LABOUR AND GEOGRAPHY IN IRELAND, 2006

EVALUATING THE NATIONAL SPATIAL STRATEGY FOR IRELAND 2002 – 2020: PEOPLE, PLACES AND POTENTIAL

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2012

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Abstract

This Ph.D. identifies the spatial structures associated with Ireland's economic geography through an analysis of travel-to-work patterns. In doing so it applies, within the Irish context, novel techniques to identify local labour market areas using data that, heretofore, were unavailable to researchers in Ireland, i.e. detailed spatial interaction data describing the journey to work. The primary aim of this thesis is to address a research lacuna concerning labour and labour market areas within the field of economic geography in Ireland. This research augments our understanding of the spatial structure of Ireland's economy through the identification of local labour market areas and elucidates the geographies of who works where and places these within an international context. This, in turn, facilitates a detailed evaluation of Ireland's 'National Spatial Strategy 2002 – 2020: People, Places and Potential' (NSS). The content of this strategy raises fundamental geographic questions concerning who lives where, where they work and the spatial structure of those functional areas associated with cities and towns in Ireland. The thesis explores these issues through the dual conceptual lenses of geographies of labour and labour geographies.

In additional to these theoretical considerations, the research is guided by three broad objectives: a) the identification of local labour market areas, b) to enhance the effectiveness of spatial policies in Ireland concerned with economic development in general and those affecting labour processes in particular by critically engaging with the concept of polycentricity, and c) to empirically evaluate selected spatial concepts that are central to the NSS.

In addressing these objectives the thesis makes a significant contribution to both economic geography and spatial planning. It provides a comprehensive evaluation of the NSS and provides new insights into the geography of local labour market areas in Ireland, whilst also providing a methodology that overcomes the central criticism of the technique used in previous studies identifying labour market areas.

Acknowledgements

Professor Jim Walsh and Dr. Ronan Foley, the supervisors of this PhD, provided enormous support to me throughout this PhD. Their patience, encouragement and willingness to make time to help me develop the ideas contained in this thesis are exemplary. Their input into this thesis was invaluable. I would also like to thank all of the staff at the Department of Geography, NUI Maynooth, particularly Prof. Mark Boyle and Dr. Mary Gilmartin and for creating a vibrant and happy place within which to undertake this research.

During the course of the research I was fortunate to be invited by Prof. Mike Coombes to the Centre for Urban and Regional Development Research (CURDS) in the University of Newcastle. During my time there, Prof. Mike Coombes and Dr. Colin Wymer provided me with a detailed overview of the development and functioning of the European Regionalisation Algorithm (ERA), which is central to this research. In addition to answering my questions as to the spatial analytical processes encoded within the ERA they were open to critical appraisal of the technique and developing new routines that generated data that are central to the analysis presented in this thesis.

I would like to express my appreciation to Prof. Greg Lloyd and Martin Charlton, the external and internal examiners, respectively, of this thesis. Their thorough review, evaluation, insightful comments and suggestions are much appreciated.

In the very early days of this PhD I was fortunate to be invited to a meeting with a small group of researchers and agencies with an interest in Place-of-Work data at the Central Statistics Office (CSO). At that meeting, Dr. Aidan Punch, Assistant Director General, and Mr. Gerry Walker, Senior Statistician, Demographic Statistics Division, asked those present to suggest new variables that might be provided with the, then forthcoming, Place of Work Census of Anonymised Records (POWCAR). I proposed, and they accepted, that all records within the POWCAR would be assigned latitude and longitude information identifying, at the scale of a 250m^2 grid,

the place of work. These data have proven invaluable to the PhD and I would like to thank the staff of the CSO for adopting this suggestion.

I am deeply indebted to Teagasc, my employer, who have supported this research. I am particularly grateful to Dr. Cathal O'Donoghue for his interest in and encouragement of the thesis. I owe a particular debt of gratitude to Stuart Green and Reamonn Fealy, my colleagues in the Spatial Analysis Unit who have provided support and advice regarding data handling and visualisation.

I would like to take this opportunity to express my appreciation for Dr. Patrick (Packie) Commins who passed away during the course of this research. I was fortunate enough to work with Packie in Teagasc's Rural Economy Research Centre. Several conversations we had on our way to and from various meeting around Europe helped shape this research from the outset and, in particular, the objective of identifying a set of local labour market areas that correspond to travel-to-work patterns.

My parents and sister have always encouraged my academic endeavours from the time I can remember. This PhD is no different and I am always appreciative of their lifetime of active involvement in my education and learning.

To Tara, who has supported and helped me through this research from start to finish. I am forever grateful for all your encouragement. When the research was frustrating me you listened as I tried to talk through the issues and identify potential solutions. You offered invaluable suggestions and criticism that have made this PhD better than it otherwise would have been. Most significantly you allowed me the time, by taking on so much, to finish writing up. Thank you.

Chapter 1 INTRODUCTION

1.1 Background

With a small number of notable exceptions, geographers in the Republic of Ireland, hereafter Ireland, have yet to undertake a comprehensive evaluation of Ireland's labour geographies. This is surprising given the growing consideration of this topic within the international literature (Ward et al., 2003). It is all the more surprising that labour geographies do not receive greater academic attention, as the production and reproduction of labour have been central to both public and policy discourses over the course of, at least, the past fifteen years. These were, and continue to be, part of wider EU and international discourses concerned with the significance of workers, places and spaces within an increasingly interlinked and interdependent globalised economy.

The primary aim of this thesis is to address the research lacuna concerning labour and labour market areas within the field of economic geography in Ireland. The approach adopted in pursuing this aim seeks to exploit improvements in the quality and quantity of data pertaining to travel-to-work patterns in Ireland and also innovations in geocomputational techniques. Application of this research strategy augments our understanding of the spatial structure of Ireland's economy, which in turn facilitates a detailed evaluation of Ireland's 'National Spatial Strategy 2002 – 2020: People, Places and Potential' (DoEHLG, 2002).

Overlying these largely empirical considerations are concerns with how labour and labour processes are structured within the spatial planning concept of polycentricity. This multi-scale concept has grown in popularity since it was incorporated within the European Spatial Development Perspective (ESDP) (1999). In the broadest sense, polycentricity offers a relational view of economic processes as being extended over space yet embedded within particular, interrelated places. It is increasingly used in EU policy discourses concerned with balanced regional development and territorial cohesion. The significance of polycentricity, from an Irish perspective, relates to its role in providing a framework on which the NSS is based.

1.2 Thesis Objectives

Associated with the aim and the approach outlined above are three primary objectives. The first objective builds on the work of Walsh et al. (2005) to identify the spatial structure of local labour market areas in Ireland. Walsh et al. (2005) used a sample of travel-to-work records from the Census of Population 2002 to identify travel-to-work areas (TTWAs) associated with those cities and towns classified as Gateways and Hubs within the NSS. This research applied a manual regionalisation approach, wherein the places of interest, i.e. Gateways or Hubs, were identified *a priori*. Electoral Divisions (EDs), were subsequently assigned to these places if a minimum 10% of the workers residing in the ED commuted to work within the Gateway or Hub. The spaces that did not associate with either Gateways or Hubs were subsequently assigned to other towns that were, once again, selected *a priori*. Whilst this objective, the identification of local labour market areas, is similar to research undertaken by Walsh et al., (2005) it differs in a number of important respects. In the first instance a more complete dataset is used in the analysis identifying travel-to-work areas. This resource, the Place of Work Census of Anonymised Records (POWCAR) 2006, differs from that used by Walsh et al. in that it provides individual level details on the journey-to-work for all workers rather than a sample of the workforce. More importantly, the research also differs from previous studies in this area as it applies the European Regionalisation Algorithm (ERA), a functional regionalisation geocomputational technique, to identify local labour market areas. This allows labour markets to be identified on the basis of selected objective criteria rather than *a priori* perspectives of the role and significance of selected towns.

The distinction between this and previous research is important as it facilitates the second objective, a critical evaluation of the spatial perspective included within the NSS. Four dimensions of the NSS are considered, including; the conceptual content of the Strategy and two different and conflicting, visions of economic space. The first of these reflects neo-classical views of economic activities as organised at the functional region level. The second perspective provides a larger scale view of economic space, which is conceived as being organised around local labour markets with particular mixes or pools of labour. The fourth dimension that is evaluated is

the concept of the Atlantic Corridor, a polycentric grouping of local labour markets extending from Waterford through Cork and Limerick to Galway. Combined, these areas are considered capable of counterbalancing the concentration, or critical mass, of economic development within the Greater Dublin Area (GDA).

The final objective is to enhance the effectiveness of spatial policies concerned with economic development in general and those affecting labour in particular. Engaging theoretically with the labour – economy relation, the research seeks to provide a better understanding of socio-economic processes that underpin the spatial relations that arise from the linking of the homeplace with workplace(s) through the journey-to-work. By privileging the praxis of travel-to-work, the methodology applied in this research enables labour geographies to come to the fore as an important factor in creating and shaping Ireland's economic geography. This sub-national, sub-regional perspective of workers is critical as spatial variation in the distribution of economic activities, employment opportunities and labour, which is itself socially and locally produced, conditions the potential for economic development. It also conditions public responses to strategic plans, such as the NSS, and ultimately determines whether they are implemented or condemned to gather dust along with so many other worthy policy initiatives.

1.3 Thesis Structure

In pursuit of these objectives, the thesis is developed through a research strategy that draws on a selected review of predominantly geographic and spatial planning literature concerned with labour, the identification of labour market areas and polycentricity; an evaluation of the conceptual basis of the NSS and review of how this evolved within the process of developing the Strategy; the identification and evaluation of both functional regions and local labour market areas; and a comparative assessment of the critical mass of the Atlantic Corridor and Dublin labour market area. The content of each chapter is outlined below.

Chapter Two integrates Herod's (1997) theoretical framework distinguishing between geographies of labour and labour geographies with Scott's (2000) disciplinary episodes to evaluate shifting perspectives of labour within economic

geography. The key objective of this literature review is to explore conceptualisations of labour and labour market areas. This work is fundamental to the rest of the thesis as it facilitates a critical evaluation of different perspectives of labour and labour market areas, explicit and implicit, contained within the NSS and those reports published during the development of the Strategy.

The purpose of Chapter Three is threefold: i) to evaluate how the production of labour is codified within polycentricity, a spatial planning concept based on a relational view of space and increasingly used in EU policy discourses concerned with balanced regional development and territorial cohesion; ii) to identify which form of polycentricity was originally adopted during the development phase of the NSS; and iii) to assess how this concept was ultimately interpreted within the NSS. In taking this approach the research draws on the theoretical and conceptual perspectives of labour and the labour – economic development relation set out in Chapter Two to evaluate a key European spatial planning concept and assess how this was incorporated into the NSS. The primary research questions explored by this thesis are outlined within the conclusions to this chapter.

Chapter Four is divided between a consideration of the data available for analyses of labour geographies and the identification of travel-to-work areas in Ireland and, the introduction of methods applied in later chapters. The CSO's 2006 Place of Work Census of Anonymised Records dataset, which provides highly detailed spatial and socio-economic information pertaining to the journey-to-work is described in detail and compared to a similar dataset from the 2002 Census of Population. The description of methods concentrates on evaluating the European Regionalisation Algorithm. Guided by the review of local labour market area concepts from Chapter Two, this evaluation critically assesses how labour and labour markets are codified within the approach adopted.

Chapter Five commences the critical evaluation of the NSS with an empirical assessment of two alternative sets of small scale functional regions which are, respectively, contained within the preparatory report to the NSS and the final Strategy document. As this Chapter also engages with a key conceptual criticism of the functional regionalisation technique applied in this and subsequent chapters, the

methodological approach developed in this thesis is set out in detail. The key objective of this chapter is to evaluate whether there is empirical evidence to support the spatial perspective of functional regions set out in the NSS.

Chapter Six has two key objectives: i) to critically assess the sub-regional, larger scale, geography of cities and towns, and their hinterlands, underpinning the classification of places and space as Gateways, Hubs or Other Towns; and ii) to evaluate the decision, explained in Chapter Four, to exclude a large amount of travel-to-work records from the analysis identifying local labour market areas. Spatial and statistical analysis is undertaken to establish whether, in the first instance, these records are normally distributed and, secondly, if there is a significant relationship between those records excluded from the functional regionalisation process and the areas identified. One of the thesis' central research questions is answered with analysis establishing whether other places and spaces emerge in addition to those identified and classified as Gateways, Hubs and Other Towns.

Chapter Seven concludes the critical evaluation of the NSS through a comparative analysis of the Dublin labour market area with that of the meso-polycentric 'Atlantic Corridor' region. The objective of this analysis is to establish the relative scale of aggregate critical mass in these areas through an assessment of the size and composition of the populations, labour forces and scale of economic sectors in each area. The research then identifies and evaluates the spatial distribution and economic structure of 'core critical mass' within the Dublin labour market and Atlantic Corridors.

Chapter Eight focuses on situating Ireland with regard to the international literature concerned with labour geographies by exploring the question "Who works where?" or, in the language of the NSS *"where people live [and] where they work"* (DoEHLG, 2002, p.10). The 'where' in this instance is considered from the perspective of the local labour market areas identified in Chapter Six. Drawing on the review of labour market segmentation literature presented in Chapter Two the research considers patterns of segmentation amongst selected socio-economic groups of workers.

Chapter Nine provides a brief overview of key findings and a short discussion of how these relate to contemporary national and regional issues of employment, unemployment and economic development. The contribution of this research to the study of labour geography is considered before closing with an overview of some of the issues raised and avenues for further research.

Chapter 2 GEOGRAPHY OF LABOUR AND LABOUR GEOGRAPHY: A REVIEW

2.1 Introduction

The themes explored in this thesis are primarily concerned with labour, its individual characteristics and the characteristics of the flows between home and work that give rise to local labour markets and the underlying processes that shape them. Labour related issues have long been central to economic geography as workers are *"the most place based of the factors of production"* (Hudson, 2001, p. 122). Recent advances in Ireland's data infrastructure enable highly detailed evaluation of work, workers and spatial patterns associated with journeys from home to work. Before proceeding with any empirical analysis, however, it is necessary to identify a theoretical and conceptual framework to guide this endeavour. After all, the concepts introduced in these opening sentences were and continue to be the site of significant debate and contestation within economic geography and its various sub-disciplines. The discourses that have emerged around these issues have raised questions regarding the conceptualisation of labour, local labour markets and their associated geographies. Drawing on a review of economic geography and spatial planning literature, this chapter provides a backdrop against which the theoretical and conceptual content of key spatial planning concepts are evaluated in Chapter Three. More importantly, the review provides the reader with a guide to understanding how these theories and concepts have been interpreted and applied to the context that is, or more appropriately, was the geography of work and workers in the Republic of Ireland in early 2006.

The purpose of this review is therefore threefold; it provides an overview of the three primary theoretical lenses through which labour is conceived; it facilitates the identification of the theoretical and conceptual framework to be applied within the thesis thereby situating it within the broad discipline that is economic geography; and, it establishes primary research questions to be considered within the analytical chapters of this thesis.

2.2 Labour and Geography

In approaching the substantial body of geographic literature associated with labour this thesis adopts Herod's framework, which distinguishes between the geography of labour and labour geography (Herod, 1997). The former area of study focuses on the firm or industry and *"seeks to understand how capital attempts to make the geography of capitalism in particular ways to facilitate accumulation and reproduction of capitalist social relations."* (Herod, 1997, p. 1). Labour geography takes an alternative perspective conceiving of both workers and work as socially and culturally contingent and, more importantly, that labour's geographic context actively *"shapes economic landscapes in ways that differ significantly from those of capital."* (Herod, 1997, p. 3). Distinctions drawn by Herod reflect broader theoretical and epistemological changes within the discipline of economic geography that reflect material developments within what are generally referred to in the literature as advanced industrialised societies. By way of situating this research within economic geography a review traces how the concept of labour has evolved from being considered as factors of production to socially and culturally contingent actors with the power to shape and reshape economic processes and activities (Barnes et al., 2004). It starts by briefly considering different theoretical approaches to labour before undertaking a select review of key authors who have made substantial contributions to how labour is conceived. The purpose here is not to provide an exhaustive chronology of economic geography's body of knowledge but rather to consider the various ways in which workers and local labour markets might be considered in this research.

2.2.1 Theorizing Labour

Labour, as a concept and object of study, has long been central to economic geography. The conceptualisation of labour has, however, evolved over time. Scott (2000), in his review of the development and evolution of the discipline of economic geography highlights distinctive paradigms that have dominated since the end of the Second World War. These include the spatial analysis / regional science movement (hereafter referred to as spatial science), political economy perspectives and regional-global interactions. These are ascribed to disciplinary 'episodes' wherein labour is conceived of differently during each period. Each reconceptualization

reflects changes in the ways of thinking about and the role or position given to workers within economic processes and, hence, their influence on the evolutions of places and spaces. These episodes can therefore be described as part of overall paradigms that have shaped geographic enquiry of economic structures and processes.

From a theoretical perspective Ward et al. (2003, p. 268-272) identify three primary approaches to theorising labour within economic geography; neo-classical, Marxist and institutionalist. These overlap Scott's episodes outlined above. Neo-classical conceptions were prevalent amongst much of the literature produced by the spatial science movement and remain central to new-economic geography's view of labour. Marxist perspectives dominate political economy discourses arising from concerns with production and distribution and labour's role and place within this process. Finally, institutionalist conceptions of labour have become more evident in recent discourses within economic geography as the discipline grapples with the scale, place and redistributive implications of economic change wrought by globalisation.

This framework, linking theory to what are, broadly speaking, methodological approaches should not be interpreted as temporally rigid or constrained. It is more in keeping with Harvey's recent revisiting of Social Justice and the City where distinctions between theory and methodology are seen as *"injurious to analysis"* (Harvey, 2009, p. 12). As will be pointed out below, each period and its attendant theorization of labour have directly and indirectly shaped the emergence of new paradigms. Furthermore, as the discipline continues to evolve, echoes of past theorisations re-emerge in new conceptual arrangements. This is increasingly true as greater numbers of academics from outside the discipline engage with core economic geography concepts including scale, enterprise and labour. Whilst these contributors bring with them their own theoretical perspectives, their rereading and reinterpretation of geographic literature has proven stimulating if not intentionally confrontational and, hence, controversial cf. Krugman (1991).

2.2.2 Labour – Resource

Starting with spatial science, geographers working in this field took greater cognisance of theory as a means of identifying generalizable 'truths' or 'iron laws' governing the distribution of economic activities and, by extension, labour. Previous to this, much of economic geography was dominated by regional depictions and or synthesis of economic activities, examples include; the localisation of cotton production in Lancashire (Atwood, 1928), the ports of Finland (Kekoni, 1932), the industrial geography of the lower Wabash Valley (Cutshall, 1941) and the impact of hail in American agriculture (Lemons, 1942).

Early (economic) geography theory was informed and developed with reference to economic theory within which workers were conceptualised as a 'stock' or factor of production to be factored into, generally, quantitative models concerned with regional growth and or industrial location (Smith, 1981, Scott, 2000). Those working in this field drew not only on neo-classical perspectives of labour, industry and markets but also connected with the work of, particularly, von Thünen, who developed the concept of rent to understand differences in agricultural land use (Chisholm, 1979), and Weber who developed a theory of the location of industry in the 1800's. However, it was not until the publication of *The Economics of Location*, a seminal work on industrial location theory published by August Lösch in 1940[1], that these theories were successfully synthesised within a cohesive framework (Ponsard, 1983). This framework subsequently provided the theoretical foundations on which quantitative economic geography was built (Chorley and Haggett, 1967, Haggett, 1966). At the heart of this research was a central concern with the process of agglomeration of economic activity through cumulative causation in particular spaces, as opposed to specific places (Pred, 1966). This body of research drew on and depended to a significant extent on theories and models put forward by Lösch.

Using quantitative techniques combined with neo-classical economic theory Lösch *"discovered simple market regions surrounding every centre of consumption or production in the form of a regular hexagon. ... for every group of products a net of these market regions was found [and] a systematic arrangement of these markets*

[1] Lösch's work was first published in English in 1954.
[2] Davoudi (2003) refers to Macro level polycentricity as Mega and Meso polycentricity is referred to

was found." (Lösch, 1954, p. 137). Lösch theorised that these represented hierarchal economic regions operating at three distinct scales; markets (local areas), belts (regional networks comprising all market areas for the same product) and districts (regional systems). It was accepted that whilst markets for individual goods i.e. newspapers or bread, were relatively simple, the overlapping of markets gave rise to highly complex if not 'chaotic' regional systems. The philosophical treatment of complexity given on pages 219 – 220 of *The Economics of Location* is instructive as it would subsequently be wholeheartedly adopted by nascent economic geographers. His perspective can be summarised as an argument for deductive reasoning that could be empirically tested using quantitative methods; anything else was 'unworthy' and 'dangerous' (Lösch, 1954, p. 219). Order, in Lösch's view, had to be brought to chaos through the use of abstract reasoning or theory, combined with supporting empirical analysis in the belief that *"spatial economic phenomena could be expressed in an explicitly abstract, formal, and rationalist vocabulary and directly connected to the empirical world."* (Barnes, 2001b, p. 546).

In addition to fostering a theory-based approach to economic geography, Lösch also established the structural (enterprise centric) paradigm that persists to this day in much of economic geography. In considering trade, Lösch set out to develop a conceptual framework that could explain the spatial distribution of economic activities. Whilst economic phenomena were, in Lösch's view, highly interrelated and integrated he conceptualised the enterprise as the structuring force determining the location of labour. At the outset he stated; *"Our theme is the combination of man, work, and place. Seen from the standpoint of man it is the problem of the occupational and spatial division of labour. Often enough, however, we do not start with ourselves, but wish to know what combination will be best for an enterprise or a country."* (Lösch 1954, p. 223). This apparently simple statement was to shape the focus of economic geographers, particular the spatial science movement, throughout the 1960s and 1970s and its influence is evident today in the area of 'new' economic geography (Scott, 2000, Barnes, 2003). Indeed there are a number of other parallels between Lösch's work and that of Krugman (1991) particularly the conflation of formal equations with theory and the central role of international trade theory in their work.

Interestingly, whilst the enterprise was given primacy as the unit of analysis in Lösch's theoretical framework this is not to suggest that he ignored the individual worker. Consideration of individual occupational choices was in fact his starting point in the development of a theory of the economics of locations. Borrowing the principle of comparative cost from international trade theory, Lösch modelled the occupational choices of individuals. Whilst concentrating on monetary returns to labour he also recognised *"the choice of an occupation does not depend entirely on money income…, or even the utilities that this income will buy. On the contrary, to these more or less variable utilities there must be added all those imponderables that are associated with various occupations and usually appear as fixed utilities (or disutilities)."* (Lösch, 1954, p. 236). Somewhat paradoxically, this statement follows ten pages of discussion wherein the worker is solely motivated by maximising his, and it is always a he, utility. The entrepreneur, who is not conceived of as a 'worker', suffers a similar fate. For significant parts of his analysis, Lösch barely conceives those making investment decisions as individuals with animus; the industrialist is presented as a hyper rational construct seeking at all times to maximise utility, generally defined as return on investment, through identification of the optimal location which will minimise production costs. The invisible hand of the market is, in line with classical economic theory, seen to be the predominant force shaping the distribution of capital and, hence, economic activities.

The concept of the worker as a stock or factor presented in *The Economics of Location* was taken up and developed by others within the growing field of spatial analysis and interdisciplinary field of spatial science. Scott characterises the work of researchers in these areas as *"focused on identifying regularities of the neo-classical space-economy."* (Scott, 2000, p. 486). With regard to labour, their endeavours focused predominantly on issues of availability, skill levels and cost (Thomas, 1956, Linge, 1960, Rodgers, 1962, Logan, 1966, Vance, 1966).

Concurrent to the development of these fields was the post-war economic boom characterised by 'Fordist' production, that is, mass production involving large workforces with productivity achieved through the (spatial) division of labour into detailed standardised tasks (Martin, 2003). Labour continued to be considered part of the location equation or function. This perspective is exemplified by Smith (1966)

who proposed the development of what was termed 'Industrial Geography' through greater engagement with theory, as represented by *"models to demonstrate the influence of various factors on the location of plants and industries."* (p.96). His treatment of labour is limited to a consideration in the geographic variance in wage costs, however, he does integrate the *"operation of chance and personal factors into the theoretical framework"* in assessing the locational decisions of entrepreneurs (Smith, 1966, p. 100, 108). Though this latter issue became an area of significant research within industrial geography (Cyert and March, 1963), workers continued to be conceived of as *"...*[like] *any other commodity. Along with capital and raw materials it is simply another "factor input" to the production process, whose price (wages) will fall when supply exceeds demand and rise when there is a shortage of workers, and so forth."* (Peck, 2000, p. 133).

As the methodological approaches and statistical techniques developed by economic geographers evolved, in line with improved data availability and theory, i.e. gravity and entropy from physics, the perspective of labour became slightly more nuanced. Increasingly it was categorised according to particular characteristics that were theorised to influence wage costs. It was no longer the case that the 'labour pool' formed a single stock; this pool comprised different bodies i.e. skilled or unskilled, unionised or non-unionised, male or female etc. This nuance did not, however, result in a reconceptualising of labour. Workers, regardless of their characteristics, remained a factor of production contributing nothing more to industry than their acquiescence and labour (Block, 1990, p. 76 - 77). Within New Economic Geography, a branch of economics pioneered by Krugman in the early 1990s, labour was once more returned to its status as a factor. Within this model there are only two classes of workers, farmers and others. Like Lösch, Krugman conceived of non-farm workers to be perfectly mobile, free to migrate between the core and periphery (Fujita and Mori, 2005, p. 380).

A critical evaluation of the neo-classical concept of labour as a factor of production demands the question; why did early economic geographers focus on what was recognised by Lösch as, a partial conceptualisation of labour? The answer, according to Cloke et al. (1991) and Barnes (2003), relates to the institutional and technological context (place) within which early economic geographers, as individuals, developed.

In an earlier review of the development of quantitative economic geography Barnes stresses the importance of the expansion of the academic labour pool through the provision of research grants and funded doctoral and post-doctoral positions (Barnes, 2001a, p. 552).

In treating labour as the equivalent of any other factor of production, the first generation of economic geographers limited their analysis to the availability and marginal cost of workers i.e. the difference between labour input (number of workers, hours worked etc.) and value of output (things produced). This conceptualisation remained largely fixed within economic geography for much of the 1950s and 1960s (Thomas, 1956, Logan, 1966). To a significant extent this was possible due to a limited analytical focus, which tended to be large-scale, multi-branch manufacturing industries (Rees et al., 1981, p. 7). That these were characterised by steady 'growth', in terms of the number of enterprises and persons, generally male, employed throughout this period probably contributed to the stability of economic geography's conceptualisation of labour. Space, in these accounts was, following from Lösch, a container housing the resources or inputs to the production process.

2.2.3 Empowering Labour

Rapid economic change resulting from de-investment in traditional industrial regions during the 1970s destabilised this orthodoxy (Scott, 2000). The agglomerative theory at the heart of neo-classical economic geography perspectives was unable to explain the real and/or relative decline in some regions and growth in heretofore peripheral ones (Clark, 1981, Massey, 1984, Massey and Meegan, 1982, Smith, 1981). Mass unemployment following the collapse of entire industrial complexes, i.e. coal mining, steel production and automobile manufacturing in the USA and the UK, gave rise to large-scale regional problems (Massey and Meegan, 1982). A central question for economic geography that emerged from these developments was; were economic problems *of* a region or *in* a region (Massey, 1978)? Where the spatial science view of economic geography considered this question to be an outcome of natural advantage, agglomeration and differential wage costs, a new breed of researcher emerged armed with theory encompassing power, control, social

reproduction and equality. Critiques of quantitative methodologies had combined with critical assessment of neo-classical theory to highlight the limited and limiting nature of the theoretical and conceptual basis of many of the models that sought to explain spatial patterns of economic processes cf. Harvey, 1973. That this perspective came to the fore is perhaps unsurprising given that the late 1960s and 1970s was a time of significant political and social upheaval in both the USA and, what was then referred to as, 'Western Europe' (Scott, 2000, Peck, 2000). Professional economic geographers increasingly engaged with radical political economy, commonly referred to as Marxist theory, as a means of developing conceptual and analytical frameworks that could get behind the processes of uneven development (Storper, 2001, p. 157). Concerns with class, exploitation and conflict arose from the Marxist perspective of capital and capital accumulation processes and the consequences for individuals and communities. However, rather than simply describing spatial distributions of economic phenomena, detailed regional and or industrial studies combined with Marxist theory were used to draw out the means in which similar processes operating at one scale could result in spatially differentiated outcomes at other scales (Clark et al., 1986, Scott and Storper, 1986).

This epistemological and theoretical context set the framework within which economic geography, in general, and labour, in particular, would come to be studied. It facilitated a critical engagement with the presuppositions underpinning spatial science. This in turn brought into focus an assessment of the central aim of spatial science, the identification of 'iron laws', to use Lösch's term, and the methods used in pursuit of this aim. Cloke et al. (1991, p. 14) conclude, *"spatial science suffered from a failure to ... acknowledge two crucial aspects of spatial patterns and processes. They (the patterns and processes) are, firstly, intimately bound up with the working of deeper economic, social and political structures that condition and constrain the paths of human existence; and, secondly, they are reflected in and are reflections of the perceptions, intentions and actions of human beings as conscious agents."*. These two issues became central to the study of economic geography and labour. They also formed two distinct lenses through which labour could be considered, from the perspective of work or labour process and from the perspective of the individual, household and or community, also known as labour power.

2.2.3.1 Capital and Workers

For Marxist geographers, in order to provide an answer to the question of whether problems were of or in regions it was necessary to take much more nuanced approaches to the study of industrial processes and how these evolved over time. Unsurprisingly, given the Marxist perspective, analysis of labour was central to much of this research. The privileging of two analytical constructs, labour process and labour power, arose not just from readings of Marx's *Capital* but also, from the structurally uneven outcomes of evolving production and transportation technologies on economies (Peet, 1978, Burawoy, 1978, Elbaum et al., 1979, Sayer, 1982). Whilst investment in transportation and communications infrastructure had greatly reduced the costs of moving raw materials and goods from one location to another, most workers, by comparison, remained anchored within specific places (Storper and Walker, 1983, p. 2 - 3). Labour became central to the study of economic processes for many geographers and was privileged over other factors of production (Peck, 2000, p. 135).

These developments, in very limited respects, were to take economic geography back to its idiographic roots as there was a return to detailed case studies of regions in general and their socio-economic arrangements in particular. As geographers explored the relationships between industrial location, growth and decline, it was increasingly evident that not only was labour dissimilar to other factors of production in that it was relatively immobile but that the local contexts arising from immobility were important in understanding the economic process. Walker (1978) used the metaphor of the mosaic to describe spatially uneven economic development. In a later text Storper and Walker (1983) expanded on this analysis to demonstrate that not only was uneven economic development a product of industrial development but it was also necessary for and a consequence of development processes and outcomes. They concluded;

> *A geographic levelling of labour supplies to the same degree as has occurred among true commodity inputs will never take place. This is not simply the result of the cultural idiosyncrasies of people in different places. It is embedded in the conditions of the employment relation under capitalism. ... Stable solutions to the dilemma of employment are temporarily possible, but*

> *they cannot be maintained forever: they are always in jeopardy of being upset by changes in technology, the competitive economic status of the unit of capital or work dissatisfaction. Conversely, stable solutions may become rigid barriers to the competitive position of capital, which must periodically introduce technical innovations or otherwise rearrange the employment relation and conditions of labour reproduction. …Mobility is not a luxury for capital, but a necessity. Because workers and working class communities are created that are not as plastic, or are less geographically mobile than capital, labour forces must be sought out, fought with, and on occasion, abandoned by industry in its ceaseless process of evolution and restructuring."* (Storper and Walker, 1983, p. 34).

Within this framework geography, labour and industrial development are interrelated and uneven economic development is conceptualised as representative of spatial divisions of labour. Space is a central element in the location equation and the spatial dynamics of economic activities are understood to arise from exploitation and conflict between capital and labour. Simply put, *"geography is part of the calculus of profitability"* (Peck, 2000, p. 135). This theoretical perspective, developed by 'spatialising' Marx's theory of surplus value, prevented economic geography from regressing back to pre-Lösch idiographic descriptions of places or industries (Herod, 2003).

Doreen Massey developed the concept of the spatial division(s) of labour, along with, primarily, Storper and Walker (1983), through a series of books and articles during the late 1970s and 1980s (Massey, 1978, 1982, 1984). Massey *"linked economic development and (industrial) restructuring processes at the regional and local scales with wider, national and international changes in the organization of production."* (Peck, 2000, p. 133). Her central argument, crystallised within *Spatial Divisions of Labour*, was *"if geographical patterns are the outcome of socio-economic processes (operating over space and through time) then in order to understand a pattern we must go behind it and interpret it in terms of the structures and processes on which it is based"* (Massey, 1995, p. 65).

Massey's is a nuanced perspective of the spatial divisions of labour. Economic (local) processes are driven by external or global drivers of change that facilitate increased capital accumulation within conglomerated industrial structures. The conglomerate is functionally and geographically distributed. Management and innovation systems, considered to be high added value activities, are located in central areas whilst lower (added) value employment is distributed to those regions with surplus and or suitable labour. This description represents the structural layer within Massey's concept. Into this she injects the concept of distinctive phases or, more appropriately given the historical materialist perspective arising from the use of Wright's (1976) model of class based functions within capitalist society, periods, of *"…social relations, networks of interconnectedness across space, and the fact that – crucially – they interact. And they interact both in moulding the character the one of the other and in producing, in consequence, radical differences in any one layer between different areas."* (Massey, 1995, p. 321). In taking this approach, labour was considered highly significant but the location decision and resulting uneven spatial development was not limited to assessing this particular factor.

One of the most important contributions of *Spatial Divisions* is Massey's analysis of the importance of history in shaping contemporary economic processes and, hence, making contemporary development contingent on past economic development or under-development. Different periods of economic change, whether resulting in growth or decline, were seen to produce discrete divisions of labour. When viewed from a historic perspective, older divisions of labour are seen to exist, spatially and temporally, in parallel to emerging divisions (Massey, 1995, p. 91 - 95). This enables a consideration of how path dependency, although Massey herself did not use this term, acts to shape current and future developments. This gave rise to greater understanding that an *"unevenly developed geographical landscape, is not only a social product but also re-bounds back to shape social relations, social practices and social life itself."* (Soja, 1987, p. 292).

Whilst *Spatial Divisions* contributed significantly to the establishment of a new orthodoxy in economic geography (Soja, 1987, Peck, 2000, p.137), other geographers were taking alternative pathways in their exploration of labour. This was part of the unpacking of human geography's conceptual (Pandora's) box

following from the acceptance of Lefebvre's (1991) conceptualisation that space is a material product or, socially produced through spatial practice. Many Anglo-American geographers would have been introduced to Lefebvre through David Harvey's *Social Justice and the City* (1973) as, at this time Lefebvre's works had not yet been translated into English (Soja, 1990, p. 76). Whilst the material production of space is clearly evident in the conceptualisation of workers presented in the writings of various authors considering spatial divisions of labour it was of much greater significance to those geographers who explored in detail how workers influenced the accumulation of capital.

2.2.3.2 Workers and Capital

Herod's 1997 critical re-evaluation of the evolution of economic geography, and more specifically the place of labour within the discipline, identified two dominant conceptualisations; geographies of labour and labour geographies. It is to the latter that attention now turns. Whilst Storper and Walker (1983) and Massey (1984), *"tell the story of the making of the geography of capitalism through the eyes of capital(ists)"* (Herod, 1997, p. 2) alternate perspectives are to be found within the literature evaluating how workers are 'produced'. This body of research was particularly influential in responding to spatial science's lacuna concerning the spatial patterns and processes that *"are reflected in and are reflections of the perceptions, intentions and actions of human beings as conscious agents."* (Cloke et al., 1991, p. 14). Central to it is the understanding that *"workers' lives are spatially embedded in the landscapes in which they live, that this spatial embeddedness may be enabling and/or constraining of their social praxis, and that workers will thus try to shape in particular ways geographical structures and relationships within which they live their lives."* (Herod, 2003, p. 113). The primary theoretical lens adopted by those pursuing this view of workers is that of segmented labour markets (Hudson, 2005, p. 287). These *"...theories begin from a root and branch rejection of the mythical characterisation of the labour market as a self regulating commodity market; instead, they insist the labour market must be understood as an institutionalised and politicised arena which is systematically structured by social relations of production and reproduction and by immanent institutional forces."* (Peck, 1996, p. 261 - 262).

In a body of work that spans the 1980s and 1990s Hanson and Pratt introduced and develop intricate concepts of labour; often drawing on data produced from case studies of Worchester, Massachusetts (Hanson and Pratt, 1992, 1995, 1988, Pratt and Hanson, 1991). Hanson and Pratt reject neo-classical perspectives of labour, which holds the market to be the primary force organising work and workers, and the implicit conceptualisation of labour as defined by the relation to work and the workplace. More specifically, they argue that the conceptualisation of the link between home and work contained in urban land use models which place most jobs in core areas and seek to explain *"households' residential location as the outcome of their trading off accessibility to work (distance) vs housing consumption (space)."* distorts what are very complex social and economic processes (Hanson and Pratt, 1988, p. 301). They critique these models and to a lesser extent, geographies of labour, on the grounds that there tends to be limited consideration of home and, correspondently, over emphasis on understanding of the workplace. Hanson and Pratt (1995) question a number of key theoretical perspectives that shaped how labour and the role of workers in shaping production processes, were conceived. They focus considerable attention on assumptions that the work location was taken as given whilst residence was seen to be mobile. Furthermore households were assumed to be homogenous and are driven by the desire to maximise their utility; and, finally, the interplay between household and neighbourhood dynamics and workplaces were seen to play out in abstract settings – that is, one did not have an affect on the other.

In responding to these shortcomings Hanson and Pratt argue for the development of conceptual frameworks that take a holistic consideration of the inter-linkages between social and economic worlds. Unsurprisingly then, their early work draws on an eclectic range of concepts. The 1995 published *Gender, Work and Space*, however, organises and synthesises these through a theoretical exegesis of the links between occupational segregation – viewed from the perspectives of both home and work, labour market segmentation, (local) knowledge networks, and above all, gender (Hanson and Pratt, 1995, p. 3 - 7). Through the medium of 'spatial stories' they lay out the ways space and place are implicated in economic processes and, most significantly, how understanding the overlapping residential and work

dimension provides important insights to the structure, functioning and evolution of local labour markets.

Historically, Hanson and Pratt's work in this area covers the period from the mid 1980s through to the mid-1990s. The temporal, economic and spatial contexts of their work is important as it is part of a period characterised by decline of, male, industrial employment, and, more generally, the reorganisation of production systems through the break-up of large scale industrial complexes into new industrial spaces characterised by flexible accumulation (Scott, 1988, p. 177, Storper and Scott, 1990). Spatially, they relied heavily on place based case studies and data collected in Worcester, Massachusetts. Over the period in question, this area saw a decline in male employment, development of suburban work locations, the feminisation of the work force, increased accessibility to Boston through infrastructure investment and the location of high-technology companies within the area (Hanson and Pratt, 1992, 1995, 1988, Pratt and Hanson, 1991). This then was a place and space of significant change and dynamism. It was not necessarily exceptional but, equally, it was not necessarily representative of all post-Fordist landscapes. Some of Hanson and Pratt's (1988) early work can be criticised as being too place focused and not giving sufficient consideration to space in general and interactions with wider economic networks in particular. In later research, however, they argued that whilst recognising that *"the world is increasingly well-connected… [however] most people lead intensely local lives: their homes, workplaces, recreation, shopping, friends and other family are all located within a relatively small orbit"* (Pratt and Hanson, 1994, p. 25). Notwithstanding this critique, one that can be levelled at most 'localities' studies, Hanson and Pratt contributed to a body of research that is at the centre of an orthodoxy amongst many geographers interested in issues related to the production and reproduction of labour. This orthodoxy foregrounds the significance of context and difference at the household, firm and regional scale. Variation in context at any of these scales gives rise to spatially constrained opportunities for both labour and, ultimately, capital. From a theoretical perspective, their contribution is noteworthy as it demonstrates the importance of labour's role in shaping place (locality) and the consequent implications for spatial relations and economic activities. This viewpoint has contributed to the development

of institutionalist perspectives of uneven economic development within the context of increasingly globalised economies.

2.2.4 Labour within a globalised context

As the economic trends of the late 1980s and early 1990s gathered pace, issues of economic flexibalisation and globalisation gained greater prominence within the geographic literature concerned with labour's place within regional economic development (Martin, 2003, p. 465 - 467). This development paralleled the cultural economy turn within economic geography (Thrift and Olds, 1996, Amin, 2000, Barnes, 2001a). The change in the spatial and functional organisation of production and the increasing dominance of the tertiary sector in advanced industrial societies led to greater emphasis being given to the embeddedness of economic activities within social relations (Thrift and Olds, 1996, p. 332). The work of Massey (1995) and Hanson and Pratt (1995) drew attention to the break-up of large-scale industrial complexes and the emergence of flexible specialisation as an important mode of production. Whilst their research largely focused on the consequences of these developments for individuals and communities the work of other economic geographers focused on the implications for industries and regions.

With the break up, over both time and space, of industrial production along discrete product or process lines (Scott, 1988, p. 177), attention turned to the emergence of regions and spaces where particular tasks or functions were concentrated and the networks linking these (Peck, 2000, p. 135). The concept of agglomeration that is central to Lösch's view of economic processes re-emerges within this body of literature. However, rather than transport costs determining the location of firms, the Marshallian perspective of accessibility to specialised labour pools and supporting formal and informal institutional networks are considered central to both economic development and regionally differentiated development trajectories (Baeten et al., 1999, Copus, 2001). Not only are place and space important within this context, so to is the institutional framework governing or regulating economic processes, including those shaping the production and reproduction of labour.

One of the primary concepts adopted by economic geographers to capture the spatiality of these interconnections, interactions and local or regional context is that of the industrial district. Scott's (2004, p.129) definition of these structures reflects a holistic view with industrial districts considered as *"spatially agglomerated production complexes together with their dependent labour markets and intercalated human communities"*. Place, or the local scale, is important in the context of industrial districts as proximity to suppliers of inputs and consumers of outputs combine with the benefits of labour pooling and un-traded interdependencies between firms and labour, i.e. specialist skill formation and tacit knowledge transfer. This give rise to specialised agglomerations of production capabilities that are functionally and spatially differentiated within the context of a global economy (Fujita et al., 1999, Asheim and Isaksen, 2002).

Scott, who has been to the forefront in developing industrial space concepts, stresses the emergence and importance of specialist groupings of firms and their associated labour pools under conditions of flexible accumulation. The historical logic underpinning this process is a transition from Fordist to post-Fordist production. Scott (2004, p. 129) characterises traditional or Fordist production by its tendency to replace labour with capital and, of the remaining workers, place them as functionaries to production processes and in doing so deskilling them. Flexible or post-Fordist production is conceived of as having the ability to *"change process or product configurations with great rapidity – an ability that is much enhanced by the use of computerised technologies. They are also typically situated in networks of extremely malleable external linkages and labour market relations."* (Phelps and Ozawa, 2003, p. 588, Pinch and et al., 2003). Due to the fluid nature of production, firms concentrate on core competencies or internal economies, with the result that their labour requirements become more specialised. The significance of networks arises from the need to buy in specialist skills or part-processed products, from the external economy, resulting in the creation of intra-firm linkages. In Scott's (2004, p. 127) view, flexible accumulation results in *"extended social divisions of labour, thus giving rise to many specialised subcontractors."* Agglomerations of intra-linked firms emerge where *"selected sets of producers with particularly elevated intragroup interaction costs… tend to converge around their own geographical centre of gravity and thus engender definitive nodes of economic activity on the*

landscape." (Scott, 2004, p. 128). These processes are seen to play out in local labour markets through increasing labour market segmentation. This is not to suggest that a single type of specialist labour dominates a particular industrial district but rather, distinctive activities within the district are characterised by employment of equally distinctive elements of the labour force (Scott, 2004, p. 129).

Since the inception of the industrial district concept it has become a popular analytical and normative concept (Scott, 2004, p. 130). In a comprehensive review, however, Amin (2000, p.150) concludes that *"the interest in industrial districts far exceeds their empirical significance."* In spite of this, Amin (2000, p.151) concludes, *"the rediscovery of decentralised production systems has renewed hope in the powers of place and the locality or region as a unit of self-sustaining economic development."* has resulted in significant interest amongst regional economic development policy stakeholders. Faced with changes in relative competitiveness as a consequence of globalisation, industrialised countries have grasped at this concept in an effort to develop new ways to tie or embed economic processes geographically (Baer and Marando, 2001, Brioschi et al., 2002, Coffey and Shearmur, 2002, De Propris and Lazzeretti, 2009, Gray et al., 1996, Molina-Morales and Martinez-Fernandez, 2004, Yarwood, 1996). Unsurprisingly then, much of the research in this area has focused on how states and regions seek to tilt the global economic terrain in their favour (Amin, 2000). The EU has been to the forefront of fostering the development of spatial strategies that seek to exploit the potential of regions as a means of achieving balanced regional development. Whilst dealt with in greater detail in Chapter Three, it is worth noting here that industrial districts are interpreted in a broad sense within the European Spatial Development Perspective through the spatial planning concept of polycentricity.

The institutional milieu underpinning the formation and functioning of economic systems, e.g. industrial districts, is considered by Peck (1996) in *Workplace: The social regulation of labour markets.* This contribution provides a highly nuanced view of workers' lives and situates labour within socially and culturally rich environments that are structured by a range of actors, including themselves, and institutions operating at a variety of scales. In rejecting neo-classical conceptions of labour markets Peck's *Workplace* draws on and reiterates Walker (1978), Storper

(1983), Massey (1984), Hanson and Pratt (1988) and other's conception of labour being conditioned by and conditioning the context in which capital operates. The significance of Peck's contribution rests in the emphasis placed on changing the capital – labour dynamic. Whilst not suggesting that there is greater equality between these two fundamental elements in capitalist economies it is recognised that labour plays a proactive role in shaping the conditions under which labour is produced and capital operates. In a limited set of circumstances, this can result in shift in this relationship from one of opposition and conflict to one of partnership. Dehli (1993) ascribes *"business demands for increased competitiveness, innovation and development on the one hand,"* to enhance regional attractiveness to external investors and "*the arguments of labour and social activists* [for]… *improved training and education"* to enhance the capacity of workers to access 'good' jobs (Dehli, 1993, p. 86). Herod also picks up on this theme in his assertion that workers, cooperating with business managers or State regulators, should not be considered *"dupes of capital"* but rather as active economic and geographic agents (Herod, 1997, p. 16). Within the Irish context this perspective is important given the pivotal roll of Social Partnership, an integrated approach to social and economic development, involving the State, employers and employees, in regulating the production and reproduction of labour. Ironically this process, led by the State, was central to the managed deregulation of the economy, in general, and changing the conditions of employment for workers, in particular. This processes conforms to Standing's (1997, p. 7) view, who identifies a *"profound re-regulation of labour relations, not `de-regulation'"* and concludes *"flexibility and market regulation has influenced the extent and character of labour fragmentation"*.

2.3 Grounding Labour: Local Labour Markets

A clearly defined economic landscape is a piece of good fortune rather than a natural subdivision of a state. (Lösch, 1954, p. 219)

The geographic literature on labour market segmentation theory emphasises the role of spaces and places in shaping initially participation and non-participation in the

labour force and ultimately patterns of travel-to-work amongst different elements of the workforce. Early contributions from McDowell (1983), Massey (1984), Singell and Lillydahl (1986) and Hanson and Pratt (1988) sought to theorise these patterns with reference to household, employer or firm behaviour, and industrial restructuring. Taken as a whole, this body of work contributes to theorising *"the formation of geographically specific local labour markets/regimes and their ongoing regulation and segmentation"* (Coe and Jordhus-Lier, 2011. p. 212). The concept of a local labour market, though seemingly intuitive, has given rise to significant debate within the academic literature. Peck (1996) writes *"The term "local labour market" is as ambiguous as it is ubiquitous. Extensively deployed in studies of urban and regional restructuring, the local labour market remains "puzzling to many economists" (Rees and Shultz, 1970 p.3). For others it is "theoretically unprincipled" (Ward, 1982 p.1) or "perplexing and underresearched" (Scott, 1988 p.120). Apparently, it has been possible to use the term without having worked out what it really means."* (Peck, 1996, p. 83). In many respects this issue arises from the use of the term in neo-classical studies that conceived local labour market distinctiveness to be solely attributable to the relationship between wage costs and variable transportation costs associated with particular locations (Moses, 1962). Local labour markets were therefore seen as a container within which universal forces functioned to bring about equilibrium in supply and demand and or equalised wage rates; this despite Kerr's (1950, p.280) assessment of the confounding data he collected during the Second World War that clearly established equilibrium was the exception, rather than the rule.

A significant body of literature produced within economic geography since the 1980s has sought to theorise the relationship between labour and labour processes and place, space and scale. Ward et al. (2003) provide a comprehensive assessment of how labour relates to these concepts. Place is considered to reflect the *"scale of everyday life: the scale of cities, towns and communities"* or locality within which workers live, work and reproduce themselves (Ward et al., 2003, p.64). This perspective can be traced to Marx's writings on the limits of the working day in *Capital: Volume 1* and Harvey's grounding of this concept as the *"geographically contiguous labour market within which daily exchanges and substitution of labour power are possible."* (Harvey, 1989, p. 127-128). By intertwining place, locality and

labour the importance of this setting is made apparent as it is here that the materiality of existence in terms of the production and reproduction of labour, is played out and given meaning in *"unique ways in different locations to create a plethora of places that are more-or-less distant from one another."* (Ward et al., 2003 p.64). This point is reflective of Storper and Walker's (1983) and Pratt and Hanson's (1991; 1995) view of the importance of place in the study of labour and economic processes. Labour therefore, and by extension local labour markets, evolve within place specific, historical contexts. This implies, as Massey (1995) highlights, that spatial or extra-local processes must pass through institutional, social, economic and cultural filters resulting in these 'common' drivers of change giving rise to uneven development and spatial differentiation within and between places.

Local labour markets are also viewed as functioning differently across space reflecting *"complex ensembles of workers, dependents, retirees, the unemployed, firms and institutions that are built-up and variable over time."* (Ward et al., 2003 p.65). It is noteworthy that local labour markets (places) are defined not only by workers, firms and institutions, but also by those populations that are not actively working whether out of choice or enforced exclusion. As an aside it is remarkable that within much of the literature reviewed so far, the emphasis on labour in general and workers in particular has resulted in limited consideration of non-workers, this despite repeated assertions that the local context matters. These groups comprise a sizable proportion of the population in any local labour market and their presence has a direct bearing on the functioning of these spaces whether through the demands they place on households to accommodate child or elder care or as available pools of 'flexible' labour to be employed during particular times of the year or as consumers of good and services produced and provided by the working population within the local labour market. Though it may be obvious, it is important to note that production through labour power is not considered separate from consumption, after all the worker is, in capitalist societies, a consumer and the journey-to-work is a primary locus of consumption (Hudson, 2005 p.3). Workers, travelling to and from work, consume commodities associated with transportation. These include all modes of transport, with all their attendant components or accessories, fuel, and as home and work have become increasingly separate places for some workers, important times when food and media are consumed.

Returning to the issue of place and local labour markets, it is not only what goes on within a locality that matters but also interaction with other places. This, after all, is one of the central points in Massey's *Spatial Divisions*, wherein place is an active element in the calculus of capital investment and divestment decisions and what happens in one local labour market has implications for other places. The work of a large number of geographers have highlighted the (increasing) interdependence of places or localities and that these relationships are not solely determined by Euclidian distance (Morgan, 2007, Bathelt and Glückler, 2003). The relational perspective of place is important in the context of local labour markets given the significance of non-local processes that actively shape individual and household decisions regarding work and the decisions of entrepreneurs to invest or relocate their investments. These drivers may be global, supranational, national, regional or local. Following from this it is not appropriate to treat local labour markets as a mosaic of discrete places but rather they need to be considered *"simultaneously placed (local) and translocal (spaced)."* (Ward et al., 2003 p.69). Simply put, local labour markets need to be considered within their spatial context, which arises from the network of interconnections and interdependencies with other places. This point is, particularly, exemplified by the treatment of local labour markets within the industrial districts literature. From the perspective of geographers the emphasis of and importance attributed to both place and space in the functioning of industrial districts is what makes them significant (O'Donnell, 1998).

2.3.1 Identifying Local Labour Markets

In the previous section spatial concepts such as region and local have been used without reference to the definitional and methodological issues that arise at the operational stage. This section addresses these issues through a consideration of the concept of labour markets.

Whilst Kerr (1950) pointed out the 'balkanisation' of labour markets along geographic lines as early as the 1950s, it took the cumulative contributions of a number of geographers, including Smart (1974), Coombes and Openshaw (1978, 1979), Massey (1984) and Hanson and Pratt (1988), to demonstrate both empirically

and theoretically the significance of place and space in understanding patterns of economic change to policy makers and the wider academic community (Herod, 1997, Martin, 2003, p. 458). Today, local labour markets are largely viewed as functional regions within which the dynamics, arising from differences in the immobility of labour relative to the mobility of capital within increasingly interconnected economies, are observable (Amin, 2000, Peck, 2000, Martin, 2003). Globally, these concerns are prevalent within popular, political and policy discourses and are driven by the opening up of key regions to trade, especially 'emerging markets', e.g. China, India and the Philippines, and widespread adoption of communications technologies (Scott, 2000). These developments have given rise to further rounds of accumulation or economic restructuring. At the European scale these processes, resulting in further agglomeration within core areas of the EU, have prompted spatial planning initiatives, including the European Spatial Development Perspective (ESDP) and the Territorial Agenda, which aim to ensure balanced regional development (Coe et al., 2007, p. 254 - 269). From the perspective of this research, these initiatives are interesting as, rather than focusing on administrative regions, emphasis is placed on the identification of functional economic regions, commonly defined as local labour markets, and their interaction with one another (Faludi, 2002a, 2004b). They are also directly relevant to the Irish context as the spatial concepts set out in the ESDP were adopted in the development of the National Spatial Strategy 2002 – 2020. Within this context then, not only are local labour markets important theoretically and conceptually in understanding uneven social and economic development, but these issues are very much the concerns of policy makers and other policy stakeholders.

The identification of local labour markets is not, however, without its own set of conceptual challenges. In its simplest form, local labour markets have been spatially defined as geographical areas within which most employers and employees fulfil their labour or employment needs (Parr, 2004, Cörvers et al., 2009). A variety of approaches have been developed and applied within economic geography that facilitate the identification of these spaces. Basic conceptualisations take the principle of labour supply and demand as a starting point. These axioms are incorporated, empirically, into economic geography through the identification of either worksheds or laboursheds. A workshed is that space within which it is feasible

for a worker to change employment without necessitating a change in residential location cf. Vance, 1966 p.297 (Martin, 2003, p. 458). With regard to laboursheds, these are spaces within which employers recruit workers. They can be applied by plotting the location of workers employed in a particular town or firm. A boundary is then drawn around the outermost residences and the area considered a labourshed (Hunter, 1969, Smart, 1974, Ball, 1980). Labourscheds can be equated to the study of the geography of labour whilst worksheds reflect labour geographies. They can also be related to Harvey's definition of local labour markets, presented above, as geographically contiguous places within which daily exchange and substitution of labour are possible (Harvey, 1989 p. 127-128).

There are, however, difficulties with these concepts. Starting with Harvey, the conceptualisation of local labour markets as being systematically organised over space in contiguous spaces reflects a particular perspective underlying early landuse models. Interaction between workers and workplaces is viewed as being determined by the friction of distance. The relative accessibility of places is ignored as is the interplay between transport systems and spatial planning. There are other difficulties that need to be considered. At a practical level, spaces associated with worksheds and labourscheds may only partially overlap. These concepts, whilst adequate for an examination of a single place or distinctive group of workers, lose their validity when confronted with the slightly more complex example of competing locations, wherein towns or firms seek labour with similar skills or attributes.

Conceptually there are more serious difficulties with a definition of local labour markets as spaces where most employees and employers fulfil their employment or labour requirements. This definition reflects a neo-classical view of labour by intimating that labour supply and demand will reach equilibrium. It also assumes equal mobility on the part of both labour and capital. As such, this definition treats space as "*the domain where social processes find 'empirical expression' on the ground."* (Ward et al., 2003 p.64). Place is not accorded a role in the functioning of local labour markets whether from the perspective of production or reproduction.

Clearly, if local labour markets are to have geographical meaning an approach that captures the complex relationships within households, amongst different segments of

workers and between workplaces and these populations is required. This leads to the consideration of those spaces where worksheds and laboursheds coincide as local labour markets. Analysis of residence – workplace interaction using travel-to-work data has long been used to identify such spaces. These have variously been labelled local labour market areas (LLMAs) or travel-to-work areas (TTWAs) (Hayter, 1979, p. 164, Lonsdale, 1966, p. 114). In an important contribution to this research area Coombes and Openshaw (1982), drawing on theoretical considerations proposed by Smart (1974) pertaining to the nature of local labour markets, introduced the concept of self-containment. This 'measure' describes the number of workers who both live and work in an area and the number of jobs in an area filled by locally resident workers. The concept has been implemented through a series of increasingly sophisticated computer algorithms, part of the functional regionalisation family, capable of evaluating spatial interaction data and, using minimum and target self-containment values, identifying local labour market areas. Importantly, however, the algorithm does not provide a 'plug-and-play' solution to the identification of local labour markets. The researcher has to select, arbitrarily, the minimum and target self-containment values to be used and, as will be demonstrated in later chapters, this has a significant bearing on the number and scale of TTWAs identified which, in turn, impacts on patterns of interaction and independence between places.

The latter issue, in particular, has resulted in significant criticism of quantitative approaches to local labour market identification and analysis of the home – work relationship. Limitations included the use of aggregate data, which precluded assessment of variance in travel-to-work patterns within and between different population and occupational groups. Another serious limitation was the reporting of journey-to-work interaction for relatively large geographic areas. Early analysis of commuting patterns in the UK by Smart used an interaction matrix depicting flows between 1,864 Local Authority Areas to identify 466 TTWAs (Smart, 1974 p.313). Later work, using 41,773 area units, resulted in the identification of 234 TTWAs (1979). Whilst the early development of functional regionalisation techniques was hampered by limited data and computational capacity, recent advances in these areas have significantly improved empirical analysis of journey-to-work data. In addition to the greater spatial granularity of journey-to-work data, information is increasingly provided at the individual, as well as the area, level. This facilitates much greater

consideration of the social construction of communing patterns. Overall, these developments, combined with improvements in geocomputational techniques, the use of relational databases and Geographic Information Systems (GIS) facilitates much more detailed consideration of the implications of 'subjective' decisions. This area of research fits with the 'local analysis' turn within the field of geocomputation (Fotheringham et al., 2000, p.93-129).

There are, as with all approaches that use travel-to-work data, a number of significant issues that need to be considered. The data is partial in that it only applies to those classified as in work and hence travelling to work. This excludes the significant proportion of any labour force that is in education, seeking a job, unemployed or retired. It also excludes those populations that are unable to work for whatever reason. By using travel-to-work data to define local labour markets there is an implicit assumption that those population not working would, if they so wished or were successful in securing employment, do so within the local labour markets they reside in. This may not always be the case as the work of Hanson and Pratt (1988) and Massey (1995) makes clear. Pockets of high unemployment can develop and persist within local labour market areas due to the place-bound nature of some workers, particular those with lower education and skill levels (Hanson and Pratt, 1988). Unemployed workers may find themselves unable to secure jobs not because, or not only because, of where they live but because they do not have the skills or other attributes employers require. Local labour market areas can therefore mask important differences in spatial patterns of employment and unemployment pertaining to sub-groups within the workforce. From a geographic perspective, local labour market areas vary in size, as does the number and distribution of jobs and the level of internal coherence (Martin, 2003, p.460). This latter point is important as an uncritical assessment of labour market areas in a particular region or country might suggest they are similar with only the number and type of jobs differing. This would, of course be a mistake. Whilst local labour market areas are useful concepts and spatial constructs, they must be treated with caution. Coombes et al., (1988, p.314) note the imposition of a single set of boundaries on complex travel-to-work patterns limits consideration of the *"multi-level mosaic"* associated with the travel-to-work patterns of different social groups and sub-populations.

This leads Peck to reject the concept of travel-to-work areas as "*Problems of theoretical underspecification are compounded by seemingly intractable dilemmas of empirical definition and where to draw the edges of commuting zones."* He goes on to conclude that it is "*futile… [to draw] a line around complex and dynamic social processes."* before concluding that *"…the problems of delimiting the boundaries around local labour markets are insoluble."* (Peck, 1996, p.88). In the following paragraphs Peck turns to Harvey (1989, p. 128) for a definition of local labour market areas. In Harvey's account the overlap between worksheds and laboursheds is considered the optimal spatial unit for the analysis of local labour markets. Harvey does not use these terms but his description of labour processes and employer practices equates to these concepts. Building on Harvey's perspective Peck's main point is that the edges of labour market areas do not matter as, after all, these fade into each other. From a theoretical perspective Peck argues for the deconstruction of labour markets in order that understanding of specific processes of segmentation can be enhanced and the role of place acknowledged. By limiting the gaze to the 'centre' (1989, p. 88) the transitional zone, that is the area between two or more local labour market areas, is ignored and the role of labour in making these boundaries is neglected. This is an interesting space given that the changes over time within areas and in the boundaries themselves reflect the materiality of changing spatial divisions of labour and the consequent impacts on labour market segmentation processes. If the boundaries are unknown then it becomes difficult to determine what changes have occurred in response to developments influencing the production and reproduction of labour and, more importantly, to develop our understanding of the role of place and space in this process.

Boundaries have to be drawn somewhere if we wish to understand processes operating within functional areas such as labour markets and how these differ from other areas. Only then is it feasible to begin to identify those features or processes that are similar or common and those that are different or local. Local labour market research that does not engage with spatial context risks descending into relativism. Whilst focusing on individual segments of a labour market is revealing it can also present a distorted perspective of labour processes. The work of Massey (1984) and Hanson and Pratt (1995) clearly demonstrates the need to place labour within a number of interrelated spatial contexts including the house(hold), community, firm

and city or region. The identification of well-defined local labour market areas assists in this process by establishing an overarching context within which different labour processes and segments intersect on a regular basis e.g. daily. Identification of local labour markets enables the researcher to assess changes in the space of places within increasingly interconnected and interdependent processes.

Whilst serious consideration has to be given to the 'dilemmas of empirical definition' the identification of local labour markets using the self-containment concept is not futile. As with all research, a careful evaluation and selection of methods is required in order to understand and interpret the results of any analysis. There is however a more fundamental, conceptual issue, with Peck's assessment. The assertion that definition of the boundaries is futile is incorrect as this precludes analysis of the interaction and interdependencies within and between local labour market areas. Not only does this perspective deny the place and space dimensions of local labour markets, it also hinders consideration of how the dynamics of one place influences another, which, are themselves fundamental to processes of segmentation. Implied in Peck's criticism is a rejection of research focused largely on the identification of local labour market boundaries in favour of consideration of the processes at work within these places. This is a common perspective amongst much of the research conducted into labour processes in general and labour market segmentation in particular. Most of the early work that developed the theoretical foundation linking place to processes of labour market segmentation focused, on relatively small geographic scales, i.e. households located in metropolitan areas (McDowell, 1983, Hanson and Johnston, 1985). Research undertaken on the issue of segmentation since these early contributions has, overwhelmingly, continued to focus on urban and suburban settings. There are relatively few studies that comprehensively evaluate labour market segmentation patterns within and between a number of different local labour market areas, i.e. not just metropolitan areas. Women living in rural areas, for example, are largely missing from the literature on segmentation. As a consequence of the focus on particular settings and groups of women the theorisation of the role of space and place in labour market segmentation is, potentially, partial. Despite this, there has been little critical re-evaluation of the role of space and place in labour market segmentation in recent years. This is surprising given a number of interrelated developments that have contributed to

changing the place of women within the labour force including, changing settlement patterns, increased car ownership, growth of 'female' sectors of the economy, decline in household size and higher levels of educational attainment amongst women compared to their male counterparts.

2.4 Conclusions

This Chapter presented an overview of different approaches to the theorisation of labour and labour market areas that are central to much of economic geography. It focused on conceptualisations of labour and how these evolved, particularly, over the past three decades. Early conceptualisations of labour, characterised as a stock or factor, have given way to more complex and nuanced, socially constructed, perspectives. Associated with these developments is the changing significance of place, space and scale in understanding labour processes and how these shape economic development pathways. The perspective of space as a container, and the attending emphasis on studying the geographies of labour and labour costs, has given way to a view of place and space as fundamental elements in the production process and, hence, the accumulation of capital.

These developments can be situated within broader economic changes that are frequently characterised as a transition from Fordist to post-Fordist regimes of production. Theoretical and conceptual evolution has come about through, firstly, a questioning of neo-classical theory and, secondly, critiques of land-use models. The body of research that engaged with the latter issue highlighted a limited conceptualisation of labour, over-emphasis of the importance of distance between home and work, and privileging of the workplace in determining or shaping the residence – workplace relation.

The emergence of labour as a primary unit of analysis reflects the growing recognition of path-dependency in shaping the on going unfolding of spatial divisions of labour. What Massey (1984) initially conceptualised as the influence of historical context on regional development trajectories has evolved into a dominant orthodoxy governing the study of labour, and economic processes, amongst geographers. Through iterative developments, institutional perspectives of labour

geographies have come to be central to the study of economic geography in general and core to those aspects of the discipline concerned with local or regional development. A dichotomy, between the relative mobility of capital compared to the relative immobility of labour, structures much of the research in this area. By foregrounding the production of particular types of labour within specific types of places through local processes, labour geographies have been afforded a central role in fixing capital spatially. From a geographic perspective the importance of local labour markets and space, and the interrelatedness and interdependence of places, emerges from this body of literature. In seeking to understand uneven economic development, the role of place is central as, it is here that the impacts and implications of increasingly stretched out or globalised drivers of change are observable. It is also at this scale that workers directly shape the filtering of these drivers through economic and institutional frameworks and resulting impacts are materially manifested.

In synopsising this assessment, and in doing so outlining the framework guiding this thesis, it is concluded that workers are organised spatially into functional areas comprising, amongst other interactions, the link between their home and workplace. Different types of worker have different patterns of interaction with the labour force and, ultimately, with work. It is accepted that there are specific labour geographies associated with specific types of workers. These differences reflect the contexts within which workers are 'produced'. This context extends from individual attributes and capabilities, the structure of the household and community through to the recruitment practices of employers and the activities of State agencies charged with economic development. The specificities of each worker's context results in a multiplicity of local labour market areas. In general, however, labour geographies are structured or segmented along three dominant lines, gender, socio-economic group and industry. The overlapping of travel-to-work patterns of different segments of the workforce gives rise to distinctive labour market areas. These can, with careful and considered application of geocomputational techniques, be identified. Spatial patterns that emerge from analysis of travel-to-work data, therefore, represent the outcome of complex relationships within households, amongst different segments of workers and across space. Identification of labour market areas facilitates analysis of spatial interactions between areas and evaluation of the two primary components of

each labour market, those that live and work locally and those that commute between areas.

Four primary questions emerge from the forgoing reading and interpretation of the literature; firstly, which of the theoretical perspectives of labour considered within this Chapter underpins the National Spatial Strategy; secondly, does the NSS accurately reflect Ireland's functional geography as reflected in regional and local patterns of travel-to-work; thirdly, whether Ireland mirrors international patterns of labour market segmentation; and, finally, from a methodological viewpoint, which self-containment values are appropriate to the identification of labour markets in Ireland? These questions are further developed and answered throughout the thesis. By way of providing a context within which to place the NSS and answer the first of these questions, the following chapter considers the background to and development of the Strategy.

Chapter 3 POLYCENTRICITY: A FRAMEWORK FOR IRELAND'S NATIONAL SPATIAL STRATEGY

3.1 Introduction

The primary aim of this Chapter is to explore how the production of labour is codified within polycentricity, a key spatial planning concept that has emerged as a primary means of describing the economic organisation of space within the EU (Davoudi and Strange, 2009, Richardson and Jensen, 2000, Richardson and Jensen, 2003, Molle, 2003). Achieving polycentric development is central to the EU policy of territorial cohesion and, hence, spatially balanced economic development. Polycentricity draws on an ontological framework linking industrial agglomeration, functional specialisation and, hence, spatial divisions of labour. In recent years a significant body of research has emerged evaluating polycentricity (Atkinson and Rossignolo, 2008, Davoudi, 2007, Faludi, 2004a, Geppert, 2009, Meijers, 2008a, Shaw and Sykes, 2004, Vandermotten et al., 2008). Much of this literature grapples with the issue of defining polycentricity and relating it to processes of regional economic development. Given the centrality of spatial divisions of labour to polycentricity and the emphasis on functional and relational spatial structures, e.g. labour market areas, it is surprising to find that relatively little attention has been allocated to considering how workers and labour processes are conceptualised.

Drawing on the perspectives of labour presented in Chapter Two, this chapter engages with two of the primary theoretical concerns central to the thesis, namely the place or role of labour within polycentricity and the interpretation of this concept within the NSS. The codification of labour within polycentricity is considered with reference to the review presented in Chapter Two and selected spatial planning literature. With an emphasis on probing how labour processes, including travel-to-work patterns and labour market fragmentation are encapsulated within polycentricity the research seeks to contribute to the conceptualisation of this concept. The interpretation of polycentricity within the NSS is then reviewed with regard to the Strategy document and a number of reports prepared in support of its development. A number of empirical research questions pursued within the

remainder of the PhD are identified through the evaluation of the conceptual content of the NSS.

3.2 From Core – Periphery to Polycentricity

From the perspective of EU economic policy, the introduction of the Single European Market and European Monetary Union are viewed as having led to greater economic and social integration. Internal borders between member states and or regions became less relevant within this space as *"more intensive [spatial] relationships and inter-dependencies"* emerged (CEC, 1999, p.7). This particular perspective is drawn from a broad body of geographic, spatial planning and policy research exploring the implications and impacts of EU economic and political integration (Amin et al., 1992, Begg, 1992, Chicoye, 1992, Moulaert, 1996, Quevit, 1992, Steinle, 1992). The analysis underpinning the European Spatial Development Perspective (ESDP) identifies centripetal forces operating at the continental scale resulting in growing social, economic and demographic imbalances between a core area identified as the zone of global economic integration and the rest of the EU. The core, or pentagon as it is referred to in the ESDP, extends between London, Paris, Milan, Munich and Hamburg. This zone is characterised as offering *"strong global economic functions and services, which enable a high income level and a well-developed infrastructure."* (CEC, 1999, p. 20). Outside of this space are a number of significant, but not yet sufficiently large centres to act as a counterbalance to the pentagon including the Barcelona Region and Øresund, encompassing the Malmo City region in Sweden and Copenhagen in Denmark, which are connected by a high-speed rail link. Beyond these spaces, in the view of the ESDP, is *"an increasingly large periphery"* (CEC, 1999, p. 20). European space, within this framework, is therefore conceptualised as comprising a small core and substantial periphery. The core has a range of social and agglomerative advantages that facilitate further growth and development. Contrasting this is the periphery, which is viewed as facing significant economic and demographic challenges.

At the sub-continental scale or national level, space is conceptualised as being organised along similar lines with core cities and underdeveloped peripheries. The conceptualisation of EU and national spaces in this way is significant as it represents

a continuation of spatial relations codified within classical spatial concepts, i.e. Freidmann's (1966) core – periphery model which in turn is predicated by spatial science conceptions of the organisation of economic space on the basis of transport costs (Moriarty, 1991).

The importance of the ESDP lies not in the analysis of core – periphery development patterns, but rather, in the assertion that a new spatial strategy fostering economic development outside of core regions is required (CEC, 1999, p. 20). Central to this new strategy is a different perspective of EU space based on the concept of polycentricity. Successful polycentric development is linked to delivering balanced regional development, European competitiveness, sustainable development, and facilitating new urban-rural partnerships (CEC, 1999, p. 19). Though this suggests that the concept is aspirational or normative in that it seeks to bring about these outcomes, a closer reading of the ESDP and key supporting texts, most notably a report prepared by Nordregio (2004), suggests that some regions are polycentric. Since the publication of the ESDP a range of policy documents draw on polycentricity as a means of achieving the EU objectives of balanced economic development and territorial cohesion (CEC, 2007, 2008a, 2008b, 2010). By ascribing such significance to this concept it increasingly determines how spatial patterns are interpreted within the EU (Hague and Kirk, 2003, Davoudi, 2003, Meijers, 2008a).

3.3 Evolution of the Polycentricity Concept: From Urban Places to Functional Spaces

Bailey and Turok (2001) trace the origins of contemporary perspectives of polycentricity to spatial planning initiatives undertaken in Belgium, Germany and the Netherlands during the 1990s. Faludi (2002b, 2004b, 2006), taking an alternative view, links it to the French regional development principle of *contrats de plan.* Previous to this, polycentricity was typically used by urban geographers to describe *"the existence of more than one centre in a city, region or other geographical unit."* (Musterd and van Zelm, 2001, p. 679). This definition can be traced to Lewis Munford's polynucleated city idea, which he attributes to Warren Thompson (Mumford, 1937, p. 95).

The 1990s saw the emergence of an alternative, spatially extended, regional definition of polycentricity that subsequently became known as the polycentric urban region (PUR) (Albrechts, 1992, Albrechts, 1997, Kloosterman and Musterd, 2001, Batty, 2001, Shearmur et al., 2007). This construct, "*regarded as a set of neighbouring but spatially separate urban centres, existing as some identifiable entity"*, shifted the gaze from the polycentric nature of places to that of spaces (Parr, 2004, p. 231). Meijers (2007) notes that a range of similar conceptualisations of space including 'city networks', 'multicore city-regions', 'network cities' and 'polynucleated metropolitan regions' emerged around this time (Meijers, 2007 p.890). This reflected greater consideration of relational aspects of space and can be associated with the work of Scott (1982, 1988) and Castells (1989) on the role of networks in the emergence of regionally specific economic clusters.

The incorporation of space into the definition of polycentricity resulted in the emergence of scale as an important attribute. Scale extended the concept from being a simple descriptor of urban morphology to one with causality when it came to understanding regional economic performance (Albrechts, 1998, Dieleman and Faludi, 1998, Blotevogel, 1998, Knapp and Schmitt, 2008). Davoudi (2003, p.980) identifies what she defines as 'macro' or inter-urban definitions of polycentricity denoting *"the existence of multiple centres in one region."*. Her evaluation also identifies continental or 'mega' scale definitions developed within the ESDP relating to the *"inter-European scale and promotes polycentricity as an alternative to the core-periphery conceptualization of the European territory."* (Davoudi, 2003, p. 980). Central to both macro and mega definitions is the visualisation of economic space as a space of flows. This metaphor, drawn from Castells' (1989, 1996) work, *"represents the economy as flows; economic objects are continual movements of capital, people, information and commodity"* (Thrift and Olds, 1996, p. 68).

The economic flows referenced within the ESDP relate to Foreign Direct Investment (FDI), inter-firm trade and travel-to-work (CEC, 1999, p. 62). This typological conceptualisation of flows linking patterns of mobile capital (FDI) with local enterprise integration into nationally or regionally based economic systems has direct implications for the spatial divisions of labour, primarily through firm and regional level specialisation. Networks, including logistical and communications,

linking urban centres and, though not explicitly stated, their associated functional regions support the emergence and development of this post-Fordist landscape where the production process is spatially extended. Implicit within this perspective of networked spaces, linked through flows of capital, goods, services and labour, is the stretching out of the production of labour, i.e. the necessity for particular types of workers to be collected within particular places.

