NET MIGRATION TO IRELAND VERSUS THE REST OF EUROPE

JOHN KIRBY
Senior Sophister

Large migration in and our of Ireland has been a defining characteristic of Ireland's labour force and economy over the last number of decades. In this paper, John Kirby attempts to demonstrate the uniqueness of Ireland's migration by comparing it to the rest of Europe. The results should prove thought provoking for Irish citizens and policymakers alike.

1. Introduction

 "It was a free choice of lifestyle… And there are a lot of families like that… It's not being driven by unemployment at home, it's driven by a desire to see another part of the world and live there."

Michael Noonan, 20th Jan 2012

These comments made by the Irish Minister for Finance early last year about young Irish emigrants have sparked fierce debate in the public domain about the swathes of people leaving Ireland at the moment and their reasons for leaving. Equally as interesting is the immigration Ireland saw in the late 1990's and early 2000's, and whether this occurred due to the social or economic climate in Ireland at the time. This paper examines the uniqueness of net migration flows in Ireland compared to the rest of Europe over a fifteen year period, 1995-2009. My main focus is on the differential between the effects of economic and social conditions on Irish net migration and other EU countries.

Background and Literature Review
Net Migration is generally accepted to be determined by the relative strength of "push" and "pull" factors. "Push" factors make emigration from the domestic country more attractive while "pull" factor incentivise immigration into the domestic country (see (Dorigo & Tobler, 1983).

        The majority of works on migration have been focussed on time series analysis of an individual country over time (Tabuchi, 1985) or country cross-sections (Dreher & Poutvaara, 2005). To date, studies on Irish migration in particular have previously been time series analyses. Very little work has been in the area of how the migration patterns

of Ireland appear unique compared to the rest of the EU. Geary and Ó Gráda's paper centers on net migration between Ireland and the UK in the years 1953-1983 and surprisingly find that unemployment differences between the two countries are not statistically significant, reinforcing the minister's assertion. (Geary & Ó Gráda, 1987) . Strielkowski and O'Donoghue, on the other hand consider inward, outward and net migration flows in both Ireland and the Czech Republic over the period 1982-2002 and conduct a comparison of the two countries. They find that the outward migrations from Ireland were dependent on the internal economic factors to less of an extent that those in the case of the Czech Republic (Strielkowski & O'Donoghue, 2006). They point to UK "pull" factors as a reason for this. This paper was greatly influenced by these works and by Mayda (2008) and Mitchell & Pain (2003) who take advantage of both time series and cross-country variation to "test the robustness and validity of earlier papers". These papers suggest using a variety of economic, social and geographical factors to explain net migration.

Empirical Approach

With only fifteen years per country in the data set, it is not possible to include all the possible explanatory variables other researchers have used in previous studies. Nevertheless, three key economic and social independent variables are employed to explain net migration rates in Eqn.1:

Model:
Eqn. 1:

$$nemig_{it} = \alpha_0 + \beta_1 nomgdppecap_{it} + \beta_2 une + \beta_3 suc\_rate + \beta_4 IreGDP + \beta_5 Ireune + \beta_6 Iresuc + C_t + \alpha_{i} + \varepsilon_{it}$$

- where u_{it} (the composite error term) $= \alpha_i + \varepsilon_{it}$
- Dependant Variable: Rate of net migration: the ratio of net migration (the difference between immigration to and emigration from a given area) during the year to the average population in that year. The value is expressed per 1,000 inhabitants.
- Independent Variables:
  - X_1: Nominal Gross Domestic Product per capita at US $ PPP.
  - X_2: Average annual rate of Unemployment
  - X_3: Suicide Rate: Crude annual death by intentional self-harm rate per 100,000 inhabitants
  - X_4, X_5, X_6: Ireland-specific dummies.

Explanations and Expectations

I would expect a positive relationship between nominal GDP per capita and net migration. As a country becomes richer, economic "pull" factors become stronger and net migration increases (as immigration increases and emigration decreases). A review of the literature

confirms an overwhelming positive correlation and statistical significance. One would expect Ireland's net migration to be influenced even more so by income changes as Ireland has been noted for its high degree of labour mobility (Strielkowski & O'Donoghue, 2006).

I would expect a negative relationship between the unemployment rate and net migration. A rise in unemployment is expected to increase economic "push" factors and therefore decrease net migration (increase emigration and decrease immigration). The hypothesis put forward by the minister is that Irish unemployment will not be statistically significant from the rest of Europe. My personal expectation is a more sharply negative reaction to unemployment than the rest of Europe for the mobility reasons previously outlined.

