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THE RELATIONSHIP OF GROSS MIGRATION TO NET MIGRATION: A SHORT RUN, LONG RUN DISTINCTION

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Three major hypotheses have been employed to predict how gross out-migration and gross in-migration for different regions will respond as the economic incentives for net migration change in those regions. Hoover [4] has labeled these three alternatives the standard hypothesis, the Lowry hypothesis, and the Beale hypothesis. The major differences in the three hypotheses lie in their conclusions regarding the expected marginal response of gross out-migration to changing economic incentives to move.

The primary contention of this paper is that none of the above hypotheses offers a completely satisfactory characterization of the responsiveness of out-migration to economic forces because each hypothesis fails to make a clear distinction between short run and long run responsiveness. Most empirical migration studies, including the Lowry and Beale studies, have been restricted to the use of cross section census migration data, and, since these cross section data focus on long run relationships, there has been a neglect of short run relationships. To overcome some of the deficiencies of census data, this study utilizes an alternative data source[1] which combines both cross section and time series elements. This new data source permits a demonstration of the importance of the distinction between short run and long run migration relationships.

The plan of the study is as follows: a review of the Lowry and Beale hypotheses; a discussion of the importance of the distinction between the long run and short run relationship of gross migration to economic forces; a statement of an alternative to the Lowry and Beale hypotheses; a discussion of the data to be used in the empirical tests; presentation of the results of the empirical tests; and a consideration of some possible conclusions and policy implications.

The Lowry and Beale Hypotheses

Although the standard economic theory of migration focuses on net migration

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[1]Unpublished data compiled from the 1 percent Social Security Sample File by David Hirschberg, Bureau of Economic Analysis, U. S. Department of Commerce.

the "common sense" extension of the standard theory to a situation in which regions experience both gross in- and gross out-migration would lead one to suppose that those regions experiencing growth and net in-migration should be able both to attract more in-migrants and keep more of their current residents from leaving than would be the case for those regions experiencing relative decline. Migration data, however, do not generally show that rapidly growing areas experience less out-migration than do less rapidly growing areas.

After conducting an extensive set of tests on gross migration data for large metropolitan areas, Lowry [5] has offered a possible explanation of the apparent lack of sensitivity of out-migration to interregional differences in economic growth forces. His contention is that migration can be treated as a two-step decision process--first a decision to move, which can be considered essentially independent of origin economic conditions, and second a choice of destination, which does involve a consideration of the relative economic conditions at potential destinations. Thus in-migration is affected by economic conditions, but out-migration is not. In general, Lowry maintains that out-migration can be predicted quite well on the basis of the demographic characteristics of the population of an area alone.

The Lowry hypothesis is a very strong hypothesis with important policy implications. The major conclusion is that there is essentially no marginal response of the moving decision (and, hence, of out-migration) to changing economic conditions. This would mean, for example, that programs of job creation designed to halt the exodus of younger people from declining areas would not be effective. Economic incentives to encourage out-migration from high unemployment areas likewise would not be effective.

Beale [1] has noted the policy implications of the Lowry hypothesis and has suggested that it would be incorrect to generalize from the migration patterns Lowry found for large metropolitan areas to all other regions. Beale conducted a more comprehensive study involving nonmetropolitan as well as metropolitan areas and found that for some groups of areas the rate of gross out-migration did increase as the rate of net out-migration increased. For most metropolitan areas, however, the Beale findings corresponded well with the Lowry findings.

The Beale hypothesis, therefore, represents a modification of the Lowry hypothesis in that it limits the range over which there will be no marginal response of out-migration to economic forces. Given this modification, the important empirical question revolves around the extent of the range of interregional economic opportunity differentials over which there will be no relationship between these differentials and decisions to move. In the next section it is contended that both the Lowry and Beale studies overstate the range of economic differentials over which out-migration will not be sensitive to economic forces. This overstatement arises primarily from a failure to distinguish clearly between the direct short run effects on moving decisions of differences in economic opportunities and the longer run impact of different growth and migration patterns on mobility.

Long Run and Short Run Migration Determinants

To the extent that differences in economic growth forces among regions affect

patterns of interregional gross migration, there may well arise a change in the mobility characteristics of the population in the various regions involved. This alteration in population mobility should then, in turn, affect future long run patterns of gross migration. Two effects of current migration on population mobility are particularly relevant to the Beale and Lowry hypotheses. Hoover has called these effects the migration selectivity effect and the beaten path effect.

