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Tests for the Macroeconomic Effects of Large-Scale Migration Based on The Irish Experience 1947-87

by

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ABSTRACT

This short paper explores the relationship between the rate of migration and the rate of economic growth. A review of the literature shows that there is no unanimity regarding the net effect of migration on economic growth. Sims' causality tests on the data for Irish migration and the growth of GNP per person over the period 1947-87 reveal no evidence of feedback from migration to growth. This finding has important implications for the interpretation of the post-war Irish economic experience.

I. Introduction[1]

A wealth of empirical research has been undertaken on the economic determinants of migration. Far less attention has been paid to exploring whether there is feedback from migration to economic growth. The present paper examines the post-war Irish experience and addresses the question of whether migration affected the rate of change in income per capita. The Irish case is particularly interesting in this context because of the exceptionally high rates of both net out- and in-migration that have been experienced and because the view has often been expressed, but never rigorously tested, that a high rate of emigration not only reflects the country's poor economic performance but is also part of the explanation for this poor performance (Commission on Emigration, 1955; O'Mahony, 1967).

II. The Effects of Migration

There are several channels through which it has been suggested that migration affects the rate of economic growth. By increasing the rate of population growth immigration could allow a country to achieve economies of scale (Kaldor, 1967) and to enjoy a higher rate of technical progress (Simon, 1986). Population growth could also stimulate economic growth through its effect on aggregate demand. Easterlin (1968) argues that immigration to the United States raised the level of investment

[1]I am grateful to Rodney Thom for help in the preparation of this paper.

in durable household goods and urban infrastructure and as a consequence dampened the business cycle. Analogously, loss of population due to emigration could reduce the rate of growth through its depressing effects on the level of aggregate demand and by creating an environment that is not conducive to investment and risk taking. At the regional level, Greenwood (1975) and Dahlberg and Holm (1978) report that out-migration leads to a self-reinforcing cycle of slow growth in employment and economic opportunities.

Immigration could also raise the rate of economic growth by increasing the human capital endowment of a country. As Reder (1963) stated "It is cheaper to import workers than to grow them" (p. 224). It has been claimed that in 1912 "between 13 and 42 per cent of the capital stock of the American economy could be attributed to the social savings arising from immigration" (Neal and Uselding, 1972, p. 87). Blitz (1977) estimates that in the late 1960s the net benefit to the economy of the German Federal Republic from immigration came to about 3 per cent of GNP a year. Finally, an inflow of population could increase the rate of economic growth by redistributing the labour force to high-productivity, rapidly growing sectors without disturbing wage differentials or narrowing profit margins (Cornwall, 1977). In Ireland, emigration has often been described as a safety valve that releases social pressures that could help modernise the economy.

However, many economists take a more negative, malthusian

view of the effect of population growth, and hence of immigration, on living standards. In the Denton and Spencer (1988) model population growth depresses the growth of income per capita because it increases the proportion of children in the population and this reduces the average level of productivity. Even though immigration increases the rate of population growth while at the same time increasing the proportion of active people in the population, Mishan and Needleman (1968) argue that the resultant growth of the labour force leads to capital shallowing and in a fully employed economy supplying the additional workers with physical capital creates inflationary pressures.

Testing all of the possible effects of migration and population growth on the performance of an economy would require a very detailed econometric model and make extreme demands on data. Simulation models, on the other hand, depend on parameter values that are assumed a priori, so that no consensus has been reached by this approach.[2] The present paper uses Sims' (1972) time series tests for causality to see if it can be said that there is a causal relationship between NMR and GNP and, if so, in which direction the causality runs. While this approach cannot provide any insight into the mechanisms through which these variables interact, it can help settle the broader question of whether unidirectional or bidirectional causality exists between them or whether they are unrelated variables. It seems

[2]See, for example, the contrasting conclusions reached by Denton and Spencer (1988) and Simon (1986).

appropriate to apply these tests to these variables because, as Pagan states, "Sims' methodology seems clearest when it is applied to the big questions of macroeconomics. . ." (1987, p. 20). Moreover, the Irish experience is particularly suitable for testing the effects of migration on economic growth. Few countries have experienced the range of annual net migration rates--from -2.0 per cent in 1957 to +0.6 per cent in 1974--that has been recorded in Ireland since the second world war (Figure 1).

The economic influences on Irish migration have been researched in depth over the years, but how migration affects the economy has received much less attention. Studies of labour market flows have established some links between migration and the change in the level of unemployment (Walsh, 1987) and research on the housing market has included the rate of household formation among the explanatory variables (Thom, 1983), but the broader question of how migration affects the rate of growth in GNP per person has not been studied econometrically.