My major innovation in this study is to introduce suicide rates as a proxy variable for the social conditions of a country. It is extremely difficult to gauge the mood of a country or the social cohesion throughout and other studies have attempted to use the lagged migrant stock to take into account that migrants will follow "friends and family" to replicate "home" social conditions. Unfortunately, as described in Mitchell & Pain (2003), this is subject to a considerable degree of measurement error. I have chosen a measure of mental health in the state because of the availability of data and the improvements in measurement error in the past twenty years across Europe (see Walsh & Walsh, 2010). A negative relationship is expected between the rate of suicide and net migration rates in a country. A rise in the rate of suicide results in stronger social "push" factor and a fall in net migration. If the minister is correct, we expect social factors to have an additional effect on Irish net migration.

Panel Data

I have chosen to use panel data to approach my research question as it enables me to control for all unobservable time-invariant factors which overcome the omitted variable bias. As I am using data across countries, unobserved heterogeneity may be an issue. For example, the culture and mindset of a nation is almost impossible to quantify and control for and therefore remains in that αi part of the composite error term (uit); so (uit $\vert$ xit) $\neq 0$ and the zero conditional mean assumption is violated and Ordinary Least Squares (OLS) Estimation results in biased and inconsistent estimates. I therefore apply the fixed effect, within transformation; the data are time-demeaned and the unobserved part αi is removed (shown in Eqn. 2). This allows us to look at the effect of X on Y by analyzing the variation of X and Y over time within each individual country. Furthermore, I include a dummy variable Ct that controls for differences in net migration over time.

Eqn. 2:

$$(\text{nemig}_{it} - \overline{netmig}_i) = \alpha_0 + \beta_1(\text{nomgdppecap}_{it} - \overline{nomgdppecap}_i) + \beta_2(\text{une}_{it} - \overline{une}_i) + \beta_3(\text{suc\_rate}_{it} - \overline{suc\_rate}_i) + \beta_4(\text{IreGDP}_{it} - \overline{IreGDP}_i) + \beta_5(\text{Ireune}_{it} - \overline{Ireune}_i) + \beta_6(\text{Iresuc}_{it} - \overline{Iresuc}_i) + (C_t - \overline{C}) + (\varepsilon_{it} - \overline{\varepsilon}_i)$$

Empirical Results

Table 2. Fixed Effects Regression Model: Net Migration

VARIABLES	netmig
Une	-0.424**
	(0.201)
nomgdppecap	0.000163**
	(6.75e-05)
suc_rate	0.0395
	(0.165)
IreGDP	-0.000344***
	(5.77e-05)
Ireune	-1.156***
	(0.245)
Iresuc	-0.473*
	(0.252)
_Iyear_1996	-0.570
	(0.448)
_Iyear_1997	-1.069**
	(0.511)
_Iyear_1998	-1.444*
	(0.713)
_Iyear_1999	-0.520
	(0.914)
_Iyear_2000	-1.270
	(1.075)
_Iyear_2001	-2.183
	(1.740)
_Iyear_2002	0.231
	(1.328)
_Iyear_2003	0.444
	(1.371)
_Iyear_2004	0.375
	(1.418)
_Iyear_2005	0.368
	(1.398)
_Iyear_2006	-0.692
	(1.499)
_Iyear_2007	-0.768
	(1.694)
_Iyear_2008	-1.577
	(1.816)
_Iyear_2009	-1.597
	(1.543)
Constant	3.749
	(2.464)
Observations	345
Number of ctry	28
R-squared	0.286

Starting with the most surprising result obtained (Eqn. 3), an increase in nominal Gross Domestic Product appears to have a statistically significant (at the 5% level) negative net

migration effect on Ireland i.e. a €1000 increase in nominal GDP per capita (at US$PPP) will increase the rate of net emigration by 0.3 per 1000 inhabitants. The effect on the rate of net migration on Europe as a whole is expected: an increase in income will increase the rate of net immigration.

Eqn. 3:

$$\frac{\partial netmig}{\partial nomgdppecap} = +0.000163 - (0.000344 \text{IreGDP})$$

To explain this we must look to Strielkowski & O'Donoghue (2006) who obtained a similar outcome and pointed to the "pull" effects of the UK as a unique factor. Ireland and the UK don't behave like the rest of Europe in that migration flows similarly to that of a regional zone. If Irish income per head is rising but UK "pull" factors are also increasing, migration may not behave as predicted.

Additionally, Gross Domestic Product may be an incorrect measure of Irish incomes. The actual income remaining with Irish residents is the GNP and it differs from GDP by the net amount of incomes sent to or received from abroad. The Irish case is unique in Europe as the amount belonging to persons abroad has exceeded the amount received from abroad. This is mainly due to the profits of foreign-owned companies and our GNP is, therefore, less than our GDP (CSO, 2012). GDP figures were used due to the lack of reliable data available for GNP in the EU.