For purposes of this study the essential feature of migration selectivity is simply that younger people and other mobile groups have a greater tendency to migrate than do less mobile groups. In this case net interregional migration should result in greater concentrations of mobile population groups in those areas experiencing net in-migration.[2] If net migration patterns are reasonably stable over time, then the resulting increase in population mobility in growing areas relative to declining areas could contribute to the observed tendency for gross out-migration to be positively correlated with net migration in the long run.

While migration selectivity works essentially through net migration, the beaten path effect is largely a gross migration phenomenon. The beaten path refers to the greater ease of movement and adjustment facing migrants who follow routes which have been heavily traveled in the past. The element of the beaten path effect which has received the greatest attention is the tendency of migrants to prefer to move to areas where they have friends and/or relatives who can smooth the adjustment process facing the migrant. Studies have generally found the friends and relatives effect to be very strong (see, e.g., Greenwood [3] and Nelson [6]).

In contrast to migration selectivity, the beaten path effect should work to increase mobility and gross out-migration from declining areas by providing a well developed exit route for potential migrants to follow. Since the paths are two-way, however, the beaten path effect should also increase mobility in high in-migration areas. It would be the average growth areas facing the fewest incentives for in- and out-migration that would be expected to have the smallest beaten path effects (holding non-growth-related incentives for gross migration constant).

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[2]There is no complete agreement on the individual characteristics which lead to mobility. For a discussion of the issue see Hoover [4]. The main limitation to the general statement that greater mobility leads to greater migration is the possibility that relatively less mobile groups may often face a greater potential economic gain from migrating than do more mobile groups. Even if migrants from poorer areas are less mobile on the average than the population in the areas they move to, however, it is still probably the case that they are more mobile on the average than the people they leave behind, and further the act of migration is likely to break old ties which had restricted mobility and also provide adjusting experience which increases mobility. Hence, net migration may tend to increase mobility in growing areas relative to declining areas even if people leaving the declining areas were initially less mobile than the populations at the destinations.

Thus the first effect (migration selectivity) should tend to give rise to the Lowry pattern of a zero or positive relationship between long run net migration and gross out-migration, and the second (beaten path) effect should tend to give rise to the Beale pattern of high out-migration rates from both rapidly growing and declining regions. When attention is restricted to nondeclining areas, however, both effects tend to work in the direction of the Lowry pattern of out-migration. Acknowledging migration selectivity and beaten path effects, however, is a much weaker proposition than the Lowry hypothesis that the decisions leading to out-migration are not sensitive to the distribution of economic opportunities over space. The Lowry hypothesis might still be largely true for metropolitan areas, but without adequate controls for migration selectivity and beaten path effects, a reliable test of the hypothesis could not be conducted using long run migration data.

Lowry recognized the migration selectivity problem, but he did not have adequate data to make an explicit allowance for it in his regression analysis. He did, however, conduct a test using two metropolitan areas of similar size, but different growth histories, to demonstrate the plausibility of the assertion that differences in out-migration rates could be explained almost entirely in terms of differences in the age structure of the populations without reference to economic differentials. Because this test was so limited and because Lowry ignores the beaten path effect, however, one would still question the Lowry hypothesis.[3] In the next section an alternative hypothesis which will be tested against the Lowry hypothesis is presented.

The Modified Standard Hypothesis

The modified standard hypothesis agrees with the standard hypothesis and can be contrasted to the Lowry hypothesis in that it asserts that many decisions to migrate will be sensitive on the margin to economic forces. The modified standard hypothesis, however, differs from the pure standard hypothesis in that it recognizes that interregional differences in long run growth patterns can lead to population mobility differences which tend to offset the economic tendency for fast growth areas to have lower rates of out-migraton than slow growth areas. More specifically, the hypothesis states that control for migration selectivity and beaten path effects will leave out-migration negatively related to economic growth forces (even for metropolitan areas).

The major problem in testing the relative merits of the modified standard and Lowry hypotheses lies in devising controls for interregional differences in mobility. Even if good measures of population mobility could be devised, the persistence of long run growth differentials among regions might make these measures of mobility so highly correlated with growth forces that their effects could not be reliably

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[3]For example, if the beaten path effect offsets the effects of economic forces on out-migration, then Lowry would find a positive relation between growth and out-migration that might be explained largely in terms of migration selectivity. The inference of no relationship between out-migration and economic forces, however, would be incorrect.

separated in cross section analysis. The major hope in separating the direct economic effects of differential growth forces from the longer run effects of differential growth on population mobility, therefore, lies in the fact that growth-related changes in population mobility should lag behind and be smaller in magnitude than would be the changes in growth. The lag occurs because population mobility is generally altered through the changes in migration patterns accompanying changing growth forces rather than being directly altered by the growth forces. The stability of population mobility relative to fluctuations in growth and net migration should arise because the magnitude of net migration in the short run is almost always very small in relation to population size so that even relatively large changes in net migration rates may have little immediate impact on the mobility of the majority of the population.

