ALL-ISLAND DEPRIVATION INDEX: TOWARDS THE DEVELOPMENT OF CONSISTENT DEPRIVATION MEASURES FOR THE ISLAND OF IRELAND



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This article summarises research undertaken by the authors to develop a prototype comparative cross-border deprivation measure using census data available from the respective censuses of Ireland and Northern Ireland. This new *All-Island Deprivation Index*, when fully tested, will allow policy-makers, practitioners and academics to better understand the spatial distribution of deprivation from a comparative perspective and provide information for cross-border communities.

For the first time, the 2011 census has been co-ordinated throughout the European Union and the use of this Index with the new census will not only benefit the Irish cross-border region but also offer the potential to better understand the spatial distribution of deprivation in different regions of Europe. The article outlines the history of deprivation indices in Ireland and Northern Ireland and the methodological challenges and data analysis behind the development of the All-Island Deprivation Index. The research was undertaken by the authors in collaboration with the All-Island Research Observatory (AIRO) at NUI Maynooth and the International Centre for Local and Regional Development (ICLRD).

Developing an *All-Island Deprivation Index*

There is a significant drive at all levels of government, from the local to the European, for evidence-informed policy and practice across all aspects of state work and service delivery. Planning and decision-making is greatly enhanced by having access to high quality data that is accurate and reliable. It is also important that this data is disseminated to as large an audience as possible in an accessible and user-friendly format. For policy-makers, local authorities, businesses and communities seeking to make urban and rural environments desirable places to live and work, access to timely information is critical to planning, funding, implementing and monitoring new schemes and initiatives.

Obtaining comparable and timely data to plan and monitor the impacts of cross-border programmes or to develop a wider understanding of the economic or demographic trends across borders is a challenging task. In the context of the island of Ireland, while significant progress has been made in terms of data generation and availability in both Ireland and Northern Ireland, there is still a dearth of accurate and reliable data available at a cross-border level.

The main objective of this research was to respond to a long-standing need to develop a way of measuring deprivation to facilitate an array of cross-border programmes and initiatives within functional regions and among and between local authorities and cross-border agencies [1]. One of the reasons why this type of measure has not previously been available is that a deprivation index that bridges different jurisdictions – and thus different data sources – raises considerable methodological challenges.

The prototype *All-Island Deprivation Index* developed through this research used two censuses conducted at two different points in time, 2001 in Northern Ireland and 2006 in the Republic of Ireland. While it is clearly understood that the underlying statistics are unaligned due to the five-year time gap, the authors felt that the principal challenges involved in developing an *All-Island Deprivation Index* would be best explored using these available datasets. This allowed the research team to develop and test a methodology in preparation for the publication of the 2011 census in both jurisdictions. Furthermore, in the case of the Republic of Ireland, the 2011 census will feature for the first time the use of the population statistics at the new Small Area geographical scale, similar to the geographical scale of Output Areas in Northern Ireland. This will help to overcome a previous limitation when comparing cross-border data.

Based on the methodology developed for an *All-Island Deprivation Index* outlined in this paper, it will be possible to generate a new comparative deprivation measure as soon as data from the 2011 Census for both jurisdictions becomes available. This new measure is not intended to replace the existing deprivation indices in the respective jurisdictions; it will, however, facilitate, for the first time, a comparative analysis of deprivation at a regional level within the Irish border region. The current research has also undertaken exploratory work on the development of an appropriate data dissemination mapping tool.

Background

The lack of comparable, cross-border data seems surprising in today's modern world and yet, it is extremely difficult to create the all-island datasets required to underpin the increasing appetite for evidence-informed, cross-border planning. This is not to say that detailed information does not exist; in many cases the data is available, but there are many difficulties that prevent an easy 'marrying' of datasets. Issues such as data availability, sourcing, census questions and what is being measured, data units and categories, synchronicity, data continuity, data clarity and context all pose difficulties in the development of all-island datasets. These issues are not unique to the Irish border region and can be found in other cross-border programmes seeking data to plan and measure the impact of their initiatives. At a European level, the new Census European Hub was established to help overcome these issues by developing methods and protocols for the dissemination of the 2011 census data and housing censuses in the European Union Member States. National statistical agencies in both jurisdictions are expected to transmit census data to Eurostat in 2013.

The ICLRD and AIRO have been addressing many of these problems in recent years and have made major progress in developing cross-border datasets on socio-demographics, housing, transport and accessibility to services. The launch of *The Atlas of the Island of Ireland* in 2008, a set of detailed, full-colour maps and cartograms of various socio-economic indicators across the island, was the first milestone in this work. Subsequent research and initiatives by AIRO and ICLRD led to the development of on-line socio-demographic mapping systems covering the entire Irish border region and demonstrated the possibilities and current limitations of cross-border analysis of socio-economic and demographic information. INTERREG funding through the Special EU Programmes Body is now supporting two regional initiatives in evidenced-informed planning: the Irish Central Border Area Network (ICBAN) region Spatial Planning Initiative and the North-West region SPACE-ial Project. The AIRO website now hosts specialised mapping modules on crime, housing, transport, unemployment and accessibility (www.airo.ie/mapping-module).

The ICLRD and AIRO are currently involved in four research activities as part of the INTERREG IVA-funded *Cross-Border Spatial Planning and Training Network* (CroSPlaN) data capture initiative. The first is an *Island of Ireland Housing Monitoring Tool* that was launched in May, 2011. It provides an interactive

mapping and querying tool for housing market indicators combining data from both the Republic of Ireland and Northern Ireland. This tool is a key step towards addressing common difficulties in the housing sector. The second initiative is focussing on the development of an *All-Island Accessibility Mapping Tool*, which will map levels of access to key services infrastructure across the island in areas such as education, health, transport and emergency services. The third initiative focuses on developing monitoring indicators to support the collaborative framework for spatial strategies, an initiative by Ireland and Northern Ireland to create practical linkages between their respective spatial strategies, the *National Spatial Strategy* and the *Regional Development Strategy*.

The fourth data related project is the development of the first *All-Island Deprivation Index*. This paper draws on the findings of the research carried out to address the development of this *Index*.

History of Deprivation Indices

Northern Ireland

The first deprivation index for Northern Ireland was based on the 1981 Census of Population and was developed to allow the Department of the Environment to identify Urban Priority Areas for inclusion under the 1978 *Inner Urban Areas Act* (Townsend, 1987). The resulting index included eight indicators, seven of which are calculated using the 1981 census. The indicators were largely perceived as identifying various groups known to be at risk of poverty, such as, lone parents, lone pensioners and those born outside the Commonwealth.

