

Note on author

Hans Blumenfeld was born in Germany in 1892. He has practiced planning in many countries, including the U.S.S.R., the U.S.A., Austria, Germany, and Canada. He graduated in Architecture from the Polytechnical Institute of Darmstadt in 1921. Hans Blumenfeld was Chief of the Division of Planning Analysis, Philadelphia City Planning Commission, 1945-1952, and Assistant Director, Metropolitan Toronto Planning Board, 1955-1961. Since 1961, he has been on the faculty in urban and regional planning, University of Toronto. Hans Blumenfeld has doctorates from the University of Montreal, University of Waterloo, and the Technical University of Nova Scotia. He was made an Officer of the Order of Canada in 1978.

The Conceptual Framework of the Problem

For several centuries a trend toward concentration of activity and population in relatively few urban centers has been observed. This trend has been generally accelerating and spreading from the 'developed' to the 'developing' countries. For at least a century this centripetal trend has been supplemented by a centrifugal trend from urban centers to their 'umland'. The resulting new form of human settlement has been recognized as a 'Metropolitan Area' by the Census of the U.S.A., and under the same or another name, by many other countries. The Metropolitan Area is essentially defined as a commuter watershed, constituting a common labor and housing market. It has long been recognized that such a concentration leads to a substantial increase of activities and population well beyond its boundaries, up to a travel distance of about two hours from its center.

These activities are of two kinds, productive, primarily manufacturing, which draw on the services of the center; and recreational services to the population of the central area. John Friedmann, while expressly recognizing only the second function, has proposed the term 'Urban Field' for this large unit. I have called it a 'Metropolitan Region', consisting of a 'Fringe' surrounding a 'Core', constituted by a Metropolitan Area. The boundary between core and fringe is blurred and becoming more so, as work places move increasingly from the center toward the periphery of Metropolitan areas.

In no country have these 'Metropolitan Regions' been defined officially, nor their characteristics investigated systematically. While 'growth pole' and 'satellite town' theories and policies are widely accepted, few comparisons have been made between the growth rates of towns within or without Metropolitan orbits. A small study of the 17 towns in Ontario which passed the 20,000 population mark between 1941 and 1969 showed that the growth rates of 10 towns located within metropolitan orbits averaged more than twice those of the seven located outside such orbits.[1]

Metropolitan Regions are potentially very large: if two hours travel time is identified with 150 km, one such area could cover almost 70,000 km², over twice the size of Belgium! Indeed, in the most urbanized parts of the world, such as West Central Europe, the Northeast of the U.S.A., and most of Japan, there is hardly an area left outside such regions. If their inhabitants are defined as 'metropolitanites', there is for them no place to go (or to come from), except abroad. The question formulated by the title loses its meaning. The United Kingdom has established 'Metro Economic Labour Areas'. Although these by definition are less extensive than 'Urban Fields', they accounted in 1971 for all but 4.3% of the population and 4.0% of the employment of the British Isles.

[1] Hans Blumenfeld, *Metropolis -- and Beyond*. John Wiley & Sons, New York, 1980, p. 132.

In most parts of the world, however, including most of North America, extended areas are definitely "non-metropolitan", and have been defined as such by U.S. Census. A difficulty arises because the census definition of a Metropolitan Area includes numerous areas which are much smaller than those denoted in common parlance as "metropolis", generally thought of as units of at least half a million or a million population. On the other hand, an investigation limited to these large units encounters the difficulty that their number in most countries is so small that the potential weight of random deviations makes statistical analysis somewhat hazardous.

Renewed discussion of the problem has been touched off by the fact that the U.S. Census showed an actual decrease of the population of some of the largest Metropolitan Areas in the country since 1970. Prior to that time a reversal of growth had been observed in only two cases: Vienna and Berlin (both East and West), after they had lost their role as imperial capitals; both, in addition, are located in countries with decreasing populations. Other cities which have lost their role of national capital -- Istanbul, Leningrad Calcutta, Rio de Janeiro -- continue to grow. !

An added impetus was given to the discussion when U.S. census figures on internal migration showed a sizeable reversal of the long established flow from Non-Metropolitan to Metropolitan Counties. While from 1965 to 1970 the sum of all Metropolitan Counties gained 352 thousand persons from the Non-Metropolitan Counties, from 1970 to 1975 they lost 1,594 thousand to them. The trend continued with a loss of 396 thousand from 1975 to 1976.

This surprising phenomenon gave rise to various explanations, not necessarily mutually exclusive. A few observers saw it merely as a repetition of the return of unemployed to their home communities, which had been observed during the depression. This may be a contributing factor, but probably a minor one. Most scholars interpret it as a continuation of the historical centrifugal trend beyond the metropolitan boundaries established by the Census; others see a "clean break", a return to life in the countryside and the small town.

There can be no question that metropolitan life extends increasingly beyond the official boundaries. Residential "sprawl" has been amply documented. Perhaps even more significant is the fact that a rapidly growing percentage of the work places of the metropolitan population is located beyond these boundaries. Table 1 presents the relevant data for the five largest metropolitan areas of the Northeastern United States, all of which have lost population since 1970. It is evident that this loss is inconclusive, and that much larger areas must be analyzed before jumping to the conclusion -- which may or may not be valid -- that the diseconomies of city size now outweigh its long established economies. Even less founded is the hypothesis of a "return to the land". Farm population continues to decrease; in the U.S.A. four out of five "rural" dwellers are now classified as "non-farm".

In opposition to those who believe that the "overspill" resulting from the historical centrifugal trend provides a complete explanation, a number of

observers have emphasized the growth of counties located well beyond metropolitan overspill. These have been defined by two different measures: first, counties not adjacent to metropolitan areas, and second, counties with less than 3% of the labour force commuting to Metropolitan Areas. The former accounted for only 12.5%, and the latter for 13.1% of the population of the United States in 1974.

An interesting new twist was given to the discussion by the studies of Daniel R. Vining, Jr.[2] Vining is interested in the most spectacular form of centripetal movement, the trend toward concentration in one (more rarely two or more) primate cities. In order to encompass any conceivable overspill, he overbounds their area. This in fact shifts the investigation from a comparison between non-metropolitan and metropolitan regions, and between various size classes of the latter, to the relation between core and periphery, or the regional distribution of a nation's population. This is an even more complex problem, related to the former one in ways which may be contradictory as well as concurrent. Another peculiarity of Vining's approach is his emphasis on net internal migration as the most significant factor of population change. I have had the benefit of a wide exchange of views with Mr. Vining which, in fact, provided the stimulus for this paper.

