

# Identifying dimensions of urban social change in Dublin– 1986 to 1996

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## ABSTRACT

Since the mid 1980s, Ireland has been subjected to significant social, economic and demographic change. The transformation was especially apparent in Dublin, the country's largest and most prominent urban centre. The paper employs small area statistics from the 1986 and 1996 censuses and adopts a factorial ecological approach to investigate the nature and geography of urban social change in the Dublin urban region. Four principal axes or dimensions of change were identified: 'Family status', 'Socio-economic status', 'Demographic change', and 'Seniors/Retirement'. While the study found that overall, the Dublin urban region was characterised by stability between 1986 and 1996, a number of significant spatial variations of change were evident in the four Local Authority Areas under study, particularly in Dun Laoghaire-Rathdown and South Dublin. The paper also proposes several avenues for further research including an update of urban social change using data from the 2002 Census of Population when it becomes available.

*Key index words:* Dublin, PCA, census, social change.

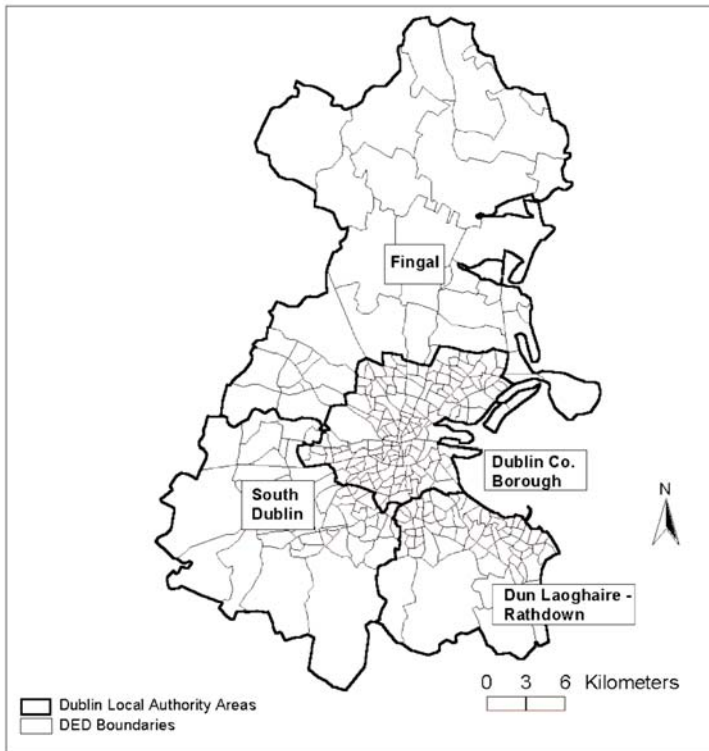
## Introduction

During the 1990s and the early 2000s, Ireland experienced unprecedented social, economic and demographic change. A markedly improving economy, brought on by the development of new industries, large-scale investment, and increased trade with the European Union, created unparalleled levels of wealth and prosperity in the country. The evidence was clearly visible in the creation of thousands of new jobs, a sharp fall in the unemployment rate, increasing wages, and population in-migration. While all parts of Ireland felt the effect of this change, the impact was particularly pronounced in Dublin, home to about 40 percent of the country's population.

With growing rates of urbanisation worldwide, cities are clearly emerging as the social and economic engines of change. Investigating the spatial characteristics of change within cities is an important function of urban geography and this task can be facilitated with the use of mapping, statistical analysis and other techniques often in conjunction with the use of census data at the neighbourhood or community level. The purpose of this paper is to examine the geographical and socio-demographic dimensions of change in the Dublin urban region from 1986 to 1996. This ten-year period preceded the explosive economic growth experienced in Ireland beginning in the late 1990s but nevertheless represents a key period of change in the country and in Dublin.

A full Census of Population is conducted in Ireland every ten years the last being in 1991. As was widely reported, the 2001 census was postponed as a result of restrictions imposed to combat the threat of the spread of the foot and mouth epidemic from the UK. A census was

conducted in April 2002. A smaller census is carried out in the middle of each decade and this paper employs small area statistics from two of these - the 1986 and 1996 censuses. The aim of the paper is to adopt a factorial ecological approach to identify the spatial character of socio-demographic change between 1986 and 1996 in the four local authority areas comprising the Dublin urban region: Dublin County Borough, Fingal, South Dublin and Dun Laoghaire-Rathdown (Figure 1). As displayed in Figure 1, the principal unit of analysis within each of the local authorities is the District Electoral Division (DED), generally the smallest area for which data are available from the Central Statistics Office (CSO).



*Figure 1: The Dublin urban region showing the four Local Authority Areas and district electoral divisions.*

In two studies, Brady and Parker (1975, 1986) used census data to examine Dublin's socio-spatial structure in 1971 and 1981. The authors identified a number of significant trends and changes in the city's urban social geography. Within the fields of urban geography and urban studies, the majority of research investigating urban social differentiation has focused on single points in time- usually corresponding with the latest census year. While this approach is effective in identifying important spatial patterns, there is also a need to investigate the process of urban social change occurring within cities by directly comparing indicators over several points in time. As a result, this paper consists of a direct 'analysis of change' of Dublin over the ten-year study period. It is divided into four sections. The first provides a brief overview of the literature on urban change in Dublin. The second outlines the methodology and data employed while the third examines the spatial characteristics of urban

social change in the city. The concluding section consists of an overview and discussion of the findings.

Table 1: Population change in the Dublin urban region.

Area	1986	1996	% change
Dublin County Borough	502,749	481,854	-4.2
South Dublin	199,546	218,728	9.6
Fingal	138,479	167,683	21.1
Dun Laoghaire-Rathdown	180,675	189,999	5.2
Total - Dublin Urban Region	1,021,449	1,058,264	3.6

### **The geography of urban change in Dublin: a brief overview**

Dublin has been described as an ensemble of villages. Bannon (1999: 1) views it “as a collection of communities and groups, which have their own identities while owing allegiance to the city”. As a European gateway and capital city, Dublin is undeniably the social, economic, cultural, and commercial hub of Ireland. Throughout much of the twentieth century, however, the city has witnessed periods of significant geographic transition. As Horner (1999) explains, the notion of ‘Slum City’ dominated the early decades as reflected by a poor and densely populated core area. By the 1950s, a ring of suburban neighbourhoods had formed around the still crowded core area. The 1980s and 1990s was a period of rapid urban expansion in the Dublin region with the building of new roadways pushing residential and commercial development progressively outward into the fringe.

In their study of Dublin’s socio-spatial structure, Brady and Parker (1986) identified several patterns of socio-economic status in the city. An area of low status was centred on the inner city and the docks and extended towards the west and south-west in the direction of Tallaght and Clondalkin, which were both found to be of middle-ranking status. In addition, a solid zone of high status was evident stretching towards the south and south-east from the core area into Dun Laoghaire. The authors found that a more complex pattern existed in the northern part of the city with high status visible in the area extending from Clontarf to Howth and a mixture of low and high status in the northern inner suburbs (Brady and Parker, 1986). In addition, the study revealed that there was very little change in this geographic pattern between 1971 and 1981.

