . . . All in all, linguistic homogeneity characterizes the state in which primordial ties and passions are more likely to be under control, cultural-religious homogeneity and enlightenment are advanced, more modern forms of heterogeneity via associational, institutional, and political groups are fostered, and *in which the good life is within reach of a greater proportion of the populace*'' (emphasis added).[6]

In the second study, Jonathan Pool correlated countries' per capita gross domestic product (GDP) with their degree of linguistic heterogeneity and concluded that while linguistically homogeneous countries could be poor, heterogeneous ones could never be rich.[7] A number of other cross-national studies using diverse data sets have supported Fishman and Pool's basic hypothesis.[8] It should be noted that these latter studies have been carried out by economists interested in understanding the causes of economic development rather than linguists interested in the causes of linguistic diversity, and so the causal interpretation of the results has been that the linguistic matrix determines the economic trajectory, rather than the other way around. I return to the issue of the appropriate causal interpretation of such correlations in the general discussion section below.

More recently, a thorough study by Brad Lian and John Oneal addressed the same issue with contemporary data.[9] They found, for a 98 country data set, no residual relationship between linguistic fragmentation and economic growth once the influences of some known correlates of growth had been factored out. There are two issues that make Lian and Oneal's study somewhat ambiguous as a test of the Fishman-Pool hypothesis. First, their economic measure was not the level of economic activity, which Fishman and Pool had used, but the rate of economic

growth over a 25 year period (1960–85).[10] Clearly, there must be a relationship between the long-run rate of economic growth of a country and its level of economic activity at the present day. However, over periods of a few decades, cross-country differences in growth rates will be partly due to what amount to stochastic fluctuations around the underlying balanced-growth trajectory.[11] If linguistic fragmentation has an effect on the rate of economic growth, it will be a very small one, which may only be visible over periods of hundreds of years where these short-term fluctuations have been averaged out. For this reason, R. E. Hall and C. I. Jones suggest that those interested in the long-run correlates or determinants of economic outcomes work with levels of activity (GDP or GNP) rather than growth rates.

Second, and more important, Lian and Oneal's study looks for a residual effect of fragmentation on economic growth once well-known predictive factors are controlled for. These factors, whose importance had been previously determined by the cross-national regressions of R. J. Barro, included the level of GDP in 1960, rates of school enrollment, estimates of political instability, and of government market distortion.[12] While the validity of these factors as correlates of economic growth is not in question, their inclusion does somewhat beg the question of the status of the Fishman-Pool hypothesis. This is because political instability, low school enrollments, and low starting GDP could be *ex hypothesi* consequences or at least correlates of fragmentation. Controlling for their influence may indirectly amount to controlling for the influence of fragmentation itself, and thus a finding of no additional influence is no great surprise. Although Lian and Oneal's study is valid as a demonstration that the inclusion of ethnolinguistic fragmentation does not improve Barro's economic growth model, it is not valid as a refutation of the Fishman-Pool hypothesis; fragmentation could be acting via such intervening variables as low school enrollments, corruption, low starting growth rates, and so on.

In this article, then, I set out to directly retest the Fishman-Pool hypothesis, using data on the level of economic activity rather than the rate of growth over some short period of time, and without including any factors that may themselves be consequences of fragmentation. First I attempt to reproduce the original correlation from Pool's study with a more comprehensive and accurate data set and to control for several possible intervening variables. I then consider the results, their causal interpretation, and their implications for economic development and language shift.

II. Linguistic Homogeneity and GDP per Capita
A. Methods
In this section I attempt to replicate Pool's findings using contemporary global data. Social and economic indicators for most of the world's

countries are given by the World Bank's *World Development Report 1993*.[13] The GDP data from this source are calculated in U.S. dollars at market exchange rates. This is a key weakness, since exchange rates do not reflect real wealth parities. I have therefore used data from the Penn World Tables (Mark 5) instead.[14] These data are calculated in international prices using purchasing power parities. The variable I have used is real GDP per capita for 1985 at 1985 prices (henceforth GDPPC).

Pool measured the linguistic homogeneity of a country by the percentage of the national population who were native speakers of the most widespread language (henceforth %FL). Fishman categorized countries dichotomously on the same basis, using 85% speakers of the first language as the criterion for his linguistically homogeneous category. I have also gathered this percentage for each country from the computer package by PC Globe.[15] The percentages range from 9% for Cameroon to 100% for Rwanda and several others countries.