Problems of the Data Base

All the relevant data for study of population change are derived from official statistics. While their authors never fail to point out the margin of error of these data, their precise numerical form makes it easy to forget that they cannot be more reliable than the individual answers which they summarize. If deviations of answers from facts are entirely random, they are irrelevant because of the "law of large numbers". Estimates of biased deviations are always speculative, but may be still worth considering.

The primary data in dealing with population change are periodic census counts, based generally on oral or written replies of the head or other member of the household. Overcounting of persons with two residences is probably eliminated with modern methods of data processing; a seasonal bias dependent on the date of the count may exist, but is probably not significant. However, undercounting may be serious. It may be assumed that persons distrustful of

[2] D.R. Vining, Jr., A. Strauss. A Demonstration That The Current Deconcentration of Population in the United States is a Clean Break with the Past. *Environment and Planning A*, 1977, Vol. 9, pp. 751-758; also: Daniel R. Vining, Jr., Robert L. Pallone, Chung Hsin Yang. *Population Dispersal from Core Regions: A Description and Tentative Explanation of the Patterns in 20 Countries. Working Description, and Tentative Explanation of the Patterns In 20 Countries. Working Paper No. 26, University of Pennsylvania, February 1980.*

public authority will try, often successfully, to avoid being enumerated. This certainly applies to illegal immigrants, but may include other groups hostile to 'the Establishment'. It is probable that these are concentrated in metropolitan areas, and increasing in number. A significant and growing undercount of metropolitan populations is a distinct possibility.

Population changes are the combined results of demography (births minus deaths) and of net migration. Probably the substitution of place of occurrence for place of residence which has long bedeviled vital statistics has now been practically eliminated in developed countries. Net migration is given as the difference between the change derived from vital statistics and that found by successive census counts, and is as reliable as these. Gross migration, however, is elusive. No data, nationally or locally, are available for out-migration. National data on in-migration are notoriously deficient because of substantial illegal immigration.

For movements between different areas of a given country the main sources are answers to census questions concerning a person's place of residence at a previous (usually 5 years) point in time. By processing these data, movements between areas can be defined, including movements from (but not to) places abroad.

On this basis a distinction has been made between 'Internal Migration' and 'Foreign Immigration'; Vining and most other authors treat them as clearly distinct and independent variables. This is questionable. First, some of the persons who lived abroad at the defined previous point in time, are not 'immigrants', but returning from temporary residence abroad. Second, illegal immigrants, and quite likely some legal ones also, will substitute a place within the country -- almost certainly a major city -- for their actual previous location abroad. Third, when does an 'immigrant' become an 'internal migrant'? According to the questionnaire classification, the moment he arrives in the country. In Canada almost all immigrants 'land' in one of the three largest metropolitan areas, Montreal, Toronto, or Vancouver. Most of them stay there for shorter or longer periods of acculturation, until they find jobs and permanent residence all over the country, approximating the general population distribution. A case in point is Toronto; from 1971 to 1976 there was a 'net internal migration' loss of about 20,000, but immigration of 200,000. In the preceding five-year period immigration had been even higher. Certainly far more than 20,000 of these moved to other places in Canada between 1971 and 1976. Should they be counted as 'internal migrants'?

Another point raising doubts about the reliability of figures on net internal migration derived as residuals from gross internal migration is the fact that the former usually represent a small fraction of the latter. In the City of Munich, Germany, e.g. a gross migration (both directions) of 217,000 resulted in a net migration of -546. It is evident that an error of less than 1% in the data for either gross direction could have reversed the sign of net migration.

Finally, the large size and irregular shape of the territorial units of

measurement -- counties in the U.S.A. -- is a potential source of error; e.g. a county with less than 3% commuting may well contain municipalities, from which 10% of the labor force commute to a metropolis.

For all these regions the following findings must be regarded as highly tentative.

Observed Changes in the U.S.A.

The changes in population between 1940 and 1977 of Metropolitan and Non-Metropolitan Counties are summarized in Table 2. In their interpretation it should be kept in mind that counties may shift from non-metropolitan status, while the opposite shift has not occurred. Somewhat surprisingly, the data do not indicate any decrease in the annual growth rates of metropolitan populations up to 1975; only the last two years show a definite slowing down, but not yet a reversal of growth.

A reversal can however be observed in the annual growth rate of non-metropolitan areas from -1.8% from 1970-1975 to 0.8 from 1976-1977. It may be noted that this rate is only nominally higher than that observed 1950-1960 (0.7%). More significant is the fact that in 1976-1977 the growth rate of non-metropolitan equalled that of metropolitan areas. Also, a definite slowing down of the growth rate already during the 1970-1975 period occurred in the largest SMSA's, those with populations over 1.5 million, together with a nominal slowing down in the smaller SMSA's and a tripling of the growth rate of the non-metropolitan counties (Tables 3 and 4).

It can be hypothesized that it is precisely the largest SMSA's which have overflowed their boundaries and that this overflow accounts for the increase of the non-metropolitan population. Some support of this hypothesis can be derived by a breakdown of the data by four major regions of the U.S.A. (Table 5). These show that only in the North-East, where SMSA's account for almost 60% of the population, has the share of the non-metropolitan population shown any increase between 1970 and 1975, from 14.2% to 14.3%. In the other three regions their share continued to drop; in the South, with only 22% in large metropolitan areas, the drop was precipitous, from 38.8% to 33.4%.

A valuable contribution to the analysis of the problem has been made by Peter A. Morrison and his associates,[3] by breaking down the non-metropolitan counties into those "adjacent" and "non-adjacent" to SMSA's. They have also

[3] McCarthy, Kevin F. and Morrison, Peter A. The Changing Demographic and Economic Structure of Non-Metropolitan Areas in the United States. Rand Corporation, Santa Monica, January 1979. Also: Peter A. Morrison, The Current Demographic Context...in: L.S. Bourne/J.W. Simmons, Systems of Cities, Oxford University Press, 1978, pp. 473-479.

divided the 2,469 non-metropolitan counties of the U.S.A. into 321 'urban', 865 'less urbanized', and 1,283 'rural' (Tables 6, 7, and 8).