Dublin’s inner city has experienced considerable change. For many decades, it was a symbol of severe urban decline and social deprivation accentuated by a dilapidated and aging infrastructure. By the mid 1980s, the inner city had a rapidly falling population and an unemployment rate of over 35 percent with levels reaching more than 80 percent in some local authority housing projects (MacLaran, 1999). However, as MacLaran points out, by the mid-1990s, the area began to see a turn around in its fortunes, largely the result of an improving Irish economy and the in-migration of middle class residents. According to Bannon (1999), the process of renewal led to an increase of nearly 10,000 in the population of the inner city between 1991 and 1996.

Table 1 shows that while the Dublin urban region recorded moderate population growth between 1986 and 1996, there was noticeable variation in change among the four local authority areas, of which it is comprised. The population of Dublin County Borough fell by

over 4 percent (a loss of nearly 21,000), while South Dublin's population grew by almost 10 percent and Fingal's increased by just over 21 percent (nearly 30,000). By comparison, Dun Laoghaire-Rathdown saw a smaller rise of about 5 percent. While the inner city gained people during the 1990s, these figures point to an overall hollowing of the central city and a simultaneous growth and movement into what Bannon (1999: 8) describes as Dublin's "low density, car-oriented, seemingly unplanned" periphery.

Dublin's economic base has also undergone considerable transformation. Beginning in the early 1970s, the city was hard hit by heavy losses in industrial employment, brought on by international competition, changing production technology, and unfavourable government policies (MacLaran, 1993). The problem was compounded by the recession of the early 1980s, which resulted in the loss of nearly a third of all the city's jobs in manufacturing. However, by the 1990s, the situation began to improve with the restructuring of Dublin's economy. While jobs in agriculture and industry fell, employment in the service industries grew by nearly 180,000 between 1981 and 1998. By the late 1990s, over 75 percent of all jobs in Greater Dublin were in the service sector, a sizeable portion of which were in the burgeoning field of information technology. These events led Bannon (1999: 9) to observe:

*"By the mid 1990s, the economic situation had changed dramatically. Now, high rates of economic growth, in-migration, new household formation and rapid increases in car ownership and traffic congestion, coupled with low interest rates were all fuelling growth far beyond expectations or even short-term projections".*

Despite the transformation, however, long-term unemployment and deprivation persist in Dublin. It is estimated that about 70,000 people currently remain unemployed throughout the region, many of them long-term (Bannon, 1999). According to the Dublin Regional Authority, other problems that need to be addressed include the continued loss of jobs in traditional industries, uneven economic development, poverty, drug abuse, crime and inadequate infrastructure.

### **Data and methods**

As stated, the methodological approach in this paper consists of a direct analysis of change, a technique used infrequently in urban social geography. Notably, this approach was used by Perle (1983) in an examination of urban social change in Detroit where he applied principal components analysis (PCA) to a change matrix containing 42 socio-economic variables from the 1960 and 1970 censuses. Similarly, Kitchen (2001) applied a model of urban deprivation change to the Montreal Urban Community by also using PCA to analyse a combined data set from the 1986, 1991 and 1996 censuses.

Table 2 lists the 45 variables selected for the study extracted from Ireland's 1986 and 1996 Census of Population. The variables, grouped into nine categories, cover a range of social, economic, demographic, housing and travel dimensions. The notes accompanying the census data were carefully examined to ensure that the definition of each variable was the same over the two censuses. The literature on social differentiation and factorial ecology stresses the importance of selecting as wide a range of variables as possible. An attempt was made here to accomplish this while providing for consistency with respect to variable type and definitions. The table shows a proportionally larger number of variables in the 'Employment Structure' category owing to the fact that a distinction was made between male and female status. On the other hand, the number of variables dealing with 'Educational

Attainment', for example, was limited because the 1986 census did not provide as much detail in this category as the 1996 census. With respect to covering the full range of possible urban social dimensions, it is also important to note that this study relies on data from the smaller mid-decade censuses, which do not include as many indicators as the full censuses conducted every ten years (i.e. 1981 and 1991), particularly housing characteristics.

The first step in the data analysis was to construct separate data matrices for 1986 and 1996 containing the 45 variables for each of the 322 District Electoral Divisions (DEDs) in the four local authorities comprising Dublin. The geographic boundaries of the DEDs remained unchanged over the two censuses, creating an ideal spatial dataset for temporal research. However, the number of DEDs in each of the areas varies considerably: 162 in Dublin County Borough, 49 in South Dublin, 42 in Fingal, and 69 in Dun Laoghaire-Rathdown. All but two of the 45 variables were expressed as ratio values.

The second step in the analysis was to assemble a single data matrix consisting of 'change variables'. These were calculated by simply subtracting the 1986 value from the 1996 value for each of the variables, thereby creating a dataset that reflects the extent of change in every DED in Dublin (either positive or negative). For example, with the variable 'percent males who are single', if the 1986 value for a DED is 59.8 and the value for 1996 is 69.8, then the change variable is 10.0. With respect to the two non-ratio variables (total population and average number of persons per household), the value was expressed as the percent change in the unit between 1986 and 1996. In short, a final matrix was created consisting of 45 change variables for each of the 322 DEDs in Dublin.

The third step was to perform a principal components analysis (PCA) on the change matrix. For this paper, PCA was chosen over factor analysis as it is used often as a data reduction technique and does not make any assumption with regards to common and unique variance. Also, it is an appropriate technique under the assumption that the error and specific variance represent a small portion of the total variance in the original set of 45 variables. Furthermore, as described by Langlois and Kitchen (2001), on empirical grounds, PCA and factor analysis have produced very similar results. In particular, this has been the case in factorial ecological studies where both techniques have been applied to socio-economic, socio-demographic or housing data for small areas to identify the principal structural dimensions of urban residential space.

PCA and factor analysis have a long history in quantitative and urban geography. For example, Brady and Parker (1975, 1986) used factor analysis in their studies of the socio-spatial structure of Dublin while Davies and Murdie (1991, 1993) employed the technique in their research on the intraurban variations of social dimensions in Canada's metropolitan areas. Broadway (1989) applied PCA in his comparative study of urban deprivation in Canadian and U.S. inner cities and Fieldhouse and Tye (1996) used it to examine the ecological fallacy in studies of deprivation in Britain.

However, it is important to point out that there are potential shortcomings in the use of these techniques. For example, MacLaran (1993) argues that a major limitation in factorial ecological studies in the Dublin context is that the available small area census statistics refer to wards or DEDs, which have fairly large populations (often over 3,500) and internally tend to be quite socially heterogeneous. For several decades, the issue of the 'ecological fallacy' or 'the modifiable areal unit problem' has been a major concern for geographers using small area data (Martin 1996). This has certainly been the case in Canada and the United States with

Table 2: Variables (and acronyms) included in the analysis of change: 1986, 1996 censuses.