The %FL indicator is a useful measure of linguistic homogeneity, but it has two main drawbacks. First, it fails to distinguish between countries like Rwanda, which is uniform simply because it is very small, and those countries that are uniform despite being large. In fact, in my data set, %FL is weakly negatively correlated with the size of the country (Spearman correlation: $r_s = -0.23$, $N = 107$, $P < .05$), introducing a source of potential error. Second, %FL is much lower in countries that were recently created by colonial powers who did not respect traditional social boundaries. Niger, for example, has rather low linguistic diversity by African standards, certainly lower than Rwanda's, in that it contains very large ethnolinguistic groups. However, it has the first-language percentage of 46% (i.e., heterogeneous in Pool's and Fishman's terms) because it is so large, and its frontiers do not correspond to the historical territories of any of those groups but, rather, represent the place where French expansion met British in the colonization of Africa. The %FL measure is therefore likely to overestimate the linguistic fragmentation of recently created postcolonial states, which also tend to be poor.

To ensure that these factors do not distort the conclusions, I have adopted, alongside %FL, a measure of languages per million capita (LPC), which is the number of languages spoken in the country divided by the population in millions. This is not a measure of the linguistic homogeneity as such. It is, rather, a measure of language diversity, similar to those measures I have used in other studies, in that it reflects the average size of the ethnolinguistic groups in a country.[16] It is independent of country size and so, taken alongside %FL, is a useful variable. The numbers of living languages per country are from the linguist's database *Ethnologue,* and the population figures are 1991 midyear estimates from the *Demographic Yearbook, 1993*.[17]

Both of these measures still suffer from one major drawback, however, in that that they do not measure the extent of multilingualism. On
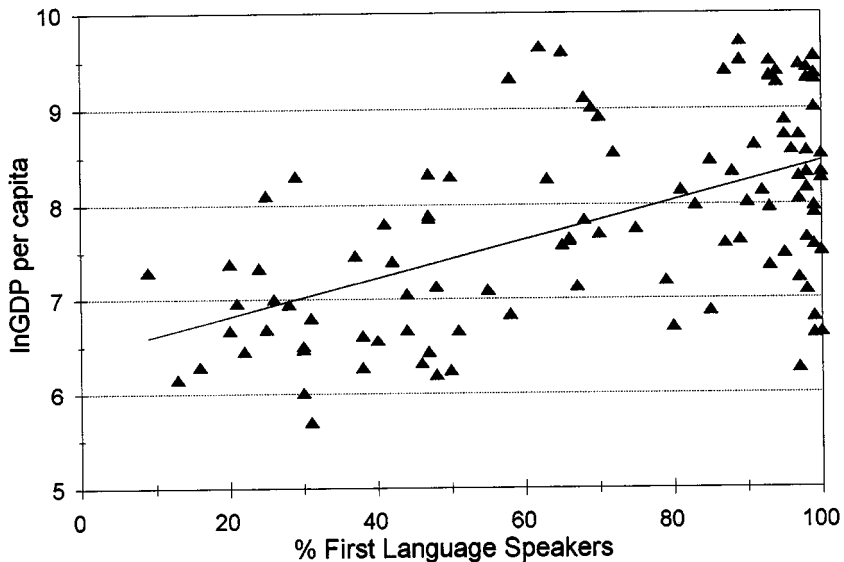
FIG. 1.—The logarithm of per capita GDP (1985 international dollar prices) plotted against the percentage of the population who are native speakers of the country's first language.

the one hand, a country might have many small languages, but widespread multilingualism might mean considerable interaction between the different groups. On the other hand, a country might have a few large languages with sharp communicative cleavages between them. Such a country would be low in diversity on the two measures advanced here but, in fact, highly fractionalized in a way relevant to the Fishman-Pool hypothesis.

It is unfortunate that there is no way of remedying this problem at present, since cross-national data on language use of the required degree of detail cannot be found. For the present purposes, then, we are limited to the %FL and LPC measures, and we have to assume that these broadly reflect linguistic fragmentation, which seems a reasonable assumption.

There are no reliable data for the former Soviet Republics, and I have excluded countries under 10,000 km². This leaves 107 countries in the data set. The GDPPC and languages per capita (LPC) figures have been logged to reduce their skew and kurtosis.