The lag of mobility differentials behind growth differentials and the expected relative stability over time of mobility differentials in comparison with growth differentials suggest that short run time series data may provide a much more effective means of testing the Lowry and modified standard hypotheses than would long run cross section data. In the next section a set of data is described which combines cross section and time series elements and illustrates some of the important differences between the short run and long run relationships connecting migration patterns and growth.

The Data

The data used in this study are unpublished data compiled from the 1 percent Social Security Sample File for 224 metropolitan areas. The basic data include employment change broken into four components--in-migration of workers, out-migration of workers, entrants into the (employed) labor force, and dropouts from the (employed) labor force--for each of the five years in the period 1960-65. These migration data have the very considerable advantage of providing an annual time series of gross migration flows.

The following analysis is concerned primarily with the following variables:

EC_{it} --the rate of employment change for the i^{th} metropolitan area during the t^{th} time interval (i.e., employment change in the interval divided by initial employment)

OM_{it} --the rate of out-migration

IM_{it} --the rate of in-migration

$\overline{EC}_i$, $\overline{OM}_i$, $\overline{IM}_i$ --the average of the five annual rates of the respective variables for the i^{th} metropolitan area.

In Table 1 cross section means and standard deviations of the above variables are presented. These data show that employment change rates are considerably more variable across areas (in relation to absolute size) than are migration rates. Further, the high variability of employment change relative to migration is considerably more pronounced in the annual data than is true of the five year average data. These characteristics of the data are consistent with the observation made in the last section that short run growth should be more volatile than would be

TABLE 1: Cross Section Means and Standard Deviations (224 SMSAs)*

	Employment Change Rate		Out-Migration Rate		In-Migration Rate	
Year	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1960-61	-.000	.059	.097	.036	.101	.048
1961-62	.027	.055	.095	.035	.092	.040
1962-63	.025	.058	.094	.035	.101	.047
1963-64	.032	.042	.092	.033	.095	.036
1964-65	.039	.053	.103	.037	.105	.040
5-Year Average	.024	.025	.096	.031	.099	.037

*Mean rates are not weighted by size of SMSA.

migration resulting from the changes in population mobility accompanying growth differentials.

In Table 2 cross section correlations of each variable with the same variable in the following year are presented. There is generally little or no significant correlation of employment change year to year. For both the gross migration rates, however, the year-to-year correlation is significant and generally fairly high (about .7). These data add further support to the proposition that short run growth should be less stable than mobility and gross migration.

The apparent short run instability of employment growth relative to gross migration will help considerably in setting up a model to separate the direct (short run) economic effects of employment growth on migration from the indirect (long run) effects of growth on population mobility. Before proceeding to the model of the next section, however, it will help to examine more closely the characteristics of the data averages for the whole five year period in order to obtain some feeling for the comparability of these data to census gross migration data. Table 3 contains the simple cross section correlations among the five year average rates for employment change, in-migration, and out-migration.

The simple correlation between employment change and out-migration (.286) demonstrates, just as census data, that growth and out-migration tend to be positively related in the long run for metropolitan areas. Also, as in the case of census data, one finds a significant relationship between growth and in-migration. Perhaps the most interesting of the three correlations, however, is the very high (.905) positive correlation between in- and out-migration. Clearly factors (such as interregional mobility differences) which affect in- and out-migration rates in the same direction dominate any economic forces tending to make long run in- and out-migration negatively related. If migration selectivity and beaten path effects are making a substantial contribution to the positive correlation between in- and out-migration, then controls for these effects should improve the chances of isolating a short run negative response of out-migration to employment growth.

The Empirical Tests

The basic model to be used to test the relative merits of the Lowry and the modified standard hypotheses is a simple adaptation of the Blanco prospective unemployment net migration model to gross migration data. The basic assumption of this model is that the supply of labor in all regions is perfectly elastic, so that any causal relationship between migration and employment change goes from employment change to migration rather than the reverse.