**Population and Age Structure**

1. Total population	TOT POP
2. Percent of population aged 0 to 14	AGE 0-14
3. Percent of population aged 15 to 24	AGE 15-24
4. Percent of population aged 25 to 44	AGE 25-44
5. Percent of population aged 45 to 64	AGE 45-64
6. Percent of population aged 65 and over	AGE 65+

**Marital Status**

7. Percent of males who are single	M-SING
8. Percent of males who are married	M-MAR
9. Percent of females who are single	F-SING
10. Percent of females who are married	F-MAR
11. Percent of all males living alone who are aged 65 and over	SEN M ALONE
12. Percent of all females living alone who are aged 65 and over	SEN F ALONE

**Family Type**

13. Percent of families that are couples with no children	NO-CHILD
14. Percent of families that are couples with children	CHILDREN
15. Percent of families that are headed by a father	LONE-FATH
16. Percent of families that are headed by a mother	LONE-MOTH
17. Percent of families that are empty-nest	EMP-NEST
18. Percent of families that are retired	RETIRED

**Household Type**

19. Percent of households comprising a conventional house	HOUSE
20. Percent of households comprising a flat	FLAT
21. Average number of persons per household	DENSITY

**Employment Structure**

22. Percent of males aged 15 and over who are at work	M-WORK
23. Percent of males aged 15 and over who are unemployed	M-UNEMP
24. Percent of males aged 15 and over who are students	M-STUDENT
25. Percent of males aged 15 and over who are unable to work	M-UNABLE
26. Percent of males aged 15 and over who are performing home duties	M-HOME
27. Percent of females aged 15 and over who are at work	F-WORK
28. Percent of females aged 15 and over who are unemployed	F-UNEMP
29. Percent of females aged 15 and over who are students	F-STUDENT
30. Percent of females aged 15 and over who are unable to work	F-UNABLE
31. Percent of females aged 15 and over who are performing home duties	F-HOME

**Occupation Groups**

32. Percent of all workers employed in manufacturing	MANUFACT
33. Percent of all workers employed in building and construction	BUILD
34. Percent of all workers employed in commerce	COMMERCE
35. Percent of all workers employed in transport	TRANSPORT
36. Percent of all workers employed in public administration	PUB-ADMIN
37. Percent of all workers employed in professional services	PROF-SERV

**Socio-economic Groups**

38. Percent of all persons aged 15 and over who are higher professionals	HIGH-PROF
39. Percent of all persons aged 15 and over who are lower professionals	LOW-PROF
40. Percent of all persons aged 15 and over who are skilled manual workers	SKILL-MAN
41. Percent of all persons aged 15 and over who are semiskilled manual workers	SEMI-MAN

**Educational Attainment**

42. Percent of all persons aged 15 and over who are still in school	IN-SCHOOL
43. Percent of all persons aged 15 and over who left school before age 15	LEFT-15

**Means of Travel**

44. Percent of all persons who regularly use public transit	PUBLIC
45. Percent of all persons who regularly use a vehicle	VEHICLE

the use of census tract boundaries and in the UK with census enumeration districts (EDs). However, in the absence of smaller and more homogeneous census defined areas, there is little one can do except to be aware of this potential limitation and to consider the sensitivity of the results (Fotheringham, 1997). Moreover, as described above, previous research on Dublin employing census data aggregated at the level of the ward has proven successful in identifying broad spatial patterns of socio-demographic change (Brady and Parker, 1975; 1986).

In this paper, PCA with a varimax rotation was used to identify dimensions of urban social change in the Dublin urban region inferred from the factor loadings on the 45 variables. This model was only selected after carefully scrutinising a range of other possible solutions, including principal factor analysis (maximum likelihood factors and principal axis method) and other rotations, including biquartimax and equamax. While it may be argued that a varimax rotation will unnecessarily impose orthogonality on the output from social data, it was deemed appropriate in this case as it is a common procedure in PCA and has been used successfully in the past to improve the interpretability of the components or dimensions of urban social change in Dublin and other cities (Brady and Parker, 1975; 1986; Shaw and Wheeler, 1994; Langlois and Kitchen, 2001; Kitchen, 2001).

From the loadings, a component score was calculated for each of the 322 DEDs in the dataset. The scores were standardised by computing their z-values, which usually have a range of -3.0 to +3.0, and they permit the extent of change in each area to be considered. The fourth step in the analysis was to use ArcView GIS to map the component scores to produce a visual representation of the geographic character of urban social change in Dublin between 1986 and 1996.

### **The nature and geography of urban social change in Dublin: 1986-1996**

The PCA produced a ten-component solution accounting for just over 74 percent of the total variance in the dataset. As is standard practice in factorial ecology, only components with an eigenvalue greater than 1.0 were retained for further analysis. The components, their eigenvalues, and total variance are shown in Table 3. As the table indicates, five of the ten components explained more than 5 percent of the variance with Component 1 accounting for 20.2 percent of the variation and Components 2, 3 and 4 explaining 13.2 percent, 10.5 percent and 7.6 percent respectively.

Table 3: Explanatory power of the principal components.

Component	Eigenvalue	Percentage Total Variance	Cumulative Percentage
1	9.1	20.2	20.2
2	5.9	13.2	33.5
3	4.7	10.5	44.0
4	3.4	7.6	51.6
5	2.3	5.3	57.0
6	2.0	4.6	61.6
7	1.6	3.6	65.3
8	1.4	3.2	68.6
9	1.3	2.9	71.5
10	1.1	2.5	74.1

Table 4 displays the structure of the ten components of urban social change with respect to their significant variable loadings. Component 1 signifies change in 'Family status' in Dublin with high variable loadings on male and female marital status (married or single) and male and female student population. Component 2 illustrates change with respect to 'Socio-economic status' as evidenced with its loadings on variables including professional status (both lower and higher), manual workers (skilled and semi-skilled), and persons employed in manufacturing. Component 3 expresses 'Demographic change' in Dublin with its significant loadings on four variables identifying population groups (0-14, 15-24, 25-44, and 45-64). Component 4, meanwhile, clearly denotes changes in 'Seniors/retirement' with four relevant variables - the population aged 65 and over, male and female seniors living alone and retired persons. Component 5 appears to be a measure of population change and use of public transit - 'Population/public transit'. As mentioned, components 6 to 10, each account for a relatively small proportion of the total variance but express several types of transition in the Dublin urban region between 1986 and 1996 - 'Household type' (component 6), 'Female work status' (component 7), 'Families and children' (component 8), 'Unable to work' (component 9) and 'Work status' (component 10).

Table 5 shows the mean component scores in the four local authority areas over the study period. These standardised values provide a broad indication of the extent of change in the city according to the ten dimensions. The table highlights scores that are above 0.4 standard deviations (either positive or negative), indicating significant change. It is apparent that at the local authority level of geography, the 1986 to 1996 period was characterised mostly by stability, particularly in Dublin County Borough, which recorded mean scores relatively close to 0 on all of the ten components of change. Dun Laoghaire-Rathdown was the only area to witness at least a modest change with respect to 'Family status', registering a mean score of 0.426. This points to an overall increase in married males and females along with a decrease in single males and females and a drop in students. The area also recorded a high mean score on 'Socio-economic status' (0.764) signifying an increase in persons with a professional status along with a growth in manufacturing workers and a corresponding fall in manual workers (skilled and semi-skilled) over the ten-year period.