A comparison between Tables 4 and 6 indicates the fragility of the data. A lowering of the threshold of 'large' from 1.5 to 1.0 million population and a one-year reduction of the period, from 1970-1975 to 1970-1974 results in the disappearance of the relative decrease of the 'large SMSA' population. In Table 6 growth rate is positively correlated with population size of SMSA's. However, the large SMSA's are the only one of the nine groups in which the 1970-1974 growth rate has dropped below that of the preceding decade. Growth has accelerated far more in the adjacent than in the non-adjacent counties, and in the rural than in the urban ones. The significant net result is an equalization of growth rates among the nine groups, the range being reduced by about 70%. By contrast, within SMSA's the difference between core and fringe areas has increased by almost 65%. The importance of the overflow as a source of the apparent reversal of metropolitan growth is strongly confirmed by data presented in the study by McCarthy and Morrison, which show an opposite reversal in the counties adjacent to SMSA's. The study divided the U.S. into 26 regions. While from 1960 to 1970 more than three quarters of these (23) showed a migration loss, including five with a total population loss, from 1970 to 1975, all but three showed migration gains.[4]

Of the three regions in which non-adjacent counties showed a net migration gain already in the 1960's, two, 'N-E Metro Belt' and Florida,[5] have a metropolitan structure which makes overflow beyond adjacent counties highly probable. In the N-E Metro Belt the migration gain in the non-adjacent counties accelerated to an annual rate of 1.7%. [6]

All data so far presented indicate continued strength of the centrifugal trend within metropolitan orbits, both within SMSA's and in the adjacent counties, defined as the 'Fringe' in Table 7. The table compares the actual changes from 1970 to 1974 with those which would have occurred if population distribution between the three groups of counties had remained stable. Of the 0.75% loss by metropolitan counties of share of the national population, 0.62% were absorbed by 'fringe' and only 0.13% by non-adjacent counties. In the 1970-1974 period 82.6% of the metropolitan loss appears to be due to 'overflow' and only 17.4% to 'reversal'. This is a very tentative conclusion; post-1974 data may show a different picture.

[4] Op. cit., p. 14.

[5] Op. cit., p. 17, fig. 4.

[6] Op. cit., p. 16.

Some Canadian Data

The Canadian Census identifies, in addition to 23 Metropolitan Areas, with populations over 100,000, also 88 smaller "Urban Areas". From 1971 to 1976 the median growth of the former was 6.80%, of the latter only 0.25%. Twelve of the 23 Metropolitan Areas, but only 27 of the 88 smaller urban areas, increased by more than 6.79%; only two of the larger areas lost population (only 0.4% in both cases), but 23 of the smaller ones showed decreases, in nine cases exceeding 5.0% (Table 8).

Within the universe of 23 Metropolitan Areas growth rates were not consistently correlated with size, either positively or negatively, but were clearly determined by specific local factors. The very small (2.2%) growth of the largest (in 1971) area, Montreal, is clearly due to adverse shifts in economic geography and an unfavourable industrial profile. The two other areas with populations over one million, Toronto and Vancouver, each grew by 7.7%, above the median rate. The highest growth rate occurred, not surprisingly, in the oil-boom area of Calgary. It was closely followed by Kitchener (14.0%) and Oshawa (12.3%), industrial towns within the metropolitan orbit of Toronto, at distances of 60 and 30 miles, respectively, from its centre. The other nine areas with growth rates above or at the median are all capitals, federal or provincial, reflecting the fact that during this period government was one of Canada's leading growth industries.

A comparison of the 1951-1976 growth of Canadian towns, urban areas, and metropolitan areas by five size groups shows a consistent positive correlation between growth rate and size, from 25.2% for those between 5,000 and 10,000, to 46.6% for those over 500,000. It appears that in Canada the centripetal trend to larger agglomerations has not been reversed, though it is certainly slowing down.

The opposite, smaller-scale, centrifugal trend within metropolitan orbits is certainly continuing vigorously. From 1971 to 1976 the three inner municipalities of the Municipality of Metropolitan Toronto lost 8.6% of their population, the three outer ones gained 10.4%, while the surrounding municipalities within the Toronto SMSA increased by 36.2%. There is little doubt that a sizeable overspill over the SMSA boundaries has occurred in this and other Canadian metropolitan areas. This overspill may account for most or all of the increase in the national share of the "rural" population from 24.0% in 1971 to 24.5% in 1976.

The Role of Migration

While overspill clearly accounts for most of the relative, and in some cases absolute population loss of Metropolitan Areas which has been observed so far, reversal toward a shift to non-metropolitan forms of settlement certainly is the more surprising and interesting phenomenon. As differences in birth and death rates between metropolitan and non-metropolitan areas have almost disappeared in developed countries, the shift is due to changes in net migration --

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which, as noted previously, is a generally small residual of much larger volumes of two-way gross migration. It is worth noting that the net movement of 396,000 persons from metropolitan to non-metropolitan areas of the U.S.A. represents only 5.7% of the gross two-way movement between these two types of areas.

Caution in the use of Census data on internal migration is also advisable because of incomplete reporting. Out of a population of 183.5 million persons over 5 years of age enumerated in the United States in 1975, 19.0 million lived in non-metropolitan areas at both periods. A group more than half that numerous, 10.4 million, are listed as "no report on mobility", in addition to 3.6 million "moved from abroad".[7]

It is well known that migration is highly selective. In the period 1970-1975 no less than 72% of those aged 25-29 and 60% of those aged 30-34, but only 20% of those over 65 changed residence.[8] A comparison of the population by age group anticipated in Metropolitan Toronto by moving forward the age cohorts of 1971 to 1976 with the age groups enumerated in 1976 indicated a strong net migration gain of the same young adult groups, and a net loss of all others.

While the influx of young adults testifies to the continuing attraction of the metropolis as a labor market, the movement in the opposite direction, from metropolitan to non-metropolitan counties, is strongly concentrated among persons relying on sources of income other than labor. Of every 100 males aged 16 years or over that had made this move between 1970 and 1975, no less than 35 were not in the Labor Force.[9] It may well be that the growth of genuinely non-metropolitan areas is due mainly, maybe exclusively, to an increase in the number of persons permanently or temporarily not working. Both the first ("retirement") and the second ("recreation") group induce of course also a growth in the number of persons working to service them.