Following the 1991 Census, this tradition of multidimensional indices was consolidated in the form of the Index of Local Conditions (ILC, also known as the Robson Index) (Townsend, 1987). The ILC was constructed using specific ideas about the main 'domains' of deprivation, and also differed from its predecessor in that it involved a conceptual shift from the notion of groups that are 'at risk' of deprivation to more direct measures, referred to as indicators of 'incidence'. This new index attracted considerable interest, providing a basis for the designation of eligible areas under successive EU- and IFI- funded initiatives to foster peace and reconciliation.

Following the 2001 Census, the Indices of Multiple Deprivation (IMD, also known as the Noble Index), were published. The IMD provided new area-based measures for the UK, incorporating eleven separate studies (Noble, et al., 2000 to 2007). The IMD differed from previous indices in that they are derived entirely from administrative data and do not require census data. The most recent Index of Multiple Deprivation for England (Noble, 2007) is based on seven domains: income, employment, health, education, housing, environment and crime. Each domain comprises a number of indicators, which are combined using the first factor of an exploratory factor analysis (EFA). The domain scores are then combined into a single index score using expert weightings. In Northern Ireland, the Index is known as the Multiple Deprivation Measure (MDM) with updates in 2001, 2005 and 2010. This data is readily available on the Northern Ireland Statistics and Research Agency website (http://www.nisra.gov.uk/deprivation/nimdm_2010.htm).

Republic of Ireland

Deprivation indices for the Republic of Ireland originated with a series of local development programmes that were implemented from the late 1980s onwards, and followed a different trajectory to that of the UK indices described above.

The Index of Relative Affluence and Deprivation for the Republic of Ireland relied on the 1991 Census (Haase, 1996). When compared with the DoE (UK) index based on the 1981 UK Census, the Irish index has two substantial conceptual differences. The first of these derives from the perception that the UK indices had an inherent urban bias, which is easily understood, given their origin in the designation of Urban Priority Areas and the more urban character

of UK society. Nevertheless, this bias is of obvious concern when the same approach is applied to the Republic of Ireland that has a more significant share of rural areas. Thus an understanding of the dimensionality of urban and rural deprivation was required in the Irish context. The second difference relates to the measurement of deprivation at different points in time. Each of the different UK deprivation indices relies on fundamentally different methodological principles, making comparison between scores in the different time periods impossible. Furthermore, the techniques used in the construction of these indices are not conducive to the analysis of change over time, allowing at best a comparison of the rank order of local areas.

In contrast to the UK where the census is carried out every ten years, the Irish Census is carried out every five years, providing a stronger incentive to develop deprivation measures that are comparable over time, right down to the small area level. The key methodological innovation that allows this comparison to occur is the application of a technique known as Confirmatory Factor Analysis (CFA), as opposed to Exploratory Factor Analysis (EFA). The latter has been used to construct the majority of deprivation indices that have been proposed for different countries and regions throughout the world. The CFA conserves all of the positive features of EFA, but allows the underlying dimensions of deprivation to be first conceptualised on theoretical grounds before being tested empirically. This allows the researcher to assess whether the hypothesised model provides an adequate fit to the empirical data, as well as maintaining a stable measurement structure and scale over successive census periods. This combination of a conceptual framework, a multidimensionality and stable measurement structure allows fully comparable deprivation scores.

This approach was first applied in Haase and Pratschke's analysis of data from the 1991, 1996 and 2002 census (Haase and Pratschke, 2005), and subsequently extended to include 2006 data (Haase and Pratschke, 2008). This methodology was used to develop the adopted Measures of Deprivation in Ireland, including: Haase and Pratschke, in 2005 and 2008, and the current Pobal-Haase Deprivation Index for Small Areas (Haase and Pratschke, 2010).

Key Considerations in Developing an *All-Island Deprivation Index*

For the first time, the 2011 Census has been co-ordinated throughout all European countries, and the definitions and procedures used ground the feasibility and utility of developing small area deprivation measures at a European-wide level. In the context of cross-border cooperation, the 2011 Censuses in Ireland and Northern Ireland now provide a unique opportunity to study the spatial distribution of deprivation from a comparative perspective.

Developing an index of deprivation for the island of Ireland requires the identification of comparable multi-national data. The recent UK indices such as the IMD/MDM are predominantly based on administrative data that do not yield comparable measures that can be used for cross-border analysis because similar administrative data at detailed spatial scales are not readily available in the Republic of Ireland. This is due largely to Ireland's legacy of poor data management procedures, the non-unique nature of Irish addresses and the lack of a unique identifier such as a postcode. The indices such as those in the UK that incorporate measures of income support, benefits, crime rates, education and proximity to services as well as the underlying methodology, may only be replicated in countries where such data are consistently available[2]. As a consequence, it is apparent that any *All-Island Deprivation Index*, and more generally, any trans-national European deprivation index, must be based on the census of population. Given the issues identified above, this research set out to test whether it is possible to extend the statistical techniques used in recent years to estimate deprivation in Ireland to Northern Ireland, in order to provide comparable scores.

The issues to be addressed, therefore, when seeking to construct a multi-national deprivation index are as follows:

- comparability of indicator variables;
- comparability of spatial units;
- temporal synchronicity;
- common dimensionality of deprivation;
- common statistical model;
- standardisation of index scores across multiple jurisdictions; and
- comparison of All-Island Deprivation Scores with other measures.

As it is beyond the remit of this paper to discuss any of these issues in the required detail, we will only briefly touch on these issues in order to provide an overview of how the *All-Island Deprivation Index* is constructed, starting with its conceptual foundations[3].

Conceptualisation and Construction

The *All-Island Deprivation Index* is constructed along similar lines to the New Measures of Deprivation (Haase and Pratschke, 2005, 2008) and the Pobal-Haase Deprivation Index for Small Areas (Haase and Pratschke, 2010). The *All-Island Deprivation Index* is based on a prior conceptualisation of the underlying dimensions of deprivation and the use of Confirmatory Factor Analysis to estimate the scores. The overall Index draws on ten indicators to express a combination of three dimensions of relative affluence and deprivation: Demographic Profile, Social Class Composition and Labour Market Situation[4]. These three dimensions can be similarly constructed with census data from Northern Ireland.

The Demographic Profile is measured by five indicators:

- percentage change in population over the previous five years;
- percentage of people aged under 15 or over 64 years of age;
- percentage of people with a primary school education only;
- percentage of people with a third-level education; and
- mean number of persons per room.