For unemployment, the results are as I expected. There is a statistically significant negative relationship between the rate of unemployment in a country and it's net migration. This effect is far more pronounced in the Irish case.

Eqn. 4

$$\frac{\partial netmig}{\partial une} = -0.424 - (1.156 \text{Ireune})$$

A 1% increase in unemployment raises the Irish net emigration rate by 1.58 per 1000 inhabitants. The effect is considerably sharper in Ireland compared with the rest of the EU. This highlights the possibility that migrants into and out of Ireland are relatively more mobile and largely motivated by employment possibilities.

The regression model used found social conditions be be statistically insignificant in determining rates of net migration. These results must be interpreted with caution for the following reasons:

- Suicide Rates may not be an accurate proxy for the social conditions of a country. My innovation may be a poor representation of the "happiness" of country's inhabitants.

- There may still be measurement error in the number of suicides per year due to underreporting. This could lead to inconsistency in all estimators (Woolridge, 2009).
- The R-Squared attained of 0.286 implies that 28.6% of the variation in net migration rates across countries is explained by the model.
- The F-test confirms that at least one of the variables used in this regression is significant (Prob>F=0.000).

The regression output suggests that Ireland is unique in its migration flows but not because of social factors. Irish migration appears to be different due to its acute reaction to economic conditions. The flippant remarks of the minister suggested an ambivalence of Irish migrants to such factors. This study underlines the importance of economic policy decisions in Ireland and at EU level and its effect on net migration.

Diagnostic Checks and Testing
Heteroskedasticity
Initially, the Pooled OLS regression model was tested for heteroscedasticity i.e. test that the variance of the unobservable error (uit) conditional on the explanatory variables is not constant (Woolridge, 2009).

Graph.1
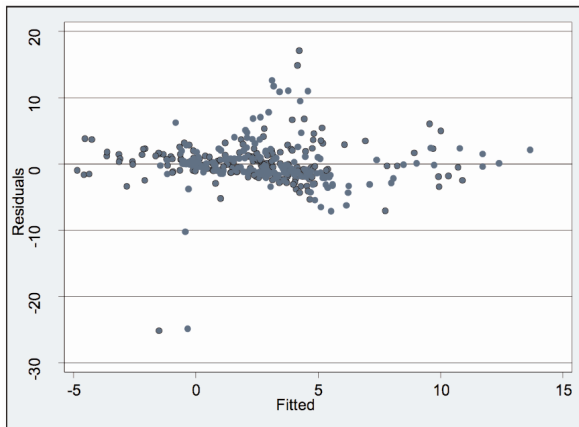
If the model is well-fitted, there should be no pattern to the residuals plotted against the fitted values. From analysis of Graph 1, the middle section is not particularly scattered, implying that the variances are not homogenous.

To add further confirmation the Breusch-Pagan / Cook-Weisberg test was con-

ducted for heteroskedasticity. The p-value (Prob > chi2 = 0.0183) suggests that the variance is not homogeneous and heteroskedasticity could be an issue in the model.

Of course these models assume normality of distribution and should thus be treated with caution.

Normality

Graph 2: Distribution of Errors
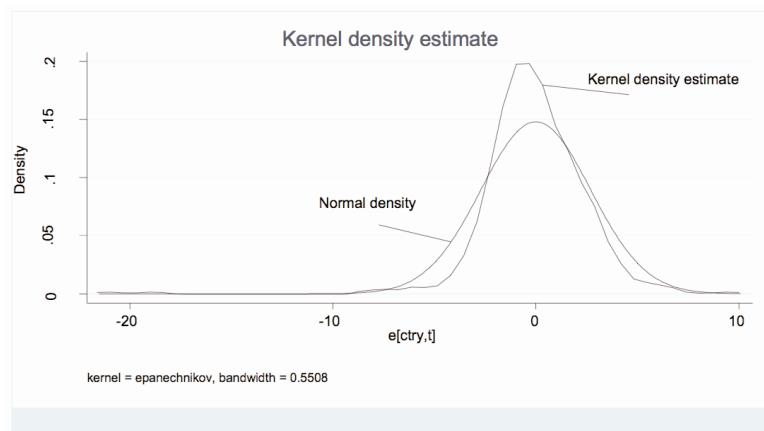
Graph 2 shows that although not perfectly normally distributed, the errors appear at least close to the normal distribution for a relatively small sample size.

Serial Correlation

According to the Gauss-Markov Theorem: Conditional on X, the errors in two different time periods must be uncorrelated: $Corr(u_t, u_s | X) = 0$, for all $t \neq s$ (Woolridge, 2009) for OLS estimates to be the Best Linear Unbiased Estimates.