Initially the following linear relationships between the migration and employment change rates discussed in the previous section will be assumed.

$$(1) \qquad OM_{it} = a_1 EC_{it} + b_1 X_i + c_1 Y_t + e^1_{it}$$

$$(2) \qquad IM_{it} = a_2 EC_{it} + b_2 X_i + c_2 Y_t + e^2_{it}$$

TABLE 2: Year-to-Year Cross Section Correlations (224 SMSAs)

Years	Employment Change Rate / Employment Change Rate	Out-Migration Rate / Out-Migration Rate	In-Migration Rate / In-Migration Rate
1961-62 / 1960-61	-.013	.719	.619
1962-63 / 1961-62	.106	.688	.714
1963-64 / 1962-63	.084	.753	.769
1964-65 / 1963-64	.080	.723	.759

TABLE 3: Correlation Matrix for 5-Year Average Rates (224 SMSAs)

	Employment Change Rate	Out-Migration Rate	In-Migration Rate
Employment Change Rate	1	.286	.592
Out-Migration Rate		1	.905
In-Migration Rate			1

where the X_i are vectors of "structural variables," the Y_t are vectors of "cyclical variables," and the e_{it} are error terms.

The main concern among the non-employment change independent variables is to control for X_i factors (such as interregional mobility differences) which would be expected to be correlated with employment change and bias the estimated relationships between employment change and gross migration (if the X_i were omitted). On the basis of the observations in the previous sections, it is expected that population mobility differentials should be more stable over short periods of time than is employment growth. For this reason and, more important, because population mobility is difficult to define or measure and because the best proxies for mobility are not available annually, the time subscripts are omitted from the X_i variables in equations (1) and (2).

With the assumption that the X_i are stable over the period of analysis, one could presumably obtain reliable estimates of the coefficient estimates for the employment change variable in equations (1) and (2) by running time series rather than cross section regressions. Many of the advantages of both the time series and cross section approaches can be obtained, however, by employing cross section regressions which use annual deviations from the average of each of the variables over the five year period. Using this approach, any variables which were constant over the five year period would drop out of the analysis (since the five year average would coincide with each of the annual values). Based on equations (1) and (2), the new equations to be estimated would take the following form:

$$(3) \qquad (OM_{it}-\overline{OM_i}) = a_1 (EC_{it}-\overline{EC_i}) + c_1 (Y_t-\overline{Y}) + (e^{1}_{it} - \overline{e^{1}_{i}})$$

$$(4) \qquad (IM_{it}-\overline{IM_i}) = a_2 (EC_{it}-\overline{EC_i}) + c_2 (Y_t-\overline{Y}) + (e^{2}_{it} - \overline{e^{2}_{i}})$$

If the time period (t) is held constant in each regression, then the only variables which must be measured directly in order to estimate the a_i coefficients of equations (3) and (4) are the employment change and migration rates. Given the highly restrictive assumptions behind equations (3) and (4), the Lowry hypothesis can now be tested. Basically the Lowry hypothesis asserts that the coefficient a_1 in the out-migration equations will not be significantly different from zero. The modified standard hypothesis suggests that a_1 will be significant and negative, provided there are adequate controls for any population mobility differentials which are correlated with employment growth. Both hypotheses predict the a_2 coefficient in the in-migration equations will be significant and positive.

If equations (1) and (2) are estimated without including the X_i variables that are related to employment growth, then both the Lowry and modified standard hypotheses agree that the a_1 coefficient estimate may turn out insignificant or positive, depending on the importance of population mobility differentials.

Tables 4 and 5 contain the a_1 and a_2 coefficient estimates obtained from

TABLE 4: Employment Change Coefficient Estimates -- Equations 1 and 2 (omitting X_i variables)

	Equation 1 (Out-Migration)			Equation 2 (In-Migration)		
Year	Coefficient	t-Statistic	R^2	Coefficient	t-Statistic	R^2
1960-61	-.06	-1.4	.009	.51	11.7	.380
1961-62	-.08	-1.9	.016	.43	10.5	.333
1962-63	-.03	- .8	.003	.54	12.9	.430
1963-64	-.05	- .9	.003	.39	7.7	.209
1964-65	-.15	-3.3	.046	.38	8.5	.247

TABLE 5: Employment Change Coefficient Estimates -- Equations 3 and 4

	Equation 3 (Out-Migration)			Equation 4 (In-Migration)		
Year	Coefficient	t-Statistic	R^2	Coefficient	t-Statistic	R^2
1960-61	-.16	- 9.0	.266	.40	17.3	.594
1961-62	-.20	-10.2	.320	.32	16.2	.542
1962-63	-.20	-10.8	.343	.36	17.2	.571
1963-64	-.18	- 7.6	.207	.24	10.3	.325
1964-65	-.22	-11.5	.373	.34	19.8	.640

annual cross section regressions involving (i) simple regressions of the migration rates on employment change with no controls for X_i variables, and (ii) simple regressions of migration rates on employment change using deviations from the five year average to "eliminate" the X_i variables. A comparison of the results of these two sets of estimates should give an indication of the extent of bias in the coefficient estimates caused by a failure to allow for growth-related mobility differences among regions.