3.4 Polycentricity: A political solution in search of a theoretical framework

Underpinning polycentricity is a theoretical perspective that draws on contributions from economic geography (Nordregio, 2004, p. 210, Phelps and Ozawa, 2003, p. 595). Closer consideration of the theoretical antecedents of polycentricity finds that in many respects it comprises an amalgam of traditional spatial science perspectives of space overlain onto that of networked spaces. The motivation, according to some commentators, for integrating these theories rests in polycentricity's political roots, that is the concern that too much of the EU's economic development is concentrated within the pentagon (Molle, 2003, p. 85, Faludi, 2002b, p. 898). In many respects it is hard to avoid drawing this conclusion. Early contributions to the development of the polycentricity concept contained within the ESDP were heavily informed by French spatial planning ideas which were themselves developed with regard to the *"political sensitivities surrounding the economic and demographic dominance of the French capital"* (Nordregio, 2004, p. 35 - 36). The resulting strategies, introduced in the 1960s and as such pre-dating EU wide concerns for balanced regional development and social and spatial justice, firmly focused on fostering economic growth along the perimeter of the French 'hexagon' (Faludi, 2009, p. 11, Allaert, 2008, p. 346). Though these strategies later evolved to give greater consideration to integrating urban places with their surrounding rural hinterland they remained urban centric, focused on influencing urban morphology, that is the structure of urban systems and rank size distribution of cities, and spatial relations between urban areas (Meijers, 2008b).

In an attempt to overcome the limitations of the French model, effectively a classical spatial science perspective, attention was given within the ESDP to understanding

the nature of linkages within and between places and spaces (CEC, 1999, p. 20). These spatial structures are interpreted through the lens of what was considered to be the transformative capacity of new technologies. It should be borne in mind that rapid adoption of Internet based communications was underway at this time, the mid to late 1990s. The advent of new communications technologies, in particular, was seen as facilitating continued expansion of post-Fordist production processes and services (CEC, 1999, p. 15, Copus, 2001, Kloosterman and Musterd, 2001, Grimes and White, 2005). The resulting restructuring, including redistribution, of economic activities offered the potential for many activities and services to, in Castells' view (1989), develop a 'new spatial logic'. For the EU, capital's evolving spatial fix could, if harnessed within appropriate spatial development strategies, redress economic development imbalances. This new logic also suggests that peripheral regions can exploit these developments and thereby realise their nascent potential. This latter point is important as the ESDP does not advocate redistributive measures to stimulate economic growth in alternative locations rather, emphasis is given to fostering the *potential* associated with different places (CEC, 1999, p. 24). This view reflects the shift towards thinking of regional development in terms of endogenous growth, that is *"polycentric development policies emphasise the building on endogenous potential, developing regional organizing capacity, equal treatment rather than equality and a nodal approach rather than a zonal approach."* (Meijers and Sandberg, 2006, p. 17). In effect, this particular perspective proffers strategies for regional economic development based on neo-Marshallian economic theory (Phelps and Ozawa, 2003, p. 598). This has fundamental implications vis-à-vis economic development strategies that, in this context, should focus on utilising and enhancing the resources available, including labour, within regions.

3.4.1 The Building Blocks of Polycentricity: Functional Urban Regions

The European Spatial Planning Observation Network (ESPON) report *Potentials for polycentric development in Europe* which, *"aims to provide a background for a more informed discussion of polycentric development in Europe."* differentiates between morphological and relational polycentricity (Duhr, 2005, p. 235). Within the ESDP these dimensions are combined to develop three distinctive types of polycentricity and integrated within a model for balanced regional development

(Figure 3.1). Continental or 'Macro-scale European'[2] polycentricity foresees the development of selected Gateway Cities outside of the pentagon; a national concept foresees development in Hubs outside of the Gateway Cities and, finally, a micro-scale concept foresees strengthening of the links between Hubs and their surrounding hinterland (CEC, 1999, p. 22, 24). A link can be drawn between Lösch's regional concepts (Chapter Two: Page 11) and these three forms of polycentricity wherein 'markets' reflect micro polycentricity, meso polycentricity is the equivalent of 'belts' and 'districts' reflect macro polycentricity.

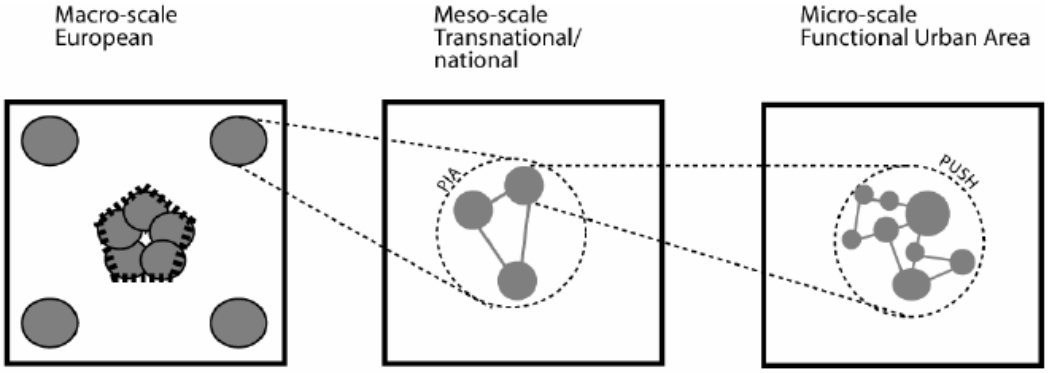


Figure 3.1 Scale related differences in polycentricity[3].

(Nordregio, 2004, p. 23)

In practical terms this model argues for development in key cities outside of the pentagon, e.g. Dublin. At the national scale it argues for development outside of the primary city(s) e.g. in Galway, Limerick or Cork, and at regional levels it argues for inter-urban and urban – rural integration to support development, i.e. Athlone, Tullamore and Mullingar. There is an obvious tension between these different scales. If, as in this example, Dublin has to develop to enhance its position relative to other European cities it raises questions as to the implications for the development of other places within Ireland. In many respects, as will be demonstrated later, this tension between scales is at the heart of debate that shaped the development of the NSS.

[2] Davoudi (2003) refers to Macro level polycentricity as Mega and Meso polycentricity is referred to as Macro

[3] In this diagram PIA = Polycentric Integration Area whilst PUSH = Potential Urban Strategic Horizons

Whether considering macro, meso or micro polycentricity, functional urban regions (FURs) are considered the basic spatial building blocks of polycentric areas (Nordregio, 2004, p. 49). These spaces are defined as an urban centre and *"the area around it that is economically integrated with the centre, e.g. the local labour market."* (Nordregio, 2004, p. 4). Using FURs one can overcome the limitations associated with administrative units, namely that the latter do not necessarily reflect the spatial patterns of economic and social linkages within and between places. Camagni (2001, p. 103 - 106) identifies a range of processes underpinning functional integration between places and hence the changing nature of spaces and spatial relations. These developments largely relate to changes in the production and reproduction of labour and include, greater personal mobility, changes in cultural views that affect household sizes and structures, increasing flexibility within the workplace, in terms of where and when work occurs, and the growing dominance of dual income households. The transition in modes of transportation away from public hub and spoke systems, to private, car-based travel has facilitated the de-concentration of workplaces (Anas et al., 1998, Notteboom, 2010, Partridge et al., 2010). At a smaller scale, i.e. between countries, changes in transportation costs and improved communications have facilitated enterprises in changing where production takes place (Modarres, 2003, Quezada et al., 2009). Combined, these developments facilitate increased population, labour and firm dispersion, through processes of suburbanisation, ex-urbanisation and counterurbanisation that were experienced throughout much of the EU and, particularly, in Ireland during the 1990s (EEA, 2006). Feilding's (1982) definition of counterurbanisation as a negative correlation between settlement size and population growth rates is used in this instance. A good example of this process is Dublin's functional integration with the surrounding administrative region, an area commonly referred to as the Greater Dublin Region (GDR) (Williams et al., 2010).

Formal administrative boundaries, whether municipal or national, lose their meaning in this economic landscape as components of the FUR, urban centres and their associated hinterlands, may be distributed between a number of administrative units or across international boarders (Kloosterman and Musterd, 2001, Chilla et al., 2010). It is important to note that this relational view of economic space also facilitates consideration of globally integrating flows of commodities, finance,

foreign direct investment (FDI) and knowledge (Pain, 2008, Sokol et al., 2008, Taylor et al., 2009, van Houtum and Lagendijk, 2001).

3.4.2 Implicating Labour: From Functional to Polycentric Urban Regions

Antikainen & Vartiainen's (2005) review of FURs identifies a range of concepts used to delineate these spaces including districts, local labour market areas, daily urban systems and commuting zones. Defined in this way FURs reflect the socially constructed and geographically embedded processes that shape labour. Within the ESDP and the broader literature applying this concept, functional regions are commonly identified through analysis of travel-to-work data and the use of objective criteria to distinguish where one region ends and another begins, e.g. 45 minutes travel time (Antikainen and Vartiainen, 2005, Nordregio, 2004). As a consequence of the use of travel-to-work analysis, FURs subsume complex processes of deepening social divisions of labour and labour market segmentation into a single space (Green et al., 1986, Coombes et al., 1988, Peck, 1989). In doing so it is possible that significant labour market processes, e.g. structural unemployment, remain unobserved. A further criticism is that FURs share the urban centric approach common to classical land-use planning concepts developed by, amongst others, Alonso (1964) which placed employment opportunities within the core of urban centres. The home – workplace relationship is limited within this conceptualisation to that of accessibility. This opens up FURs to significant criticism. It is feasible that significant non-urban flows, i.e. rural – rural economic activities, are not considered. Clearly then, the identification of FURs requires careful consideration. It is vitally important that the gendered and socio-economic composition of the workforce, and resulting differentiated travel-to-work patterns, are incorporated into the analysis. This facilitates assessments of the results of impacts of both spatial divisions of labour between areas and labour market segmentation within them. There are some instances where FURs have been applied more sensitively as analytical concepts than the foregoing criticism implies (Kloosterman and Lambregts, 2001, Meijers, 2008b, Meijers, 2005, Parr, 2004). In most instances, however, *a priori* assumptions of the relationship between labour and economic processes of restructuring are not implicit within the concept or scale of FURs.

With regard to polycentricity, the conceptual significance of FURs is their use as the building blocks for polycentric urban regions (PURs) (Nordregio, 2004, p. 27). These structures are defined by the presence of two or more distinctive urban centres, and their attendant hinterlands, that are functionally integrated through the geographic distribution of specialised activities and the spatial relationships that arise from social and economic linkages thereby giving rise to a PUR (Parr, 2004, Meijers, 2007). This depiction of space reflects Davoudi's (2002) conceptualisation of a multi-core city region. Furthermore, it also suggests a geographic context in which the proximity of, at least, two FURs results in their functional spaces overlapping. The *Potentials* report suggests *"cities with overlapping travel-to-work-areas have the best potential for developing synergies"* and goes on to propose an accessibility measure, 45 minutes commuting time to the centre of a FUR, as a means of delineating the structural composition of the PUR (Nordregio, 2004, p. 13). The centrality of functional links between places based on the spatial distribution of specialised activities points towards the significance of the industrial districts concept in informing the development of polycentricity. Further evidence of an institutional perspective of both space and labour is provided in the ESDP that, at various points, highlights the importance of the regional context as a site where labour and skills are produced (CEC, 1999, p.28). Functional regions are continually emphasised as the place where networks of complementary enterprises can benefit from labour pooling, development of specialist skills and the processes of innovation.

By developing the concept of polycentricity through the incorporation of economic interrelationships between two or more places within a PUR *"implies an unfolding of a spatial division of labour where 'new' locations are being developed."* (Kloosterman and Musterd, 2001, p. 627). This process follows from the development of place based economic specialisation along the lines set out for industrial districts (See pages 21 – 24). The conceptualisation of economic interrelationships and interdependencies developing in this way reflects a return to consideration of processes of economic agglomeration that are central to Lösch's (1954, p. 75 - 78) *The Economics of Location*. However, rather than view agglomeration as a process determined by firms trying to maximise the locational advantages of consumption, sales and production, contemporary perspectives of this

concept emphasise the significance of *"the entire industrial system."* (Scott, 1986, p. 227). Endogenous potential does not simply rest within a single firm or place but is determined by how it integrates into wider space(s) of production. Processes of economic specialisation and agglomeration are therefore central to polycentricity. However, whereas Massey (1984) emphasises the distribution of labour roles and production functions between different places and spaces, polycentricity proffers a view of the industrial division of labour between different places within a single, extended space; the PUR. This is, apparently, feasible as polycentricity sees the various spatial components comprising a PUR *"increasingly co-operating… by developing complementary functions."* (CEC, 1999, p. 64). In affect then, polycentricity requires the organisation of production and the subsequent spatial division of labour to be spatially constrained. This particular view of spatial constrained, complementary economic specialisation is the most significant theoretical weakness associated with polycentricity. It is not the case that such spatial organisation of economic activates are unlikely to occur, rather they are, if they exist, exceptional.

Support for this critical assessment of polycentricity is to be found in a body of research that has developed since the publication of the ESDP, which attempts to ground the normative perspective of polycentricity. This research has encountered a variety of obstacles, not least the lack of conceptual specificity and absence of a theoretical foundation. Summarising this research, Vandermotten et al. (2008) find that normative cases of polycentricity are often unsubstantiated or ambiguous and lacking theoretical rigour. Others have taken critical approaches to key texts and case-studies that were held up to offer examples of polycentricity and its benefits. In this vein Limtanakool et al. (2009) find that a detailed study of the Randstad, the 'poster region' for polycentricity, fails to provide evidence of polycentric features, most notably spatially differentiated functions and integrating flow patterns.

3.5 From Normative Agenda to National Spatial Strategy

The ESDP *"contributed to the emerging spatial turn in planning in many EU member states."* (Davoudi and Strange, 2009, p. 10). Within EU policy discourses polycentricity became a normative spatial planning concept considered capable of

contributing to the attainment of European Union goals including the realisation of the Lisbon and Gothenburg Agendas, territorial cohesion and, hence, balanced regional development (CEC, 1999, Faludi, 2006, Geppert, 2009). Parr (2004, p. 232) notes, *"much has been claimed for polycentricity"*. This was only possible because definitional vagueness allowed different stakeholders to interpret this concept to suit their objectives. Despite, or perhaps because of, the definitional vagueness associated with polycentricity it has gained significant political and policy traction (Davoudi, 2005, Davoudi, 2007). This resulted in the incorporation of this concept into key EU documents including the Territorial Agenda and Green Paper on Territorial Cohesion and national and regional spatial planning strategies (Faludi, 2007, Davoudi and Strange, 2009). Unsurprisingly, different member states have interpreted the ESDP's spatial planning concepts within the context of their own local challenges and cultural settings. Polycentricity has however proved a central concept within these strategies (Faludi, 2010, p. 134). This is also true of Ireland's National Spatial Strategy, the development and acceptance of which, as will be demonstrated below, depended on definitional vagueness surrounding both meso and micro-polycentricity and how these could contribute to the objective of achieving balanced economic development.

3.6 Ireland's National Spatial Strategy: People, Places and Potential

In a review of the impact of the ESDP on spatial planning in the EU it was found that "*The most prominent example of an ESDP inspired 'spatial plan' is the Irish… 'National Spatial Strategy' (2002)"* (Viehhauser, 2007, p. 72). Apart from the influence of those activities associated with the preparation of the ESDP, a confluence of events and processes gave impetus to the development of a spatial strategy in Ireland. Walsh (2009, p. 96) highlights the *"changed political landscape following the 1998 Good Friday Agreement in Northern Ireland which opened up the prospect of closer economic links over the longer term between the North and South of Ireland."* The primary motivation for the development of the NSS was, however the pattern of increasingly uneven regional economic development within Ireland (DoEHLG, 2000b, p. 4).

The Irish economy experienced rapid economic development during the 1990s. This contributed to significant growth and change in the structure of the economy, value of economic output, the size of the labour force and composition of the workforce. These developments had spatially differentiated impacts including, growing congestion in and around major towns and cities, rapidly increasing house prices that threatened to undermine national economic competitiveness whilst, simultaneously, high levels of unemployment persisted in more peripheral regions (Kitchin and Bartley, 2007, Kirby, 2010, p. 64). Such was the level of concern regarding uneven economic development that the National Development Plan for the period 2000 – 2006 called for the publication of a national spatial strategy. This was, however, a concern largely at odds with the overarching objective of the strategy set out by the Department of the Environment, namely to:

> *Identify broad spatial development patterns for areas and set down indicative policies in relation to the location of industrial development, residential development, rural development and tourism and heritage, and*
>
> *Develop and present a dynamic conception of the Irish urban system, together with its links to rural areas, which recognises and utilises their economic and social interdependence.* (DoEHLG, 2000b, p. 7)

There are apparent contradictions between what can be interpreted as a Marxist concern for uneven development within the National Development Plan and the neo-classical perspective of the need to organise spatial development patterns in support of the economy. These contradictions and subsequent dilution of theories reflects a lack of clarity as to what the NSS's core objective was; sustainable residential planning, de-concentration of economic development; or development of agglomerative advantages (critical mass). The emphasis on the labour – workplace relation reflected both public and political concerns with the nature and socio-geographic implications of development patterns that were increasingly evident towards the end of the 1990s (Williams and Shiels, 2000). The primacy of this concern is reflected in the opening paragraph of the Strategy which talks of the *"closer matching of where people live with where they work"* (DoEHLG, 2002, p.10). This discourse largely reflected the concerns of economists and urban planners

who were influential in shaping the conceptualisation of what a national spatial strategy might achieve in terms of economic development. A Technical Advisory Group and Expert Advisory Group were convened in support of the Spatial Planning Unit (SPU). The SPU is part of the Department of Environment, Heritage and Local Government (DoEHLG) and was responsible for the development and drafting of the Strategy. The Expert Advisory Group's role was that of *"critically assessing and refining at an early stage new concepts and approaches to planning"* (Walsh, 2009, p. 104). Interestingly, a senior member of the European Spatial Planning Observatory Network, the body responsible for drafting the ESDP, was also a member of the Expert Group.

3.6.1 Translating European Spatial Concepts to the Irish Context

The process of drafting the NSS involved four distinctive stages, which incorporated the publication, initially, of the *Scope and Delivery Report.* This document outlined the rationale for developing a National Spatial Strategy and identified key principles and timelines to guide and structure the preparation process (Figure 3.2).

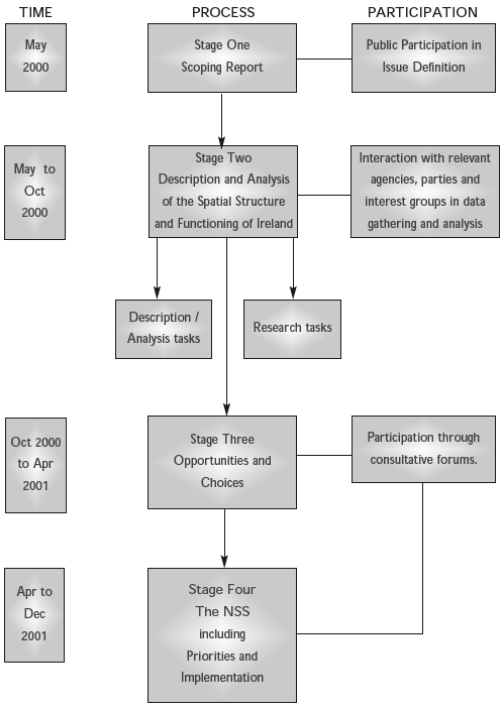


Figure 3.2 Developing the NSS

(DoEHLG, 2000b, p. 13)

During this phase of development, the ESDP provided the framework that guided the identification of the scope and content of the National Spatial Strategy and placed these objectives within a European context. This led to the consideration of how Ireland integrated with global and European networks and systems. It is likely that in the absence of the ESDP these issues would have been considered given the nature of Ireland's economy, which is highly integrated with global flows of trade and FDI. The presence of Kieran McGowan, a former chief executive of the Industrial Development Authority (IDA) of Ireland as Chair of the Expert Advisory Group also ensured that there was a broader consideration of Ireland's place within both EU and wider international economic and political networks. The IDA is the state agency responsible for encouraging foreign direct investment (FDI) in Ireland.

One of the key tasks identified in the Scope and Delivery Report was the need to *"translate the concept of polycentric urban development to national and regional levels in Ireland, expressing it in terms of "gateways" within their contexts of regional urban systems and rural areas."* (DoEHLG, 2000b, p. 9). At the outset then it is clear that there was a vision of both meso and micro polycentricity contributing to the development of the spatial framework and the need to take into consideration the relationship between rural and urban areas within a regional urban systems perspective.

The second stage of the development processes involved the commissioning of research to provide a greater understanding of past and current spatial trends and spatial structures. Walsh (2012) noted that this research also served the purpose of convincing senior civil servants within the Department of Finance as to the need for a spatial strategy. The SPU led this process and commissioned research into a number of areas. Those with an explicitly spatial dimension include *Ireland's Urban System* (Grace and Walsh, 2000), *The Role of Dublin in Europe* (Rhys-Thomas et al., 2000), *Rural and Urban Roles* (SPU, 2000), *Ireland's Rural Structure* (Grace et al., 2000) and *Coastal Zone Management* (SPU, 2001). Each of these reports represented the collation of the state of the art in terms of available data and research. They also provide a window into the theoretical perspectives of space underpinning the analysis; one prominent example is the use of the urban fields concept in both the *Irish Urban System* and *Rural Structure* reports to describe the distribution of

economic functions between urban centres (Rhys-Thomas et al., 2000, Grace et al., 2000). Walsh (2009, p. 112) highlights the positivist nature of these contributions with their emphasis on traditional spatial planning, i.e. managerial approaches to land use.

The third stage of the development process involved the publication of the document *Indications for the Way Ahead* (DoEHLG, 2001). This report was significant as the shape of the final Strategy, in terms of the model for spatial planning that would facilitate balanced regional development, was presented. It also facilitated a further round of public consultation, which was to prove highly significant in shaping how polycentricity was incorporated into the NSS.

Building on the analytical reports and the reflections of the Expert Group the report concluded that a targeted approach focusing on urban centres would be central to achieving balanced regional development. Balanced regional development was defined as *"Developing the potential of each area as fully as possible so as to contribute to the optimal performance of the State as a whole – economically, socially and environmentally."* (DoEHLG, 2001, p. 19). Walsh (2009, p. 107) reports that two conceptualisations of balanced development were originally considered by the Expert Group in 2000; the first explored it from the point of spatial equity whilst the second saw it as 'utilising full potential', this latter definition was drawn from the *Study Programme on European Spatial Planning* that supported the development of the ESDP. The 'potential' approach was favoured and defined as:

> *"A structured spatial development approach, which seeks to ensure that no area or space is under or overdeveloped to the extent that this detracts from that area's potential to contribute to realising the optimal performance of the country as a whole in economic, social, environmental and physical terms."* (quoted in Walsh, 2009, p. 107)

Drawing on the conclusions from the preparatory research the report stated that urban centres were at the heart of strong regional economic performance as a consequence of the agglomeration of economic activities and *"large and skilled workforces"* (DoEHLG, 2001, p. 13). Concentration of economic activities within sufficiently large urban places was viewed as supportive of dense socio-economic

interaction, which in turn mobilised development and adoption of innovative practices. Networking of places within a complementary hierarchy was seen as crucial to this process. Complementarity is a key concept relating to the distribution of services and employment opportunities amongst different spaces and places such that they are accessible to the populations residing in these areas. It is possible to conclude that the case was been made for a spatial development strategy focused on medium and large sized towns and cities that complemented rather than competed with each other.

Following from this analysis and guided by the ESDP, urban centres were conceptualised within a hierarchy of spatial relationships. In setting out this hierarchal framework of places a conceptual model of spatial development was established. The fundamental element in this model was the functional area. These territorial units were considered to provide ways of understanding the interconnections and interdependencies between different places, identifying the potential of areas and how it might be developed, and consequently maximise the impact of both sector and territorial policy interventions (DoEHLG, 2001, p. 15). Functional areas, a spatially extended interpretation of the urban field concept, were conceived of as heterogeneous spaces characterised by their critical mass. The latter concept defined within the NSS as an *"attribute areas possess related to the size and relative concentration of population that enables a range of services and facilities to be supported. The higher the level of critical mass the greater and more extensive the range of services and facilities."* (DoEHLG, 2002, p. 12). Spatial heterogeneity stems from differences in the size and distribution of the population, the size of the area and characteristics of the landscape and the nature and structure of linkages or interconnections with other places and spaces at regional, national, EU and global scales. Functional areas were conceived of as being structured around physical element, most notably larger towns and cities. These were classified in hierarchal terms as;

- Gateways – large towns or cities with a strategic location nationally linking with global transportation, communication and economic networks, providing national scale social, economic infrastructure and support services,

- Hubs – larger towns linked to Gateways and integrating with Other Towns and rural areas and acting as a driver of rural and regional development.
- Other Towns – locally significant towns playing a key role in economic development and local administration. These are conceived of as providing strong links to smaller towns and villages and rural areas.

The incorporation of 'Other Towns' into the NSS is a departure from the ESDP. Whilst these were loosely defined as 'local capitals' within the NSS, no justification for their selection was offered in either the *Indications* report or the final NSS. In conversations with members of the SPU it was stated that Other Towns are towns with local administrative functions that had not been classified as either Gateways or Hubs, i.e. they contained the headquarters of the Local Authority, (Niall Cussen, Pers. Comm., 2008). In some respects the absence of a justification for the selection of Other Towns is surprising as the report on the Irish Urban System identified the presence of "*smaller centres* [that] *provide a level of function far greater than their population would indicate."* (Grace and Walsh, 2000, p. 8). The *Indications* report also highlights the absence of a well-defined urban system in parts of the country, particularly within the Border, Midland and West (BMW) Region (DoEHLG, 2001, p. 16). To understand why a justification on the basis of functional grounds was not used in the selection of Other Towns, and indeed why the concept of functional areas was excluded from the NSS, it is necessary to appreciate the cultural and political context within which the NSS was developed. This approach also facilitates a critical assessment of the changing conceptual framework supporting the NSS and how polycentricity was interpreted and reinterpreted within the national strategy development context.

3.6.2 From Functional Areas to Polycentricity

When the NSS was published in 2002 the research reports were influential in informing the understanding of the nature of contemporary spatial structures in Ireland and the implications of spatial processes. The analytical chapters of the Strategy largely reflect the content of the reports. Conceptually, however, the spatial structures and processes are organised within a framework of Gateways, Hubs and polycentric spaces. Some of the conceptual perspectives, most notably that of urban

fields, were omitted. A close reading of the NSS suggests that the ESDP framework was applied not simply to conform to the European discourse of spatial planning, but also to overcome politically difficult realities. These tensions are most evident within the discourse concerning the concept of functional areas and resulting emergence of polycentricity as a primary spatial concept underpinning the NSS.

Walsh (2009) provides an invaluable overview of the process resulting in the publication of the NSS. In this account, early attempts to adopt a functional perspective of space were resisted during the public consultation phase that was part of the development process. Analysing the submissions received Walsh (2009, p. 111) concludes that *"overall there were strong reservations with almost 30 per cent of the submissions stating that the concept of functional areas as outlined ... did not provide a useful explanation for the manner in which the country functions spatially."*.

Based on research completed in support of the NSS 12 functional areas were identified (Figure 3.3). These areas contained "*cities or towns and their hinterlands that are loosely defined in terms of boundaries."* The reason the boundaries of these spaces are 'loosely defined' relates to the absence of sufficient data pertaining to spatial interaction patterns (Grace and Walsh, 2000, p. 104, SPU, 2000). Notwithstanding this issue, a spatial typology was developed using 1996 Census of Population Data, which was subsequently used as the basis of defining the extent of 'urban fields' incorporating urban places and rural hinterlands. This terminology was changed to that of functional areas by way of reflecting the heterogeneous character of these spaces spanning "*the urban/rural divide and frequently ... across county boundaries"* and "*the merging of the various areas at their edges"*. (DoEHLG, 2001, p. 15). Depicting the boundaries between functional areas as overlapping or fuzzy was a conscious decision on the part of those responsible for the development of the NSS as it drew attention to the relational nature of economic space. What each of these functional areas had in common was the presence of an urban centre or number of such centres that formed a focus of economic activities. These provided a dominant spatial structure that shaped their hinterlands. The significance of the observation that the boundaries of functional spaces merged into each other

highlights awareness that parts of hinterlands associated with different centres could overlap.

Walsh (2009) highlights two key reasons for concern regarding the concept of functional areas amongst those who participated in the public consultation exercise. It was not thought to accurately reflect the functional division of space along county and sub-county lines and the representatives of rural interest groups considered the proposal urban centric to the detriment of rural areas. Urban centric in this instance relates to an emphasis on the orientation of space around a number of larger towns and cities including the Gateway Cities, which were identified in the National Development Plan 2000 – 2006 as Dublin, Cork, Limerick, Galway and Waterford.

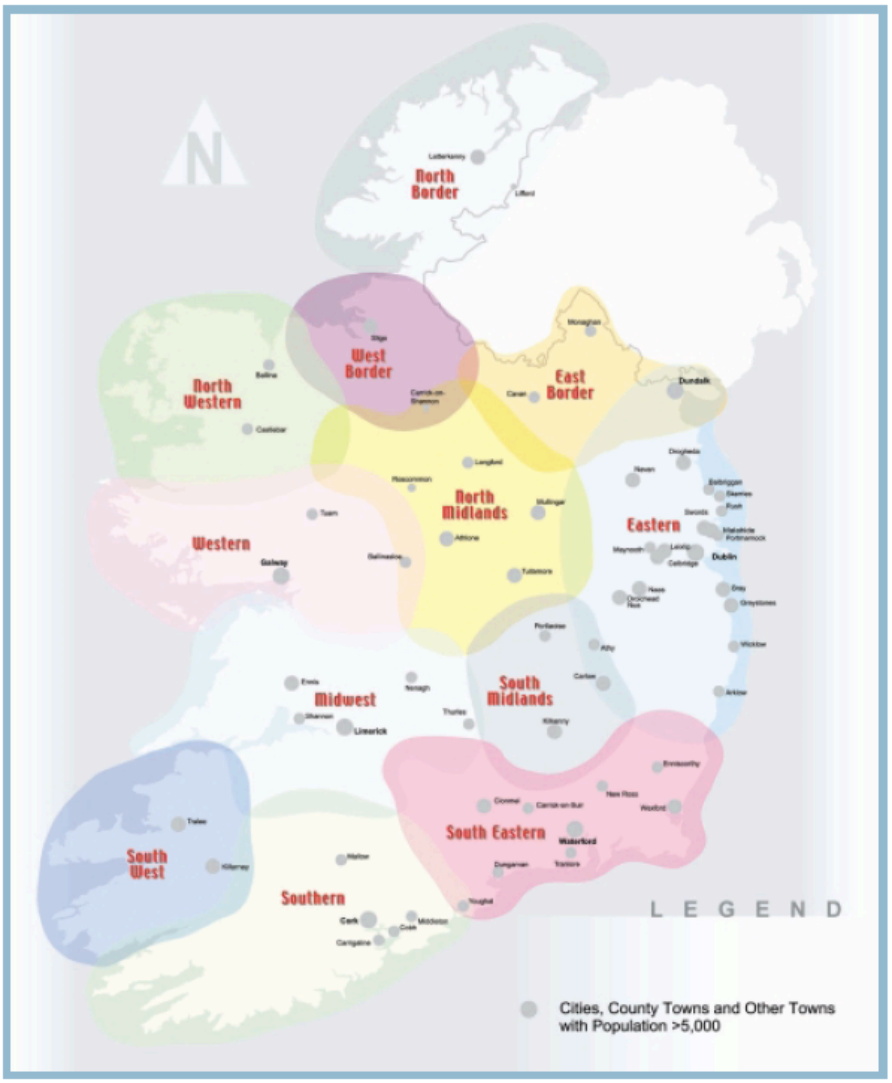


Figure 3.3 Proposed functional areas identified in the draft NSS

(DoEHLG, 2001, p. 33)

Opposition to the concept of a functional area is informative as it provides a window into different perspectives of places and spaces amongst the contributors to the public consultation process. Ultimately, the concept was to prove so contentious that explicit references to it were excluded from the NSS. Feedback from institutional stakeholders highlights their resistance to the reformulation of boundaries; *"Particularly strong reservations were expressed by the local authorities in the Midlands and Southeast as the draft FA map suggested a distinctive FA [functional area] located between these two regions."* (Walsh, 2009, p.111). These reservations were expressed despite assurances given within the *Indications* report that no redrawing of the administrative boundaries would follow from the acceptance of the functional areas concept and associated division of space along these lines (DoEHLG, 2001, p. 15). Seen from a political economy perspective, resistance on the part of public representatives and regional authorities to functional areas can be interpreted as a concern that administrative boundaries might be redrawn. If this were to happen, two key towns, Portlaoise and Kilkenny, would be allocated to the new region. A selective assessment of some of the comments published within the NSS highlight what were perhaps larger concerns with the concepts presented within the report (Table 3.1). These primarily centre on issues of culture and identity.

One of the biggest challenges the SPU faced in developing the Strategy was a cultural antipathy to Dublin, in particular, and 'Urban', in general. The *Indications* report reflects on this with the comment that *"A frequently held view of spatial trends in Ireland is one of "Dublin versus the Rest"* (DoEHLG, 2001, p. 12). This antipathy can be traced to the 1960s, at least, when a national regional development strategy proposed towards the end of the 1960s advocated the concentration of industrial development within 'growth centres' comprising, in addition to Dublin, two National Growth Centres in Cork and Limerick-Shannon, six Regional Growth Centres in Waterford, Galway, Athlone, Sligo, Dundalk and Drogheda and a further four Local Growth Centres in Castlebar, Cavan, Letterkenny and Tralee (Buchanan and Partners, 1969). This proved highly controversial in, what was at that time, a largely rural country (Laffan, 1996, p. 323 - 324). Such was the backlash to this proposal that alternative measures actively discouraging industrial investment in Dublin and promoting growth outside of urban areas were adopted (Walsh, 1989, p. 444).

Table 3.1 Classification of NSS public consultation feedback

Theme	Dispersal	Balance	Concentration
Balanced Regional Development	One of the objectives of the NSS should be to shift current gravitational forces in Ireland westwards.	Each region has its own uniqueness and this should be recognised	
	Decentralisation as a mechanism for promoting development was relevant to the NSS.	The NSS must recognise that spatial balance is also required internally within regions.	
	Peripheral areas may lose out and a targeted approach should be adopted towards them.		
Gateways, Critical Mass and Potential	If centres too close to Cork/ Dublin are selected as gateways/hubs, they will simply become commuter towns	Care must be taken not to disturb the existing potential within regions	
	Gateway towns may receive benefits to the detriment of other towns/ rural areas		
Functional Areas	Focussing on strengths in a limited number of places on a functional area basis may prevent other places from reaching their potential		
Rural Areas	There must be a strategic expansion of rural villages and towns; people should be encouraged to live in rural areas.	Gateway development must not be at the expense of rural areas. There must be simultaneous investment in the Gateways and the rural areas.	Rural areas around Dublin must be protected.
		The NSS should not be urban focused.	
Implementation	The NSS must identify spatial objectives for population resettlement, select policy instruments, and allocate investment.		
The Role of Dublin	The growth of Dublin should be limited until its infrastructure can cope.	Dublin will grow but its footprint should be curtailed e.g. the Midlands should not become a dormitory for Dublin based workers.	
	There is a need to divert traffic out of Dublin Port to other ports on the east and south east coasts.		Dublin must remain competitive, in the interest of national competitiveness.
	The IDA should as a priority redirect investment from Dublin.	Outer (mid-east) counties should not be subsumed into a greater Dublin urban sprawl.	

(DoEHLG, 2002, p. 130 - 135)

Echoes of the resistance to the growth centres strategy persisted through to the public discourse that was part of the drafting of the NSS. It is most clearly articulated in comments concerning rural areas and the role of Dublin. Taking the selected comments published in Appendix One of the NSS (2002, p. 129 - 135) and classifying them according to whether they advocated dispersed, balanced or concentrated development it was apparent that most were in favour of dispersed development (Table 3.1). In many respects these comments can be interpreted as different views as to what the NSS could achieve. Rural advocates pursued a vision of social equity whilst economic stakeholders, including representatives of business lobby groups, pushed for measures that supported the maintenance or enhancement of competitiveness (Walsh, 2009, p. 107 – 108). Reviewing the development process makes it clear that the equity approach was rejected when the 'potentials' definition of balanced regional development was accepted in 2000, over 12 months before the public consultation concerning the vision set out in the *Indications* report. This is not to suggest however that the 'equity lobby' were faced with a *fait accompli*. When published in 2002 the concept of functional areas was excluded from the NSS to be replaced by polycentricity.

3.6.3 Meso and Micro Polycentricity within the National Spatial Strategy

The Strategy, published in 2002, *"sets out how Ireland can be spatially structured and developed over the next twenty years in a way that is internationally competitive, socially cohesive and environmentally sustainable."* (DoEHLG, 2002, p. 38). The document focuses on developing an understanding of population distribution, location of the workforce and the spatial structures that arise from economic and 'other' activity patterns. It then considers the implications of these patterns in relation to contemporary trends, highlighting the increasingly unbalanced nature of development in Ireland. The approach to achieving balanced regional development is then presented and follows the hierarchal perspective outlined in the *Indications* report and presented above. The Strategy diverges from the *Indications* report (2001) in one important area, namely the use of the functional area concept. There are no direct references in the strategic vision to functional areas, indeed the term 'functional' is only used four times. Three of these references relate to 'functional links' between Dublin and its relationship to the GDA and Drogheda

(DoEHLG, 2002, p. 44, 78). The other reference pertains to the towns of Roscommon and Ballinasloe and their *"strong functional links with parts of the Midlands region, particularly Athlone"* (DoEHLG, 2002, p. 89).

The concept of functional areas is replaced by the continued emphasis on the highly relational nature of places and spaces within a polycentric framework. Whilst polycentricity had been highlighted within both the *Issues* and the *Scope and Delivery* reports it was not explicitly referenced in the *Indications* report. There was however an implicit reference as part of the discussion concerning the 'critical mass' concept and how this might be realised through enhanced cooperation between towns. The example of Denmark is provided highlighting that *"spatial planning has been successfully used to identify the strengths of areas and to explore possibilities for linking urban centres through excellent transport and co-operative arrangements in order to establish critical mass and provide effective counter-magnets to larger cities."* (DoEHLG, 2001, p. 16). With the publication of the Strategy polycentricity emerged as one of the central organising structures at both meso and micro scales. The concept is not mentioned all that frequently, rather it is translated through the use of the terms 'links', 'linking' and 'linkages' with the result that the document presents the case for 'linked Gateways' and 'linked Hubs' (DoEHLG, 2002, p. 46). The concept was interpreted at both levels as a means of increasing or enhancing the critical mass of key cities and towns.

In the first instance the challenge of achieving balanced regional development is interpreted as the need to enhance the critical mass of four cities, Galway, Limerick, Cork and Waterford, and creating synergies between these places through improvements in transport, communications and educational infrastructure. This development would come to be conceptualised as the Atlantic Gateways (DoEHLG, 2006). Within the NSS it suggests that there is evidence to indicate increasing interaction between Galway and Limerick, Limerick and Cork and Cork and Waterford. The challenge is to combine *"the complementary strengths of these cities and expanding such interaction to achieve a critical mass strong enough to balance the type of critical mass that has been achieved by Dublin."* (DoEHLG, 2002, p. 41). The Atlantic construct is considered normative within the NSS given the reference to increasing interaction between places and suggestion that functional specialisation is

also present when it refers to the 'complementary' strengths of the individual cities. It is an objective of the Strategy to enhance interconnections within this space. To facilitate this two Hubs are identified, Mallow, located between Cork and Limerick, and Ennis, situated between Limerick and Galway. The development of these places serves as a means of strengthening the linkages within the space encompassing the Atlantic Gateways (Figure 3.4).

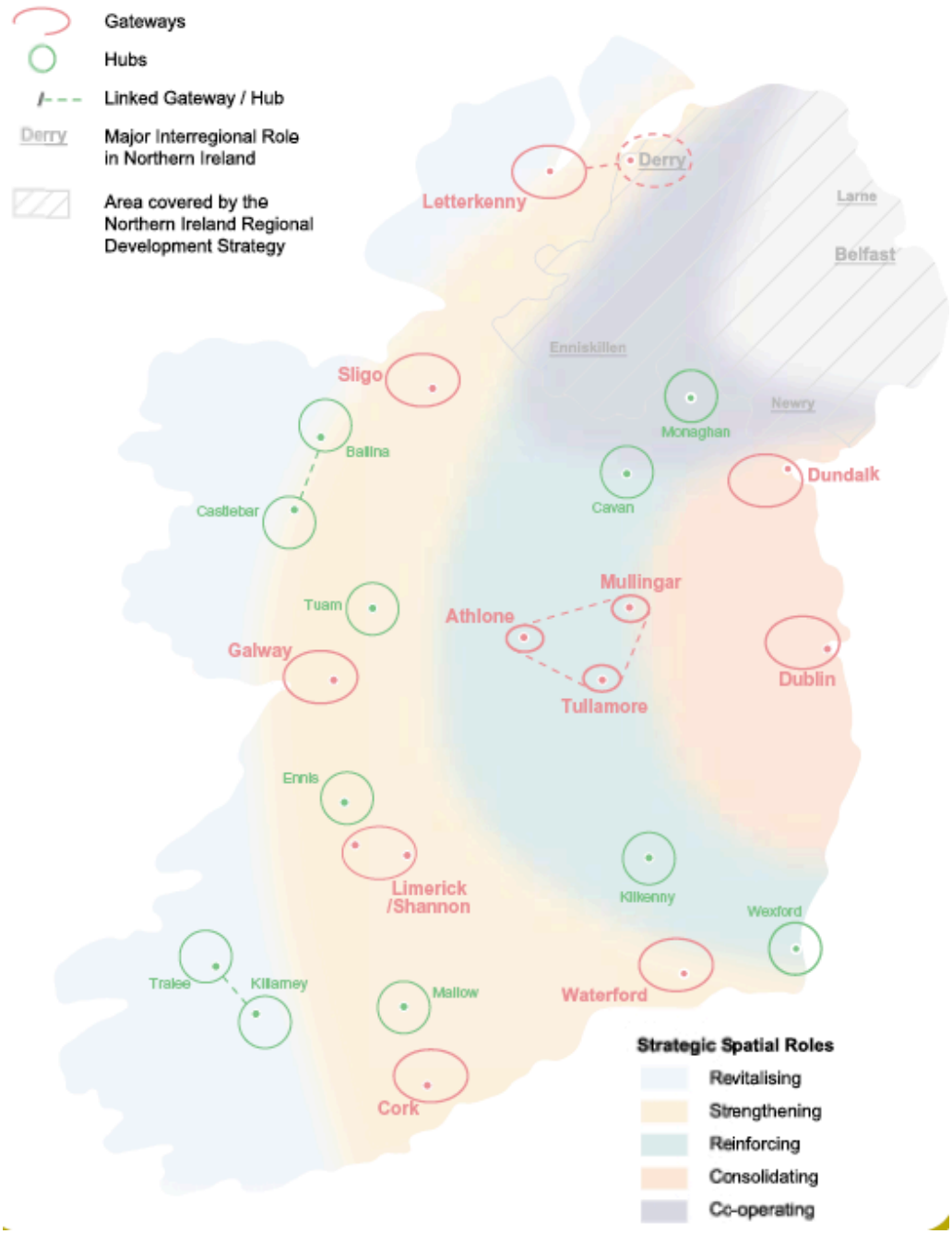


Figure 3.4 Location of Gateways and Hubs identified in the NSS

(DoEHLG, 2002, p. 58)

The NSS identified two micro-polycentric Gateways comprising the towns of Athlone, Tullamore and Mullingar in the Midland region and the international Gateway of Letterkenny, a town in the Border region and Derry in Northern Ireland. It also identifies two polycentric Hubs, Castlebar – Ballina and Tralee – Killarney (Figure 3.4). Once again the primary purpose of these constructs is to enhance critical mass through co-operation. In each instance the Gateways and Hubs are conceived of as strategically located places that, individually, do not comprise sufficient critical mass, but combined, offer the potential for improve access, for the towns and their surrounding rural areas, to a range of social, economic and cultural resources. The emphasis within the Strategy is on the enhancement or development of critical mass in order that new enterprises might be attracted to invest in these areas and existing businesses have the capacity to expand through greater access to skilled labour and knowledge based innovation.

In the case of both meso and micro polycentricity it is not simply a case of enhancing the linkages between places but also within spaces. There is continual reference to linkages between Gateways, Hubs and Other Towns and smaller towns, villages and rural areas. This particular perspective of rural space can be traced back to the Commons and Keane (1994) report on behalf of the National Economic and Social Council on *New Approaches to Rural Development*. Their analysis was to have a considerable impact on the conceptualisation of rural space in the White Paper on Rural Development published in 1999, which subsequently shaped the NSS conceptualisation of links between rural and urban areas (DoEHLG, 2002). McHugh (2001) made a significant contribution to this dimension of the NSS through a comprehensive evaluation of the changing nature of rurality within Ireland. In the White Paper rural areas were seen as heterogeneous spaces some of which were experiencing growth and development whilst others stagnated or declined. The analysis drew attention to the close interdependences and interrelationships between urban and rural areas and advocated *"regional development aimed at sustaining a balanced population through a settlement pattern of a network of urban centres acting as hubs for economic and social development, interacting with, and sustaining, dispersed rural communities in towns, villages and the countryside in their hinterlands."* (DoAFRD, 1999, p. 58). The conceptualisation of linkages within

hinterlands is repeated throughout the NSS and in many respects replaces that of functional areas. A very significant difference between these two concepts is that of scale. Whereas functional areas encompassed spaces approximating 'city-regions', hinterlands represented spatial units pertaining to small towns right the way up the urban hierarchy to those of large cities.

In a broad sense, the understanding of both meso and micro polycentricity presented in the NSS relates to the ESDP conceptualisation in that it emphasises the significance of agglomeration and complementarities through continual reference to critical mass. This term is used to refer to the concentration of population and the resulting *"mix and clustering of the types of labour pools, education, transport links and networks of people and enterprise which provided the scale or "critical mass".* (DoEHLG, 2001, p. 16). As a concept it is somewhat vague although, this may well be intentional. It is likely that the term critical mass rather than agglomeration, was used in order to avoid the appearance that the NSS was advocating the concentration of development within larger urban centres. Compressing so much into a single concept detracts attention from critical elements of polycentricity, particularly the unfolding of spatial divisions of labour and consequent implications for both the location of enterprise and labour market segmentation. Instances of linked or polycentric Gateways and Hubs are presented as quasi-normative, that is to say the NSS indicates that there are interactions occurring between areas but that these need to be enhanced. Within the Strategy, little implicit or explicit consideration is given to encouraging spatial divisions of labour. Like the ESDP, the emphasis is placed on creating the conditions for realising regional potential rather than intervening to direct investment to particular places.

3.7 Conclusions and Identification of Research Questions

This chapter draws on the different conceptualisations of labour presented in Chapter Two to develop a better understanding of polycentricity, one of the key spatial planning concepts advocated by the ESDP to achieve balanced regional development. Though a growing body of literature explores this concept it remains under-theorised and under-conceptualised. Viewing polycentricity through the lens of economic geography in general and the concept of labour, in particular, facilities a

limited unpacking of the theoretical and conceptual framework developed in support of polycentricity.

Understanding polycentricity requires a consideration of the scale-dependent construction of meaning associated with this concept, which extends from macro or continental scales down to micro or functional region levels. The scale variegated nature of polycentricity gives rise to distinctive and contradictory meanings. These tensions are particularly apparent at the meso and macro levels. Overall, one can conclude that polycentricity is a theoretical amalgam drawing on both neo-classical and institutionalist perspectives of economic processes and place. There are, however, several critical shortcomings associated with the concept, not least of which is the PUR and the dependence of this concept on a particular reading of the industrial districts literature. At the heart of polycentricity is a view of economic processes resulting in spatially constrained, complementary spatial divisions of labour. Much of what is asserted for polycentricity rests on what was considered to be the transformative potential of, at the time, new communications technologies that, it was thought, would diminish the significance of both place and distance.

This perspective was, unsurprisingly, highly attractive to policy stakeholders. As a consequence, the concepts set out in the ESDP, polycentricity in particular, were incorporated by several European states, including Ireland, into their national spatial strategies. The emergence of polycentricity as the key organising concept within the NSS was considered through a review of the strategy development process. This evaluation highlights tensions amongst stakeholders concerning issues of place and scale. Much of the resistance focused on the perceived urban centric structure of functional areas. This resulted in a changed emphasis within the Strategy when it was published in 2002 when compared to the proposals contained in the *Indications* report (2001). Polycentricity replaced the concept of functional areas as a means of highlighting the importance of interactions and interdependencies between a hierarchy of places that are classified as Gateways, Hubs and Other Towns.

The review and evaluation of polycentricity and how this concept emerged and was interpreted within the NSS gives rise to a number of empirical questions that are pursued within the remainder of this thesis.

Firstly, which of the spatial perspectives outlined in the *Indications* report (2001) and the NSS accurately reflect Ireland's economic structure. Both documents propose the functional division of Ireland into 12 economic regions. These, however, differ in terms of their spatial structure. The research seeks to evaluate which, if either, of these proposals is an accurate reflection of Ireland's regional economic geography.

The second question concerns the identification of the spatial structure of local labour market areas. The research establishes whether other spaces, in addition to those associated with Gateways, Hubs and Other Towns, emerge from an assessment of travel-to-work patterns.

The third question addresses issues of labour market segmentation in Ireland. Central to the NSS is the concept of the residence – work linkage. This research addresses the question of "Who works where?" The 'who' refers to different socio-economic groups of workers whilst the 'where' is considered from the perspective of the local labour market areas associated with Gateways, Hubs, Other Towns and Other Places.

The fourth, and final question seeks to assess whether the scale of critical mass within the local labour market area associated with Dublin and those places that comprise the Atlantic Corridor is comparable in scale and structure.

Taken as a whole, the research associated with these questions represents a comprehensive evaluation of the spatial and conceptual dimensions of the NSS. Before these can be considered it is necessary to introduce in the next chapter the data and methods that will be applied in these analyses.

Chapter 4 DATA AND METHODS

4.1 Introduction

This Chapter details the data and methods employed in answering the research questions set out in Chapter One and Three. As a comprehensive evaluation of travel-to-work patterns has not been undertaken in Ireland using these data, this Chapter outlines the background to and content of the Place of Work Census of Anonymised Records (POWCAR). Attention is subsequently directed towards evaluating the data contained within this dataset in terms of suitability for spatial interaction modelling. Due to the novelty of this research within an Irish context, both in terms of the use and modelling of travel-to-work data, some consideration is given to the data and the technique adopted for this purpose. The modelling technique applied to these data is, guided by the conceptual review of labour and labour market areas presented in Chapter One, critically evaluated. The Chapter concludes with the specification of a number of additional research questions to be pursued in subsequent chapters.

4.2 Data

Two key spatial data sources are used in this thesis, the Place of Work Census of Anonymised Records and a geospatial dataset depicting the administrative boundaries associated with regions, counties and Electoral Divisions (EDs). Commencing with the spatial data these datasets are described below.

4.2.1 Spatial Data

The Ordnance Survey of Ireland (OSi), the agency responsible for producing official administrative boundary datasets for use in spatial analysis, divides the State into regions, counties, EDs and townlands (Horner, 2000). Within urban areas there is an additional, administrative geography, of Enumerator Areas (EAs). The CSO, provide datasets from the Census of Population corresponding to the first three of these spatial units and EAs (CSO, 2007a, p.161-164). There are eight regions (Figure 4.1). These reflect the spatial extent of Ireland's Regional Authorities that were

established under the Local Government Act, 1991. In line with the Local Government Act, 2001 the five largest urban centres in Ireland, Dublin, Cork, Galway, Limerick and Waterford, are classified as cities. There are a further 29 counties including three administrative areas comprising Co. Dublin, i.e. Fingal, South Dublin and Dún Laoghaire-Rathdown. Each county nests within one of the eight administrative regions. Finally, there are 3,440 Electoral Divisions (EDs). These are the smallest administrative unit at which the CSO publishes population statistics. Each ED nests within a county, i.e. the boundaries of EDs match those of counties.

Within the POWCAR individual records contain variables designating the residence location to an administrative region, county and ED. The place of work is designated to an administrative region, county, ED and spatially referenced grid. This grid is 250 meters by 250 meters in area. As there is no corresponding grid data for the place of residence it is not possible to undertake spatial interaction analysis using these data. They are, however, particularly useful in visualising the distribution of employment opportunities and, because of their granularity and regularity, are suited to spatial analysis. Within the five city areas both residence location and place of work are reported at the scale of EAs. These areas represents the zone assigned to individual census data collectors, known as enumerators.

An assessment of the POWCAR establishes that residential (Origin) and place of work (Destination) data is reported for all 3,440 EDs meaning that, in 2006, there was at least one person living in each ED and there was at least one person working in each ED. This is the highest spatial scale, or the smallest geographical unit, at which it is possible, using the POWCAR, to construct a matrix of origin – destination flows for the country as a whole. There is, however, a fundamental geographic issue with using these spatial units; they are irregular in shape and size.

As is evident in Figure 4.1, the size of EDs varies significantly between very large, in some of the western coastal counties, and extremely small in the city areas. This reflects the classic modifiable areal unit problem (MAUP) and raises issues concerning scale and aggregation or zonation. Based on the literature review presented in Chapter Two the ideal spatial scale at which to study labour markets is

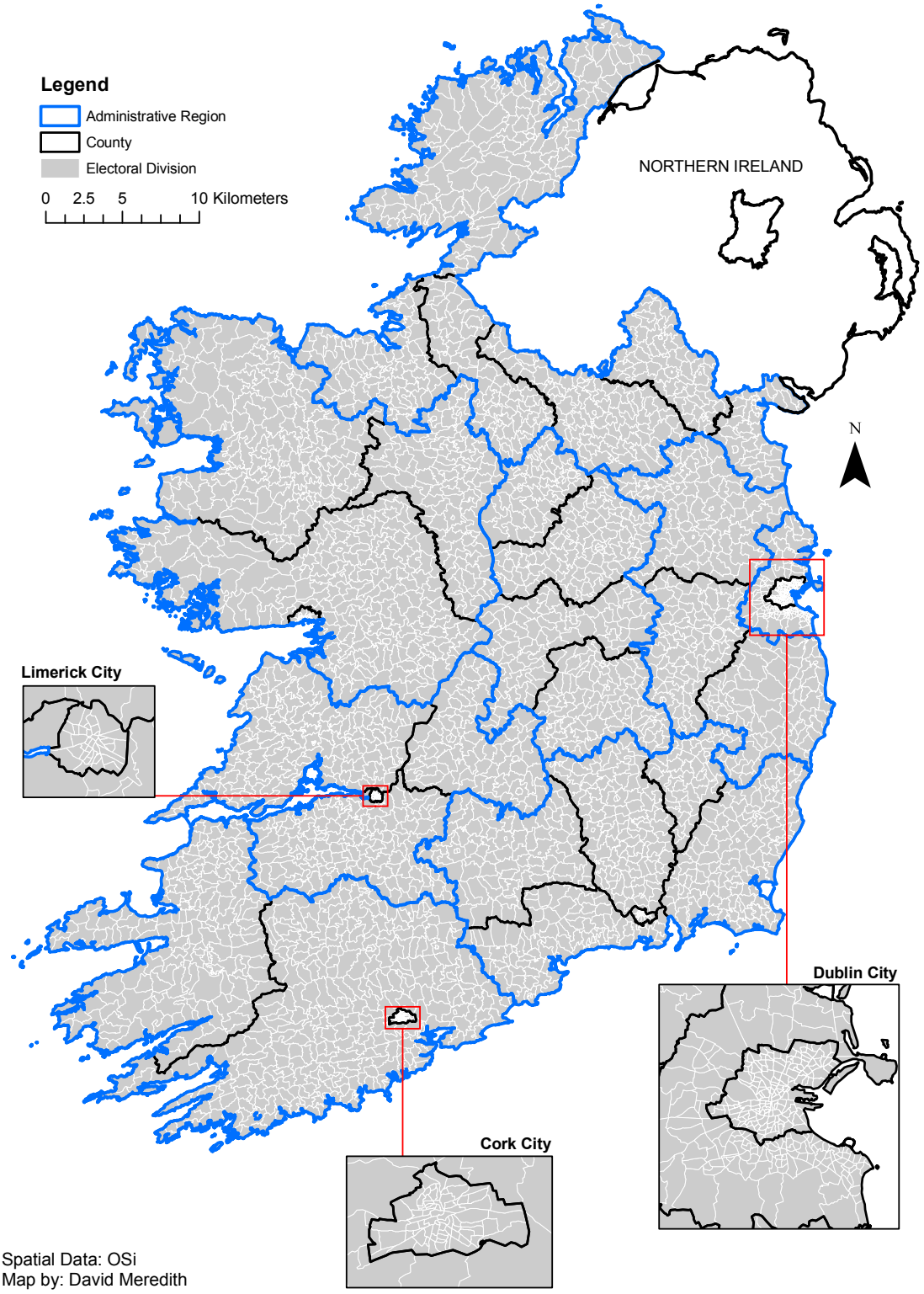


Figure 4.1 Spatial Structure of Administrative Regions, Counties and Electoral Divisions

that of the household, i.e. a point in space containing information concerning the composition of the household and other demographic and socio-economic information. As such data is not available it is necessary to use what data there are and, in the present case, these are aggregated into EDs.

Though there are workers and jobs in every ED in the State, their numbers vary significantly in scale. At one end of the distribution, an ED in Dublin records 16,431 workers living within this space. At the other extreme there are five EDs with less than 10 workers living in each of them. A similar pattern is observable in relation to the number of jobs per ED. Here one finds one ED with 20,422 jobs whilst 57 have fewer than 10 jobs. This presents some challenges around the depiction of various indicators used in, particularly, Chapters Five, Six and Seven. The maps reporting results of different analyses give equal weighting to EDs regardless of the total sum of labour living in these areas or the total number of jobs within the EDs. Several of the maps presented in these chapters report the percentage of different groups of workers or different types of job within each ED. This is problematic as the denominator values will vary significantly, giving rise to extreme values on the choropleth maps used to depict the results. In turn, the spatial patterns, portrayed through the grouping of the results into a small number of classes, could present the reader with a distorted view of the distribution of particular phenomena. Notwithstanding this 'small number' issue, most of the variables mapped within this thesis use ratios or percentages to provide an indication of the distribution of different components of the workforce and employment opportunities. Where necessary, the reader's attention is drawn to this issue.

4.2.1.1 Census of Population Place of Work Datasets

Horner notes in his article on 'Aspects of commuting in the Republic of Ireland' that *"literature on commuting in Ireland is remarkably sparse, with most of it being focused on case studies of particular places (e.g. Cawley, 1980; Walsh, 1980) or being generated in the course of broader studies (e.g. Fitzpatrick Associates, 1999: 63; Horner, Walsh and Harrington, 1987: 71-3)."* (Horner, 1999, p.99). By way of explaining the dearth of commuting studies, Horner highlights the "*absence of specific origin-and-destination data"* and the consequent difficulties confronting

those interested in the geography of work, labour geographies and transport geographies (Horner, 1999, p.109). This particular issue has been commented on by a number of other writers including Commins and Keane (1994) and Morgenroth (2002). Fortunately, the data available to model travel-to-work patterns in Ireland has improved substantially with the publication in 2002 of the Place of Work Sample of Anonymised Records (POWSAR) and, in 2006, the POWCAR. These resources are based on information collected as part of the Census of Population in, respectively, 2002 and 2006 (CSO, 2004, CSO, 2007c). Though the POWSAR dataset is not used, it was comprehensively evaluated as part of the research. This process was undertaken as the production of the POWSAR provided the CSO with a learning opportunity that influenced the production of the POWCAR.

4.2.1.2 Place of Work Sample of Anonymised Records 2002

The CSO took the decision to produce individual level data on place of work following the 2002 Census of Population. In large part, this initiative was in response to requests from those engaged in the development of the NSS for micro-data concerning patterns of travel-to-work. The POWSAR dataset was subsequently released and has since been used by researchers, State agencies and planning authorities to develop a better understanding of the travel-to-work geography pertaining to towns and various industry and socio-economic groups. The POWSAR represents a sample of those enumerated in a private household, who were 15 years old or over, were enumerated at home on Census night and indicated that their Present Principal Status was working for payment or profit. Initially the CSO intended on producing a dataset containing 30% of this population. Each person was randomly assigned a sub-sample number between one and six. The entire sample was then sorted by county of enumeration and, subsequently, by industry code. At this stage the CSO took a decision to code 50% of the sample data as the resources required to code the place of work were not available to them. The place of work data for individuals in sub-samples one, two and three were captured and coded to the ED. This facilitates analysis of flows between origin EDs and destination EDs. Due to the exclusion of 50% of the original data the final sample coverage is roughly 15 per cent of the 'At-work' population, however *'some Electoral Divisions may have a final sampling fraction greater than 15 per cent and others less than 15 per*

cent depending on the random sub-sample allocation. A grossing factor (WgtPersons) is assigned to each record in the sample taking account of differential sampling fractions.' (CSO, 2004, p.10). The WgtPersons variable represents the number of persons making this type journey to work.

4.2.1.3 Place of Work Census of Anonymised Records 2006

Following the 2006 Census of Population the CSO produced the POWCAR, which is similar to the POWSAR in many respects. It contains the records of almost every person enumerated in a private household, 15 years old or over on Census night, enumerated at home and indicated that their Present Principal Status was working for payment or profit. Unlike the POWSAR however, the POWCAR is not a sample of data but rather a micro-data file containing the individual records for the vast proportion of the working population of Ireland in 2006. This is an invaluable resource for researchers interested in the geography of work and labour geographies.

4.2.1.4 POWSAR – POWCAR: Evolution of the Dataset

One of the consequences of the production of a census of records was a decision to change and or exclude a number of variables from the POWCAR that were part of the POWSAR dataset. They did however introduce new variables at the request of stakeholders that use the POWSAR on a regular basis. These changes are summarised below.

The first point to note is that only two variables reported in the POWSAR were not included in the POWCAR. The reasons for excluding these data pertain to issues of, respectively, individual confidentiality and data redundancy. The variable quantifying the number of hours an individual worked in the previous week was excluded to preserve individual confidentiality whilst the WgtPersons variable was removed as the POWCAR is not a sample. It is unfortunate that the hours worked data was excluded from the POWCAR as, it is a feature of labour market segmentation that women, in general, are more likely than their male counterparts to be employed on a part-time basis and this is likely to influence their travel-to-work patterns.

A further 12 variables, 41% of the total, are directly comparable between the POWSAR and POWCAR. These include spatial information concerning residence (origin) and workplace (destination), household size and demographic attributes, amongst other variables (Table 4.1). Changes to the categorisation of 21% of the variables in the POWCAR have been made compared to those reported in the POWSAR. These are outlined in Appendix 1. Any researcher undertaking a comparative evaluation of the POWSAR and POWCAR will need to carefully consider these differences.

The CSO included 11 new variables in the POWCAR that are not available in the POWSAR. These predominantly involve additional origin and destination variables, e.g. the inclusion of a geographic reference, latitude and longitude, indicating the place of work at the sub-electoral division scale. There are also a number of other variables included in the POWCAR concerning the number of persons in each household that are employed, the type of sewerage facility associated with each house, accommodation type (detached, semi-detached house etc.) and the individual's highest level of education.

4.2.2 Assessment of changes in the content of POWSAR and POWCAR

Whilst it is regrettable that any of the variables provided in the POWSAR were reclassified or excluded from POWCAR it must be recognised that the CSO have produced two enormously valuable datasets to geographers and planners working in Ireland. The POWCAR in particular, because it contains information on the population of people at work in Ireland in 2006, is an important resource to anyone interested in the geographies of work, labour markets and understanding the overlapping social, economic and spatial relationships that structure these spaces. One obvious shortcoming in the data is the focus on individuals rather than households. The literature concerned with the determinants of travel-to-work emphasises that household structure plays a very significant role in shaping travel to work patterns i.e. Singell and Lillydahl (1986) and Johnston-Anumonwo (1992). Whilst it may be technically feasible to develop synthetic households from the POWCAR, this type of research is precluded by the licence agreement under which the CSO grants access to the database.

Table 4.1 Comparison of the content of the POWSAR and POWCAR Datasets

Number	Variable Name	2002	2006
1	Residence Planning Region	Yes	Yes
2	Residence County	Yes	Yes
3	Residence ED	Yes	Yes
4	Residence ED OSi	No	Yes
5	Residence Town	Yes	Yes (>D)
6	Residence 2006 Enumerator Area	No	Yes
7	Resident Persons	Yes	Yes
8	Residence Workers	No	Yes
9	Household Composition	Yes	Yes (<D)
10	Accommodation Type	No	Yes
11	Year Built	Yes	Yes (<D)
12	Nature of Occupancy	Yes (>D)	Yes (<D)
13	Sewerage	No	Yes
14	Cars or vans	Yes (>D)	Yes (<D)
15	Sex	Yes	Yes
16	Five year age group	Yes	Yes
17	Martial Status	Yes (>D)	Yes (<D)
18	Usual residence 12 months ago	Yes	Yes
19	Highest level of education	No	Yes
20	Socio-economic Group	Yes	Yes
21	Industrial Group	Yes	Yes
22	Means of Travel	Yes	Yes
23	Time of departure	Yes (<D)	Yes (>D)
24	Journey distance	No (Miles)	Yes (km)
25	Journey time (minutes)	Yes	Yes
26	POW County	No	Yes
27	POW Electoral Division	Yes	Yes
28	POW OSi Electoral Division	No	Yes
29	POW Town	Yes	Yes
30	POW Enumerator Area	No	Yes
31	POW Grid - Easting	No	Yes
32	POW Grid - Northing	No	Yes
33	ILO Hours	Yes	No
34	Weight Persons	Yes	No

Notes:

Green = Data are directly comparable

Orange = Data available but there are differences in format / category / unit of measurement

Red = Variable is unavailable for either 2002 or 2006

< D = Less detail, i.e. categories are amalgamated or collapsed

> D = Greater Detail, i.e. categories are expanded

Those interested in assessing changes in Ireland's travel-to-work patterns and transport geography during the 2002 – 2006 period comparing the POWSAR and

POWCAR face significant but not insurmountable challenges. There are, however, fundamental differences in the spatial coverage of these two datasets. As a random sample of 15% of the population at work in 2002 there is always the possibility that the interactions between places described in the POWSAR might be distorted through under-representation of particular components of the workforce. Analysis of travel-to-work patterns from areas with a relatively large population, and correspondingly large numbers of records within the dataset will yield sufficiently robust results. However, in areas where the population is relatively small the potential for distortion, as a consequence of the correspondingly small number of records, in the identification of spatial interactions between places is greater. Based on this assessment it was decided that the POWSAR would not be used within this thesis.

4.2.2.1 POWCAR: Content, context, and structure

As noted above, the POWCAR is derived from the 2006 Census of Population and comprises 1,834,472 individual records containing details of those persons who met the criteria set out on page 68 regarding being 'At work' etc. This is not, however, the total number of people that were classified as 'At Work' at the time of the census. This number, reported in the Census of Population, was 1,930,042 (CSO, 2007b, p.36). The discrepancy between this figure and the number of POWCAR records, 95,570 persons, is thought to relate to the exclusion of workers who were not at home on census night or lived in communal establishments. Whilst this is a relatively small discrepancy, slightly less than 5% difference, it warrants further exploration.

The industry of employment data is disaggregated to a greater degree within the Census of Population *Principal Economic Status and Industries* Report than the POWCAR. As a result it is necessary, for the purposes of comparison, to aggregate data reported in the *Principal Economic Status and Industries* report. Data is provided in Table 12 on the numbers employed in each industrial group. Those relating to 'Mining, quarrying and turf production', 'Manufacturing industries' and 'Electricity, gas and water supply' were compiled into a single group labelled 'Manufacturing industries, mining, quarrying and turf production, electricity, gas and

water supply'. The data pertaining to Hotels and Restaurants', 'Wholesale and retail trade', 'Banking and financial services', and 'Real estate, renting and business activities' were aggregated into a single group labelled 'Commerce'.

Comparison of those data contained in the POWCAR to those of Table 12 indicates that, overall, there is a close relationship in the sectoral distribution of the data (Figure 4.2). In most instances the number of persons in each industrial group recorded as 'At Work' in Table 12 exceeds the equivalent figure in the POWCAR.

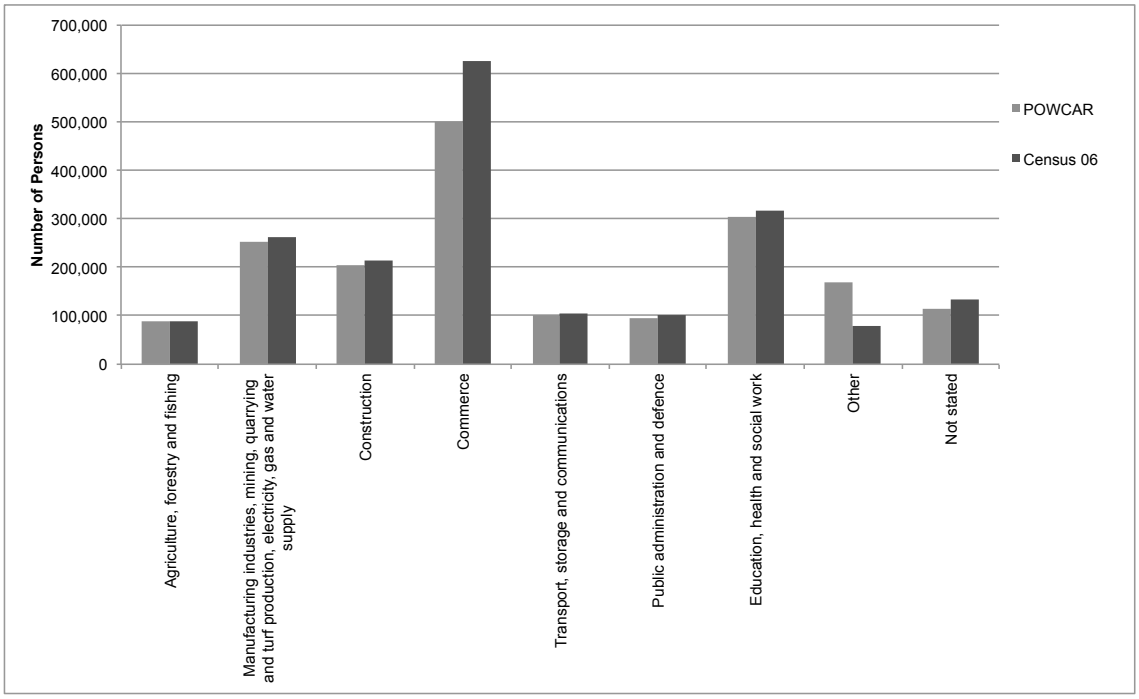


Figure 4.2 Census of Population and POWCAR: Comparison of the numbers of persons employed by industrial group.

This is to be expected given the greater number of persons recorded as 'At Work' in Table 12. In general the difference in numbers is less than 5%. There are however two notable exceptions, 'Commerce' and 'Other'. Table 12 records 624,426 persons at work in the 'Commerce' sector whilst the corresponding figure from the POWCAR is 501,554. Analysis of the POWCAR establishes that 170,583 persons are classified as 'Other' whereas Table 12 records 80,358 people in this category. It is very likely that many of those recorded in Table 12 as being employed in 'Commerce' were allocated to the 'Other' category when the POWCAR was compiled. It is not known why this occurred. Given this discrepancy it will be

important to bear in mind the composition of 'Other' when considering the results presented in later chapters.

Evaluating the structure of the POWCAR identifies that roughly 75% of 1,834,472 records that comprise the dataset have both residence and place of work data. The remaining population is divided between those classified as working from home, those without a fixed place of work and those that did not provide information on their place of work, the latter group are referred to as blank records or 'Blank'. Whilst there is little that one can do with the latter group it is worth considering in greater detail the composition of records associated with those individuals classified as 'Works from home' and the 'No fixed place of work'. Though it is not considered in any great detail within the thesis there is an apparent correlation between those that did not provide a place of work and those that failed to provide other information, e.g. the sector of the economy they are employed in (Table 4.2).

Table 4.2 Industrial structure of 'Works from Home' ('W'), No fixed place of work' ('M') and 'Blank' Records

Industrial Group	W	% Total W	M	% Total M	Blank	% Total Blank
Agriculture, forestry and fishing	46,529	43.40	7612	3.65	13867	10.06
Manufacturing industries, mining, quarrying and turf production, electricity, gas and water supply	7,511	7.01	13,127	6.29	2,812	2.04
Construction	5,980	5.58	112,363	53.88	7,342	5.33
Commerce	22,183	20.69	23,936	11.48	7,972	5.78
Transport, storage and communications	3,137	2.93	19,335	9.27	2,550	1.85
Public administration and defence	1,381	1.29	4,125	1.98	1,491	1.08
Education, health and social work	6,667	6.22	11,498	5.51	4,740	3.44
Other	10,521	9.81	6,976	3.35	3,896	2.83
Not stated	3,293	3.07	9,576	4.59	93,203	67.60
Total	**107,202**	**100.00**	**208,548**	**100.00**	**137,873**	**100.00**

Source: POWCAR, 2006. Author's Calculations

An assessment of those records with both origin and destinations information establishes that whilst most live and work in the Republic of Ireland, a small percentage, 0.45% or 8,295, travel-to-work in Northern Ireland or 'Overseas'. The

majority, 63.6% work in Northern Ireland whilst 3,018 work in other 'overseas' locations. Within Northern Ireland the largest flows are to Co. Derry and Co. Fermanagh (Figure 4.3).

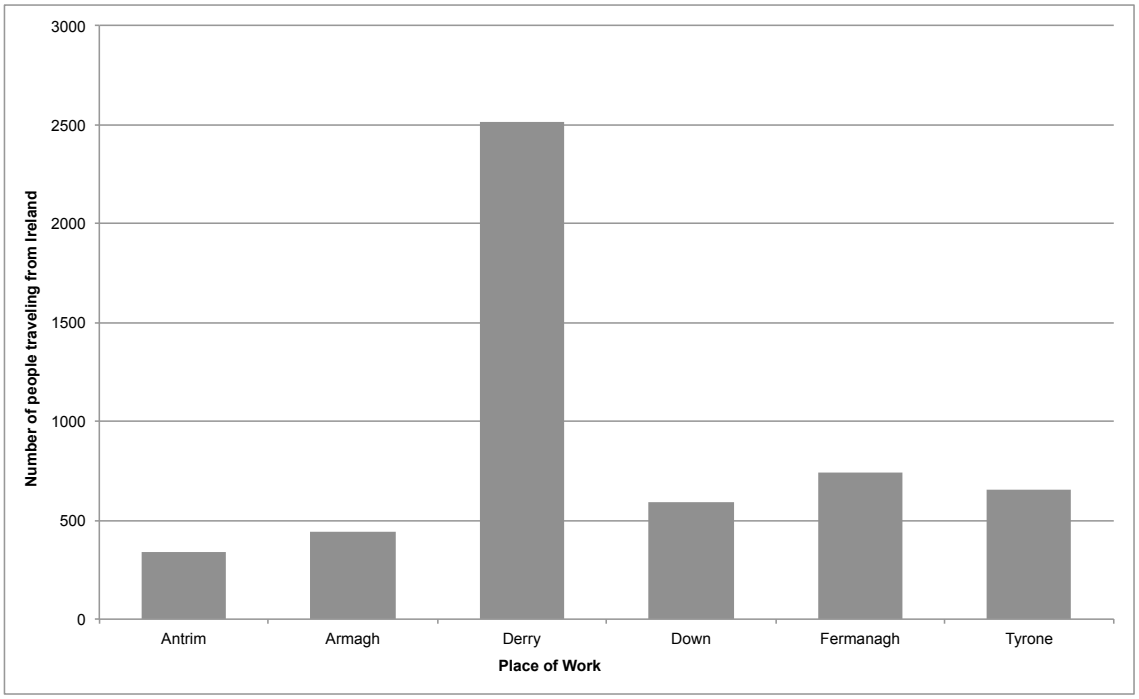


Figure 4.3 Destination of people travelling to work in Northern Ireland.