This hypothesis receives some support from the aforementioned study by McCarthy and Morrison. If I understand the study correctly, it identified 753 non-metropolitan counties which showed positive net migration gains from 1970 to 1974, by "concentration" of one or more functions; in 98 cases there was more than one concentration, resulting in a universe of 671 cases in 26 selected states of the U.S.A. Out of these more than a third (244) were identified as "retirement", followed by 135 for "recreation"; government accounted for 125, energy for 124, and manufacturing only for 43 cases. If my understanding of the study is correct, it did not identify concentration in

[7] U.S. Bureau of the Census, Series P-20, No. 285, October 1975. Mobility of the Population of the United States, March 1970-March 1975, Table 1.

[8] Ibid, Figure 1.

[9] Ibid, Table 10.

counties with population loss; their number may well be higher in the case of manufacturing, and possibly also in the cases of energy and government.

The changes in the rate of change 1970-1974 versus 1960-1970 were least pronounced for "urban", more pronounced for "less urbanized" and strongest for "rural" counties, both for net population (0.33, 1.16, 1.85) and for net migration (0.75, 1.60, 2.31).[10] The most significant changes, those of net migration in rural counties, are summarized in Table 10. By far the greatest change, 3.46 annual net migration, was found in recreation counties, which also were the only category which had experienced a net migration gain in the 1960's. They are followed by "retirement" with 2.54 and lower values for the three other, work-based categories.

Interaction Between Metropolitan-Non-Metropolitan and National Core-Periphery Population Shifts

As already noted, this important area has been opened up by Vining. His studies attempt to deal with both at once by applying the general concept of "concentration". By an ingenious application of the "Hoover Index of Concentration" to areas of different sizes in the United States he shows, first, that the results vary strongly with size of area and, second, that for the first time in the history of the United States the Index showed increased deconcentration for all size units. He concludes that the secular trend toward concentration has been reversed since 1970.

He then proceeded to an investigation of the same problem in 20 other countries and summarizes his conclusions as follows: "... suggests a law of spatial development whereby deconcentration becomes possible only in the mature phase of a country's industrialization." It is true, as Vining states, that in the "developed" countries the trend to concentration in major urban areas in "exhausted", while in "developing" ones it is still continuing apace.

As noted earlier, Vining's studies provide information primarily on population shifts between core and peripheral regions of nations rather than on those between metropolitan and non-metropolitan regions (however defined). However, shifts between national regions cannot be understood in terms only of the two "classical" trends: national-scale centripetal towards major agglomerations, and smaller-scale centrifugal towards the expanding periphery of these agglomerations. At least five other general trends can be identified:

[10] Op. cit., p. 37, Table 5.

1. Older-to-newer regions.
2. Unpleasant-to-pleasant climate and scenery.
3. Declining-to-growth industries.
4. Depression-to-boom (the business cycle).
5. Catastrophe-affected to safe.

The meaning of 'old' and 'new' is different for long-settled countries and for those of relatively recent white settlement, such as the U.S.A., the U.S.S.R., Canada, or Australia. For these 'old' areas are, by definition, the core areas. In long-settled countries the 'old' regions are those first industrialized, usually comprising both the region of the capital and of location of the 'old' industries, coal-steel and/or textiles.

The interactions of shifts between geographic regions of a country and shifts between metropolitan and non-metropolitan regions are multiple and complex.

In developing countries, a substantial part of the population, frequently the majority, are employed in agriculture. Only in the core region is a substantial part of the population urban. As urbanization proceeds, even if it proceeds at the same or faster pace in peripheral regions, the share of the core region is bound to increase. It is therefore erroneous to conclude from this that the metropolitan share or urban population must have increased. A separate investigation of this share is required. In the case of the Soviet Union and other East European countries such an investigation shows an actual decrease of this share absorbed by the largest cities,[11] contrary to Vining's conclusions.

If and when development in one or more peripheral regions proceeds faster than it does in the rest of the country, generally -- though with significant variations -- the growth rate of both rural and urban (not necessarily metropolitan) population will be above the national average. Frequently one or more urban nodes in such a growing region will transcend the metropolitan threshold, and further growth of such a region may indicate strength, rather than weakness of metropolitan concentration.

Vining's studies, which take into account only the inverse, less ambiguous effect of growth rate of a metropolis being reflected in the growth rate of their region, are therefore inconclusive as to the problem which has been brought to the fore by recent developments in the United States population

[11] Hans Blumenfeld, *Metropolis -- and Beyond*, John Wiley & Sons, New York, 1980, pp. 181-187.

shifts between metropolitan and non-metropolitan forms of settlement. However, their significance as pioneering efforts in the field of international comparisons warrants further discussion of at least some of his cases.

Vining's 'classical' first two cases are those of Japan and Sweden. In both countries he compares the population growth rates of the three largest metropolitan areas, first defined more narrowly, roughly corresponding to the U.S. concept of 'Metropolitan Areas' and, second, defined much more broadly, corresponding to my concept of 'Metropolitan Regions'. However, by regrouping his data (Tables 11 and 12), I arrive at different conclusions.

In Japan the share of the three 'Metropolitan Areas' continued at the same annual rate of 0.3% from 1970 to 1975 as during the preceding 50 years. In the 'metropolitan fringe', here 'the rest of Tokaido', the modest annual decrease of -0.1%, observed 1920 to 1970, has stopped after 1970. I interpret this to mean that the centripetal 'country-to-metropolis' movement is now being balanced by the centrifugal 'overflow' from the three 'Metropolitan Areas'. The decrease in the share of the 'rest of the country' has accelerated from an annual rate of -0.2% during the half-century prior to 1970 to -0.3% after that date.

In Sweden the centrifugal movement has been stronger, resulting in a slowing of the annual share increase of the three metropolitan areas from 0.167 during the period 1900-1960 to 0.147 from 1960 to 1975. Correspondingly the annual change in the share of the fringe, or 'umland', has reversed from -0.090 to 0.053. In the rest of Sweden it has slowed down from -0.770 to -0.200. As the second period presented for Sweden includes also the 1960's, these data do not preclude a reversal after 1970. However, this appears highly unlikely in the light of data for net total (internal plus external) migration to the three metropolitan areas, also given by Vining, which I have summarized as follows:[12]

1973	-9,940
1974	2,337
1975	6,542
1976	11,314
1977	16,392
1978	10,502

Vining is of course correct in showing that internal net migration alone has been negative for the three metropolitan areas in recent years. However, for reasons presented earlier, I consider this to be less relevant than total population change.