While South Dublin experienced stability with respect to 'Family status' and 'Socio-economic status', it witnessed noticeable 'Demographic change' recording a mean score of 0.865. The demographic transition in the area is visible in a growth in the proportion of the population aged 15 to 24 and 45 to 64 and a decrease in the population aged 0 to 14 and 25 to 44. Interestingly, these changes in South Dublin were also related to an average fall in vehicle use over the ten-year period, a surprising trend confirmed by re-examining the raw census data. As Table 5 indicates, Fingal saw a similar but more modest shift with respect to 'Demographic change' recording a score of 0.530. Fingal also demonstrated significant change with respect to 'Female Work Status' (-0.486), 'Families and Children' (0.738) and 'Unable to Work' (0.571). The following section of the paper consists of a more detailed analysis of the geography of urban social change in the four local authority areas comprising the Dublin Urban Region with respect to the first four components - 'Family status', 'Socio-economic status', 'Demographic change' and 'Seniors/retirement'. The remaining analysis was limited to these four components for several reasons. First, they accounted for the largest proportions of the total variance in the dataset (each explaining more than 5 percent), secondly, 'Family status' and 'Socio-economic status' were identified as key dimensions of change in earlier research on Dublin by Brady and Parker (1975, 1986) and thirdly, a 'cut-off' point was established in order to stay within the limits of the length of the paper.

Table 4: Component loadings of dimensions of change.

Component	Variable	Loading	Title
1	7. M-SING	-0.880	Family status
	8. M-MAR	+0.867	
	9. F-SING	-0.868	
	10. F-MAR	+0.822	
	17. EMP-NEST	+0.609	
	21. DENSITY	-0.620	
	24. M-STUDENT	-0.701	
	29. F-STUDENT	-0.772	
42. IN-SCHOOL	-0.759		
2	16. LONE-MOTH	-0.594	Socio-economic status
	32. MANUFACT	+0.578	
	38. HIGH-PROF	+0.842	
	39. LOW-PROF	+0.850	
	40. SKILL-MAN	-0.820	
	41. SEMI-MAN	-0.886	
3	2. AGE 0-14	-0.829	Demographic change
	3. AGE 15-24	+0.715	
	4. AGE 25-44	-0.747	
	5. AGE 45-64	+0.852	
	31. F-HOME	-0.507	
	45. VEHICULE	-0.588	
4	6. AGE 65+	+0.661	Seniors/retirement
	11. SEN M ALONE	+0.472	
	12. SEN F ALONE	+0.600	
	18. RETIRED	+0.714	
	22. M-WORK	-0.681	
5	1. TOT POP	+0.600	Population/public transit
	23. M-UNEMP	-0.453	
	39. PROF-SERV	-0.611	
	44. PUBLIC	-0.763	
6	19. HOUSE	-0.885	Household type
	20. FLAT	+0.905	
7	27. F-WORK	-0.684	Female work status
	31. F-HOME	+0.506	
	33. BUILD	+0.687	
	36. PUB-ADMIN	-0.412	
	37. PROF-SERV	-0.409	
	43. LEFT-15	+0.401	

Table 4: Component loadings of dimensions of change (continued).

Component	Variable	Loading	Title
8	13. NO-CHILD	-0.778	Families and children
	14. CHILDREN	+0.822	
	21. DENSITY	+0.458	
9	25. M-UNABLE	-0.812	Unable to work
	30. F-UNABLE	-0.877	
10	16. LONE-MOTH	-0.498	Work status
	26. M-HOME	-0.512	
	28. F-UNEMP	-0.579	
	34. COMMERCE	+0.480	

Table 5: Mean Component Scores in Dublin's Local Authority Areas: 1986-1996.\*

Component	Dublin County Borough	South Dublin	Fingal	Dun Laoghaire Rathdown
1. Family status	-0.164	0.096	-0.179	<b>0.426</b>
2. Socio-economic status	-0.280	-0.249	0.118	<b>0.764</b>
3. Demographic change	-0.368	<b>0.864</b>	<b>0.530</b>	-0.072
4. Seniors/retirement	-0.065	0.286	0.055	-0.083
5. Population/public transit	0.011	0.019	-0.196	0.081
6. Household type	-0.019	0.026	-0.014	0.034
7. Female work status	0.190	-0.139	<b>-0.486</b>	-0.052
8. Families and children	-0.324	0.169	<b>0.738</b>	0.192
9. Unable to work	-0.046	0.023	<b>0.571</b>	-0.255
10. Work status	-0.062	0.025	<b>0.395</b>	-0.113

\* Figures in bold indicate significant change.

### Family status

Figure 2 displays the distribution of change in ‘Family status’ in the four local authority areas between 1986 and 1996. The extent of change is conveyed by the five categories in the legend derived directly from the component scores: high positive (> 2 standard deviations [SD] ) positive (1 to 2 SD), stability (- 1 to 1 SD) negative (- 2 to - 1 SD) high negative (< - 2 SD). The third category, stability, signifies little or no change. Figure 2 shows a dispersed geographic pattern of ‘Family status’ change in the Dublin urban region with stability clearly the most visible condition, particularly in Fingal. Only two DEDs in Fingal had positive scores, signifying a growth in ‘Family status’ - Donabate on the east coast and Blakestown in the south-west. As the map indicates, there are two clusters in the southern part of Fingal displaying negative and high negative scores pointing to a decline in ‘Family status’ over the ten-year study period. These comprised several DEDs in Blanchardstown, including