The 'Works from home' group are identifiable within the POWCAR dataset by the designator 'W' in the POW_ED (Place of Work Electoral Division) variable. There are 107,202 records in this category. These records were not allocated a workplace destination by the CSO during the development of the dataset. Analysis identifies the largest group in this category as those working in the Agriculture, Forestry and Fishing sector, 43% of all 'W' records (Table 4.2). The second largest group, Commerce, including the 'Hotels and Restaurants', 'Wholesale and retail trade', 'Banking and financial services' and 'Real estate, renting and business activities' sectors, accounts for an additional 21% of the data. It is plausible to assume that the place of work for this group is located in close proximity to their residence, i.e. they represent enterprises such as farms, shops, pubs and Bed & Breakfasts or over the shop as it were! During the data processing phase of the research, all 'W' records were assigned a place of work that corresponds to their residence ED.

A group of 208,548 workers do not have a fixed place of work. These are designated within the dataset by 'M' in the POW_ED variable with 'M' referring to 'Mobile Worker'. This cohort includes trades people, sales representatives and those providing community services, amongst others. The largest proportion of 'Mobile Workers' are employed in the construction sector, accounting for 54% of all workers with no fixed place of work (Table 4.2). This is unsurprising given the project-based and contractual nature of construction work.

A regional analysis of the distribution of mobile and blank records highlights a number of interesting spatial features. The administrative region is used in this instance, as, with the exception of Dublin and the Mid-east region, there are no large cities proximal to regional boundaries that might strongly influence travel-to-work patterns. Following the processing of the 'works from home' records to assign them a place of work corresponding to their residence ED, the proportion of records with origin and destination information increases from 75% to 81% (1,479,756) of all records. There is however, significant regional variation in this figure ranging from 95% in the Dublin region to 48% in the Midland region (Table 4.3).

Table 4.3 Regional structure of POWCAR

		Place of Work												
		Border	Midlands	West	Dublin	Mid-East	Mid-West	South-East	South-West	Mobile	Northern Ireland	Overseas	Unknown	Number of Residents
Residence	Border	131,056	1,099	2,047	7,859	3,818	74	60	66	26,035	4,896	332	12,833	190,175
	Midlands	829	64,928	1,671	6,319	5,822	1,435	2,294	81	45,006	163	897	43,641	173,086
	West	2,645	4,999	124,750	1,147	205	863	78	127	25,470	70	350	15,639	176,343
	Dublin	1,128	534	196	433,688	13,900	249	440	261	13,274	29	138	10,306	474,143
	Mid-East	4,772	2,148	102	70,174	98,483	130	1,785	139	16,938	21	223	11,077	205,992
	Mid-West	51	1,029	1,075	946	198	115,514	2,017	2,968	24,854	34	279	12,382	161,347
	South-East	60	1,203	69	4,004	4,301	2,736	139,458	2,166	32,189	28	481	19,625	206,320
	South-West	44	129	105	1,067	159	2,826	993	204,237	24,782	36	318	12,370	247,066
	Number of Workers	140,585	76,069	130,015	525,204	126,886	123,827	147,125	210,045	208,548	5,277	3,018	137,873	1,834,472

Source: POWCAR, 2006. Author's Calculations

The relatively small number of records with origin – destination information in the Midland region is accounted for by the large proportion of individuals, 26% of the total, classified as 'Mobile Workers' and a further 25% who's place of work is blank or unknown. The high level of 'Mobile Workers' is interesting and, based on the data presented in Table 4.2, suggests a large number work in the construction sector.

In relation to the significant proportion of blank or place of work unknown records, it is not known why so many people residing in the Midland region did not return this information. It is possible that it is associated with a high percentage of records where the Industrial Group variable is classified as 'Not Stated' (Table 4.2).

4.2.2.2 Overview of the analytical data used in this Study

The assessment of the content and structure of the POWCAR facilitates the identification of the two datasets to be used in this study. The first of these retains all 1,834,472 records. These data are used to provide a detailed description of the workforce of local labour market areas, include information on those individuals classified as 'Mobile Workers' and those who did not return place of work information (Blank). In other studies these types of records have been assigned a place of work corresponding to their place of residence (Prof. Mike Coombes, University of Newcastle, pers. comm., Dr. Edgar Morgenroth, Economic and Social Research Institute, pers. Comm). The assumption that those records without a specified place of work live and work in the same area is not applied in this research, rather, as part of the analysis reported in Chapter Six, an evaluation is undertaken assessing whether these records are normally distributed across space and, if not, their influence on the spatial structure of local labour market areas identified.

The analysis of geographies of work and the identification of local labour market areas draws on that subset of the POWCAR where both origin and destination data are present, including the 'works from home' population. As previously explained, these records were assigned a place of work corresponding to their residence ED. This brings the total number of records with both origin and destination information to 1,488,051, representing 81.12% of the original dataset. Those records with destination locations classified as 'Northern Ireland' or 'Overseas' are excluded from the analysis on the grounds that the corresponding flows of workers from these places is unknown and hence interaction analysis is not possible. The exclusion of these data, 8,295 records, results in a final dataset of 1,479,756 individual records or 80.66% of the original dataset.

4.3 Methods: Identification of local labour market areas

The literature review introduced a number of different conceptualisations of labour market areas including those based on considerations of labour supply (the labourshed), labour demand (the workshed), and the spatial overlapping of these areas. Based on the assessment of the literature, the labourshed and workshed were found to be limited in their conceptualisation of labour and labour processes, see Chapter 2, pages 29-30 for a brief overview of these concepts. This led to the conclusion that those spaces where worksheds and laboursheds coincide can be considered local labour market areas.

A range of 'functional regionalisation' techniques have developed over time in response to the need to analyse spatial interactions, i.e. travel-to-work data. The most prominent of these are Massser and Scheurwater's (1980) Intramax, a hierarchal technique, and Coombes' (1986, 2000) European Regionalisation Algorithm (ERA), a rules based approach. The Intramax approach can be considered a purely statistical means of identifying labour market areas as it tests, following the specification of the number of areas to be identified, the significance of the flow between small areas and groups them accordingly. The ERA applies a multi-stage process to identify locations with large numbers of jobs and subsequently statistical techniques, which ascribe other places to these places based on analysis of labour flows. As a rules based approach, the ERA allows one to specify the character of the local labour market areas to be identified at the outset of the analysis. This differs from both manual and statistical methods, which require *a priori* knowledge to determine the location or number of local labour market areas to be identified.

The fundamental difference between Intramax and the ERA relates to the role of theory in shaping how they function. Intramax is largely atheoretical in the sense that it assigns areas to groups on the basis of statistically significant flows. The ERA is based on a conceptualisation of labour markets drawn from economic geography. Functionally, it tests for key features or characteristics of local labour markets including minimum and target self-containment values and minimum and target workforce populations. Self-containment, the proportion of persons that live and work in an area and the number of jobs within an area filled by persons living in that

area, reflects the conceptualisation of a labour market area as a space where most workers who live in an area also work there and most jobs in an area are filled by workers from that locality (Chapter Two, page 30). The higher the level of self-containment associated with a particular area the more 'coherent' the labour market. Areas with low self-containment values are not considered *bona fide* functional region; see Goodman (1970) and Smart (1974) for further discussion on this issue. The introduction of the minimum and target workforce values into the technique allows the researcher to specify the type of labour markets areas that *could* emerge from the analysis, e.g. if one selects a very large minimum population it will result in the identification of a small number of large labour market areas.

The concept of relative self-containment was developed with a number of key contributions from, particularly, Goodman (1970), Smart (1974) and Ball (1980). It was, however, the work of researchers based in the Geography Department at the University of Newcastle, which codified it within an empirical model. This model has evolved since reflecting improvements in data, computing power and programming capabilities. It also developed in response to re-conceptualisation of local labour market areas; namely the recognition that new patterns of production were resulting in changes to the distribution of economic activities.

The utility of this technique was recognised within the UK where it was used to define local labour market areas by the Department of Employment to report monthly unemployment statistics (Coombes et al., 1986). The model has also been applied in a variety of other countries including Australia, Spain and New Zealand amongst others (Watts, 2004, Casado-Díaz and Coombes, 2005, Newell and Papps, 2001). A review of functional regionalisation techniques by Eurostat, the EU statistical agency, identified the ERA method to be the state of the art (EUROSTAT, 1992). More recently, work undertaken as part of the European Spatial Planning Observatory Network concerning functional urban regions highlight the use of the ERA in identifying such regions (Böhme, 2006).

4.3.1 The European Regionalisation Algorithm Methodology

The ERA is a hybrid of manual and statistical approaches; that is one which adopts *"a multi-step approach ... based on a traditional understanding of [clusters of employment opportunities] as foci for hinterlands, but which uses ... statistical methods and criteria with successive stages of the analysis in order to ensure that final boundaries all meet strictly pre-defined objectives, and can be 'optimised' in relation to these objectives."* (Coombes, 1996, p. 1500). This conceptualisation of economic space is similar to those employed in manual approaches, namely that there are places where employment opportunities are concentrated. These are considered to have a structuring effect on spatial interaction, i.e. commuting between areas. Importantly, the ERA does not assume that the foci of hinterlands are cities or urban centres. This is particularly important given the spatial reconfiguration of economic activities that has taken place since the development of the first functional regionalisation methods in the 1960s. Whereas it was once the case that most economic activities were concentrated in cities, trends over the course of the past number of decades have seen greater dispersion of economic activity. Recalling the criticism of land-use models outlined in Chapter Two (page 20), it is unsafe to assume that employment is concentrated in urban places as this risks neglecting those proportions of the workforce that do not commute to work in these places. Contemporary industrial location trends, driven by the impacts of de-industrialization, the growing significance of the services sector and the globalization of production have seen the development of significant economic activates outside of urban centres (Hayter, 1997). These developments have had specific impacts on different segments of the labour force, i.e. men and women. The hybrid method is capable of taking on-board the implications of these developments through a sequence of analytical steps that are outlined below.

The ERA initially identifies spaces with high levels of interaction in terms of the linkages created by travel-to-work patterns and assesses these spaces against objective criteria. The objective criteria used by the ERA include minimum and target populations of workers and minimum and target self-containment values. The starting point for this process is to establish the number of people commuting between EDs. Table 4.4 provides an example of the output from this assessment. In

it we can see that 569 workers live and work within ED 1001, a further 17 live in 1001 but work in 1002 etc. Out of a possible 11.8 million ED – ED interactions there are 225,980 travel-to-work, ED – ED, flows.

There are two elements to self-containment, supply side and demand side. Supply side self-containment is calculated by summing the number of workers who both live and work in the ED and dividing this figure by the total number of workers living in the ED. Demand side self-containment is the number of workers living and working in an ED divided by the total number of jobs in the ED. In the case of ED 1001, 569 workers live *and* work in the ED out of a total of 4,609 workers who live in the ED. This yields a supply side self-containment value of 0.12. As there are 1,249 jobs in ED 1001 and 569 of these are filled by workers living in the area this gives a demand side self-containment value of 0.46. These results establish that 12% of the resident workforce works in ED 1001 but that these workers fill 46% of all jobs located in the ED.

Table 4.4 Example of Residence ED – Workplace ED interaction matrix

	To										
From	**ED**	1001	1002	1003	1004	1005	1006	1007	1008	1009	**Workers**
	1001	569	17	0	10	0	0	0	0	0	1249
	1002	145	36	0	15	0	0	0	0	0	448
	1003	10	0	42	20	0	0	0	0	0	172
	1004	19	0	12	150	3	1	0	1	1	405
	1005	7	1	1	5	14	0	1	0	0	87
	1006	12	0	0	0	0	37	0	0	0	116
	1007	19	1	0	3	0	0	42	6	0	208
	1008	14	2	0	5	0	0	12	47	2	252
	1009	6	0	0	1	2	0	1	1	19	119
	Jobs	4609	206	68	326	27	58	75	68	23	

Source: POWCAR, 2006. Author's calculations

These values do not, however, tell us about the level of interaction between ED 1001 and other EDs and the obverse flows of workers travelling from other EDs to work in ED 1001. It is therefore necessary to calculate supply and demand side self-containment values for all flows from each ED to all other EDs. This results in four values:

a) Commuting flow ED*i* to ED*j* as a % of all flows **from ED*i*** (including internal flows within ED*i*)
b) Commuting flow ED*i* to ED*j* as a % of all flows **to ED*j*** (internal flows within ED*j*)
c) Commuting flow ED*j* to ED*i* as a % of all flows **from ED*j*** (internal flows within ED*j*)
d) Commuting flow ED*j* to ED*i* as a % of all flows **to ED*i*** (including internal flows within ED*i*).

The values are combined by multiplying a by b and c by d, representing supply side and demand side self-containment respectively. The product of these two calculations is subsequently summed resulting in a measure of the overall self-containment of each ED (Table 4.5). In algebraic terms this takes the form of

$$\left(\frac{Tij}{I} * \frac{Tij}{J}\right) + \left(\frac{Tji}{J} * \frac{Tji}{I}\right) \qquad \textbf{(Equation 1)}$$

Where T*ij* is the sum of workers travelling from ED*i* to ED*j*
I is the sum of all workers living in ED*i* and
J is the sum of all workers working in ED*i*

Table 4.5 Worked example of the ERA

ED	*ij/I*	*ji/J*	*ij/J*	*ji/I*	Tij^2
1001	45.56	12.35	45.56	12.35	1124.83
1002	1.36	8.25	32.37	3.15	113.06
1003	0.00	0.00	5.81	0.22	1.26
1004	0.80	3.07	4.69	0.41	4.39
1005	0.00	0.00	8.05	0.15	1.22
1006	0.00	0.00	10.34	0.26	2.69
1007	0.00	0.00	9.13	0.41	3.77
1008	0.00	0.00	5.56	0.30	1.69
1009	0.00	0.00	5.04	0.13	0.66

Source: POWCAR, 2006. Author's calculations

The result of this assessment is an interaction matrix that allows the strength of interaction between EDs to be assessed and, more significantly, the directionality of the flow to be established (Bond and Coombes, 2008, p.1 – 2). These data therefore

facilitate the amalgamation of EDs into local labour market areas. The amalgamation process is outlined below with reference to the summary data provided in Table 4.5.

The subset of the POWCAR with both origin and destination data was assessed to establish the number of workers travelling from each ED to all other EDs. The ERA uses these data to calculate supply and demand self-containment values. The number of workers living in each ED are also calculated and incorporated into the analysis allowing the population of workers living in the areas identified to be evaluated. The process of aggregating EDs into labour market areas is as follows:

1. At the outset all areas, in this instance the 3,440 EDs that form the basis of the analysis, are considered potential local labour markets in their own right.
2. Self-containment values and the total resident workforce are calculated. These are the objective criteria.
3. Areas are ranked from highest to lowest against the objective criteria.
4. The area with the lowest values is identified. In the example provided in Table 4.5, this is ED 1009.
5. The ERA assesses the interaction of this ED with all others by analysing the travel-to-work flows using Equation 1 (Table 4.6). The algorithm also assesses the interactions between all other areas and this ED. The ED with the strongest links to it, ED1005 in this example, joins with it to form a potential local labour market area (LLMA1).

Table 4.6 Assessment of interaction between ED 1009 and selected EDs

	ij/I	*ji/J*	*ij/J*	*ji/I*	Tij^2
1001	5.04	0.13	0.00	0.00	0.66
1002	0.00	0.00	0.00	0.00	0.00
1003	0.00	0.00	0.00	0.00	0.00
1004	0.84	0.31	0.25	4.35	1.33
1005	1.68	7.41	0.00	0.00	12.45
1006	0.00	0.00	0.00	0.00	0.00
1007	0.84	1.33	0.00	0.00	1.12
1008	0.84	1.47	0.79	8.70	8.14
1009	xxx	xxx	xxx	xxx	xxx

Source: POWCAR, 2006. Author's calculations

a. Having started the analysis with 3,400 EDs, two have been amalgamated, ED1005 and ED1009. This leaves 3398 unassigned EDs and LLM1.

6. The objective criteria are recalculated for the remaining EDs and LLM1. All EDs and LLM1 are ranked from highest to lowest against the objective criteria and the ED / local labour market with the lowest value identified.
7. The process of joining EDs to form local labour markets areas is repeated iteratively until all have been assigned to a local labour market that meets the objective criteria.

In an attempt to ensure that the local labour market areas identified reflect the actual spatial patterns of interaction between spaces, the algorithm continually assesses both sets of minimum and target objective criteria values. This can result in EDs that were grouped together at an early stage being disaggregated and the individual EDs assigned to two or more other local labour markets. If there are instances where the addition of residual EDs to the remaining local labour markets results in the critical values for these areas falling below the minimum objective criteria thresholds then they remain unassigned. This can occur in the case of islands or instances of remote areas. If this issue arises the residual group of EDs is classified as a local labour market despite not having reached the minimum objective criteria as to not do so would undermine the integrity of other labour market areas.

4.3.1.1 Critical Assessment of the ERA

As outlined above researchers have developed a variety of functional regionalisation approaches and applied these to the identification of local labour market areas. The ERA was selected for use in this research because, as a rules based approach, it is possible to specify the characteristics of the areas to be identified in terms of their internal cohesion or self-containment and size of workforce. Neither manual nor statistical methods offer this facility though research by Farmer and Fotheringham (2012) offers the potential to do so in the future. By utilising the concepts of self-containment and a minimum resident workforce to identify local labour markets the ERA gets away from arbitrarily selecting specific places or a particular number of local labour markets. It does however, necessitate the establishment of critical

thresholds for each of these objective criteria. Areas above these thresholds are considered *de facto* local labour markets whilst those that do not achieve these values are subjected to further iterations of analysis to assign them to viable areas. Clearly then, the number and type of areas identified by the ERA depends on the objective criteria values selected at the beginning of the analysis. Watts (2009) notes the importance of selecting appropriate criterion as failure to do so results in area's being 'forced' to amalgamate resulting in sub-optimal solutions.

4.3.1.2 Self-Containment

Early research developing the ERA drew on conceptualisations of overlapping labourshed and worksheds, referred to as travel-to-work areas. The work of Goodman (1970) and Smart (1974) was particularly influential as they held that an overlap of 75% between labour supply and labour demand, i.e. an overall self-containment value of 75%, provided an adequate level for the identification of local labour market areas. This value has proved influential and remarkably persistent and has been used in studies in the UK, Spain, Australia, New Zealand and Italy. Smart (1974), in justifying this value, stated that it would be ideal if local labour markets were perfectly self-contained, that is if all workers living in the areas worked in the area and all jobs in the area were filled by local workers. It was recognised, however, that perfect self-containment, regardless of the geographic scale, is unobtainable. As a consequence Smart advised setting *"a relatively low level of self-containment as a general criterion of "independent" labour market status. As a preliminary guide, a figure of 75 per cent was adopted."* (Smart, 1974, p.261). He defends this figure on the basis that it lies halfway between perfect self-containment (100%) and *"a level of 50 per cent which seems a reasonable minimum for thinking of an area in labour market terms at all. (An area with over half its residents working elsewhere, or over half its day workers living elsewhere, can hardly be regarded as an independent labour market by any standards.)"* (Smart, 1974, p.262). Both Ball (1980) and Coombes and Openshaw (1982) accepted the logic underpinning Smart's argument and used the 75% value in their research. This is not to suggest that acceptance of the 75% value was uncritical. Smart himself recognised the *"criterion can still leave out of account large commuting movements between separate areas"* (Smart, 1974, p.262). Coombes and Openshaw (1982) undertook sensitivity analysis as part of their

research developing what would later become known as the ERA. They found that increasing or decreasing the 75% value had significant implications for their analysis in terms of the number of labour markets identified (Coombes and Openshaw, 1982, p.146-147). Later work by Coombes et al., (1982) introduced the concepts of minimum *and* target self-containment levels. Whilst the target of 75% was maintained, the minimum value was set at 62.5% (Coombes et al., 1986, p. 951). No specific justification for this value is given but it is worth noting that it is the median value between 50% and 75%. The incorporation of the minimum value represented an important step in the development of the ERA as it facilitated the identification of locally significant labour markets that might otherwise be subsumed into larger labour market areas. This is particularly important in rural or remote areas where long-distance commuting to towns and cities by specific groups of workers, i.e. those classified as 'Professionals', suppresses self-containment values and could lead to the aggregation of distinctive local labour markets into larger units. Equally, assigning 'Mobile' workers to the place where they live would inflate the self-containment of, potentially, weak labour markets. The development of the algorithm in this way did however open up the possibility that 'phantom' local labour markets might be identified. These are labour markets that attain the minimum self-containment value but that do not have very many workers. The introduction of the minimum value also takes into consideration the impacts of larger numbers of workers commuting longer distances as a consequence of improved transportation systems and changes in cultural values (Casado-Diaz and Coombes, 2005).

4.3.1.3 Population of Workers

To overcome these issues the objective criteria of minimum and target populations of workers was introduced into the ERA. The values used in the UK are 3,500 as a minimum and 25,000 as a target population (Bond and Coombes, 2008). A rules based approach was developed to evaluate local labour markets identified using these criterion:

1. *"An area with self-containment - on both supply and demand side - exceeding 75 per cent and at least 3,500 workers living in the area should be accepted.*

2. *An area with self-containment - on both supply and demand side - exceeding 66.67 per cent and at least 25,000 workers living in the area should be accepted.*
3. *An area in which fewer than 3,500 workers live should be rejected.*
4. *An area with self-containment – on either supply or demand side - of less than 66.67 per cent should be rejected.*
5. *For areas where between 3,500 and 25,000 workers live, the minimum self-containment required - on both supply and demand side - for acceptance as a Travel-to-Work Area should progressively decrease from 75 per cent for the smallest areas to 66.67 per cent for the largest."*

(Bond and Coombes, 2008, p.3).

The first point to note is the change in the minimum self-containment value to 66.67%. This is one third less than the target value and two thirds greater than the absolute minimum for accepting an area as a viable labour market, namely 50%. Secondly, clear guidelines are provided to assist in the interpretation of the results of the ERA. As a rule of thumb however, it is clear that the guidelines suggest that as the number of workers comprising a labour market decreases the self-containment value should increase. The selection of the minimum and target population values is not based on any particular theoretical labour market principle. Once more the selection of these values is subjective and contingent on the purpose of the analysis. Their use, in conjunction with self-containment values, does however ensure that local labour markets identified using the ERA conform to clear criteria.

This overview of objective criteria used in the ERA demonstrates the evolution of this model to take account of improvements in the availability of data and computing power on the one hand and changes in commuting patterns on the other. It highlights the need for very careful selection of the objective criteria values. It was unknown whether those values used in international settings are appropriate to Ireland given the significantly different structure of the urban hierarchy in comparison to many of the countries where this technique has been applied, e.g. the UK.

4.4 Conclusions

This Chapter provided an overview of the research strategy developed in pursuing the aim of this thesis. Those spatial data used in this analysis were reviewed and a number of issues concerning the MAUP outlined. A comparative evaluation of key place of work datasets, the POWSAR and POWCAR, was presented. Assessment of the POWCAR resulted in the identification of a subset of data with both origin and destination information. These records are used to model travel-to-work patterns and evaluate the structure of local labour market areas and their interaction with other labour market areas in subsequent chapters.

A brief review of methods was presented followed by a detailed overview of the European Regionalisation Algorithm. This model is used to identify the spatial extent of local labour markets in Ireland. An evaluation of the model found it is superior to alternative approaches, including manual and statistical techniques, as one can specify the characteristics of areas to be identified.

In the course of assessing the data and methods applied in this thesis a number of issues were identified that warrant further attention. Firstly, it was decided not to assign those without a place of work to the labour market where they live. Doing so could potentially 'inflate' the self-containment of these areas and, more significantly, subsume locally important patterns of local labour market segmentation. This decision is evaluated as part of the research presented in Chapter Six and guided by the following question; are those records classified as 'Blank' and 'Mobile' normally distributed across space?

The evaluation of the ERA technique highlighted the subjective nature of the criterion used to identify local labour market areas. Given that this technique has not been applied in Ireland heretofore it is appropriate to evaluate, in light of the NSS's perspective of Ireland's spatial structure as organised into 12 functional regions and approximately 36 local labour market areas, what these values should be. These questions form the basis of much of the analysis presented in the next chapter.

Chapter 5 PERSPECTIVES ON IRELAND'S ECONOMIC GEOGRAPHY: AN EVALUATION OF SPATIAL-STRUCTURES PRESENTED IN TWO STRATEGIC SPATIAL PLANNING TEXTS

5.1 Introduction

This Chapter presents an empirical evaluation of contrasting spatial structures proposed within the *Indications* (2001) report and the National Spatial Strategy whilst engaging with criticism of functional regionalisation techniques. Whilst both documents propose the functional division of Ireland into 12 economic regions, they differ in terms of the scale and spatial structure of these areas. The objective of this Chapter is to evaluate which, if either, of these solutions is an accurate reflection of regional economic processes. This type of analysis was not feasible when the two reports were written due to the restrictions imposed by the need to deliver a Strategy in a relatively short period of time (Walsh, 2009, p. 105). It was also limited by the absence of up-to-date data and a comprehensive dataset detailing spatial structures as reflected in activity patterns (Walsh, 2004, p. 133). The researchers and consultants engaged by the SPU sought to overcome the absence of interaction data using a number of techniques. In each instance, the analysis depended on Census of Population data collected in 1991 and 1996. Though the NSS was published in 2002, the results of that year's Census were not available in time to be incorporated into the analyses and, hence, did not inform the development of the Strategy.

With the advantage of new data and the development of the Place of Work datasets in particular, this Chapter undertakes a critical evaluation of functional divisions of space contained in the *Indications* (2001) report and the NSS. The perspectives applied in the research reports supporting the development of the NSS are reviewed before the methods used to identify 12 functional areas are presented. The primary focus here is developing approaches to overcome the subjective nature of the objective criteria commonly used to delineate functional regions. In doing so, a systematic approach is employed that enables the implications of using different

objective criteria values to be evaluated in terms of the number and spatial structure of regions identified. This allows the research to overcome some of the criticisms of functional regionalisation techniques. More importantly, the identification of functional areas enables the conceptualisation of labour markets and labour market processes presented in both the *Inceptions* (2001) report and the NSS to be evaluated.

5.2 Perspectives on Ireland's Spatial Structure

Walsh (2004) provides a synopsis of the research commissioned by the SPU in support of the development of the NSS. He draws attention to the limited availability of data before going on to review some of the key findings of the *'Rural Structure'*, the '*Irish Urban System and its Dynamics'* and '*Urban and Rural Roles'* reports (Walsh, 2004, p. 133 – 135). The *Irish Urban System and its Dynamics* report is important in three areas, it highlights the increasing dominance of Dublin in terms of population and economic growth, it identifies a typology of urban centres based on their functional index and it draws attention to the presence of "*potential*" networks of towns or polycentric urban clusters (Grace and Walsh, 2000, p. 103). With regard to the functional index, this analysis established that the relationship between the population of a particular urban centre and the type and scale of functions present in that town was non-linear. Around Dublin, in particular, many towns with large populations were shown to have low functional scores indicating that these function as commuter or dormitory towns. Contrasting this were towns in more rural locations that were found, despite having relatively small populations, to score highly on the functional index (Grace and Walsh, 2000, p. 97). The report concluded that no other city or city region in Ireland was comparable to that of Dublin. It recommended that capacity for economic development could be increased through strategic polycentric arrangement of towns and cities throughout the State.

The research is interesting in that it reflects a classical perspective of the functional organisation of economic activities within places and over space that was first advocated by Christaller in 1933 and developed by Lösch in 1940. Despite this, the absence of data and the unrealistic assumptions underpinning techniques traditionally used to identify urban fields, led the authors of this report to reject

traditional spatial science approaches and techniques, i.e. gravity models. In their place a typology was developed as part of the research supporting the *Rural Structure* report. This typology was subsequently used to identify the spatial extent of the hinterlands surrounding the main towns and cities (Grace and Walsh, 2000, p. 104). Three of the six typology categories, 'Urban', 'Peri-urban Areas and Very Strong Areas, were considered to *"correspond to the outer limits of commuting and therefore are useful in helping to visualise the wider urban fields of the major centres."* (Grace and Walsh, 2000, p. 105). Surprisingly, though the techniques commonly associated with central place theory analysis are rejected as unrealistic the underlying theory is not. This is a significant inconsistency particularly in light of the report's recognition that smaller towns contain functions commonly associated with larger towns and that there are instances where neighbouring towns are in direct competition with each other.

The focus on labour processes as reflected in travel-to-work patterns is also significant. The emphasis in the *Urban System* report is very much on geographies of labour, that is the relationship between worker and workplace as determined by the location of the latter. Agglomeration of employment opportunities in urban centres is considered the basis for the functional organisation of space. Employment is conceived of as concentrated in urban centres. Commuting between residences and workplaces is the primary structuring mechanism in determining Ireland's economic spatial structure. That this particular perspective is dominant in the *Urban System* report is unsurprising given the theoretical perspectives of space organised in line with an urban hierarchy despite the fact that the research presented in the report indicates that the relationship between urban structure and economic functionality is non-linear.

In addition to developing a typology of rural areas, the *Irish Rural Structure* report produced an analysis of employment change in rural areas. This facilitated an assessment of the economic relationship between cities and towns and rural areas. Using an accessibility index, based on the Euclidian distance from all EDs to urban centres, the analysis established that the most 'accessible' rural areas experienced significant growth in the number of persons classified as 'At-work' between 1991 and 1996. The results demonstrate the positive influence proximity to urban areas

has on the number of people living in rural areas and on the number of persons classified as being employed. In this regard the *Rural Structure* report supports the perspective of rural space as being organised functionally around urban places of varying size that was presented in the *Urban System* report. The conceptualisation of spatial differentiation extending from the friction of distance continued the classical perspective of spaces and places developed within the *Urban System* report. Counterbalancing this is the theoretical basis of the typology of rural areas, which reflects contemporary economic geography perspectives of places and spaces as being socially and economically heterogeneous. Heterogeneity is considered to arise from the interplay between internal structures and external processes. The key contributions of the rural structures report to the NSS were twofold. Rural spaces were conceptualised as being differentiated and not simply a productive or agricultural space. Another important contribution is the analysis highlighting the significance of smaller towns to the functional organisation of space.

Combined, the *Urban System* and *Rural Structures* reports develop an understanding of the spatial representation of, largely, labour processes. Travel-to-work is viewed as being driven by similar underlying processes, namely the concentration of work in urban centres and distribution of workers' residences in relation to these places. The intensity of interaction declines as distance from the centre increases. These features give rise to distinctive labour markets or functional areas. Though both reports touch on differences in the spatial distribution of industry, with high technology manufacturing concentrated in larger cities and traditional economic activities dominant in peripheral regions, there is relatively little consideration of the implications for the spatial division of labour and local segmentation processes. In both reports, emphasis is given to increasing local and regional economic capacity through greater cooperation within and between adjacent or proximal functional spaces and, in particular, their urban centres. This research is also interesting as it highlights the underdeveloped nature of Ireland's urban hierarchy and it suggests that small towns in rural regions depend to a significant degree on rural populations to support higher-level economic activities and services.

Taken together, these findings suggest that places and spaces are locally independent, but highly interdependent within both regional and national contexts.

Around some of the larger cities there is a high level of interdependence between some urban places based on commuting patterns. Throughout the rest of the country urban and rural areas are strongly integrated. This suggests two distinctive scales of functional region. In the first instance there are those associated with the larger cities where the functional region comprises a mosaic of discrete spaces organised around smaller urban places that are strongly integrated into the economic systems of the city through commuting activities. Secondly, there are functional regions centred on individual towns. These spaces support a range of economic activities but are largely similar in profile.

5.3 Gateways, Hubs and Other Towns: A Functional Typology of Places

This perspective of an urban hierarchy is central to the conceptualisation of space contained in the NSS. Places are identified and categorised within a hierarchal, functional framework. At a regional scale, there are key towns and cities, classified as Gateways that form a framework around which smaller towns, villages and rural areas are organised through networks of social and, particularly, economic activity. This framework suggests that the country can be divided into nine functional areas; corresponding to the number of Gateways. However, the weak urban structure in the North and West gives rise to spaces that are weakly integrated with this framework of places. The absence of interaction with the nine Gateways provides the justification for the identification and classification of smaller urban centres and towns in remote areas as Hubs. These places are conceptualised as functioning on two spatial scales, as important local or regional economic centres and as nodes linking their associated rural hinterlands to the Gateways. Some Hubs are ‘closely linked’ to Gateways whilst others are seen to be ‘strong county towns’ (DoEHLG, 2002, p. 50). This terminology is interpreted to mean that there are effectively two classes of Hubs, those that function largely independently of Gateways and those that are integral elements of Gateway hinterlands. These relationships and associations are summarised below and drawn from a detailed reading of the Strategy document.

5.3.1 Gateways

The NSS identifies nine Gateway cities and towns (Figure 5.1). Five of these, Dublin, Cork, Limerick/Shannon, Galway and Waterford, are currently considered to function as Gateways. These places were identified within the 2000 – 2006 National Development Plan which had, as one of four key objectives, the goal of balanced regional development. It was envisaged in this plan that the NSS would identify a small number of additional Gateways that *"will drive social and economic development throughout their surrounding counties and regions by virtue of their critical mass of population, skills, economic base, support services and infrastructure."* (DoEHLG, 2000a, p. 13). Ultimately, four additional Gateways were identified on the basis of their strategic locations in areas without larger urban centres to drive regional development. A Midland Gateway comprising Athlone, Tullamore and Mullingar was identified as an area with the potential to develop on the basis of the strategic geographical location linking Dublin to Sligo, Galway, Limerick and Cork. In the case of Letterkenny and Dundalk, their proximity to the border with Northern Ireland and role in supporting cross-border economic interaction is emphasised. Sligo is classified as a Gateway to energise *"a wider area encompassing parts of Mayo, Leitrim, Donegal and Sligo county itself as well as capitalising on emerging cross-border co-operation"* (DoEHLG, 2002, p. 149). Though the Strategy talks of a *"broader corridor of cities spanning from Cork to Derry"* of which Sligo is considered one of the constituent places, emphasis is given to highlighting the polycentric potential of the Atlantic Corridor comprising cities and towns stretching from Waterford, through Cork and Limerick to Galway (DoEHLG, 2002, p. 149). The logic underpinning this conceptualisation of space rests in the perspective that *"not even Cork, the largest of the existing gateways, will approach the scale of development and critical mass of the Dublin area for the foreseeable future. ... A strategic approach to achieving similar critical mass, based on the complementary attractions of cities that are relatively close to each other, is required to emulate the scale and critical mass of the Dublin area."* (DoEHLG, 2002, p. 45).

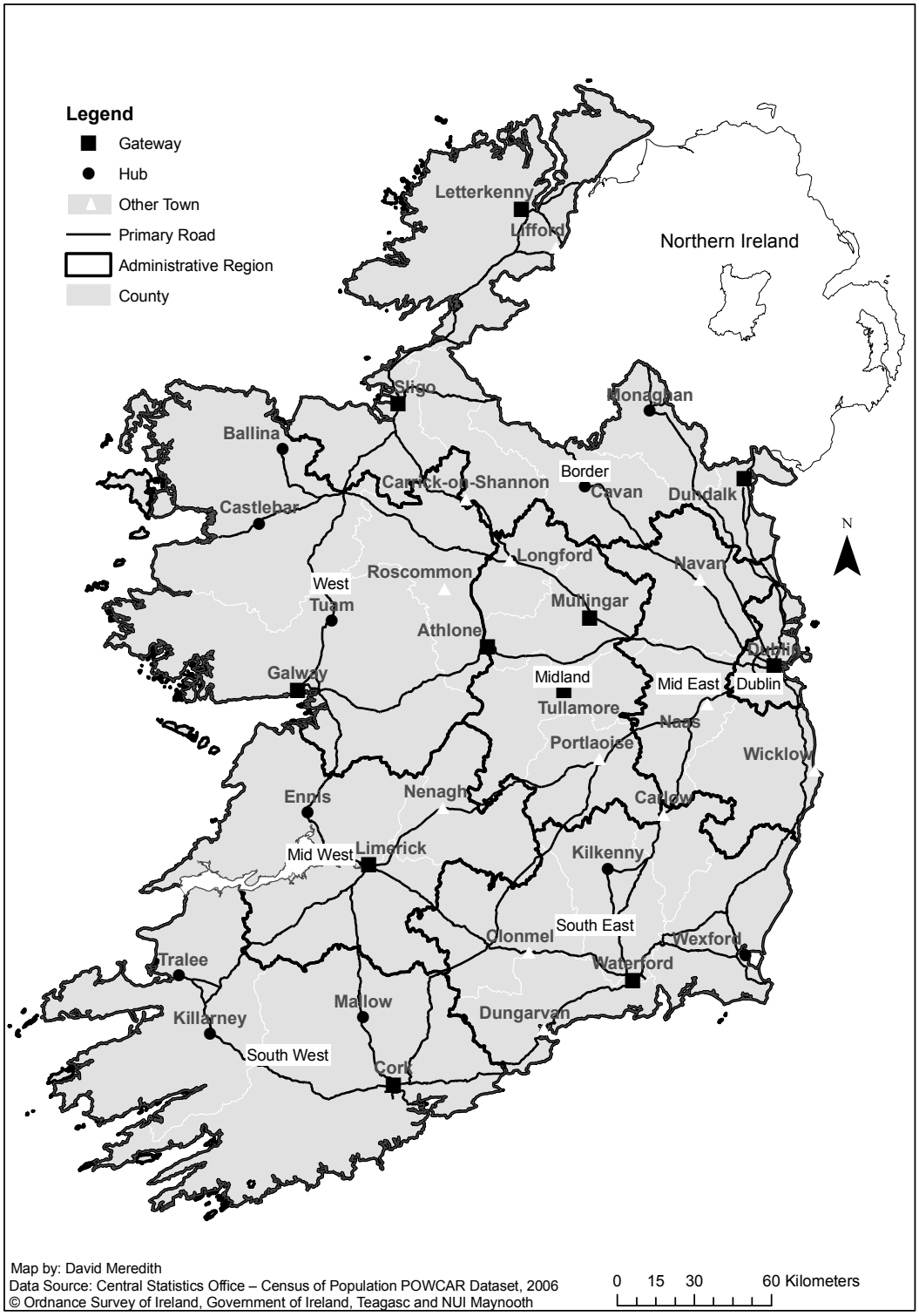


Figure 5.1 Distribution of Gateways, Hubs and Other Towns.

Breathnach (2010, p. 1192) interprets this statement to mean *"none of the four largest provincial urban cities ... approach the level of critical mass required to function effectively as gateway centres"*. This assessment is perhaps overly critical,

in that it, re-positions individual Gateways as, following the implementation of the NSS, equal to Dublin in terms of critical mass. The Strategy is, however, explicit in classifying Dublin and the surrounding Greater Dublin Area as the primary, globally connected space in Ireland. Achieving balanced regional development is not presented in terms of each Gateway developing in competition with Dublin but rather through 'co-operation and competition' (DoEHLG, 2006, p. 10).

This perspective of spatial processes is exemplified in the meso-polycentric structure of the Atlantic Corridor. The NSS states, "*There is evidence of growing interaction between Cork and Limerick and also between Waterford and Cork and between Limerick and Galway. This interaction suggests future possibilities for combining the complementary strengths of these cities and expanding such interaction to achieve a critical mass strong enough to balance the type of critical mass that has been achieved by Dublin.*" (DoEHLG, 2002, p. 41). It is also evident in the proposal of the Midland Gateway. A micro-polycentric arrangement is proposed on the basis of these places sharing overlapping functional areas but that their critical mass is currently fragmented as a consequence of competition between them (DoEHLG, 2002, p. 46). Proximity between places is considered to give rise to potential for increased linkages, interactions and interdependencies and hence, polycentricity (Kloosterman and Lambregts, 2001). In this respect polycentricity is once again assumed to be normative given that the respective functional spaces associated with each individual town overlap to some degree. It is not, as with the Atlantic Corridor, based on interaction between the towns.

The final Gateway represents a, cross-border, micro-polycentric arrangement between Letterkenny in Co. Donegal and Derry in Co. Derry, Northern Ireland. The NSS suggest that there is a *"strong dynamic at present in the relationship"* between these places (DoEHLG, 2002, p. 46). This statement suggests that, in this instance, polycentricity is functional rather than aspirational. Breathnach (2010, p. 1192), however challenges this and labels the linking of Derry and Letterkenny a "*hypothetical partnership"*. This raises the question of whether there is sufficient evidence of commuting between the functional areas comprising Letterkenny and Derry. This question will be considered in Chapter Seven.

5.3.2 Hubs

Each of the Gateways identified within the NSS is situated within a hierarchical framework of interrelations and interdependencies. In the first instances there are nine Hubs, towns that support *"the national and international role of the gateways and in turn energising smaller towns and rural areas within their sphere of influence."* (DoEHLG, 2002, p. 12). More so than the identification of new Gateways, the conceptualisation of spatial relations in terms of rural areas and smaller towns interacting with Hubs, which in turn link to Gateways, reflects an evolution of thinking pertaining to Ireland's spatial structure. It also indicates a more nuanced perspective of Ireland's economic geography wherein space is not seen as being dominated by the Gateway towns and cities. Rather, it is viewed as being structured at a smaller scale through the organisation of spaces around smaller towns. This, in contrast to that of the Gateways, is a more bottom up perspective of Ireland's spatial structures. It represents a departure from the entrenched morphology of five city regions that has dominated regional development and spatial planning in Ireland for so long. Critically, however, it seems from the reaction of various stakeholders during the public consultation phase that this is not a perspective shared by the wider social, economic and environmental planning communities. These, it seems, do not see places within a multi-scale, hierarchal relational construct. The analysis of those comments collated during this process and presented in Chapter Three, indicate a perspective on places that is dichotomous; they are either rural or urban.

The vision presented in the NSS, conceives of Tralee – Killarney in Co. Kerry and Ballina – Castlebar in Co. Mayo as polycentric Hubs (Figure 5.1). Similar to the Midland Gateway, these places are seen as sharing overlapping functional spaces given their proximity. This conclusion is drawn from the analysis of accessibility and economic performance contained in the *Rural Structure* report (Grace et al., 2000, p. 49). The rationale associated with the identification of these places rests in their location and economic role in peripheral regions, distant from major urban centres. In both instances they fit with the conceptualisation of an extended Atlantic Corridor running the length of the Ireland's West coast. Six additional 'Hubs' are also identified including Monaghan, Cavan, Tuam, Mallow, Kilkenny and Wexford

(Figure 5.1). These correspond to larger towns with populations exceeding 5,000, dispersed throughout the country.

5.3.3 Other Towns and Other Places

In addition to these places, the NSS refers to 'Other Towns' and 'Other Places'. Whilst the Strategy is clear in the identification of 22 Gateways and Hubs, no formal definition of these Other Towns is given in the NSS nor are they explicitly identified. In an effort to overcome this issue, members of the SPU were asked to provide a list of these places for the purposes of facilitating this research. In response, the SPU identified 12 Other Towns and explained that these are places that contain local administrative functions that are not classified as either Gateways or Hubs (Figure 5.1). The list of Other Towns includes Dungarvan, Clonmel, Carlow, Portlaoise, Wicklow, Naas, Navan, Nenagh, Roscommon, Longford, Carrick-on-Shannon and Lifford.

Finally, the NSS also refers to other, locally significant places' *"such as Clonakilty, Kenmare, Dingle, Clifden and Westport"* (DoEHLG, 2002, p. 47). In the course of the discussions with the SPU regarding the identification of Other Towns, the presence of locally significant places was emphasised by way of stressing that the NSS is not a plan to centralise growth within the Gateways and Hubs. These places are referenced in Section 4, pages 73 – 92, of the NSS, which outlines *'How each region will participate in the NSS'*. In general, these places are located in remote and or inaccessible areas. Though they are considered important centres and drivers of local economic development, these towns are not classified as Other Towns nor are they associated with particular Gateways or Hubs.

5.3.4 Gateways and Hubs: Setting the framework for functional areas

A reading of the NSS draws out a description of the spatial relations between Gateways, Hubs, Other Towns, Other Paces, and rural areas. This highlights the presence of economic relationships between places, which in aggregate suggest the presence of 12 distinctive economic regions or functional areas (Table 5.1). The relationships and associations, or absence thereof, between Gateways, Hubs and

other towns provide a guide to the conceptualisation of Ireland's spatial structure envisaged in the NSS. They also provide a guide to the scale, in terms of the particular combinations of urban centres, of these functional regions.

Based on the assessment of spatial linkages described in the NSS it is apparent that the NSS suggests that there are 12 functional areas in Ireland (Table 5.1). Interestingly this conceptualisation largely reflects the functional areas presented in the *Indications* (2001, p. 14 - 15) report with one important exception. Rather than group Kilkenny and Portlaoise within a single functional area, these places are associated with Gateways within their respective administrative regions. It is clear that the objections to the functional areas concept raised during the public consultation process were accommodated in the NSS (Walsh, 2009). Two questions stem from this assessment; using travel-to-work data, is it possible to identify 12 functional areas that correspond to the description given in the NSS and summarised in Table 5.1. The second question relates to whether a functional area comprising Portlaoise and Kilkenny can be identified within an overall framework of 12 functional areas. Before engaging with this question the methods applied to identifying functional areas are considered.

Table 5.1 Association of Gateways, Hubs and other places described in the NSS

Gateway / Hub	Associated Places
Dublin	The towns of Navan, Naas, Newbridge, Kilcullen, Arklow, Drogheda and Balbriggan are considered key elements of Dublin's hinterland. Drogheda and Dundalk are key nodes in the Dublin – Belfast corridor (DoEHLG, 2002, p. 43). Portlaoise and Carlow are, currently, associated with Dublin as a consequence of 'extensive commuter-based development' (DoEHLG, 2002, p. 44).
Dundalk (Cavan / Monaghan)	As noted above, the NSS foresees the development of Dundalk as a Gateway given its strategic location close to the border with Northern Ireland. It is considered a key node in the Dublin – Belfast corridor and important in supporting the 'wider border area extending westwards from Dundalk' incorporating large parts of counties Monaghan and Cavan (DoEHLG, 2002, p. 43). Presently, Dundalk remains part of the extended Dublin Gateway area. The 'wider border area' is however thought of as a distinctive space.
Cork	As the Republic of Ireland's second largest urban centre, Cork is central to the NSS's overall aim of achieving balanced regional development. To the north, Mallow is classified as a strategic node linking between the Cork and Limerick hinterlands. The town is viewed as an important local centre serving an 'extensive rural hinterland' (DoEHLG, 2002, p. 46).
Limerick/Shannon	Ennis, classified as a Hub within the Limerick/Shannon hinterland, is posited as a key town linking the hinterlands of Limerick and Galway.
Galway	Tuam, a hub, is associated with Galway City. It, similar to Mallow, is 'positioned to act as a strong market and service centre for an extensive rural hinterland while interacting with its neighbouring gateway'. (DoEHLG, 2002, p. 46)
Sligo	Sligo is classified as a Gateway given the town's location in a region with an underdeveloped urban structure. No associations with other urban centres are referenced.
Letterkenny/Derry	Letterkenny is viewed as being strongly integrated with Derry in Northern Ireland. The proximity of the two centres is seen as offering the potential to build critical mass in the Northwest region. No other associations with towns in the Northwest are referenced.
Athlone, Tullamore and Mullingar	These towns are considered to have the potential to improve and increase their economic capacity through greater cooperation.
Waterford	Kilkenny is considered an important urban centre in its own right and is, consequently, classified as a Hub. Notwithstanding this, it is associated with Waterford due to the close ties between southern parts of the county and Waterford City.
Wexford	Whilst proximal to Waterford, Wexford is identified as a separate Hub with its own hinterland.
Tralee – Killarney	Classified as regionally important towns, the linked Hub of Tralee – Killarney is seen to have the potential to 'capitalise on the combined capacities of both towns, such as those in third-level education, developing links between industry and centres of learning, surface and air transport links and key natural resources such as scenic landscape.' (DoEHLG, 2002, p. 47).
Ballina – Castlebar	Similar to Tralee – Killarney, the Castlebar and Ballina Hub is seen as occupying a strategic location serving a large rural hinterland between two Gateways, in this instance Galway and Sligo.

5.4 Data and Methods

One of the consistent themes running through all of the research undertaken in support of the NSS is the limited availability of particular types of spatial data. Undoubtedly, this frustrated efforts on the part of the SPU to develop a better understanding of the extent of spatial interaction between places and communicate this knowledge to key stakeholders and the wider public. Whilst the Census of Population provided large quantities of micro-data pertaining to populations and their socio-demographic characteristics, there was relatively little information describing interaction between places. Compounding this issue was the dated nature of the Census data, which had been collected in 1996. Whilst it was hoped that the Census of Population planned for 2001 would be in a position to inform and update the analyses, the outbreak of Foot and Mouth Disease resulted in the postponement of this Census until 2002 (Walsh, 2004). As a consequence, much of the analysis concerning spatial patterns of uneven development did not capture significant changes that were underway during the late 1990s and early years of the new millennium. More significantly, the POWSAR, introduced in the previous chapter, was not available to inform assessments of the extent of functional areas and the level of interaction and interdependencies between these spaces. The development of this dataset by the CSO was, after-all, a response to the information needs of those involved in the process of developing the NSS.

The POWCAR facilitates detailed analysis of the spatial structures contained in the NSS including those different conceptualisations of functional areas presented in the *Indications* (2001) report and the final Strategy document. As outlined in Chapter Four, this thesis uses the 2006 POWCAR as it contains a comprehensive record of all persons classified as being 'At work' and, for a substantial proportion of this number, information regarding where they live and where they work. The functional regionalism geocomputational technique known as the ERA is used to evaluate travel-to-work patterns and, thereby, identifying functional economic areas.

Much of the research identifying local labour market areas using the ERA has applied, frequently uncritically, subjective values to describe these spaces. This is an important issue and one that is addressed by this research. Whilst it has become

convention to use a minimum self-containment value of 66% and a target value of 75% there is no theoretical or empirical rationale underpinning the selection of these criteria. Rather than defining the functional areas used in this analysis on the basis of a single set of objective criteria, this study applies a systematic approach to identify several local labour market regionalisation solutions. This involves the systematic identification of regionalisation solutions where the minimum and target self-containment values exceed 50%. This threshold is selected on the basis that, at the very minimum, 50% of the people working in an area also have to live there for it to be considered a *de facto* local labour market area (Ball, 1980). There may be merit in considering lower containment values in certain instances, e.g. where the objective is to evaluate the role of changing spatial divisions of labour in the emergence or development of local labour market areas. This is not, however an objective of this research and hence the 50% value is used.

Using that subset of the POWCAR with both origin and destination data, a matrix of ED-to-ED travel-to-work interactions is calculated. These data are loaded into the ERA which is implemented within AWK, a pattern-matching program for processing files that is a fundamental element of UNIX shell programming (Robbins, 2005, p. 611). In order to undertake the analysis, this environment was adjusted with the assistance of Prof. Mike Coombes and Colin Wymer. Rather than testing one set of objective criteria comprising minimum and target population values and minimum and target self-containment values, the ERA was altered such that the population criteria were fixed whilst the self-containment values were systematically varied. Before commencing the assessment of variable self-containment values it was necessary, therefore, to identify the minimum and target population criteria.

5.4.1 Identifying the 'Population' criteria

With regard to the establishment of the population thresholds, these values were selected to ensure that small but locally important areas could emerge from the analysis rather than, by using higher population thresholds, forcing all EDs to associate with the larger urban centres. Whilst the *Urban Structures* report found that towns with populations over 5,000 generally recorded strong economic performance it is important to bear in mind that the minimum population criteria pertain to spaces

rather than places. This is a particularly important consideration given the relatively underdeveloped urban system in parts of the country. Not only is the Border Region and those remote and or inaccessible areas along much of the west coast characterised by their distance from larger urban centres but also by the absence of towns with populations in excess of 5,000 persons. In these spaces it is feasible that very small towns play important roles in structuring labour activity patterns.

In order to explore this issue further the ERA programme environment was altered to set the minimum and target self-containment values at 15%. Setting the self-containment at 15% allows for the implications of using selected population values to be teased out. It is important to note that 'population' in this instance refers to the number of workers where both residence and workplace data are present. It does not refer to the total number of persons living in the area. The population criteria were progressively increased in units of 500 persons up to a maximum value of 40,000. This resulted in the development of a dataset of 80 different regionalisation solutions. The first solution, that uses a population value of 500, results in the identification of 658 'functional areas'. Evaluation of this solution finds that 563 of these areas have a supply side self-containment value of less than 50%. Supply side self-containment reflects the proportion of workers with a known workplace destination that both live and work within the area. Assessment of the demand side self-containment values finds that 314 of the areas identified have a value less than 50%. Demand side self-containment reflects the proportion of employment opportunities in an area filled by workers living in that area. A more detailed assessment of the spatial composition of the 658 areas finds that 103 comprise single EDs. Clearly, for the purposes of this research, using a minimum population value of 500 is too low. The results of this analysis are however instructive as they suggest that there are many small spaces with relatively high concentrations of both workers and employment opportunities.

As the minimum population is increased the number of local labour market areas identified quickly declines (Figure 5.2). The rate of decline falls rapidly as the threshold population criterion is increased after which a long and downward sloping tail characterises the very gradual process of agglomeration.

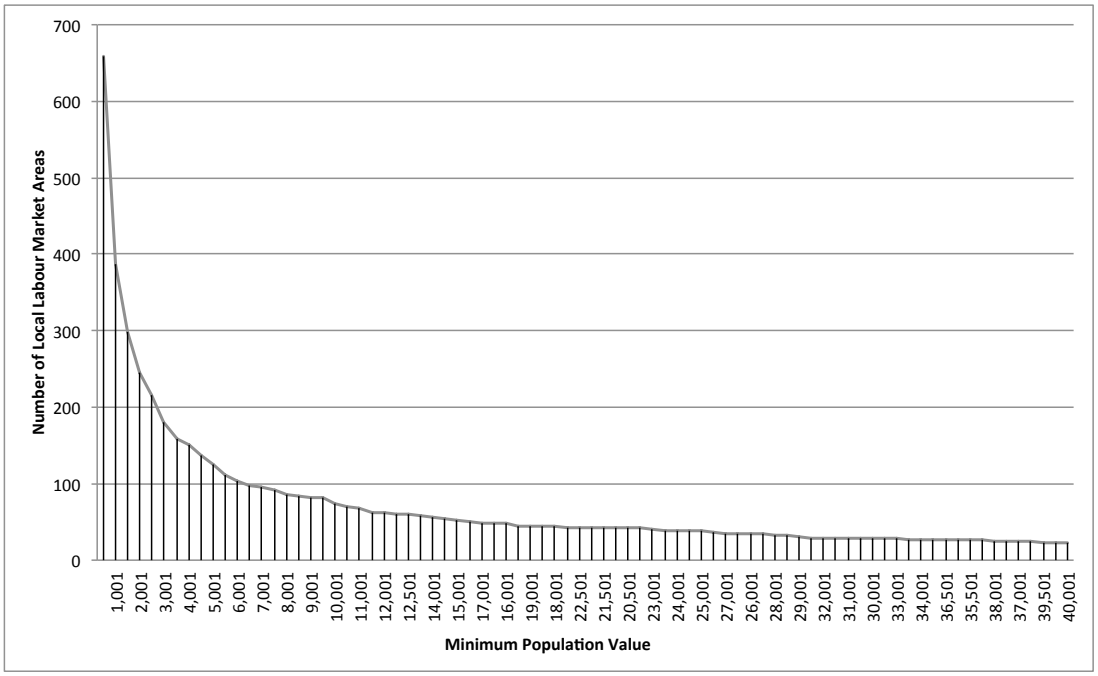


Figure 5.2 Evaluation of changing population criteria on the number of local labour market areas identified.

A closer assessment of the average rate of change highlights a number of interesting features that hint at the nature of those areas identified. The rate of change reflects the level of spatial agglomeration taking place as population values increase. The average decline in the number of areas identified per iteration, between 500 and 2,500 persons, is 88.6. An iteration represents the increase in the population criterion by 500 persons. The average rate of agglomeration falls to 15.8 between 2,500 and 4,500 persons and continues to decline until the population criteria reach 20,500 – 22,500 (Figure 5.3). At this point the number of areas is stable at 42. Closer inspection of the spatial aggregations associated with the regionalisation solutions based on the population values between 20,500 and 22,500 establishes that there is no variation in the composition of the areas identified. The same EDs are grouped together within the same functional areas.

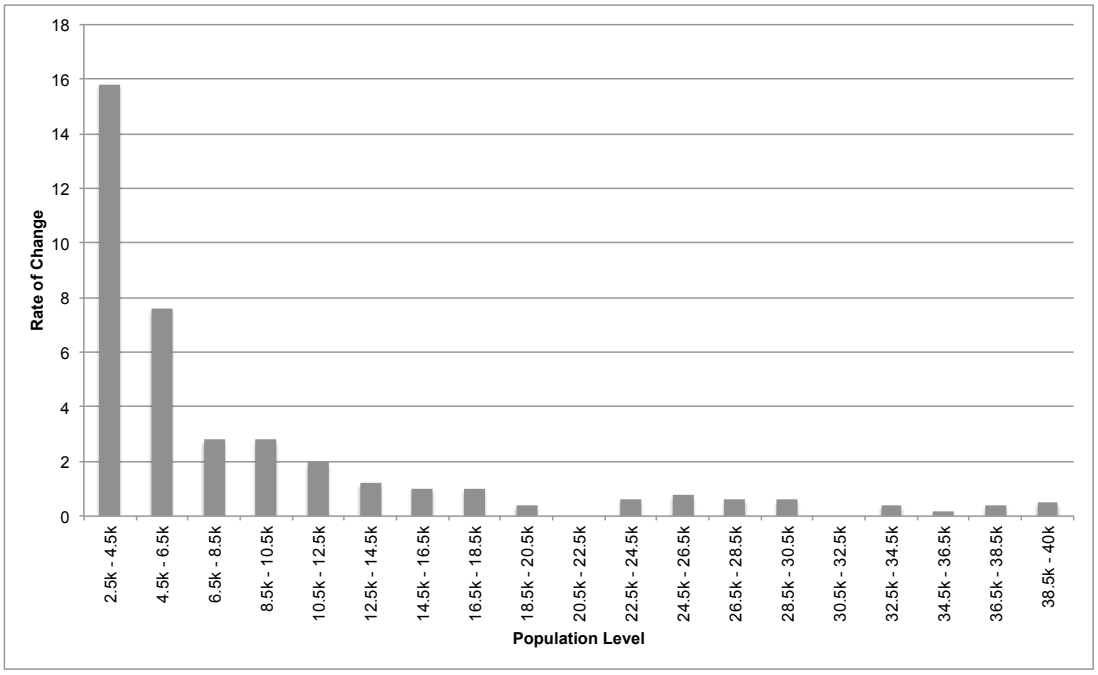


Figure 5.3 Average rate of decline in the number of functional areas identified.

The rate of decline picks up again as the population is increased further. Later, between 30,000 and 32,500, the value remains constant at 29 functional areas after which agglomeration increases as higher population values force areas to merge to attain this criterion.

Evaluation of these data assists in the selection of minimum and target population values for use in the systematic assessment of self-containment values and identification of functional areas. Clear breakpoints are evident in these data, at the 6,500 and the 20,500 values. With regard to the use of the 6,500 value, this marks a break in the rate of area aggregation. Though, on average, three local labour market areas are aggregated with each iteration, the earlier volatility that characterised the merging of areas up to this point has given way to a much more gradual and stable process. The 20,500 criterion is selected as the target value given that this is the first point where the rate of change declines to 0. As an aside it is worth noting that these results clearly demonstrate the utility of the ERA as an effective exploratory tool.

5.4.2 A systematic approach to identifying self-containment values

Separately to the population assessment outlined above, the ERA was altered to enable a systematic evaluation of the implications of selecting combinations of

minimum and target self-containment values. Starting with a target value of 100% the minimum self-containment value was systematically reduced, one percentage point at a time, from 99% to 50%. On reaching the minimum value of 50% the target value was set at 99% and the minimum value was systematically reduced. This process was repeated resulting in the identification of 1,176 different regionalisation solutions with minimum and target self-containment values ranging from 50% to 100%.

Taking the minimum values first, an evaluation of the distribution of these, relative to the number of functional areas identified, highlights the linear nature of the relationship between these data (Figure 5.4). As the self-containment value is reduced the number of areas increases. The R^2 value describing this relationship is 0.753 indicating that 75% of the variance in the number of functional areas identified is accounted for by reference to the self-containment values. When one examines the target self-containment value a similar linear relationship is apparent although in this instance the R^2 is lower at 0.679. The explanation for the difference in these values is apparent when one considers the average minimum and target self-containment values and the resulting number of functional areas identified (Figure 5.5).

It is evident from these data that there are distinctive thresholds that one would expect to find in an analysis of this kind. As the reduction in both minimum and target self-containment values takes place, increasing numbers of functional regions emerge. In the first instance Ireland's political geography rather than urban geography plays a significant role in determining the functional division of the country into two areas. It might be expected that County Donegal would form a separate functional area given its peripheral location, short land border with the rest of the country and absence of a significant urban centre in the Northwest.

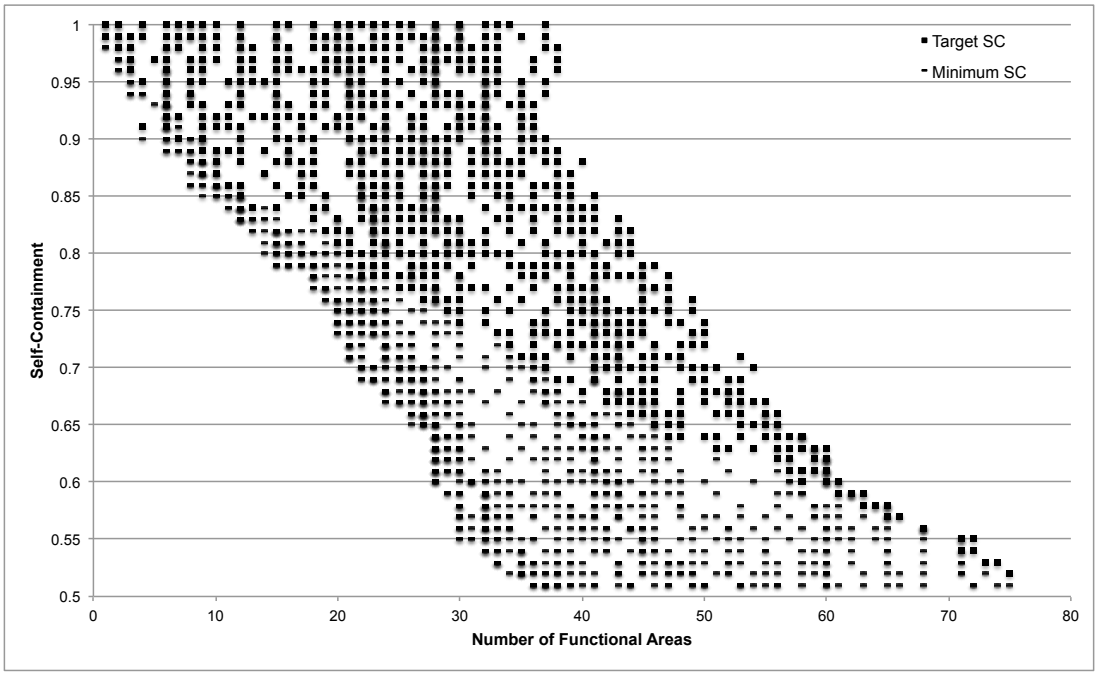


Figure 5.4 Relationship between minimum and target self-containment values and the number of functional areas

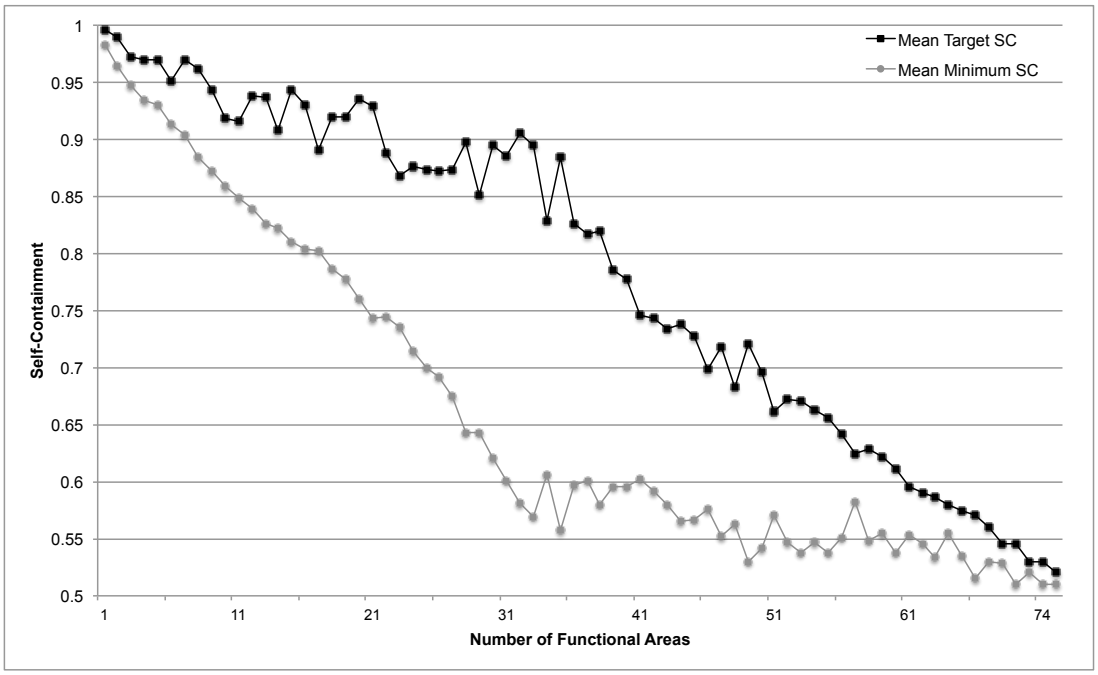


Figure 5.5 Assessment of the relationship between mean self-containment values and the number of functional areas identified

When those values identifying two functional regions are plotted this area forms a distinctive space with the remainder of the country comprising the other. Exploring the structure of three functional regions one finds the Northwest functional area is

amalgamated into a larger West – Northwest region and the Midwest - Southwest emerges as a separate area (Figure 5.6). The latter area is interesting as it largely approximates to the space described as the Atlantic Corridor. Below this scale the spatial relationships, as defined in relation to the objective criteria, become more complex. The identification of four functional areas sees the West – Northwest agglomeration disaggregated and the re-emergence of the Northwest as a separate functional region. With the identification of four functional regions, the Southwest functional area re-emerges and a space comprising much of the West Region forms the new area whilst the east of the country comprises a single large region. Assessing the structure of five functional areas identifies an additional region encompassing much of the Midwest including counties Clare, Limerick and North Tipperary. The Northwestern functional area is absorbed into a region containing much of Co. Sligo and north Co. Mayo whilst the remainder of the Western region forms a distinctive space containing Castlebar and Galway City. The Southwestern region is much reduced following the emergence of the Midwest functional area although it extends further east to encompass Waterford City. The remainder of the country is grouped into a single functional area covering the East Coast, the East, Southeast and Midlands.

Closer analysis of the data highlights some of the reasons for variation in the self-containment values and the number of areas identified. Taking a sample of 48 regionalisation solutions with a target value of 100% and minimum value in excess of 50% one finds a negative linear relationship between the change in the minimum self-containment value and the number of areas identified; in general, as the value increases the number of areas decreases. In this instance, whilst the minimum self-containment values are systematically varied, the target value is set at 100% and the minimum and target population of each area are fixed at 6,500 and 20,500 workers respectively.

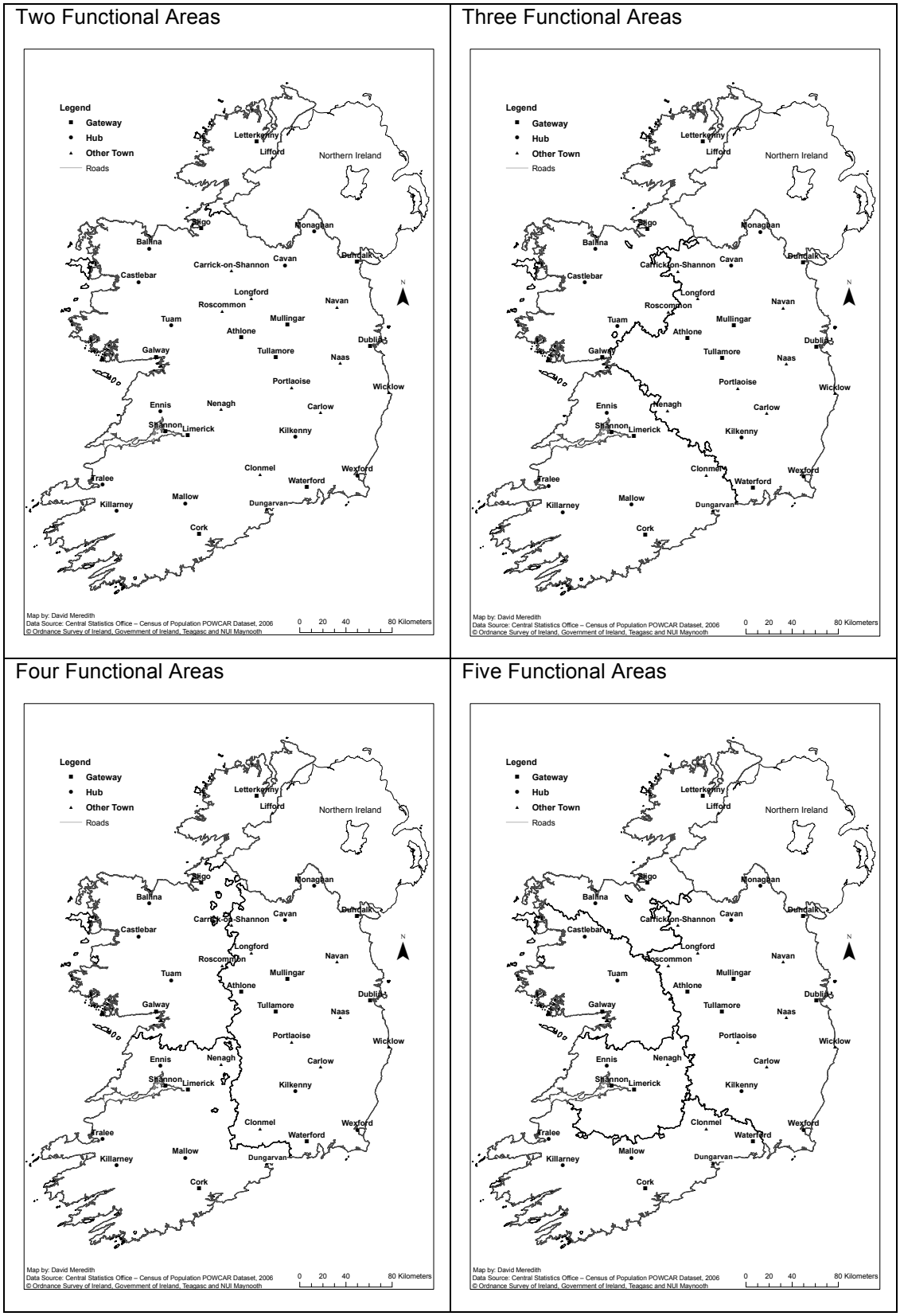


Figure 5.6 Systematic division of Ireland into functional regions

Assessment of the minimum self-containment value associated with the 48 areas highlights key thresholds. These are points where the minimum self-containment values are reduced yet the number of areas identified remains the same e.g. values of 87, 88 and 89 each yield 9 areas. These points reflect relative stability in the spatial structure of the areas identified. Other thresholds reflect instability. A change from a value of 82 to 81 gives rise to the amalgamation of four areas (Figure 5.7).

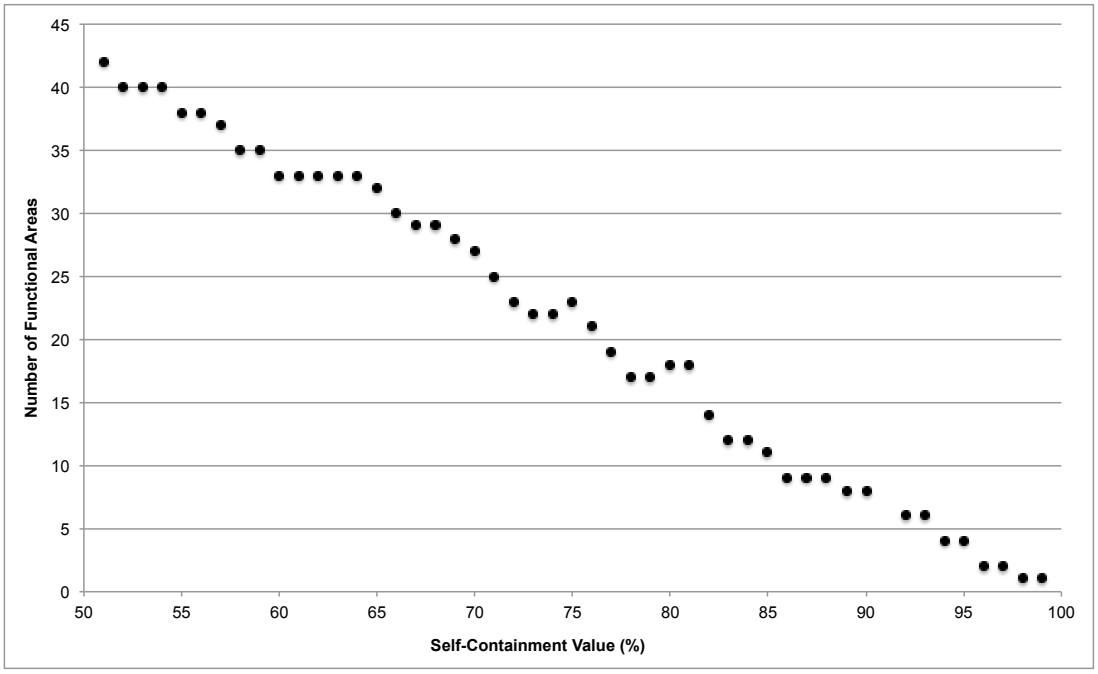


Figure 5.7 Assessment of minimum self-containment values and the number of functional areas

That these data are not perfectly linear is unsurprising. The number of areas reflects, to some extent, the underlying material geography of Ireland's local labour market areas. This point is exemplified by a number of outliers in the data where, though the minimum self-containment value increases so also do the number of functional areas e.g. the increase in the value from 74 to 75 sees the number of areas increase from 22 to 23 before falling to 21 when the self-containment value is further increased to 76. Whilst this initially may appear counterintuitive, closer inspection of the data indicates the emergence of locally significant functional areas. Before proceeding, however, it is worth considering this issue of volatility or sensitivity.