[12] Daniel R. Vining, Jr., Robert L. Pallone, Chung Hsin Yang, Population Dispersal from Core Regions. Working papers in Regional Science and Transportation, University of Pennsylvania, No. 26, p. 12, Table 2.

Of the other countries investigated by Vining, I will deal only with the two Germanies. Vining notes that the strong population shift towards the provinces ("Laender") located in the watershed of the Rhine, which was characteristic of Germany since the middle of the 19th century, has stopped in the post-war Federal Republic. He defines this very large area, which comprises five of the ten provinces, as the "core" and interprets the change as a "long-term secular decline in net immigration from peripheral regions". I believe that a more adequate explanation of recent changes is provided by the shift from North to South (Table 13).

Certainly it cannot be interpreted as a shift from metropolitan to non-metropolitan areas, because five of ten areas identified by German geographers as agglomerations ("Ballungen") are located in the South and have considerably increased their national share in recent years. In the North the growth of three of its four metropolitan areas has been slower because of their industrial profile: in the Ruhr-Rhine region coal-steel, and in Hamburg and Bremen oversea trade, which has largely shifted to Rotterdam and to the Baltic ports of East Germany and Poland.

In East Germany Vining recognizes the decreasing share of its industrial heartland, formed by its four southeastern provinces, but assigns it to the group of countries in which "net migration into the core regions remains high and positive". This conclusion is based on the assumption that the growth of the two eastern provinces (Frankfurt and Cottbus) contiguous to East Berlin is due to overflow from the capital. This assumption is in error. There is no overflow from East Berlin, as was confirmed orally by East German planners in 1980. The growth of these two provinces is due entirely to the growth of five new (or enlarged) towns on the Oder river, which from 1969 to 1976 increased their population by 53,100, or 21.8%, while the balance of the provinces, including the umland of Berlin, lost 36,900, or 2.8%. The share of the population of Berlin itself, which had dropped from its prewar level of 9.5% to 6.3% in the 1960's, has increased to 6.6% in 1976, as a result of a reversal of government policy. This reversal applies however only to the capital, apparently for reasons of prestige. The general shift from larger to smaller towns, continues: from 1967 to 1975 the five cities with populations over 200,000 (in 1969) increased only by 0.7%, while the sixteen with populations between 50,000 and 200,000 increased by 7.9%. The conclusion of my earlier study appears still to be valid: the countries with centrally planned economies have achieved some "deconcentration", with population shifts both from core to periphery and from larger to smaller urban units.

Perhaps the most interesting result that can be derived from Vining's data on the share of national population concentrated in the core area is its almost miraculous stability (Table 14). In conjunction with the previously noted stability of the shares of the national population living within and outside "Metropolitan Regions" achieved in the United States in the 1970's this points to the tentative conclusion that population distribution, in these terms, in the most developed market (including "mixed") economy countries has reached maturity. It is significant that this term is being used not only by Vining, but also by another astute observer of the phenomena under study,

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Charles L. Leven.[13]

Three Possible Interpretations of Recent Stability

It should be noted that the observed stability is, in fact, compatible with the three previously mentioned different interpretations of net migration from metropolitan to non-metropolitan counties in the United States.

It is compatible with the hypothesis of a temporary interruption of the trend to metropolitan concentration by the economic stagnation of the 1970's, presumed to be part of a business cycle.

It is compatible with the hypothesis of "reversal". In this case it would represent the moment at which the pendulum is at rest between swings toward concentration and deconcentration, respectively.

Finally, it is obviously compatible with the hypothesis of achievement of "stability" or a "stable state".

Only the analysis of future events will enable us to determine which hypothesis is the true one.

The Significance of the Concept of 'Metropolitan Region'

It must be emphasized that the stability of the share of the Metropolitan Regions does not apply to their cores, the Metropolitan Areas. It is maintained because their loss in terms of share of national population is compensated by the gain of the "Fringe" of the Metropolitan Region.

For the United States this conclusion is strongly supported by data from Morrison's studies. Morrison has broken down the non-metropolitan counties by percentage of the labor force commuting to S.M.S.A.'s into four groups: over 20%, 10%-19%, 3%-9%, and less than 3%. Their annual rates of growth 1970-1974 averaged 2.0, 1.4, 1.3, and 0.6 percent respectively, compared to 0.8% for the S.M.S.A.'s.

I tentatively identify the counties with less than 3% commuters which accounted for only 13.1% of the U.S. population, as genuinely non-metropolitan, and those with higher percentages of commuters accounting for 13.5%, as the Fringe. My rationale -- not tested, but plausible -- for rating counties with a commuting share of the labor force as low as 3% as part of a Metropolitan Region is as follows.

[13] Charles L. Leven. The Mature Metropolis. Lexington Books, O.C. North & Co., Lexington, Mass. 1978.

By definition, the Fringe is the area beyond normal commuting range, which attracts both residents seeking recreational services and establishments seeking business services within the range of easy accessibility of the metropolis. Commuting requires about 240 round trips annually. Both recreational services, e.g. summer cottages, and establishments needing intermittent metropolitan services, e.g. factories, may need no more than 24 round trips annually, an average of two per month to induce them to choose a location within the metropolitan orbit rather than beyond it. It can therefore be hypothesized that their number is likely to be ten times that of the commuters who make the same trip ten times as frequently, or 30% for 3% commuting. Together with the population serving them, they will account for the majority of the population of such a county.

As Charles L. Leven notes: "It is not so much that metropolitan life is being forsaken for a return to a small town or rural existence, but rather that metropolis is actually moving to the countryside." [14] It is, however, equally valid to note that these moves do reflect a preference for a location other than a metropolis.

The debate whether these moves should be interpreted as a continuation of the centrifugal trend toward metropolitan expansion or a reversal of the centripetal trend of metropolitan concentration is really a quarrel about semantics. They are both. We are dealing with a dialectical process which can be adequately explained only by the concept of "reversal (Umschlagen) into its opposite", so dear to Hegel and Marx. The continuing urban, or metropolitan expansion into the countryside reaches the point where it becomes "ruralization" of urban population and activities. ("Rus" includes many small and some not so small towns.) The age-old distinction between city and country is beginning to lose its meaning.

Tentative Causal Explanations

In the social sciences incontrovertible identification of cause-effect relations is never possible. In trying to explain the recent population movements away from metropolitan areas, the small size of the universe, and the small number of years during which this phenomenon has been observed, make such attempts particularly speculative.