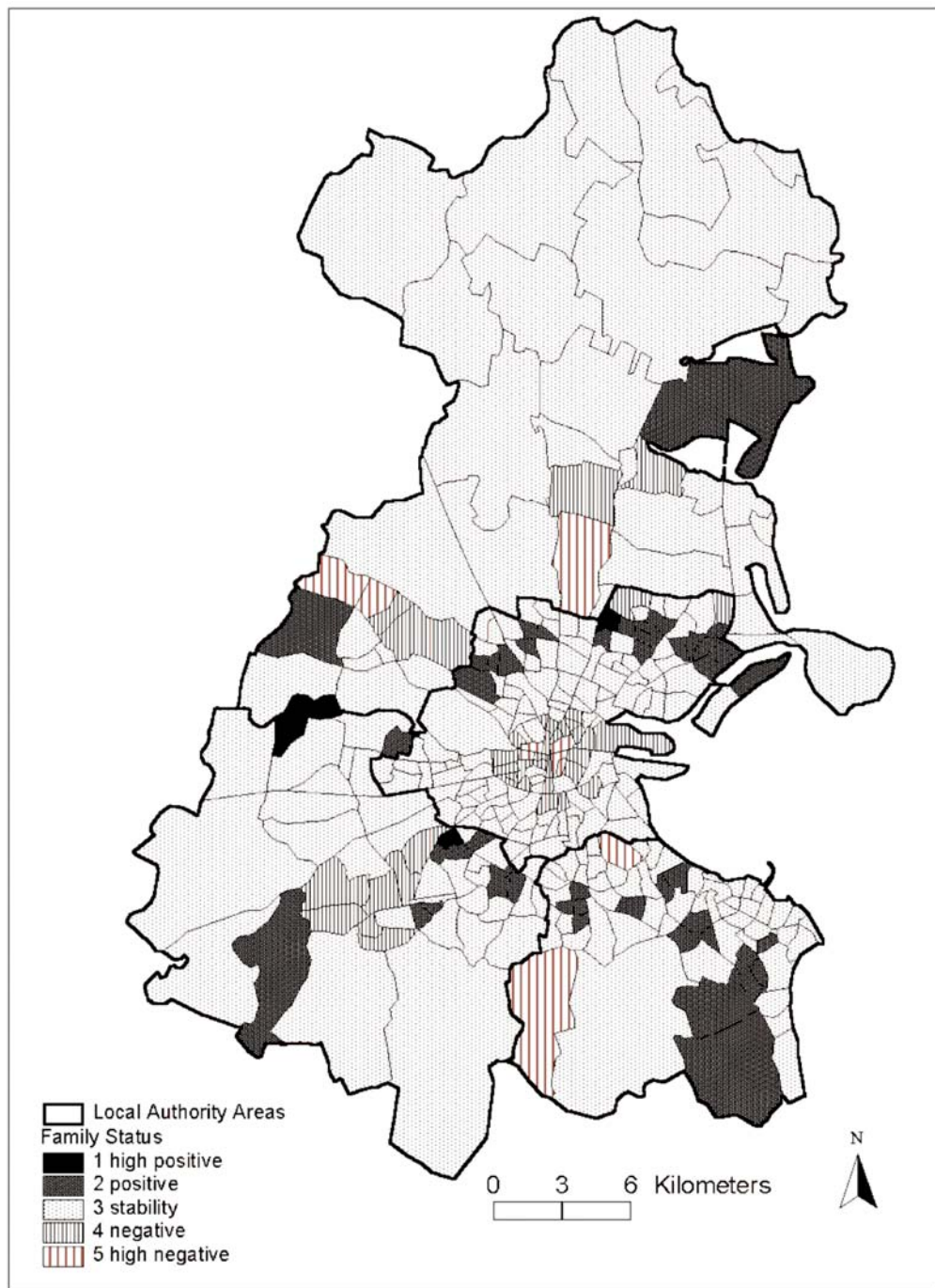


Figure 2: Component 1 - Family Status: extent of change 1986-1996.

Tyrrelstown, Mulhuddart and Corduff and three DEDs south of Donabate - Swords-Seatown, Swords-Forrest and Airport.

In South Dublin, Lucan-Esker (situated on the northern limit) witnessed substantial growth in 'Family status' recording a high positive score as did Saggart in the south-east. A grouping of DEDs with negative scores, signifying a decline in 'Family status', is prominently visible in the centre of South Dublin. These include several communities in Tallaght, notably Fettercairn, Jobstown, Springfield and Kingswood. In Dun Laoghaire-Rathdown, a cluster of DEDs with positive scores is evident in the south-east portion, comprising Shankill-Rathmichael, Cabinteely, Ballybrack and Foxrock. Tibbradden, in the south-west, stands out with a high negative score.

An interesting geographic pattern is discernable in Dublin County Borough. A significant decline in 'Family status' is clearly visible as a ring of wards in the inner city (negative and high negative scores). These include the inner-city wards of Ushers, Arran Quay, Merchants Quay, Royal Exchange, Mansion House, Mountjoy and North Dock. Given the nature of socio-demographic change in Dublin's inner city in recent years, it is perhaps not surprising that the area saw a generally large decline in married persons and a significant increase in singles and students. Outside the inner ring is a band of suburban DEDs, which primarily witnessed stability. However, several areas experiencing growth in 'Family status' over the period (positive and high positive scores) are seen in the northern part of Dublin County Borough, including parts of Ashtown, Finglas, Ballymun, Kilmore, Grange and Raheny.

### **Socio-economic status**

Figure 3 displays the geographic distribution of change in 'Socio-economic status'. A much more compact spatial pattern is clearly evident on the map, with change occurring primarily in the outer parts of Dublin County Borough and in Dun Laoghaire-Rathdown. All of Fingal, with the exception of two pockets of DEDs, was characterised by stability. The coastal communities of Malahide East and West and Portmarnock North are visible with positive scores, reflecting a growth in professional working status and a fall in manual workers. In South Dublin, two groups of DEDs, comprising parts of Clondalkin and Tallaght, can be seen as having negative scores, indicating a decline in professional status there. Within Dublin County Borough, Phoenix Park (the residential portion surrounding it), in the western section, stands out with a positive score. There also appears to be a dispersed collection of DEDs registering negative scores in the outer ring of the county, including the DED containing the communities of Ringsend and Irishtown, south-east of the inner city. North of the River Liffey, only a small number of inner city areas experienced growth in 'Socio-economic status', including Botanic B, Botanic C and parts of Clontarf.

Figure 3 reveals a relatively tight clustering of DEDs with positive scores in the south-eastern part of the Dublin urban region. This grouping includes a solid corridor south of the Grand Canal including most of Rathmines, Donnybrook, Ballsbridge and Sandymount, several areas in the easternmost part of South Dublin (Templeogue and Rathfarnham) and a noticeable presence in Dun Laoghaire-Rathdown, extending as far south as Killiney. In fact, Dun-Laoghaire-Rathdown had the highest concentration of change in 'Socio-economic status' with 33 of its 69 DEDs (48 percent) recording growth. The transition was especially evident in communities such as Ballinteer, Blackrock, Churchtown, Dalkey and Stillorgan, which witnessed substantial increases in persons having a professional status and a corresponding fall in skilled and semi-skilled manual workers over the ten-year study period.