Basic sensitivity analysis using the dataset of 1,176 regionalisation solutions establishes that relatively small changes in self-containment values have significant impacts on the number of local labour markets (Table 5.2). Using the self-containment values presented by Bond and Coombes (2007) the implication of a 5% increase and decrease in the objective criteria is explored. Reducing both the minimum and target values by 5% results in a 15.8% increase in the number of local labour markets identified. A 5% increase in these criteria leads to a 31.6% fall in the areas identified. Clearly there are significant implications in choosing one set of objective criteria over another.

Table 5.2 Self-Containment Sensitivity Analysis

	Target Self-containment	**Minimum Self-containment**	**No. Functional Areas**	**Change in No. Functional Areas**	**% Change in Functional Areas**
-5% SC	71	63	44	6	15.8
Baseline	75	66	38	0	0
+5% SC	79	69	26	-12	-31.6

Returning to the assessment of the 48 areas, the increase in minimum self-containment value to 75, combined with static minimum and target population thresholds, sees the emergence of an area incorporating two towns in the Midland Region, Mullingar and Longford, linked by the N4 road (Figure 5.8). The area is an amalgam of parts of the Athlone, Tullamore and Mullingar and Roscommon – Carrick-on-Shannon functional area. Many of the EDs that comprise the new area are located along to the borders of other functional areas. The emergence of this area reflects weaker interaction between these EDs and the original functional areas, namely Carrick-on-Shannon - Roscommon and Dublin. This is not to suggest that intra-region interaction is tenuous rather, it highlights the impact of the modifiable areal unit problem and the significance of scale in determining the level of spatial heterogeneity as measured in terms of self-containment. Larger areas will have higher levels of self-containment simply due to their geographic scale. They will, however, also record high standard deviation in levels of intra-regional interaction.

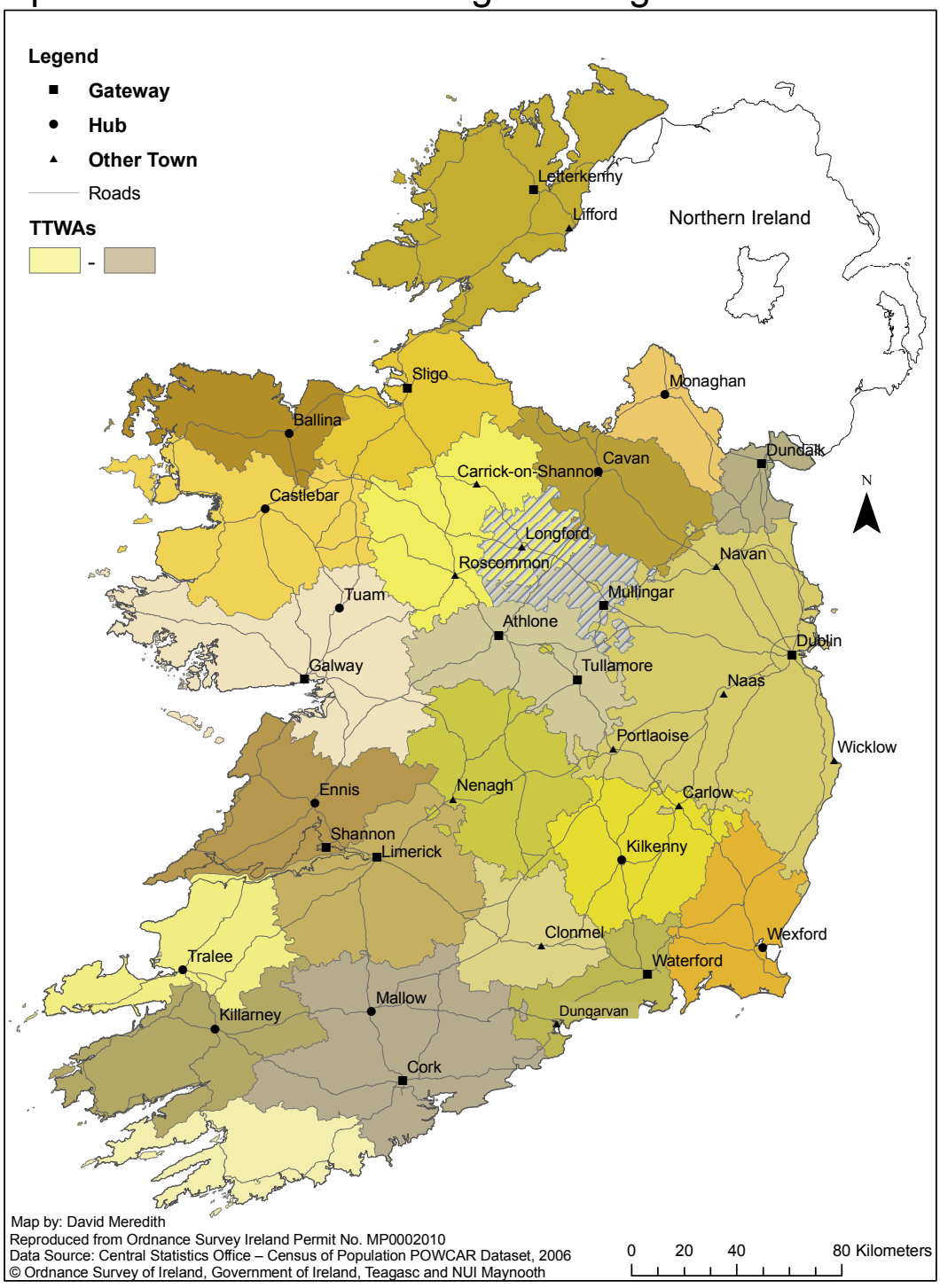


Figure 5.8 Changing self-containment values and the emergence of new TTWAs

Increasing the minimum self-containment value, from 75 to 76, sees the re-emergence of the original Athlone, Tullamore and Mullingar and Roscommon –

Carrick-on-Shannon functional area and the fusion of the Ballina and Castlebar TTWAs resulting in the reduction in the overall number of TTWAs to 21 (Figure 5.9).

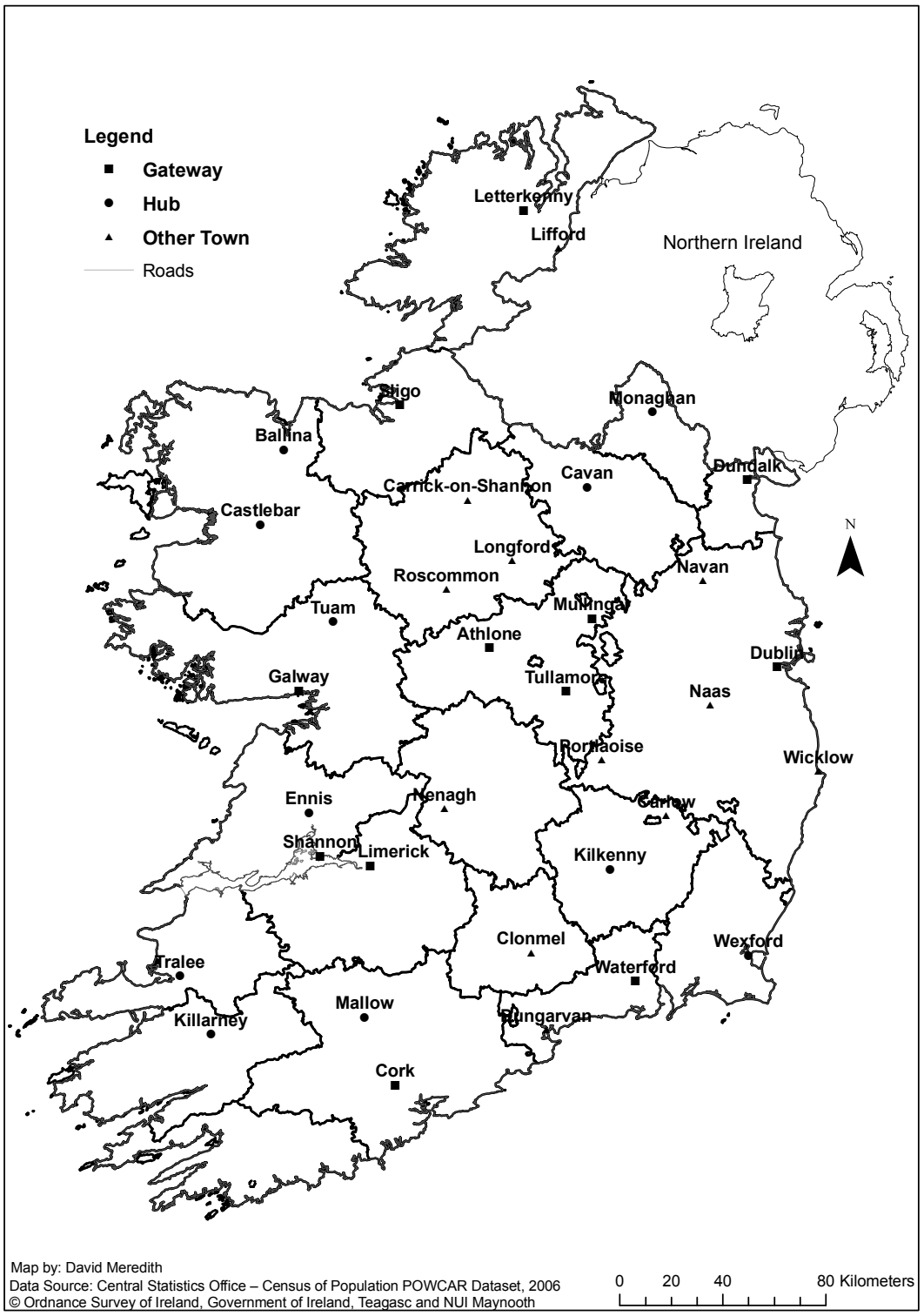


Figure 5.9. Functional areas following an increase in minimum self-containment.

In the case of the Ballina functional area it was not, as one might expect, that this hinterland had relatively low self-containment and was consequently merged with the neighbouring TTWA of Castlebar. An examination of functional area self-containment values establishes that, in both Ballina and Castlebar functional areas, over 88% of workers are employed within the hinterland where they live. The narrowing of the margin between the minimum and target self-containment and the algorithm's ability to attain a self-containment value of 94.0%, closer to the target value of 100%, for the resulting Ballina – Castlebar functional area, drives the merger of these hinterlands.

The foregoing analysis demonstrates the complexities of balancing the intersecting demands of scale, or the number of areas being defined, with theory, as reflected in self-containment values. Underlying this tension are the difficulties of identifying local labour markets using subjective self-containment objective criteria. It is clear that applying very high self-containment values has significant repercussions in terms of the scale of functional areas identified. This result draws attention to the functioning of the algorithm, which is not place focused. The agglomeration process does not assess interaction between a select location with many jobs and all other areas, rather it focuses on identifying patterns of interaction within spaces. This has many advantages, not least of which is the capacity to overcome changes in the location of employment from central business districts to the edge of towns and cities and, indeed, within rural settings over the course of the past few decades.

Underlying much of the research using the self-containment concept as a means of defining local labour market is the recognition that the selection of objective criteria is problematic. Having arrived at this conclusion, most studies persist in the application of the 75% threshold used by Smart (1974) cf. Newell and Papps (2001). This body of literature also draws attention to the need to identify regionalisation solutions that are 'stable'. If relatively small changes in the self-containment criteria give rise to significant changes in the number of areas identified it suggests that the analysis is capturing a variety of processes, possibly operating at very different scales. Bearing this in mind the next section undertakes exploratory analysis to

identify 12 functional areas that correspond to the spatial structure described within the NSS.

5.5 Evaluating the NSS's conceptualisation of space

The assessment of Gateways and the interactions described between them and other places, and their associated hinterlands, within the NSS suggests that Ireland is divided into 12 functional regions based on the links between larger cities and towns and their hinterlands (Table 5.1). This conceptualisation of economic space was first mooted within the *Indications* report (2001) (See Figure 3.4, page 57). Whilst the NSS, published the following year, also suggests that space is organised functionally it does not explicitly state the number nor outline the spatial structure of these regions. A careful reading of the NSS, however, indicates that it too proposes a spatial vision of 12 functional regions.

A comparison of the regions depicted in the *Indications* (2001) report and those of the NSS highlights important differences in the spatial composition of the functional regions. In contrast to the NSS, *Indications* (2001) proposed a functional area encompassing Kilkenny and Portlaoise whilst incorporating Wexford into the broader Southeast functional area. The NSS proposes an alternative vision of space with Wexford a distinctive functional area whilst Portlaoise was associated with the Dublin Gateway region and Kilkenny associated with Waterford. Given the different visions presented in these documents it is necessary to explore if either of them are reflective of spatial structures as represented in travel-to-work patterns.

5.5.1 Identification of 12 Functional Areas

When the 1,176 functional area solutions associated with different combinations of self-containment values were evaluated, 17 were found to yield 12 areas. Rather than simply selecting the solution yielding 12 functional areas with the highest self-containment values, a comparative evaluation is undertaken exploring all self-containment combinations resulting in 12 functional regions (Table 5.3). Unsurprisingly, given the small number of relatively large areas being identified, both the minimum and target self-containment values are high. These range from

83% - 85% with regard to minimum self-containment and between 86% and 100% in the case of target values. Combinations associated with minimum values of 83% and 84% both yield eight solutions each whilst the more tightly constrained 85% value, results in only one combination identifying 12 functional areas. There are significant differences between the groups of solutions resulting from combinations of 83% and 84% minimum values. Whilst solutions associated with minimum values of 83% are associated with very high target values, those pertaining to the minimum of 84% display a bimodal split (Table 5.3). This assessment suggests that the composition of the functional areas associated with very high target values will be relatively similar in terms of their spatial extent. It does, however, raise questions as to the size and extent of those solutions associated with lower target values.

Table 5.3 Distribution of self-containment combinations identifying 12 functional areas

	Target Self-Containment													
	86	**87**	**88**	**89**	**90**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**
Min83		12						12	12	12	12	12	12	12
Min84	12		12	12	12	12						12	12	12
Min85			12											

In order to explore this issue the composition and the number of EDs associated with each of the different solutions are evaluated. These are grouped in relation to the minimum self-containment value. Taking the eight solutions associated with the 84% value first it is evident that whilst the very tightly constrained solutions contain similar number of EDs, the areas resulting from target self-containment values below 90% are substantially and consistently different (Table 5.4).

Turning to the group of functional areas associated with the 83% minimum self-containment value, the distribution of EDs is similar to those associated with the 84% value. Whilst the target value is very high, the distribution is relatively stable, although there is a transfer of 11 EDs from LLMA 9 to LLMA 6 due to a reduction in the target value from 100% to 99% (Table 5.5). Once again, the stability of the LLMA groupings declines in line with the target value. Comparison of the functional areas associated with 83% and 84% minimum values and very high target values

highlights a degree of stability. However, once the target value is reduced below 98% there is much more volatility in terms of the size and structure, in terms of the number of EDs, of individual areas.

Table 5.4 Number of EDs associated with each functional area regionalisation solution with a minimum self-containment value of 84%

	Number of Electoral Divisions per Functional Area Target Value – Minimum Value							
ID	**100 - 84**	**99-84**	**98-84**	**92-84**	**90-84**	**89-84**	**88-84**	**86-84**
1	822	822	822	866	1082	1066	985	971
2	123	123	123	114	114	114	114	140
3	282	282	282	218	218	243	218	300
4	156	156	156	146	161	156	147	405
5	314	314	314	304	304	369	575	465
6	420	420	420	363	360	312	299	376
7	220	220	220	255	497	440	502	57
8	416	416	416	529	160	173	160	170
9	172	172	172	125	193	194	162	166
10	161	161	161	176	208	223	128	239
11	205	205	205	201	25	125	125	125
12	149	149	149	143	118	25	25	26

Table 5.5 Number of EDs associated with each Local Labour Market regionalisation solution with a minimum self-containment value of 83%

	Number of Electoral Divisions per Labour Market Target Value – Minimum Value							
ID	**100 - 83**	**99-83**	**98-83**	**97-83**	**96-83**	**95-83**	**94-83**	**87-83**
1	822	822	822	840	931	1023	906	985
2	123	123	123	124	124	121	111	114
3	282	282	282	264	249	226	219	218
4	156	156	156	156	90	90	90	89
5	314	314	314	314	306	427	322	388
6	409	420	420	420	405	260	379	405
7	220	220	220	220	220	234	220	283
8	416	416	416	416	432	462	499	502
9	183	172	172	172	179	177	172	160
10	161	161	161	161	161	157	161	146
11	205	205	205	204	194	121	218	125
12	149	149	149	149	149	142	143	25

Though the number of EDs associated with very high target values are similar it is unsafe to assume that the same EDs are amalgamated into the same areas on a consistent basis. As the ERA compiles the results it assigns each functional area a unique identification number, starting at one. In most instances the same core groups of EDs are assigned the same identification number. However, as the target value is reduced it is clear that very different areas are created. This point is exemplified with reference to the group of areas assigned the identifier '12' in Table 5.5. The number of EDs assigned this identification number is relatively consistent across a range of target values until it falls to 87% whereupon only 25 EDs are assigned to this cohort. Clearly then, it is unsafe to assume that solutions recording the same number of EDs are spatially consistent.

5.5.2 Spatial Assessment of Different Functional Area Solutions

Following from this conclusion analysis was undertaken identifying the spatial structure associated with each of the different regionalisation solutions through mapping. Whilst facilitating comparisons between the scale of functional areas identified, this research also affords the opportunity to establish whether any of the 17 solutions accord with the perspectives of functional areas set out in the map of functional areas included in the *Indications* report (Figure 3.4, page 57) and / or those presented in the NSS. In order to guide the evaluation of the NSS, the spatial combinations of Gateways, Hubs and other towns outlined in Table 5.1, is used to determine if any of the 17 solutions reflects this spatial structure.

Rather than limit the analysis to a simple description of the spatial extent of the different regionalisation solutions, a number of indicators describing these spaces are also considered. These include:

- The number of workers living in each area
- The number of records with both origin and destination data present
- The number of jobs within each functional area
- The number of workers who both live and work within each area
- The supply-side self-containment value for each area
- The demand-side self-containment value for each area

These data provide a broad picture of the workforce associated with each area in terms of overall size and self-containment levels. Comparison of the number of workers in each area to the number of workers with origin and destination information gives an indication of the completeness of the data used to identify the functional areas. The data also provide an indication as to the extent to which individual areas meet the objective criteria in terms of target and minimum workforce and self-containment values.

A sequence of 17 maps was produced identifying the spatial extent of individual functional areas associated with the different combinations of self-containment values yielding 12 regions. Using the 'Dissolve' function within ArcGIS new shapefiles were created identifying the boundaries of individual functional areas. These maps are contained in Appendix 2. Additional details concerning the self-containment values associated with each solution are also provided, as is a table of indicators characterising each labour market area.

5.5.3 Functional Areas Defined in the Indications Report

Visual analysis was undertaken to establish whether, in the first instance, any of these areas reflected the perspective of functional spaces presented in the *Indications* (2001) report. The areas outlined in the *Functional Areas Map* (2001, p. 33) were compared to those associated with each of the 17 regionalisation solutions. A summary of the results of this assessment is provided in Table 5.6. It provides a visualisation of the presence or absence of a particular region identified in the *Indications* report *Functional Areas Map*. An 'x' indicates that, for a given solution, labelled S1 to S17, a region outlined in the Functional Areas map is missing, e.g. in S1 the South Eastern region is missing but in S17 it is present.

It is clear from Table 5.6 that none of the 17 solutions reflect the functional areas proposed within the *Indications* (2001) report. The primary issue is the absence of the South Midland region, the proposed area encompassing Portlaoise and Kilkenny, from any of the solutions. The South Eastern region, covering much of counties Waterford, Wexford and South Tipperary, also proved problematic as the ERA

identifies Wexford as an independent functional area in the majority of the 17 solutions. Overall, those solutions associated with lower target self-containment values resulted in the identification of areas that did not conform to the spaces suggested within the *Indications* (2001) report. The absence of the South Midlands regions in this analysis reflects the lack of significant interaction between the functional areas associated with the spaces encompassing Kilkenny and Portlaoise. It is unclear why this region was proposed by the SPU as no rationale is provided in the *Indications* (2001) report. A detailed analysis of interaction between spaces associated with towns in the Midland and South-East regions indicated that Portlaoise is orientated towards Dublin and has limited interaction with other towns in these regions (Meredith and Foley, 2008). This is also the conclusion of the NSS, which reports that Portlaoise associates with Dublin as a consequence of *"extensive commuter-based development"* (DoEHLG, 2002, p. 44). A contrary view was however presented in the *Indications* (2001) report, which proposed the subdivision of both the Midlands and Southeast regions.

Given the response of various stakeholders engaged in the development of the NSS, it is clear that cultural considerations regarding the introduction of functional regions did not receive sufficient recognition (Walsh, 2009, p. 111). In large part, Walsh (2009) attributes the rejection of the functional areas concept to the antipathy of regional authorities to the idea that there might be a possible redrawing of the boundaries to carve out the 'South Midland' functional area. Resistance to this idea was all the more potent in the absence of empirical data to suggest that such a functional area existed. It is apparent from the evaluation of the 2006 Place of Work data presented above that this spatial structure, at the regional scale, was very much aspirational.

Table 5.6 Functional Area Conformity Analysis: Indications Report

	S1 (Fig. 5A.1)	S2 (Fig. 5A.2)	S3 (Fig. 5A.3)	S4 (Fig. 5A.4)	S5 (Fig. 5A.5)	S6 (Fig. 5A.6)	S7 (Fig. 5A.7)	S8 (Fig. 5A.8)	S9 (Fig. 5A.9)	S10 (Fig. 5A.10)	S11 (Fig. 5A.11)	S12 (Fig. 5A.12)	S13 (Fig. 5A.13)	S14 (Fig. 5A.14)	S15 (Fig. 5A.15)	S16 (Fig. 5A.16)	S17 (Fig. 5A.17)
Eastern	✓	✓	✓	✓	✓	✓	✓	x	x	✓	✓	x	x	x	x	x	x
South Eastern	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	✓
Southern	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓	✓	✓	✓
South West	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x
Midwest	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	x	x	x	x	x
Western	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	x	x	x	x	x
North Western	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	x	x	✓	✓	✓
West Border	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	✓
North Border	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	x	x	x	x	x
East Border	✓	✓	✓	✓	✓	✓	✓	x	x	x	✓	✓	✓	✓	✓	✓	✓
North Midlands	✓	✓	✓	✓	✓	✓	✓	x	x	✓	✓	x	x	x	x	x	x
South Midlands	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

5.5.4 Functional Areas Defined in the National Spatial Strategy

Turning to the NSS, the sequence of 17 maps were assessed to establish whether, in the first instance, any of these regionalisation solutions reflect the perspective of functional spaces presented in the Strategy as described in Table 5.1. In contrast to the vision of functional areas offered in the *Indications* (2001) report, eight of the 17 maps do reflect the spatial structure proposed within the NSS. What is immediately obvious from the synopsis presented in Table 5.7 is the difference between those solutions associated with high and slightly lower self-containment values. Higher values result in regionalisation solutions that accord with the NSS's perspective of space whilst lower self-containment levels do not.

Eight combinations of different self-containment values do reflect the spatial structure set out in the NSS. It is evident that these are only associated with very high target self-containment values, in excess of 95% (Table 5.7 and Figure 5A.1 – 5A.8). In many respects the identification of this spatial division of Ireland is unsurprising given the number and distribution of centres classified as Gateways, Hubs and Other Towns. The list of towns classified as either Gateways or Hubs reflects the 18 largest urban centres in Ireland. The results of the accessibility and commuting analysis contained in the *Irish Rural Structure* (2000) report enabled the SPU to establish, roughly, the economic relationships between these centres and surrounding hinterlands. The functional areas identified in Figure 5A.1 – 5A.8 should not, however, be interpreted as the outer limits of commuting into the Gateway(s) or Hubs within these areas. As previously demonstrated, there are distinctive, smaller functional areas within these spaces organised around locally significant centres. Whilst this is true of all twelve spaces identified in this analysis, it is particularly true of the eastern or 'Dublin Gateway' region, which covers a significant proportion of the country and which contains a large number of sizable towns including Dundalk, Portlaoise, Carlow, Naas and Navan.

The boundaries of the six solutions with target values over 98% are largely stable at these levels with little difference in their spatial extent and hence economic structures and workforces. An assessment of the total number of workers resident in each of the functional areas establishes that there are no significant differences in the composition of the first six regionalisation solutions. These are all associated with minimum values of

Table 5.7 Summary of conformity analysis undertaken on 17 regionalisation solutions

	S1 (Fig. 5A.1)	S2 (Fig. 5A.2)	S3 (Fig. 5A.3)	S4 (Fig. 5A.4)	S5 (Fig. 5A.5)	S6 (Fig. 5A.6)	S7 (Fig. 5A.7)	S8 (Fig. 5A.8)	S9 (Fig. 5A.9)	S10 (Fig. 5A.10)	S11 (Fig. 5A.11)	S12 (Fig. 5A.12)	S13 (Fig. 5A.13)	S14 (Fig. 5A.14)	S15 (Fig. 5A.15)	S16 (Fig. 5A.16)	S17 (Fig. 5A.17)
Dublin, Dundalk	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wexford	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x
Waterford, Kilkenny	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cork, Mallow	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tralee - Killarney	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Limerick, Shannon, Ennis	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	x	x	x	x	x	x
Galway, Tuam	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Castlebar - Ballina	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sligo	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Letterkenny	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cavan, Monaghan	✓	✓	✓	✓	✓	✓	✓	x	x	x	✓	✓	✓	✓	✓	✓	✓
Athlone, Tullamore, Mullingar	✓	✓	✓	✓	✓	✓	✓	✓	x	✓	✓	x	x	x	x	x	x

either 83% or 84% and target values ranging between 98% – 100%. Once the target value is reduced to 97% however, some changes are evident in the composition of the areas identified. The expansion of the eastern functional area containing Dublin takes place at the expense of the 'Athlone, Tullamore and Mullingar Gateway' and the 'Waterford Gateway'. The absence of a strong focus in the Midland Region is particularly striking. Neither Athlone, Tullamore or Mullingar, individually nor collectively, provide strong support for the notion of a polycentric Gateway within this space.

Overall, however, these results indicate that there is some basis for the spatial perspective proffered in the NSS. The spatial extent of the functional areas that correspond to this perspective are such that they can be considered 'functional' in a limited sense only. Analysis of supply-side interaction, the percentage of workers living in each ED and working in a Gateway or Hub, demonstrates that significant proportions of workers do not work in the those places classified as either Gateway or Hubs (Figure 5.10). The number of EDs where a minimum of 50% of workers travel-to-work in a Gateway or Hub is limited and there are significant areas where less than 15% of workers do so. This suggests that the spaces associated with each of the 12 functional regions are reflective of extended city regions rather than the local labour market areas associated with individual towns or cities. In a comprehensive assessment of the spatial division of the island of Ireland into regions Horner (2000) provides a definition of city regions as *"devices of convenience for integrating information and portraying relationships that might otherwise be less readily understood."* (Horner, 2000, p. 136). The spatial vision proposed in the NSS clearly sets out to describe the implications and impacts of economic development arising as a consequence of the changing functional relationships between a select number of urban centres and their surrounding areas. Whilst each of these places has an effect on the functional organisation of travel-to-work patterns, the scale of impact varies considerably from place to place. It is evident from this analysis that a number of additional places, corresponding to either the Other Towns or, unidentified, Other Places, must play a key role in structuring Ireland's economic geography and understanding spatial patterns of local labour market segmentation.

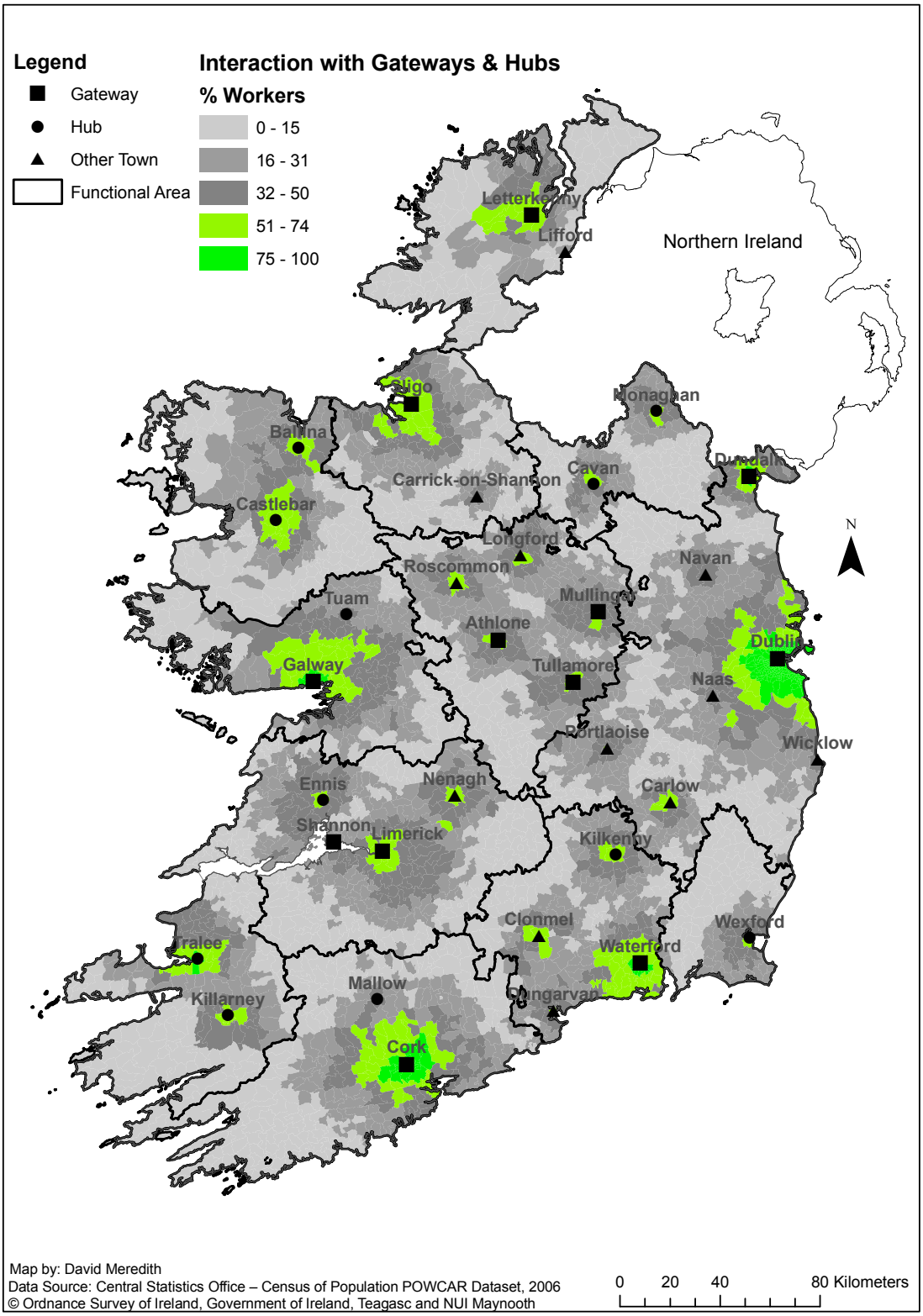


Figure 5.10 Proportion of workers living in each ED travelling to work in either a Gateway or Hub

5.6 Summary and Conclusions

In seeking to undertake a critical evaluation of the functional areas contained in the *Indications* (2001) report and outlined in the NSS, this Chapter provided an overview of the spatial perspectives underpinning the research supporting the development of the NSS. Much of the theoretical content of this research reflects a neo-classical (spatial science) view of economic geography and labour, namely that the location of, and accessibility to, economic activities in general and employment in particular is largely a function of the friction of distance and, more importantly, that this relationship is determined by the location of the workplace. Interestingly, though the theory associated with neo-classical perspectives of economic space was adopted within these reports, those methods commonly associated with these theories were rejected. In their place, approaches that recognise places and spaces as being socially and economically heterogeneous, were adopted as a means of identifying the 'fields' or hinterlands associated with towns and cities.

A new approach to the implementation of the ERA involving the systematic identification of a number of potential solutions was presented. This overcomes some of the key criticisms of functional regionalisation approaches by evaluating values for the minimum and target population and self-containment appropriate to Ireland. The approach contributes to the identification of several different functional area solutions. These results were evaluated to establish which, if either, reflected the spatial structure of functional regions proposed in the *Indications* and NSS reports. It was found that, on the basis of the evaluation of travel-to-work patterns, there was no evidence to support the view put forward in the *Indications* report that a functional region containing Portlaoise and Kilkenny existed within the context of 11 additional functional areas. The possibility that such a space could be identified at a higher spatial scale, i.e. in a functional solution with more than 12 regions, is not ruled out.

An evaluation of the travel-to-work data identifies solutions with 12 functional areas corresponding to those set out in the NSS. Assessing the spatial and economic structure of those solutions that reflect the view of the NSS demonstrates that they vary in their spatial extent and the number of workers, employment opportunities in

each region and levels of self-containment. These results establish that the functional areas proposed within the NSS reflect contemporary socio-economic processes, measures here in terms of travel-to-work. The analysis of interaction between EDs and Gateways and Hubs, however, raises a number of concerns. In the first instance the extent that these spaces can be considered 'functional' areas, given the relatively low levels of interaction between those places classified as Gateways and Hubs and their surrounding hinterlands, has to be considered. This conclusion highlights the potential importance of those 'Other Towns' identified within the NSS and also the rather ambiguously defined group of 'Other Places'. It is to these issues that the research now turns. Over the course of the next two chapters, the spatial structure associated with Gateways, Hubs, Other Towns and Other Places is identified and the extent to which the 'Atlantic Corridor' can be considered polycentric is evaluated.

Chapter 6 IDENTIFICATION AND EVALUATION OF LOCAL LABOUR MARKET AREAS IN IRELAND

6.1 Introduction

This chapter applies the European Regionalisation Algorithm to identify the spatial structure of local labour market areas that reflect the perspective of economic space organised around Gateway, Hubs, Other Towns and Other Places set out in the NSS. The research differs from that presented in Chapter Four as the focus shifts from the relatively small scale of functional areas to the large scale, and hence greater detail, of local labour market areas. A number of key research questions are addressed. These are divided between those concerned with the identification of local labour market areas and those evaluating the structure of these spaces. From an empirical perspective and in keeping with the thesis' concern with conceptualisations of space within the NSS, the first area of enquiry establishes whether places, in addition to those associated with Gateways, Hubs and Other Towns, emerge from an assessment of travel-to-work patterns. The resulting spatial framework is used throughout the chapter to evaluate the coherence of the local labour market areas identified. This framework is also used to pursue empirical considerations regarding the implications of the decision to exclude those records without place of work information from the ERA process.

6.2 The Spatial Structure of Local Labour Market Areas in Ireland

This research is novel within the Irish context as comprehensive spatial analysis identifying local labour markets has not been undertaken before. Work by Horner (1999) and Lennon and Keane (2006) identified travel-to-work boundaries around a small number of selected towns. These studies depended on an *a priori* identification of places, which subsequently formed the basis of their analyses. It was not feasible, given the data limitations at the time, for these authors to undertake more detailed analyses of the structure of these spaces. A number of authors have applied regionalisation techniques, using the POWSAR, in an attempt to define the boundaries of labour market areas associated with particular regions, i.e. Morgenroth (2005), or selected places, i.e. Walsh et al. (2005). The latter research analysed the POWSAR to identify travel-to-work areas (TTWAs) associated with those cities and

towns classified as Gateways and Hubs within the NSS. This research applied a manual regionalisation approach, wherein the places of interest, i.e. Gateways or Hubs, were identified *a priori*. Electoral Divisions were subsequently assigned to these places if a minimum 10% of the workers residing in the ED commuted to work within the Gateway or Hub. This reflects a supply side perspective of labour processes. The spaces that did not associate with either Gateways or Hubs were subsequently assigned to other towns that were, once again, selected *a priori*. Research has also been undertaken by the CSO using the POWCAR. Once more, *a priori* identification of places was central to the research. The 27 towns in Ireland with a population of greater than 5,000 persons in 2006 were profiled (CSO, 2009). The spatial unit of analysis used in this research comprised of the town and associated suburban area. A profile of workers employed within these 27 spaces was developed. No attempt was made to define the extent of those local labour market areas boundaries associated with these towns. It is also worth noting that where place of work datasets have been used the spatial interactions, in terms of flows to and from places, have not been taken into account. In all cases only supply side interaction was considered. A more recent contribution by Farmer (2011) utilised the POWCAR to evaluate the utility of a particular modelling technique to identify functional regions. The emphasis of the latter research was firmly on applying network-based analysis to the data rather than any attempt to utilise the results of the research to evaluate the NSS. Furthermore, whilst Farmer's research is highly innovative from a methodological standpoint, there is little consideration given to interpreting the results of the analysis vis-à-vis Ireland's economic spatial structure. The present research can therefore be considered novel as it is the first time that the place of work data are modelled with a view to identifying the spatial structure of labour markets in Ireland with reference to the NSS.

Rather than utilising the 12 functional areas identified in the preceding chapter a set of smaller geographical spaces or local labour markets are used in the analysis that follows. The emphasis on these spatial units is warranted as, in the first instance, the NSS views the matching of *"where people live with where they work"* as the primary means of delivering balanced and sustainable regional development. (DoEHLG, 2002, p. 10). This statement of purpose places the local labour market concept at the heart of the NSS. In addition, following resistance to the concept of

functional regions, the NSS developed a strategic spatial framework based on smaller scale geographical units and the functional interactions between them (See Chapter Three, page 57-58).

6.2.1 Identification of local labour market areas

Drawing on the analysis presented in Chapter Five, Table 5.1 (Page 105) there are 34 places classified as Gateways, Hubs and Other Towns. Each of these might be expected to form a key component of a local labour market area. In order to identify a solution that reflects the spatial structure of Gateways, Hubs and Other Towns outlined in the NSS, an analysis of the 1,176 regionalisation solutions with minimum and target self-containment values ranging from 50% to 100% was undertaken. In the first instance the 562 solutions with less than 34 functional areas were excluded. Systematic spatial analysis was then undertaken of the remaining solutions. Rather than incorporating every within group solution, i.e. the 31 combinations of self-containment values that yielded 34 functional areas, a preliminary evaluation of the spatial structure of solutions with the highest minimum self-containment values was undertaken. If one were to map every solution yielding 34 to 50 areas this would result in 450 individual maps. Focusing on the minimum self-containment value is justified given the finding in Chapter Five that varying this, rather than the target value, has a greater impact on the number of areas identified (Figure 5.5, Page 112).

An exploratory approach is necessary as the spatial structure of each solution is unknown. The selection of a solution yielding 34 travel-to-work-areas, with target and minimum self-containment values of 73 and 71 respectively and a population minimum and target of 6,500 and 25,000, results in the identification of a spatial structure where several of the Gateways, Hubs and, or Other Towns cluster within individual local labour market areas i.e. Dublin, Navan, Naas and Wicklow in one area and Carlow, Kilkenny and Portlaoise in another (Figure 6.1). It is also noteworthy that Shannon, part of the Limerick – Shannon Gateway, is located in the area containing Ennis. This spatial structure wherein Ennis and Shannon are grouped within a local labour market area, as will be seen, is a persistent feature.

One of the striking features of the map of travel-to-work patterns depicted in Figure 6.1 is the identification of a local labour market area containing Portlaoise, Kilkenny and Carlow. This spatial structure, one of the 34 local labour market areas, was rejected during the consultation phase by policy stakeholders as one of the 12 functional regions identified within the *Indications* report. This suggests that the analysis underpinning the identification of a functional space containing these places is valid. However, its emergence as part of a spatial structure containing 33 other functional areas indicates that this area is significant from a regional rather than a national perspective. It is also noteworthy that a large number of Other Places are identified. These are, with one exception, located along the west coast. The Inishowen peninsula in north Co. Donegal and the peninsulas in south-west Co. Cork and Co. Kerry form distinctive local labour market areas. In subsequent maps these areas emerge as distinctive spaces although there is some shifting of the boundaries between them. In many respects this is to be expected given the relative remoteness of these spaces from the Gateways, Hubs and Other Towns. The combination of topography, road infrastructure and urban structure within these areas, all of which are contingent, contributes to the expectation that distinctive local labour markets will be identified in these places. Perhaps more intriguing, and a point that will be considered in Chapter Eight, is the socio-economic composition of the groups within the workforce that live and work in these areas and of those that commute from these areas.

As the minimum self-containment value is reduced from 72 to 71 the number of local labour markets increases from 34 to 35. The area associated with Waterford and Dungarvan divides in two (Figure 6.2). The next iteration sees the emergence of an area containing Athlone and Tullamore whilst Mullingar is allocated to an area containing Longford (Figure 6.3). There is some rearrangement of the boundaries between local labour markets as evidenced by changes to the spatial structure of the Killarney and East and West Galway areas. The next two iterations, 37 and 38, see the break-up of the Portlaoise – Kilkenny – Carlow area with the emergence of separate spaces containing Carlow and a distinctive space between Wexford and Wicklow (Figure 6.4 and 6.5).

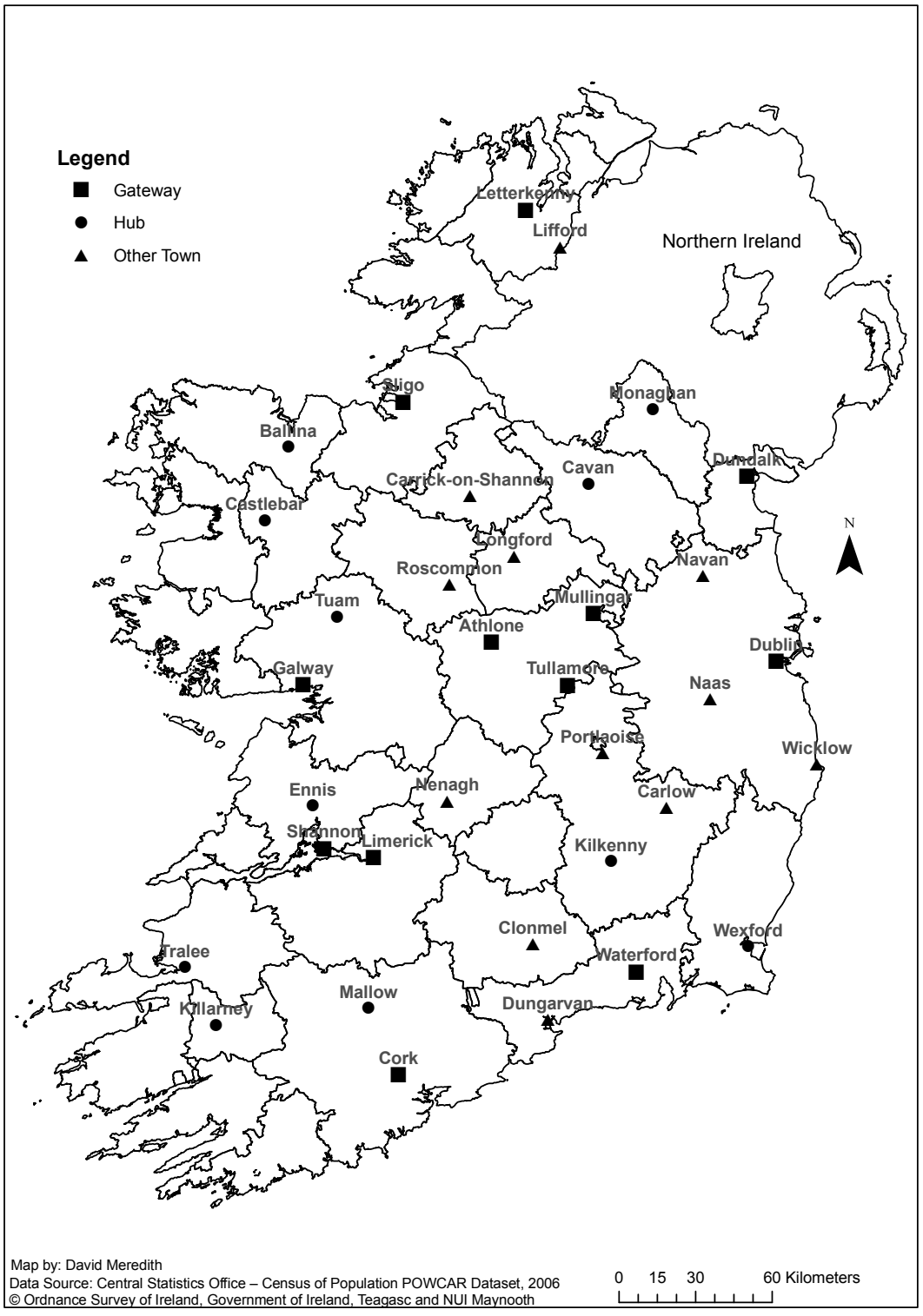


Figure 6.1 Spatial Structure of 34 Local Labour Market Areas

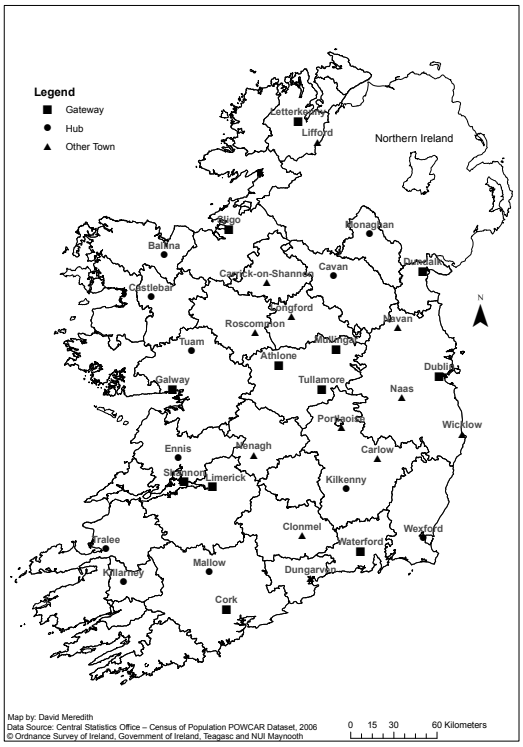


Figure 6.2 Spatial Structure of 35 Local Labour Market Areas

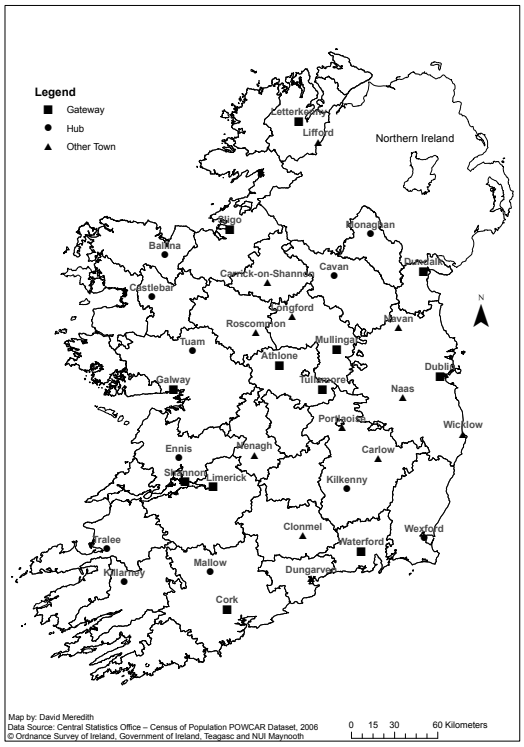


Figure 6.3 Spatial Structure of 36 Local Labour Market Areas

Once again, there are a number of changes in the boundaries of some of the areas, in one instance this sees the re-emergence of a space containing Athlone, Tullamore and Mullingar. The next iteration, 39 areas, sees a reversal of this development with Tullamore and Athlone grouped together within one area and Longford and Mullingar in another. It also sees the division of the area south west of Cork into two small local labour markets corresponding to functional spaces associated with the towns of Skibbereen and Clonakilty (Figure 6.6). It is worth noting at this stage that a number of 'Other Places' emerge from the analysis and, as will be demonstrated, remain consistent features i.e. the spaces between Nenagh and Tullamore and between Dublin and Wexford.

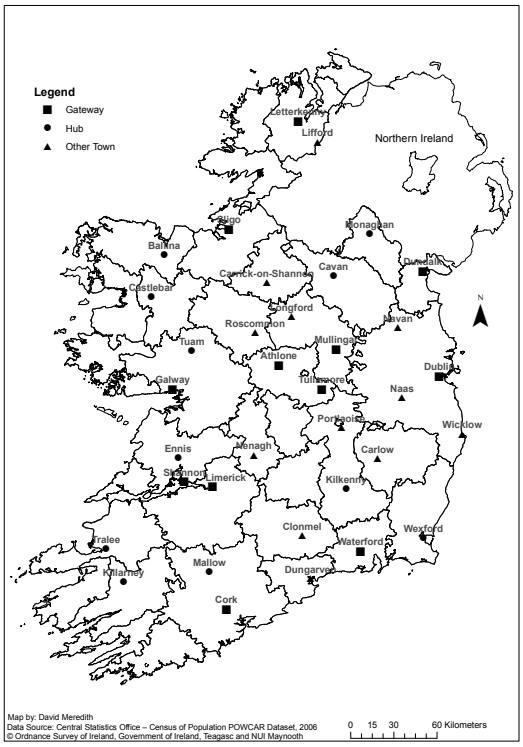


Figure 6.4 Spatial Structure of 37 Local Labour Market Areas

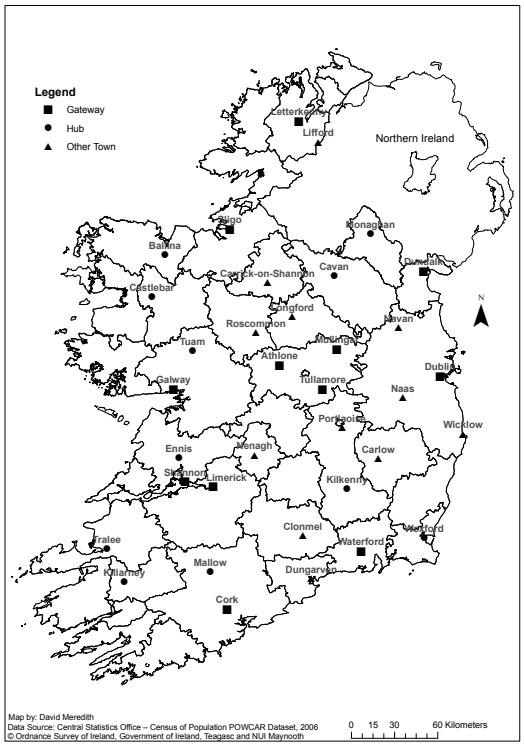


Figure 6.5 Spatial Structure of 38 Local Labour Market Areas

Increasing the number of areas to 40 results in Kilkenny, a Hub, being allocated to an individual functional area and the identification of a space between Limerick and Tralee (Figure 6.7). The amalgamation of Portlaoise into the eastern area containing Dublin, Naas, Navan and Wicklow, is a consequence, not of a decrease in the minimum self-containment value but, rather, an increase in the target value. It is this dynamic that underlies the aggregation and disaggregation of areas associated with Athlone, Tullamore, Mullingar and Longford evident in Figures 6.4 and 6.5.

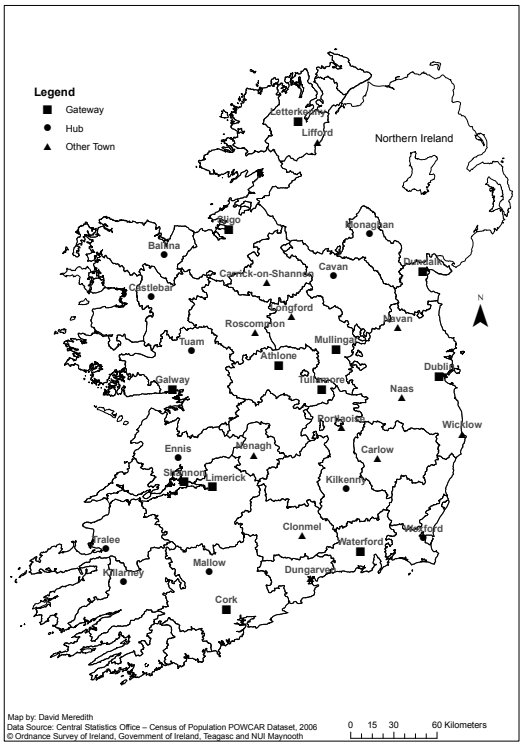


Figure 6.6 Spatial Structure of 39 Local Labour Market Areas

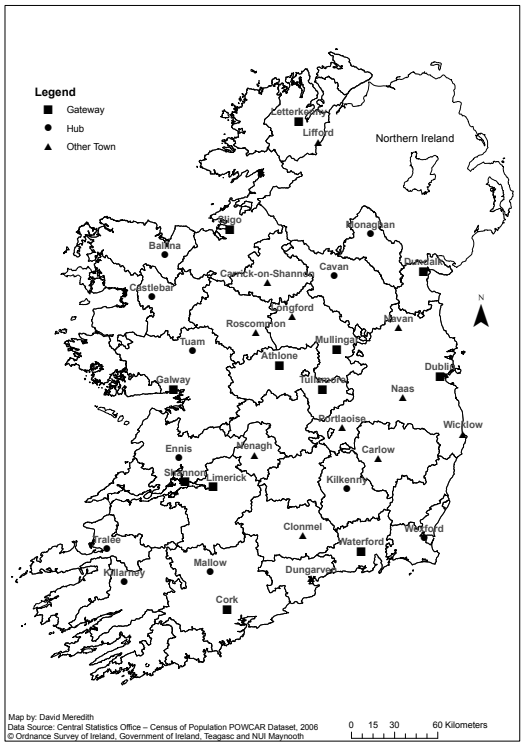
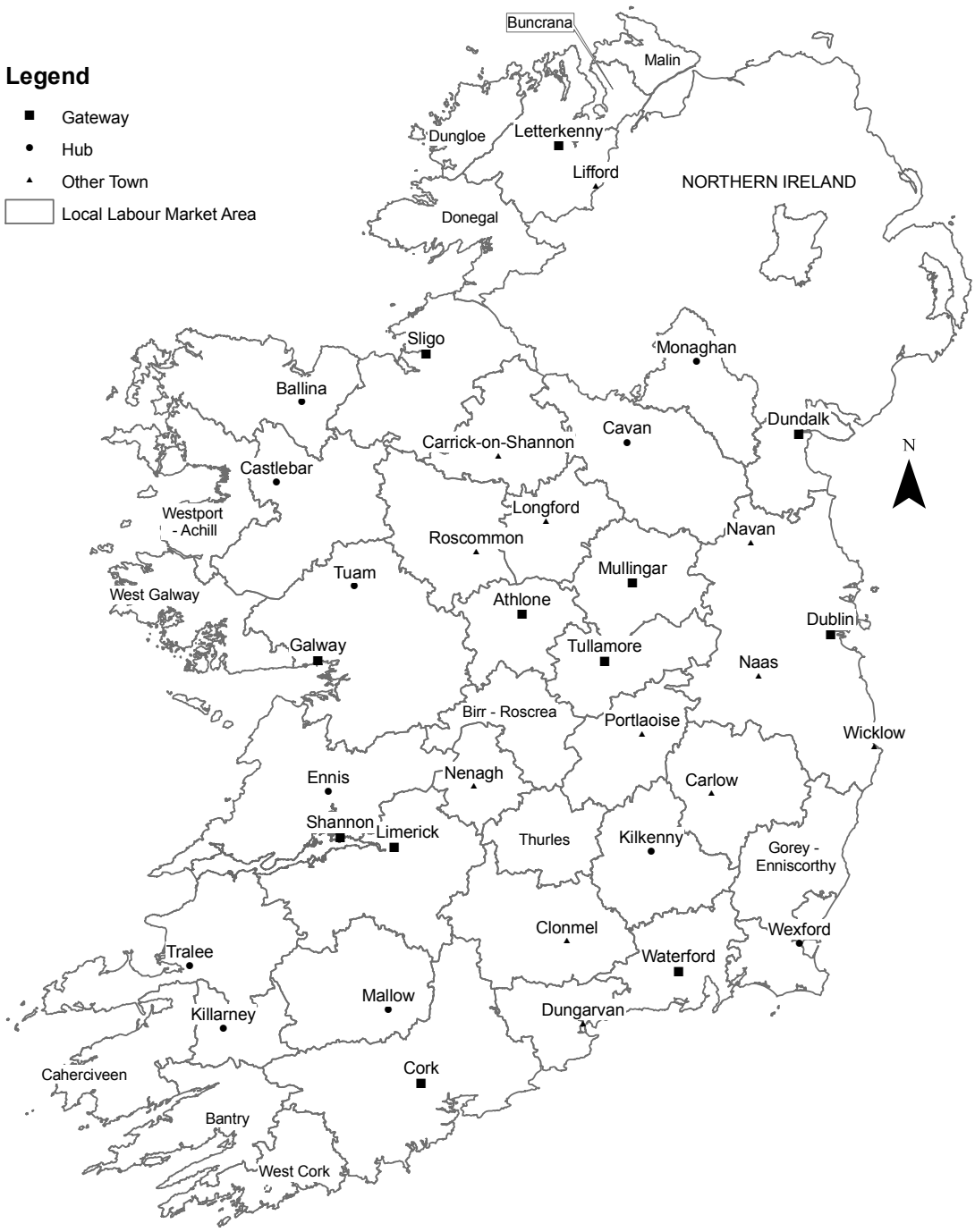


Figure 6.7 Spatial Structure of 40 Local Labour Market Areas

The reduction of the minimum self-containment value to 66 sees the identification of 41 functional areas. This is the first spatial structure that approximates the vision outlined in the NSS. With the exception of Dublin and Galway, each of the Gateway cities and towns are situated in individual spaces. Most of the Hubs and Other Towns are also located in discrete spaces (Figure 6.8). The 41 areas result from a combination of a minimum self-containment value of 66 and a target of 74. That these values are similar to those recommended by Bond and Coombes (2007) is noteworthy but entirely coincidental. It should, however, be borne in mind that the population criteria differ from those applied by Bond and Coombes (2007) (See page 91). On a cartographic note, no symbol is provided to denote 'Other Places'. The decision to do so is based on the frequently multi-nodal nature of these spaces including 'Gorey and Enniscorthy', 'Birr and Roscrea' and Clifden, Carraroe and Spiddal in 'West Galway'.



Map by: David Meredith
Data Source: Central Statistics Office – Census of Population POWCAR Dataset, 2006

0 20 40 80 Kilometers

Figure 6.8 Spatial Structure of 41 Local Labour Market Areas

6.2.2 Evaluating Local Labour Market Areas

As a point of departure, an analysis of the relationship between the size or geographic extent of local labour market areas and self-containment is warranted. Given the characteristics of the modifiable areal unit problem, wherein the grouping of, firstly, individual data into EDs and, subsequently EDs into local labour market areas produces aggregation or zonation effects (Fotheringham et al., 2000, p.28). The spatial extent of the areas selected for analysis will produce results specific to these areas. If a different regionalisation solution were selected, i.e. one with 42 local labour market areas, the analysis would generate different results. Further to this, the spatial extent of each area will influence, with respect to this study, the levels of self-containment. A number of researchers exploring the MAUP have noted the relationship between the geographic size of an area and the strength of relationships between variables (Amrhein, 1995, Green and Flowerdew, 1996). This has important implications as different labour market areas will have different levels of self-containment that may be explained with regard to their size.

Plotting the supply and demand self-containment values associated with the 41 local labour market areas, relative to their geographic size, confirms that larger local labour market areas tend to record higher levels of both supply and demand self-containment (Figure 6.9 and 6.10). A simple, and simplistic, Ordinary Least Squared Regression where the geographic size of an area is the independent variable and self-containment the dependent variables finds an R^2=0.4057 (*p=0.00*). This finding indicates that 40% of the variance in self-containment values are explained with reference to the geographic extent of the labour market areas. The obverse of this statement is arguably more important, that 60% of the self-containment level is not explained by the geographic size of a local labour market area. Closer inspection of the relationship between geographic extent and supply side self-containment establishes that 34.41% of variance in supply side self-containment may be explained by the size of local labour market areas. The equivalent figure for demand side self-containment is 35.91%.

It is clear from Figures 6.9 and 6.10 that there are a number of outliers in the data. These data points relate to the Dublin, Cork and Galway local labour market areas.

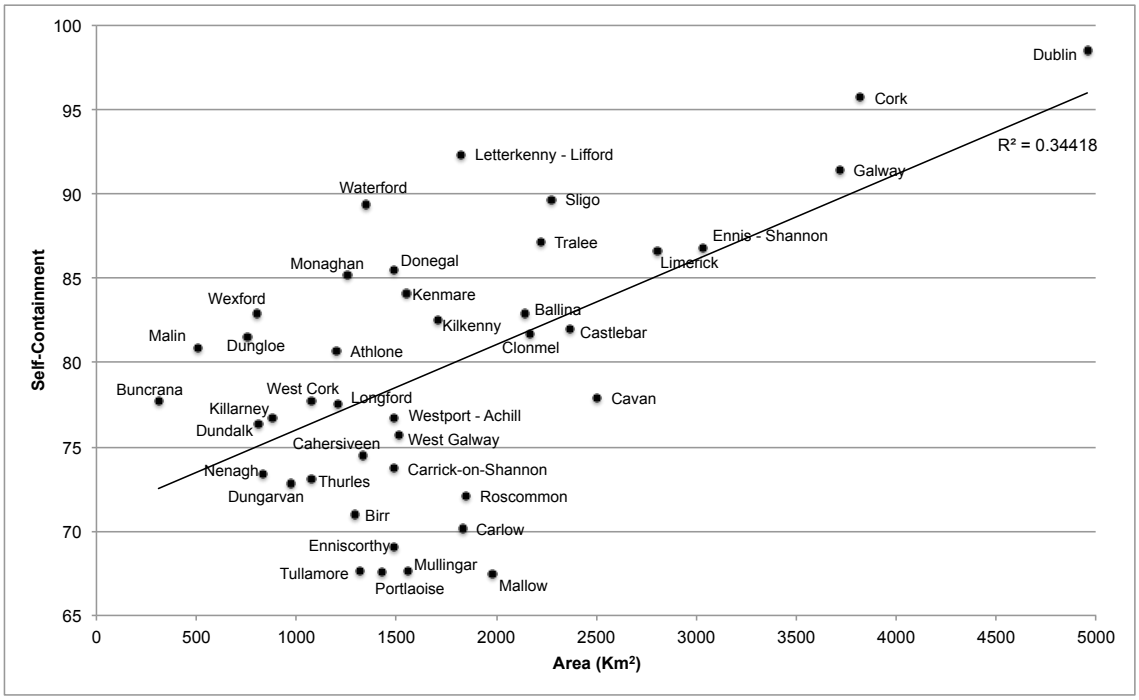


Figure 6.9 Relationship between supply side self-containment and the geographic size of local labour market areas

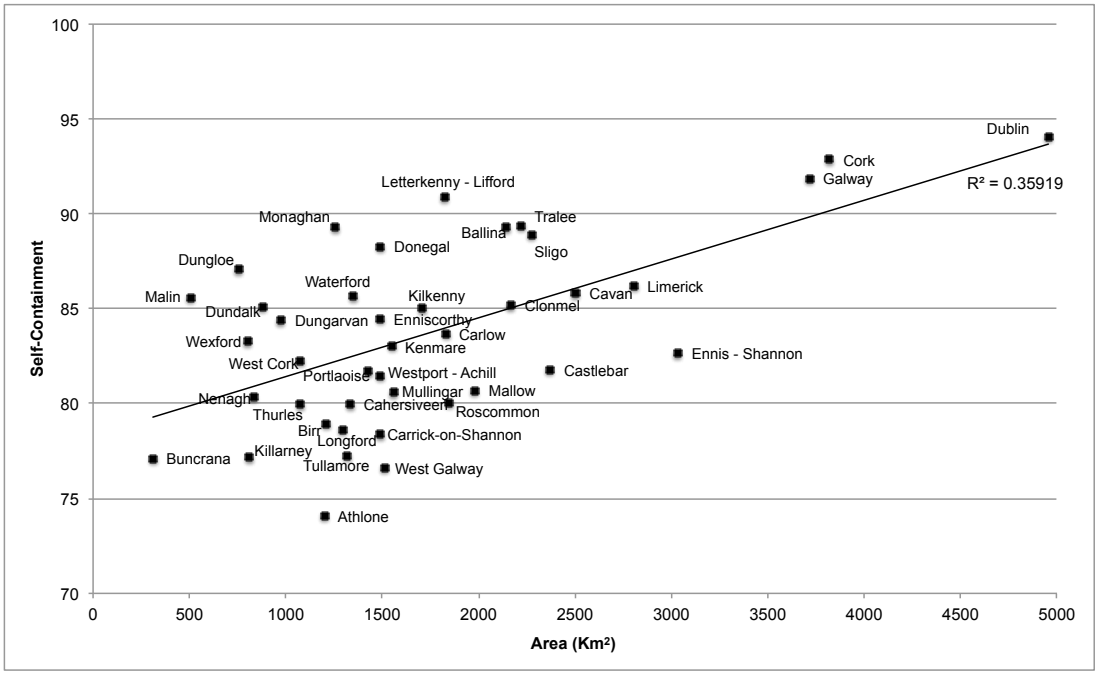


Figure 6.10 Relationship between demand side self-containment and the geographic size of local labour market areas

In each instance they record very high levels, above 90%, of self-containment. As these areas are related to some of the largest population centres in Ireland it is unsurprising to find that they also have spatially extensive local labour market areas.

Most people living in these areas also work in them and workers residing in these areas fill most jobs available in these areas. If these three labour market areas are removed from the analysis the explanatory power of the model collapses. Geographic area only explains 8.80% of variance in supply side self-containment and 11.23% of demand side self-containment. There is a large cloud of data points pertaining to local labour market areas where the relationship between self-containment and geographic area is much weaker. Overall then, whilst the level of self-containment recorded in each of the areas is related to their geographic size, this analysis clearly demonstrates that a range of other factors contribute to variance in self-containment values, particularly amongst smaller labour market areas.

Whilst the spatial structure in Figure 6.8 reflects the framework of places and spaces outlined in the NSS it also contains 12 additional spaces. These are largely located in peripheral and inaccessible areas along the west coast. There are however, two such spaces located between Portlaoise and Nenagh and a further space between Wicklow and Wexford. The presence of these areas suggests that a number of locally significant economies remain unidentified within the NSS; these are referred to here as 'Other Places'. If this is the case, it undermines the coherence of the Strategy as the dynamics of these spaces undoubtedly impact on the functioning of those areas classified as Gateways, Hubs and Other Towns. Before reaching this conclusion, however, it is worth evaluating the composition of these areas in terms of, firstly, self-containment and workforce criteria and, secondly the proportion of each areas' workforce that is excluded from the interaction analysis resulting in their identification.

Bond and Coombes (2007) establish a multi-step procedure evaluating local labour market areas identified using the ERA (Chapter Four, page 91). Each of the 41 labour markets were classified in accordance with these criteria and the results mapped (Figure 6.11 and Table 6.1). It is evident that most of the areas, 28 of the 41, have supply and demand self-containment in excess of 75% and hence are deemed valid local labour market areas. A further three record either supply or demand side self-containment of, at least, 75% and have workforces exceeding 25,000 persons. The supply and demand side self-containment values of the remaining 10 areas exceeds 67% whilst their workforces range in size from 8,561 to 24,891. None of the

areas fail to achieve the minimum self-containment or minimum population values. As a consequence, all 41 spaces are deemed valid local labour market areas.

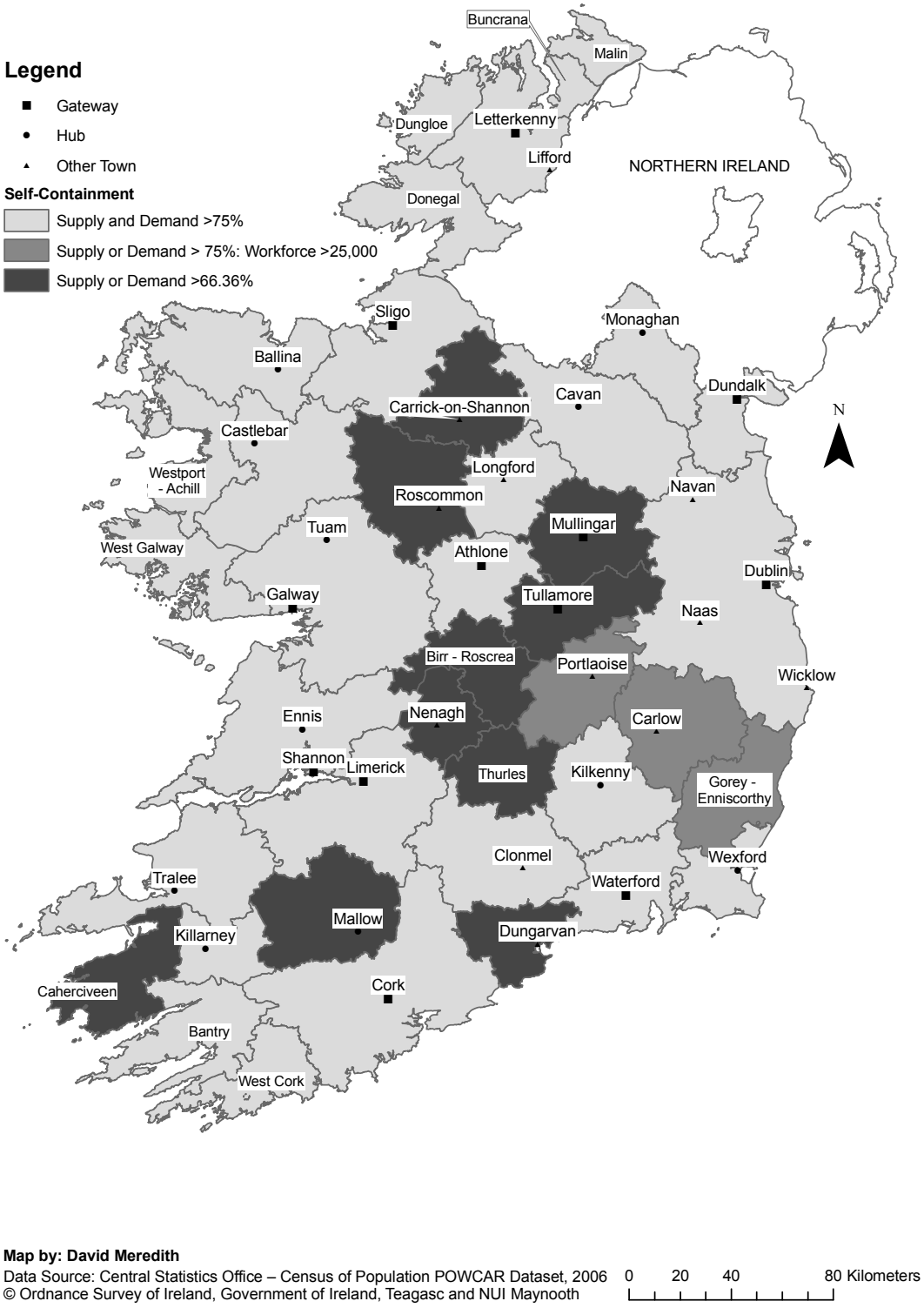


Figure 6.11 Spatial Evaluation of 41 Local Labour Market Areas

Table 6.1 Summary records associated with each local labour market area

	Total Workforce	Origin and Destination Data present	Destination Data Missing	Jobs in Area	Persons living and working in area
Dublin	739772	613718	126054	642873	604487
Dundalk	32205	25719	6486	23170	19724
Carlow	35758	27771	7987	23282	19484
Kilkenny	30387	24593	5794	23871	20293
Enniscorthy	31610	25108	6502	20520	17327
Waterford	45857	37265	8592	38888	33317
Cavan	36411	27717	8694	25157	21594
Mullingar	24742	19305	5437	16196	13052
Birr	12517	9836	2681	8882	6982
Tullamore	22692	17621	5071	15438	11927
Athlone	21911	17557	4354	19130	14167
Portlaoise	27232	21313	5919	17634	14406
Nenagh	10462	8247	2215	7527	6051
Wexford	22939	18679	4260	18601	15491
Ennis - Shannon	40532	31925	8607	33529	27718
Galway	83684	66872	16812	66536	61134
Limerick	81074	67853	13221	68188	58764
Cork	163968	134447	29521	138614	128686
West Cork	13129	9935	3194	9390	7726
Mallow	24891	19682	5209	16450	13277
Kenmare	8344	5945	2399	6027	5003
Killarney	13957	11225	2732	11108	8572
Tralee	34896	26823	8073	26157	23374
Cahersiveen	8561	6058	2503	5642	4512
Clonmel	33005	26292	6713	25205	21478
Thurles	13904	11132	2772	10175	8134
Dungarvan	12558	10056	2502	8681	7327
West Galway	7672	5500	2172	5430	4161
Roscommon	16019	12003	4016	10819	8656
Castlebar	27363	21137	6226	21198	17334
Westport - Achill	8501	6314	2187	5947	4844
Carrick-on-Shannon	12176	9481	2695	8914	6989
Sligo	27606	22367	5239	22560	20060
Donegal	11643	8798	2845	8523	7525
Longford	14965	11285	3680	11086	8747
Ballina	15255	11634	3621	10807	9648
Buncrana	5655	3187	2468	3210	2476
Letterkenny - Lifford	25781	19713	6068	20034	18206
Dungloe	5295	4033	1262	3775	3287
Malin	5740	3305	2435	3124	2674
Monaghan	23803	18305	5498	17458	15596
Total	**1834472**	**1479756**	**354716**	**1479756**	**1324210**

Source: POWCAR. Author's calculations

Spatial assessment of the distribution of those areas that do not exceed both the supply and demand criteria highlights a distinctive pattern. The three areas that have workforces in excess of 25,000 persons and a supply or demand value, but not both, of at least 75% are located adjacent to the Dublin area. Closer consideration of these thresholds establishes that the areas associated with Portlaoise, Carlow and Gorey – Enniscorthy record relatively low supply-side self-containment values. In each instance 21% – 23% of the workforce with known places of work, commute to other areas. Chapter Eight explores in greater detail the interaction between areas but suffice to say at this stage that the Dublin labour market has an effect on the commuting patterns from these areas.

With regard to the remaining ten areas, each records supply and demand self-containment values less than 75% but in excess of 66.36%. These local labour markets are therefore not as cohesive as those others identified so far. The spatial distribution of these local labour market areas suggests that their location relative to other, larger labour markets may be one explanatory factor. This is particularly true for the Mullingar, Tullamore, Dungarvan and Mallow areas. Whilst the former two areas are located adjacent to the Dublin labour market area, the latter are, respectively, sandwiched between Waterford and Cork and Cork and Limerick local labour markets. Relative to the group of areas with higher, above 75% self containment values, greater proportions of labour commute from these areas resulting in lower supply side values. This pattern of commuting suggests a number of developments. In the first instance is the impact of counterurbanisation, defined as the growth of lower-order urban centres relative to high-order centres on settlement and, hence, commuting patterns. The combination of rapid population growth in the ten years prior to the Census of Population (2006), rapid growth in house prices, improved road infrastructure and greater personal mobility through increased car ownership contributed to the growth of population in smaller urban centres and rural areas (Champion and Hugo, 2003). The relative rapidity of this process combined with limited opportunities within these local labour markets, may explain why those who moved to the area travel-to-work in another labour market area. Whether this feature diminishes with time as they develop links into the local community remains to be seen. The remaining areas, Carrick-on-Shannon, Roscommon, Nenagh, Birr, Tipperary and Caherciveen are, with the exception of the latter area, located along a

north – south spine. Each is situated adjacent to, or accessible to, larger labour markets. It is likely that high levels of accessibility and labour mobility accounts for reduced self-containment values.