There is fairly unanimous consent that the reason for metropolitan concentration is primarily the economic one of greater productivity of labor, due to agglomeration economies which are reflected as "external economies of scale" for the individual enterprise. The preference of enterprises for metropolitan location sets in motion the well-known cycle -- vicious or virtuous -- of enterprises attracting workers and supplementary enterprises, and

[14] Op. cit., p. 7.

the presence of these two factors attracting more enterprises. The concentration of people and of purchasing power also greatly enlarges the choice of services and contacts of all kinds. In addition to its primary attraction as a place for 'making a living' the metropolis also has attractions as a place for living.

It has been argued that the observed 'reversal' is due to the 'diseconomies of scale' having outgrown the 'economies of scale'. This is questionable. The strictly economic 'diseconomies' affecting enterprises are time losses in short-distance transportation due to street congestion and higher local taxes due to higher cost of services. There is no evidence to show that either of these has increased more in metropolitan areas than in smaller agglomerations; or even has increased at all, though it may frequently be perceived as having done so.

It is more likely that the 'external economies of scale' have decreased, though the changes are not all one-way. Access to the most effective forms of long-distance transportation for both persons (frequent and direct air and rail service) and goods (big and specialized ships, unit trains, pipelines) is increasingly concentrated in the largest metropolitan areas. However, improvements in transportation and, in particular, in communication have made many business services as accessible to small communities as to the metropolis. This is particularly true for those located in the 'fringe', which continue to have substantial advantages over more distant ones in access to services requiring personal presence as well as to highly specialized goods.

However, it is likely that the recent acceleration of the movement away from the metropolis and, in particular from its core, to more dispersed forms of settlement, both within and beyond the fringe, is due primarily to a basic shift in attitude, encouraged by prosperity, from seeking a place 'to make a living' to choosing a place for 'living'. This is reflected in the greatly increased emphasis on "environment" and on the "quality of life". Most of the goods and services previously found only in the metropolis, are now to be found almost everywhere in developed countries; those that are not, in particular personal contact, are becoming more accessible by greater ease of travel. The relative advantages of the metropolis as a place for living have been greatly reduced.

On the other hand, its relative disadvantages are weighted far more heavily and perceived as growing inexorably. They are numerous: congestion, pollution of air and water, noise, anomie, and, in particular in the United States, insecurity of person and property and unsatisfactory schools. The rural and small-town environment is attractive not only, as it has always been, because it offers access to the world of nature, more space and privacy, but also as providing stronger community ties.

The growing importance of environmental amenity is confirmed not only by the previously mentioned dominant role of retirement and recreation in the growth of non-metropolitan counties, and the correlation of their rates of growth with "rurality", but also by the fact that out of the 14 areas which

showed the highest growth among the S.M.S.A.'s of the U.S.A. since 1970, nine are located in Florida.

It is also important to keep in mind that any net gains of non-metropolitan areas are residuals of a much larger and highly selective two-way movement. Despite the rejection of the "consumer society" by a significant minority, the majority of young adults still is attracted by the economic opportunities of the Metropolis. As Charles L. Leven notes, on the basis of migrations observed in the U.S.A. from 1970 to 1975 the chances of a person moving from a non-metropolitan county to a metropolitan county were 1.7 times greater than the reverse.[15]

What May The Future Hold?

In very general terms, probably "more of the same".

The contrast in the rate of metropolitan growth between "developing" and "developed" countries is bound to increase simply because the former have a much higher rate of growth and a huge and growing "surplus" of agricultural population. By contrast, the population of the developed nations is approaching stability or even beginning to decrease, and the total non-metropolitan population is small in relation to the majority already concentrated in metropolitan regions. There is little left "to come from", except foreign countries.

In the developing countries metropolitan concentration is reinforced because the infrastructure and services making a place attractive both for economic activity and as a living environment are to be found only in primate cities. This increases their advantage in productivity, because the small number of educated and qualified people strongly resist living in "backward" areas.

I am also hypothesizing that these same factors generally will limit metropolitan expansion to areas much smaller than the metropolitan regions of developed countries. An exception is China which has implemented a policy of locating industry in "new towns" at considerable distances from the center. This has however led to time- and energy-consuming commuting from the central cities, the volume of which, in places like Peking and Shanghai, far exceeds that of inbound commuting. It remains to be seen if, with the present emphasis on the "four modernizations", this policy will be fully maintained.

[15] Op. cit, pp. 29-30.

In the Soviet Union, after exhaustive discussions, the policy of limiting the growth of big cities has been somewhat relaxed. Soviet policy now favors small and medium-sized cities within "agglomerations", or, in my terms, metropolitan regions. East German planners consider their present population distribution as generally satisfactory. Moderate preference is, as before, given to development of the less industrialized northern and eastern provinces, and of some provincial capitals, to which more recently Berlin has been added. In addition, there is a strong effort to contain the spatial expansion of all settlements, large and small, in the interest of preservation of agricultural land.

In the developed market economy countries the main shifts to be expected are, first, those between regions. These will be determined in part by the predominance of new industries, but primarily by the increasing importance given to climatic and scenic amenities. Second, and even more important, will be the rate, location, and form of the outward shift within the metropolitan regions.

In the "old" and relatively small countries of Europe and Japan, and also in the equally densely populated and highly urbanized northeastern part of the United States these are the only questions. In the large "new" countries, including the U.S.A. as a whole, most of the areas, though only a relatively small part of the population, are certainly non-metropolitan and the question of their development is highly relevant.

Growth in these areas, and to a considerable extent also in the "fringe", is likely to be increasingly selective in terms of environmental amenities. This means that the majority of municipalities in non-metropolitan regions, and many in the fringe, are more likely to lose than to gain population. Planning theory so far has always been dealing with growth; we are ill-prepared to deal with conditions of decreasing population. Such decrease will increasingly occur not only in scattered small communities, but in a rapidly extending area of all core cities. Here the task is to provide a higher quality of urban environment for a smaller quantity of people.

The toughest problem however will be posed by increasing scatteration of "urban" activities and population. The danger is twofold. First, exclusive reliance on and greatly increased use of motor vehicles for all movements, of goods as well as of persons. Second, loss of agricultural production, both by direct occupancy of land and by disruption of farming by other uses.

The obvious remedy is channeling of development into relatively compact clusters. Continuing and increasing conflicts are predictable between such attempts and the apparently insatiable desire for more space, supported by a strongly rooted belief in the right of the individual to freely own and use land.