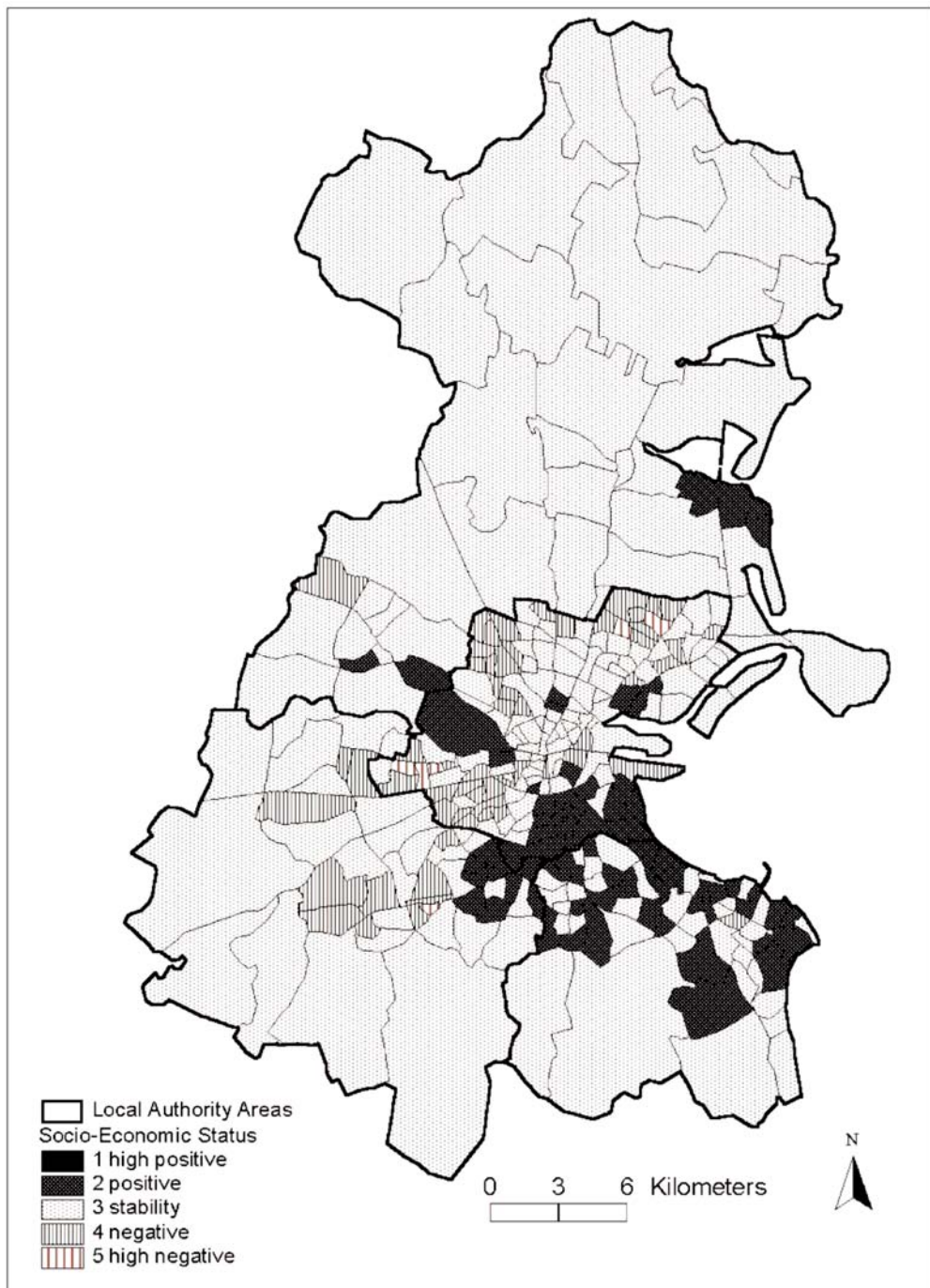


Figure 3: Component 2 - Socio-economic status: Extent of Change 1986-1996.

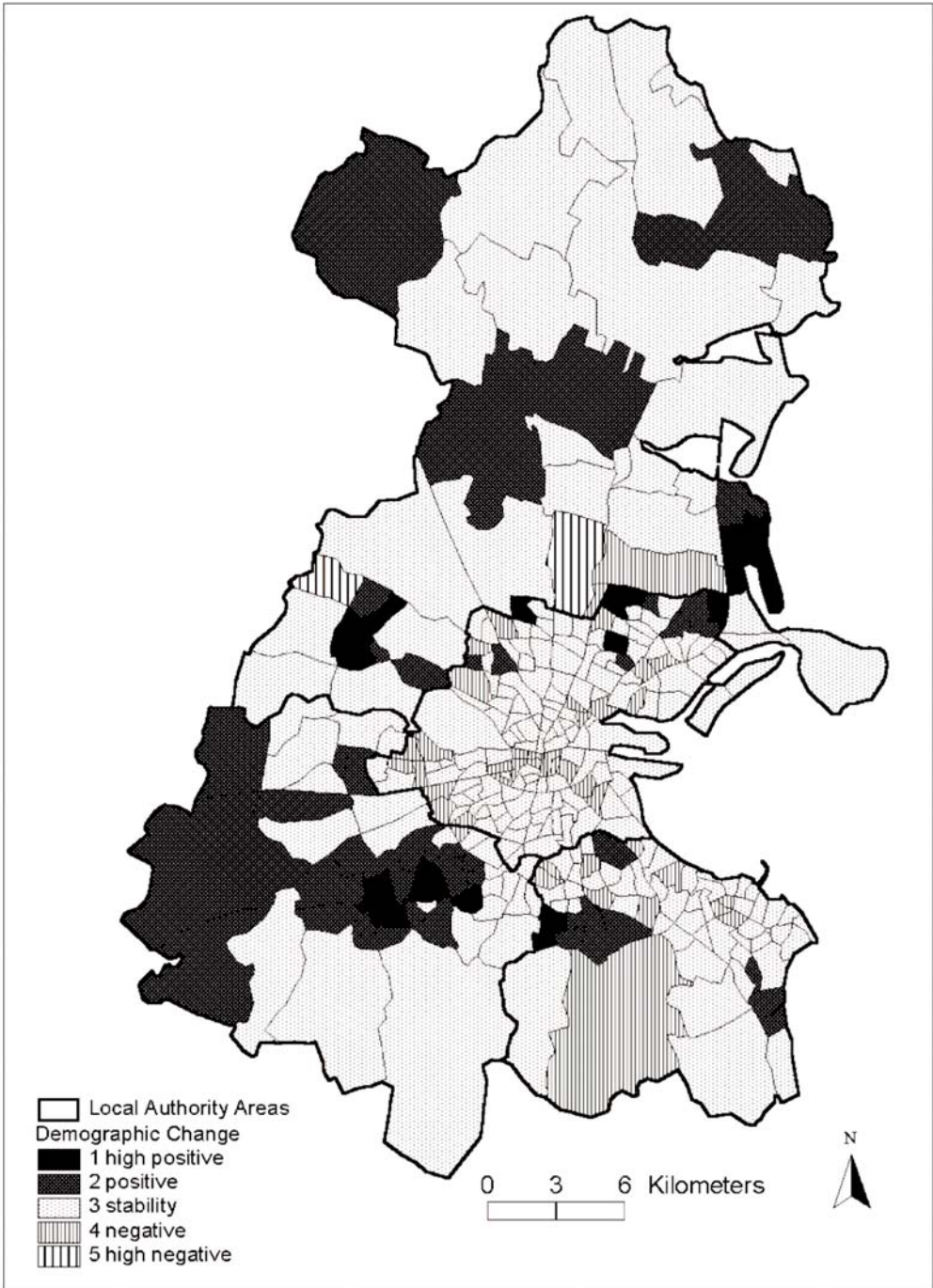


Figure 4: Component 3 - Demographic change: extent of change 1986-1996.

In this south-east region, the 60 DEDs with positive scores recorded an average growth of 13.4 percent in persons with a higher professional socio-economic status and a decline of 6.5 percent in semi-skilled manual workers. These areas also witnessed an average population growth of over just over 7 percent, an increase in childless families of 8.0 percent, a drop of nearly 10 percent in females performing home duties and a rise of 6.0 percent in females at work. (Several of these DEDs in South Dublin and Dun-Laoghaire-Rathdown had population growth rates exceeding 30 percent). Not surprisingly, there was an average fall of nearly 7 percent in the use of public transit as a means of regular travel and a growth of just over 5 percent in the use of vehicles. Furthermore, several areas in the Rathmines-Donnybrook-Sandymount corridor recorded strikingly higher figures with respect to population growth, professional status and a drop in public transit use. These findings are consistent with recent evidence, which suggests that the south-east section of Dublin has become a popular destination for upwardly mobile residents often employed in rapidly growing sectors of the economy such as high-tech, commerce, real estate, corporate head offices, and public services.

### Demographic change

Figure 4 displays the extent of demographic change in the Dublin urban region between 1986 and 1996. A very different geographic configuration from the two previous dimensions is immediately apparent. Positive scores on demographic change, reflecting a proportional growth in two age groups (15-24 and 45-64) while a corresponding decrease in two other age groups (0-14 and 25-44) is largely visible in the central and outer parts of South Dublin and Fingal. Meanwhile, stability or negative scores characterised most of Dublin County Borough and Dun Laoghaire-Rathdown. Negative scores illustrate the interesting dichotomy of this dimension and primarily signify a decline in the proportion of the population in the 15-24 and 45-64 age groups.