The Social Class Composition is also measured by five indicators:

- percentage of people with a primary school education only;
- percentage of people with a third-level education;
- percentage of households headed by professionals or managerial and technical employees, including farmers with 100 acres or more;
- percentage of households headed by semi-skilled or unskilled manual workers, including farmers with less than 30 acres; and
- mean number of persons per room.

Finally, the Labour Market Situation is measured by three indicators:

- percentage of households with children aged under 15 years and headed by a single parent;
- male unemployment rate; and
- female unemployment rate.

When considering the new *All-Island Deprivation Index*, it is important to: compare the scores on the measures above and other indices currently in use within each jurisdiction, note the resulting differences and understand any variations.

For Ireland, the existing deprivation index is in line with the conceptual underpinnings of the *All-Island Deprivation Index*, but the main difference is that the new census uses Small Areas as the basic geographic unit. The individual area scores from the *All-Island Deprivation Index* are almost identical to those already published for Electoral Divisions in the form of the Pobal-Haase Deprivation Index and have an ever closer alignment with the score from the Pobal-Haase New Measures of Deprivation that have recently been published at the Small Areas level.

A much greater challenge is posed by the Northern Ireland estimates, as the deprivation scores presented here differ significantly from those of the Multiple Deprivation Measures. For this reason, it is necessary to discuss some of the differences in the conceptualisation and construction of these two indices.

Firstly, the MDM aim to provide an estimate of the number of people in each area who are poor. In contrast, the *All-Island Deprivation Index* conceptualises deprivation as embracing structural weakness – for example in the case of disadvantaged rural areas where some of the 'would-be poor' have effectively left the region.

Second, and related to the first consideration, the MDM build exclusively on variables that appear to represent direct and count-like expressions of deprivation. The *All-Island Deprivation Index*, by contrast, is based on the understanding that, when considered at an area level, all indicators express the likelihood of poverty and deprivation. As a result, there is no reason to prefer indicators that are directly correlated with deprivation over indicators that are inversely correlated, such as measures of affluence. For this reason, the *All-Island Deprivation Index* uses measures of affluence as well as deprivation, including, for example, the proportion of people with a third-level education, and higher or lower professionals.

Third, the MDM derive the overall deprivation scores by summing seven domain-specific deprivation scores. The *All-Island Deprivation Index*, by contrast, conceptualises three underlying ('latent') dimensions of deprivation, which are measured by ten indicators using the CFA . We believe that the MDM involves a 'double counting' of the same underlying dimensions of deprivation which, indeed, is acknowledged by the authors (Noble, 2005).

Fourth, and stemming from the preceding considerations, the MDM and *All-Island Deprivation Index* result in two very different distributions of deprivation scores. The *All-Island Deprivation Index* is based on a continuous measurement from extremely affluent to extremely disadvantaged. The MDM, by contrast, makes no distinction between degrees of affluence. This is less important when using small area maps to identify the most disadvantaged areas, but is of considerable relevance when aggregating to larger areas, as the *All-Island Deprivation Index* generates a population-weighted average across affluent as well as disadvantaged areas, while the MDM counts only the extent of disadvantage.

As a result of these different conceptual and construction issues and the fact that indices in both jurisdictions are measuring deprivation in a slightly different manner, it is not surprising that a comparison of the *All-Island Deprivation Index* and MDM reveal a different pattern of results. This is explored in the section below on the 'Interpretation of the Results'.

Comparability of Indicators and Spatial Units

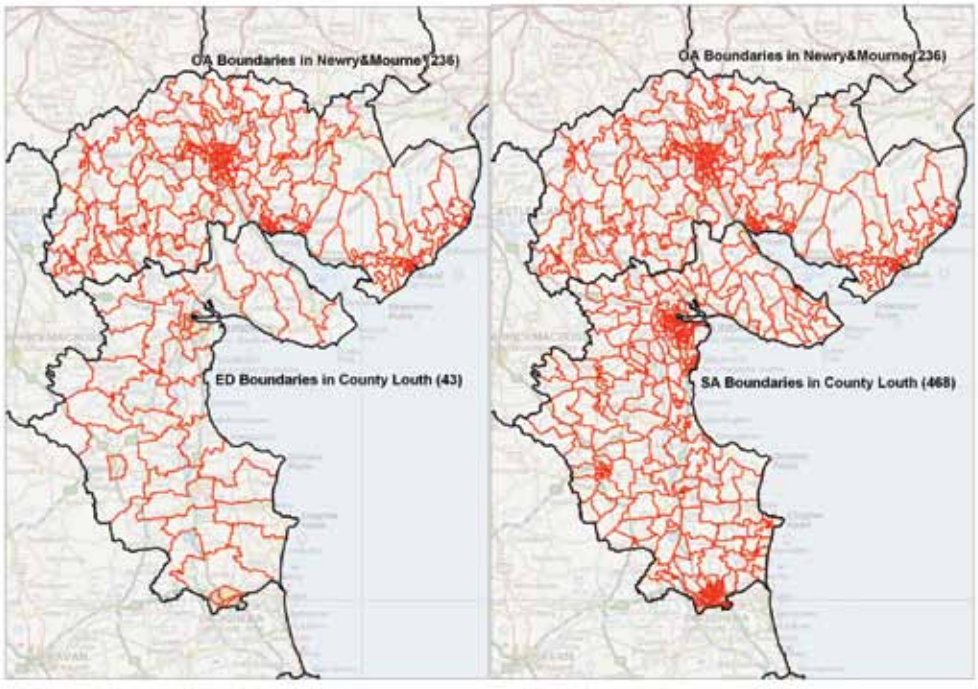
For the census indicators of interest to the *All-Island Deprivation Index*, Europe collects similar information and relies on similar classifications and typologies, and the Irish and UK censuses are well aligned in this sense. Measures of population change, age dependency, lone parent families, unemployment and housing density all translate well from one jurisdiction to another. However, there are significant differences in the measurement of educational attainments, due primarily to differences in the two education systems. For example, there is a very large difference in the percentage of people with no more than a primary education in the Republic of Ireland (18.7 percent) and Northern Ireland (42.8 percent), and in the percentage with a third-level qualification (30.8 percent in the Republic compared with 15.5 percent in Northern Ireland). The magnitude of these disparities may not reflect meaningful differences between the two populations so much as the way in which questions about educational attainments were constructed and administered in the census. If this is indeed the case, there would be a strong justification for transforming the education variables to control for spurious differences in the statistical means.

Ireland and the UK also use different occupational classifications to measure social class, although the differences here are much less pronounced. Some of the variables included in the model are not directly comparable, and the structure of the deprivation model must allow for these differences while maintaining comparability.