As might have been expected the coefficient estimates involving no controls (Table 4) typically show no significant relationship between out-migration and employment change. By contrast with the five year average data, however, the annual data show a negative (even though generally insignificant) rather than positive relationship between out-migration and employment change. As in the case of the five year average data the relationship between in-migration and employment change is positive and highly significant.

In examining the results in Table 5 one can see that the deviations from the five year average present a sharp contrast to the results of Table 4. Most important, the coefficient estimate of employment change in the out-migration equation is negative and highly significant for all five years. This finding is consistent with the modified standard hypothesis and presents strong evidence against the Lowry proposition that metropolitan areas will have out-migration rates that are unrelated to economic conditions. The coefficient estimates in Table 4 still reveal that the marginal response of in-migration to employment change is larger in absolute value than is the response of out-migration to employment change, but the difference has been cut considerably (from about .4 to less than .15 on the average).

The remaining asymmetry in the responsiveness of in- and out-migration to employment growth could be accounted for by several factors. In the first place the controls for growth-related mobility differences among areas may not fully eliminate the bias in the employment change coefficients. The more quickly mobility changes in response to changing growth and net migration, the less reliable will be controls assuming stable mobility differentials. Also, if there is a significant group of movers who, in Lowry fashion, decide to move on non-economic grounds, but pick a destination on the basis of economic factors, then some difference in the responsiveness of in- and out-migration to employment change would be expected. Closely related to this last factor is the (Beale) possibility that the decision to migrate will be progessively more sensitive to economic forces the greater are those economic forces for movement. In this case the omission of rural areas from the analysis may bias the measure of the overall marginal response of out-migration to employment change.

To test this possibility of a "non-linear" response of in- and out-migration to employment change, a quadratic employment change term was introduced into equations (3) and (4). The quadratic term was significant in both equations and did show the expected pattern of in-migration increasing at an increasing rate with employment change, while out-migration decreases at a decreasing rate with rising employment change. Generally speaking, the level of employment change at which the marginal response of in- and out-migration become equal in absolute value is around one standard deviation below the mean rate of employment

change for all the metropolitan areas.[4] This result seems broadly consistent with Beale's finding that areas experiencing the greatest pressure for out-migration do generate a greater response of out-migration to economic forces than do faster growing areas.

Conclusions and Policy Implications

The Social Security data present strong evidence for rejecting the Lowry hypothesis of no marginal response of out-migration to economic forces for metropolitan areas. On the other hand, there is evidence to suggest that long run mobility differences among regions are related to employment growth. Hence, the long run effect of increasing employment growth could possibly be increased rather than reduced out-migration. This latter possibility, however, should be carefully distinguished from the Lowry proposition that current decisions to migrate are not sensitive to local economic conditions.

From a policy point of view the results suggest that economic incentives to induce or reduce out-migration from particular areas can be effective. Policy makers should be aware, however, of the long run effects of their migration policies on area mobility in addition to considering the short run effects of the policies on current migration decisions. Thus, to formulate effective migration policies more information is needed on the causal relationship between current growth and the future mobility of the population. Of particular importance will be improved understanding of the relationship of regional growth to such phenomena as migration selectivity and beaten path effects.

Certainly the most important aspect of the data analyzed in this paper is that they combine a cross section and time series of gross migration flows. Time series data on gross migration flows by region previously have not been generally available, and this data gap has been associated with an almost complete failure to distinguish between the short run and long run relationship between gross migration flows and differential regional growth. From the contrast in the coefficient estimates in Tables 4 and 5, it is seen that the distinction between short run and long run responsiveness of gross migration to employment growth is very significant. Further, the data in Tables 1 and 2 illustrate that gross migration flows are much larger and more stable year to year than is employment growth or net migration.

In summary, then, the Social Security data illustrate that the economist's tendency to focus on net migration rather than gross migration and to concentrate on cross section analysis rather than time series analysis leaves some very important gaps in the information required to formulate enlightened economic policies in the areas of labor mobility and migration. Since a wide variety of gross migration data can be, and has been, aggregated by region on an annual

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[4]The details of these findings appear in Renshaw [7] (ch. 2).

basis from the Social Security Sample File,[5] data similar to the data used in this study should provide a very useful tool for increasing understanding of the economic basis of both short run and long run gross migration patterns.

[5]A substantial amount of data has been generated at the Regional Economics Division of the Bureau of Economic Analysis.

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