B. Results and Discussion

The data set is not reproduced here but is available on request from me. There is a significant correlation between %FL and ln GDPPC ($r = 0.56$, df $= 106$, $P < .01$). Figure 1 shows this relationship. It is clearly a weak one, but it does illustrate Pool's conclusion: there are countries in the

bottom right quadrant, which shows that linguistically homogeneous countries can be poor, but there are no countries in the top left quadrant, which shows that no linguistically fragmented countries are rich.

There is a significant though less strong negative correlation between ln LPC and ln GDPPC ($r = -0.29$, df $=106$, $P < .01$). Pool's result, therefore, is not simply due to the particular measure of diversity he used. By either measure, high diversity correlates with low GDPPC. As one would expect, the two linguistic diversity measures are themselves significantly correlated ($r = -0.56$, $N = 106$, $P < .01$).

This result agrees with Pool's. However, there are a number of problems with its interpretation. In particular, it is quite possible that the inhabitants of linguistically heterogeneous countries have lower per capita GDP without having a lower quality of life, since the extent to which GDP genuinely reflects human welfare has been frequently questioned in the literature.[18] Some of the theoretical problems with it are overcome by using figures derived from purchasing power parity rates rather than currency exchange rates, as I have done here. Other problems are not directly relevant to the current comparison. For example, GDP assigns no value to environmental resources except when they are liquidated. Logging a forest and selling the timber will always increase GDP in the short term, as no account is taken of the fact that the capacity for future revenue—through hunting, gathering, sustainable forestry, and so on— is thereby reduced. A more accurate measure of long-term wealth would subtract an amount for deterioration in environmental resources, just as the conventional net national product makes deductions for the depreciation of capital.[19] This distortion is unlikely to affect the present results, however, as the concern here is the relationship between linguistic diversity and the quality of life across societies, and the environmental problem, though important, is mainly a failing of GDP as an indicator of wealth within a society through time.

Still other problems with GDP as a measure of development are directly relevant to the present case and may distort the results. The GDP measures the total income generated by the inhabitants of a country in a given year. It is, therefore, primarily a measure of the extent of monetized exchange. It does not record transactions that are nonmonetized, such as gifts, barter, help given to kin or neighbors, and so on. Furthermore, it tends to miss or underestimate the value of domestic production that never enters the market but is consumed at home. The inclusion of these activities would make a very large difference to the economic profile of even the industrialized countries.[20]

I have argued elsewhere that linguistic groups should be seen as systems of generalized exchange, and that linguistic diversity arises precisely where the scope of such exchange is limited.[21] Money is another system of exchange, analogous to language in many ways, and we should not be surprised to find that the scope of the one system is related

to that of another.[22] GDP will tend to be low where the economy is very local, people are self-sufficient, and transactions are nonmonetized. These are precisely the conditions required for high linguistic diversity. Large linguistic groups arise where there is more intense exchange over longer distances; GDP will be higher under such circumstances because more of the goods produced will enter the monetized market, and they will tend to travel further and to pass through more intermediaries, with the corresponding additions of value.

In sum, GDP per capita does not necessarily relate directly to human welfare, as it does not account for the nonmonetary economic strategies people may employ to procure their livelihoods. As John Davies has stated, ''Successive governments—over several centuries—have found it easier to collect statistics in the marketplaces rather than round the dinner-tables of the nations . . . it is easier to describe market transactions . . . than it is to measure Sunday lunch.''[23] The correlation with GDPPC may not, then, mean that linguistic diversity is associated with a low quality of life. Economists have attempted to overcome the limitations of GDP accounting either by producing composite indexes, which combine GDP with other variables pertaining directly to the quality of life, or by bypassing monetary statistics altogether and examining the relevant social indicators directly.[24] Such an examination is the aim of the next section.

III. Language Diversity and Social Indicators

A. Methods

The best universally applicable indicators of long-term well-being are health statistics. Among these, the life expectancy at birth (LE) is one of the most informative and widely available and has been proposed as a direct measure of socioeconomic development.[25]

To test whether there was any relationship between life expectancy and linguistic diversity, I gathered data on them from the World Bank's *World Development Report, 1993* for the same 107 countries as in the previous analysis. The data were logged to reduce skewness and kurtosis.