Until recently, one of the major drawbacks of the Irish Small Area Population Statistics, was that they were based on Electoral Divisions. The population of Electoral Divisions could range from as little as 50 people in some rural areas to over 34,000 in the case of Blanchardstown-Blakestown, a suburb of Western Dublin that has grown significantly over the past two decades. In preparation for the 2011 census, the Ordnance Survey of Ireland and the Central Statistics Office developed a new set of spatial units, denominated Small Areas, with a minimum of 65 households and an average of about 100. The 2011 Small Area Population Statistics data will be provided at this level. This follows earlier developments in the UK, which had adopted Output Areas, which are similar in scale to Small Areas, at the time of the 2001 Northern Ireland census.

With a view to developing improved deprivation measures for the Republic of Ireland, the Central Statistical Office made the complete 2006 census data, recompiled to the new Small Areas, available to the authors[5]. It is thus possible, for the first time, to overcome the problems posed by heterogeneous spatial units and to use census data to explore the possibility of measuring deprivation on a cross-border basis. The improved spatial comparability of geographies on either side of the border is highlighted in Figure 1.

Figure 1: Improved Spatial Comparability – Electoral Divisions vs. Small Areas



Source: AIRO, 2011

Interpretation of the Index Scores

Using the methodology outlined above for developing the *All-Island Deprivation Index*, as well as more spatially compatible output areas, the research team developed a prototype deprivation index using the two censuses conducted at two different points in time, 2001 in Northern Ireland and 2006 in the Republic of Ireland.

To get a better understanding of the results of the new *All-Island Deprivation Index* and the differences between the indices in both jurisdictions it is necessary to: (1) map the results and look at the distribution of the final scores across the island; and (2) analyse the difference between the results from this new index and those that are already in place in both jurisdictions.

Results and Cross-Border Comparisons

The *All-Island Deprivation Index* scores are normally distributed, with most scores clustered around the mean and fewer scores at the extremes of affluence and deprivation (i.e. it follows a bell-shaped curve). Nearly all scores are situated within three standard deviations of the mean (i.e. range between -30 and +30). Eight labels, ranging from 'extremely affluent' to extremely disadvantged' are used to illustrate the range of scores in Table 1, and are also illustrated as a graph in Figure 2. The colours used to illustrate the spatial distribution for deprivation in the maps (see Figure 3) are noted in Table 1.

The initial findings of the *Index* suggest that there are more extremes in levels of both disadvantage and affluence present within and across the Republic

Table 1: Distribution of All-Island Deprivation Index Scores

				Republic of Ireland		Northern Ireland	
Index Score	Standard Deviation	Label	Colour in Maps	# of Small Areas	% of Small Areas	# of Output Areas	% of Output Areas
> 30	> 3	extremely affluent	dark blue	75	0.5	0	0
20 to 30	2 to 3	very affluent	medium blue	469	3.1	0	0
10 to 20	1 to 2	Affluent	medium green	2,153	14.4	138	2.7
0 to 10	0 to 1	marginally above average	light green	5,263	35.2	1,916	38.2
0 to -10	0 to -1	marginally below average	light yellow	4,494	30.1	2,388	47.6
-10 to -20	-1 to -2	Disadvantaged	medium yellow	2,012	13.5	577	11.5
-20 to -30	-2 to -3	very disadvantaged	orange	454	3.1	2	0.0
< -30	< -3	extremely disadvantaged	red	12	0.1	0	0
				14,942	**100.0**	**5,022**	**100.0**