III. Test for Feedback from Migration to Growth.

The Sims' methodology was applied to the annual series on the net migration rate (NMR) and the percentage change in real GNP <u>per capita</u> (GNP) for the period 1946-87. (The data are contained in an Appendix.) The causality tests require that the series be covariance-stationary. For this reasons the original series, NMR and GNP, were filtered until the residuals showed no

evidence of autocorrelation up to the kth order by the Liung-Box Q-statistic. The procedures used to filter the original series are shown in Table 1. It may be seen that the residual of GNP regressed on a one-year lag of itself showed no evidence of autocorrelation. A second-order autocorrelation of NMR, or the inclusion of a cubic time trend with a first order autocorrelation, was required to obtain stationary residuals.

The causality test proposed by Sims was performed on the residuals from these equations. It takes the general form of testing for the significance of the coefficients of the leading values of X in the following equation:

$$(1) \qquad Y_t = a + \sum_{k=-j}^{+j} b_k X_{t-k} + v_t$$

This test was performed with the NMR residuals as the dependent variable and the GNP residuals on the right hand side and then vice versa, providing tests for the exogeneity of GNP and NMR, respectively. The results of the F-tests for the joint significance of the coefficients of the leading (i.e. $k < 0$) values of b_k are shown in Table 2.

The most striking feature of these results is the low overall levels of significance of the F-statistic. The tests do not support the view that there is a very strong causal relationship in either direction between these variables. However, the evidence is much stronger that GNP causes NMR than vice versa. The F-statistic is significant at the 10% level or better in two of the four equations testing for the significance

of the leading values of NMR but in none of the equations testing for the significance of the leading values of GNP does it reach this level of significance.

The negative finding that there is no evidence of feedback from NMR to GNP is the most important result to be obtained from this test. It has interesting implications for the interpretation of post-war Irish economic growth, suggesting for example that the extraordinary rate of emigration that was recorded during the 1950s had no adverse effect on the performance of the economy in subsequent years and that the sustained inflow of population during the 1970s did not help to cushion the economy against the recession of the early 1980s.

Several explanations may be offered for the failure of the Sims test to reveal significant feedback from NMR to GNP. It is possible, for example, that NMR affects GNP in a number of offsetting ways, with the result that the net effect is negligible. Alternatively, all of the individual effects may be so small that they are not discernable in the data for GNP. Finally, it is possible that the effects of NMR on GNP become apparent only in the long-run. Much more detailed, structural estimation is required if we are to be able discriminate between these alternatives.

IV. CONCLUSION

This short paper reports the results of applying Sims'

causality test to exploring the nature of the relationship between net migration and economic growth. There is some, relatively weak, evidence that the rate of economic growth influences the rate of migration, but no significant evidence of a feedback from migration to the rate of economic growth over the period 1947-87. This negative finding has important implications for the interpretation of Ireland's post-war economic performance.

Table 1: Filtering of GNP and NMR

Equation:

1a. $$NMR_t = \underset{(2.2)}{-0.54} + \underset{(1.5)}{0.26}\, NMR_{t-1} - \underset{(2.3)}{0.15}\, T + \underset{(3.1)}{0.013}\, T^2 - \underset{(3.4)}{0.00024}\, T^3$$

$Q(18) = 23.8$ MSL = 0.16

1b. $$NMR_t = \underset{(0.7)}{-0.046} + \underset{(4.1)}{0.66}\, NMR_{t-1} - \underset{(1.5)}{0.24}\, NMR_{t-2}$$

$Q(18) = 18.7$ MSL = 0.41

2. $$GNP_t = \underset{(2.9)}{1.53} + \underset{(2.2)}{0.35}\, NMR_{t-1}$$

$Q(18) = 11.2$ MSL = 0.89

t-ratios in parentheses.

MSL = minimum significance level. 1 - MSL is the confidence level for the rejection of the null hypothesis.

Table 2: Tests for Exogeneity.

a. Using residuals from equations 1a and 2

Leads, lags	Regression of GNP on NMR	
3, 3	F (3, 25) = 2.43	MSL = 0.089
4, 4	F (4, 21) = 0.93	MSL = 0.467
	Regression of NMR on GNP	
3, 3	F (3, 25) = 0.36	MSL = 0.780
4, 4	F (4, 21) = 0.93	MSL = 0.467

b. Using residuals from equations 1b and 2

	Regression of GNP on NMR	
3, 3	F (3, 24) = 2.43	MSL = 0.090
4, 4	F (4, 20) = 1.70	MSL = 0.188
	Regression of NMR on GNP	
3, 3	F (3, 24) = 1.20	MSL = 0.332
4, 4	F (4, 20) = 1.50	MSL = 0.240

