

Tests for the Macroeconomic Effects of Large-scale Migration Based on the Irish Experience, 1948-87: A Comment

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Walsh (1989) addresses an interesting and extremely pertinent problem: What is the causal relationship between migration, as proxied by the net migration rate (NMR), and economic activity, as proxied by the percentage change in real GNP *per capita* (GNP). Is there a feedback from NMR to GNP or is the feedback confined to GNP influencing NMR?

Walsh finds evidence (admittedly weak) that there is causality running to migration from economic activity, but that there is no statistically significant evidence of changes in migration influencing economic growth. The implications, left unstated for the most part, are that migratory flows are, economically at least, not necessarily a bad thing.

In this comment, it is intended to concentrate on two aspects of the paper, and to attempt to extend the analysis a little further.

What Walsh was attempting, with a very small dataset, it must be said, was to find any evidence of a causal relationship. Time series analysis shows that co-integrability of two series imply at least univariate causality (but does not say anything about the direction of such causality). A legitimate test preliminary to testing for causality therefore would be to look at the co-integrat-

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ability of two series. Also, if two series are co-integrated, we can say that there is an equilibrium relationship between them, i.e., they will not diverge arbitrarily far apart. For this dataset, such considerations are important: if NMR and GNP are co-integrated, then an equilibrium relationship exists between them, and confirmation of at least univariate causality is given; if not, then GNP and NMR may diverge arbitrarily far, indeed must inevitably do so. In order to test for co-integration, all series present must be $I(1)$. Thus, we must test GNP and NMR for the presence of a unit root. If a unit root is present, the series is $I(1)$.

For net migration rate (NMR), the series is clearly $I(1)$, as evidenced by Dickey Fuller tests. We cannot reject at 5 per cent the hypothesis of no drift, no trend and a unit root, nor the hypothesis of drift, trend and a unit root, according to the tests of Dickey and Fuller (1981). The F statistics for these hypotheses respectively were .78 and 1.18.

For GNP the situation is more complex. The F statistics were 6.06 and 9.095 for the two hypotheses respectively. While this would entail rejection of a unit root at 5 per cent, we would not reject at 1 per cent. If, however, we construct a series in the levels of *per capita* GNP (CAPITA), then we can perhaps more easily accept a unit root. The F statistics then are 8.18 and .94 respectively. Table 1 gives further details.

Table 1: *Unit Root Tests*

| Significance Level | No. of Observations | | | |
|--------------------|--|------|---|------|
| | 25 | 50 | 25 | 50 |
| 1% | 8.21 | 7.02 | 10.61 | 9.31 |
| 5% | 5.68 | 5.13 | 7.24 | 6.73 |
| 10% | 4.67 | 4.31 | 5.91 | 5.61 |
| | H_0^1 : No drift, no trend, unit root. Reject H_0 for large values. | | H_0^2 : Drift, no trend, unit root. Reject H_0 for large values. | |

Source: Table V, Table VI, Dickey and Fuller, 1981.

| | | | |
|----------------------|---------|---------|------|
| Calculated F values: | GNP: | H_0^1 | 6.06 |
| | | H_0^2 | 9.1 |
| | NMR: | H_0^1 | .78 |
| | | H_0^2 | 1.18 |
| | Capita: | H_0^1 | 8.18 |
| | | H_0^2 | .94 |

The results are not unambiguous and therefore we present in Table 2 details of co-integration tests on both the system GNP-NMR and the system NMR-CAPITA.

Table 2: *Testing for Co-integration*

| <i>Significance Levels</i> | <i>Critical Values (n=50)</i> | | |
|----------------------------|-------------------------------|-----------|------------|
| | <i>CRDW</i> | <i>DF</i> | <i>ADF</i> |
| 1% | 1.00 | 4.32 | 4.12 |
| 5% | .78 | 3.67 | 3.29 |
| 10% | .61 | 3.28 | 2.90 |

| <i>System</i> | <i>Calculated Values (n=40)</i> | | |
|---------------|---------------------------------|-----------|------------|
| | <i>CRDW</i> | <i>DF</i> | <i>ADF</i> |
| NMR-GNP | .23 | -1.57 | -1.22 |
| NMR-Capita | .40 | -1.58 | -0.80 |

Source: Engle and Yoo (1987).

H_0 : No co-integration. Reject for large values.

CRDW: Co-integration Regression Durbin Watson Statistic.

DF: Dickey Fuller Test

ADF: Augmented Dickey Fuller Test

It can be seen that for the system of NMR-GNP we can accept the null hypothesis, i.e., reject co-integration, on the basis of all tests, at 1 per cent, 5 per cent and 10 per cent. For NMR-CAPITA, however, the evidence is slightly less overwhelming, Co-integration Regression Durbin Watson Statistic (CRDW) at 10 per cent implying rejection. None the less, we can state with a certain degree of confidence that there does not seem to be a long-run equilibrium relationship between migration and economic growth. This is rather a startling result, and were it not for the uncertainty surrounding the appropriate series to use (changes in or levels of *per capita* GNP), the acknowledged weakness of the tests used here for unit roots and the low power of co-integration tests, one might be tempted to see it as exceptionally important. However, a different result could emerge if we scrutinise the work of Hylleberg, *et al* (1988), who show that although two series may not be co-integrated at annual frequencies (e.g., these two series), they may be so at seasonal frequencies. Data on seasonal migration are not available however.

We seem to be left with the conclusion that, in the long run, there is no equilibrium relationship between economic growth and migratory flows. In addition, the NMR series is $I(1)$. If there is no equilibrium, there cannot be an equilibrating mechanism and so much of migration theory would need to be re-thought. However, it is rather unbelievable that there should be *no* relationship. It would be best to say that if there is one, then it is not apparent in annual data and/or is not picked up by present tests. The fact of NMR being $I(1)$ implies that shocks in randomly-induced changes in NMR will have a permanent effect. Combined with the weak evidence found in the paper for causality running from economic growth to migration but not *vice versa*, this data raised significant, pertinent and profound questions about the macro-economic setting of Irish migratory patterns. In addition, one wonders as to the rationale for migration: is it economic only, or does a persistence effect hold?

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