Many observers believe that the increasing price of oil will force a reversal of this trend. I consider this unlikely for two reasons. First, the wellhead price of oil is now well above the cost of producing an equivalent

amount of coal in the United States; it is therefore more likely to decrease than to increase, in real terms, in the future. Second, the traditional American cars are so fantastically inefficient that fuel consumption can easily be reduced by two-thirds by a switch to smaller lighter cars. This argument has been countered by the statement that "smaller, lighter cars...do not lend themselves to one-way work trips of thirty and more miles because they are uncomfortable." [16] To this writer, who has travelled all over Canada from coast to coast in a VW Beetle, this statement is not convincing. Nor is the same authors' expectation that multi-nucleation will induce people to work in the nearest nucleus confirmed by experience.

Desirable Future Research

As noted earlier, the data published by the U.S. Census on metropolitan and non-metropolitan counties do not provide an adequate basis to evaluate changes in metropolitan concentration for two reasons. First, the definition of "metropolitan" is much broader than that normally and meaningfully associated with the term "metropolis"; and, second, the country may contain areas with radically different characteristics.

I suggest a special study of the Metropolitan areas in the United States with a population over 1 million and of their surrounding regions up to a distance of 150 km from the metropolitan center. In Canada, because of the paucity of areas of this population size, half a million is a more suitable lower limit. A supplementary study of U.S. areas with populations between 500,000 and 1,000,000 would, of course, also be welcome.

All smaller metropolitan areas, whether outside of or within metropolitan regions, would have to be treated as non-metropolitan in dealing with all movements, commuting as well as migration. This should, of course, not preclude additional studies dealing with them. In many cases neighboring metropolitan regions will overlap. The boundary between two such neighbors can easily be determined by the preponderance of commuting to one or the other. Within the metropolitan regions I recommend collection of data by Census Tracts or, where these are not available, by municipalities, and their grouping by concentric circles around the metropolitan center, as well as by location in the fringe and its S.M.S.A., respectively. With the aid of available computers, this is not excessively laborious.

As for the population shifts and migrations affecting the distribution of the national population by major regions, only a detailed investigation of all relevant factors can provide valid answers. I completely agree with the

[16] Alex Anas and Leon N. Moses. Transportation and Land Use in the Mature Metropolis; in Charles L. Leven, op. cit., p. 164.

statement made by Daniel R. Vining Jr. in a letter to me of 10 October 1978 'that a satisfactory theory of the phenomenon of deconcentration will be more complex, richer, and more interesting than monocausal explanations'.

TABLE 1

Percentage distribution by location of place of work
of workers resident in five S.M.A.'s, U.S.A., 1960 & 1970

S.M.A.	Central City		other S.M.A.		outside S.M.A.	
	1960	1970	1960	1970	1960	1970
New York	79.2	71.0	18.7	24.4	2.1	4.6
Chicago	68.1	51.9	30.3	46.0	1.6	2.1
Philadelphia	55.6	45.8	41.0	48.5	3.4	5.7
Detroit	55.9	37.5	42.3	60.0	1.8	2.5
Boston	42.8	36.0	53.6	59.0	3.6	5.0
unweighted average	60.3	48.5	37.2	47.6	2.5	4.0

Source: Alex Anas and Leon N. Moses, *Transportation and Land use in the Mature Metropolis*; in: Charles L. Levin, *The Mature Metropolis*, Lexington Books, 1978, p. 158, Table 8-1.

TABLE 2

Metropolitan and Non-Metropolitan Population,
U.S.A., 1940 to 1977

Year	percent of total	Metropolitan		Non-Metropolitan	
		1000	av. annual change (%)	1000	av. annual change (%)
1940	52.8	69,535	--	62,135	--
1950	56.0	84,854	2.2	62,135	0.0
1960	62.9	112,886	2.8	66,438	0.7
1970	68.6	139,419	2.2	63,793	-0.4
1975	72.7	155,021	2.2	58,153	-1.8
1976	73.0	156,754	1.1	58,114	-0.1
1977	73.0	157,968	0.8	58,570	0.8

Note: Average annual growth is calculated as equal fraction of period.

Source: U.S.A., S.M.S.A. Population (Statistical Abstract 1979, No. 14).

TABLE 3
Percentage Distribution of Population of SMSA's,
U.S.A. 1970 & 1977

Size group (1000)	1970		1977		percent change 1970 to 1977
	1000	percent	1000	percent	
over 3,000	39.3	26.3	38.8	24.6	-1.1
1,000-3,000	45.8	30.6	49.3	31.2	7.5
500-1,000	23.8	15.9	25.3	16.0	8.4
250- 500	22.9	15.3	25.0	15.9	9.1
100- 250	15.8	10.6	17.4	11.0	10.2
under 100	2.0	1.3	2.1	1.3	5.9
All groups	149.6	100.0	158.0	100.0	5.6

Source: U.S.A., SMSA population (Statistical Abstract 1979, No. 15).

TABLE 4
Population of the U.S.A.,
by three size groups of settlement units,
1960, 1970 and 1975

Unit	1960	1970	1975	percent change		
				1960-70	1970-75	1960-75
SMSA						
over 1.5 m	69,262	81,472	82,899	17.6	1.7	19.7
under 1.5 m	58,676	68,355	73,198	16.5	7.1	19.7
non-SMSA	51,373	53,478	56,954	4.3	6.6	10.9
U.S.A.	179,311	203,305	213,051	100.0	100.0	100.0

Source: U.S. Census, Estimates of the population of counties and metropolitan areas, July 1, 1974 and 1975.

TABLE 5

Population of SMSA's with population over 1.5 million
and of non-SMSA counties
as percentages of four regions, U.S.A., 1960, 1970, 1975

Region	SMSA's over 1.5 million			Non-SMSA		
	1960	1970	1975	1960	1970	1975
Northeast	58.9	59.0	58.0	14.7	14.2	14.3
North-Central	38.8	40.0	39.4	33.3	31.3	30.8
South	18.4	22.0	22.1	41.2	38.8	33.4
West	45.2	46.7	44.2	23.9	21.2	20.0

Source: U.S. Census Estimates of the population of counties
and metropolitan areas, July 1, 1974 and 1975.