What is unclear is why demand side self containment is also relatively low within these ten local labour market areas. One possible explanation has its roots in the spatial mismatch hypothesis alluded to above. The rural studies literature points to spatial mismatches between the number of jobs and the resident population or, more specifically, between the type of employment available locally and the skills associated with the resident workforce, as the primary explanation as to how these patterns of interaction arise (Walsh, 2008). The mismatch hypothesis has a number of dimensions. In the literature concerning rural labour markets these primarily centre on processes of counterurbanisation and economic restructuring (Fuguitt, 1991, Hodge et al., 2002, Lindsay et al., 2003, Hodge and Monk, 2004, Sang et al., 2011). These processes give rise to instances where the types of jobs available locally do not match the skills of the workforce.

With regard to the labour markets under consideration it is likely that a combination of both process are at work. In each instance, these labour markets are characterised by the relatively small number of employment opportunities within them (Table 6.1). Industrial restructuring, particularly the decline of employment in the primary and manufacturing sectors, has reduced overall levels of employment within rural regions (Morgenroth, 2008). One clear example of this restructuring was the consolidation and subsequent demise of Ireland's sugar beet industry, which was concentrated around the towns of Tuam, Mallow, Carlow and Thurles. In response, it is possible that those groups of workers affected, have secured employment in other labour market areas, (a proposition predicated on assumptions of some workers' willingness to commute relatively long distances), retired from the labour force early, or became unemployed.

More recent developments have seen new industries locate within these areas. Employment opportunities associated with these industries require highly (or higher) skilled and educated labour. As many workers from the primary and manufacturing sectors do not have these qualities they are unable to secure employment locally

thereby necessitating relatively large inflows of labour from other areas (Hennessy and Rehman, 2008). This may well be the case in both Carrick-on-Shannon and Caherciveen, (west of Killarney in the Southwest), which are the locations for relatively large financial services companies. It is also possible that the labour attracted to these types of roles prefer living in larger urban centres with their greater range of social and cultural facilities and are prepared to commute longer distances to work from the larger places to more remote locations. Additional detailed, micro level analysis is required to assess if the spatial mismatch hypothesis applies to these areas. This research is not pursued within the context of this thesis.

An alternative analysis of the spatial patterns associated with those areas that do not surpass supply and demand-side thresholds of 75% is that the NSS classified too many places as Gateways, Hubs and Other Towns. The Strategy recognised that several areas had, prior to 2002, become increasingly integrated into the Dublin economy including Westmeath (Mullingar), Wexford (Gorey - Enniscorthy), Laois (Portlaoise), Louth (Dundalk) and Carlow (DoEHLG, 2002, p.28). With the exception of Dundalk, each of these areas fails to surpass one or other of the 75% objective criteria (Figure 6.9). Furthermore, in order to make the Atlantic Corridor structurally coherent a number of places were identified as 'strategic hubs' (DoEHLG, 2002, p.46). One of these, Mallow, located between Cork and Limerick cities, like those areas proximal to the Dublin area, fails to meet the more stringent test of objective criteria. The same issue arises for Dungarvan located between Cork and Waterford. In other cases, some Hubs and Other Towns are fully integrated within Gateway labour market areas at even 50% self-containment thresholds e.g. Naas and Navan within the Dublin area and Tuam within the Galway area. This assessment raises the question of what, if the NSS had not proposed such a large number of Gateways, Hubs and Other places, would the spatial structure associated with a more limited set of places look like? In answering this question it is worth bearing in mind the analysis presented in Figures 6.1 – 6.8. In most instances, the spatial structure of areas identified is relatively stable. There are, however, a number of spaces where this is not true. The space that experienced the most significant changes in the spatial structure of labour market areas is the Midland Region. Within several iterations of the analysis, the composition of labour markets in this area

changed. This may be related to the large number of workers for whom there is no place of work data.

6.2.3 Evaluating the spatial distribution of 'missing' data and the implications for the identification of local labour market areas

A more prosaic explanation for the pattern of low supply and demand side self-containment may relate to the uneven spatial distribution of records without place-of-work data. If large proportions of an area's workforce did not provide such data it is conceivable that this would result in a relatively small population having a disproportionate influence on the self-containment values. Analysis of data provided in Table 6.1 highlight that each of the ten areas with low self-containment values including, Mallow, Tullamore, Birr - Roscrea, Mullingar, Carrick-on-Shannon, Roscommon, Dungarvan, Thurles, Caherciveen and Nenagh contain a substantial proportion of the workforce for which there is no destination data. If it were possible to incorporate these data into the regionalisation analysis it is probable that the number and spatial structure of the areas would be different. It would also change the self-containment values reported for these areas. In order to explore this issue analysis was undertaken allocating the 1,834,472 POWCAR records to each of the local labour market areas on the basis of their residential location. Summary data quantifying the number of workers living in each of the 41 areas that reported no fixed place-of-work (Mobile), worked in Northern Ireland or Overseas or did not return any workplace information, was generated and mapped (Figure 6.12).

All areas, regardless of whether they are classified as Gateways, Hubs, Other Towns or Other Places, contain a proportion of workers for which there is no place-of-work. Whilst the average proportion of the population excluded from the spatial interaction analysis is 23.04% the levels recorded for individual local labour market areas areas range from roughly 16% to 44% of the total workforce. Mapping the data highlights a distinctive spatial pattern. Areas associated with Dublin, Cork, Limerick and Waterford cities, in addition to those labour market areas associated with Sligo, Kilkenny and Wexford record the lowest levels of missing data (Figure 6.12). At the other end of the distribution are areas where more than 25.75% of the total workforce is excluded from the regionalisation analysis. These spaces, including

Caherciveen and Kenmare in the southwest and Buncrana and Malin on the Inishowen peninsula in Co. Donegal, do not have large towns and record low levels of local jobs relative to the workforce residing within the labour market (Table 6.1). Overall, these spaces occur north of the line between Dundalk and Galway.

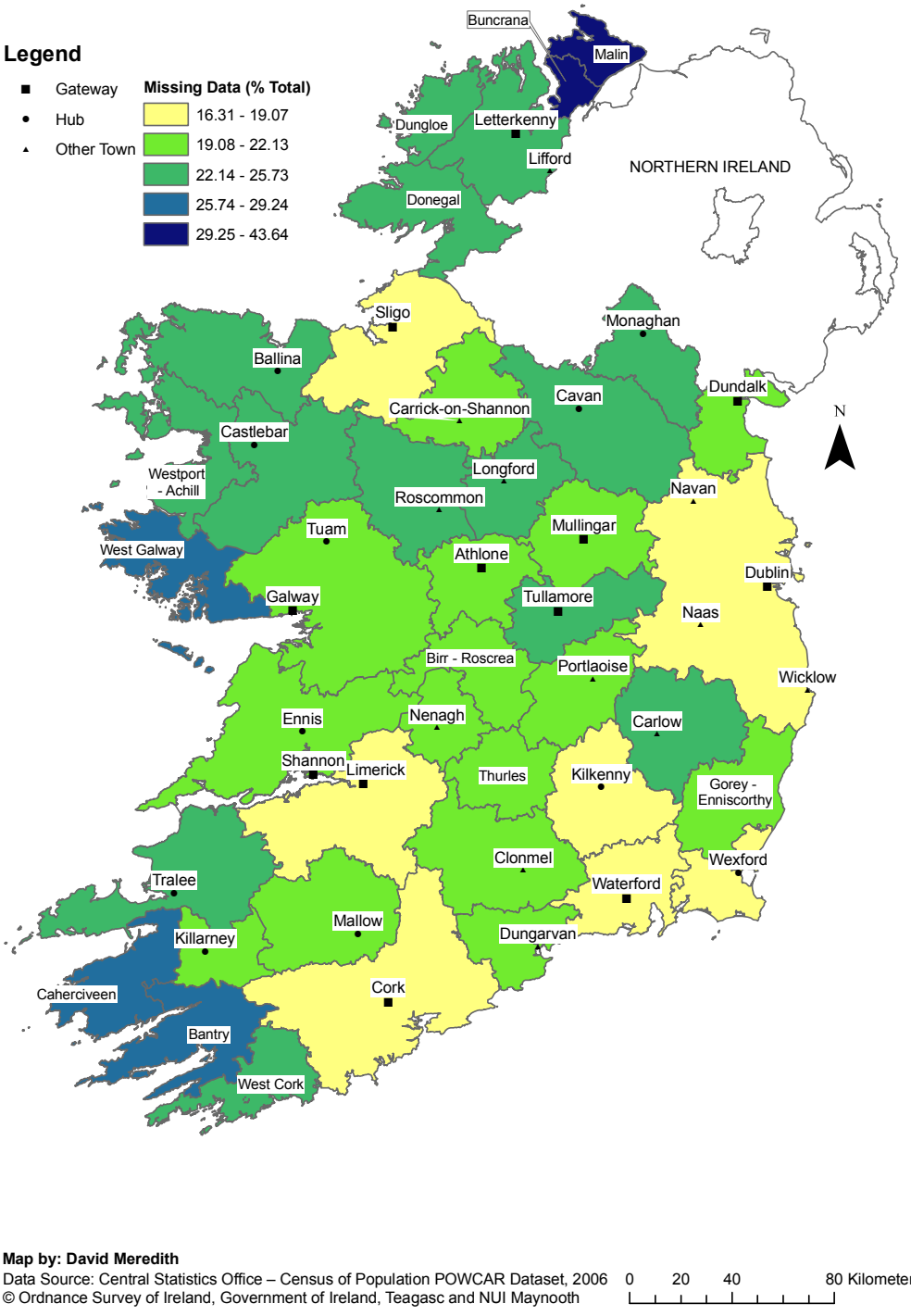


Figure 6.12 Distribution of POWCAR records without destination (Place of Work) data

It is apparent from this assessment that there is a relationship between location and the proportion of records that are classified as either 'Blank', 'Mobile' or working in Northern Ireland or Overseas. It is worth recalling that 'missing' in this context refers to the absence of the place-of-work variable rather than the absence of data. Considering these data in aggregate could result in misleading analyses i.e. concluding there is a significant relationship between the self-containment values and missing data. This point is exemplified by disaggregating the data into three distinct groups, those that did not provide any place-of-work data, those workers without a fixed place-of-work classified as mobile, and those working in Northern Ireland or Overseas.

6.2.3.1 Spatial assessment of 'missing' place-of-work records: Northern Ireland

Turning to those records with a place of work in Northern Ireland. These data, as outlined in Chapter Four, were excluded from the analysis identifying travel-to-work areas on the basis that the equivalent data showing interaction of workers living in Northern Ireland with workplaces in Ireland is unavailable. See Gleeson et al., (2008, p.122) for a more detailed discussion of cross-border data interoperability issues. Though the data were excluded from the analysis, local labour market areas adjoining the border with Northern Ireland can be expected to record larger number of workers classified as working in Northern Ireland or Overseas. Mapping these data confirms this assumptions (Figure 6.13).

A number of local labour markets within Co. Donegal, adjoining the border with Northern Ireland, namely Buncrana, Letterkenny – Lifford and Malin, contain relatively large numbers of workers travelling to work in Northern Ireland. That 8.26% of the total workforce, 3,073 workers, living in these areas commuted to work in Northern Ireland on a daily basis undermines Breathnach's contention that the identification of a linked Gateway comprising Letterkenny and Derry is 'rather hypothetical' (Breathnach, 2010, p. 1192). The area immediately adjoining Derry City, Buncrana, contains a large population, 20.43%, of the total workforce that travels to work in Northern Ireland (Figure 6.13). Had these data and their associated patterns of interaction been incorporated into the ERA for analysis they would have

reduced the self-containment value for this area. Against this, it should be realised that if these data were assigned a place of work within their respective labour markets it would have inflated the self-containment value. On this basis, the decision to exclude these data from the ERA was correct.

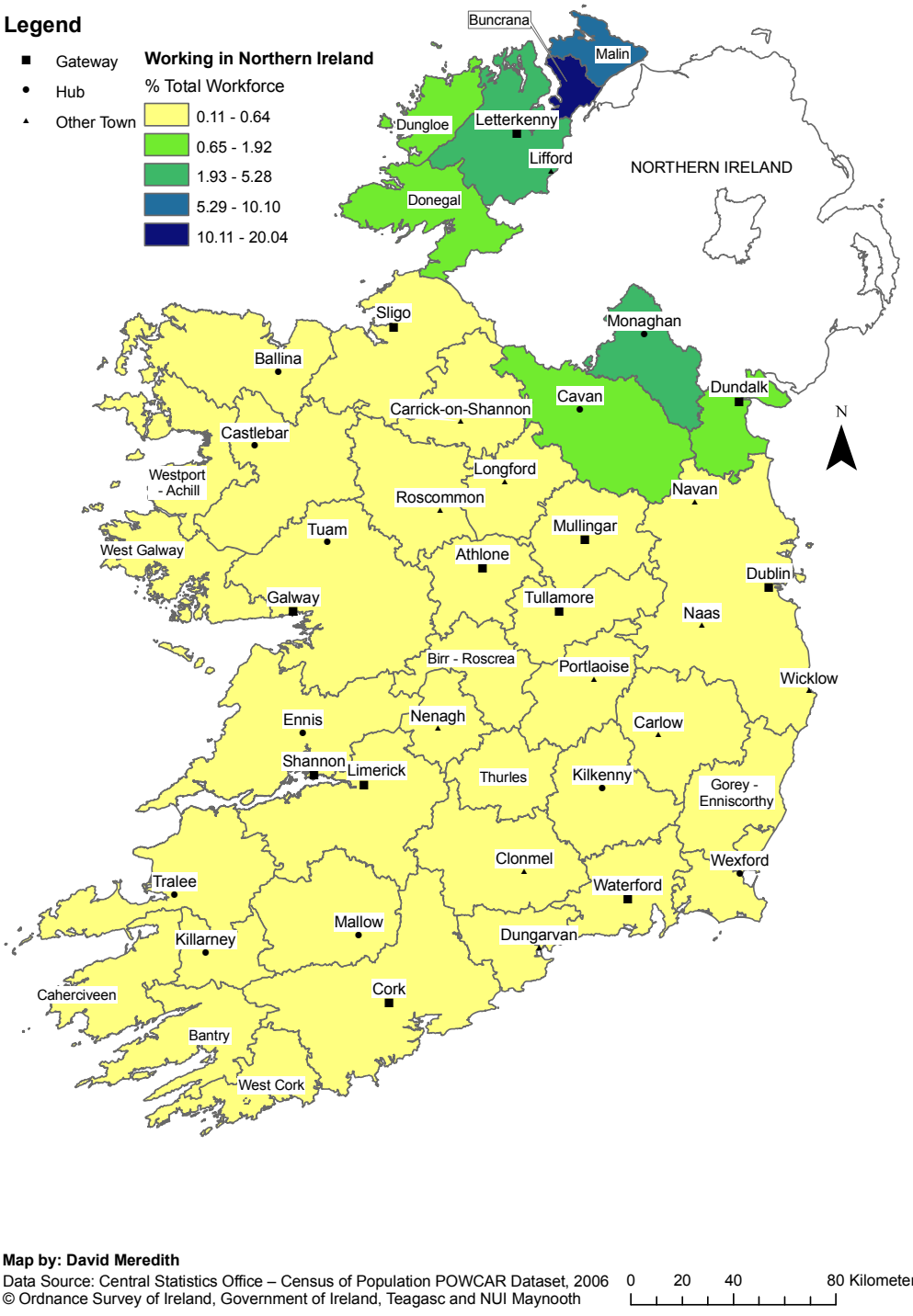


Figure 6.13 Distribution of POWCAR records with a workplace in Northern Ireland

6.2.3.2 Spatial assessment of 'missing' place-of-work records: Blank Records

Those workers that did not provide any details of their place-of-work account for roughly one third of the missing records within each of the 41 local labour market areas. On average, 7.61% of all records in each of the 41 areas are classified as Blank. Comparing between areas one finds a wide range of values, with the Wexford area having the lowest percentage of these records (3.78%) and the Longford area the highest (11.05%). An evaluation of the relationship between the supply side self-containment value and the proportion of records classified as Blank finds a weak, but not statistically significant relationship (*p=0.328*). Areas with higher levels of self-containment tend to have relatively low levels of Blank records. Conversely, labour markets with lower levels of self-containment tend to have higher proportions of blank records (Figure 6.14). Evidently there is a scale issue at work here. Evaluating the relationship with demand side self-containment finds a statistically significant, if very weak, relationship (*p=0.036*). These results suggest that a proportion of those who did not provide place of work information, work within the labour market where they live. The relative weakness of the relationship, however, suggests that this is not true with regard to all local labour market areas.

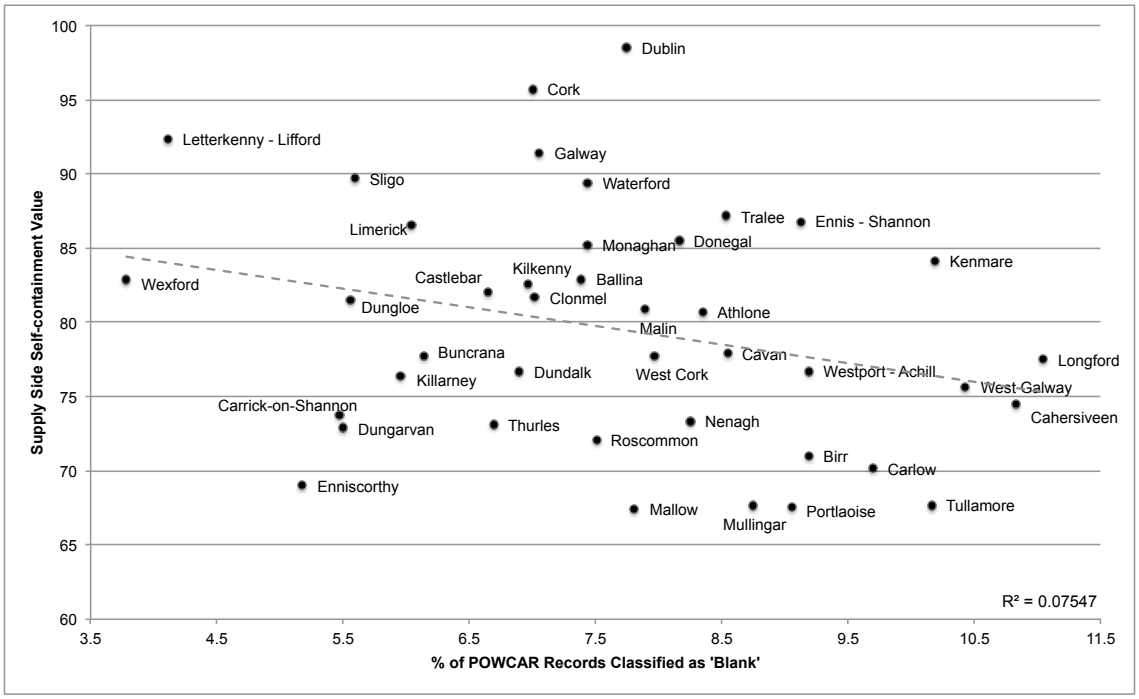


Figure 6.14 Relationship between Blank records and supply side self-containment

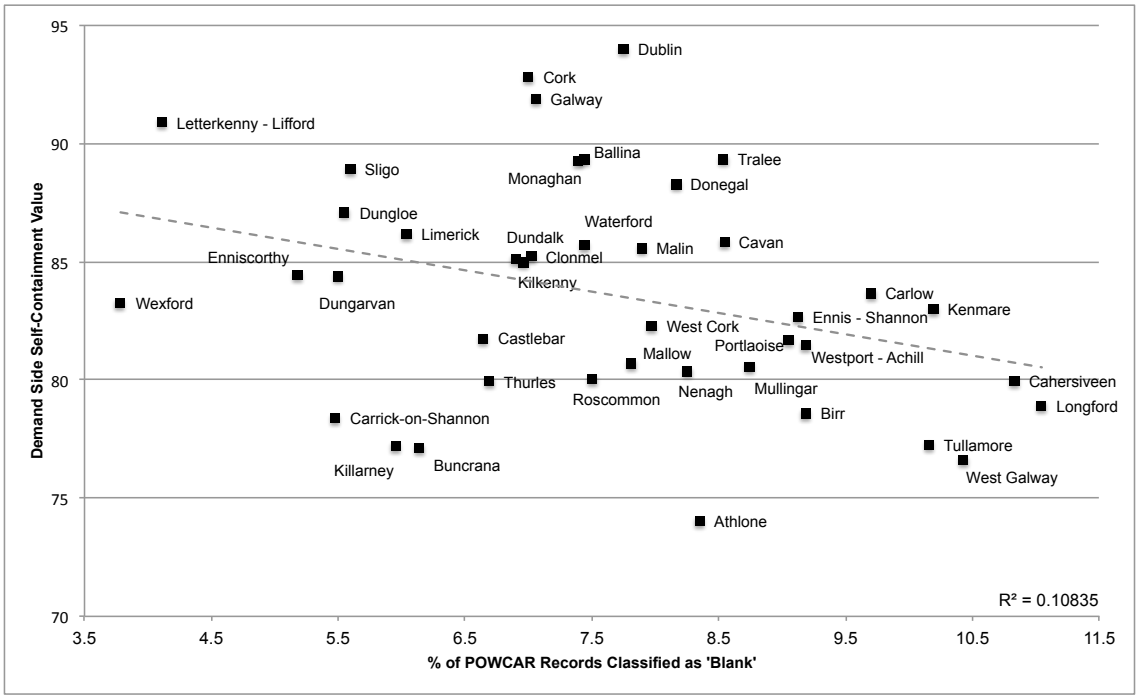


Figure 6.15 Relationship between Blank records and demand side self-containment

Mapping these data highlights a distinctive geography that helps to explain the results of the statistical analysis (Figure 6.16). In general, areas with the highest levels of Blank records are located proximal to larger labour market areas and, or along the west coast. This pattern suggests that, within some of the local labour market areas, a proportion of those who did not provide place-of-work information, commute to workplaces in other labour market areas. Though seemingly contradictory, the statistical and spatial analyses suggest something of a bimodal distribution within the 'Blank' records. There is a population that live and work locally and another population who commute outside of the labour market they live in to work. Spatial evaluation of these data indicates that these populations are not distributed randomly. It is possible to speculate that higher proportions of those living and working locally occur within the Dublin and Waterford local labour market areas, for example. Greater proportions of those with 'Blank' place of work data living in peripheral areas and proximal to larger labour market areas are likely to commute to these places to secure employment. Based on this assessment the decision to exclude 'Blank' place-of-work records from the analysis of spatial interaction was correct.

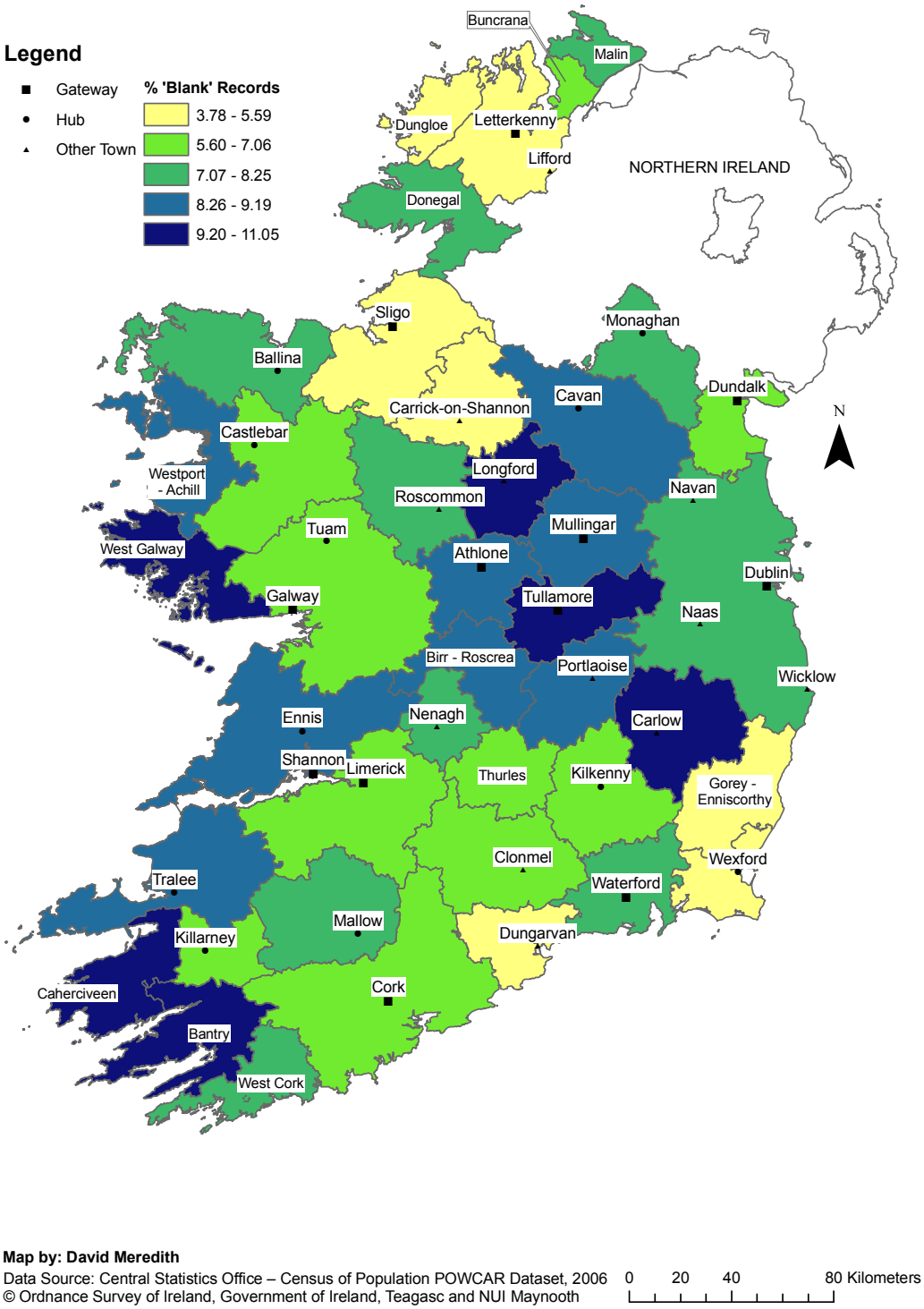


Figure 6.16 Distribution of POWCAR records classified as 'Blank'

6.2.3.3 Spatial assessment of 'missing' place-of-work records: Mobile Records

Workers classified as having no fixed place of work or 'Mobile', represent the largest proportion, 58.79%, of the data with missing workplace information. These data account for roughly a quarter of the missing records within each of the 41 local

labour market areas. Comparing between areas one finds a wide range of values, with the Dublin area having the lowest percentage of these records (9.09%) and the Malin area the highest (24.42%). The latter area is an outlier in the data. The next highest value is recorded in the Caherciveen area (18.31%). An evaluation of the relationship between both the supply side and demand side self-containment values and the proportion of records classified as Mobile finds a weak, but not statistically significant relationship, *p=0.217* and *p=0.245* respectively. If one were to remove the data point associated with the Malin local labour market area, which records a large proportion of missing data and a relatively high demand and supply self-containment value, the strength and directionality of the relationship increases; *p=0.10* with regard to supply side self-containment and *p=0.08* with regard to demand side self-containment. It is therefore possible to conclude that areas with higher levels of self-containment tend to have relatively low levels of Mobile records whilst labour markets with lower levels of self-containment have higher levels of Mobile records (Figure 6.17 and Figure 6.18).

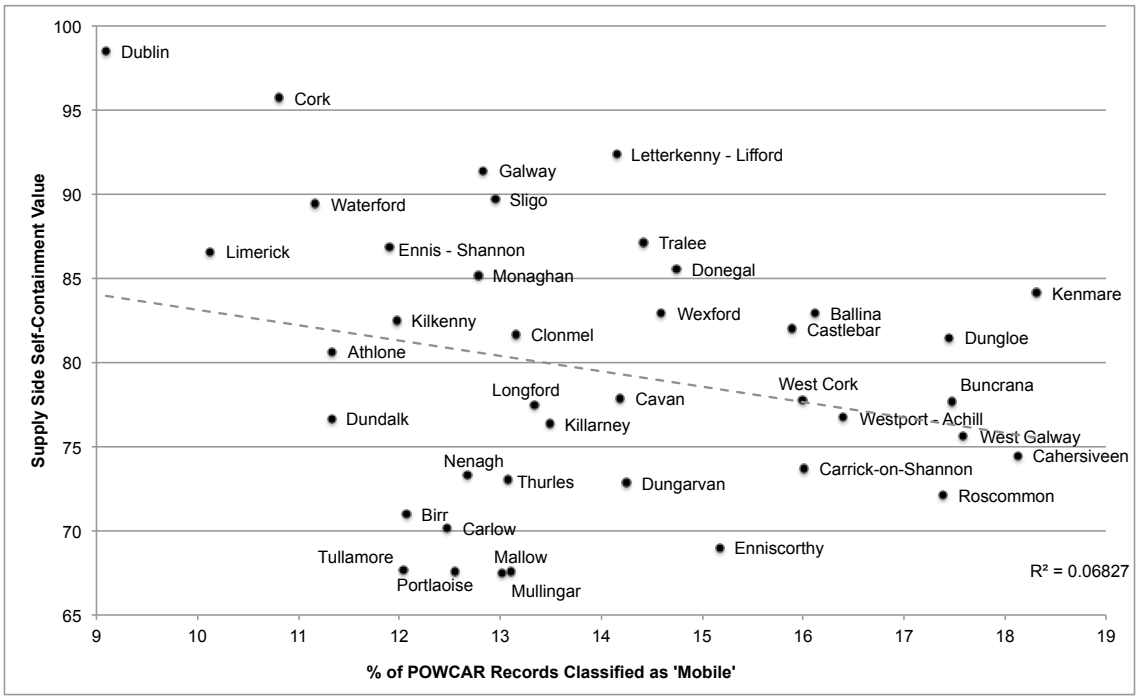


Figure 6.17 Relationship between Mobile records and supply side self-containment

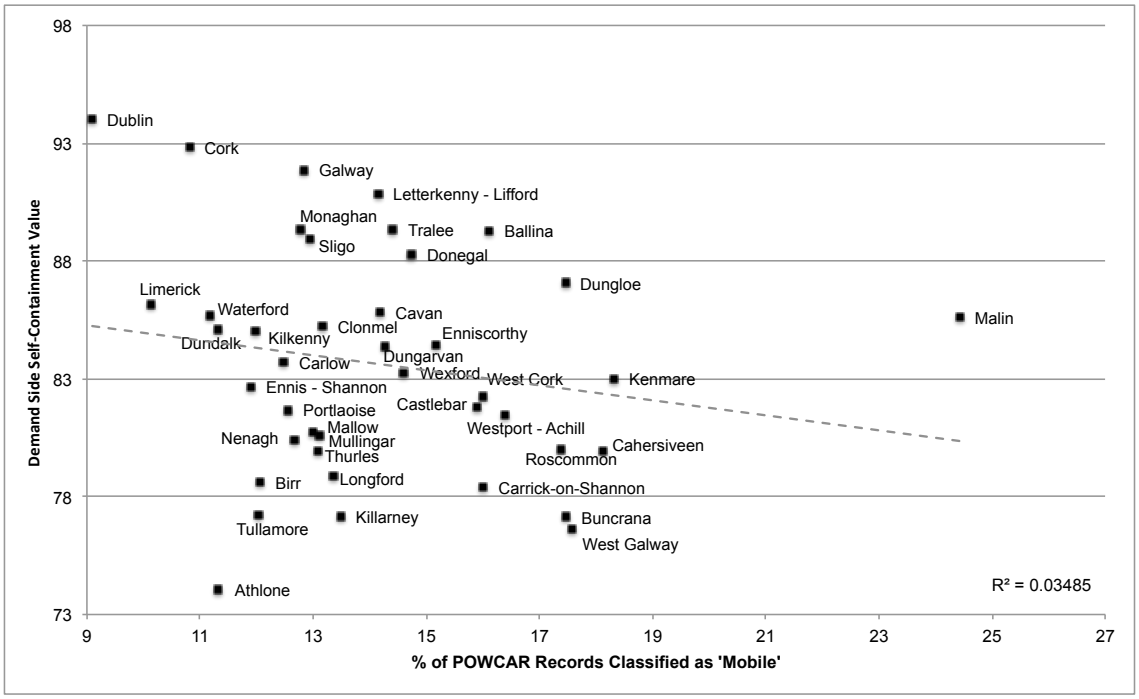


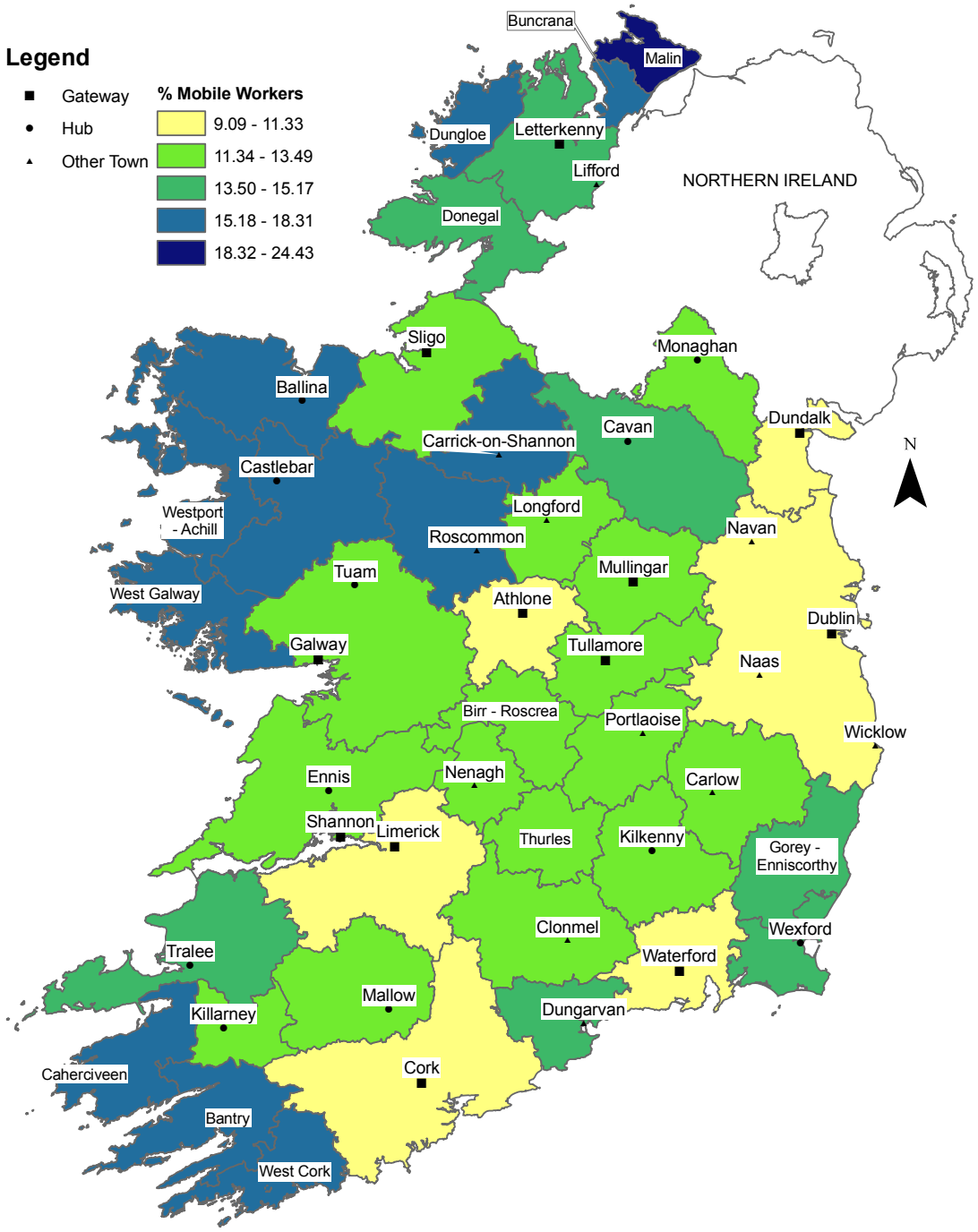
Figure 6.18 Relationship between Mobile records and demand side self-containment

Careful consideration of Figures 6.17 and 6.18 suggests a number of relatively distinct groups of local labour market areas, e.g. a cluster of areas extending from Mullingar to Kilkenny and westwards to the Clonmel and Nenagh labour markets that all record below average levels of Mobile workers and relatively high, >75%, demand side self-containment values. Mapping these data confirms this view. What is immediately apparent from this analysis is the identification of local labour markets in the west of Ireland with significant numbers of Mobile workers including, amongst others, Malin, Dungloe, Ballina, Castlebar, Carrick-on-Shannon and West Galway (Figure 6.19).

The spatial mismatch hypothesis is useful in understanding this pattern. Analysis of the POWCAR establishes that most of this population is male (Figure 6.20). Occupationally, the male 'Mobile' workforce is largely classified as either 'manual skilled' or 'semi-skilled' workers. An evaluation of the industrial profile of these workers finds that, with the exception of Donegal, Limerick and Dublin labour market areas, between 60% and 74% were employed in the construction industry (Figure 6.21). The high proportion of male, 'manual skilled' or 'semi-skilled' workers engaged in the construction sector classified as 'Mobile' suggests, in the

first instance, the absence of alternative employment for these individuals within their local labour market. This is, in all likelihood, a consequence of the decline of traditional male employment sectors, particularly primary sector activities. In support of this view the Teagasc National Farm Survey noted that the highest levels of part-time farming were recorded in the West Region incorporating those labour market areas of Ballina, Castlebar, Westport – Achill, Roscommon and Carrick-on-Shannon (Connolly et al., 2009). Research by Hennessy and Rehman (2008) established that most part-time farmers were engaged in 'manual skilled' and 'semi-skilled' occupations and highly concentrated within the construction industry. Crowley et al., (2008) document changing farm structures throughout this region during the 1990s in response to a series of EU policy reforms resulting in a reduction in the number of persons employed in agriculture and an increase in part-time farming. Unfortunately, there is little that can be deduced regarding the destination of these workers from the patterns depicted in Figure 6.19. It is possible that the higher levels of 'Mobile' workers recorded for a number of areas, e.g. Wexford, Gorey – Enniscorthy, Dungarvan, West Cork and West Galway are associated with travel-to-work to workplaces located in the labour market areas of the largest urban centres, e.g. Dublin, Cork and Galway.

It is worth noting that there may also be a scale issue, in terms of the size of the denominator, in evidence. The small percentages of 'Mobile' workers associated with labour markets containing large populations, i.e. Dublin, Waterford, Cork and Limerick point to this effect. The inclusion of Dundalk and Athlone in this group of areas, however, undermines this assessment and indicates that the patterns of travel-to-work depicted in these data reflect underlying socio-economic processes.



Map by: David Meredith

Data Source: Central Statistics Office – Census of Population POWCAR Dataset, 2006

0 20 40 80 Kilometers

Figure 6.19 Spatial distribution of Mobile workers

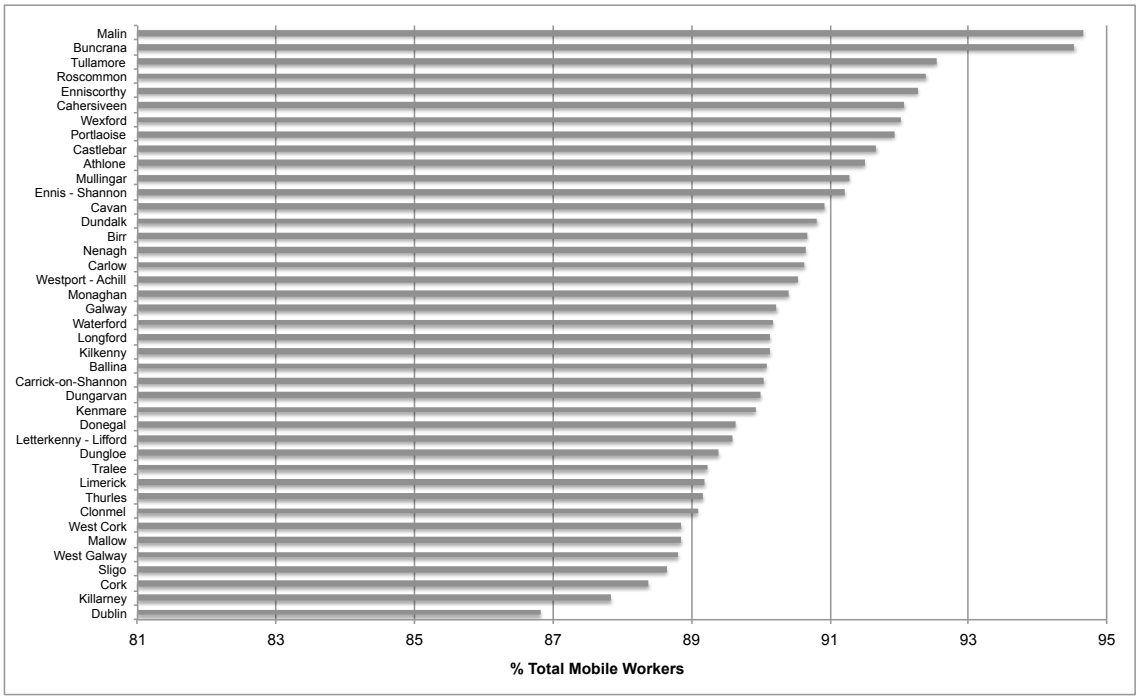


Figure 6.20 Males as a proportion of all Mobile Workers

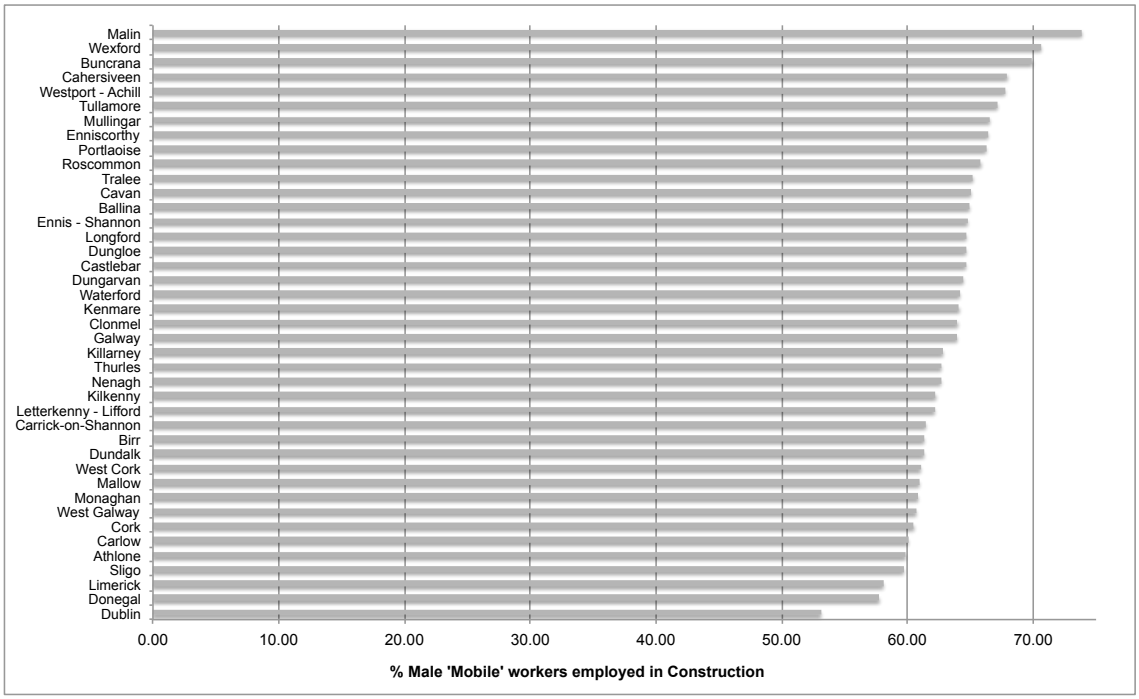


Figure 6.21 Proportion of male, mobile workers employed in the construction industry

6.2.4 Summary and Conclusions

This chapter sought to identify the spatial structure associated with Gateways, Hubs, Other Towns and their associated hinterlands as set out in the NSS. A regionalisation solution approximating this spatial vision, comprising 41 local labour market areas, was selected. This relatively large number of areas is related to the identification of 12 'Other Places', spaces that emerge as distinctive local labour markets within the context of the spatial structure outlined in the NSS. These spaces are largely located along the west coast in remote or inaccessible areas. Two 'Other Places' are, however, located in the space between Nenagh and Limerick corresponding to the hinterlands associated with Thurles and Birr - Roscrea in the Midwest region. There is a further labour market area between Dublin and Wexford containing Gorey and Enniscorthy towns. The presence of so many 'Other Places' along the west coast points to the limited engagement, within the NSS, with the economic geography of rural areas distant from, or inaccessible to, larger urban centres. The existence of these and three additional relatively small areas proximal to larger labour market areas emphasises the complexity of Ireland's economic geography. Whilst the labour market areas along the west coast can be understood in terms of distance from larger urban centres and their associated labour markets, the three other areas may reflect spaces where the traditional rural economy remains relatively strong. The local economies in these spaces may also be in the process of restructuring driven by enhanced local consumption arising from population growth, which is, in turn related to interaction with other labour markets.

The evaluation of the 41 labour market areas identified by this research establishes that they reflect the structure of local labour markets in Ireland and travel-to-work patterns in general. Whilst the level of self-containment recorded in each of the areas is partially related to their geographic size there is a large, unexplained residual. Whilst larger local labour market areas tend to record higher levels of both supply and demand self-containment the analysis of this relationship clearly demonstrates that a range of other factors contribute to variance in self-containment values.

Detailed analysis of that group of areas with self-containment values below 75% highlights the impact of concentrations of records without place-of-work data on

supply and demand side self-containment. That effects are observable, particularly in relation to demand side self-containment, indicates that some of the individuals comprising this group work within the local labour markets in which they live. Significantly, however, lower levels of self-containment are not fully explained by the distribution of records without place-of-work information. Spatial assessment of the data demonstrates the geographically variable nature of the distribution of these records. Proximity to the border with Northern Ireland and accessibility to larger labour markets clearly play a role in shaping travel-to-work patterns amongst cohorts of this population. Taken together, the analysis of self-containment and the proportion of records without place-of-work data, combined with the evaluation of the influence of scale of local labour markets areas, demonstrate that whilst these do have an effect there is a large residual that remains unexplained. This being so, other socio-economic factors play a role in influencing patterns of travel-to-work and self-containment.

The identification of local labour market areas by this research opens up new areas of study within Irish geography including comparative studies of local labour market areas. The next chapter develops such an analysis as a means of evaluating the polycentric 'Atlantic Corridor' proposed in the NSS.

Chapter 7 A COMPARATIVE EVALUATION THE CRITICAL MASS OF THE ATLANTIC CORRIDOR AND DUBLIN LABOUR MARKET AREAS

7.1 Introduction

Using the spatial structure of local labour market areas identified in Chapter Six, the research evaluates the level and composition of aggregate and core critical mass associated with the populations and labour forces living within the Dublin local labour market area and those that comprise the Atlantic Corridor. Aggregate critical mass is interpreted to be the overall population, labour, skills and workers living within each area. Core critical mass is defined as those economic activities and their associated workforces undertaken in places with the equivalent of 5,700 jobs per km^2. The guiding research question associated with the research reported in this chapter focuses on whether the critical mass of the Atlantic Corridor is equivalent to that of the Dublin labour market area? In addition, the research explores whether commuting between labour markets that comprise the Atlantic Corridor enhances its critical mass.

7.2 Comparative Evaluation of the Critical Mass of the Dublin and Atlantic Corridor Local Labour Market Areas

In Chapter Three a detailed overview of the National Spatial Strategy is provided (page 49 - 65). The concept of balanced regional development is discussed with reference to polycentricity. The implementation of this concept was developed within the Strategy through the proposition of a number of polycentric functional areas (page 61 - 65). The largest of these is the Atlantic Corridor, a *"broader corridor of cities spanning from Cork to Derry"* (DoEHLG, 2002, p. 149). Particular emphasis is given to the polycentric potential of the southern arc of the Atlantic Corridor, comprising cities and towns, and their associated hinterlands, stretching from Waterford, through Cork and Limerick to Galway. This assemblage is proposed on the grounds that there is evidence of economic interaction between these places and spaces which *"suggests future possibilities for combining the complementary*

strengths ... and expanding such interaction to achieve a critical mass strong enough to balance the type of critical mass that has been achieved by Dublin." (DoEHLG, 2002, p. 41).

This strategic spatial structure is proposed on the basis that, individually, none of the cities and towns within the Corridor are of a similar scale, in terms of their critical mass, to that of Dublin. The absence of scale is conceived of as the primary obstacle to sustainable economic growth within this region. Through integrated strategic development, however, it is proposed that a "*similar critical mass, based on the complementary attractions of cities that are relatively close to each other, is required to emulate the scale and critical mass of the Dublin area."* (DoEHLG, 2002, p. 45). Critical mass, another term from physics that has been adopted by the spatial science community and has made its way into strategic spatial planning frameworks, is defined as the concentration or density of "*population, skills, economic base, support services and infrastructure."* (DoEHLG, 2000a, p. 13). Those elements of critical mass pertaining to the population, skills and economic base are compared for the labour market areas associated with the Dublin and Atlantic Corridors. The objective of this analysis is to establish the relative scale of aggregate critical mass in these areas through an assessment of the size and composition of the populations, labour forces and scale of economic sectors in each area. Analysis then turns to identifying and evaluating the geographical distribution and economic structure of 'core critical mass' within the Dublin and Atlantic Corridors.

Critical mass, in this instance, is narrowly interpreted as the size of the population, the size and characteristics of the labour force and the economic structure or base in each area. A distinction is drawn between an area's aggregate critical mass and the mass of the 'core(s)' of each area. This is necessary given the emphasis within the NSS on the spatial concentration of critical mass. Theoretically, this reflects neo-Marshallian perspectives of (endogenous) economic growth that are codified within thinking regarding industrial districts. This latter concept underpins polycentricity, as reviewed in Chapter Three (page 47), namely that agglomeration of enterprises results in positive externalities or 'spillovers' that give rise to improved firm and local economy performance. In the first instance, the aggregate critical mass of the

Dublin and Atlantic Corridor areas is considered before engaging in an estimation of their 'core critical mass'.

7.2.1 Aggregate Critical Mass: Dublin and the Atlantic Corridor Areas

Establishing aggregate critical mass of the Dublin and Atlantic Corridor labour market areas introduces the broader context, in terms of the size and characteristics of the populations and economic activates, within which core critical mass can be considered. A number of key indicators are compared as a means of providing an overview of the size and composition of, in the first instance, those populations living in these areas. Attention then shifts to consider the scale and composition of the economic base associated with these populations and spaces. This approach is very much in line with conceptualisations of the geographies of labour wherein workers are a stock and the broader population the basis of consumption supporting economic activities.

The indicators used in this analysis are selected on the basis of the definition of critical mass offered in the *Indications* report (2001) and outlined above. These are grouped into three thematic areas; population, skills and economic base. The first two groups of indicators are drawn from the Census of Population (2006) whilst those pertaining to the economic structure of each area are taken from the POWCAR 2006. With regard to the population indicators, three key indicators are identified; total population, percentage share of the national population and the elderly dependency ratio. Data pertaining to skills are difficult to ascertain for the entire population. As a consequence, a number of indicators describing educational qualifications are presented including the proportion of population with low levels of education and higher-level educational qualifications. The number of persons holding a PhD qualification is also compared. Finally, the economic structure for each area is considered through an evaluation of the numbers of persons employed within the eight main industrial groups reported within the POWCAR.

7.2.2 Population

The total population of the Dublin labour market area is 52.80% greater than that of the Atlantic Corridor. Structurally there are more women than men within the Dublin labour market area whereas there are roughly similar numbers of males and females living with the area covered by the Atlantic Corridor (Table 7.1). Within the Corridor, the population ranges from 380,000 persons in the Cork labour market area to 30,000 in the adjacent space associated with Dungarvan. There are substantial differences in the distributions of the populations of both areas. Whilst 1,254,962, 77.62% of the total population, live in areas categorised as 'urban' within the Dublin Labour market area, the corresponding figure for the Atlantic Corridor is 343,901 (32.50%).

Table 7.1 Quantifying the critical mass of the Dublin and Atlantic Corridor areas: Population

	Male	Female	Population	Area (km^2)	Population Density (km^2)
Dublin	***798,539***	***818,171***	***1,616,710***	***4,955***	***326***
Galway	95,502	95,388	190,890	3,716	51
Ennis - Shannon	47,845	46,699	94,544	3,035	31
Limerick	97,235	96,310	193,545	2,805	69
Mallow	29,205	28,235	57,440	1,983	29
Cork	189,788	190,897	380,685	3,822	100
Dungarvan	15,517	15,272	30,789	978	31
Waterford	55,096	55,002	110,098	1,349	82
Atlantic Corridor	***530,188***	***527,803***	***1,057,991***	***17,688***	***60***

Source: CSO, Census of Population 2006 – Author's calculations

7.2.3 Demography

The stark differences in the size of the populations residing in the Dublin labour market area and within the Atlantic Corridor are apparent when one compares their demographic structures (Figures 7.1 and 7.2). Whilst the composition of these populations are broadly similar the population living within the Atlantic Corridor is slightly different to that of the Dublin area. The elderly dependency ratio is higher within the Atlantic Corridor, 16 persons per 100, compared to 14/100 in the Dublin area. This accounts for the higher percentage, 70.80%, of persons aged between 15

and 64, living in the latter labour market area. The equivalent figure for the Atlantic Corridor is 68.78%.

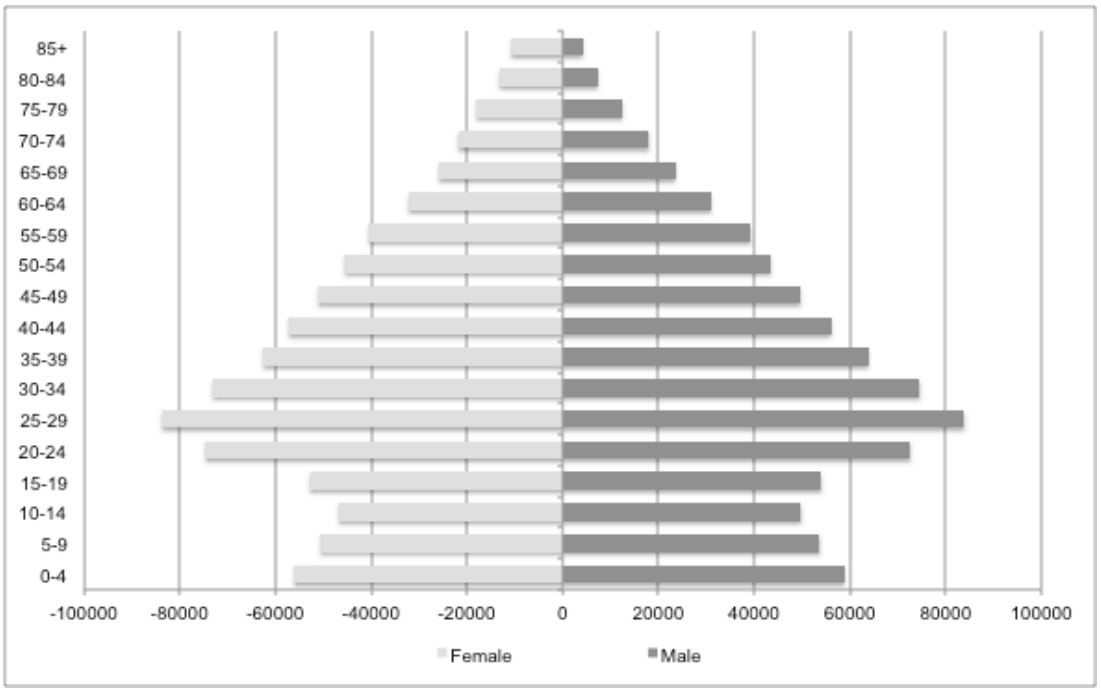


Figure 7.1 Demographic Structure of the Dublin Labour Market Area (2006)

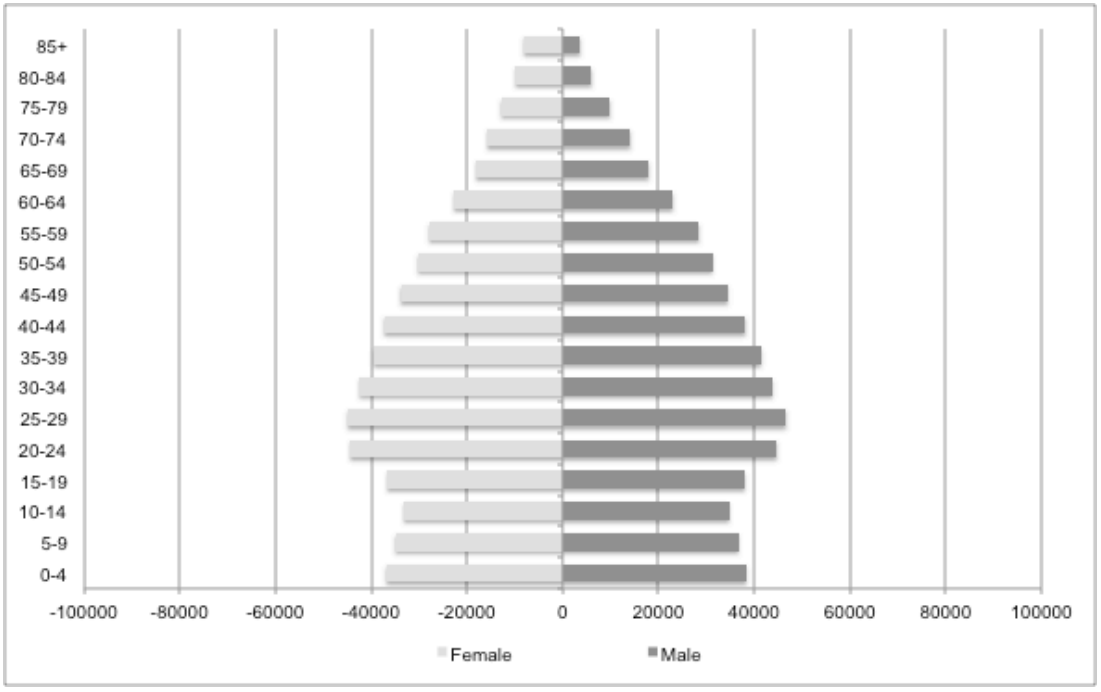


Figure 7.2 Demographic Structure of the Atlantic Corridor (2006)

7.2.4 Education

The population residing in the Dublin labour market area has, compared to the Atlantic Corridor, greater numbers of individuals with low levels of education (Table 7.2). Proportionally though, those with no formal education or primary schooling, represent 37% of each areas population. There is, however, a significant difference in the percentages of each area's population with 3rd level educational qualifications. Whilst 17.68% of the Dublin area's population has a degree of some form, only 12.75% of their counterparts in the Atlantic Corridor do. The latter figure is constrained by low, less than 9%, of the populations of Waterford, Dungarvan and Mallow holding a degree. It is notable, given the 65.44% difference in their overall populations, that the number of persons with a degree in the Atlantic Corridor is approximately half that of the population in the Dublin area. Expressing the number of degree holders per thousand population provides an indication of the scale of difference between the Dublin, 5.08/'000, and the Atlantic Corridor, 3.91/'000.

Table 7.2 Quantifying the critical mass of the Dublin and Atlantic Corridor areas: Education

	No Formal Education	Primary Only	Lower Secondary	Upper Secondary	Degree
Dublin	***5,833***	***159,828***	***185,096***	***31,248***	***82,072***
Galway	718	19,154	21,065	4,014	8,916
Ennis - Shannon	285	10,699	12,764	2,206	3,214
Limerick	722	21,224	27,190	3,758	7,331
Mallow	231	7,893	9,428	1,215	1,642
Cork	1,084	37,141	51,688	7,926	16,113
Dungarvan	137	4,040	4,805	849	898
Waterford	364	12,860	17,563	2,317	3,295
Atlantic Corridor	***3,541***	***113,011***	***144,503***	***22,285***	***41,409***

Source: CSO, Census of Population 2006 – Author's calculations

Looking at the population within each of the areas with a PhD one finds a similar pattern. The number of persons with a PhD in the Dublin area, 7,949, is roughly twice that of the Atlantic Corridor, 4,160. Expressed in terms of the number of PhDs per 1000 population, Dublin records 4.92/'000 whilst the Atlantic Corridor reports 3.93/'000. Clearly there are differences between these spaces but they are not as great as the aggregate numbers would suggest. It is important to note however that there is significant variation between the constituent labour markets within the

Atlantic Corridor (Figure 7.3). The figures for the number Ph.D.'s per thousand population in the Galway local labour market area exceed those of Dublin, whilst those of Cork are roughly similar to Dublin. Mallow, Dungarvan and Waterford all record relatively low levels.

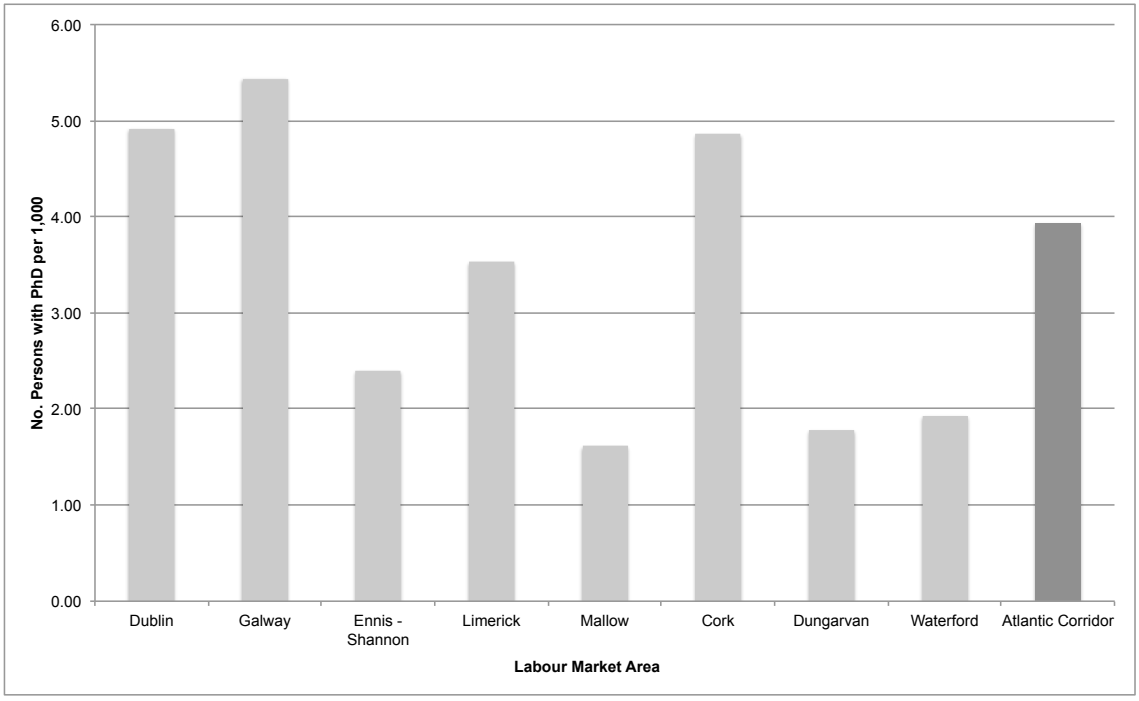


Figure 7.3 Number of persons with a PhD per 1000 population

7.2.5 Labour Force

The labour force is defined as that cohort of the population over 15 years of age classified as 'at work', unemployed or looking for their first job. Unsurprisingly, given the size of the population in the Dublin area, the labour force, 851,084 persons, is substantially, 64.41%, larger than that of the Atlantic Corridor (Table 7.3). This is a notable difference, particularly in light of the smaller difference in the total populations living in each area. The latter result reflects, as will be shown below, differences in labour force participation rates.

There are indications of structural differences in these populations i.e. differences in the numbers of persons classified as employed and unemployed and the proportion of women in the labour force. The overall labour force participation rate is greater in the Dublin area (65.41%) compared to the Atlantic Corridor (61.39%). This disparity

is reflected in higher labour force participation rates for both male and female workers living in the Dublin area. Per thousand persons over 15 years of age in the Dublin local labour market area, 599 are classified as 'At-work'. Within the Atlantic Corridor the equivalent figure is 564.

What is striking, however, are not those differences between the areas but rather the differences within the Atlantic Corridor. The percentage of the labour force that are unemployed ranges from a low of 5.34% (Mallow) to highs of 7.65% (Dungarvan) and 8.62% (Waterford). The national figure at this time was 7.11% and that of the Dublin area was 7.0%. The variance in the level of unemployment points towards differences in the size and composition of the economies of each of these areas and their associated labour market processes. It also points to spatial divisions of unemployed labour.

Table 7.3 Quantifying the critical mass of the Dublin and Atlantic Corridor areas: Labour Force

	Labour Force		Employed		Unemployed	
	Male	Female	Male	Female	Male	Female
Dublin	**473,980**	**377,104**	**432,392**	**347,334**	**35,065**	**24,515**
Galway	54,643	41,399	50,281	38,269	3,611	2,499
Ennis - Shannon	27,705	19,359	25,559	17,788	1,808	1,278
Limerick	53,930	39,308	49,069	36,023	4,090	2,704
Mallow	16,726	10,859	15,645	10,134	892	580
Cork	107,770	78,217	99,593	72,535	6,873	4,592
Dungarvan	8,552	5,858	7,757	5,380	698	405
Waterford	30,830	22,490	27,551	20,416	2,858	1,740
Atlantic Corridor	**300,156**	**217,490**	**275,455**	**200,545**	**20,830**	**13,798**

Source: CSO, Census of Population 2006 – Author's calculations

There is significant variation in the levels of participation recorded within the Atlantic Corridor. The lowest male participation rate, 69.66%, is recorded in the Limerick area. Interestingly, the adjoining labour market area, Ennis – Shannon, has the highest male participation rate, 73.51%. The figures for female participation are lower overall but particularly so in the Mallow and Dungarvan local labour market areas (Table 7.4). The latter areas, record the largest difference between male and

female participation rates suggesting that not only are employment opportunities limited overall but those jobs that are available tend to be filled by males.

Table 7.4 Quantifying the critical mass of the Dublin and Atlantic Corridor areas: Male and Female Labour Force Participation Rates

	Male	Female
Dublin	**74.50**	**56.71**
Galway	71.93	53.84
Ennis - Shannon	73.51	52.80
Limerick	69.66	50.72
Mallow	71.50	48.10
Cork	71.60	50.98
Dungarvan	70.41	48.38
Waterford	71.32	51.48
Atlantic Corridor	**71.40**	**51.43**

Source: CSO, Census of Population 2006 – Author's calculations

7.2.6 Employment Structure of Local Labour Market Areas

Analysis of the POWCAR, 2006 establishes that there are 648,873 jobs in the Dublin labour market area compared to 370,866 within the Atlantic Corridor. It was previously reported, (Table 7.3) that 779,726 and 476,000 persons in the Dublin and Atlantic Corridor areas, respectively, were 'At-work'. There are two primary reasons for the discrepancy the data reported above and in Table 7.3. Firstly, the labour force data refers to the population who live in the area that are employed. The POWCAR data reported here records the number of jobs located within the Dublin and Atlantic Corridor labour market areas, regardless of where the worker associated with each job lives. It is to be expected that a certain proportion of these individuals will travel-to-work from other labour market areas. Secondly, the number of jobs within each area is calculated using a subset of the POWCAR, namely those with a known place of work. It excludes those classified as Mobile and those that did not provide place of work information. Had these populations of workers been included the discrepancy between the At-work population and number of jobs in each area would be significantly reduced (Table 7.5).

Table 7.5 Dublin and Atlantic Corridor Areas: Structure of the POWCAR data

	Jobs	Mobile	Blank	Total
Dublin	642,873	67,278	57,312	767,463
Atlantic Corridor	370,886	51,663	32,024	454,573

Source: CSO, POWCAR, 2006 Author's calculations

Based on the assessment of the number of jobs within each of the areas under consideration it is apparent that there is a substantial difference in the 'mass' of the Dublin area compared to that of the Atlantic Corridor. It is not, however, all that surprising given the differences in the sizes of population and labour force outlined above. Attention now turns to considering the industrial structure of the economies of the Atlantic Corridor and Dublin local labour market areas.

Using the POWCAR data, it is possible to analyse the economic base of the Atlantic Corridor and compare it to that of the Dublin local labour market area. Applying location quotients, the composition of employment opportunities within each area is considered by way of identifying the economic structure of each local labour market. The location quotient technique has long been applied within both economic geography and econometric research concerned with the distribution of economic activities (Green and Owen, 1989, Keeble et al., 1991, Feser and Bergman, 2000, Baldwin et al., 2008). It was developed as a means of evaluating the distribution of economic activities over space or, as it is more commonly referred to, economic base analysis. Conventionally, location quotients are calculated to determine whether a regional economy has a greater share of selected industries compared to the national economy (Harrington and Warf, 1995, p. 73). This technique starts from an assumption that each industry is evenly distributed over space. By measuring the relative concentration of firms or employment associated with each industry within a region compared to the total size of the industry nationally, one can assess whether it is under or over represented. The location quotient is commonly expressed as:

$$\mathrm{LQ}i = \frac{(Eij/Ein)}{(Ej/En)}$$

where E is the number of persons employed and i, j and n represent industry, region and national, respectively (Cader et al., 2009, p. 137).

The output from this analysis is subject to rules based assessment. When the percentage of people employed within a particular industry within a region is equal to the national percentage of people employed in that industry a value of 1 is derived. Where a region's value is < 1 this is interpreted as below average or 'under represented' in terms of employment whilst > 1 represents above average or 'over representation' of the industry within the area compared to the national figure (O'Donoghue and Gleave, 2004, p. 421). Though crude and lacking statistical significance these measures are commonly employed in economic geography (Feser and Bergman, 2000, Suarez and Delgado, 2009). The popularity of the location quotient technique is associated with, according to Heanue (2008), its applicability at different geographic scales, the simplicity of the calculation and the use of a rules based approach to interpreting the results.

Within the body of geographic literature using location quotient analysis there are many examples of this technique being applied to functional regions, particularly travel-to-work areas (Coe, 1996, O'Donoghue, 2000, O'Donoghue and Townshend, 2005, Coombes et al., 2007, Chadwick et al., 2008). This approach to the identification of functional spaces followed by an evaluation of their employment or industrial structure using location quotients, has proven popular. In the first instance it builds on the potential of using functional areas, e.g. local labour markets, for economic analysis. From this starting point it is then possible to identify whether specific local labour markets are particularly dependent on a limited number of industrial activities.

The issue of denoting 'concentrations' of economic activities within regions using location quotients is something of a movable feast. Very high quotients are frequently interpreted as evidence of greater concentrations of employment in particular industries in specific locations. The problem with this approach is in the definition of 'high'. Coe (1996, p. 65 - 66) denotes values in excess of 2 to highlight concentrations of 'computer industry' employment whilst Coombes et al., (2007, p. 338) employ a value of 1.2, on the basis that it identifies those labour markets that

contain a share one fifth greater than expected, of migrants who moved from eight eastern European countries to the UK.

Recent development of location quotient analysis has seen the introduction of Standardised Location Quotients (O'Donoghue and Gleave, 2004) and, in a similar vein, the Location Quotient Confidence Interval (Moineddin et al., 2003). Other contributions to the development of this approach have seen greater use of statistical techniques to evaluate whether apparent geographic concentrations reflect economic processes or simply occur by chance (Guimarães et al., 2009). Whilst these contributions have the major advantage of producing results indicating the presence of statistically significant clusters of industrial employment they is not used here. The aim of this research is to profile the industrial structure of the Dublin local labour market area and those seven labour markets that comprise the Atlantic Corridor rather than identify statistically significant concentrations of particular types or groups of industry. The research fits with the NSS's emphasis on the 'mix' and 'clustering' of labour pools. It uses location quotients, as presented above, to describe the industrial structure of these labour market areas. The location quotients are mapped facilitating the development of a brief commentary on the spatial patterns associated with each of the major industrial groups.

7.2.6.1 Agriculture, Forestry and Fishing

The location quotient scores indicate that the Agriculture, Forestry and Fishing sectors are under represented in those labour markets associated with the three of the areas Dublin, Limerick and Cork. Within those areas corresponding to the labour markets of Waterford, Dungarvan, Mallow, Ennis-Shannon and Galway, agriculture is an important sector. To a degree this pattern is to be anticipated. Much of the land within the Atlantic Corridor, particularly between Waterford and Limerick, comprises well-drained, fertile soils and is the location of intensive farming. Agricultural structures are relatively strong with larger than average farm sizes and farms specialising in dairy and tillage products, the most profitable agriculture sectors in Ireland (Crowley et al., 2008). The presence of Waterford and Galway in this group reflects the continued importance of agriculture despite these areas being associated with large urban centres. Considering the wider pattern of agricultural

employment, it reflects the spatially ubiquitous nature of this sector, particularly outside of the main city regions.