South Dublin clearly witnessed the highest concentration of 'Demographic change'. The three westernmost DEDs in the county containing the communities of Lucan-St Helens, Newcastle and Rathcoole stand out with positive scores. There is also a noticeably tight cluster of DEDs in the central portion comprising virtually all of Tallaght and a portion of Templeogue. Three DEDs in Tallaght registered high positive scores (Springfield, Oldbawn and Tymon), primarily reflecting above average growth in the 15-24 and 45-64 age groups.

The population transition that occurred in large parts of South Dublin represents an interesting finding but is somewhat more difficult to interpret. The growth in the two age groups (15-24 and 45-64) in these areas did not correspond with an increase in families, as there was an average decline of nearly 10 percent in families with children and a fall in married males and females. Furthermore, these areas, on average, witnessed a decline in persons with a professional socio-economic status and a substantial increase in manual workers. One possible explanation for this situation is that over the ten-year period, there was a sizeable out-migration from South Dublin of younger (aged 25-44), higher educated professionals (and in some cases their families) to areas such as the Rathmines-Donnybrook-Sandymount corridor and to parts of Dun Laoghaire-Rathdown. In addition, this trend may also reflect emigration to other countries as Ireland experienced a significant 'brain drain' during this period.

Positive scores on 'Demographic change' are also visible in several other areas of the region including Ballinteer and Dundrum in Dun Laoghaire-Rathdown and in parts of Priorswood and Grange on the northern limit of Dublin County Borough. As can be seen in

Figure 4, Fingal had the second highest concentration of this dimension among the four local authority areas. A loose arrangement of DEDs with positive scores is apparent and includes Malahide East and Portmarnock South (south-east coast), Holmpatrick (north-east), Garristown (north-west) Kilsallaghan and Swords-Lissenhall (centre-west) and parts of Blanchardstown. Three DEDs in Fingal received negative scores on 'Demographic change' - Blanchardstown-Tyrrelstown, Airport and Balgriffin as did several in Dublin County Borough including a band in the inner city south of the River Liffey. DEDs with negative scores are also apparent in Dun Laoghaire-Rathdown, most notably Glencullen. As might be expected, these areas experienced a reverse population transition over the ten-year period, seeing a significant growth, particularly in the 25-44 age group and a simultaneous drop in the 45-64 age group.

### **Seniors/retirement**

As indicated in Table 5, between 1986 and 1996, none of the four local authorities in Dublin witnessed significant change with respect to 'Seniors/retirement'. Nevertheless, Figure 5 reveals that while stability clearly dominates, clusters of DEDs recording change (both positive and negative) are visible in several areas including the southern portion of Fingal, the inner and peripheral regions of Dublin County Borough, the eastern edge of South Dublin and parts of Dun Laoghaire-Rathdown. A dispersed pattern is apparent in south Fingal with several DEDs in Blanchardstown as well as The Ward, Swords-Forrest and Portmarnock North and South receiving positive scores, indicating a growth in 'Seniors/retirement'. Meanwhile, Dubber, Swords-Glasmore and Balgriffin registered negative scores pointing largely to a rise in the non-senior population in these areas, particularly in the 25-44 age group. This cohort likely comprises many first time house buyers.

Figure 5 also shows a dispersed collection of DEDs with positive scores in the northern section of Dublin County Borough including parts of Finglas, Whitehall, Beaumont and Clontarf. Consistent with the findings above, stable and negative scores can be seen in all of the inner city as well as many of the suburban communities in the Borough, reflecting either no change or a fall in the proportion of seniors and retired residents. Two small but intense clusters of change are noticeable along the South Dublin/Dublin County limit. The first comprising Palmerston Village, Drumfinn, Chapelizod and Cherry Orchard and the second further south containing Walkinstown and parts of Templeogue and Terenure. Both appear to be aging communities with an average growth of just over 7 percent in the proportion of the population aged 65 and over compared to an average increase of just 1 percent in this age group for the entire region. They also witnessed an average growth of over 10 percent in the proportion of male and female senior citizens living alone compared to an average decline of 2 percent for the region during the ten-year study period.

A small number of DEDs stand out with high negative scores including Lucan-Esker on the northern limit of South Dublin and Glencullen in the southern part of Dun Laoghaire-Rathdown. An examination of the raw census data for these two areas, however, revealed that the high negative scores on this dimension were attributable to explosive population growth rather than an actual decline in seniors. Between 1986 and 1996, the population of Lucan-Esker grew by 277 percent and Glencullen by 135 percent. Furthermore, both DEDs recorded increases of more than 20 percent in the proportion of the population aged 25-44.