Data Appendix

Year	NMR	GNP
1948	-1.1	3.5
1949	-1.2	5.5
1950	-0.9	2.6
1951	-1.2	1.3
1952	-1.1	3.4
1953	-1.2	2.7
1954	-1.5	1.2
1955	-1.6	3.5
1956	-1.4	-1.1
1957	-2.0	0.3
1958	-1.1	0.0
1959	-1.4	4.2
1960	-1.4	5.4
1961	-0.5	5.4
1962	-0.3	3.2
1963	-0.6	4.0
1964	-0.7	3.8
1965	-0.7	2.2
1966	-0.5	-0.2
1967	-0.6	4.4
1968	-0.5	7.8
1969	-0.2	4.4
1970	-0.2	2.3
1971	0.4	2.0
1972	0.5	6.0
1973	0.5	2.5
1974	0.6	1.9
1975	0.5	-0.9
1976	0.3	0.2
1977	0.2	5.3
1978	0.5	3.8
1979	-0.2	1.7
1980	0.1	1.5
1981	0.0	1.5
1982	-0.4	-3.5
1983	-0.3	-1.5
1984	-0.6	2.4
1985	-0.9	-2.4
1986	-1.0	-1.2
1987	-1.0	5.4

NMR = the estimated net migration rate (per 100 population). For the year t, the flow relates to the interval $April_t$ to $April_{t+1}$. Source: Central Statistics Office.

GNP = the percentage change in real GNP per capita. Source: National Income and Expenditure and Department of Finance Data Bank.

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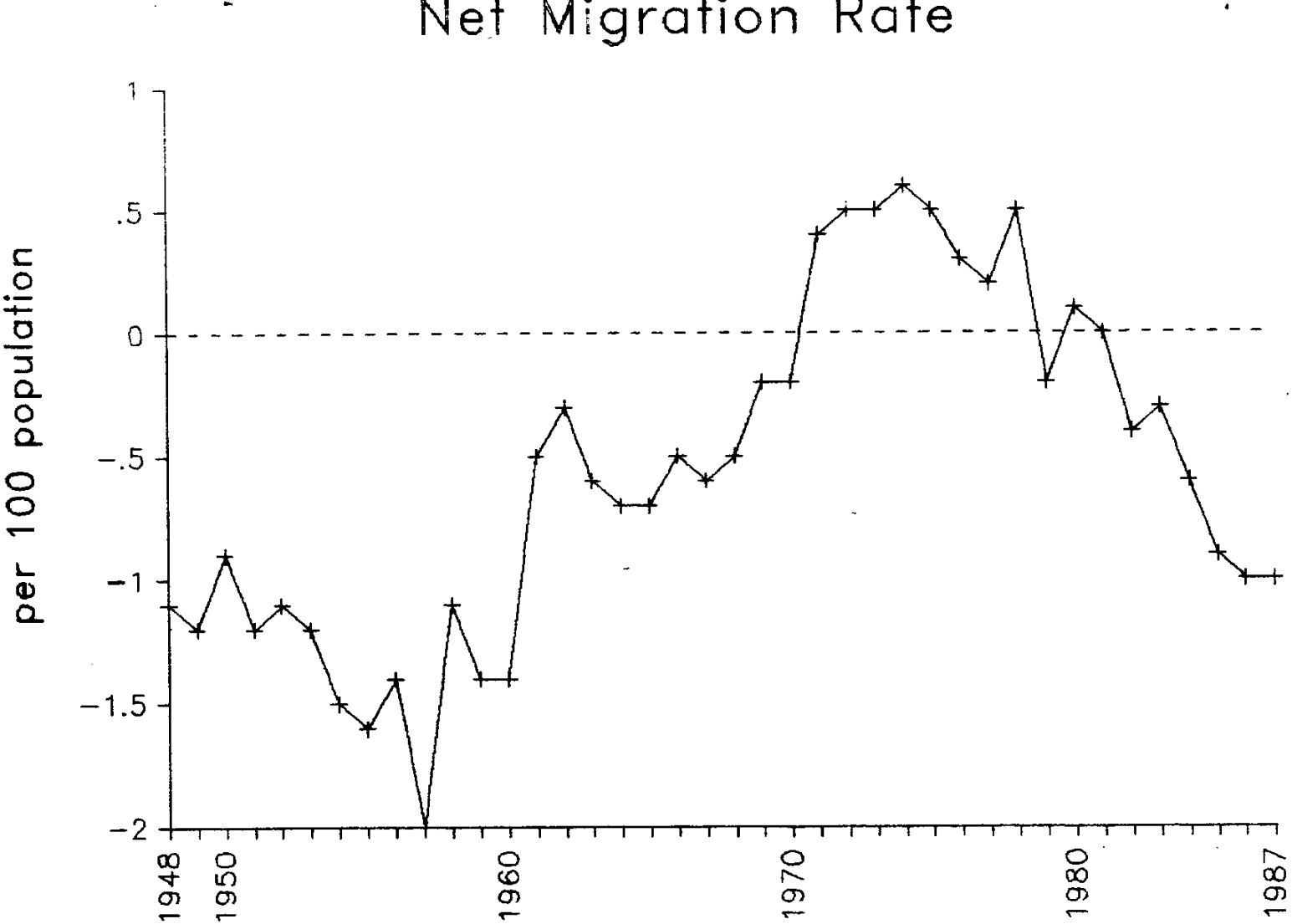
Net Migration Rate
per 100 population
1
.5
0
-.5
-1
-1.5
-2
1948
1950
1960
1970
1980
1987

Figure 1

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