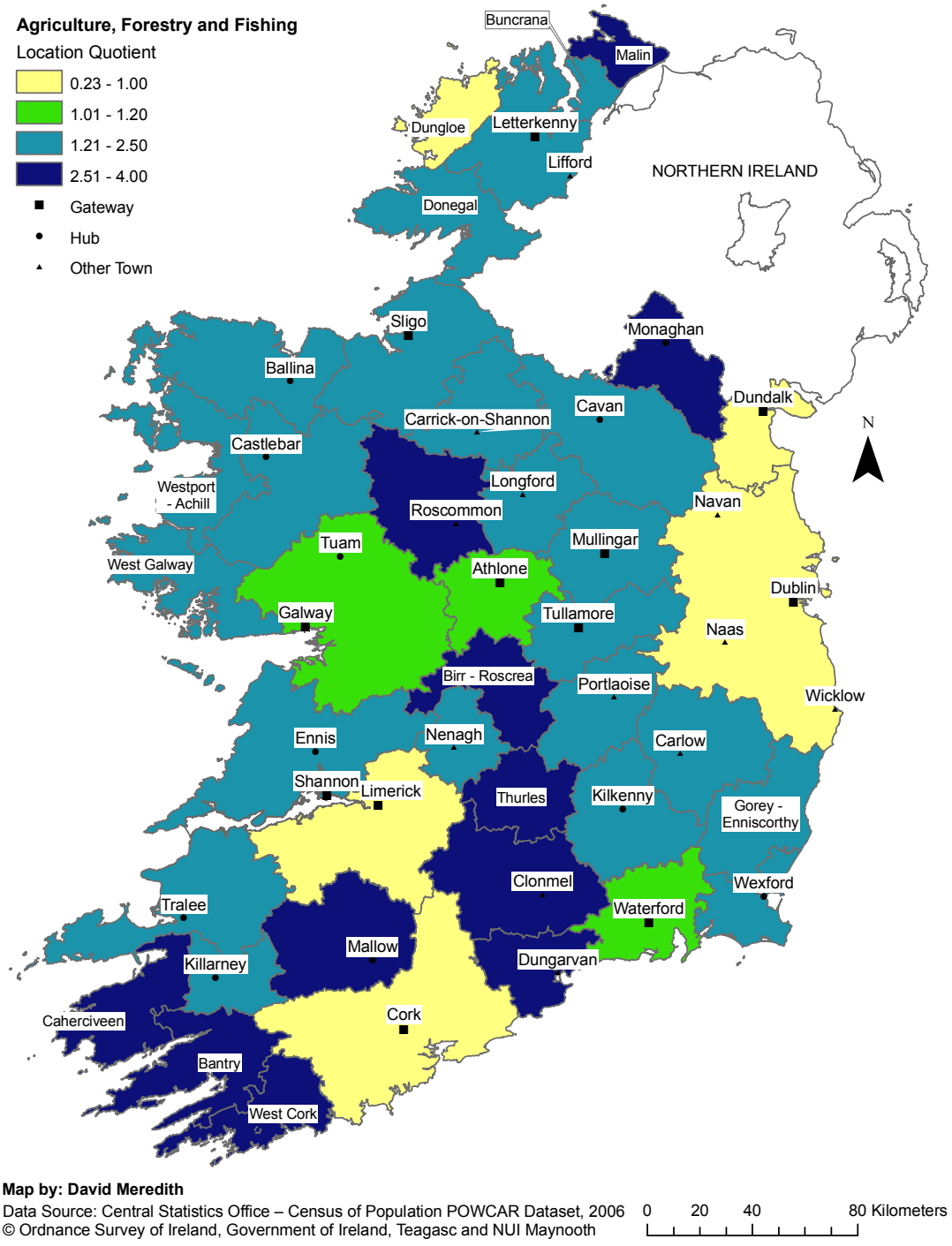


Figure 7.4 Relative concentration and distribution of Agriculture, Forestry and Fishing industry employment

7.2.6.2 Manufacturing, Mining, Turf Production, Electricity, Gas and Water Supply

Though this group of economic activities covers a number of sectors it is primarily composed of manufacturing related employment. The location quotient scores indicate that, with the exception of Dundalk, manufacturing employment is under-represented within the economies of those labour markets along the east coast, including the Dublin area. The labour markets within the Atlantic Corridor all record quotients above 1.2. This result reflects the importance of a relatively small number of large enterprises within each of the labour markets. Waterford, Cork, Limerick, Ennis – Shannon and Galway, the main labour markets within the Atlantic Corridor, are all associated with large scale, predominantly foreign-owned, manufacturing subsectors e.g. chemicals in Cork, computer assembly in Limerick, and pharmaceuticals in Galway (Clancy et al., 2001). The broader pattern of labour markets reporting concentrations of manufacturing employment reflect the significance of the agri-food processing sector with key facilities located in the Mallow, Cork and Dungarvan areas. These enterprises are also complemented by a large number of smaller firms engaging in manufacturing related activities (Heanue, 2008).

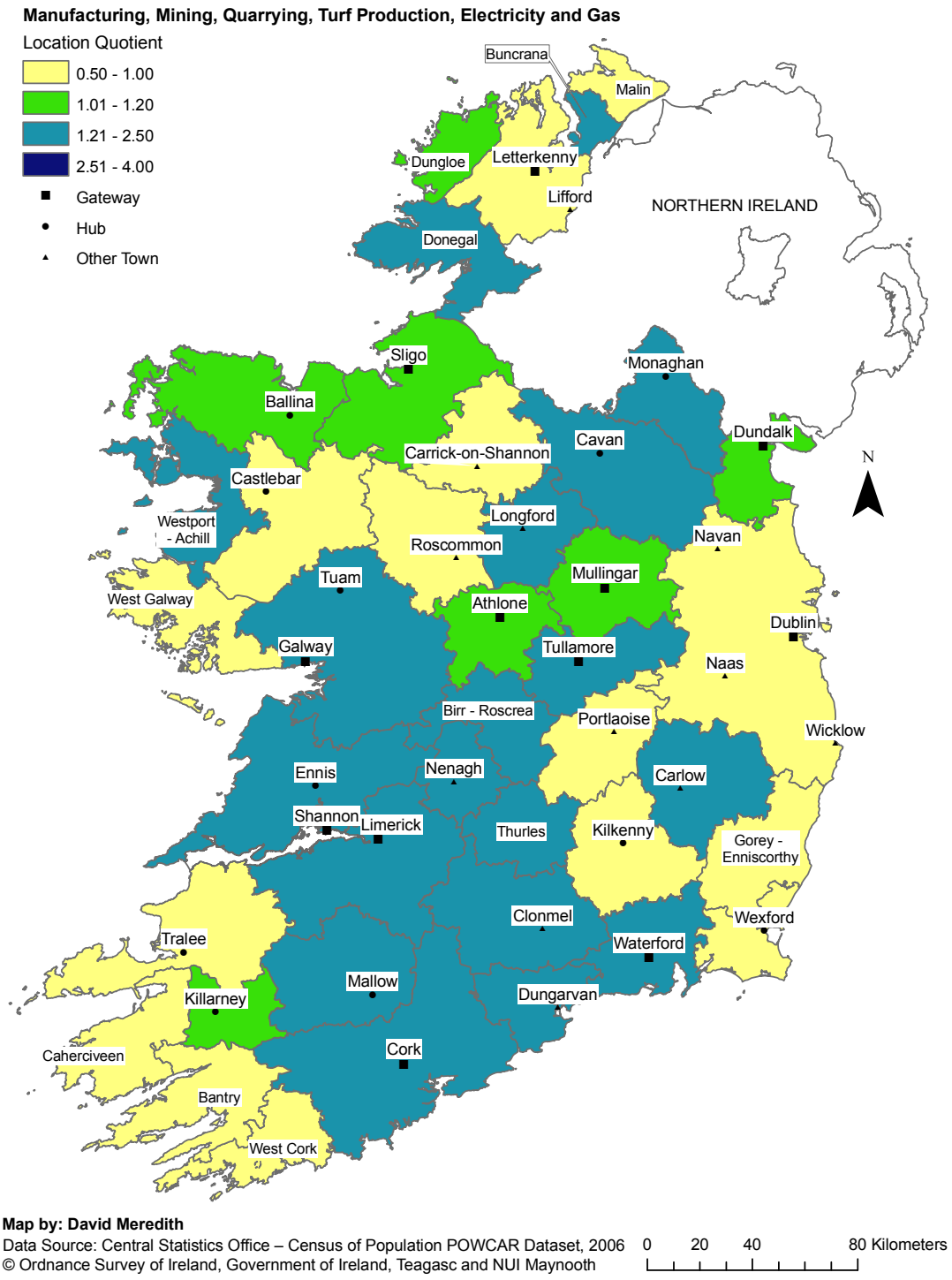


Figure 7.5 Relative concentration and distribution of Manufacturing, Mining, Turf Production, Electricity, Gas and Water Supply employment

7.2.6.3 Construction

The spatial pattern associated with the construction sector is interesting in that it, in large part, reflects population changes taking place at the time of the last census. These developments resulted in increased demand for residential housing and both commercial and consumer (retail) facilities and hence growth of the construction industry. Horner (1999), Morgenroth (2002) and Walsh (2008) noted the increase in residential development on the fringe of towns and cities and the growth in long distance commuting to the largest cities. It is this process that largely explains the relative importance of the construction sector in the arc of labour markets surrounding the Dublin area. A similar process is thought to be at work within the Mallow local labour market area. These areas have seen population growth due to their proximity and accessibility to, respectively, Dublin and Cork. This raises the question as to the importance of commuting from the Mallow, and perhaps also the Dungarvan labour market areas in bolstering or enhancing the core critical mass of larger, neighbouring labour markets including Limerick, Cork and Waterford. This question will be returned to later in this chapter.

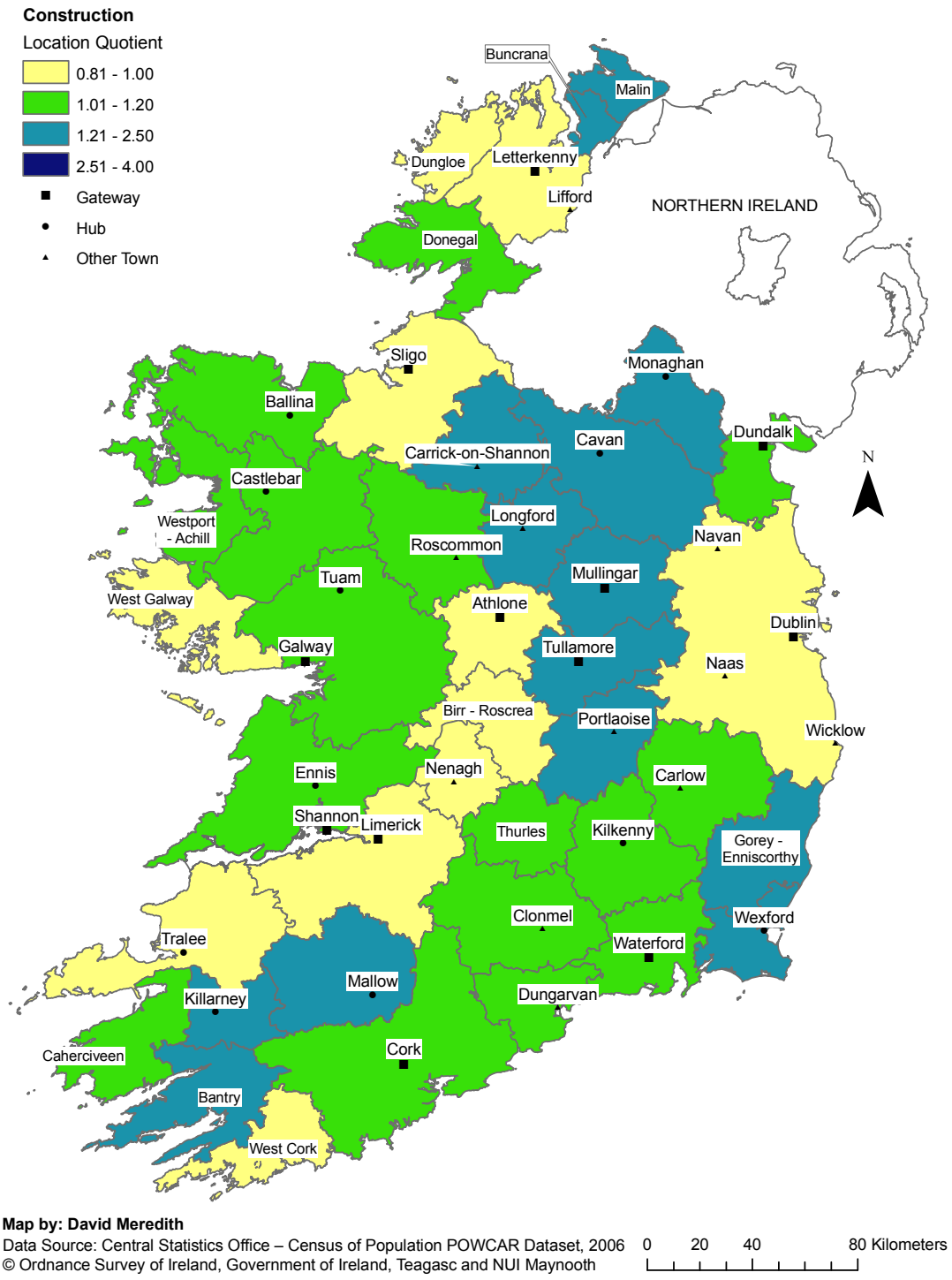


Figure 7.6 Relative concentration and distribution of Construction related employment

7.2.6.4 Commerce

This sector comprises a variety of subsectors including 'Hotels and Restaurants', 'Wholesale and retail trade', 'Banking and financial services', and 'Real estate, renting and business activities'. Taken together 'Commerce' is the single largest component of Ireland's economy in terms of the number of jobs associated with the aforementioned activities and yet the location quotient analysis highlights only one labour market area as having a greater than average share of jobs in this sector, Dublin. This is not all that surprising given the concentration of the financial services sector in the area, a high concentration of hotels, pubs and guesthouses and extensive retail facilities. By way of example, two of the shopping centres situated on the outskirts of Dublin City employ in excess of 3,000 persons (Kelly, 2008, Horner and Webb, 2010). That all other labour market areas record values below 1 reflects the extent to which this sector is concentrated in the Dublin area. It also reflects the local nature and / or small scale of these services in the other 40 local labour markets, including those within the Atlantic Corridor.

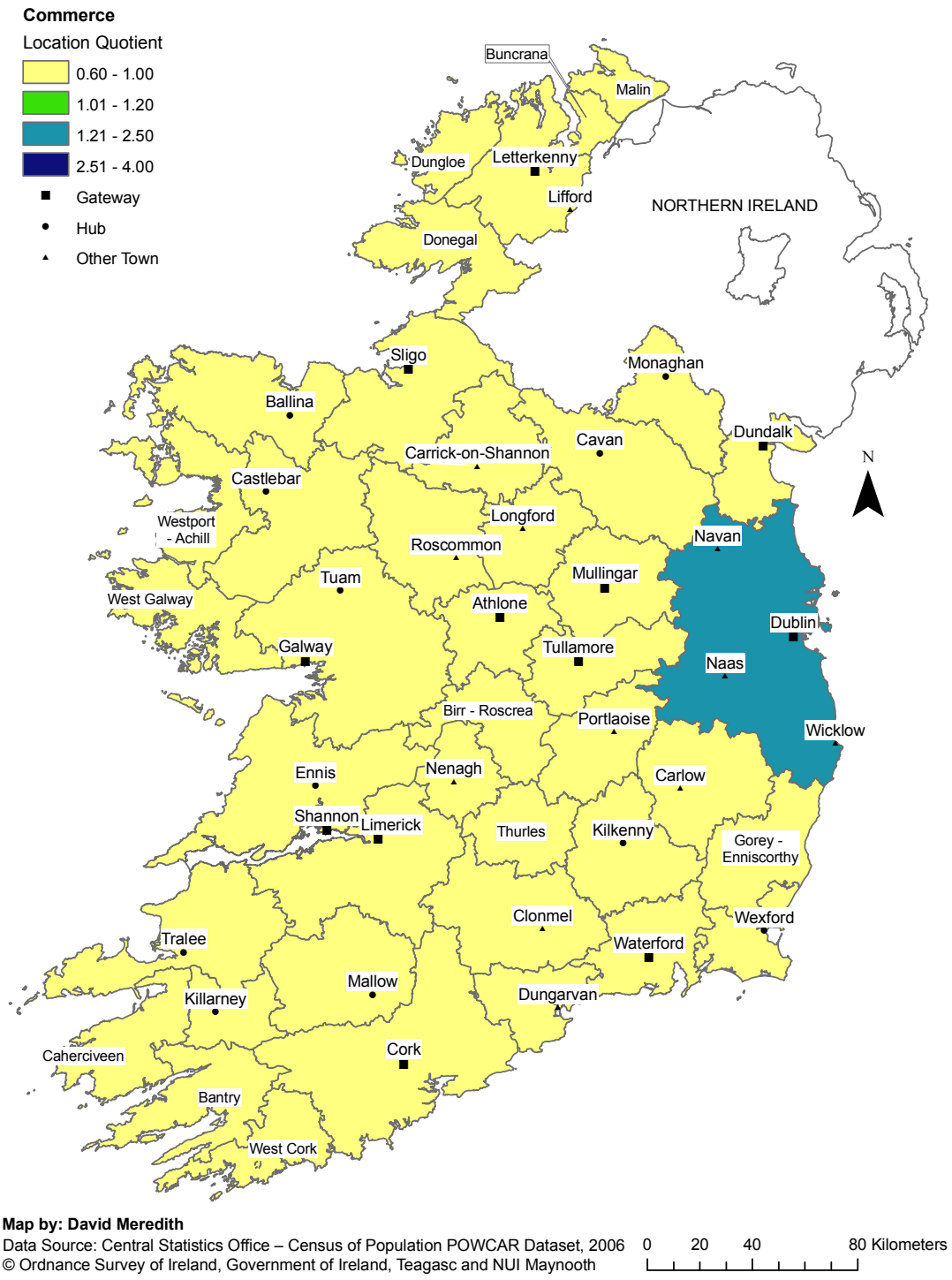


Figure 7.7 Relative concentration and distribution of Commerce employment

7.2.6.5 Transport, Storage and Communications

Though this is a relatively small sector, accounting for slightly more than 100,000 jobs in the total economy, it has a distinctive spatial pattern. Three areas, Dublin, Athlone and Ennis – Shannon, each record a location quotient in excess of 1.2 indicating that this sector is over represented in their respective economies. An additional two areas, Portlaoise and Limerick, have scores in excess of 1. That Portlaoise is identified in this assessment is interesting given the high accessibility of the area to most parts of the country via the road network. In the NSS it was identified as having potential as a transport and logistics hub, though it was not deemed a 'Hub'. The over representation of this sector in the Athlone, Ennis – Shannon and Limerick economies is largely unsurprising given their dependence on road transportation of finished or part-finished manufactured goods. Dublin, in addition to being a source of goods for export, acts as a node in the Transportation and Storage sectors. Furthermore, much of the Communications sector is concentrated in the Dublin area with each of the largest telecommunications companies headquartered within the city area. That Cork, a major centre for the production of chemicals, is not featured in this list is thought to reflect its access to international sea-based cargo services.

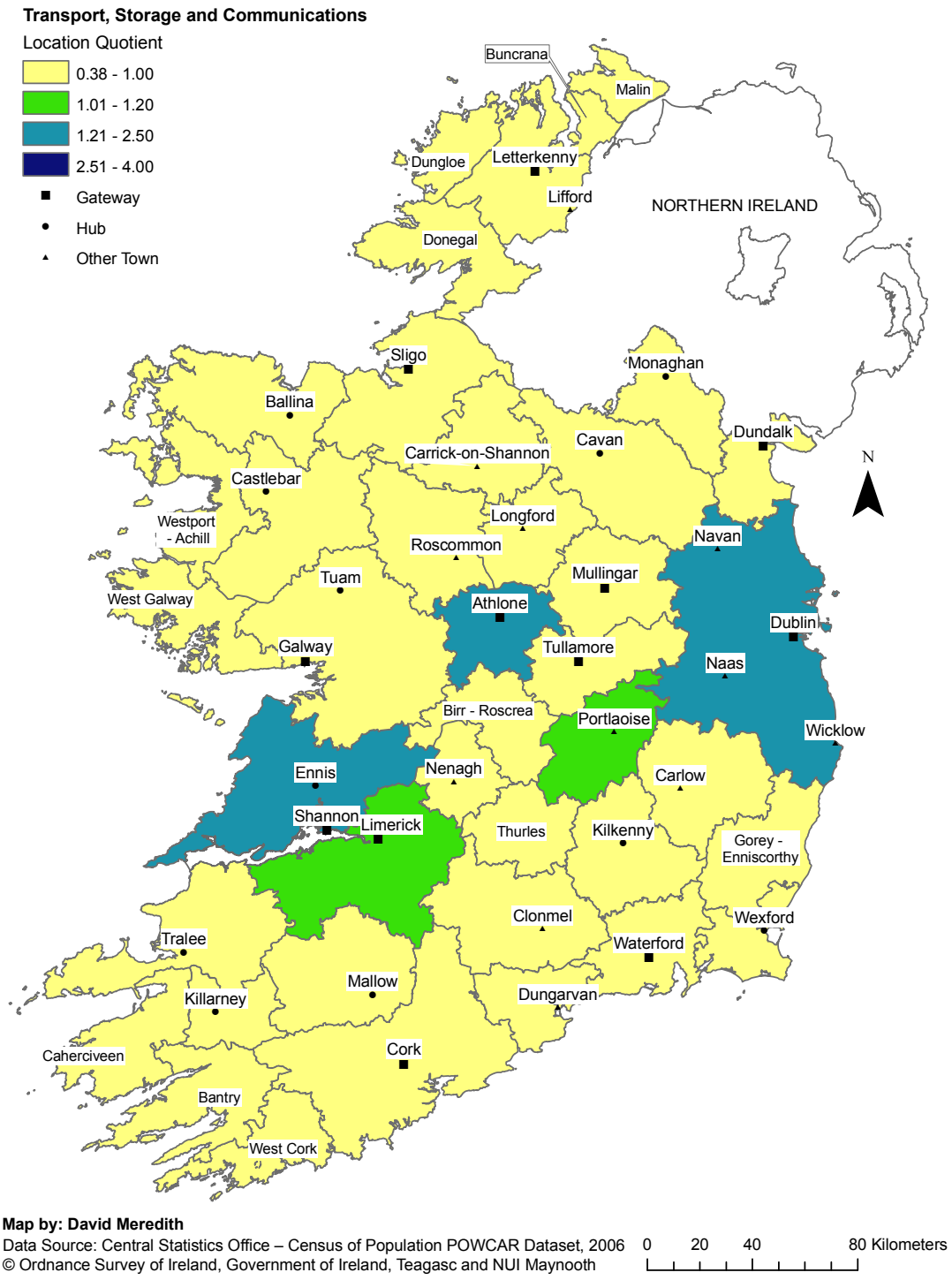


Figure 7.8 Relative concentration and distribution of the Transport, Storage and Communications employment

7.2.6.6 Public Administration and Defence

Given the centralised nature of Ireland's system of governance, not all that surprising given the relatively small size of Ireland's population, it is unsurprising to find this sector over represented within the Dublin labour market area. Despite successive rounds of decentralisation of public sector jobs to locations outside of Dublin, most of the government departments retain a presence in the city. In addition, a number of key services including the defence forces headquarters and police headquarters are also located in Dublin City.

The spatial pattern of over representation associated with the Public Administration and Defence, comprising administrative services to government ministries, public policing and national and international defence, outside of the Dublin labour market area reflects the local significance of these activities within a number of particularly smaller, rural labour market areas. Over representation of this sector in these areas is thought to reflect the location of key facilities, i.e. the police training facility within the Nenagh area and an army barracks in the Athlone area. None of the seven local labour markets within the Atlantic Corridor record 'high' levels of employment in this sector.

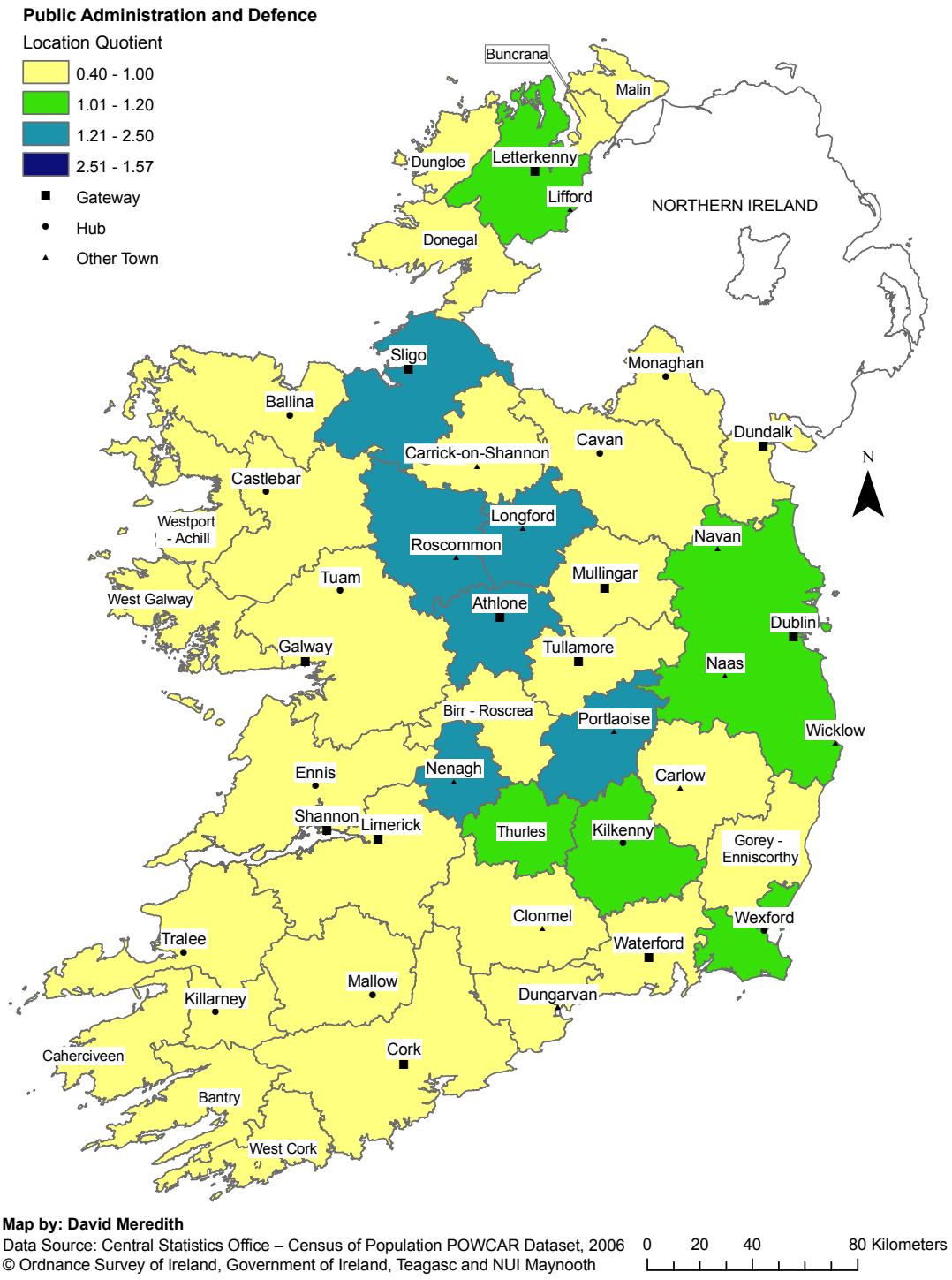


Figure 7.9 Relative concentration and distribution of the Public Administration and Defence employment

7.2.6.7 Education, Health and Social Work

The health, education and social work sectors comprise a large and important element of Ireland's economy. Despite this, there is little by way of an obvious spatial pattern associated with the results of the location quotient assessment. Those areas in the West and Northwest that report high, above 1.2, values results from a combination of employment stemming from clusters of health and education institutions in these spaces. This is the likely explanation for the over-representation of this sector in the Waterford, Cork, Limerick and Galway labour market areas. In each instance the cities at the centre of these areas are the location of a number of large, regional scale hospitals and 3rd level education institutions. There are also a large number of hospitals distributed across a number of other labour market areas, i.e. Kilkenny, Tralee, Clonmel and Mullingar, amongst others. Each of the main labour markets within the Atlantic Corridor, Waterford, Cork, Limerick and Galway, all record location quotients between 1 and 1.2 indicating a slight over representation of these activities in these areas.

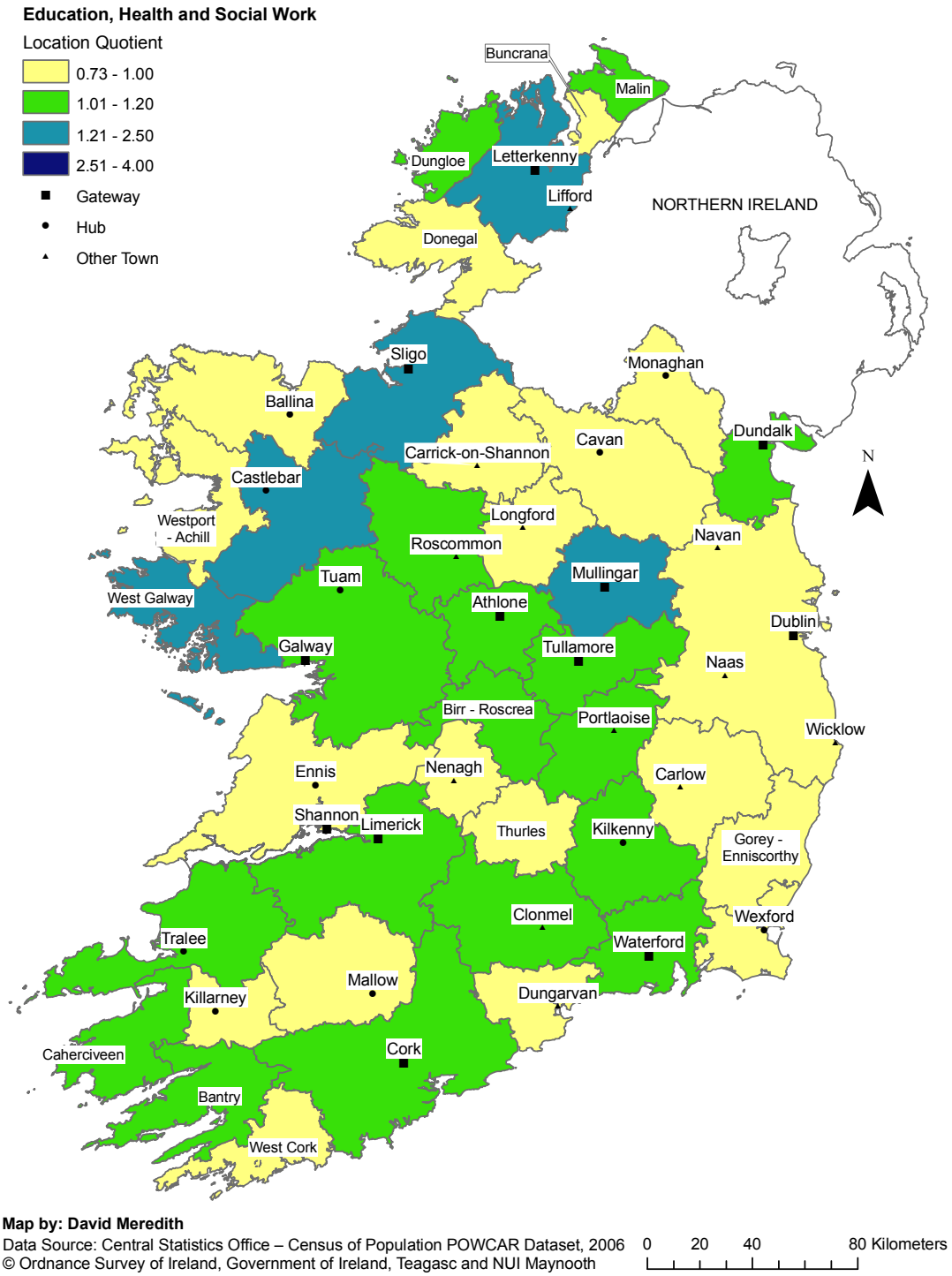


Figure 7.10 Relative concentration and distribution of Health, Education and Social Work employment

7.2.6.8 Other

Workers classified as working in the 'Other' industrial group cover a wide variety of economic activities ranging from sewage and refuse disposal through to motion picture and video activities. It is worth recalling the analysis presented in Chapter Four (page 78 – 79) that identified a large group of workers originally classified as working in the commerce sector within the Census of Population were coded to the 'Other' category within the POWCAR. This group of workers is, consequently, occupationally diverse. Despite this, the 'Other' industrial group displays a relatively distinctive spatial pattern. Local labour market areas with high location quotients are found along the length of the west coast. With the exception of Killarney, none of these areas have significant urban centres. The other region with high location quotients is the Southeast, all but one of the labour market areas records greater than average concentrations of employment in the 'sector'. Due to the very diverse range of activities grouped within the 'Other' category, it is difficult to provide a meaningful assessment of the factors or economic sub-sectors that might underlie these data. Walsh et al., (2007, p. 146) notes that the relative size of the tourism sector in the southwest, west and northwest, accounts for higher numbers of workers classified as 'Other'. These areas correspond to the labour markets associated with West Cork, Bantry, Caherciveen, Killarney, West Galway, Westport – Achill, Donegal and Dungloe. A similar effect may account for the slight over representation of employment in this sector within Dungarvan, Ennis – Shannon and Galway. Each of these areas have long been key destinations for tourists.

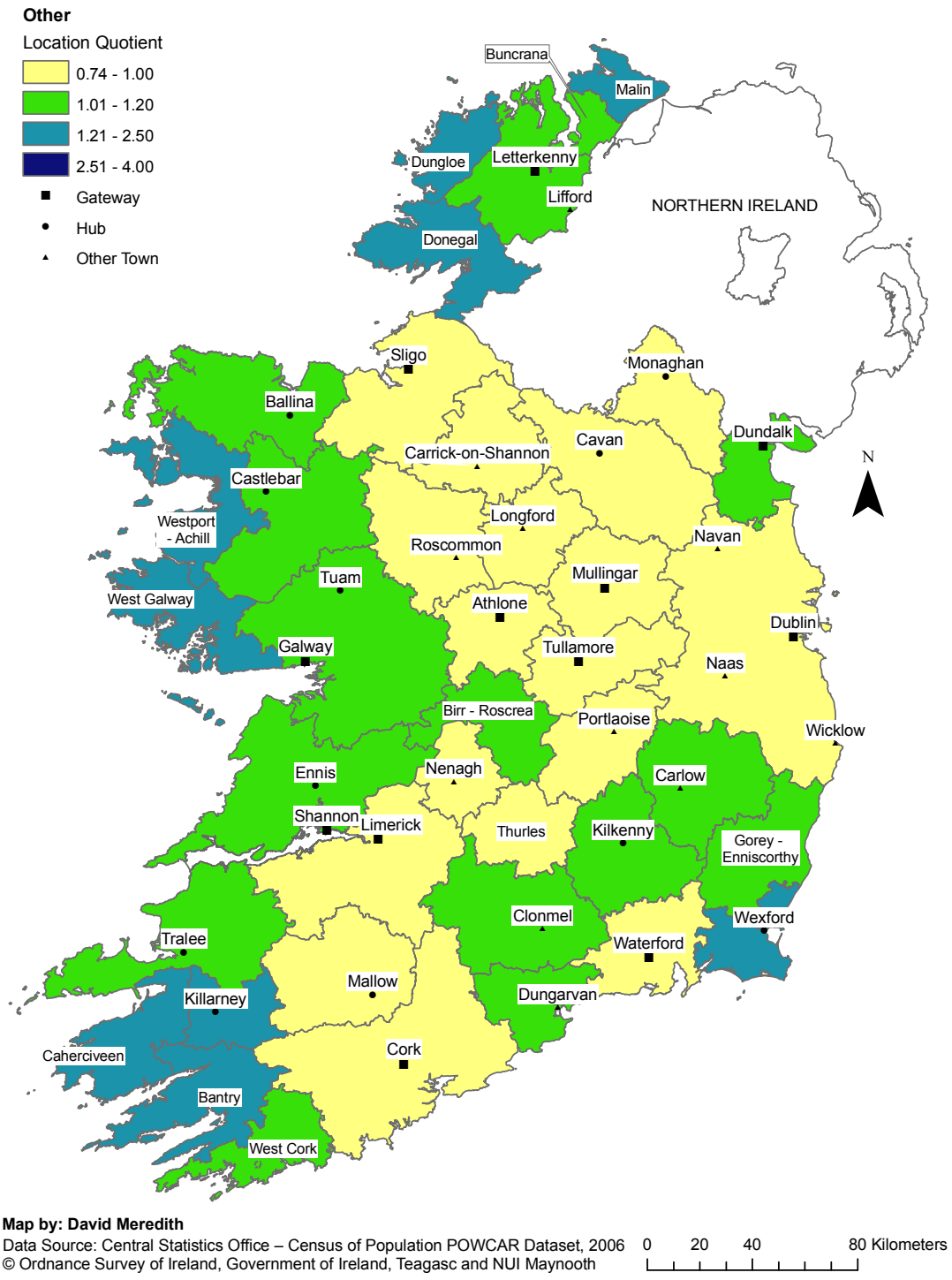


Figure 7.11 Relative concentration and distribution of 'Other' industrial activities

7.2.6.9 Synopsis of Location Quotient Analysis

In synopsising the forgoing analysis one of the most striking features is the ubiquitous nature of many economic sectors in Ireland. With the exception of Commerce, several sectors are widely dispersed, particularly Agriculture, forestry and fishing, Manufacturing, Construction and Health, Education and Social Work. In large part this reflects the potential of various labour market areas or the role of various waves of State intervention in the distribution of economic activities whether they be the dispersal of manufacturing to rural areas or the location of public sector related employment.

Unsurprisingly, the percentage of jobs within the agriculture sector is higher in the Atlantic Corridor given the scale of the area, which at 17,688 km^2, is over 3.5 times the size of the Dublin labour market area. Comparing between the industrial structure of economic activities in the Atlantic Corridor and Dublin labour market areas one finds a number of sectors that are of greater relative importance to the Atlantic Corridor (Table 7.6). Sectors with greater proportions of employment, compared to the Dublin area, include Manufacturing (20.57%), Construction (6.19%) and Health, Education and Social Work (19.79%). With reference to the Dublin area's economic structure, the most striking feature is, the proportion of jobs associated with Commerce (38.23%) by comparison to the Atlantic Corridor (27.79%).

Table 7.6 Quantifying the critical mass of the Dublin and Atlantic Corridor areas: Economic Structures

	Agriculture, forestry and fishing	Manufacturing industries	Construction	Commerce	Transport, storage and communications	Public administration and defence	Education, health and social work	Other	Missing	Total
Dublin	**6,705**	**79,125**	**31,875**	**245,756**	**43,700**	**45,995**	**117,106**	**66,491**	**6,120**	**642,873**
% National Total	*10.18*	*33.75*	*37.42*	*52.57*	*55.15*	*51.06*	*40.88*	*41.80*	*51.06*	*43.44*
Galway	3,145	13,286	4,088	18,380	2,395	2,752	14,271	7,809	410	66,536
Ennis - Shannon	1,935	7,522	1,952	8,380	2,960	1,766	4,844	3,882	288	33,529
Limerick	2,964	14,466	3,832	17,961	3,676	3,334	14,941	6,633	381	68,188
Mallow	2,295	3,332	1,170	4,046	680	522	2,969	1,305	131	16,450
Cork	5,381	26,730	8,921	42,327	6,942	7,180	26,983	13,431	719	138,614
Dungarvan	1,210	1,697	577	1,994	211	463	1,500	984	45	8,681
Waterford	1,796	9,266	2,405	10,001	1,885	1,531	7,848	3,929	227	38,888
Atlantic Corridor	**18,726**	**76,299**	**22,945**	**103,089**	**18,749**	**17,548**	**73,356**	**37,973**	**2,201**	**370,886**
% National Total	*28.44*	*32.55*	*26.94*	*22.05*	*23.66*	*19.48*	*25.60*	*23.87*	*18.36*	*25.06*

Source: CSO, POWCAR, 2006. Author's calculations

7.3 Comparative Evaluation of Core Critical Mass

Taking the results of the preceding section analysing critical mass and considering them in conjunction with the assessment of the distribution and scale of employment within the Atlantic Corridor and Dublin labour market areas leads to the conclusion that the proposal of the 'Corridor' as a counterbalance to Dublin is highly ambitious. The analysis thus far highlights stark differences in the scale of populations living in each of the areas, their skills or educational profile and substantial variations in the relative importance of various economic activities. Such differences in aggregate critical mass are to be expected given the nature of these spaces. The Dublin area contains a large, densely settled population, a large labour force with a relatively large stock of highly educated individuals. With the exception of Agriculture, forestry and fishing, there are a large number of jobs located within the Dublin area across all of the economic sectors. Of these, Commerce is the most significant in terms of employment. In contrast, the population of the Atlantic Corridor is substantially smaller and more widely dispersed. The labour force is correspondingly smaller and orientated around several medium to small size cities and towns. A further important point is the extent of spatial variation in the size and importance of the various economic sectors within each of the local labour markets extending from Waterford to Galway. What remains unclear, however, is whether critical mass exists below the scale of local labour market areas, i.e. at the firm or enterprise level. This issue forms the focus of the next section of this chapter.

7.3.1 Identifying the cores of local labour market areas

In order to identify 'cores', spatial analysis of the location of places of work is undertaken identifying those places where there are significant concentrations of jobs. As noted in Chapter Four, the POWCAR reports the place of work at a number of scales ranging from the administrative region down to a 250m^2 grid. It is this latter geography that is used to identify locations with high concentrations of employment. It should be noted that the total number of jobs, 1,372,554, used in this analysis is less than the 1,479,756 applied to the analyses presented elsewhere in this and preceding chapters. This difference is accounted for by the exclusion of the 'Works from home' population from this analysis due the challenges associated with

processing these data. An evaluation of the 1,372,554 records was undertaken to identify the employment associated with each 250m^2 cell resulting in the identification of 55,471 cells with at least one job. The cell with the largest value recorded 5,211 jobs, located close to the centre of Dublin.

Unsurprisingly, the vast majority of cells, 75.63%, recorded less than 10 jobs (Table 7.7). These, however, accounted for only 7.57% of all jobs. This suggests that employment, and hence economic activity, is limited to a relatively small number of areas. Plotting the location of all cells with 10 or more jobs highlights the concentration of employment in urban locations, particularly the Dublin Labour Market Area, and along major roads (Figure 7.4).

Table 7.7 Frequency Distribution of employment associated with POWCAR 250m^2 cells

No. Jobs	No. Cells	% All Cells	Total No. Jobs	% All Jobs
< 10	41956	75.64	103862	7.57
10 - 19	4472	8.06	60846	4.43
20 - 29	1982	3.57	47694	3.47
30 - 39	1270	2.29	43264	3.15
40 - 49	868	1.56	38389	2.80
50 - 59	684	1.23	37256	2.71
60 - 69	488	0.88	31450	2.29
70 - 79	373	0.67	27709	2.02
80 - 89	318	0.57	26861	1.96
90 - 99	294	0.53	27647	2.01
100+	2766	4.99	927576	67.58
Total	55471	100	1372554	100.00

Source: POWCAR, 2006. Author's calculations

Data in Table 7.7 demonstrates that 4.99% of cells account for 67.58% of all jobs. In line with the finding by Calion et al., (2007p. 407) that areas with a high density of employment, greater than 2,200 persons per square mile (5,700 per km^2), exhibit higher levels of economic growth and innovation, core areas, for the purpose of this research, are defined as those where the number of jobs exceeds this value. In terms of a methodological approach to the data, rather than combining 16 250m^2 units to form a square kilometre block, the employment density criterion was downscaled. If

the number of jobs required to classify a km^2 as high density is 5,700 then the number per $250m^2$ cell is 356.

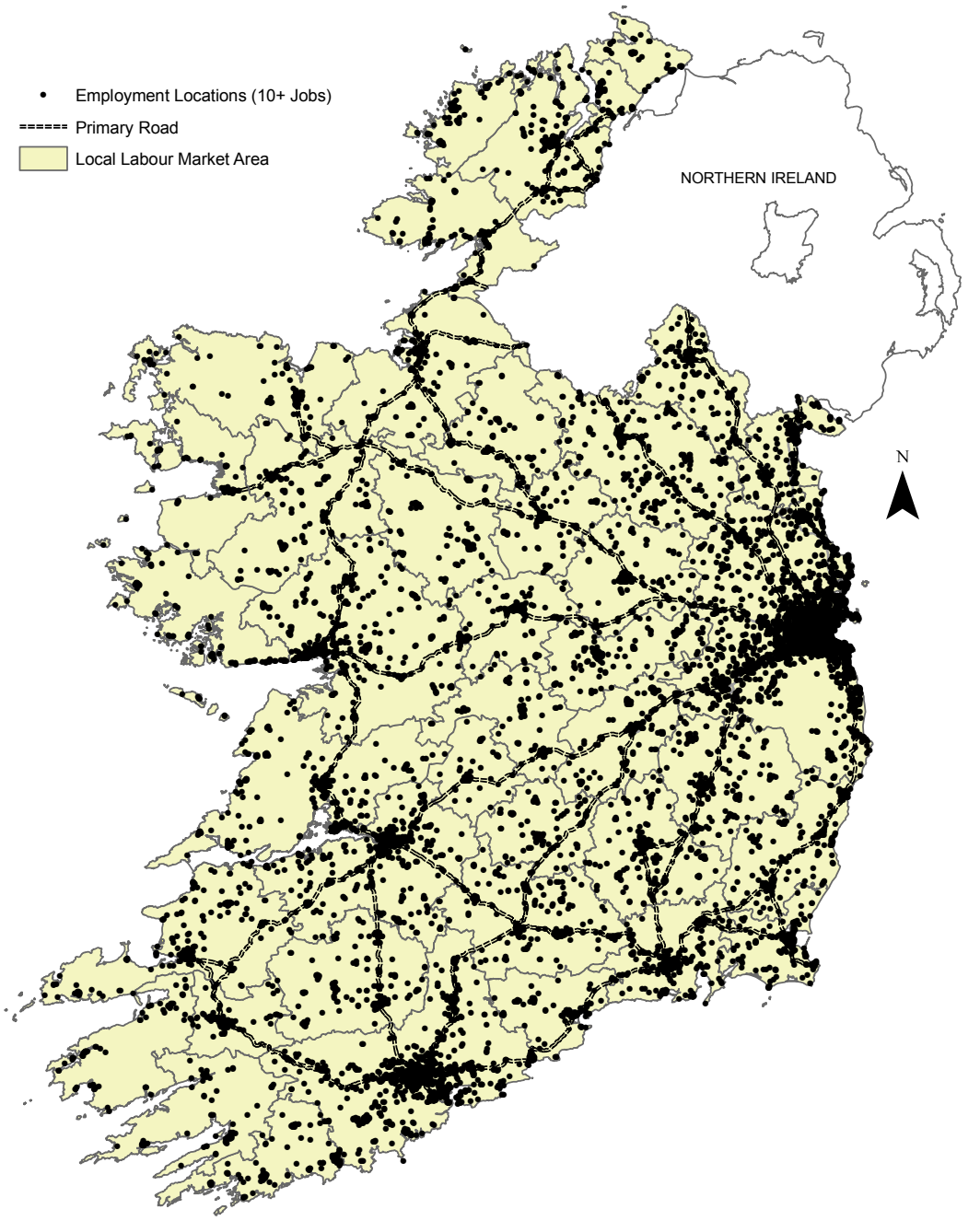


Figure 7.12 Distribution of employment in Ireland (2006)

Cells with less than 356 jobs were identified and excluded from further analysis leaving 683 cells, 1.23% of the total number. There are 547,279 jobs associated with these cells or 'High Density Nodes', which equates to 39.87% of all jobs in this subset of the POWCAR. Spatial analysis was undertaking assigning the 683 cells to their respective local labour market areas (Figure 7.5).

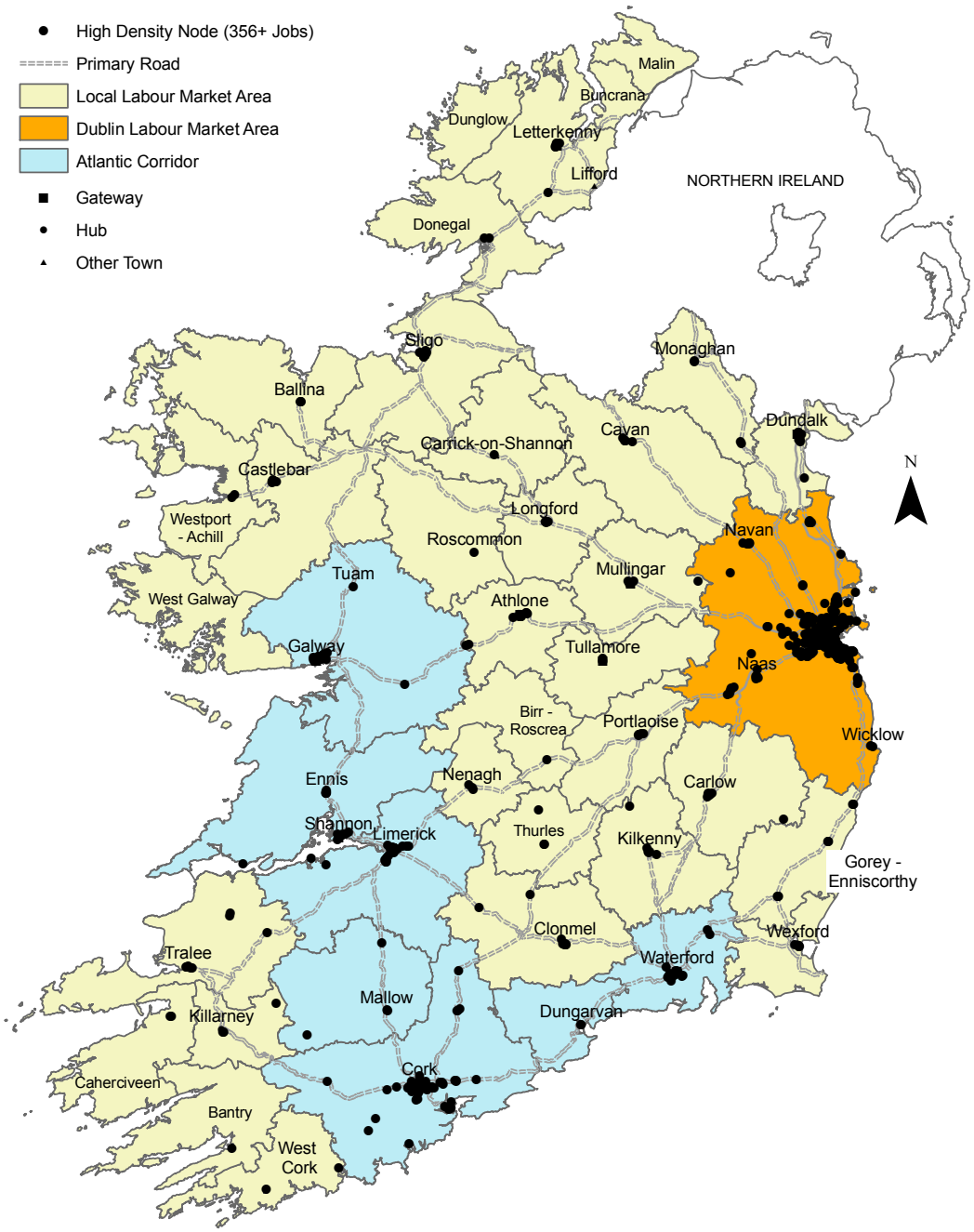


Figure 7.13 Distribution of 'High Density' Employment

A number of observations regarding the distribution of High Density Nodes (HDNs) are worth noting. There are four labour markets in Ireland without a high-density cell. These are all smaller, geographically peripheral areas and include Malin and Buncrana on the Inishowen peninsula, Dungloe in West Co. Donegal and West Galway. Furthermore, many labour market areas have a small number of highly dispersed HDNs suggesting that the capacity and impact of these places may be localised. Related to this issue, the second point pertains to the limited spatial impact of some high-density cells on travel-to-work patterns. A number of cells are located very close to the boundaries of local labour market areas e.g. the point located near the coast between the Cork City and West Cork labour market areas. This suggests that, within the context of the objective criteria used to identify the 41 local labour market areas, these places have a limited impact beyond their immediate setting.

Returning to the assessment of the distribution and size, in terms of the total number of people employed in each cell, of HDNs, it is clear that these are generally concentrated in labour markets associated with the larger urban centres. This is particularly true of Dublin, Cork, Limerick and Galway. Also interesting are those differences in the spatial distribution or morphology of the cells in these labour market areas. Creating a kernel density map facilitates the visualisation of the concentration of employment within these places (Figure 7.6). Within the Dublin area, the HDNs are relatively compact as are those associated with Galway. The core areas of both Limerick and Cork are more dispersed. In the latter instance this is a consequence of the topography of the landscape within which Cork City is situated, along a river valley with steep sides. With regards to Limerick, the presence of a relatively compact centre and a number of large industrial parks around the edge of the city area results in the appearance of a dispersed core.

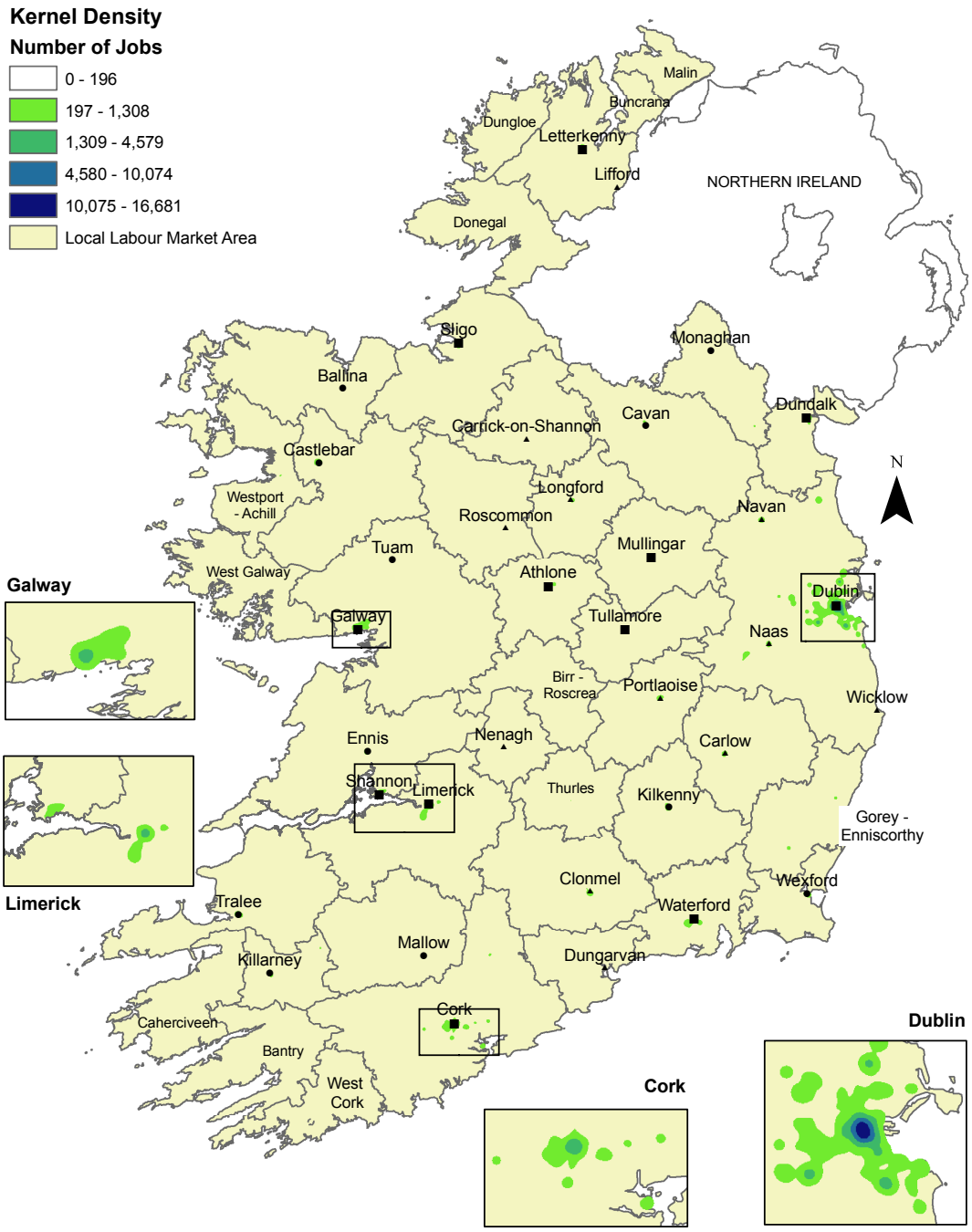


Figure 7.14 Concentration of employment in selected cities

Cartographically, Figure 7.6 is indicative of the level of concentration of employment. Notwithstanding this, they provide an indication of the 'mass' or number of jobs within these cores. Colder colours, the blues, represent locations with

large numbers of jobs. Applying spatial analysis techniques to these data it is possible to develop new economic geographies both in terms of the identification of employment locations within cities and characterising these spaces along industrial and occupational lines. By way of example, a comparison between the core of Galway City and Dublin City is presented below.

The blue area at the core of Galway is 5.6 km^2 and contains 17 high-density nodes. These account for 14,637 jobs. There are an additional 58 nodes within this space with less than 356 jobs accounting for a further 6,091 jobs. There are 20,728 jobs within this area, 31% of the total employment within the Galway labour market area. By way of comparison, the hot-spot at the centre of the Dublin labour market area (26.81 km^2) has 148 high-density nodes accounting for 181,191 jobs. A further 26,197 jobs are located within this area in lower density nodes. Combined, these 207,316 jobs account for 32.25% of all employment within the Dublin labour market area. Before coming to the conclusion that the Dublin and Galway cores are relatively similar, in terms of percentage share of total number of jobs within their respective labour markets, it has to be stressed that Dublin's core is multi-nodal. The analysis here, simply presents the data for the hot spot at the centre of the Dublin area. All other high-density nodes are excluded from the analysis i.e. Sandyford, the very distinctive hot spot south of the city centre (Figure 7.6). Development trends in Dublin and many other large and small towns in Ireland has resulted in the emergence of multi-nodal spaces (MacLaran and Kelly, 2007) or edge cities (Horner and Webb, 2010).

7.3.2 Assessing the Distribution of Core Critical Mass

Of the total number of high-density nodes, 357 (52.27%) are located within the Dublin area whilst a further 25.92% or 177 are situated within the Atlantic Corridor. Analysis of the internal distribution of core critical mass in the two areas highlights significant differences. A basic evaluation of the number of high-density nodes (HDNs) per 100 km^2 establishes that there is a higher concentration of critical mass within the Dublin area (Table 7.8). This is a function of the small geographic size of this space, relative to the Atlantic Corridor, and the number of nodes. However, even controlling for size, the Dublin area records an adjusted value of 2.00 compared to

the Atlantic Corridor's 0.99. In order to control for geographic scale, the spatial extent of the Dublin area was divided by that of the Atlantic Corridor. The number of HDNs per 100 km^2 was multiplied by the resulting coefficient.

Table 7.8 Basic 'Core Critical Mass'

	Number of High Density Nodes (HDNs)	**% Total (N=683)**	**Number of HDNs/100km^2**
Dublin Area	357	52.27	7.14
Atlantic Corridor	177	25.92	0.99

Source: POWCAR, 2006. Author's calculations

In order to establish whether HDNs within the Dublin area are more clustered than those in the Atlantic Corridor, Nearest Neighbour Analysis (NNA), using this function within ArcGIS 9.3, was undertaken. The NNA tool produces an index reporting the ratio of the observed distance divided by the expected distance between nodes. If the result of this calculation is less than 1, the pattern is considered to exhibit signs of clustering. If the index is greater than 1, the trend is toward dispersion.

In this instance it was found that both areas recorded clustered patterns. This is relatively unsurprising given that, based on a cursory assessment of the distribution of HDNs, it is clear that these are not randomly distributed. There is an apparent correlation between the distribution of nodes and the location of towns and cities (Figure 7.6). With regard to the Dublin area, however, the finding that the index value, 0.32, is greater than that of the Atlantic Corridor, 0.27, was unexpected (Table 7.9).

Table 7.9 Nearest Neighbour Analysis of HDNs

	Dublin Area	**Atlantic Corridor**
Observed Mean Distance: (Meters)	564.13	1618.08
Expected Mean Distance: (Meters)	1717.52	5975.27
Nearest Neighbour Ratio:	0.33	0.27
Z Score:	-24.27	-18.56
p-value:	0.000	0.000

The result indicates that, despite having fewer HDNs, those that are present within the Atlantic Corridor cluster to a greater extent than those within the Dublin area. Whilst it is tempting to extrapolate from this finding that the Atlantic Corridor has a greater degree of 'mass' arising from the clustering of HDNs, this would be premature. The observed mean distance between HDNs in the Dublin area is 53% less than that of the Atlantic Corridor (Table 7.9). One cannot escape from the reality that the distances between HDNs within the Atlantic Corridor are substantially greater than those of the Dublin area.

The foregoing analysis raises the question of the relationship between urban centres and the location of HDNs. It is to be expected that the location of major employers within urban centres including, hospitals, universities and other 3rd level education institutions, financial services institutions and manufacturing facilities will result in HDNs clustering in these settings. In order to further understanding of core critical mass in both areas, spatial analysis was undertaken evaluating the distribution of HDNs with respect to the Gateways, Hubs and Other Towns within the Dublin and Atlantic Corridor areas. The distance between each HDN and the nearest centre was calculated within ArcGIS. The results of this assessment were then summarised through the allocation of the HDNs to one of three groups, those within 5 km of a centre, those between 5 and 10 km and those greater than 10 km from a Gateway, Hub or Other Town (Table 7.10). The use of these categories follows from the findings of Graham (2009, p. 82) that positive externalities arising from the location of firms are spatially limited to, in most instances, less than 10 km.

HDNs within the Atlantic Corridor display something of a bimodal distribution with 78% of the total (n=177) located within 5 km of a Gateway, Hub or Other Town. Of the remainder, 14.69% are located over 10 km from these places (Table 7.10). This distribution contrasts with that of the Dublin area. Here only 47.06% of all HDNs are located within 5 km of a Gateway, Hub or Other Town. A further 32.77% are within 5 – 10 km of these places whilst the remaining 20.17% are located more than 10 km from a Gateway, Hub or Other Town. Unlike the distribution of HDNs within the Atlantic Corridor there is a clear distance decay effect, the numbers of nodes

Table 7.10 Assessment of the distribution of High-Density Nodes in the Dublin and Atlantic Corridor areas

Atlantic Corridor							
	No. HDNs	**% Total Number**	**Cumulative %**	**Minimum (km)**	**Maximum (km)**	**Mean (km)**	**Standard Deviation (km)**
<5 km	138	77.97	77.97	0.12	4.99	1.67	1.42
5 km – 10 km	13	7.34	85.31	5.13	8.60	6.36	1.26
10 km+	26	14.69	100	10.57	35.82	20.46	7.62
Dublin Labour Market Area							
	No. HDNs	**% Total Number**	**Cumulative %**	**Minimum (km)**	**Maximum (km)**	**Mean (km)**	**Standard Deviation (km)**
<5 km	168	47.06	47.06	0.07	4.89	1.76	1.23
5 km – 10 km	117	32.77	79.83	5.05	9.98	7.72	1.44
10 km+	72	20.17	100	10.04	29.79	14.32	4.30

declines as distance increases. Mapping these data provides a better understanding of this process. With one exception, corresponding to NUI Maynooth, north of Naas, all HDNs in the 5 – 10 km category are located in an arc around Dublin City (Figure 7.7). This arc corresponds to the M50 motorway which provides an orbital route that connects all of the major motorways linking Dublin to the other main cities and towns in Ireland. Beyond this space there are a large number of dispersed HDNs creating a ring around the city. Within this group there are a number of identifiable clusters, a group of HDNs located just north of the city along the coast, which corresponds to Swords – Dublin Airport. A further group, southwest of the city corresponds to a large office park between Tallaght and Saggart, and finally, a linear cluster of HDNs, south of the city follows the path of the main motorway link to the southeast. Two additional clusters of HDNs are identifiable. These correspond to Newbridge, south-west of Naas and Drogheda in the northeast of the area, close to the boundary with the Dundalk labour market area. Beyond these, there are relatively few distinguishable clusters of HDNs. Based on this analysis, two points are evident, firstly though the distribution of HDNs is relatively dispersed, these places are concentrated within 15 km of Dublin City. Outside of this area, there are relatively few places with HDNs. This spatial structure accounts for the patterns observable in the descriptive statistics presented in Table 7.10 whereby the minimum and maximum distances recorded are, with one exception, all lower than those associated with the Atlantic Corridor.

Returning to the Atlantic Corridor, the relatively low level of standard deviation associated with the HDNs greater than 10 km from a Gateway, Hub or Other Town suggests that at least some of these are clustered together (Table 7.10). Spatial analysis confirms this assessment. Of the 26 HDNs in this group, 15 or 57.69% are located within three kilometres of each other. One of these is situated in the northwest of the Waterford Local Labour Market area (Figure 7.8). Three clusters are located within 15 km of Cork city, five HDNs around Cobh (south of the city) and three, east of Cork in Mitchelstown (Figure 7.9). Finally, two HDNs are located close to each other east of Limerick along the Shannon Estuary (Figure 7.10). There are no clusters of HDNs outside of the Gateways, Hubs and Other Towns in the Ennis – Shannon and Galway areas.

Similar to the Dublin area, there are individual HDNs dispersed throughout the Atlantic Corridor. These correspond to locations with large-scale enterprises and reflect the on-going significance of industrial development in rural areas of Ireland. It is though, on the basis of the location of several of these HDNs that they are associated with the agri-food industry producing butter, cheese and infant milk formula. Spatial analysis was undertaken identifying the association of HDNs with the location of large-scale agri-food enterprises in the Atlantic Corridor. Of five rural HDNs within the Cork, Mallow and Limerick local labour market areas, four correspond to these locations. Further analysis establishing the relationship between rural HDNs and the agri-food industry is precluded on the grounds that it would require merging the POWCAR with the An Post Geodirectory, a spatial database that contains location and enterprise information for Ireland. This type of analysis is precluded under the terms of the licence agreement governing access to the POWCAR.

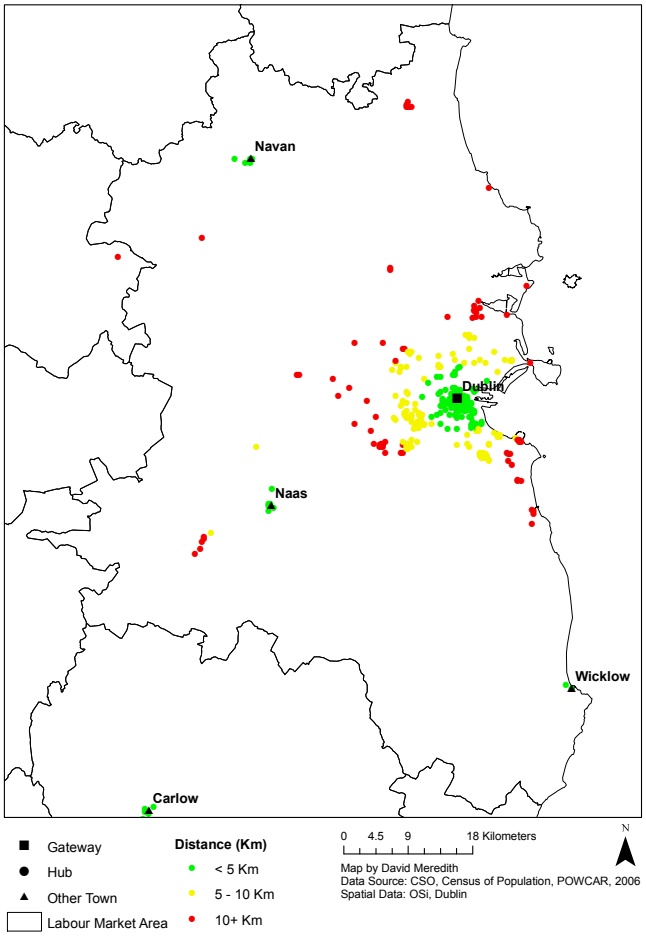


Figure 7.15 Dublin: Distribution of HDNs

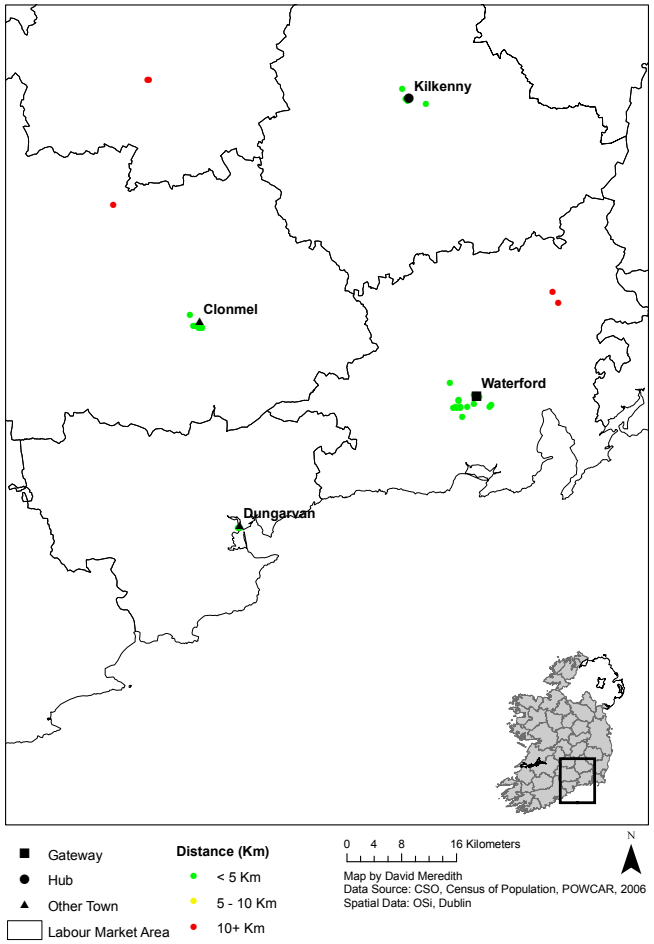


Figure 7.16 Waterford /Dungarvan: Distribution of HDNs

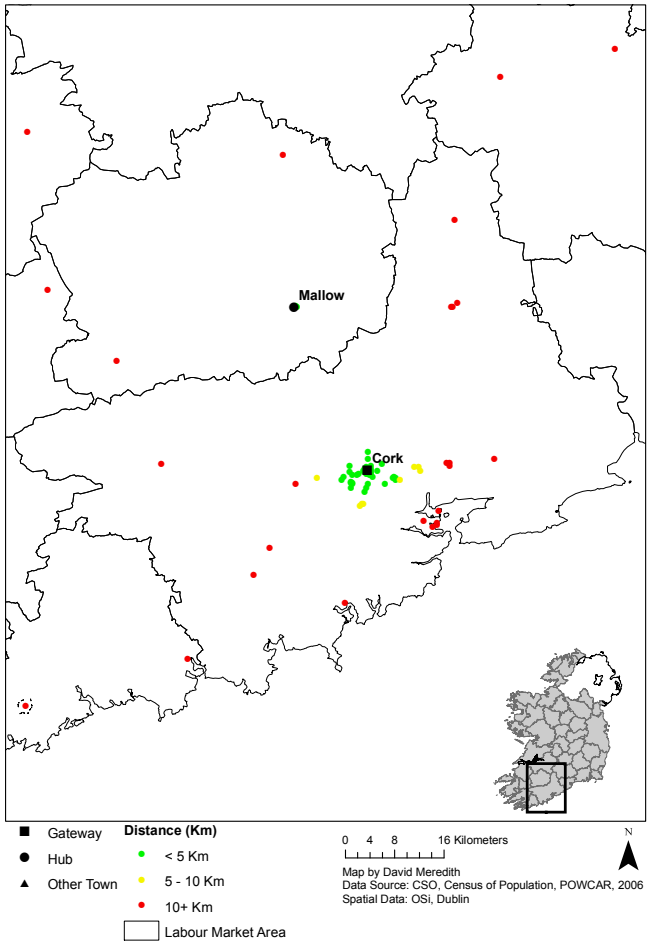


Figure 7.17 Cork / Mallow: Distribution of HDNs

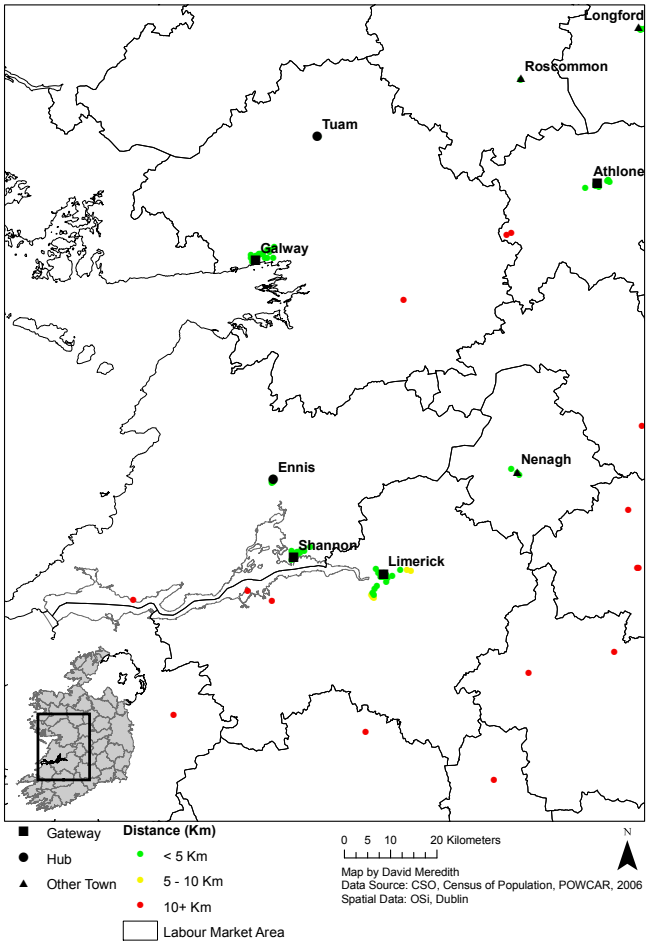


Figure 7.18 Limerick/Ennis/Galway: Distribution of HDNs

7.3.3 Scale of Core Critical Mass

A total of 545,158 persons are employed in the 683 HDNs in Ireland. Of this number, 56.82% or 309,803 workers are employed within HDNs located in the Dublin labour market area and a further 130,130 (23.87%) are employed in those HDNs located within the Atlantic Corridor. Comparing these figures to the aggregate critical mass (ACM) in each area, 51.30% of total employment in the Dublin area is concentrated within the 357 HDNs whilst the equivalent figure for the Atlantic Corridor is 35.09% (Table 7.11). This disparity in core critical mass (CCM) arises as a consequence of the difference in the density of employment per HDN. Within the Atlantic Corridor, there are, on average, 735.20 jobs per HDN whilst in the Dublin area there are 923.82.

Table 7.11 Comparison of aggregate and core critical mass

	Aggregate Critical Mass	**Core Critical Mass**	**% ACM**	**Jobs per HDN**
Dublin	642,873	329,803	51.30	923.82
Atlantic Corridor	370,886	130,130	35.09	735.20

Source: POWCAR, 2006. Author's calculations

These data depict very different levels of CCM between the two areas. Just over one third of all employment is concentrated within HDNs in the Atlantic Corridor leaving 65% of jobs distributed at lower densities. This analysis establishes that the aggregate critical mass within the Corridor is not enhanced as a consequence of being concentrated within HDNs. The question that arises at this juncture is whether the mass associated with particular economic sectors is enhanced through concentration of employment within a limited set of HDNs. In order to answer this question it is necessary to evaluate the industrial structure of employment related to the HDNs in each area.

7.3.4 Industrial nature of core critical mass

Comparing the industrial structure of employment in HDNs one finds significant differences in the economic composition of CCM. Within the Atlantic Corridor,

greater proportions of the workforce employed in the Manufacturing and Education, health and social work sectors are located within HDNs (Figure 7.11).