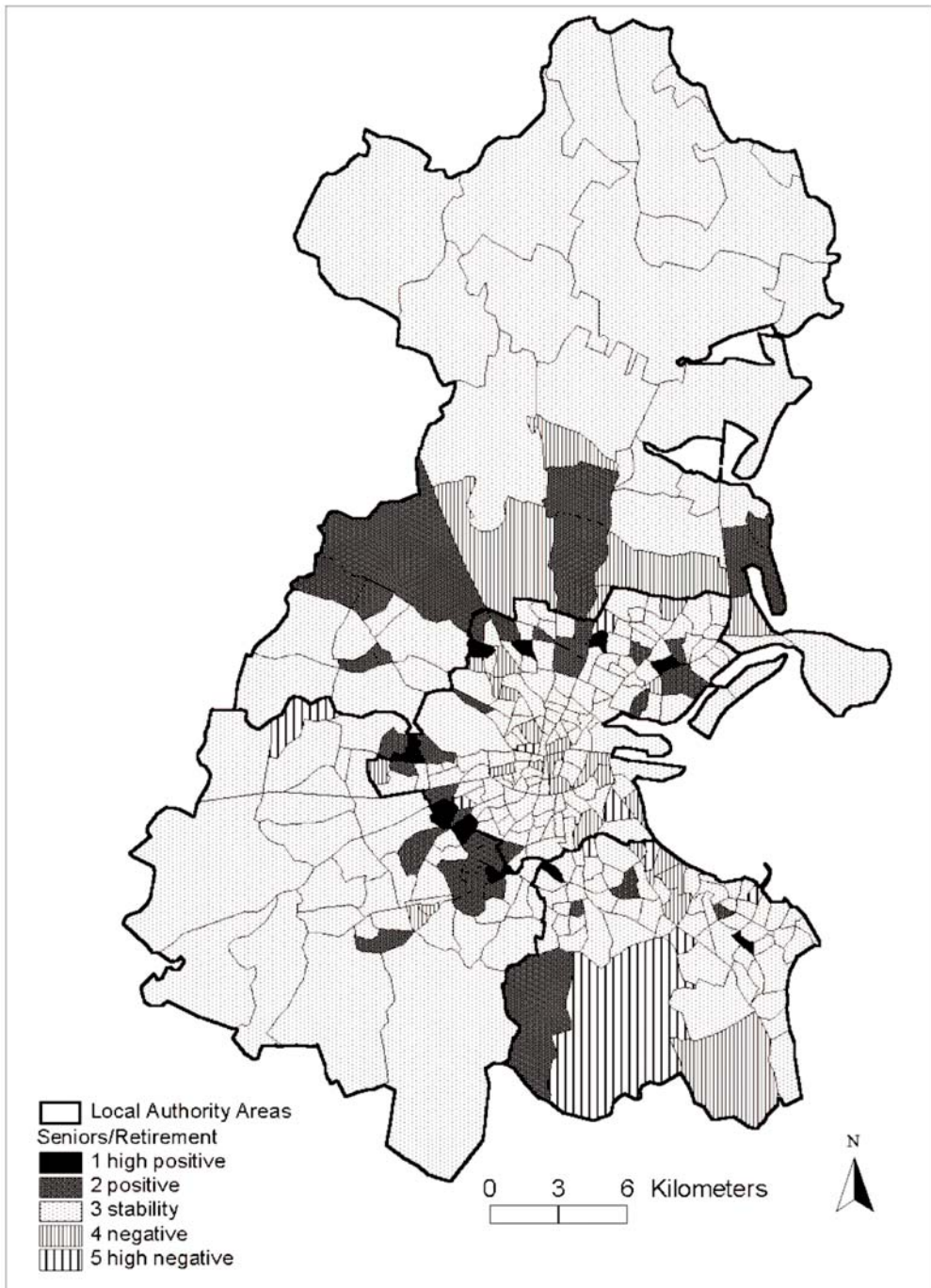


Figure 5: Component 4 - Seniors/ retirement: extent of change 1986-1996.

### Overview and Discussion

This paper adopted a factorial ecological approach to examine the geographical characteristics of urban social change in the Dublin urban region from 1986 and 1996. It employed 45 variables drawn from the two censuses to conduct a direct analysis of change at the level of the District Electoral Division, which can be viewed as roughly delimiting a community. The multivariate technique of principal components analysis (PCA) proved to be effective in identifying several axes or dimensions of change in the city, including the first four which were subjected to a more detailed examination: 'Family status', 'Socio-economic status', 'Demographic change' and 'Seniors/retirement'. The first two were identified by Brady and Parker (1986) in their earlier research on the socio-demographic spatial structure of Dublin.

This analysis has provided a generalised overview of the complex and changing urban social geography of the city. It is fair to conclude that while the Dublin urban region can be characterised broadly by stability between 1986 and 1996, there were several important spatial variations of change within the four local authority areas. This was clearly the case in Dublin County Borough, which as a unit, saw stability, but also contained areas such as the inner city and several suburban communities, which were subjected to marked change. For example, the inner city experienced significant decline in 'Family status', while a group of suburban DEDs in the north and south-west part of the county saw a fall in 'Socio-economic status'. A relatively tight clustering of growth in 'Socio-economic status' was highly visible in the south-east section of Dublin, comprising the Rathmines-Donnybrook-Sandymount corridor, the eastern edge of South Dublin and a large portion of Dun Laoghaire-Rathdown. This area witnessed significant change in the form of a rapidly growing population, a marked increase in women at work and a substantial rise in persons with a professional designation.

The paper also revealed that within South Dublin, Tallaght stood out as a community undergoing consistent change on a number of dimensions. During the ten-year study period, it saw an overall decline in 'Family status' and 'Socio-economic status' and considerable 'Demographic change'. The transition in Tallaght took the form of a significant drop in families and married persons, a sizeable decrease in professional workers and a simultaneous growth in manual workers and a marked decline in the proportion of two age groups - 0-14 and 25-44. On the whole, however, South Dublin and Fingal were characterised by stability with respect to 'Family status' and 'Socio-economic status'. Finally, the paper found that while 'Seniors/retirement' was not an overall factor in change, several areas experienced intense growth on this dimension, including parts of southern Fingal and several communities along the South Dublin/Dublin County limit.

A possible limitation of this paper was that it relied on data from the smaller mid-decade censuses which do not contain as much detail as the full censuses, especially as related to indicators such education and housing. As a result, analysing a dataset from the larger ten-year censuses would likely yield alternative dimensions of change and their geographic patterns. Subsequently, an avenue for further research would be to conduct a 'factorial ecology of change' for the Dublin urban region using indicators from the 1991 census and the 2002 census, when it becomes available. An update would be useful in charting the impact of more recent change, particularly since the mid 1990s, a period of unprecedented transition in the economic and social fabric of Dublin and Ireland.

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### References

- BANNON, M. J. (1999) The Greater Dublin Region: Planning for its transformation and development, *In: Killen, J. and MacLaran, A. (eds) Dublin: Contemporary trends and issues for the twenty-first century*. Dublin: Geographical Society of Ireland, Special Publication 11, 1-19.
- BRADY, J.E. and PARKER, A.J. (1986) The Socio-Demographic Spatial Structure of Dublin in 1981, *The Economic and Social Review*, 17(4), 229-252.
- BRADY, J.E. and PARKER, A.J. (1975) The Factorial Ecology of Dublin: A Preliminary Investigation, *The Economic and Social Review*, 7(1), 35-54.
- BROADWAY, M.J. (1989) A comparison of patterns of urban deprivation between Canadian and US Cities, *Social Indicators Research*, 21, 531-551.
- DAVIES, W.K.D. and MURDIE, R.A. (1993) Measuring the social ecology of cities, *In: Bourne, L.S. and Ley, D.F. (eds) The Changing Social Geography of Canadian Cities*. Montreal and Kingston: McGill-Queen's University Press, 52-75.
- DAVIES, W.K.D. and MURDIE, R.A. (1991) Consistency and differential Impact in urban social Dimensionality: Intra-urban variations in the 24 Metropolitan Areas of Canada, *Urban Geography*, 12(1), 55-79.
- FIELDHOUSE, E.A. and TYE, R. (1996) Deprived People or Deprived Places? Exploring the Ecological Fallacy in Studies of Deprivation with the Sample of Anonymised Records, *Environment and Planning A*, 28, 237-259.
- FOTHERINGHAM, A.S. (1997) analysing Numerical Data, *In: Flowerdew, R. and Martin, D. (eds) Methods in Human Geography*. Essex: Longman, 155-171.
- HORNER, A. (1999) Population dispersion and development in a changing city-region, *In: Killen, J. and MacLaran, A. (eds) Dublin: Contemporary trends and issues for the twenty-first century*. Dublin: Geographical Society of Ireland, Special Publication 11, 55-68.
- KITCHEN, P. (2001) An Approach for Measuring Urban Deprivation Change: East Montreal and the Montreal Urban Community, 1986-96, *Environment and Planning A*, 33(11), 1901-1921.
- LANGLOIS, A. and KITCHEN, P. (2001) Identifying and Measuring Dimensions of Urban Deprivation in Montreal: An Analysis of the 1996 Census Data, *Urban Studies*, 38(1), 119-139.
- MacLARAN, A. (1999) Inner Dublin: Change and Development, *In: Killen, J. and MacLaran, A. (eds) Dublin: Contemporary trends and issues for the twenty-first century*. Dublin: Geographical Society of Ireland, Special Publication 11, 21-33.
- MacLARAN, A. (1993) *Dublin: The shaping of a Capital*. London: Belhaven Press.
- MARTIN, D. (1996) *Geographic Information Systems: Socioeconomic applications*. London: Routledge.
- PERLE, E.D. (1983) Ecology of Urban Social Change - An American Example, *Urban Ecology*, 7, 307-324.
- SHAW, G. and WHEELER, D. (1994) *Statistical Techniques in Geographical Analysis*. London: David Fulton Publishers.