Figure 2: All-Island Deprivation Index Category Results

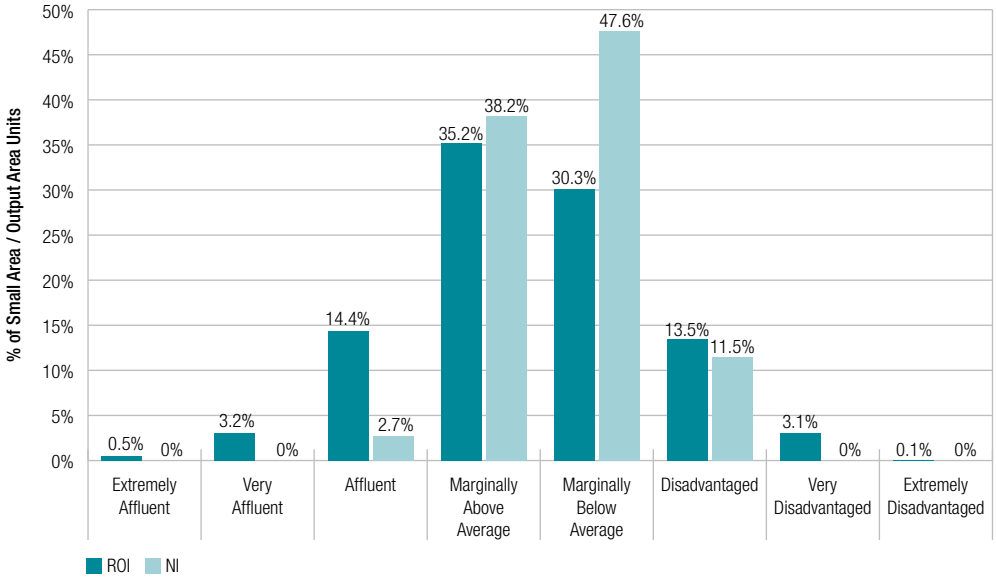
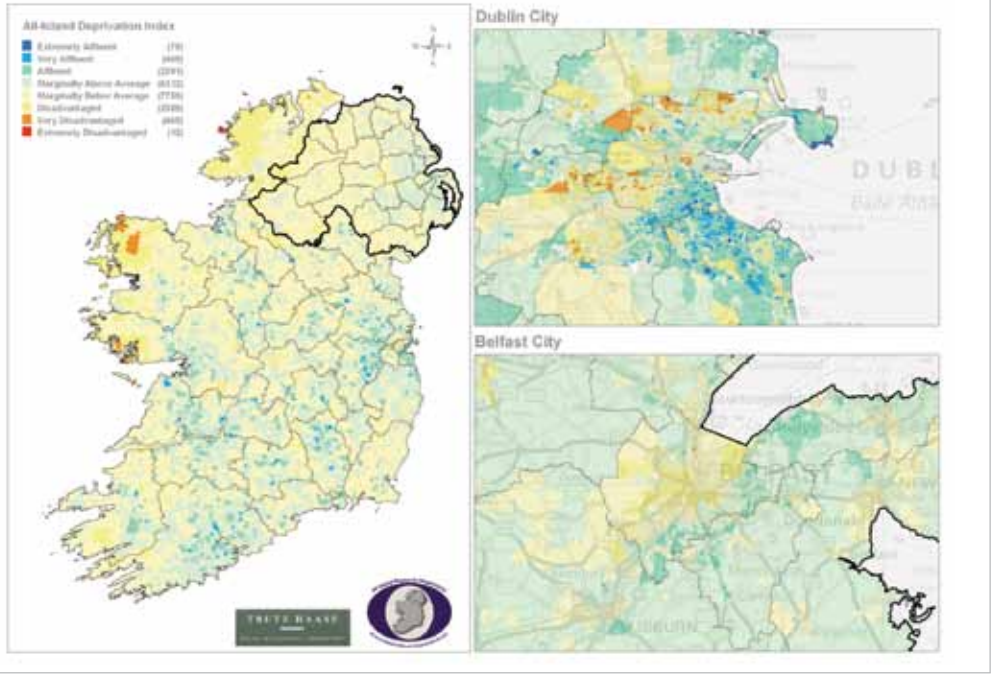
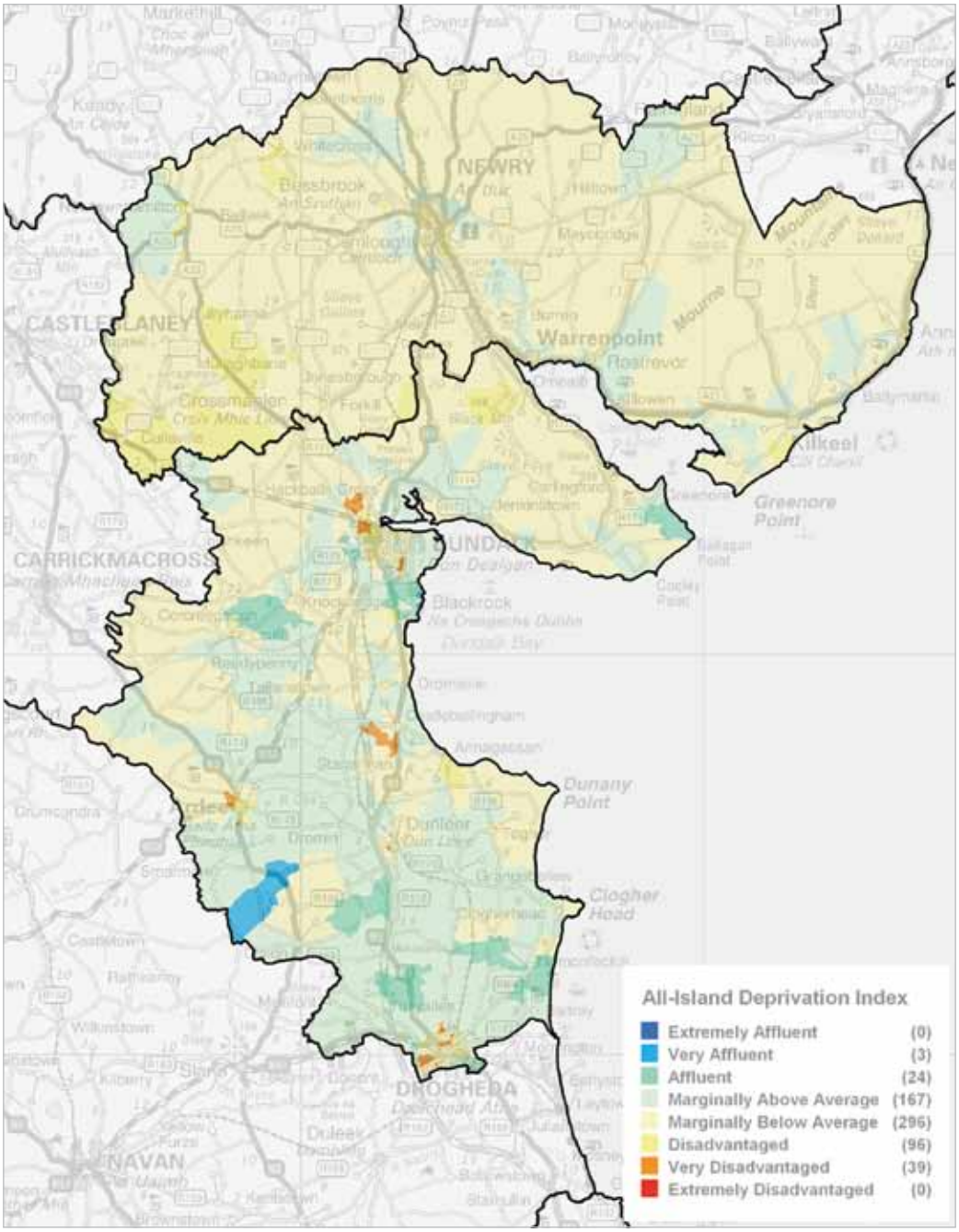