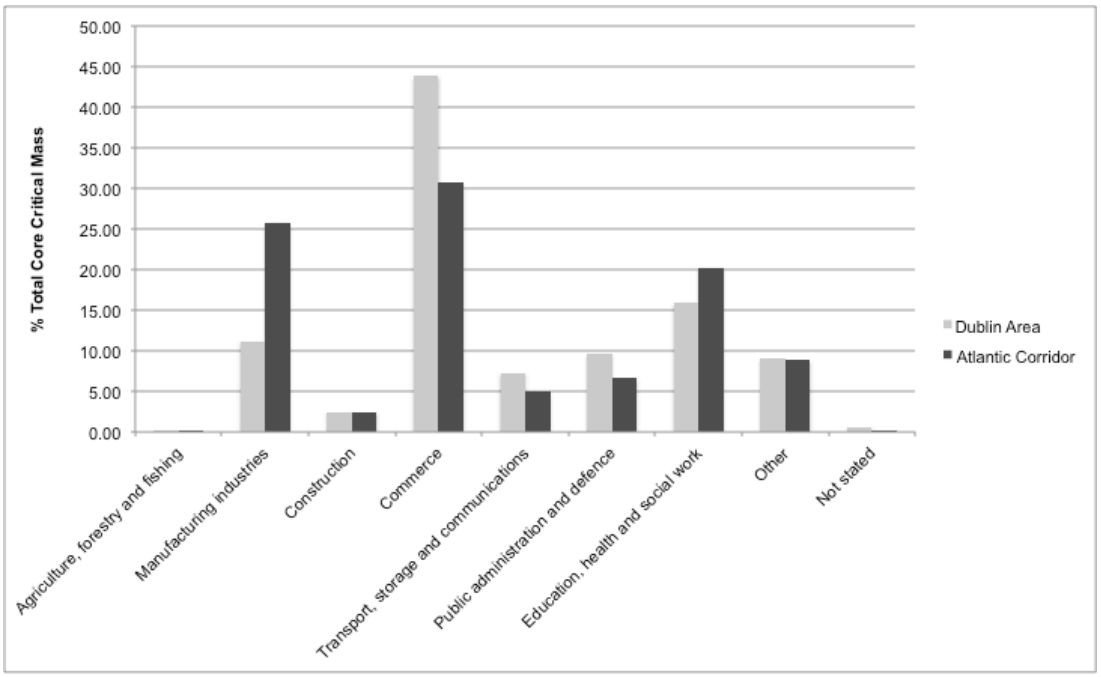


Figure 7.19 Comparison of the industrial composition of core critical mass

In comparison, a greater percentage of those working in the Commerce, Transport, storage and communications and Public administration and defence sectors in the Dublin local labour market area have their place of work in a HDN. This assessment suggests the possibility that, with regard to the Atlantic Corridor, CCM may exist within specific sectors of the economy, namely Manufacturing and Education, Health and Social Work. As the size and location of the latter sector is heavily influenced by the size and distribution of an areas population it is excluded from this stage of the analysis. These facilities are, within the Irish context, generally situated in larger urban centres.

7.3.4.1 Evaluating clusters of manufacturing employment within the Atlantic Corridor

In order to establish whether CCM is concentrated within the manufacturing sector within the Atlantic Corridor spatial analysis was undertaken on that subset of the data pertaining to HDNs with any employment in these sectors. Cluster and Outlier Analysis (COA) was implemented within ArcGIS using the Spatial Statistics toolset.

COA takes a given set of weighted features and identifies statistically significant clusters of high or low values as well as any spatial outliers associated with these data (Scott and Janikas, 2010, p. 33 - 35). As part of the process the Z score associated with each feature, in this instance HDNs with manufacturing employment, was calculated. Additional analysis is incorporated within the process identifying which of these results (clusters) is statistically significant.

The results of the analysis are then grouped into four categories of clusters denoted by HH, LL, HL and LH. These annotations are interpreted as follows:

- HH: HDNs that are surrounded by similar HDNs with statistically significant high Z scores
- LH: HDNs with low Z scores that are surrounded by those with statistically significant high Z scores
- HL: HDNs with high Z scores that are surrounded by other HDNs with statistically significant low Z scores,
- LL: HDNs that are surrounded by similar HDNs with statistically significant low Z scores

Prior to analysis, the data were standardised by calculating the percentage of total employment within each HDN accounted for by Manufacturing related activities. Whilst it is feasible to use the actual employment data associated with each HDN, to do so would result in MAUP scale effects influencing the results which would be limited to the identification of a limited number of clusters approximating to HDNs with very high levels of employment relative to their surrounding HDNs.

The analysis establishes that there are 170 HDNs with some manufacturing related employment within the Corridor. A total of 126,806 jobs are located in these nodes of which, 33,434 are classified as manufacturing related. It is evident from these data that, within a considerable number of nodes, there are a range of other economic activities taking place. Applying the cluster analysis confirms this assertion. Of the 170 nodes with some manufacturing activity, 37 clusters of manufacturing employment are identified. The vast majority, 32, of these are classified as HH, i.e. HDNs proximal to other HDNs with statistically significant concentrations of manufacturing employment. These are distributed primarily around the perimeter of

the larger cities within the Atlantic Corridor (Figure 7.12). There are exceptions to this pattern in the Limerick and Mallow labour market areas. Here one finds three HDNs with statistically significant concentrations of manufacturing employment in locations that are distant from the larger urban centres. A further three HDNs are classified as LH, having lower levels of employment but are located close to other HDNs with high concentrations of employment. Combined, these two groups (HH and LH) of HDNs account for 22,122 of those persons employed in manufacturing within the Atlantic Corridor. This equates to 65.90% of the total manufacturing employment concentrated within HDNs in the area and 28.99% of total employment in manufacturing within the Corridor. There are three HDNs classified as LH, nodes with low levels of manufacturing located beside those with statistically significant high levels of manufacturing employment.

Given the limited number of HDNs and relatively large proportion of employment associated with them, there is evidence to support the view that the CCM associated with manufacturing is enhanced through the clustering of workplaces. From a neo-Marshallian perspective of development, the economic geography of manufacturing within the Atlantic Corridor enhances the potential for growth of these activities in this location. Additional research into the type of manufacturing that is taking place and those formal and informal linkages between firms in these locations is required to understand whether this potential can be activated.

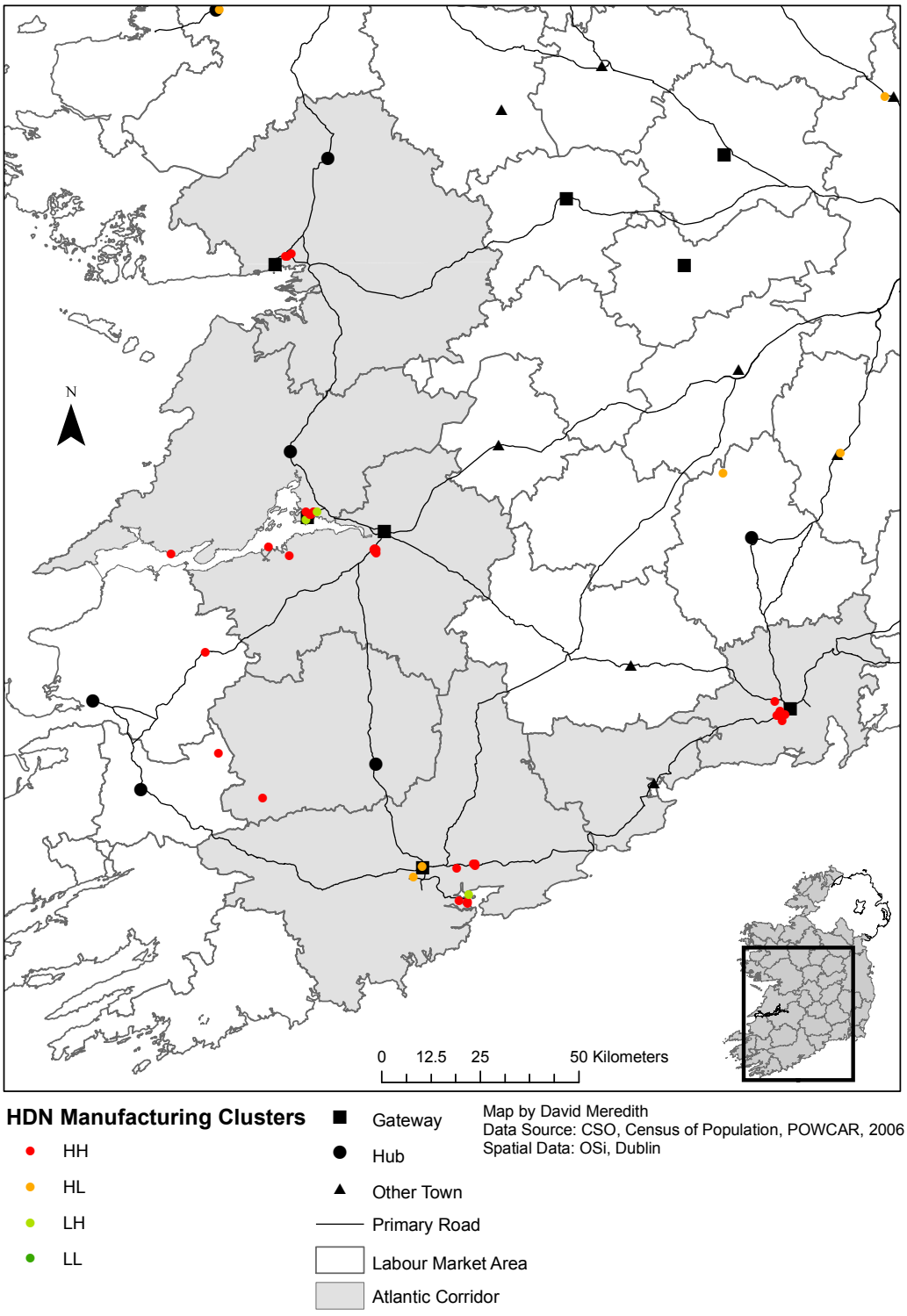


Figure 7.20 Location of HDN clusters with statistically significant concentrations of manufacturing employment within the Atlantic Corridor

7.4 Interaction along the Atlantic Corridor

In proposing the Atlantic Corridor as a counterbalance to the Dublin area, the NSS indicates that *"There is evidence of growing interaction between Cork and Limerick and also between Waterford and Cork and between Limerick and Galway."* (DoEHLG, 2002, p. 41). This analysis aims, using the POWCAR data, to establish the extent of interaction between the constituent local labour markets within of the Atlantic Corridor.

Successful implementation of this polycentric model is considered central to achieving balanced regional development by enhancing the critical mass of a number of places. Establishing the extent of interaction provides, albeit one dimensional, indications as to the extent of functional integration between individual labour market areas. Notwithstanding these limitations, travel-to-work data have been consistently used in studies of inter-regional polycentricity (Green, 2007, Kloosterman and Musterd, 2001, Musterd and van Zelm, 2001, Parr, 2004). Analysis of the socio-economic composition of these flows provides insights into the characteristics of and reasons for those populations to commute between areas.

Before commencing this analysis it is important to acknowledge that measuring economic interaction through labour flows is problematic as, in the first instance, there is a limit to the extent that commuting between distant places, i.e. Waterford and Galway, is practical. Secondly, measuring interaction in this way ignores key functional flows created through economic activity, namely those associated with the transaction of goods and services cf. Musterd and van Zelm, 2001. Notwithstanding these issues, travel-to-work patterns provide an indication of the *relative* significance of commuting from each of the local labour market areas to other labour markets, both within and external to the Atlantic Corridor.

7.4.1 Interaction within the Atlantic Corridor

There are 368,100 workers living within the Atlantic Corridor with known places of work. Within the same space, there are 370,866 jobs. A simplistic analysis would suggest that there was a -0.75% jobs deficit within the region. This figure equates to the difference between the number of workers living within the area and the number

of jobs, necessitating daily commutes on the part of 2,766 workers from places outside of the Atlantic Corridor to workplaces within it. Travel-to-work patterns are, and labour market interaction is, however, much more complex. Workers exhibit highly variable travel-to-work patterns that are shaped by the multidimensional characteristics of the individual, their local and or household context and the types of employment that are accessible to them.

Of the 368,100 workers living within the Atlantic Corridor 352,261 also work within this space, equating to a supply side self-containment level of 95.69%. The number of workers living and working within each of the constituent labour markets comes to 330,223 persons. The size of these labour markets, in terms of the number of jobs and workers living within them varies considerably (Figure 7.13). Waterford, Cork, Limerick and Ennis – Shannon local labour market areas all record labour deficits whilst those associated with Dungarvan, Mallow and Galway have labour surpluses.

The population who commute between labour market areas within the Atlantic Corridor amounts to 22,038 workers. Compared to the total population of workers living within the Corridor, this is a relatively small number, 5.99% of the total. It should, however, be borne in mind that there are substantial populations of 'Mobile' workers and those that did not provide information on their place of work, some of whom must work within the region.

The distribution of the 22,038 commuters between the seven local labour market areas that comprise the Atlantic Corridor is highly uneven (Figure 7.14). The rate of inter-market commuting ranges from 2.12 persons per thousand workers within the Galway market to 14.60 and 17.38 in the Mallow and Limerick areas, respectively. An evaluation of these data suggests that there is a greater level of potential interaction between some parts of the Atlantic Corridor, particularly the Mallow – Limerick – Ennis-Shannon labour market areas. If this is an accurate assessment it lends significant support to the contention within the NSS of interaction along the Corridor.

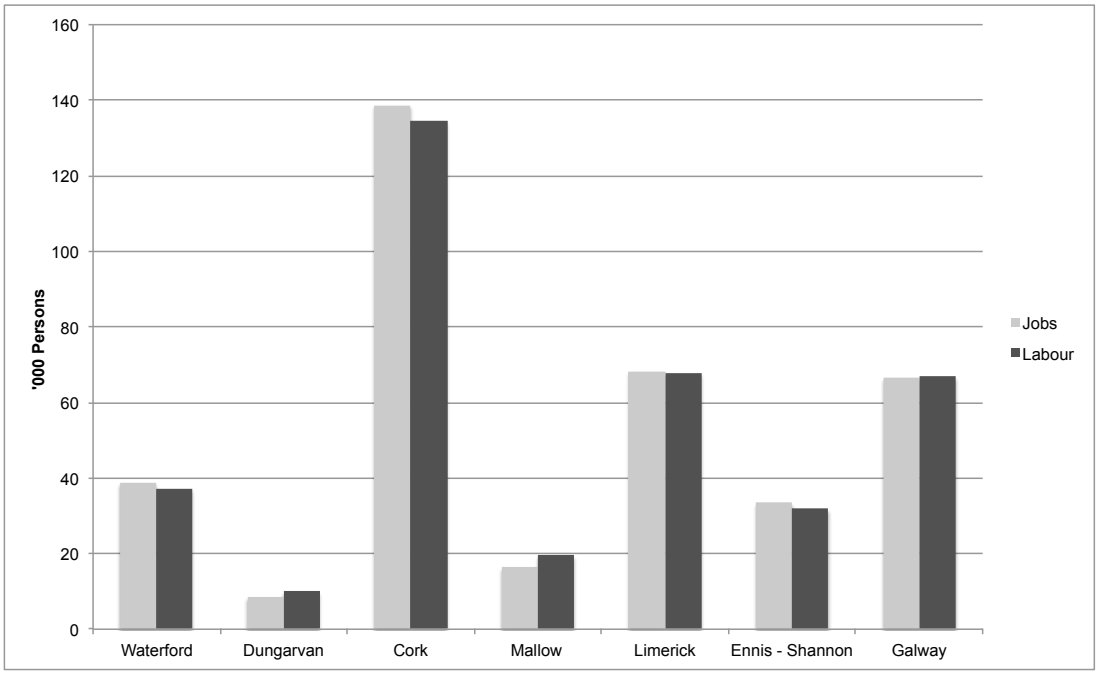


Figure 7.21 Atlantic Corridor: Number of jobs and number of workers in each local labour market area

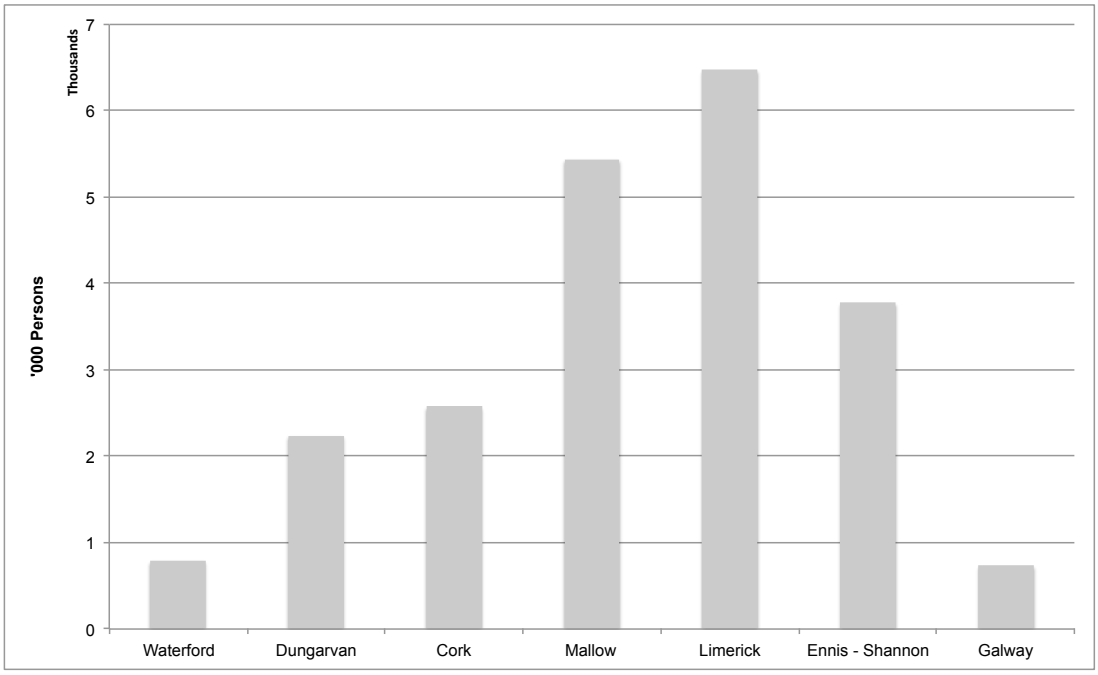


Figure 7.22 Number of persons commuting between local labour market areas within the Atlantic Corridor

Before arriving at this conclusion it is necessary to consider the population of 15,839 workers living in the seven labour market areas that travel-to-work outside of the Atlantic Corridor. This population is unevenly distributed within the Atlantic

Corridor, largely reflecting the overall size of the workforce residing in each area. Expressing these data in terms of the rate per thousand workers living within each labour market enables a clearer pattern to emerge (Figure 7.15). For the purpose of comparison the rate of commuting between areas within the Atlantic Corridor is also provided. The latter rate is referred to as 'Internal Flows' whilst the former is labelled 'External Flows'. The rate of external commuting exceeds, with the exception of the Ennis – Shannon area, by a multiple the rate of internal flows. With regard to the latter local labour market, the reduced external flows may be explained by its physical geography with the ocean to the south and west and the Shannon River hindering access to the east. What is most striking is the rate of external flows from the Waterford and Galway areas. Anchoring the northern and south-eastern ends of the Corridor, it is apparent that these labour markets, with their low rate of internal flows, are oriented away from the Atlantic Corridor.

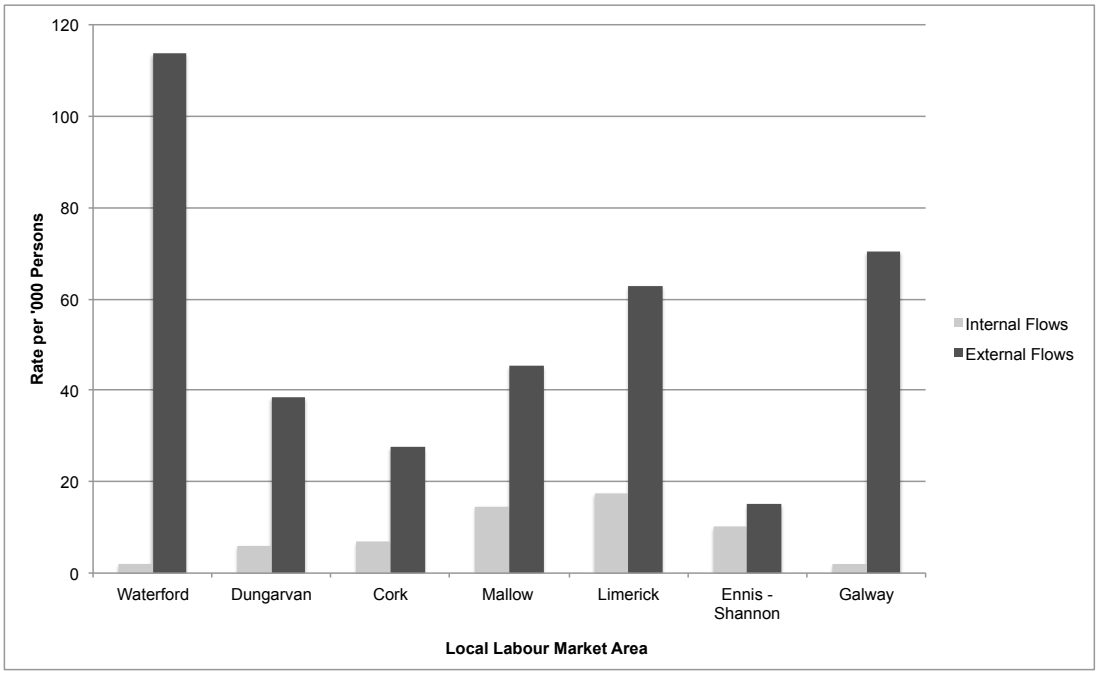


Figure 7.23 Atlantic Corridor: Rate of internal and external flows

Spatial interaction analysis using the POWCAR data, involving an evaluation of the scale and distribution of the internal flows, confirms this assessment. In the case of the Waterford, Cork and Galway labour market areas, less than 2.1% of the resident workers commute to another labour market within the Atlantic Corridor. Summary data related to the scale of these flows is presented in Table 7.12 and Table 7.13. The

largest flow from the Waterford labour market, 585 or 1.57% of the workers living in the area, enters the neighbouring Dungarvan labour market. With regard to the pattern observed in the case of the Galway labour market area, interaction with other areas of the Atlantic Corridor is minimal. The largest flow enters the neighbouring Ennis – Shannon local labour market area. This flow comprises 494 workers or 0.74% of the total number of workers living in the Galway area. In both instances, the major flows from these areas are towards more accessible labour markets e.g. Wexford in the case of Waterford and Athlone with regard to Galway.

Table 7.12 Counts of the origin – destination flows between local labour markets within the Atlantic Corridor

		Place of Work						
		Waterford	**Dungarvan**	**Cork**	**Mallow**	**Limerick**	**Ennis - Shannon**	**Galway**
Place of Residence	**Waterford**	33,317	585	159	*	30	*	*
	Dungarvan	1,091	7,327	1,100	23	20	*	*
	Cork	188	382	128,686	1,452	443	69	40
	Mallow	*	24	4,049	13,277	1,290	66	*
	Limerick	44	16	673	927	58,764	4,666	151
	Ennis - Shannon	*	*	65	10	3,184	27,718	509
	Galway	*	*	54	10	168	494	61,134

Source: POWCAR, 2006. Author's calculations.

The Limerick labour market area displays a similar pattern to those of Galway and Waterford, recording a high rate of interaction with areas external to the Atlantic Corridor. In this instance, however, the largest flows of workers resident in this area enter the Ennis – Shannon and Mallow local market areas. Indeed, there is a relatively high level of labour market interaction between Limerick and Ennis - Shannon. With regard to interaction between Limerick and Ennis – Shannon areas, 4,666 (9.97%) of workers from the former area work in the latter. Conversely, 3,184 (6.88%) of workers resident in Ennis – Shannon, work within the Limerick labour market.

Table 7.13 synopsises the level of interaction between the constituent labour markets that comprise the Atlantic Corridor whilst also giving an indication of the

directionality of these interactions. It is evident that smaller labour market areas interact with larger labour markets. The obverse of this relation is true only in the case of the Limerick – Shannon – Ennis labour markets. Both Dungarvan and Mallow local labour market areas record high levels of interaction with their larger neighbours. In Mallow's case, the interaction is with both the Cork and Limerick areas.

Table 7.13 Evaluation of inter-labour market interaction within the Atlantic Corridor

Inter-Labour Market Interaction			
Direction (South – North)	Strength	Direction (North – South)	Strength
Waterford - Dungarvan	0	Dungarvan - Waterford	++
Dungarvan - Cork	++	Cork - Dungarvan	0
Cork - Mallow	0	Mallow - Cork	+++
Mallow - Limerick	+	Limerick - Mallow	0
Limerick - Ennis-Shannon	+	Ennis-Shannon - Limerick	+
Ennis-Shannon - Galway	0	Galway - Ennis-Shannon	0
0 = < 5% interaction		++ = 10 - 20% interaction	
+ = 5% - 10% interaction		+++ = >20%interaction	

This finding lends support to the classification of these towns and their associated labour market areas as Hubs and Other Towns within the NSS as they clearly provide a form of functional integration or bridge between larger Gateways. Thinking somewhat more critically about this pattern raises a number of issues not least of which is the contradiction between the NSS's objectives of encouraging increased economic interaction within the Corridor whilst simultaneously reducing extensive commuting patterns from rural areas through increased 'matching' of where people live with where they work (DoEHLG, 2002, p. 105 - 107).

7.5 Summary and Conclusions

In setting out to explore the composition and scale of critical mass associated with the Dublin and Atlantic Corridor local labour market areas this chapter adopted a

theoretical perspective of labour as a stock or asset. This is in keeping with the view of the NSS, which sees labour as being set within a neo-Marshallian framework. These populations were evaluated to identify the scale of differences in size and composition in terms of labour force characteristics, educational qualifications. Detailed spatial analysis was undertaken to identify the core critical mass of each area. In keeping with contemporary spatial science perspectives, those places where more than 357 persons per 250m^2 cell work were classified as high-density nodes. The spatial distribution and economic composition of employment within these HDNs was analysed through the use of a number of statistical techniques.

The results of this analysis found that, compared to the Dublin local labour market area, the critical mass within the Atlantic Corridor is smaller and more fragmented. In terms of the indicators suggested within the NSS to denote critical mass, the Atlantic Corridor records significantly lower population, population density and proportion of population living in urban areas. Even when one allows for the differences in the size of population, the labour force within the Atlantic Corridor is smaller than that of the Dublin area. The structure of the labour force is also different. Both male and female participation rates are higher in the Dublin area whilst the unemployment rate is lower. The composition of the economy differs substantially between the areas. Whilst Commerce is the most important activity in terms of employment in both areas, only 27.80% all jobs in the Atlantic Corridor are in this sector. The equivalent figure for the Dublin labour market is 38.23%. Manufacturing and related activities is a very significant sector employing 20.57% of persons within the Atlantic Corridor compared to 12.31% in Dublin.

In addition to the generally lower level of critical mass, one of the other important features to emerge from the analysis is the fragmented nature of critical mass within the Atlantic Corridor. The labour markets associated with the Mallow and Dungarvan areas, in particular emerged as being relatively small. This accounts for some of the commuting patterns from these areas to neighbouring labour markets identified in this analysis.

The analysis of core critical mass confirmed the findings of earlier research into aggregate critical mass. Overall there are a substantially smaller number of high-

density nodes within the Atlantic Corridor. Whilst these are geographically clustered to a greater extent, overall, than those in the Dublin area the distances between clusters is significantly greater. This is evidenced by the presence of a group of HDNs more than 10 km from a Gateway, Hub or Other Town within the Atlantic Corridor. A detailed evaluation of the core critical mass associated with manufacturing activities in the Atlantic Corridor was undertaken. The analysis suggests that the core critical mass associated with manufacturing activities is enhanced through the presence of a number of clusters proximal to the main cities in the region.

Exploring patterns of interaction between the constituent local labour markets of the Atlantic Corridor found that relatively few workers commute between areas. The highest levels of travel-to-work based interaction were found between neighbouring labour markets, particularly Shannon – Ennis and Limerick, Limerick and Mallow, and Mallow and Cork. A further significant finding is the limited interaction between Waterford and Galway and other parts of the Corridor. These results indicate that the Atlantic Corridor is neither polycentric nor is the critical mass enhanced through inter-area commuting.

From an empirical perspective, the results of this analysis demonstrate that the critical mass, whether aggregate or core, of the Atlantic Corridor and the Dublin area differs significantly in terms of scale, spatial structure and industrial composition. The spatial location of key centres within the Corridor mitigates against consolidation of critical mass. Thinking metaphorically about the spatial structure of critical mass in these areas Dublin can be viewed as the centre of a dense network of relatively proximal places. In contrast, the Atlantic Corridor is perhaps best viewed as an archipelago with each city an island only tangentially connected to their neighbour by the body of water/land separating them.

Polycentric development within the Atlantic Corridor calls for increased ‘complementarity’ and specialisation of economic activities within each of the labour market areas that comprise this space. Given the relative importance of manufacturing related industries within most of the labour markets that comprise the Corridor there is potential to build networks of economic relationships between

spaces through development of this sector. Such a strategy would, however, necessitate the development of industrial complexes wherein the inputs for a particular manufacturing process were produced by another conglomeration within the Corridor. This, in turn, demands a complementary unfolding of the spatial divisions of labour and, the dark side of this relationship, of unemployment between spaces. Whether such a strategy is achievable is open to question. A number of factors mitigate against the successful implementation of this type of economic model not least of which is Ireland's reliance on FDI led development. Whilst this is an important source of employment and revenue, it implies greater integration of local networks into global systems rather than those that are regionally based.

Chapter 8 LABOUR GEOGRAPHY IN IRELAND

8.1 Introduction

Central to the NSS is the concept of the residence – work linkage. This Chapter addresses the question of "Who works where?" or, in the language of the NSS *"where people live [and] where they work"* (DoEHLG, 2002, p.10). The 'who' refers to different socio-economic groups of workers whilst the 'where' is considered from the perspective of the local labour market areas identified in the Chapter Six. As noted in the introduction to this thesis, labour geographies, with a limited number of exceptions, are largely under-researched in Ireland. In contributing to the development of greater understanding of labour geographies this chapter has two key objectives: i) situating Ireland with regard to the international literature in this area; and ii) providing improved comprehension of how different groups of workers are placed within space.

The analysis commences with an assessment of the gendered nature of employment in Ireland. Differences in journeys-to-work experienced by males and females are explored through an assessment of the distance travelled and mode of transport used. Attention then turns to the issue of gender sorting, a consequence of processes that place male and female workers within particular industries and occupations[4]. This is a common feature of labour market segmentation reported in the literature. If, in accordance with experience elsewhere, sorting occurs within Ireland's labour markets it will result in highly variable travel-to-work patterns amongst different segments of the workforce. It is necessary, therefore, to provide a short overview of the gendered structure of both industries and socio-economic groups before commencing the evaluation of labour geographies. This evaluation takes as a starting point an assessment of gendered differences in the geography of self-containment before considering the intersection between geography, gender and socio-economic group self-containment.

[4] The term occupations and socio-economic group are used interchangeably throughout this chapter.

8.2 Gendered Divisions of Labour

The work of Massey (1995), Hanson and Pratt (1991), Schwanen et al., (2008) and many other researchers identifies two key features of labour market segmentation; differences in male and female journey-to-work, in terms of distance travelled and mode of transport used; and, the sorting of male and female labour into different occupations and industrial sectors (Raynolds, 1998, Wyly, 1999, Yeung and Lin, 2003, Perrons, 2004, Silva and Leichenko, 2004). In many respects it is the issue of labour sorting and the attendant spatial manifestation of this process that is at the heart of the NSS's concern with where people live and work as this gives rise to different travel-to-work patterns. By way of providing a context to this research and before considering this issue it is worth setting out gendered differences in travel-to-work.

8.2.1 The gendered friction of distance: Evaluating male and female differences in distance travelled to work

Analysis of the POWCAR establishes that the average distance between home and work for males is 17.6 km compared to 13.2 km for females. This finding is very much in keeping with the results of similar analysis reported in national and international research. The analysis also establishes, in line with international experience, that though female journeys-to-work are shorter than their male counterparts, it takes longer for women to get to work. In many instances this is thought to reflect 'spatial entrapment' wherein working women's greater responsibilities within the household and dependence on public transportation to travel-to-work, constrains where they can work (Mensah, 1995).

Analysis of the POWCAR data establishes that a greater proportion of women (68.42%) travel-to-work by car compared to their male counterparts (58.91%). Closer examination of women with children, the group most commonly studied within the local labour market segmentation literature (Law, 1999), finds that, in Ireland 77.73% commute to work by car compared to 63.97% of males with children. 'Spatial entrapment', in terms of differential rates of access to private transport does not appear to explain the differences in average distance travelled-to-work highlighted above. These results are in line with those reported in some of the

literature concerned with labour market segmentation and mobility. Hanson and Pratt (1995, p.229-230) noted that approximately 75% of their sample of female workers commuted to work by car, concluding that accessibility to private transport was not the primary issue resulting in labour market segmentation. Other research has however, noted significant differences in the level of car usage between men and women, with limited access on the part of female workers considered to contribute to processes of labour market segmentation (Frost and Spence, 1981, p.108, Cristaldi, 2005, p.280, Crane and Takahashi, 2009, p.331).

It should be noted that the research by both Frost and Spence (1981) and Crane and Takahasi (2009) focused on urban or inner-city areas. In order to establish if similar patterns are observable in Ireland the travel-to-work data associated with that population of women, residing in urban areas in Ireland, was extracted from the POWCAR. Urban areas refer to those spaces defined as urban by the CSO for the purpose of reporting the results of the Census of Population. The results of this analysis establish that 53.25% of women living in urban settings travel-to-work by car compared to 54.69% of males (Figure 8.1). Though fewer women travel by car to work within urban settings than their male counterparts the difference between the groups does not reflect the findings of either Frost and Spence (1981) or Crane and Takahasi (2009).

Interestingly, greater proportions of women living in urban areas commute to work on foot or by public transport, though more men than women cycle to work. Greater dependence on personal mobility and public transport on the part of women may reflect processes of local labour market segmentation. The spatially limiting nature of this type of travel-to-work, in terms of the household's proximity to the workplace make it likely that labour markets with large urban populations will have higher levels of female supply and demand side self-containment. It is to this issue that attention now turns; however before doing so it is worth noting that relatively little research concerning travel-to-work patterns within and from rural areas has been published. This is surprising given the considerable attention given to issues of restructuring of the rural economy, counterurbanisation and rural gentrification within a number of journals including *Regional Studies*, the *Journal of Rural Studies* and *Population, Space and Place*. Cristaldi (2005) has explored differences in the

mode of transport used by women commuting from rural areas in Italy; unfortunately the percentage using cars is not reported. Within Ireland, far more women living in rural areas travel-to-work by car as either a driver or passenger (81.09%) than their male counterparts (61.85%) (Figure 8.1). This difference is largely accounted for by the proportion of men living in rural areas who travel-to-work in a lorry or van (16.96%).

Within area differences are equally interesting as they point towards gendered movement through space. In urban areas higher proportions of women walk to work (20.40%) though fewer cycle (1.73%) compared to their male counterparts, 12.08% and 4.80% respectively. Within rural areas, though the overall number travelling to work using these modes is substantially smaller, the pattern is largely similar (Figure 8.1).

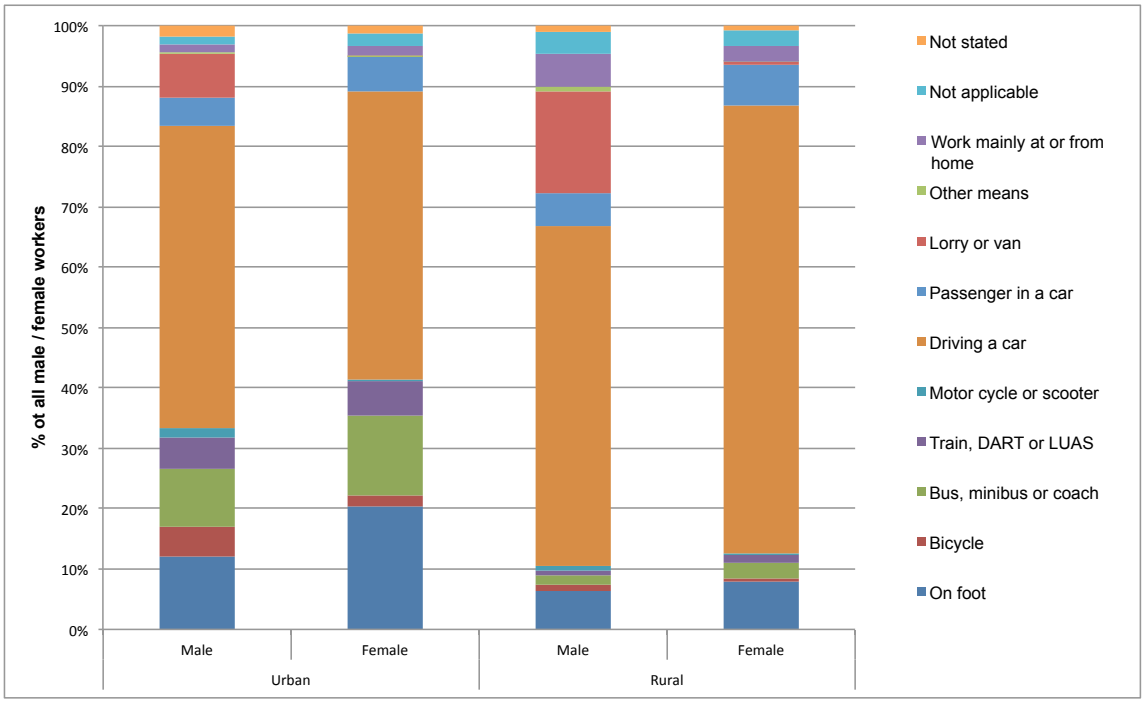


Figure 8.1 Urban – Rural differences in male and female mode of travel-to-work

8.2.2 The gendered nature of industrial employment

Sorting of males and females into different industrial groups is conventionally explored through an evaluation of the proportion all jobs within each sector that are

filled by either males or females. Jacobs (1989, p. 68) determined that an industrial group, or occupation, could be deemed 'gender dominated' if more than 70% of the national population of workers were either male or female. Sectors that are not dominated are classified as 'gender-integrated'.

Analysis of the eight industrial categories reported in the POWCAR identifies four male and one female dominated groups. It is largely unsurprising to find that the male dominated industrial groups include sectors that are traditional viewed as 'male', i.e. Agriculture, Forestry and Fishing; Manufacturing and related industries; Construction; and Transportation, Storage and Communications (Figure 8.2). Health, Education and Social Work, is the only female dominated sector. This is, once again, unsurprising as the jobs associated with this sector are stereotypically linked to women i.e. nurses and other health workers, teachers and social workers.

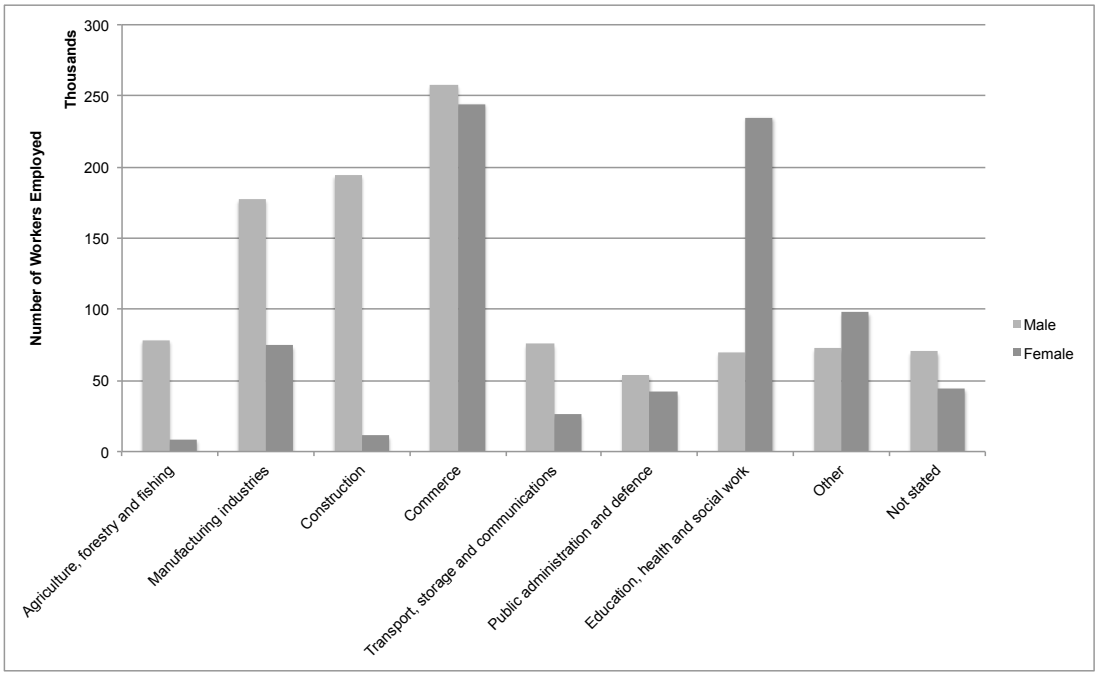


Figure 8.2 Male and Female employment by industrial group

The remaining three categories, Commerce, Public Administration and Defence as well as Other and those that did not state their industry, all record majority male employment. As neither male nor female workers account for more than 70% of total employment in these sectors they are classified as gender-integrated. Whilst greater numbers of women compared to men are employed in the 'Other' sector, female

employment is less than 70% of the total and hence this sector is also classified as gender integrated.

8.2.3 Intersection between gendered divisions of labour and education

Human capital explanations of labour market segmentation in Ireland associate the type of employment engaged in by males and females as inherently linked to their skills and education (O'Connell and Gash, 2003). As such it is worth briefly considering differences between the sexes employed in gender dominated and gender integrated sectors. This assessment draws on analysis of all records in the POWCAR to establish the percentages of males and females with second level or lower qualification and those with a 3rd level qualification.

The results of this research find that in the female dominated sector, very high proportions of both male and female workers have some form of 3rd level qualification (Table 8.1). This reflects the requirement for both health and education professionals and social workers to attain higher levels of formal education as a means of accessing employment in this sector. Higher proportions of males working in this sector, relative to their female counterparts, have a third level qualification. This is thought to reflect the male dominated nature of some occupations within, particularly, the health sector e.g. as doctors.

Table 8.1 Percentage of males and females in gender dominated and gender integrated sectors by highest level of education

	Female Dominated		Gender Integrated		Male Dominated	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
2nd Level Education or lower	20.12	24.55	72.14	57.24	85.04	69.78
3rd Level Qualification	79.88	75.45	27.86	42.76	14.96	30.22

Source: POWCAR, 2006. Author's calculations

The gender integrated and male dominated sectors see a reversal of this pattern with significantly ($p < 0.01$) greater proportions of females with higher levels of education than their male counterparts. In the gender integrated sector, comprising Commerce, Public Administration and Defence, 'Other' and those that did not state their industry, 42.76% of women held a 3rd level qualification compared to 27.86%

of their male counterparts. Similarly, women working in male dominated sectors recorded significantly ($p < 0.01$) higher levels of education. That female workers consistently record higher levels of education compared to their male counterparts in both gender integrated and male dominated sectors suggests that educational attainment is not the primary reason for the segmentation of labour in Ireland. This is not to suggest that education is unimportant in the process of within group segmentation i.e. between women.

8.2.4 Intersection of industrial and occupational segmentation

The foregoing assessment establishes the gendered nature of employment in Ireland. Attention now turns to considering the gendered nature of socio-economic groups. This aspect of economic geography has formed the focus of much of what has been written about labour geographies in general and labour market segmentation in particular. Research by Green et al., (1986) Green and Owens, (1989) Hanson and Pratt (1991), Pratt and Hanson (1991), Feilding (1992), Hiebert (1999) and Hillmert (2002) draw attention to the presence and persistence of occupational, in addition to industrial, segregation of male and female workers. Before exploring the intersection of occupational and industrial segmentation, male and female occupational differences are outlined.

Classifying the socio-economic groups reported in the POWCAR along similar lines to male and female-dominated industries highlights the male-dominance of four occupational groups, Farmers, Agricultural workers, Own account workers and Manual skilled (Figure 8.3). Only one socio-economic group, 'Non-manual', is classified as female-dominated. There are also greater numbers of women classified as 'Lower Professional' (64.20%) than men. Males predominate across the remaining occupational groups including 'Employers and managers' (64.56%), 'Higher Professional' (62.98%), 'Skilled' (61.55%) and 'Unskilled' (69.06%). As with industrial segmentation, it is evident that the workforce is clearly segmented between socio-economic groups.

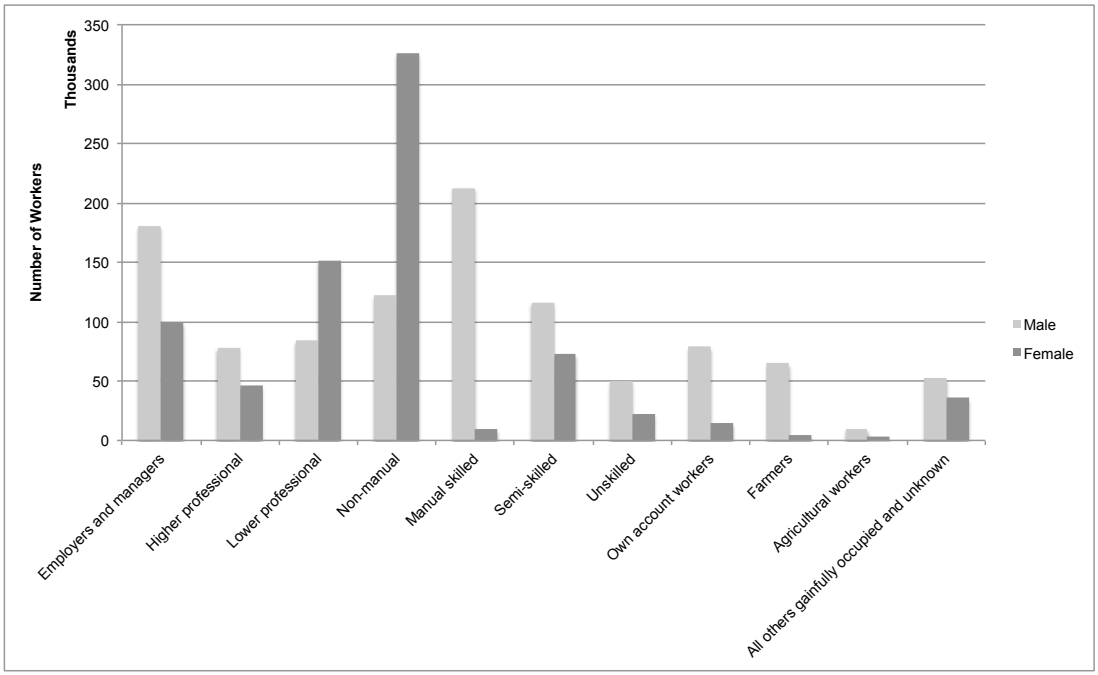


Figure 8.3 Male and Female employment by socio-economic group

The processes resulting in industrial and occupational sorting are, of course, interrelated. By way of exemplifying this point the gendered occupational structure of three industries are profiled. These are selected on the basis that they represent male-dominated, female-dominated and gender-integrated sectors. In the first instance, occupational segmentation within the 'male-dominated' "Manufacturing industries, mining, quarrying and turf production, electricity, gas and water supply sector" is considered. This is followed by a similar evaluation of the female-dominated "Education, health and social work" sector. Finally, the "Commerce" sector, which has roughly similar numbers of male and female workers, is considered.

With regard to occupational segregation within the manufacturing sector, workers classified as 'Non-manual' and 'Manual skilled' are highly sorted by gender (Figure 8.4). Women dominate the 'Non-manual' workforce whilst males dominate the 'Manual skilled' group. The population of 'Semi-skilled' workers is relatively highly segregated, with more women than men, though not to the same extent as the 'Non-manual' and 'Manual skilled' cohorts. Another notable feature of segregation within the manufacturing sector is the higher percentage of females classified as 'Lower Professional' workers.

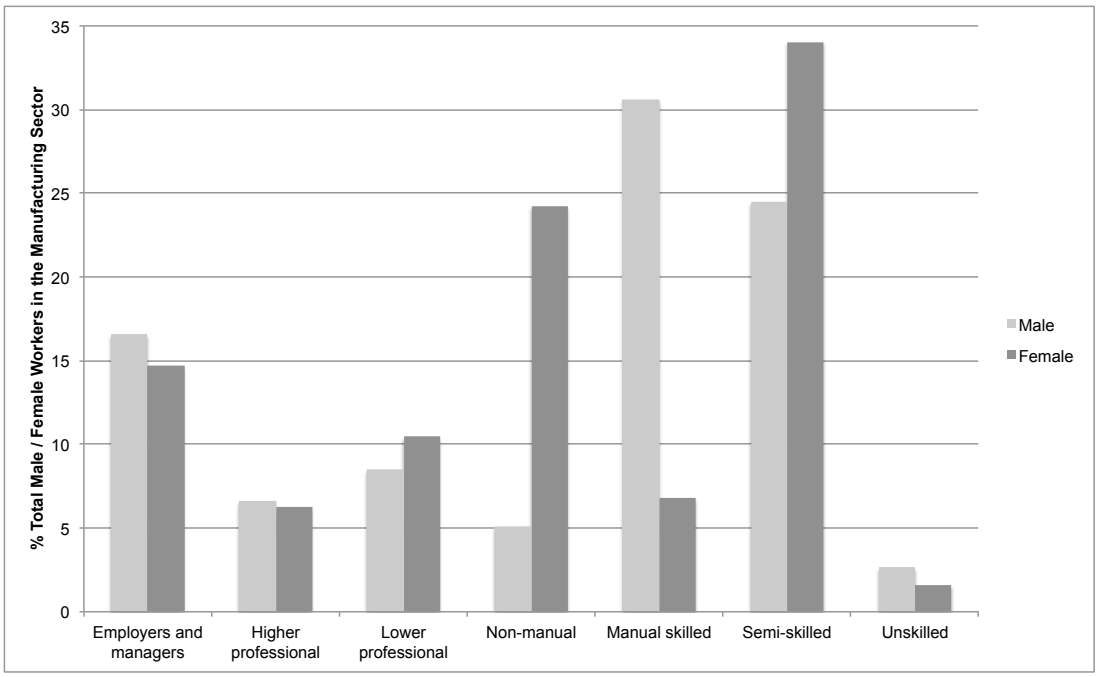


Figure 8.4 Occupational segmentation within the manufacturing sector

The Education, health and social work sector is classified as female-dominated; 77.02% of all workers employed in this sector are women. The occupational structure of employment is notable in that considerably more men than women are classified as 'Higher Professional' (Figure 8.5). A further key difference relates to the 'Non-manual' group of workers. Whilst 25.97% of women working in the sector are classified as 'Non-manual', only 8.82% of males are. As with the Manufacturing sector, there is a stark difference in the percentage of males (3.76%) and females (0.20%) classified as working in 'Manual' occupations.

Commerce is considered 'gender-integrated' given that roughly equal proportions of males and females are employed by enterprises within this sector. Notwithstanding this, those workers classified as 'Non-manual', 'Manual skilled' and 'Semi-skilled' are highly sorted by gender (Figure 8.6). Women predominate in the 'Non-manual' population whilst males dominate the 'Higher professional', 'Manual skilled' and 'Semi-skilled' groups.

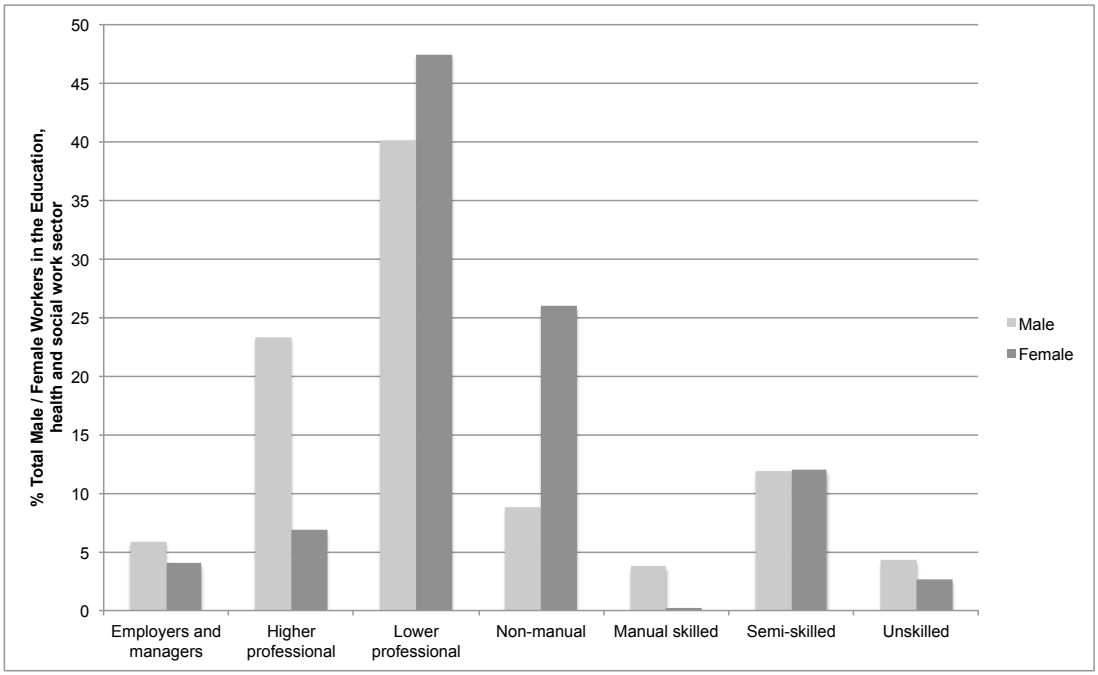


Figure 8.5 Occupational segmentation within the Education, health and social work sector

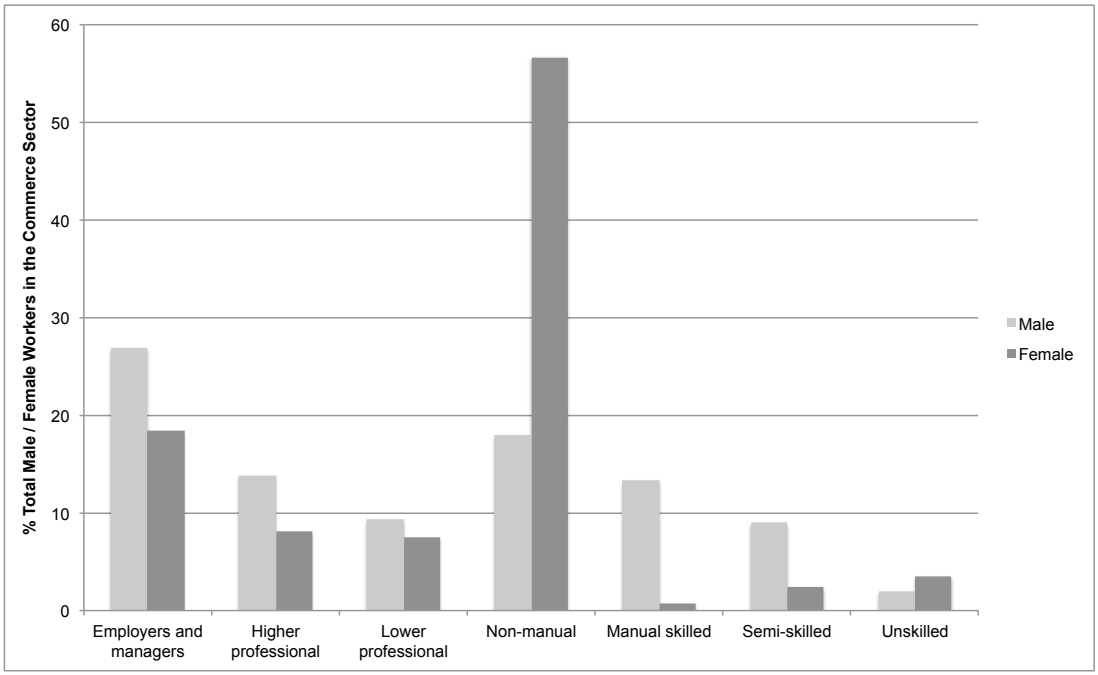


Figure 8.6 Occupational segmentation within the Commerce sector

Analysis of these three sectors establishes significant levels of industrial and occupational segmentation between men and women. In general, within industries men and women are doing largely different types of jobs. The level of segregation

between men and women employed as 'Employers and managers', 'Higher Professional' and 'Lower Professional' varies somewhat. Whilst manufacturing enterprises have slightly greater proportions of males than females employed in these occupational classes the difference is not substantial. There is clear segregation between men and women in these groups within the "Education, health and social work" and "Commerce" sectors. A systematic pattern of high levels of segmentation is evident with regard to 'Non-manual' and 'Manual skilled' and, to a lesser extent, 'Semi-skilled' workers. These results reflect those of other studies carried out in the UK, USA, Canada, Australia and New Zealand (Green et al., 1986, Anderson et al., 1987, Hanson and Pratt, 1992, Randall and Ironside, 1996, Hiebert, 1999, Newell and Papps, 2001).

The analysis undertaken thus far establishes that Ireland reflects international patterns of labour market segmentation when considered from the national perspective. Bearing this in mind, the next section explores the geographies of labour market segmentation in Ireland through an assessment of socio-economic group supply side self-containment. The supply side dimension is focused on as the NSS places emphasis on where people live, in the first instance, and subsequently, on where they work. The local implications of these differences are subsequently considered with regard to the 41 local labour market areas identified in Chapter Five.

8.3 Evaluating labour geographies

In the review of labour market concepts presented in Chapter One the balkanisation of labour was identified as a key issue confronting researchers attempting to define and identify local labour market areas. Green et al. (1986, p. 339) put it succinctly, emphasising *"there is no single 'local' labour market. Rather there is a set of overlapping gender, age, socio-economic, occupational and industrial-specific labour market areas; the dimensions of which are determined by the location of workplaces and residences, differential access amongst sub-groups to transport and other resources, and variations in the areas over which employers and workers are willing to search."* By virtue of the fact that travel-to-work patterns are differentiated along several socio-economic and demographic dimensions, it is to be expected that some groups within the workforce will, relative to other groups, be more self-

contained within local labour market areas. Conversely, some groups will record greater levels of commuting between local labour market areas.

Results generated through the application of the ERA represent, in an aggregate form, a spatial synopsis of local labour market processes (Green et al., 1986, Green and Owen, 1989). These capture a variety of segmentation processes that give rise to local and non-local travel-to-work patterns. In effect, the ERA identifies and distinguishes between those segments of the workforce that both live and work within an area and those that live in one labour market area but work in another. Consideration of the socio-economic composition of those workforces living and working within each of the 41 local labour market areas therefore provides insights into labour geographies. Equally, consideration of the population of workers commuting between areas also provides insights into patterns of labour market segmentation.

8.3.1 The gendered geography of self-containment

A comparative analysis of aggregate male and female self-containment establishes that whilst 88.89% of males live and work within each of the 41 local labour market areas, 90.14% of their female counterparts do so (Table 8.2). Given that men, in general, travel further to work than their female counterparts it is to be assumed that they are more likely to engage in external labour markets. A simple regression analysis of male and female demand side self-containment values and the area or spatial extent of the local labour market, confirms the significance of this relationship ($p=0.00$). The R^2 values resulting from these models are, respectively, 0.319 for males and 0.360 for females. The higher proportion of female demand side self-containment explained with reference to the extent of local labour market areas reflects the greater likelihood of women living and working 'locally'. These aggregate figures and results are very much in line with what one would expect from a theoretical perspective. Assessment at the level of Gateways, Hubs, Other Towns and Other Places however, highlights noteworthy spatial patterns.

Labour markets associated with Gateways are the residential location for 69.79% and 71.16%, respectively, of males and females with known places of work. These

spaces, in aggregate, record a supply side self-containment value of 93.60% for men and 95.15% for women. This pattern of higher female self-containment is also evident in those areas classified as Hubs and Other Towns although the absolute difference between men and women is substantially smaller. Other Places are the only spaces that, when combined, the self-containment value for females is greater than that of males. These results point towards differences in the type and distribution of male and female employment. They also demonstrate the effects of the modifiable areal unit problem, in general, and the issue of zoning wherein different groupings of the data, national, regional and local, in this instance, results in different levels of self-containment levels for males and females depending on which scale one is considering.

Table 8.2 Residential distribution and supply side self-containment of male and female workers

	Resident Workforce		**Working Locally**		**Commuting to other Labour Market**		**Supply Side Self-Containment**	
	Male	Female	Male	Female	Male	Female	Male	Female
Gateway	538357	504080	503881	479643	34476	24437	93.60	95.15
Hub	112701	99019	91942	80955	20759	18064	81.58	81.76
Other Town	68058	58390	50007	43131	18051	15259	73.48	73.87
Other Place	52254	46897	39861	34790	12393	12107	76.28	74.18
Total	771370	708386	685691	638519	85679	69867	88.89	90.14

Source: POWCAR, 2006. Author's calculations.

These spaces are not, however, evenly or regularly organised over space. As noted in the Chapter Five, Other Places are largely associated with labour markets located in remote and, or inaccessible areas, particularly along the west coast of Ireland. Below the aggregate level of Gateways, Hubs, Other Towns and Other Places an assessment of the spatial variation in self-containment highlights significant differences between areas associated with Gateways. In the first instance, female self-containment is higher than that of males in each of the Gateway local labour market areas (Table 8.3). The self-containment associated with these spaces ranges from in excess of

98% (Dublin) to 64.24% (Mullingar). With regard to the latter space, this is part of the Athlone – Tullamore - Mullingar polycentric Gateway. The self-containment values of these spaces are, compared to other Gateways, relatively low indicating higher levels of interaction with surrounding labour market areas.

Table 8.3 Variation in the supply side self-containment of Gateway local labour market areas

	Male supply side self-containment	**Female supply side self-containment**
Dublin	98.19	98.81
Cork	95.22	96.27
Letterkenny - Lifford	91.26	93.49
Galway	91.06	91.78
Waterford	88.25	90.67
Sligo	88.22	91.13
Limerick	84.59	88.90
Athlone	79.02	82.56
Dundalk	75.01	78.61
Tullamore	64.70	71.11
Mullingar	64.24	71.39

Source: POWCAR, 2006. Author's calculations

Similar differences are also evident with regard to the variation in the self-containment values of Hubs, Other Towns and Other Places. With regard to the Hubs, one of the most striking differences, compared to the Gateway areas, is the number of labour markets where male self-containment exceeds female self-containment, for example in Monaghan, Ballina, Cavan and Mallow (Table 8.4). Relatively low female self-containment is common amongst labour markets, four of eight areas, associated with Other Towns (Table 8.5). With regard to these labour markets, compared to those associated with Gateways and Hubs, the range of self-containment is relatively narrow. Whereas the range (between the highest and lowest values) in male and female self-containment is quite broad for Gateway areas, 33.95 and 27.42 respectively, and 17.56 and 21.64 for Hubs, it is relatively narrow for Other Towns, 14.66 and 13.43. It is likely that this reflects the spatial structure of these spaces, which are largely centred on a single urban centre. These places,

'county towns' in most instances, function as the economic core of the labour market area and contain a broadly similar range of economic and administrative functions.

Table 8.4 Variation in the supply side self-containment of Hub local labour market areas

	Male supply side self-containment	Female supply side self-containment
Ennis - Shannon	86.95	86.68
Monaghan	85.63	84.69
Tralee	85.39	89.09
Ballina	83.92	81.86
Wexford	82.31	83.60
Kilkenny	81.17	84.04
Castlebar	81.11	82.96
Cavan	79.18	76.36
Killarney	77.38	75.18
Mallow	69.39	65.03

Source: POWCAR, 2006. Author's calculations

Table 8.5 Variation in the supply side self-containment of Other Towns local labour market areas

	Male supply side self-containment	Female supply side self-containment
Clonmel	80.94	82.57
Longford	79.21	75.46
Carrick-on-Shannon	74.93	72.38
Roscommon	73.55	70.45
Dungarvan	72.96	72.75
Nenagh	72.85	73.97
Carlow	69.46	70.98
Portlaoise	66.28	69.14

Source: POWCAR, 2006. Author's calculations

The range of values, 16.14 and 17.02, associated with Other Places is relatively narrow but, greater than those recorded for the Other Towns (Table 8.6). This reflects the highly heterogeneous structure of these spaces with some focused on county towns, e.g. Donegal, whilst others are amalgams of smaller labour market areas associated with a number of employment centres in, predominantly, remote, rural areas, e.g. West Galway which comprises two distinctive employment centres,

Clifden in the northwest of the area and Carraroe - Spiddal immediately west of Galway City. There are a number of labour markets associated with Other Places where male self-containment exceeds that of females, i.e. West Galway, Dungloe and Buncrana. It is worth recalling the analysis of those records without place-of-work information. All three of these areas reported large cohorts, greater than 15% of the total number of records in each area, of 'mobile' workers and populations that did not provide information on their place of work. In relation to Buncrana, more than 10% of all workers are employed in Northern Ireland.

Table 8.6 Variation in the supply side self-containment of Other Places local labour market areas

	Male supply side self-containment	Female supply side self-containment
Donegal	86.08	84.96
Kenmare	84.23	84.07
Malin	82.06	79.70
Dungloe	80.52	82.35
West Cork	78.46	76.96
Westport - Achill	77.70	75.74
Buncrana	77.21	78.27
Thurles	77.10	67.96
Caherciveen	75.69	73.26
Birr - Roscrea	73.99	67.08
West Galway	72.87	78.22
Enniscorthy	69.94	67.94

Source: POWCAR, 2006. Author's calculations

The pattern of self-containment values suggests that areas with lower numbers of women living and working locally correspond to areas with significant numbers of records with missing place-of-work data. This relationship is assessed through a regression analysis of the percentage of all records without place-of-work data and the percentage of female supply side self-containment. This establishes that there is no statistical relationship between these variables, $R^2=0.029$, $p=0.281$, confirming that patterns of self-containment reflect other processes influencing the numbers of women living and working locally.

8.3.1.1 Patterns of Female supply side self-containment

One of the key features associated with the data presented above are within-group differences, i.e. between males and between females, in self-containment. Plotting the level of female supply side self-containment associated with the 41 local labour market areas highlights a number of distinctive spatial patterns (Figure 8.7). Labour markets associated with larger urban centres record the highest percentages of females living and working in the same area whilst the lowest values are recorded in those areas immediately adjacent to the Dublin, Waterford, Cork, Limerick and Galway areas. In the first instance, this indicates that occupations available to or favoured by women are concentrated in larger urban centres. Secondly, this pattern suggests a relatively high degree of commuting on the part of women from geographically smaller labour markets to those containing large urban centres. Analysis of those populations of women commuting from these areas confirms this proposition.

An evaluation was undertaken using the POWCAR data to assess the interaction, in terms of the number of women travelling-to-work, between all labour market areas. Women commuting from areas with lower, <75%, self-containment establishes that these generally travel to work in labour markets with large urban centres. There is, as one might expect, an obvious spatial pattern of low self-containment and proximity to labour markets with large urban centres. Figure 8.8 depicts the origin and destination labour markets of women commuting from a number of such areas including the Carlow, Mallow, Thurles and Carrick-on-Shannon labour markets. Taking the Carlow labour market area as an example, the analysis establishes that 2,524 women travel to work in the Dublin labour market area. This figure represents 68.03% of all female commuters from the Carlow area.

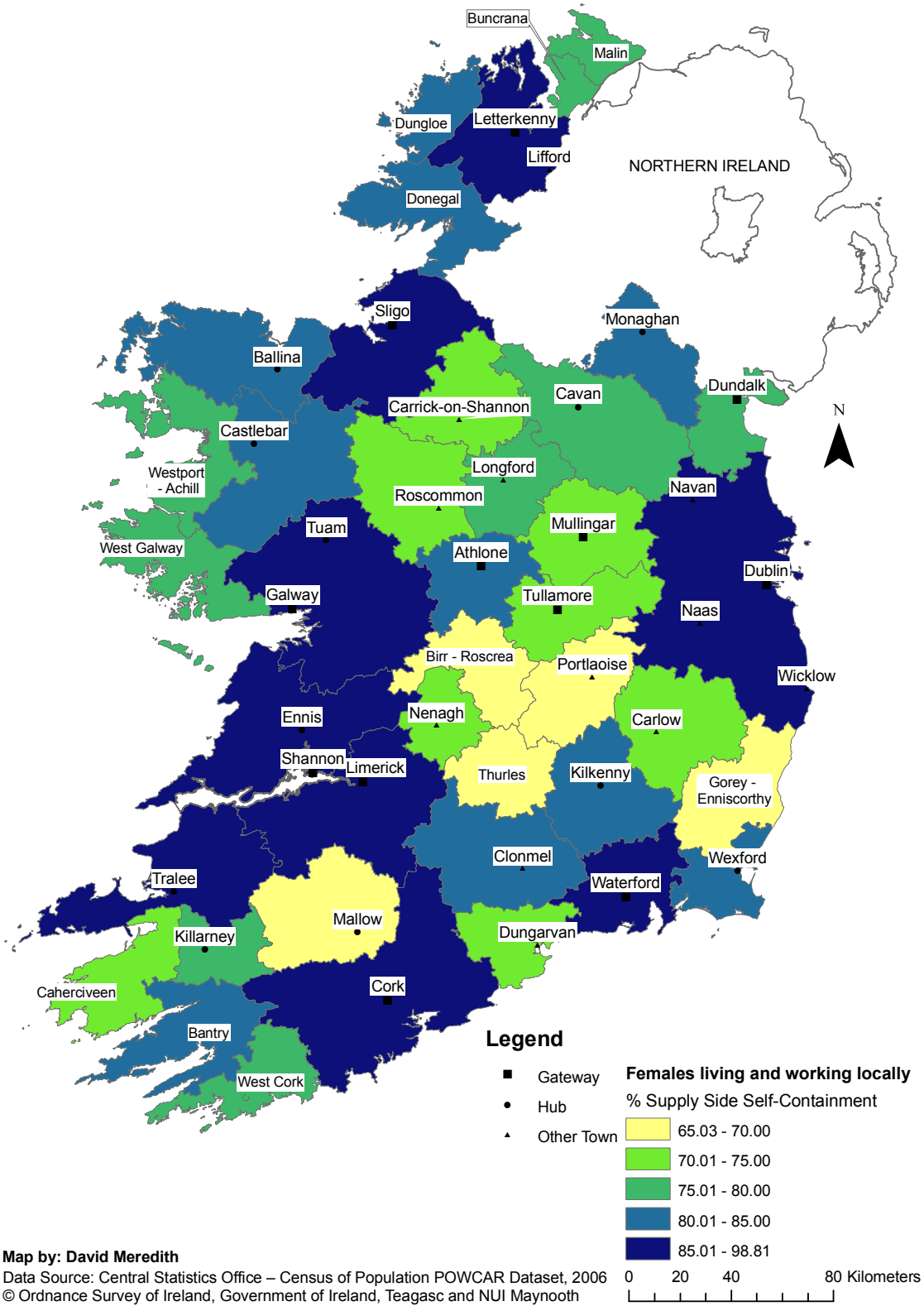


Figure 8.7 Percentage of females living and working within the same local labour market area

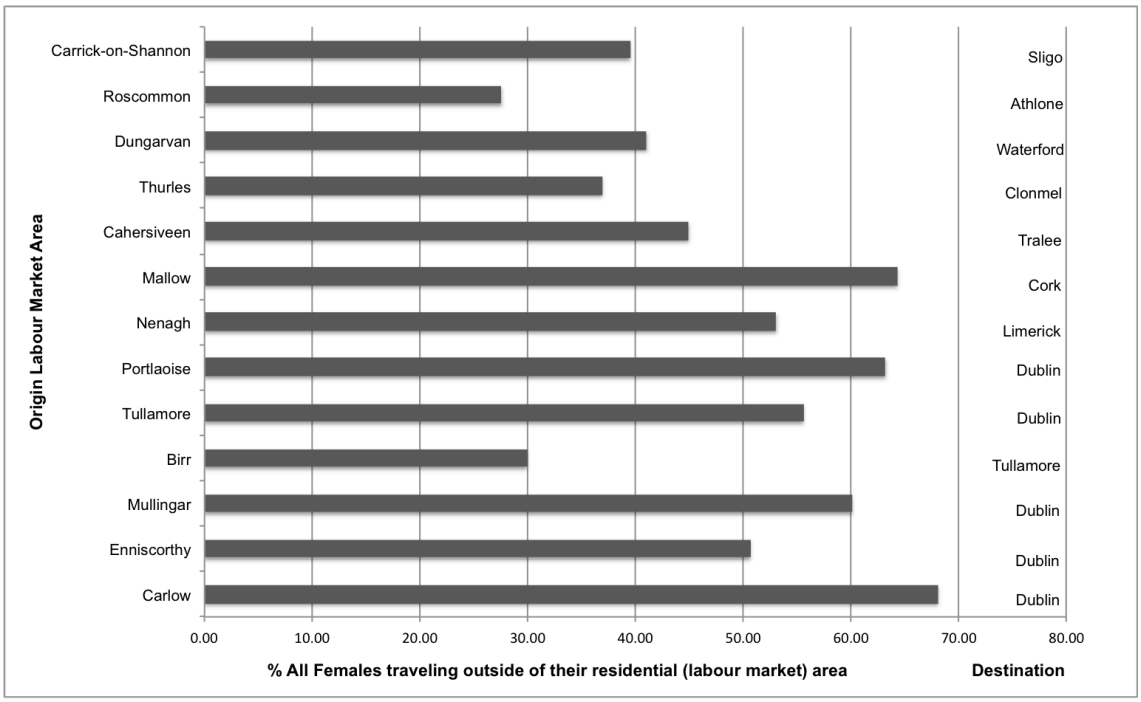


Figure 8.8 Origin and destination of female commuters from selected labour market areas

Within these data a further pattern is evident. Where an area is distant or inaccessible to a larger labour market, the flow of female commuters going to any one labour market is substantially smaller, e.g. the interaction between Birr - Roscrea and Tullamore labour market areas. This suggests that inter-area flows from smaller labour markets are more dispersed. One possible explanation for this is relatively intensive, local inter-area interaction. Spatial analysis of the residential distribution of female workers commuting between local labour market areas identifies apparent concentrations near the borders of some areas, i.e. West Cork – Cork, Castlebar – Galway and Tullamore – Dublin, Malin, Buncrana and Dungloe, supporting the proposition that interaction is, in part, a local phenomenon (Figure 8.9). Interestingly, there is a clear directionality to this interaction. Taking the Cork labour market area as an example it is evident that larger proportions of females commuted from EDs in labour markets adjoining this space than make the reverse journey-to-work. This is not true in every case as is exemplified by the patterns of interaction associated with the labour markets surrounding the Killarney area. Here one finds, particularly along the western boundary with the Caherciveen area, high levels of female interaction between both labour market areas.