B. Results

Ln GDPPC in fact correlates extremely highly with the logged life expectancy, ln LE ($r = 0.88$, df $= 106$, $P < .01$). It is known that within the developing countries, as GDPPC increases, health care expenditure increases, and child health improves.[26] These findings support the view that despite the theoretical problems, GDPPC may be a useful indicator of socioeconomic development when comparisons are made at very macroscopic scales.[27]

The Pearson correlation coefficient between ln LE and %FL (the percentage of the population speaking the country's first language) is 0.60 (df $= 106$, $P < .01$). That between ln LE and ln LPC (languages

per million capita) is -0.41 (df $= 106$, $P < .01$). Both correlations are thus highly significant and in the direction predicted by the Fishman-Pool hypothesis—that higher linguistic diversity is related to lower life expectancy. What is more, the correlations are actually stronger than those between GDPPC and linguistic diversity.

This result might seem to be rather strong support for the Fishman-Pool hypothesis. However, there is another type of methodological problem in analyses such as these. Countries are not really statistically independent examples of economic evolution. On the contrary, the economic development of neighbors is often closely linked. The distribution in figure 1 is actually made up of clusters of geographically close countries. In the top right-hand corner, there is the high income cluster of Western Europe. Economic takeoff in this region occurred through a regionwide, self-reinforcing process involving population growth, agricultural intensification, the creation and investment of surplus wealth, and technological change.[28] Although one can argue about when the critical changes really took place, it is clear that this series of revolutions was in some sense a unitary phenomenon rather than a set of independent events in different countries. Europe was also a region of low linguistic diversity. It has been argued that the two facts were connected, and of course, such a connection is what is at issue in this investigation.[29] The point is, however, that the European countries only constitute a single data cluster.

In addition to the Western Europe cluster, there is a mid-income cluster in South America. These countries have similar GDPs due to their common history and articulation with the world economy and similar, rather low linguistic diversity due to their geographical position and the effect of disease on the indigenous inhabitants. Most of the rest of the countries in the world are rather poor in GDP terms. Thus, there may be in reality as few as three clusters of economies in the data, and even these are not statistically independent, considering the role of European expansion in the (lack of) development of the rest of the world. Thus a correlation analysis, which assumes the complete independence of the 107 cases, may be, strictly speaking, invalid. In the next section, I use two different methods to attempt to defuse this problem.

C. Controlling for Artifacts

The problem of the statistical nonindependence of countries is rarely considered in cross-national economic studies, though it should be, since it can inflate apparent significance levels. The same problem is encountered by linguists comparing related languages and anthropologists comparing related cultures, and in those disciplines, statistical techniques have been developed to compensate.[30] There are a number of possible approaches. One approach is to divide the countries of the world into the bands conventionally used by economists and found in the *World Development Report:* (1) low income, (2) lower-middle income, (3) upper-

TABLE 1

CORRELATION COEFFICIENTS BETWEEN THE MEASURES
OF LINGUISTIC DIVERSITY AND THE SOCIAL INDICATORS
WITH THE COUNTRIES DIVIDED INTO BANDS

Band	ln LPC/ln LE	%FL/ln LE
1	−.46**	.30*
2	−.56**	.66**
3	−.54*	.76**
4	−.12	−.15
Fisher's test χ^2	36.61**	35.33**

NOTE.—LPC = languages per million capita; LE = life expectancy at birth; %FL = percentage of the national population who were native speakers of the most widespread language.
* $P < .05$.
** $P < .01$.

middle income, and (4) high income. Neighboring countries with shared economic histories will tend to fall into the same band. If there is any genuine relationship between linguistic diversity and living standard, it should be detectable within the bands. Another method is to try to control for the economic development itself and look for relationships between linguistic diversity and social welfare in the residual differences between countries. I will carry out each analysis in turn.

The correlation coefficients between linguistic diversity and the social indicators for the countries split into the four income bands are shown in table 1. Six of the eight correlation coefficients are significant individually, and seven out of eight are in the direction predicted by the Fishman-Pool hypothesis. Considering them collectively by using Fisher's procedure for combining probabilities, both correlations are highly significant.[31] Thus there is strong evidence that the same relationships obtain within the bands as in the sample as a whole.

The second method of controlling for artifacts is to control for economic development, which in practice means controlling for GDPPC and looking for residual correlations between linguistic diversity and social indicators. Fishman employed this strategy in his original paper. It may seem rather an odd one; I began this section with the claim that linguistic diversity and GDPPC were causally linked and then showed that GDPPC predicts social indicators very well. To control for it, therefore, seems like eliminating what is at issue. However, if there were a residual correlation, it would be strong evidence of a real relationship between social welfare and linguistic diversity, as most of the differences between the developing world and the developed world by which an artifactual result might be produced would have been statistically eliminated.