Figure 3: All-Island Deprivation Index



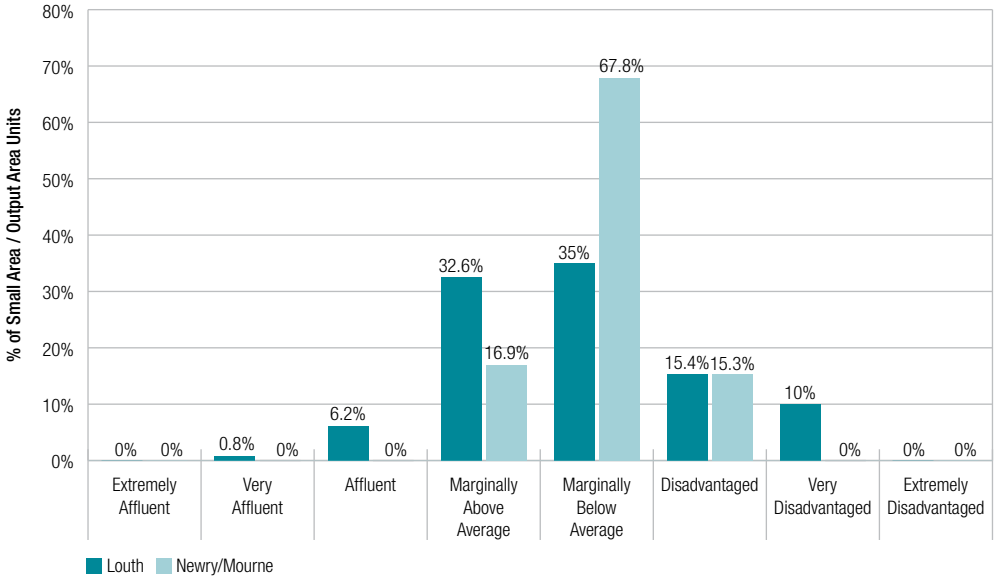
Source: AIRO, 2011

Figure 4: All-Island Deprivation Index – Louth and Newry/Mourne



Source: AIRO, 2011

Figure 5: All-Island Deprivation Index in Louth and Newry/Mourne



of Ireland with 554 Small Areas (3.6 percent) in the *Extremely Affluent* and *Very Affluent* categories and 466 Small Areas (3.2%) within the *Extremely Disadvantaged* and *Very Disadvantaged* categories. The results for Northern Ireland show a much tighter distribution with 38.2 percent of Output Areas classed as being within the *Marginally Above Average*, 47.6 percent within the *Marginally Below Average* categories, the remaining within the *Affluent* and *Disadvantaged* categories. In contrast to the Republic of Ireland, no Output Areas in Northern Ireland fell within the more extreme categories of affluence and disadvantage.

An examination of a specific cross-border study region, such the Louth-Newry/Mourne area, highlights the usefulness and contribution that the *All-Island Deprivation Index* will make towards developing stronger levels of evidence-informed cross-border planning. Figure 4 illustrates the distribution of levels of affluence and disadvantage within the study area and clearly shows the higher levels of affluence apparent in the southern half of County Louth. In general, Newry and Mourne have a higher proportion of geographical units classed as being Marginally Below Average in comparison to County Louth and an almost identical proportion of units classed as being Disadvantaged (see Figure 5). Most of the Disadvantaged areas within Newry and Mourne are within Newry City; however, there is a noticeable cluster of areas in the immediate border area such as Culaville, Crossmaglen, Silverbridge and Jonesborough that are classed as Disadvantaged. All of the Very Disadvantaged areas within this study area are within County Louth, specifically in the urban environs of Dundalk, Drogheda, Ardee and Dunleer.

Comparison of All-Island Deprivation Scores with Other Measures

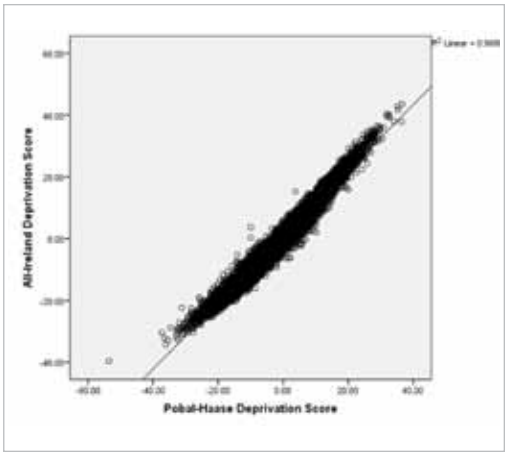
In the following section, we will provide two brief comparisons drawing on scores from the *All-Island Deprivation Index* and scores from existing deprivation indices in the Republic of Ireland and Northern Ireland. With regard to the Republic of Ireland, comparisons are made with the recently published Pobal-Haase Index for Small Areas (Haase and Pratschke, 2010). Comparisons for Northern Ireland are all based on the 2005 Multiple Deprivation Measures (NISRA, 2005), with the spatial

levels being considered the Output Areas and at Super Output Areas. In each case, we present a scattergram of the distribution of scores, a brief overview of the main observations and a discussion of the sources of any similarities and differences.

1. Comparison of *All-Island Deprivation Index* and Pobal-Haase Index for Small Areas

Observation: Figure 6 shows a scattergram of scores for 14,942 Small Areas in the Republic of Ireland, comparing the new *All-Island Deprivation Index* (Y-axis) with the Pobal-Haase Index for Small Areas (X-axis). The scores are almost indistinguishable ($R^2 = .968$).

Figure 6: Scattergram of the Correlation between the AIDI and Ireland's Pobal-Haase Index for Small Areas

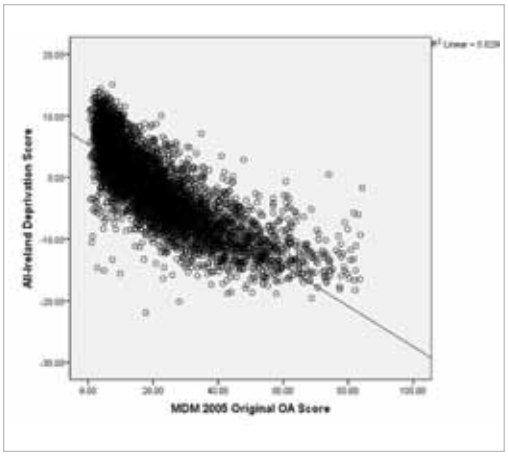


Discussion: The two indices are based on the same variables, analytical techniques and very similar statistical models. The Pobal-Haase Deprivation Index contains two additional (relatively weak) cross-loadings between indicator variables and factors, which were dropped in the context of the All-Island model as a result of the disparity between education and social class variables as discussed earlier. The next Pobal-Haase Deprivation Index, following the publication of 2011 census data, should ideally be constructed in the form of an *All-Island Deprivation Index*. Using the All-Island Deprivation Scores or the Pobal-Haase Deprivation Scores in the context of a Resource Allocation Model should make little or no difference to the distribution of resources, particularly in a Republic of Ireland context.

2. Comparison of *All-Island Deprivation Index* Scores for Northern Ireland and 2005 Multiple Deprivation Measures – Output Area Level

Observation: Figure 7 contains a scattergram of scores for 5,022 Output Areas in Northern Ireland, comparing the scores for the new *All-Island Deprivation Index* (Y-axis) against the 2005 Multiple Deprivation Measures (X-axis). The scores are only broadly convergent, composing two visibly and markedly distinct distributions ($R^2 = .629$), with an evident threshold effect at the affluent (upper left-hand) "tail" of the distribution, due to the application of a cut-off point of zero to the MDM scores.