To test for this, the Wooldridge test for autocorrelation in panel data was employed. We cannot reject the Null hypothesis of no first order autocorrelation at the 5% level in this case as the Prob > F = 0.1895. Nevertheless, this by no means implies that autocorrelation is not a serious issue in the model.

Fixed Effects (FE) or Random Effects (RE)?

To decide which model to use the Hausmann Test was run and the null hypothesis could not be rejected at the 5% level i.e. the difference in coefficients may not be systematic and so either model may be used (as Prob>chi2 = 0.9742).

FE was used as it allows for correlation between the unobserved effect and the

explanatory variables whereas RE requires these to be uncorrelated.

Time fixed effects
Finally I ran a test to see if time fixed effects are needed when running a FE model.

A joint test was run to see if the dummies for all years are equal to 0; if they are then no time fixed effects are needed. The null hypothesis is rejected as Prob > F=0.0045 and time dummies should be included.

Corrections
To correct for these issues, the fixed effects model was used (including time dummy variables) and clustering by country: controlling for correlation within groups. This also controls for the effect of autocorrelation and should improve the robustness of our estimates.

Possible Extensions

Following from the work of Mitchell & Pain (2003), it may be useful to use incomes relative to some source or destination group with which the country receives immigrants or emigrate to e.g. in Ireland's case relative to the EU-25, the UK or Australia.

They also raise the possibility of a dynamic effect model of migration where migration at time t depends on migration at time t-1. I sought to capture this "following friends and family" effect using the independent variable "the proportion of 15-24 year olds in the country" but the results didn't make sense using a static model and I had to exclude this variable. Perhaps future studies could use a dynamic model such as an approach based on the use of autoregressive distributed lag (ARDL) that is appropriate for the examination of long-run relationships regardless of the time series properties of the individual regressors (Mitchell & Pain, 2003).

Additionally, the experience of using nominal GDP per capita encourages a proposal to use GNP in future studies if reliable data is available. Geary & Ó Gráda, (1987) also highlight the possibility of taking the tax system in the country into account when comparing economic circumstances across countries (again, depending on the availability of reliable data).

Summary & Conclusions

The central goal of this study was to discover whether net migration rates in Ireland were affected differently by changes in economic and social factors to other European countries. To achieve this I used panel data from Ireland and twenty seven other European countries over the period 1995-2009. Fixed Effects were applied and country and time dummy variables included, in order to gain an insight into the differentials among European countries. Consequently, the major result obtained was that unemployment in Ireland does have a unique effect on Irish net migration. Irish migration reacted much more

strongly to changes in unemployment than across Europe. Income had an unexpected opposing effect in Ireland as to that held in Europe as a whole. This study found no significance for the social factors that were allegedly driving net migration, uniquely in Ireland. Of course this may be due to the proxy of "suicide rates" per 1000 population annually for social conditions. This study should serve to remind policy makers in Ireland of their influence on net migration.

References

CSO. (2012, March). *What are GDP and GDP?* Retrieved 2012, from cso.ie: http://www.cso.ie/en/studentscorner/nationalaccounts/whataregdpandgnp/

Dorigo, G., & Tobler, W. (1983). Push-Pull Migration Laws. *Annals of the Association of American Geographers*, 1-17.

Dreher, A., & Poutvaara, P. (2005, May). Student Flows and Migration: An Empirical Analysis. Bonn, Germany.

Geary, P., & Ó Gráda, C. (1987, May). Post-War Migration between Ireland and the UK: Models and Estimates. Dublin, Ireland.

Mayda, A. M. (2008, May). International Migration: A panel data analysis of the determinants of bilateral flows. Washington DC, USA.

Mitchell, J., & Pain, N. (2003, May). The Determinants of International Migration into the UK: A Panel Based Modelling Approach. London, United Kingdom.

Strielkowski, W., & O'Donoghue, C. (2006). READY TO GO? EU ENLARGEMENT AND MIGRATION POTENTIAL: LESSONS FOR THE CZECH REPUBLIC IN THE CONTEXT OF IRISH MIGRATION EXPERIENCE. *Prague Economic Papers*.

Tabuchi, T. (1985). Time-series modeling of gross migration and dynamic equilibrium. *Journal of Reg. Science*, 65-83.

Walsh, B., & Walsh, D. (2010, October). Suicide in Ireland: The Influence of Alcohol and Unemployment . Dublin, Ireland.

Woolridge, J. M. (2009). *Introductory Econometrics: A Modern Approach*. Canada: South-Western.

Datasources

http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/