The partial correlations between the lnLE and the linguistic indica-

tors once ln GDPPC has been controlled for are as follows: ln LE/%FL: 0.27 (df = 105, P < .01); ln LE/ln LPC: −0.35 (df = 105; P < 0.01). There is still a significant negative relationship, albeit a weaker one, between linguistic diversity and life expectancy when economic development is controlled for.

The outcomes of these two procedures tend to suggest that the evidence supporting the Fishman-Pool hypothesis is not simply an artifact. There seems to be a robust, though weak, negative correlation between linguistic heterogeneity and the quality of life, which support's Fishman's claim. However, the correct causal interpretation of this correlation, and its implications for economic development, are complex issues.

IV. General Discussion

The preceding analysis shows that there is indeed some evidence of an inverse relationship between linguistic heterogeneity and the level of economic development. The question remains of how we should interpret this correlation. Of course, the importance of the correlation should not be overstated. An r value of 0.6 (the best obtained) means that only 36% of the variance in one variable is related to variance in the other. This, and the complexity of individual economic trajectories, must always be borne in mind in studies such as this one. None the less, any robust correlation deserves proper consideration.

One interpretation, which is implicit in Pool's original paper, is that there is a direct causal linkage between linguistic fragmentation and poor economic performance, since linguistic fragmentation leads to social division conflict, factionalism, and corruption.

This interpretation takes the degree of ethnolinguistic fragmentation as a given, which in turn affects economic outcomes. A more thoroughgoing anthropological perspective acknowledges that the ethnolinguistic situation is not fixed from the outset but is itself the outcome of larger social and geographical processes.[32] Areas are divided into many small languages as a result of such factors as the scale and nature of the traditional economy and the degree of isolation and mobility of the population. Thus, taking a longer view, the correlation between linguistic heterogeneity and economic performance may simply stem from the fact that both are conditioned by similar geographical factors. For example, latitude is one of the best predictors of both the level of economic development and the degree of linguistic diversity.[33] Jeffrey Sachs cautions us against a simplistic direct causal interpretation of the Fishman-Pool correlation for this reason.[34] No data thus far produced give unequivocal evidence of a link between language and economy above and beyond that explained by their codetermination by geographical factors.

A more realistic interpretation of the correlation would therefore stress that languages and economies coevolve under the constraints of physical and human geography. This does not rule out the possibility that

linguistic heterogeneity per se has some causal influence on economic performance. That is a matter to be determined by other types of studies. However, it should be acknowledged that there is an important link from economic performance back to the linguistic situation. F. Coulmas, for example, considers the argument that it was the takeoff of the national economies of European countries that brought about the homogenization and standardization of the European languages.[35] Today, across the developing world, we see a massive movement from minority languages to national and international languages, leading to widespread concern among linguists and anthropologists about the future of much of our linguistic heritage.[36] In many of these cases, adoption of the national language is seen as a way of accessing the wider economy, with all the services and status that it can provide. Thus it is the economic incentives available to people that determine choice of language more than the other way around.

Consider a specific example of geographical codetermination: the finding that language diversity is particularly high in equatorial climates the world over. Examples of equatorial ecosystems are New Guinea, island Southeast Asia, and West-Central Africa. These low-income regions harbor a small proportion of the human population but the great majority of all human languages. In a recent book, I argued that this is a consequence of the ecological regime in which equatorial peoples produce their livelihood.[37] There is relatively little spatial or temporal variation in the food supply in equatorial farming societies, and so very small groups of people can easily be self-sufficient. This possibility, coupled with low population densities and limited infrastructure for storage and transport, means that equatorial societies often find an equilibrium of local self-sufficiency, limited trade (at least in foodstuffs), and minimal surplus production. It is this economic situation that has led to the evolution of so many local languages in the equatorial regions. In short, both the linguistic and the economic situation seem to be results of the geographical matrix within which societies are operating. Now, with greater interchange with an ever larger developed world economy, many of these regions seem to be going through an equilibrium shift toward more trade and external integration. This has caused the rapid spread of languages of wider communication all around the equator: Bahasa, Tagalog, and English in Southeast Asia, Tok Pisin in New Guinea, French and English in tropical Africa. These are increasing at the expense of numerous local vernaculars that are associated with local exchange systems.