Figure 7: Scattergram of the Correlation between the AIDI and Northern Ireland's *Multiple Deprivation Measures*



Discussion: The Northern Ireland MDM have, until now, been mainly used in the form of a ranking of areas, with all areas above a given value being included in public intervention programmes. The *All-Island Deprivation Index*, by contrast, provides a more continuous measurement of the spectrum of

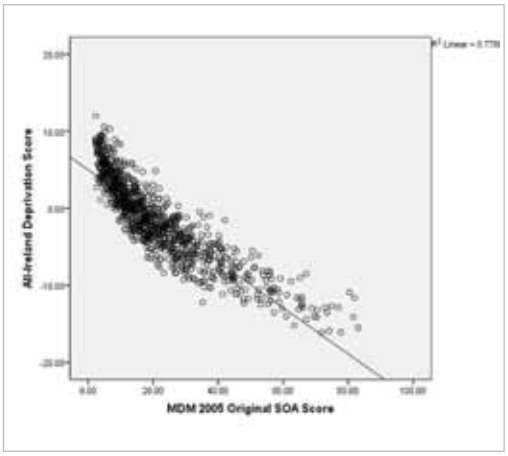
deprivation and affluence on a defined measurement scale.

In addition to this distributional difference, the above figure also reveals a high level of dispersion around the regression line, which is a result of differences in the indicator variables utilised, the techniques applied and the way in which indicators are combined to form the overall index. In particular, it is worth pointing out that the Output Area-level MDM uses only a small subset of mainly 'economic' variables. As a consequence, we are dealing with a rather unbalanced comparison, between the multi-dimensional *All-Island Deprivation Index*, on the one hand, and an essentially one-dimensional set of scores from the Output Area level MDM.

3. Comparison of *All-Island Deprivation Index* Scores for Northern Ireland and 2005 Multiple Deprivation Measures – Super Output Area Level

Observation: Figure 8 shows a scattergram of scores for 890 Super Output Areas in Northern Ireland, comparing the scores for the *All-Island Deprivation Index* (Y-axis) with the 2005 Multiple Deprivation Measures (X-axis). The scores are more closely aligned ($R^2 = .778$) than in the previous Output Area-level comparison, although the threshold effect is still clearly visible at the cut-off point of zero on the MDM scale (at the left-hand 'affluent' tail of the distribution).

Figure 8: Scattergram of the Correlation between the AIDI and Northern Ireland's Multiple Deprivation Measures at the Level of Super Output Areas

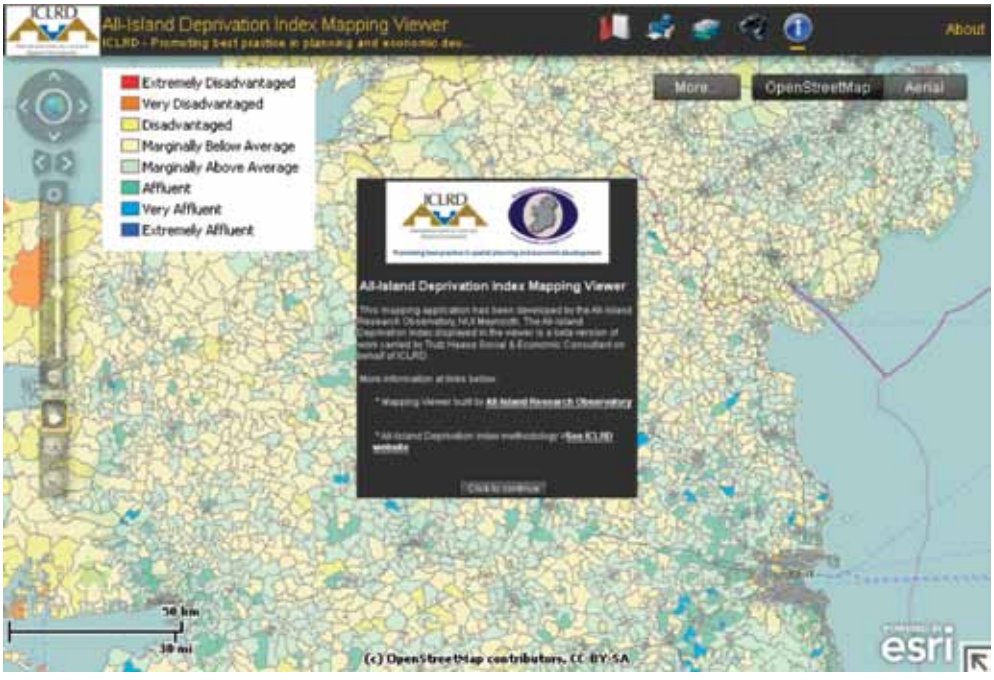


Discussion: When plotted against the normally distributed *All-Island Deprivation Index*, we can observe the results, which are characterised by a clear 'threshold effect' that coincides with the cut-off value for the MDM scores. Figure 8 shows a much better alignment of scores, due to the fact that the Super Output Area-level MDM is based on a broader range of indicators and domains than the Output Area-level scores. This valuable comparison between the two indices reveals that, despite their conceptual differences, they generate comparable estimates of the degree of deprivation at the level of Super Output Areas in Northern Ireland. At the same time, the clustering of values at the 'affluent' end of the spectrum has consequences for resource allocation systems. If the latter aim to identify areas for inclusion or exclusion in a targeted initiative on the basis of their relative ranking, the differences associated with the two sets of scores would be quite small. If deprivation scores are used, more significant differences will occur.

Dissemination of the All-Island Index of Deprivation

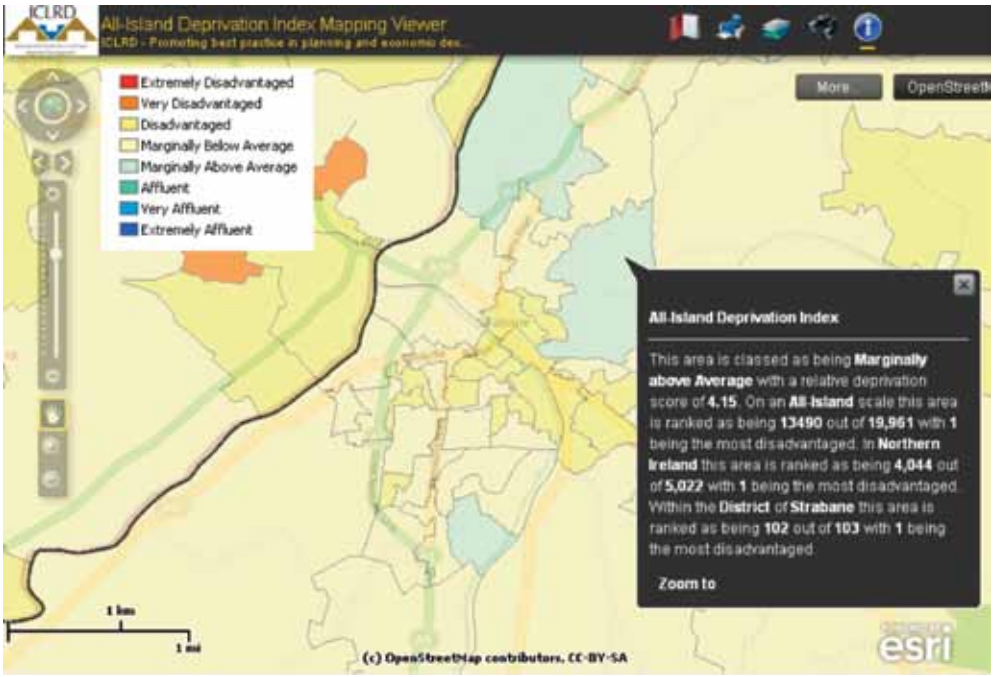
The results of this initial *All-Island Index of Deprivation* will be made available via an interactive web-mapping tool accessible through the ICLRD website. The mapping tool will provide users with an easy to use platform to analyse the results of the index (see Figures 9a and 9b). Users can click on specific areas of interest and be presented with a detailed summary of the Deprivation Score within that area, how it ranks within the hierarchy of *All-Island Deprivation Index* scores and, importantly, detail its relative position within its jurisdiction and Local Authority or Local Government District.