TABLE 6

Non-Metropolitan Counties in 26 States of the U.S.A. which
showed growth from 1970 to 1974;
Annual Net Migration 1960-1970 and 1970-1974,
for three groups of counties

Group of Counties	1960-1970	1970-1974	Change from
			(1960-1970)-(1970-1974)
Urbanized	- .23	.52	.75
Less urbanized	- .77	.83	1.60
Rural	-1.00	1.30	2.31

Source: McCarthy, Kevin F. and Morrison, Peter A., The
Changing Demographic and Economic Structure of Non-
Metropolitan Areas and in the United States. Rand Corp.,
Santa Monica, January 1979, p. 34-37.

TABLE 7
 Net shift of population from SMSA's to
 "fringe" and "other" counties, U.S.A., 1970 to 1974

County	population (million)		change, 1970-1974		shift from national average	
	1970	1974	million	%	% of 1970	million
SMSA	149.8	154.9	5.1	3.5	-0.5	-0.75
Fringe	26.8	28.5	1.7	6.3	2.3	0.62
Other	26.7	27.9	1.2	4.5	.5	0.13
USA	203.3	211.3	8.0	4.0	0.0	0.00

Source: Peter A. Morrison, *The Current Demographic Context...*,
 in: L.S. Bourne/J.W. Simmons, *Systems of Cities*, Oxford
 University Press, 1978, p. 477.

TABLE 8
 Average annual net migration, percent, 1960-1970 and 1970-1974,
 U.S.A., by type of county

Type of County	annual percent change	
	1960-1970	1970-1974
Metropolitan		
over 1 million	1.46	1.03
250,000-999,999	.47	.96
50,000-249,999	.17	.72
Adjacent to Metropolitan		
urbanized	.13	.66
less urbanized	- .56	.73
rural	- .82	1.18
Non-adjacent to Metropolitan		
urbanized	- .45	.16
less urbanized	-1.02	.40
rural	-1.37	.64
Range	2.83	.87
Within Metropolitan Counties		
Core	.30	- .46
Fringe	1.89	2.15
Range	1.59	2.61

Source: McCarthy, Kevin F. and Morrison, Peter A., *The Changing Demographic and Economic Structure of Non-Metropolitan Areas and in the United States*. Rand Corp., Santa Monica, January 1979, p. 23, Table 1.

TABLE 9

Population change of urban areas
with population over and under 100,000, respectively,
grouped by rate of change, Canada, 1971-1976

Population of area, 1976	Percent change 1971-1976									
	Decrease		0.0-4.0		4.01-7.0		over 7.0		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
over 100,000	2	8.7	3	13.0	7	30.5	11	47.8	23	100.0
under 100,000	23	26.2	23	26.2	15	17.0	27	30.6	88	100.0
	<u>Median percentage change</u>									
over 100,000	6.80									
under 100,000	.25									

Source: Census of Canada, 1976, Population, Metropolitan Areas, Urban Areas.

TABLE 10

Annual Net Migration Rate, Rural Counties Only
by Predominant Function

Function	1960-1970	1970-1974	Change from (1960-1970)-(1970-1974)
Recreation	.54	4.00	3.46
Retirement	-.24	2.30	2.54
Energy	-1.48	.48	1.96
Government	-.23	1.55	1.78
Manufacturing	-.87	.88	1.75
All	-1.00	1.30	2.31

Source: McCarthy, Kevin F. and Morrison, Peter A., The Changing Demographic and Economic Structure of Non-Metropolitan Areas and in the United States. Rand Corp., Santa Monica, January 1979, p. 37, Table 5.

TABLE 11

Percentage distribution of population of Japan
by three major metropolitan regions,
rest of central (Tokaido) region, and rest of Japan,
1920, 1970 and 1975

Region	Percent of pop'n			Annual percent change	
	1920	1970	1975	1920-1970	1970-1975
Tokyo, Nagoya, Osaka	29.6	44.6	46.1	0.3	0.3
rest of Tokaido	19.5	14.5	14.5	-0.1	0.0
rest of Japan	50.9	40.9	39.4	-0.2	-0.3
Japan	100.0	100.0	100.0	0.0	0.0

Source: Daniel R. Vining, Jr., and Thomas Kontuly. Population dispersal from major metropolitan regions: an international comparison. RSRI Discussion paper series, No. 100, September 1977, p. 7, Table 1.1.

TABLE 12

Percentage distribution of population of Sweden,
by three major metropolitan areas,
their umlands, and rest of Sweden,
1900, 1960 and 1975

Region	Percent of pop'n			Annual percent change	
	1900	1960	1975	1900-1960	1960-1975
Stockholm, Goteborg, Malmo	23.8	33.7	35.9	0.167	0.147
Their umlands	37.8	32.5	33.3	-0.090	0.053
Centers with umlands	61.6	66.2	69.2	0.770	0.200
rest of Sweden	38.4	33.8	30.8	-0.770	-0.200
Sweden	100.0	100.0	100.0	0.0	0.0

Source: Daniel R. Vining, Jr., and Thomas Kontuly. Population dispersal from major metropolitan regions: an international comparison. RSRI Discussion paper series, No. 100, September 1977, p. 7, Table 2.1.

TABLE 13

Percentage of population
in northern, middle, and southern provinces
of German Federal Republic, 1960 and 1975

Region	Percentage of population	
	1960	1975
North	51.1	49.3
Middle	17.3	17.3
South	31.8	33.5
F.R.G.	100.2	100.1

North: Nordrhein-Westfalen, Niedersachsen, Schleswig-Holstein, Hamburg, Bremen. Middle: Hessen, Rheinland-Pfalz, Saar. South: Bayern, Baden-Wurttemberg.

Source: Daniel R. Vining, Jr., and Thomas Kontuly. Population dispersal from major metropolitan regions: an international comparison. RSRI Discussion paper series, No. 100, September 1977, p. 7, Table 9.1.

TABLE 14

Range of change
of share of national population concentrated in core areas,
five European nations, various recent periods

Country	Region	Length of Period	Range
		years	percent
Sweden	Stockholm, Goteborg, Malmo	4	0.1
Italy	Piedmonte, Lombardia, Ligure Toscana, Lazio	5	0.1
Norway	Ostlandet	5	0.3
Germany	Nordrhein-Westfalen	14	0.4
France	Paris Region	14	0.3

Source: Daniel R. Vining, Jr., and Thomas Kontuly. Population dispersal from major metropolitan regions: an international comparison. International Regional Science Review, Vol. 3, No. 1, 1978, pp. 56, 57, 58, 62. Same authors and title, RSRI Discussion Paper Series, No. 100, 1977, p. 45.

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