Given the lack of evidence for a direct causal interpretation, I would resist any argument on the basis of the Fishman-Pool result that language diversity should be discouraged. The fact that two variables have co-evolved in no way implies that manipulating one will affect the other in the desired direction. In this respect, I agree with Lian and Oneal's con-

clusion that attempts to enforce linguistic homogeneity cannot be justi-
fied on economic terms.[38] Furthermore, there is little evidence that the
ethnolinguistic situation of a country can be effectively manipulated,
even if this is thought desirable and ethical; the experience of language
planning is that it often fails and only succeeds where it is concordant
with the spontaneous sociolinguistic preferences of most of the peo-
ple.[39] Indeed, it is likely that the economic situation will ultimately deter-
mine the linguistic one, since people respond to economic incentives not
just in narrow monetary terms, but with broad patterns of often uncon-
scious social-cultural choices that involve shifting their patterns of lan-
guage use.

Notes

   1. See, e.g., A. Maddison, *Explaining the Economic Performance of
Nations: Essays in Time and Space* (New York: Elgar, 1995); K. Matsuyama,
''Why Are There Rich and Poor Countries? Symmetry-Breaking in the World
Economy,'' *Journal of the Japanese and International Economies* 10 (December
1996): 419–39; D. Acemoglu and F. Zilibotti, ''Was Prometheus Unbound by
Chance? Risk, Diversification and Growth,'' *Journal of Political Economy* 105
(August 1997): 709–51; R. E. Hall and C. I. Jones, ''Levels of Economic Activ-
ity across Countries,'' *American Economic Review* 78 (May 1997): 173–77.
   2. R. J. Barro, ''Economic Growth in a Cross-Section of Countries,''
Quarterly Journal of Economics 106 (May 1991): 407–44.
   3. J. H. Greenberg, ''The Measurement of Linguistic Diversity,'' *Lan-
guage* 32 (January 1956): 109–15, esp. 110.
   4. G. Dalton, ''Traditional Economic Systems,'' in *The African Experi-
ence,* ed. J. N. Paden and E. W. Soja, vol. 2 (London: Heineman Educational,
1970).
   5. Lenin, cited in F. Coulmas, *Language and Economy* (Oxford: Blackwell,
1992), p. 41.
   6. J. Fishman, ''Some Contrasts between Linguistically Homogeneous and
Linguistically Heterogeneous Polities,'' in *Language Problems of Developing
Nations,* ed. J. Fishman, C. Ferguson, and J. Das Gupta (New York: Wiley,
1968), p. 60.
   7. J. Pool, ''National Development and Language Diversity,'' in *Advances
in the Sociology of Language,* ed. J. Fishman, vol. 2 (The Hague: Mouton,
1972). It seems fair to note that Fishman, here and in his other work, holds out
hope that linguistic heterogeneity and economic development may be jointly
pursued, even if they have not gone together in the past. Pool, however, seems
wholly negative about the economic consequences of linguistic heterogeneity.
As he stated, ''a planner who insists on preserving cultural-linguistic pluralism
had better be ready to sacrifice economic progress'' (p. 225).
   8. I. Adelman and C. T. Morris, *Society, Politics and Economic Develop-
ment* (Baltimore: Johns Hopkins University Press, 1967); M. R. Haug, ''Social
and Cultural Pluralism as a Concept in Social System Analysis,'' *American
Journal of Sociology* 73 (November 1967): 294–304; L. G. Reynolds, *Economic
Growth in the Third World, 1850–1980* (New Haven, Conn.: Yale University
Press, 1985).
   9. B. Lian and J. R. Oneal, ''Cultural Diversity and Economic Develop-

ment: A Cross-National Study of 98 Countries, 1960–1985,'' *Economic Development and Cultural Change* 46 (October 1997): 61–78.

10. Adelman and Morris and Reynolds had also used rates of growth rather than levels of activity.

11. Hall and Jones (see n. 1 above).

12. Barro (see n. 2 above).

13. World Bank, *World Development Report, 1993* (Oxford: Oxford University Press for the World Bank, 1993).

14. R. Summers and A. Heston, ''The Penn International World Table (Mark 5): An Expanded Set of International Comparisons, 1950–1988,'' *Quarterly Journal of Economics* 106 (May 1991): 327–68.

15. *PC Globe International Database* (Tempe, Ariz.: PC Globe, 1990).