Figure 9(a): The ICLRD All-Island Deprivation Index Tool



Source: AIRO, 2011

Figure 9(b): ICLRD All-Island Deprivation Index Tool – Descriptive Analysis of Areas



Source: AIRO, 2011

Conclusion

It is evident that the publication of this initial *All-Island Deprivation Index* will stimulate debate given the use of deprivation indices for identifying and assessing programmes as well as resource allocation at both a National and European level. The authors welcome such debate and hope that this can foster a broad and informed discussion of the issues involved in the construction of deprivation indices within the research community and amongst policy-makers, practitioners and communities.

It is the intention of ICLRD and AIRO that the initial results of the initial *All-Island Deprivation Index* research will be tested by a number of planning and community groups in the coming months. This is an important step in the introduction of this new methodology and the use of common census datasets to measure relative levels of affluence and disadvantage. This outreach among potential user groups can also identify the interest and demand for a 2011 *All-Island Deprivation Index* following the release of new census results in 2012.

The broadening of deprivation measures to account for areas on either side of the border will undoubtedly change the way communities see themselves, and may in time impact on the content and design of cross-border programmes. The potential linking of this index to the development of EU programmes, in a cross-border context, is an exciting output of this research and will not only benefit the cross-border region of Ireland, but also pave the way for a more evidence-based approach in the allocation of funding to cross-border regions throughout Europe. In this context, the research

undertaken by the authors and ICLRD is a major step forward in the better understanding of cross-border regions throughout Europe.

The aim within the current study was to demonstrate the feasibility of constructing a deprivation index across two jurisdictions. The end result has been the development of a powerful conceptualisation of deprivation that achieves a 'very good model fit' when translated into a multiple group statistical model. As long as the limits of this model and the assumptions inherent in the resulting deprivation scores are remembered, the Index can make an important step forward in our understanding of the spatial distribution of deprivation in different regions of Europe. This approach, if applied to data from the forthcoming 2011 Census, has enormous potential and relevance.

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Endnotes

[1] In the context of the larger Irish border region, the three sub-regions include: the East Border Region, the Irish Central Border Region and the North West Region.

[2] An example from South Africa has been recently published and even in this case does not facilitate trans-national comparisons as the administrative procedures and policies that generate these data vary greatly.

[3] A more detailed paper, *The All-Island Deprivation Index for Small Areas--Consistent Deprivation Measures for the Island of Ireland*, is available on the AIRO and ICLRD websites.

[4] A detailed explanation of the statistical model used in the development of the index is available online at www.pobal.ie.

[5] It should further be noted that to meet the confidentiality requirements of the Central Statistics Office, the Pobal-Haase Deprivation Index for Small Areas combines all Small Areas with less than 65 households that fall within a single Electoral Division to form a new aggregate unit. The exception to this are 250 Small Areas with less than 65 households which represent full Electoral Divisions and for which data had already been published as part of the 2006 Small Area Population Statistics. To distinguish the resulting dataset from the original Small Area-level dataset of the Central Statistics Office, the IDs for the Pobal-Haase index are referred to as 'Combined Small Areas' or CSAs. The same units have been utilised for the *All-Island Deprivation Index*.

[6] A scattergram is a type of mathematical diagram that displays values as Cartesian points using two variables. The results are displayed as a set of points with each point using a variable that anchors its position on both the horizontal and vertical axis. The scatterplot maps the results for each Small Area using results for its score from the Pobal-Haase Deprivation Index (horizontal axis) and results for its score from the *All-Island Deprivation Index* (vertical). If the pattern of dots slopes from lower left to upper right the scatter plot suggest a positive correlation between the variables. Figure 6 shows a set of scores that are almost indistinguishable and as such highly correlated.

References

Haase, T (1996). *The New Measures of Deprivation*, Slideshow, 52 pages (PDF). https://www.pobal.ie/WhatWeDo/Deprivation/Pages/DeprivationIndex.aspx

Haase, T. & Pratschke, J. (2005). *Deprivation and its Spatial Articulation in the Republic of Ireland*, Dublin: Pobal, 68 pages (PDF). https://www.pobal.ie/WhatWeDo/Deprivation/Pages/DeprivationIndex.aspx

Haase, T. & Pratschke, J. (2008). *An Inter-temporal and Spatial Analysis of data from the Census of Population, 1991, 1996, 2002 and 2006.* https://www.pobal.ie/WhatWeDo/Deprivation/Pages/InformationforBeneficiaries.aspx

Haase, T. & Pratschke, J. (2010). *New Measures of Deprivation.* https://www.pobal.ie/WhatWeDo/Deprivation/Pages/InformationforBeneficiaries.aspx and http://maps.pobal.ie/

NISRA (2005). *Northern Ireland Multiple Deprivation Measure 2005.* http://www.nisra.gov.uk/deprivation/nimdm_2005.htm

NISRA Website: http://www.nisra.gov.uk/deprivation/nimdm_2010.htm

Noble et al (2007). *The English Indices of Deprivation 2007*. http://www.communities.gov.uk/publications/communities/indiciesdeprivation07

Townsend, P. (1987). 'Deprivation' in *Journal of Social Policy*, 16, pp 125-146 doi:10.1017/S0047279400020341.