16. D. Nettle, ''Language Diversity in West Africa: An Ecological Approach,'' *Journal of Anthropological Archaeology* 15 (December 1996): 403–38, and *Linguistic Diversity* (Oxford: Oxford University Press, 1999).

17. B. F. Grimes, *Ethnologue: The World's Languages,* 12th ed. (Dallas: Summer Institute of Linguistics, 1993); United Nations, *Demographic Yearbook, 1993* (New York: United Nations, 1993).

18. N. Hicks and P. Streeten, ''Indicators of Development: The Search for a Basic Needs Yardstick,'' *World Development* 7 (June 1979): 567–80; M. D. Morris, *Measuring the Condition of the World's Poor: The Physical Quality of Life Index* (London: Frank Cass, 1979); V. Anderson, *Alternative Economic Indicators* (London: Routledge, 1991).

19. Anderson; J. M. Hartwick, ''Natural Resources, National Accounting and Economic Depreciation,'' *Journal of Public Economics* 43 (March 1990): 291–304.

20. J. Bonke, ''Distribution of Economic Resources—Implications of Including Household Production,'' *Review of Income and Wealth* 3 (September 1992): 281–93.

21. Nettle, *Linguistic Diversity.*

22. Coulmas (see n. 5 above), chaps. 1 and 2.

23. J. Davies, *Exchange* (Minneapolis: University of Minnesota Press, 1992), p. 3.

24. J. Drewnowski and W. Scott, *The Level-of-Living Index* (Geneva: United Nations Research Institute for Social Development, 1966); M. D. Morris; also see M. McGillivray, ''The Human Development Index—yet Another Redundant Composite Development Indicator,'' *World Development* 19 (October 1991): 1461–68, for a critique of this approach.

25. Anderson.

26. K. P. Gbesemete and U. G. Gerdtham, ''Determinants of Health-Care Expenditure in Africa—a Cross-Sectional Study,'' *World Development* 20 (February 1992): 303–8; K. P. Gbesemete and D. Jonsson, ''A Comparison of Empirical Models on Determinants of Infant Mortality—a Cross-National Study on Africa,'' *Health Policy* (January 1993) 24: 155–74.

27. McGillivray. Of course, there are instances of a discrepancy between the economic and social indicators, and these are of interest in their own right to those seeking ways to improve living standards in particular countries. See S. R. Holloway and K. Pandit, ''The Disparity between the Level of Economic Development and Human Welfare,'' *Professional Geographer* 44 (1992): 57–71.

28. F. de Braudel, *Civilisation and Capitalism, Fifteenth–Eighteenth Century,* vol. 3, *The Perspective of the World* (London: Fontana, 1985), pp. 588–618; E. L. Jones, *The European Miracle,* 2d ed. (Cambridge: Cambridge University Press, 1987); G. D. Snooks, ''Great Waves of Economic Change: The Indus-

trial Revolution in Historical Perspective, 1000 to 2000,'' in *Was the Industrial Revolution Necessary?* ed. G. D. Snooks (London, Routledge, 1994).

29. Coulmas.

30. M. S. Dryer, ''Large Linguistic Areas and Language Sampling,'' *Studies in Language* 13 (March 1989): 257–59; R. Mace and M. Pagel, ''The Comparative Method in Anthropology,'' *Current Anthropology* 35 (October 1994): 549–64.

31. R. R. Sokal and F. J. Rohlf, *Biometry: The Principles and Practice of Statistics in Biological Research,* 2d ed. (Oxford: W. H. Freeman, 1981).

32. Nettle, *Linguistic Diversity* (see n. 16 above).

33. Hall and Jones (see n. 1 above), p. 176; Nettle, *Linguistic Diversity.*

34. J. Sachs, ''Ethnolinguistic Fractionalization and Economic Performance: A Note,'' unpublished manuscript (Harvard Institute for Economic Development, Cambridge, Mass., 1997).

35. Coulmas (see n. 5 above).

36. K. Hale, M. Krauss, L. Watahomigie, A. Yamamato, C. Craig, L. Jeanne, and N. England, ''Endangered Languages,'' *Language* 68 (January 1992): 1–42.

37. Nettle, *Linguistic Diversity.*

38. Lian and Oneal (see n. 9 above), p.73.

39. J. Fishman, *Reversing Language Shift* (Clevedon: Multilingual Matters, 1992).