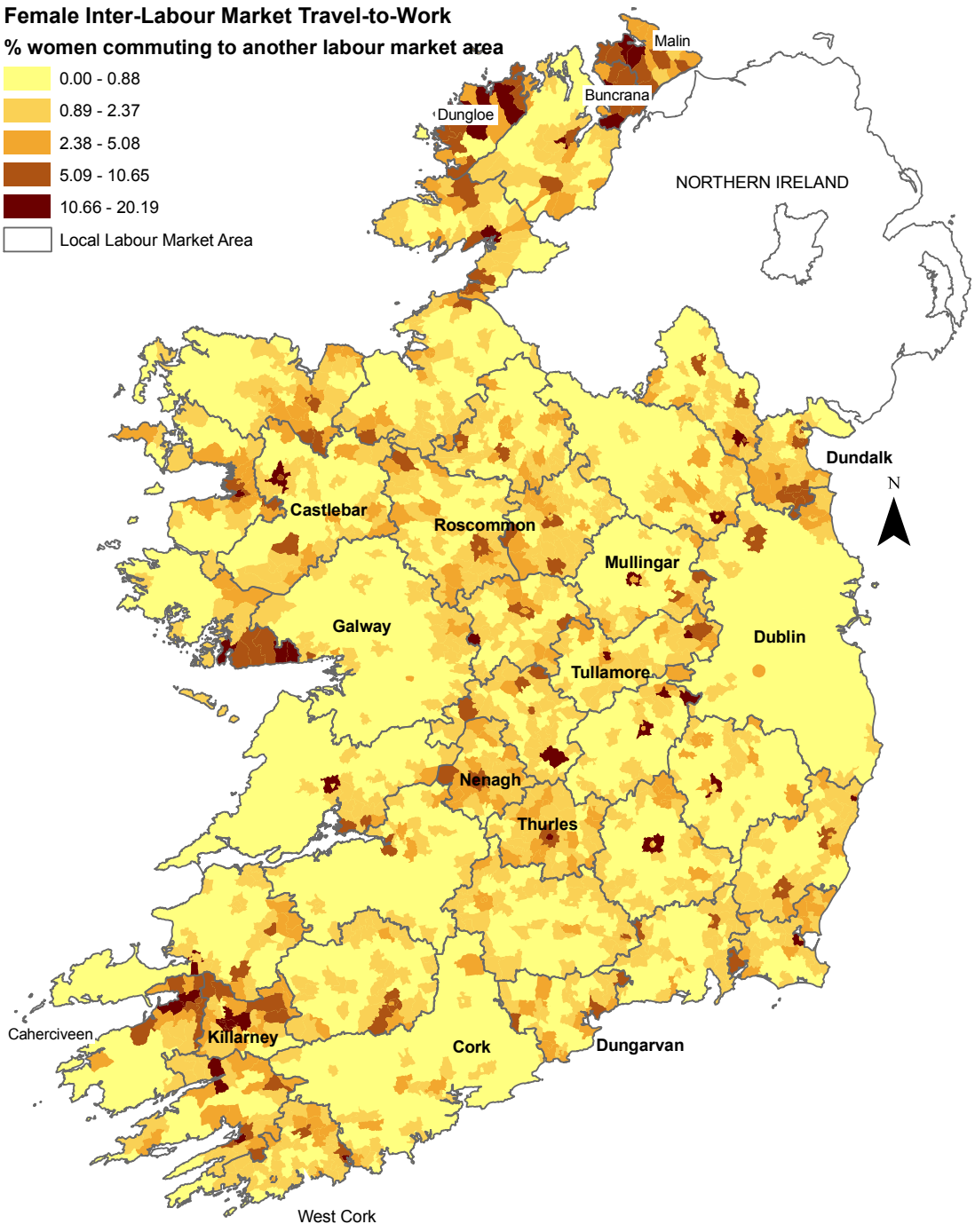


Figure 8.9 Residential distribution of females travelling to work in other labour market areas

A boundary – distance decay effect is evident amongst females commuting from some labour market areas to other. In a number of areas, e.g. Birr - Roscrea, Nenagh, Thurles, Dundalk, Dungarvan and Roscommon, most of the EDs proximal to boundaries record higher than average flows of women to other labour market areas (Figure 8.9). Before drawing the conclusion that proximity to a labour market area boundary results in greater interaction with other areas, based on visual inspection of Figure 8.9, further analysis is required.

Spatial analysis was undertaken identifying those EDs adjacent to the boundaries of each of the labour market areas and measuring their extent or area (km^2). An analysis of the POWCAR then identified the total number males and females commuting from each area. Regression analysis was applied to establish whether there is a statistically significant relationship between the spatial extent of the border area and the proportion of the total population of workers commuting to other areas. Whilst it was found that such a relationship exists and is statistically significant ($p=0.00$), the extent to which proximity to a boundary explains the proportion of workers commuting to other labour markets is relatively small ($R^2=0.302$). Exploring these data and this relationship further, it is evident that a number of the 41 labour market areas do fall relatively close to the regression line (Figure 8.10).

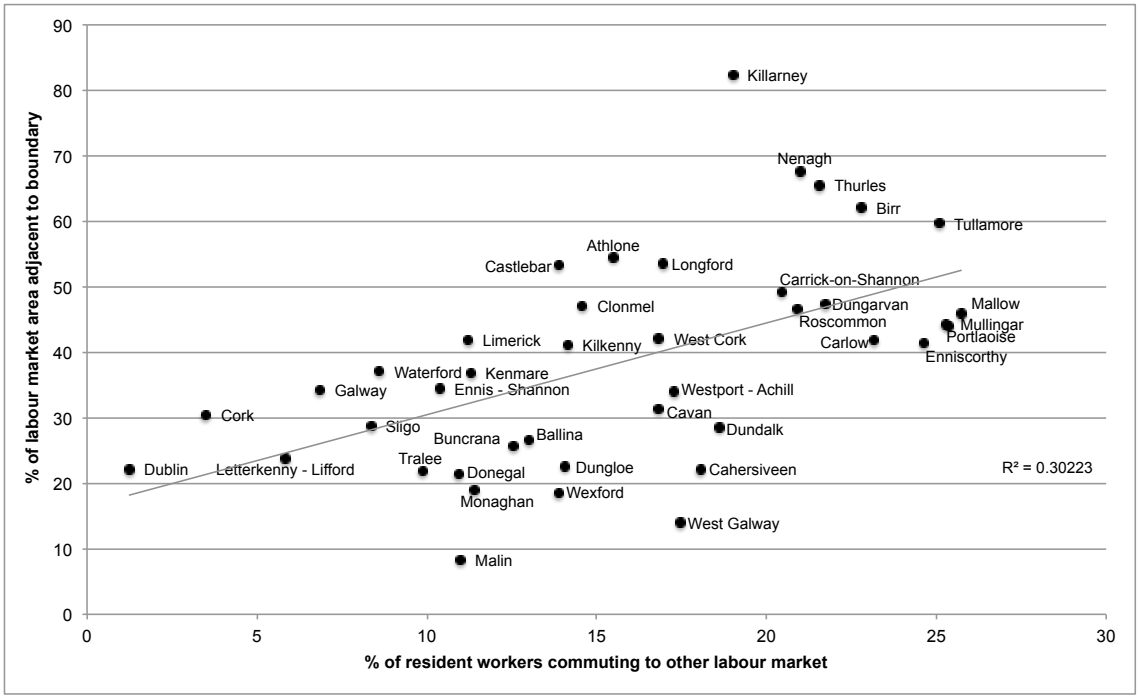


Figure 8.10 Assessment of boundary effect on levels of inter-area commuting

There are, however, a number of outliers. These largely correspond to geographically small local labour markets, i.e. Malin, Killarney, Thurles and Birr - Roscrea. In these instances one finds that though the area adjacent to the boundary is relatively large, it does not explain the level of commuting, or relative absence thereof, to other labour market areas.

An evaluation of male and female differences in the relationship between proximity to a labour market boundary and commuting to other labour market areas is warranted given the substantial differences in average journey-to-work distances between these populations of workers. The analysis identifies that a slightly greater proportion of male ($R^2=0.295$) inter-area interaction, compared to female ($R^2=0.282$), is explained with reference to proximity to a labour market boundary. This result is contrary to theoretical expectations and suggests that some groups of women travel further to access employment than their male counterparts.

Evaluation of the data presented in Figure 8.7 and comparison with the equivalent data for males presented in Figure 8.11 finds that, in accordance with labour market segmentation theory, most labour market areas record more women than men living and working locally. There are areas, e.g. Birr - Roscrea and Thurles, where more women than men engage with external labour markets. Whilst the gendered nature of data with missing place-of-work data has an influence on this assessment, the result highlights the pervasive nature of commuting on the part of women from some labour market areas.

Increasing the spatial resolution of the analysis to explore the distribution of men and women residing within local labour markets that commute to other areas identifies that other types of spaces, in addition to those proximal to boundaries, are associated with higher levels of inter-area commuting to work (Figure 8.12 and Figure 8.13). Areas around towns, in particular, emerge as spaces from which significantly greater than average numbers of both men and women commute. Some of the highest percentages of females and males travelling to work in other labour market areas occur, not along the boundaries of the labour markets but in and around urban centres.

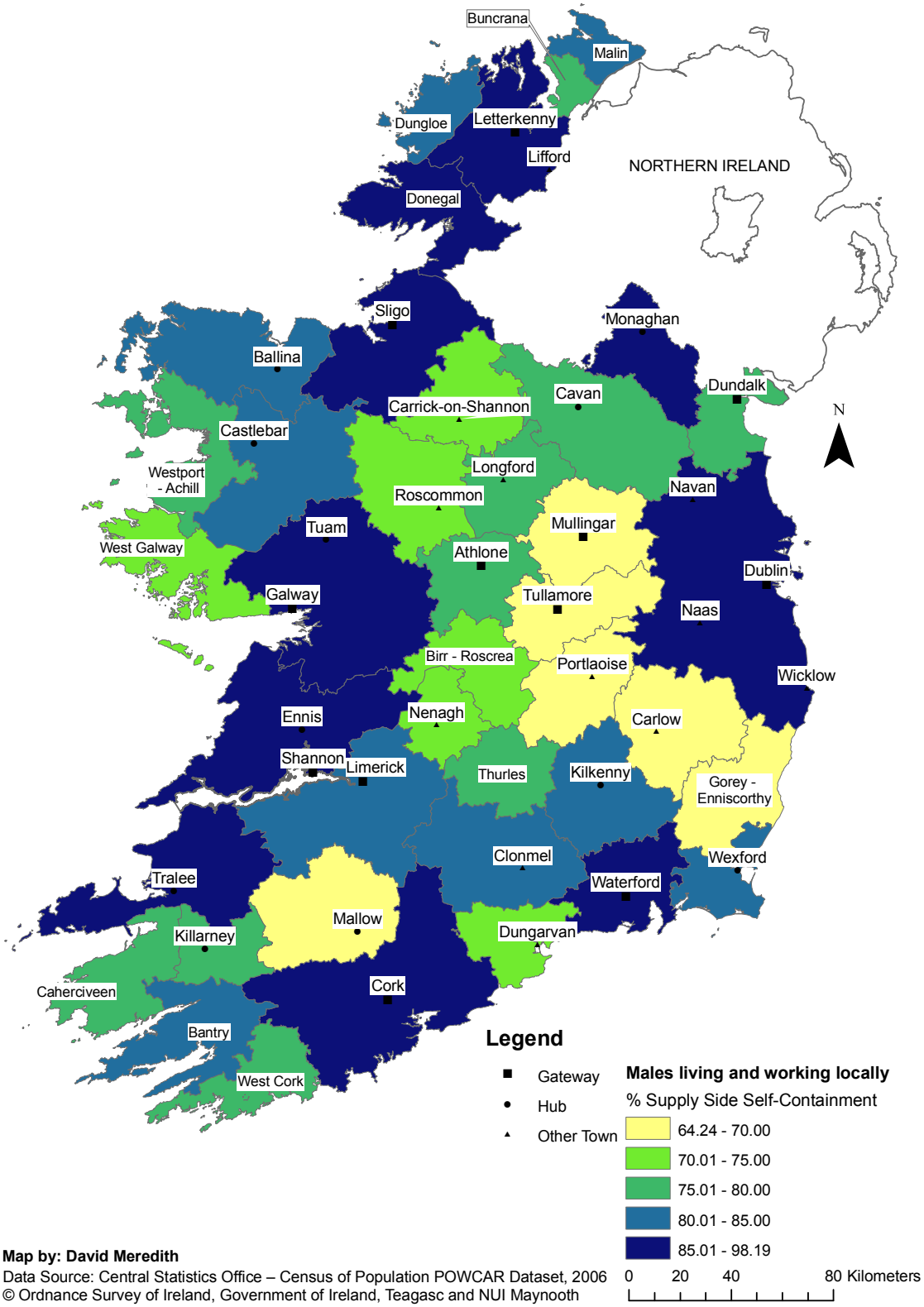


Figure 8.11 Percentage of males living and working within the same local labour market area

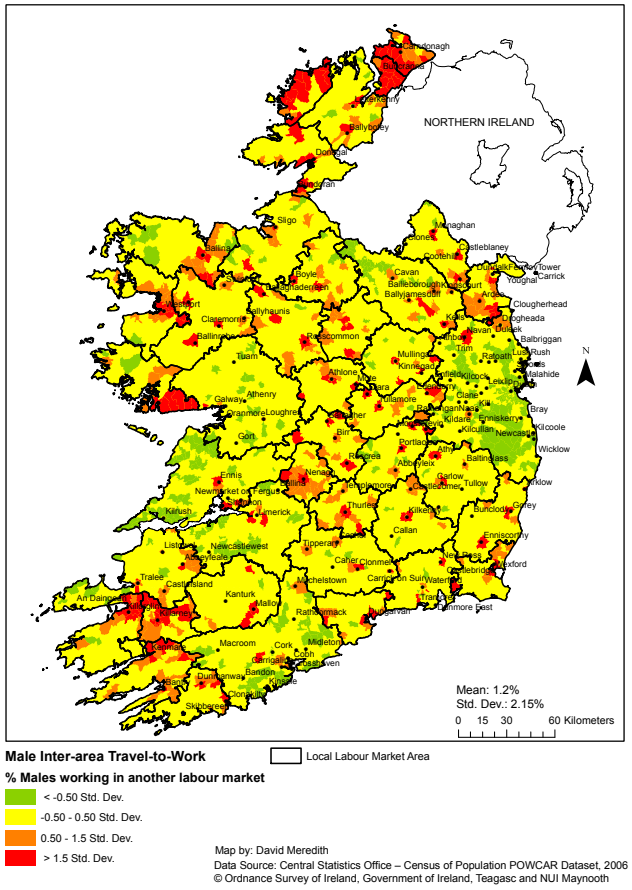


Figure 8.12 Residential location of males commuting between labour markets

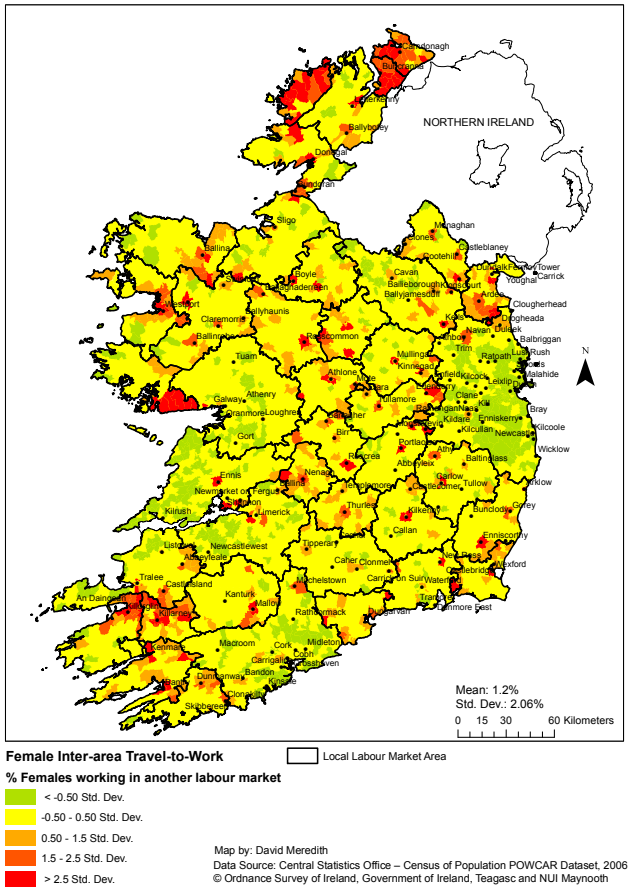


Figure 8.13 Residential location of females commuting between labour markets

Plotting the standard deviation in the distribution of males and females commuting to other labour market areas highlights the association between residential location in or near towns and travel-to-work in another area. (Figure 8.12 and 8.13). Whilst this effect is particularly evident in the east of Ireland, suggesting it may be an artefact of long distance commuting to the Dublin labour market, there are a number of places in the western half of the country where commuting from towns to other areas is a notable feature, i.e. around Ennis, Nenagh, Thurles and Westport. This result raises questions regarding the functioning of housing markets in Ireland as it appears from the analysis that the residence – workplace relation is spatially extended. Horner (1999) noted this effect with regard to the space beyond the Greater Dublin Region, i.e. Carlow, Louth, Westmeath and Offaly, and suggests that the steep house price gradient between Dublin and the surrounding hinterland led to more households purchasing houses in places distant from their workplace. It is clear from the maps presented above, Figures 8.12 and 8.13, that this house price gradient effect had extended to several other labour markets by 2006. There are, of course, a number of alternative explanations including increased spatial mismatches resulting from the restructuring of industries during the 1990s and early years of the new millennium. A further potential explanation is the need for dual income households to locate in a place that provides access to two separate workplaces.

This analysis of the gendered nature of self-containment highlights the complexity of travel-to-work flows, for both men and women, and the resulting spatial relations between areas. Perhaps most importantly, the analysis establishes the relatively minor role of proximity to another labour market in influencing interaction with that space. To get a better insight into who works where, the socio-economic dimensions of travel-to-work and their influence on patterns of within area interaction are explored. An assessment of local labour market area occupational division of labour, as reflected in differences in travel-to-work amongst 11 socio-economic groups of workers is undertaken.

8.3.2 Intersection of geography, gender and socio-economic group self-containment

A summary of the average distance travelled by men and women in different occupational groups identifies considerable disparities between both the sexes and occupations (Figure 8.14). Whilst males, on average, travel further to work than their female counterparts, with one exception – female farmers, there are striking differences between and within gender and occupational groups in terms of those travelling the longest and shortest distances. Comparing between females one finds that those working in the higher or lower professional categories face the longest journeys to work whilst unskilled women record the shortest average commute. Male workers in the 'Own account workers' and 'Manual skilled' categories have the longest average commutes. Male farmers record the shortest commutes at just under an average of 10 km. That farmers commute such distances may come as a surprise but such is the fragmented nature of Irish farms that commuting between separate parts of a farm is a key element in many farmer's days.

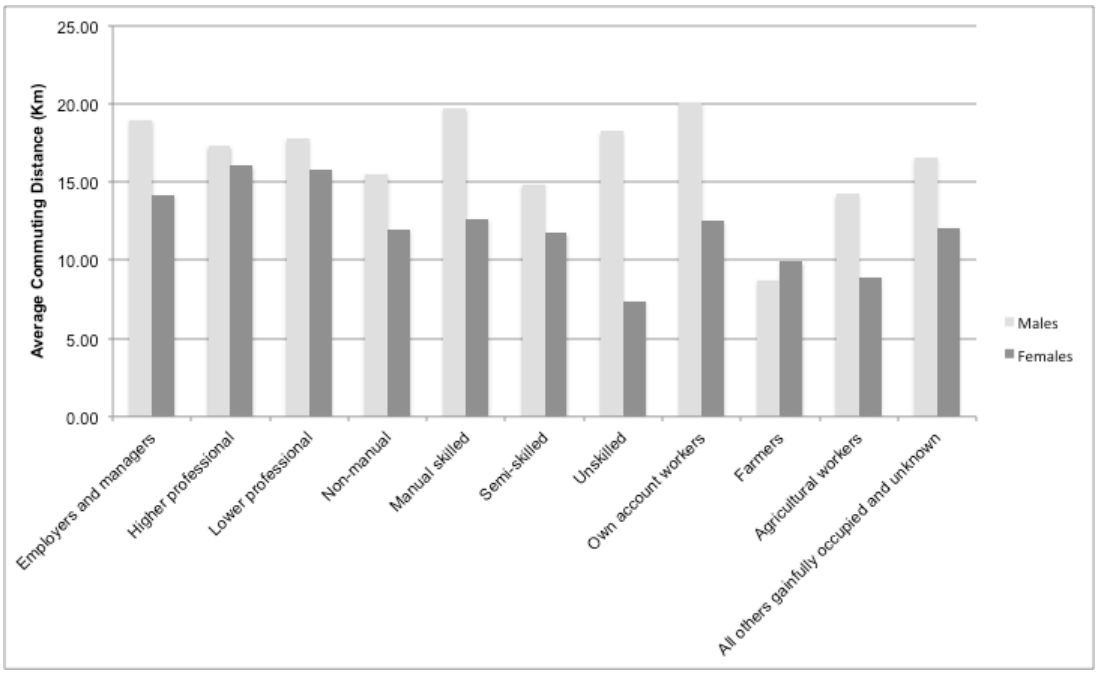


Figure 8.14 Average distance travelled to work by males and females

From this analysis there are two notable points, firstly, in line with the international literature males, regardless of their occupation, on average travel further to work than their female counterparts and, secondly, the largest difference between male and

female workers is associated with those in 'unskilled' occupations. The latter finding suggests that the world of work experienced by unskilled women is significantly smaller than that engaged with by their male equivalents. The relative similarity in average commuting distances recorded amongst the 'Professional' categories are interesting given that this raises the question of whether or not male and female workers in these classes occupy the same spaces? These issues are explored further through an assessment of the gendered geography of occupation.

Before considering differences between labour market areas an evaluation of the occupational structure of the population of workers with known places-of-work provides insights into the extent that self-containment varies by occupation (Figure 8.15). That virtually all, 98.02%, of those classified as 'Farmers' both live and work within the same area is unsurprising given the ubiquitous nature of family-farm ownership in Ireland wherein the residence is also the workplace. Interestingly, however, 'Agricultural workers', record a self-containment level, 89.36%, slightly below the median value of 89.49% for all occupations.

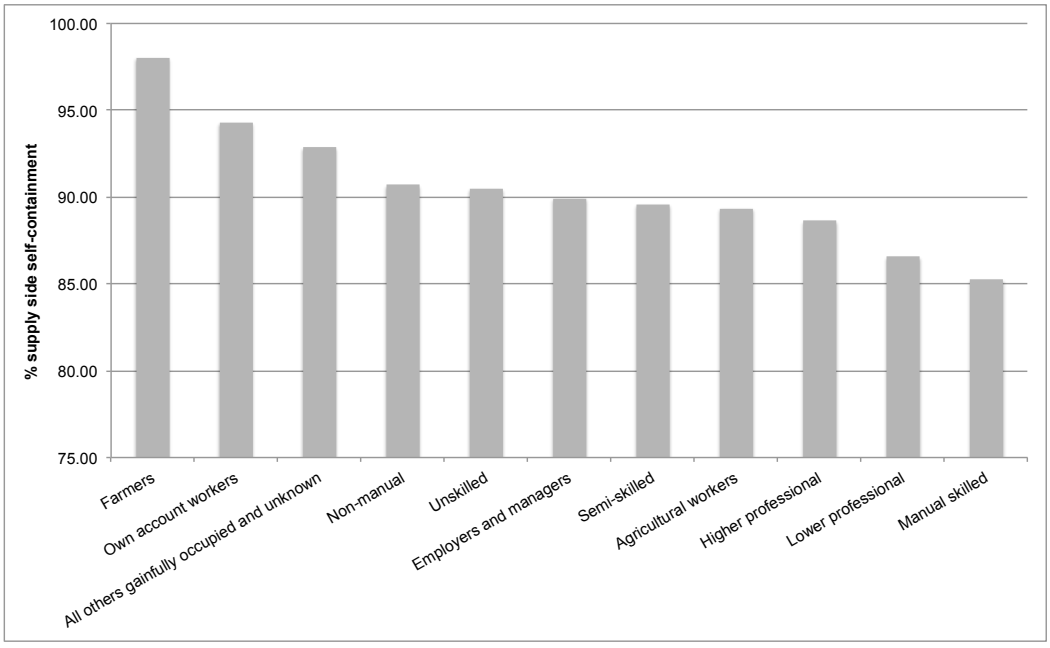


Figure 8.15 Socio-economic group supply side self-containment

Those classified as 'Own account workers' and those whose occupations are unknown also have relatively high, above the median value, levels of self-containment. Several occupational categories, comprising 'Non-manual',

'Employers and Managers', 'Semi-skilled' and 'Higher Professionals' record largely similar levels of self-containment, ranging between 90.69% and 88.63%. The self-containment levels of the two remaining occupational categories, 'Lower Professional' and 'Manual Skilled' are relatively low compared to all other occupations.

Turning to consider gender based occupational differences in self-containment one finds a pattern of, in line with the literature in this area, female workers being more self-contained than their male counterparts. These results also, with two notable exceptions, reflect those of the analysis of average journey-to-work distances presented in Figure 8.14. The exceptions refer to the greater levels of males classified as 'Higher' or 'Lower Professionals' that live and work in the same area compared to their female counterparts. This particular finding is interesting in light of the data indicating that females in these categories commute, on average, shorter distances to work then their male counterparts. From a spatial perspective this raise a number of questions regarding the distribution of 'Professional' employment opportunities for both male and female workers that are explored, with reference to the 'Higher Professional' group in greater detail below. Though it has already been touched on in relation to the assessment of average distance travelled-to-work, it is

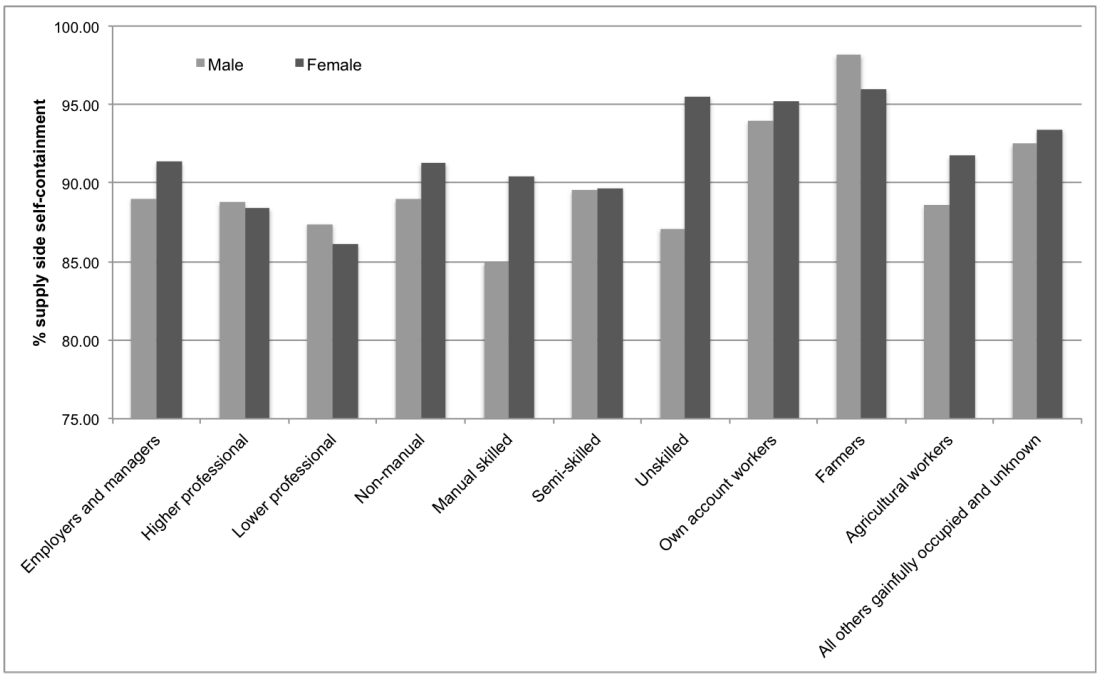


Figure 8.16 Male and female socio-economic group self-containment

worth re-iterating the substantial differences in self-containment between male and female ‘Manual skilled’ and ‘Unskilled’ workers. This gives rise to the question of whether male and female workers in these groups have separate geographies of work.

Based on the assessment of the variable nature of self-containment, two socio-economic groups, ‘Higher Professional’ and ‘Unskilled’, form the focus of the remainder of this assessment of where people live and where they work. The focus here is on providing an answer to the question of ‘where do people live and where do they work?’ The geographies of home and work are assessed through a sequence of thematic maps that, firstly, consider variations in the local labour market area geography of male and female self-containment. The analysis then identifies the local or within area geographies of residence – workplace interaction for both groups of workers. The geographies of home and work are explored through an analysis of those place of work records associated with ‘Unskilled and ‘Higher Professional’ males and females living and working within each labour market area.

In order to enhance the spatial resolution of the analysis, the proportion of the total population living and the proportion of the total population working in each ED associated with each labour market area was calculated. This analysis enables within labour market area variations in the distribution of distinct groups, i.e. either male or female ‘Unskilled’ or ‘Higher Professional’ workers, to be assessed. There are two maps associated with each set; the first, displayed on the left, shows the residential location of either males or females whilst the second, on the right, shows the workplace. For the purposes of comparison the scale in each sequence of maps associated with ‘Unskilled’ and ‘Higher Professional’ workers is held constant. This facilities comparison between where, for example, unskilled males and females live and work.

Significant time was invested in identifying an appropriate scale capable of highlighting variations in geographies of home and work both within each of the 41 areas and also between areas. As there are many EDs with relatively low percentages of workers or jobs and a very small number with large percentages, the modifiable

areal unit problem presents particular challenges to this analysis. The data distribution gives rise to aggregation and zoning effects associated with the modifiable areal unit problem. Aggregation issues are particularly problematic in those labour market areas where most jobs or workers are dispersed amongst a large numbers of small EDs, i.e. those labour markets with large urban centres. Zoning issues are particularly pertinent to a number of geographically small labour markets that comprise a limited number of large EDs, e.g. Dungloe or Killarney. A number of experiments were undertaken utilising different visualisation techniques. Whilst several authors have taken a variety of approaches to mapping similar data distributions no single approach has been identified within the literature as offering a better solution than others. As the range of values is large with many low values and a small number of extreme values, neither an Equal Interval nor Quantile classification is particularly useful. With regard to the former approach most values are grouped within one class whilst the latter method groups equal numbers of EDs into each class. This results in a misleading impression that many EDs have high percentages of workers or jobs. Using both the Standard Deviation and Natural Breaks classifications highlights areas with higher and lower proportions of workers or jobs. Given the results of this evaluation and the demands of the research, a combination of Natural Breaks and Manual methods is used. In the first instance the Natural Breaks method, one of the cartographic options developed by Environmental Systems Research Institute (ESRI) based on an implementation of the Fisher-Jenks algorithm within ArcMAP 9.31, is applied to identify five classes within the data depicting the location of employment opportunities. The algorithm underlying the Natural Breaks method identifies classes that are coherent, that is the within group variation is minimised to the greatest extent possible and between group variation is maximised. The same classes are then applied, manually, to the residential location data to facilitate visual assessment of differences in where people live and where they work. The assessment of these maps focuses on describing observable patterns between where people live and where they work.

8.3.2.1 Geography of 'Unskilled' male and female occupational segmentation

The number of 'Unskilled' workers, both male and female, living within each labour market area varies considerably. Of the total, 46,867, 46.76% (18,370) live in the

Dublin labour market area. This figure comprises 9,868 males and 8,502 females, 35.32% and 44.92% respectively of all such male and female workers. This cohort however, only accounts for 3.04% of all workers in living in the Dublin labour market. By comparison, unskilled workers account for 6.61% of the population of workers living in the West Galway area and 6.28% in the Tullamore area. The spatial patterns of self-containment for male and female workers classified as 'Unskilled' are starkly different. Female workers in this category do not, based on this analysis, commute between areas. It is worth recalling that 95.45% of all 'Unskilled' females work within the labour market where they live. In contrast, their male counterparts, particularly those living in areas adjacent to labour markets with large urban centres and towns are more likely to commute between areas (Figure 8.17). The equivalent self-containment figure for males is 87.10%, which, whilst high by comparison to other groups of male workers, is significantly lower than the figure recorded for females.

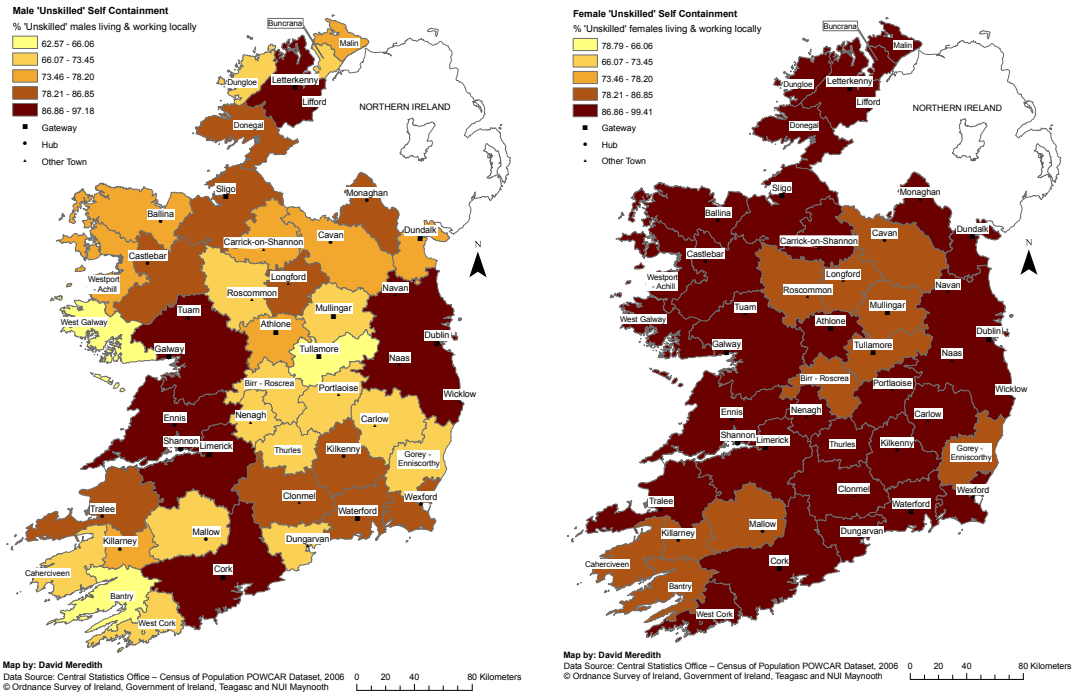


Figure 8.17 Male and Female 'Unskilled' Self-containment

This pattern, in line with the findings reported in the international literature, indicates that different processes of labour market segmentation affect 'Unskilled' males and females. An evaluation of those 'Unskilled' workers commuting between areas found that males in this group were predominantly employed in the

Construction sector whilst their female counterparts were employed in Commerce and Education, health and social work (Figure 8.18). In 2006 there was a general shortage of construction workers in Ireland resulting in substantial wage premiums paid to those willing to work in the sector, both skilled and unskilled. The same premium was not available to other 'Unskilled' workers. It is this differential that largely explains higher levels of inter-area commuting on the part of 'Unskilled' males.

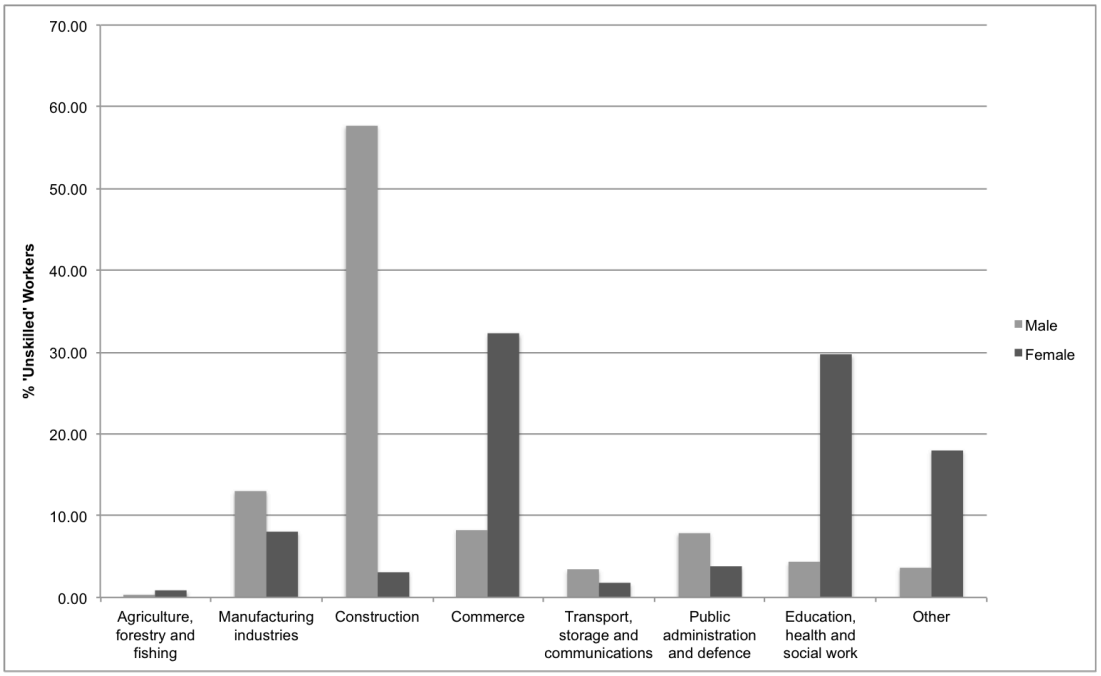


Figure 8.18 Comparison of the industrial employment profile of male and female workers commuting between labour market areas

Turning to the issue of differences in the distribution of male and female employment within each of the 41 labour market areas, the data pertaining to unskilled workers were mapped and evaluation of the distribution of residences and employment undertaken. Mapping the residential and workplace distribution of 'Unskilled' workers makes apparent the differences between the sexes noted in Figure 8.16. Compared to their male counterparts, the residence – workplace geography of females in this socio-economic group is constrained and seemingly structured by location in or proximity to urban centres (Figure 8.19 and Figure 8.20). An assessment of this relationship was undertaken by exploring the 'urban' and 'rural' distribution of both male and female residences and workplaces.

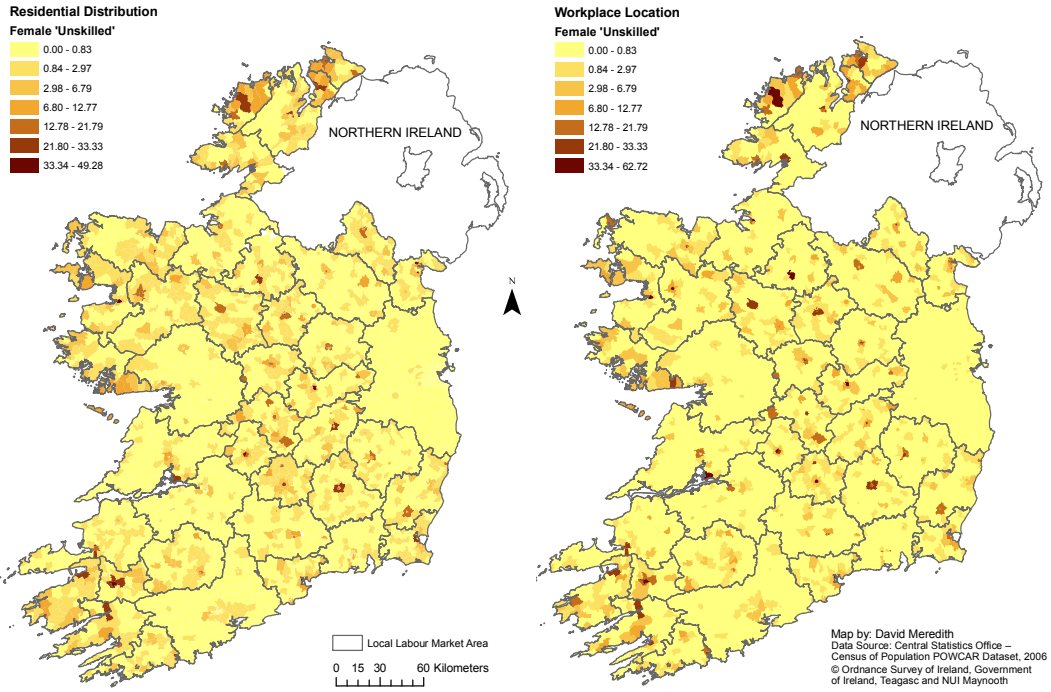


Figure 8.19 The geography of 'Unskilled' female workers' residence and workplace

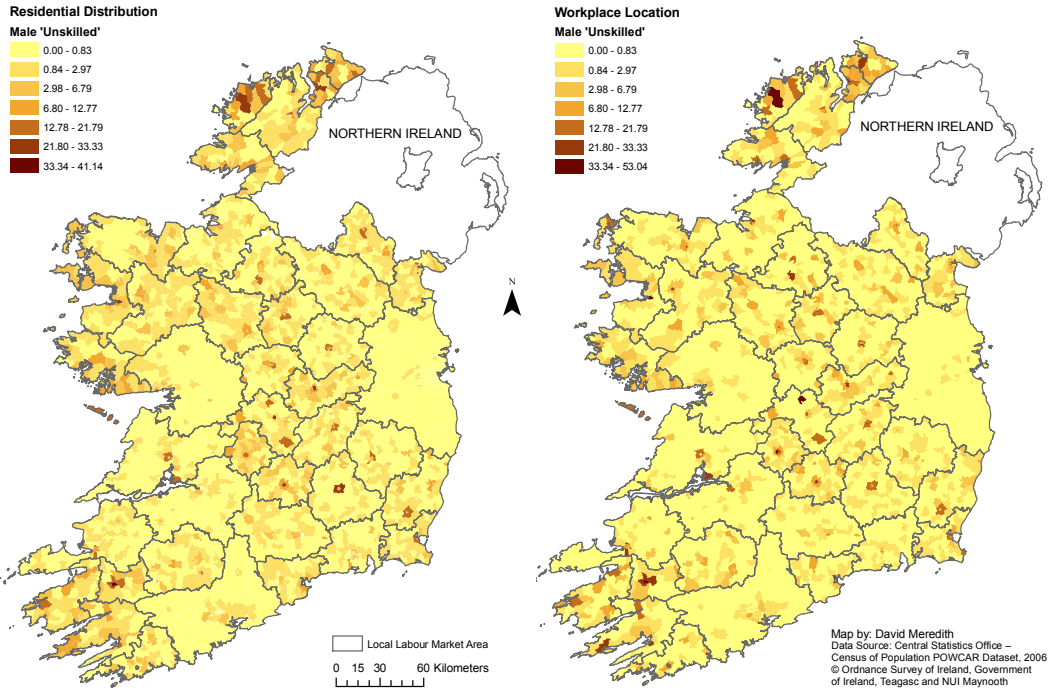


Figure 8.20 The geography of 'Unskilled' male workers' residence and workplace

This evaluation depends on the CSO classification of EDs as either 'Urban' or 'Rural'. There are significant issues with this spatial typology, which uses the presence or absence of continuous urban fabric to classify an ED as either urban or rural (Teljeur and Kelly, 2008). From the perspective of this study, this definition is problematic, as it fails to take into consideration places of employment located on the edges of towns and cities, e.g. large industrial or business parks located outside of city or town boundaries. Notwithstanding this issue, the typology is used here and in the next section, which considers where 'Higher Professional' males and females live and work, as a spatially consistent summary measure of the 'distribution' of both workers and jobs.

Evaluating the distribution of 'Unskilled' female employment establishes that 65.05% of all such jobs are located in urban areas whilst 59.52% of those who fill these jobs live in urban areas. The results indicate that there is relatively little mobility between these spaces. A similar pattern is also observable for 'Unskilled' males, in this instance 53.49% live in rural areas whilst 48.69% are employed within rural locations. This result suggests that the scale of 'Construction' related economic activities taking place in 2006 had an influence on 'Unskilled' males commuting between labour market areas.

8.3.2.2 Geography of 'Higher Professional' male and female occupational segmentation

The number of 'Higher Professional' workers, both male and female, living within each area vary considerably. There are 23,143 'Higher Professional' females within the Dublin labour market area, 59.67% of all such women in this socio-economic group. By comparison, there are only 34 in the Malin area. There are 37,096 'Higher Professional' males living and working in the Dublin area, 57.61% of this population. Once again, the Malin area records the smallest number, 42, workers in this class.

The overall spatial pattern of self-containment is similar for both male and female workers classified as 'Higher Professional' with the highest levels recorded in those areas associated with large urban centres (Figure 8.21 and Figure 8.22). These

include the labour markets of Dublin, Waterford, Cork and Galway. This pattern suggest that whilst the modifiable areal unit problem may have an effect on the analysis, it is not unreasonable to expect that employment opportunities for both men and women in this group might be concentrated within larger urban centres. A number of other labour markets also record high self-containment amongst males and females in this category including Tralee, Sligo and Letterkenny. With regard to the latter spaces, each of these contain relatively large Health and Education facilities i.e. 3rd level Institutes of Technology and regional hospitals.

Labour market areas, generally located in the west and southeast, record self-containment levels above the average for these groups of male and female worker, 69.19% and 64.25% respectively. These labour markets include Wexford, Clonmel, Ennis-Shannon, Athlone, Castlebar, Ballina, Donegal and Dungloe. Further similarities between male and female workers are evident in relation to areas with low levels of self-containment i.e. Dungarvan, Mallow, West Galway, Nenagh, Enniscorthy – Gorey, Portlaoise and Mullingar.

It is important to note a number of key differences in the spatial pattern associated with the distribution of male and female 'Higher Professionals'. One of the more obvious differences evident from the comparison of Figure 8.21 and Figure 8.22 is the Limerick area where more women than men live and work in the same area. Closer inspection of these data finds little real difference between the sexes; the self-containment value for women is 83.43% and 81.80% for men. There are, however, nine labour markets where the numbers of women living and working locally are lower than those of males i.e. Carlow, Birr - Roscrea, Thurles, Tullamore, Roscommon, Caherciveen, Killarney, Westport and Dungloe. With the exception of Birr - Roscrea, all of these areas are adjacent to labour markets containing large or medium sized urban centres. In order to explore this relationship the interaction patterns between these areas and other labour markets for male and female 'Higher Professional' workers is evaluated.

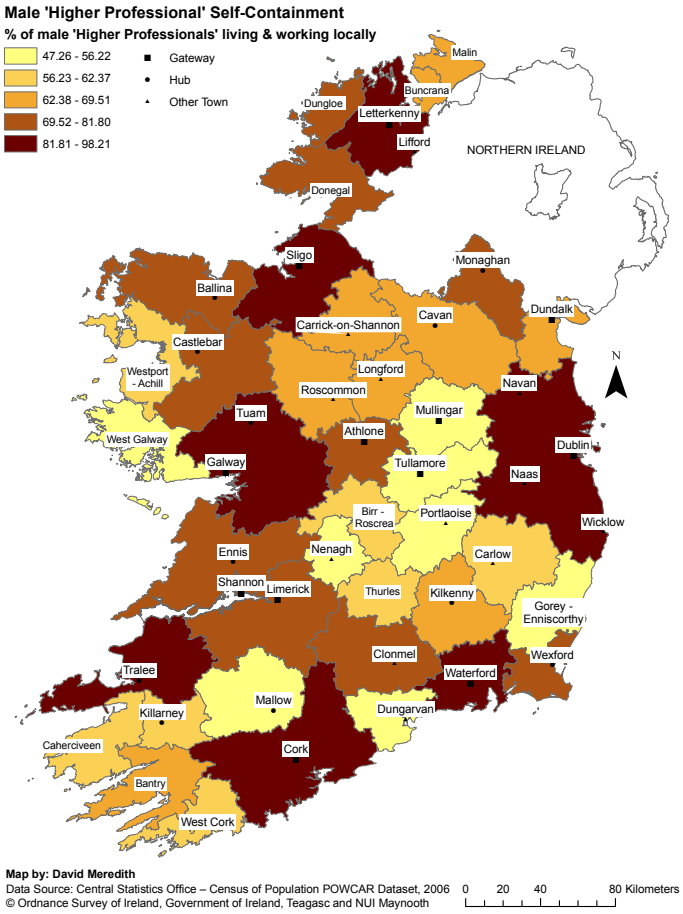


Figure 8.21 Male 'Higher Professional' Self-Containment

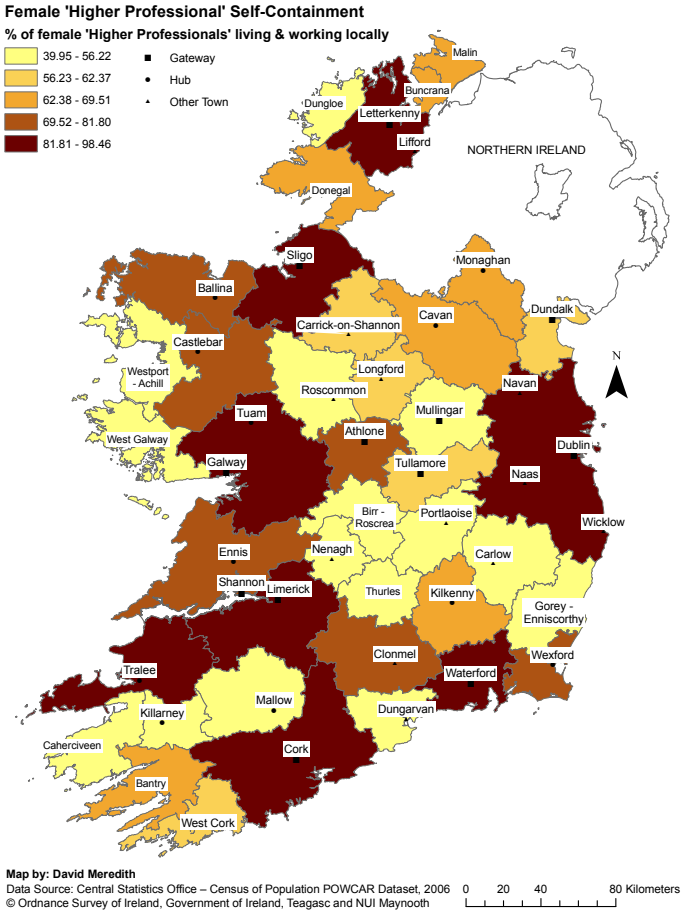


Figure 8.22 Female 'Higher Professional' Self-Containment

8.3.2.3 'Higher Professional' interaction between labour market areas

The first point to note are the relatively small numbers of male and female 'Higher Professional' workers commuting between areas. Of the 43,865 women classified as 'Higher Professional', only 5,069 or 11.56% commute to another labour market area. The equivalent figures for males are, 72,534 in this socio-economic class with 8,144 (11.23%) commuting to work in other labour markets. Exploring the distribution of these workers one finds, not unsurprisingly, that those labour markets with larger numbers of jobs attract higher proportions of the populations of males and females that live in one area but work in another. There is, however, variation in the spatial patterns of interaction. Whilst 54.55% of males commute to the Dublin, Cork, Limerick, Ennis-Shannon, Waterford and Galway areas only 49.81% of their female counterparts do so (Figure 8.23). There is also some variation within this group of areas with greater proportions of males commuting into the Ennis-Shannon labour market compared to females. This pattern is reversed when one considers the Waterford labour market area.

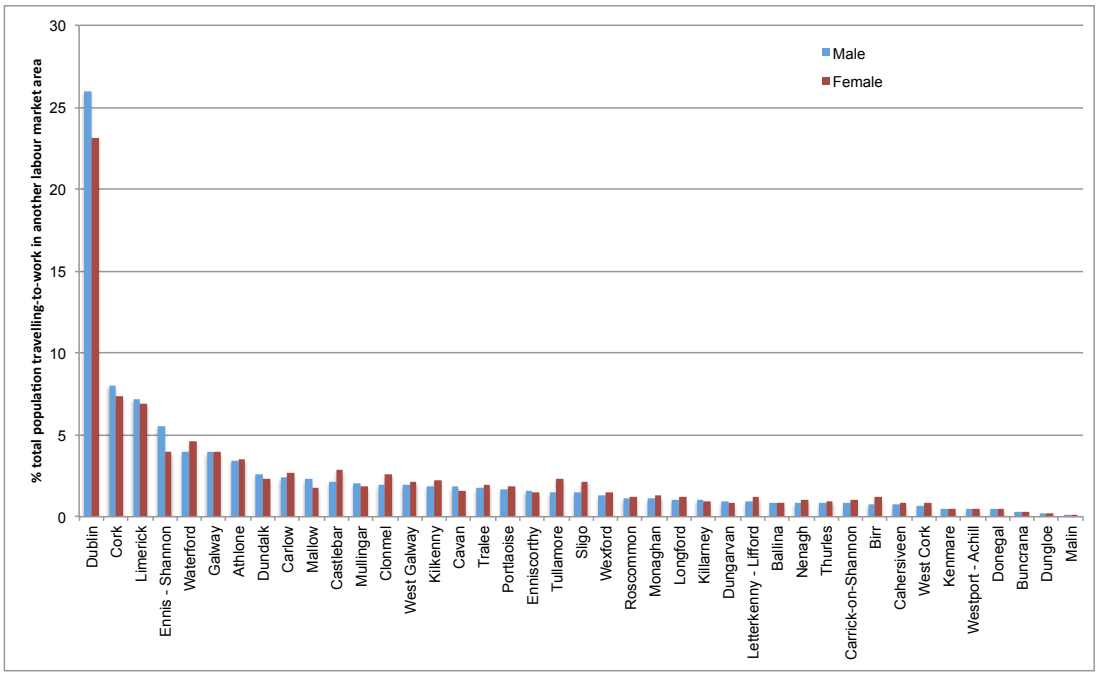


Figure 8.23 Destination of 'Higher Professional' male and female workers commuting to other labour market areas

Summarising these data, in terms of male and female interaction with Gateways, Hubs, Other Towns and Other Places, one finds that greater proportions of 'Higher

Professional' male workers travel-to-work in either a Gateway or Hub area, 80.66% of all males, compared to 78.11% of females. A greater percentage of females travel-to-work in labour markets associated with Other Towns or Other Places. This suggests that there is a difference in the spatial division of labour and the type of work undertaken by males and females in this socio-economic group and, potentially, that these jobs occur in different locations. Given the analysis presented above establishing the gendered nature of industries and occupations it is unsurprising to find that those 'Higher Professional' men and women commuting between labour market areas are employed in different industrial groups (Figure 8.24). The clearest examples, from the male perspective, relate to 'Manufacturing and related industries' and the 'Construction' sectors where significantly greater proportions of the 'Higher Professional' cohort are employed compared to their female counterparts. In contrast, there are greater numbers, and a higher overall percentage, of 'Higher Professional' females employed in the 'Education, health and social work' group.

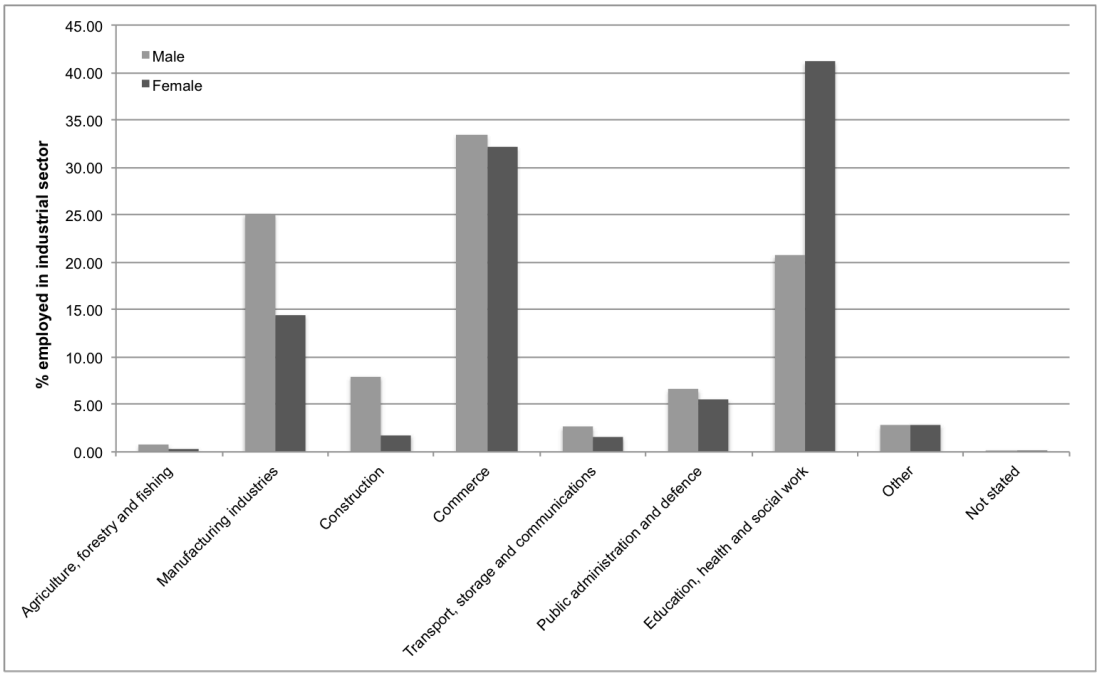


Figure 8.24 Industrial group of 'Higher Professional' males and females commuting between labour market areas

To assess whether this cohort of the workforce is spatially, in addition to occupationally, segregated an analysis of the distribution of the place-of-work, in

terms the location of employment within a Gateway, Hub, Other Town or Other Place is undertaken. The assessment establishes that broadly similar percentages of males and females, regardless of industry, work in those labour markets associated with the NSS Gateways (Figure 8.25). There are a number of notable exceptions, namely females working in the 'Manufacturing' and 'Public administration and defence' groups. 'Higher Professional' women commuting between areas working in the latter sector are more likely to work in one of the Gateway areas. The obverse of this observation is apparent in the 'Manufacturing' sector with greater proportions of 'Higher Professional' females travelling-to-work in Other Towns and Other Places. This finding, whilst demonstrating the dominance of Gateways and Hubs in terms of attracting workers from outside their areas, highlights the variability in the geography of the industrial division of labour.

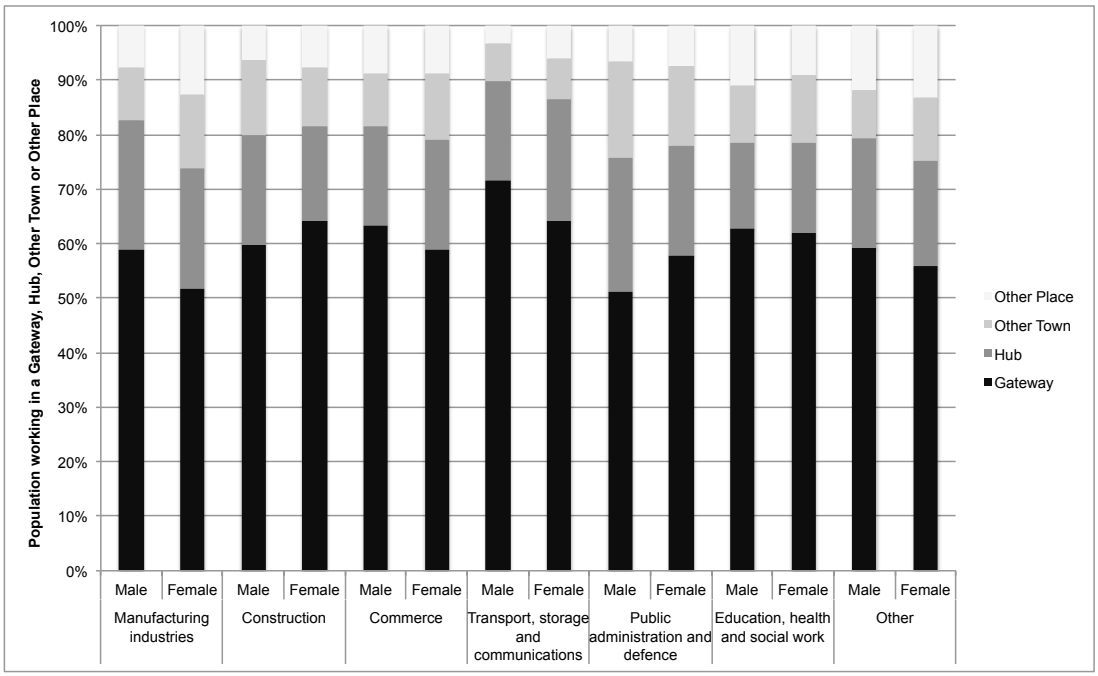


Figure 8.25 Location of employment of 'Higher Professional' males and females commuting between labour market areas

8.3.2.4 Where 'Higher Professional' workers Live and Work

The data presented in Figures 8.26 and 8.27 depicts where, respectively, 'Higher Professional' males and females live and where they work within each of the 41 local labour market areas. What is immediately apparent is the absence of distinctive

spatial patterns associated with larger labour market areas, particularly that of the Dublin area.

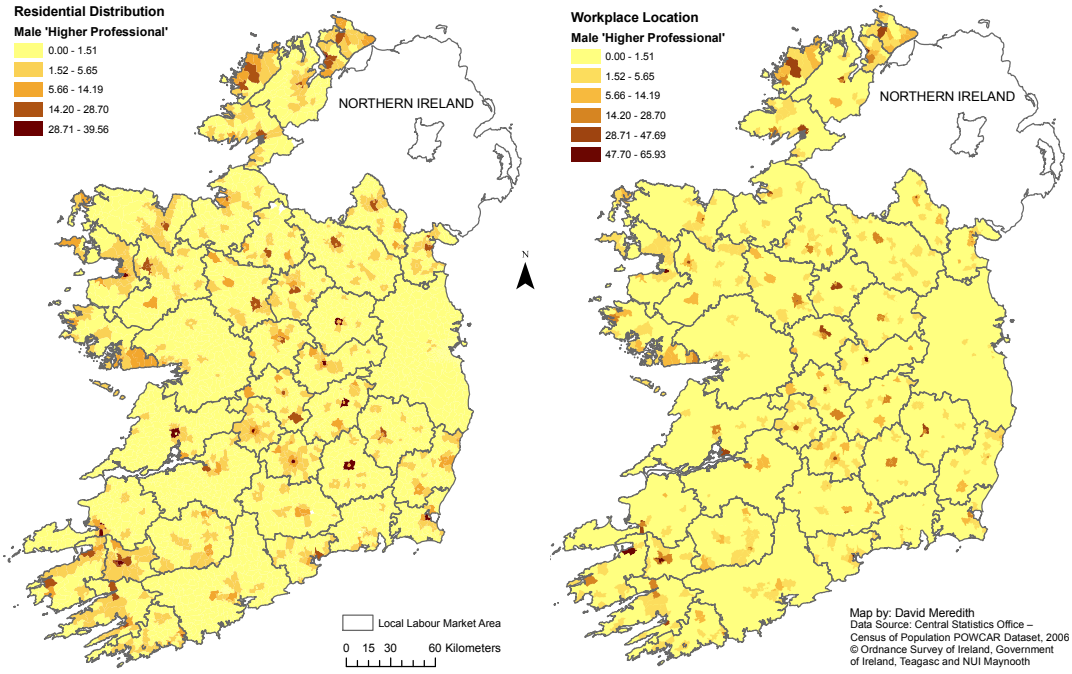


Figure 8.26 Where 'Higher Professional male' workers live and work

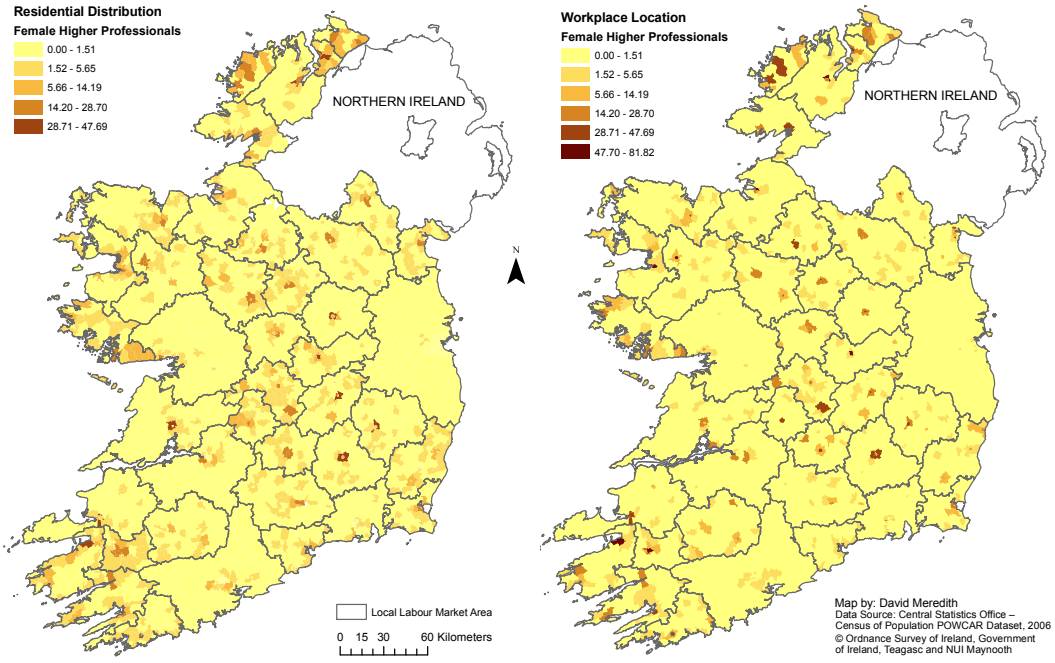


Figure 8.27 Where 'Higher Professional female' workers live and work

This is associated with the large number of small EDs that comprise the core where many jobs, of all types, are concentrated. Outside of these areas, however, a more generally recognisable pattern is evident; both male and females live near to or in EDs that are accessible to towns and cities. This pattern is particularly apparent in the swath of labour markets extending through the centre of Ireland associated with, amongst others, Mallow, Nenagh, Tullamore and Roscommon.

Comparing between males and females within this socio-economic group it is apparent that there are differences in both their residential locations and workplaces. Visual interpretation of the maps depicted in Figure 8.26 and Figure 8.27 suggest that greater proportions of 'Higher Professionals' males, compared to their female counterparts, live and work outside of urban areas. This pattern is particularly observable in labour market areas associated with Monaghan, Mullingar, Clonmel and Roscommon. A simplistic analysis of the 'Urban' – 'Rural' distribution of residential location finds that 40.55% of 'Higher Professional' males live in rural areas compared to 38.15% of their female counterparts (Figure 8.28). What is apparent from this assessment, in the first instance, are differences in the proportions of 'Higher Professionals' working in rural locations compared to those living in rural areas regardless of gender. There are, however, also notable differences in male and female residential and work locations. Whilst 40.55% of 'Higher Professional' males live in rural areas only 26.81% also work in rural locations. The figures for females are interesting in that, though the number living in rural areas is lower, by 2.40%, than their male counterparts, the proportion working in rural locations, 22.16%, is 4.66% lower. This assessment confirms the patterns observed in the sequence of maps presented in Figure 8.26 and Figure 8.27. Not only do fewer 'Higher Professional' females live in rural areas, employment opportunities for those that do are concentrated, to a greater degree, in urban locations.

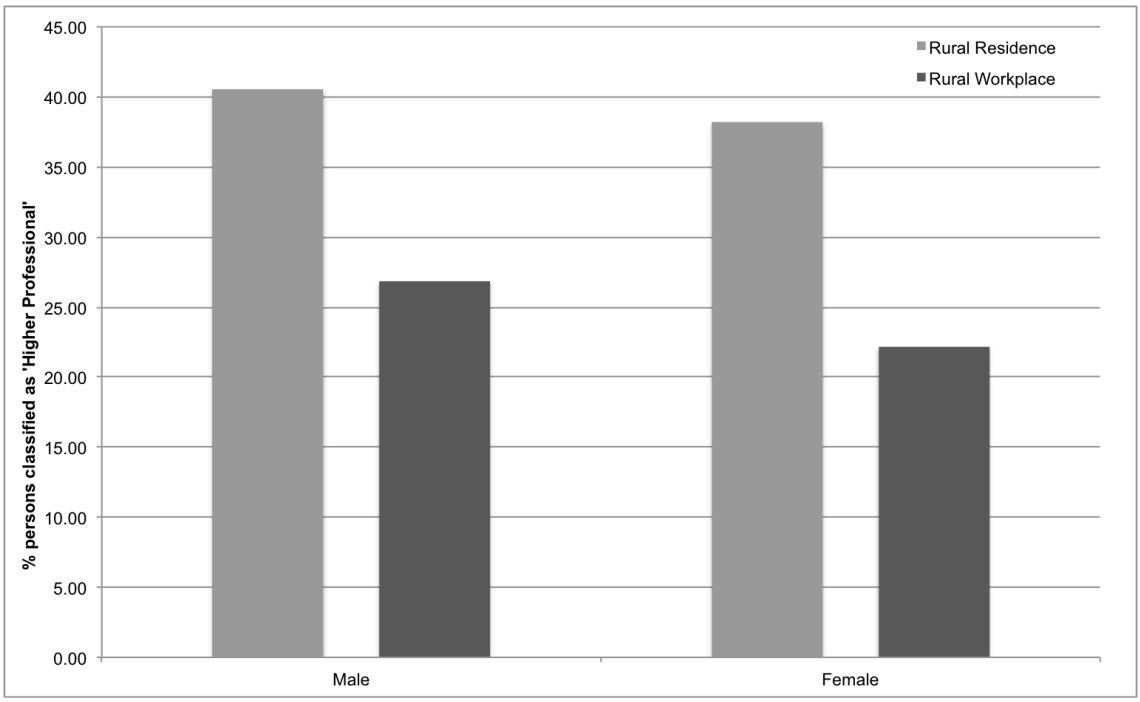


Figure 8.28 Comparison of rural residential and workplace locations of male and female 'Higher Professionals'

8.4 Summary and Conclusions

The primary aim of this chapter was to assess, using the POWCAR, where workers live and where they work. The analyses situates Ireland within the broad body of international literature associated with labour market segmentation establishing that, in the first instance, males and females experience different types of journey-to-work in terms of distance travelled and mode of transport used. The research also found that, in line with international experience, the workforce is sorted by gender into different socio-economic groups and different industries. There is no evidence to suggest that the sorting process reflects differences in levels of educational attainment associated with males and females.

A spatial assessment of gendered differences in self-containment highlighted a number of similarities and differences between the proportions of males and females living and working locally and those travelling to work in other labour markets. Whilst areas associated with urban centres classified as Gateways and, a limited number of Hubs, recorded high levels of male and female self-containment, a large proportion of Other Towns and Other Places recorded relatively low levels of self-

containment. This is particularly true of those areas adjoining labour market areas with large urban centres. An evaluation of self-containment at the level of the 41 labour markets found that, in most, greater proportions of females live and work locally compared to their male counterparts. There were, however, a number of notable exceptions, areas where more men than women work. This finding contravenes much of the theoretical literature. An evaluation of the effect of excluding the highly gendered (male) records without place-of-work data found that this did not sufficiently explain these patterns. This finding points to the need for detailed spatial analysis of labour market segmentation within a range of spatial settings and not just urban and sub-urban locations.

The analysis presented in this Chapter established that residential proximity to the boundary of a labour market area has an effect on the level of interaction with other labour markets. This finding gives limited support to Peck's (1996p. 88) contention that the identification of precise labour market boundaries is "*futile*" as *"it amounts to trying to draw a line around complex and dynamic social processes"*. Analysing interaction between areas at such a large scale, i.e. at the ED level, highlights the fuzziness of the boundaries between some, particularly geographically smaller, labour market areas. This is to be expected given that most people travel shorter rather than longer distances and they are more likely to work somewhere relatively close to their residence rather than at a distant location. However once one moves away from the very large geographic scale used above, i.e. EDs, some form of objective criteria are required if local labour market areas are to be systematically identified rather then through *a priori* selection of places. More importantly, whilst the analysis undertaken establishes that proximity to a labour market boundary explains a certain degree, roughly 30%, of interaction between areas, a large proportion of the variance in the data remains unexplained. The assessment carried out in this Chapter identified urban and sub-urban locations are key sources of both males and females commuting to other labour market locations. This finding highlights the need for greater understanding of the role of housing markets in shaping the residence – workplace relation and, furthermore, the need for dual income households to make residential decisions on the basis of, potentially, two geographically separate workplaces.

Labour market segmentation was assessed with regard to the socio-economic groups reported within the POWCAR. Analysis of the average distance travelled-to-work identified that males, regardless of occupation, record longer average journeys-to-work than females and that the greatest difference between men and women are associated with the 'Unskilled' group. The most similar cohorts are male and female 'Higher Professional' workers. This group formed the focus of more detailed analysis exploring differences in patterns of self-containment, interaction between areas and an assessment of gender-based variation in where, within each labour market, men and women live and work. The research found that, in contravention of the theory in this area, there are nine labour markets where the numbers of 'Higher Professional' females living and working locally are lower than those of males. Analysing the interaction between areas found that females in this group are more likely to commute to smaller labour markets associated with Other Towns and Other Places compared to their male counterparts. Mapping within labour market variation in male and female travel-to-work patterns identified that a smaller proportion of 'Higher Professional' women live and work within rural areas compared to males as female employment opportunities are concentrated, to a greater degree than those available to 'Higher Professional' males, in urban locations. This is thought to explain the higher levels of female commuting between areas.

Overall, where people live and where they work is shown to be a highly complex issue. From the perspective of the gendered division of labour, Ireland is similar to many other industrialised countries. The foregoing analysis clearly establishes that Ireland reflects international patterns of labour market segmentation. Males and females are sorted into different industries and different occupations within these industries. Associated with this sorting is a geography of travel-to-work that differs according to, as demonstrated in this research, gender, industry and socio-economic group. This brings into focus the question of the relevance of the NSS to discrete sub-groups within the workforce and, fundamentally, the extent to which the core objective of *"closer matching of where people live with where they work"* is achievable (DoEHLG, 2002, p.10). Within the NSS, it is proposed that a polycentric region extending from Waterford in the Southeast and Galway, in the West, be developed to counterbalance the concentration of growth in the Dublin area and thereby facilitating more people to work closer to where they live.

Chapter 9 SUMMARY AND CONCLUSIONS

9.1 Introduction

The development of this thesis was informed by theoretical developments within economic geography that seek to understand the significance of labour in shaping economic processes. With a small number of notable exceptions, geographers in Ireland have yet to engage with or in these debates. This is noteworthy given that the production and reproduction of labour were central to public policy discourses in advance of, and subsequent to, the publication of the National Spatial Strategy. The thesis aimed to address this lacuna by conducting research into geographies of travel-to-work in Ireland. This aim was pursued through an empirical evaluation of the National Spatial Strategy, which aims to guide economic and social development in Ireland in order to deliver balanced regional development. Three broad objectives were framed in relation to the thesis' aim and these provide a guide to the research and results.

The first objective sought to enhance the effectiveness of spatial policies in Ireland concerned with economic development in general and those affecting labour in particular by critically engaging with key spatial planning concepts including functional areas and polycentricity. Underpinning this objective was the question of how European perspectives of space, particularly that of polycentricity, came to be interpreted within the context of the development of the NSS. The approach adopted in answering this question drew on a review of geographic theory concerned with labour processes and an evaluation of the conceptual content of polycentricity. This subsequently informed an assessment of the adoption of polycentricity as a guiding conceptualisation of space within the NSS. The empirical analysis presented in Chapters Five, Six and Seven, also contributes to enhancing the effectiveness of spatial policy in Ireland by providing a broad assessment of the spatial structure of Ireland's economy as reflected in travel-to-work patterns. However, before the latter research was undertaken it was first necessary to complete Objective Two, the identification of functional areas and local labour market areas. Important conceptual, methodological and data issues associated with the definition and

identification of labour markets were considered in the course of this particular aspect of the research. The results informed and facilitated Objective Three, an empirical evaluation of the NSS. Here, three key research questions were addressed; which of the spatial perspectives proposed in the *Indications* (2001) report and NSS (2002) most accurately reflected the materiality of economic processes in Ireland; was the critical mass of the 'Atlantic Corridor' equivalent to that of the Dublin local labour market area and; and who worked where? A brief synopsis of the research findings associated with these questions is provided before considering their policy implications. Future avenues for research into labour geographies and geographies of labour in Ireland are then considered.

9.2 Overview of Results

9.2.1 Theoretical Considerations

The development of this thesis through a combination of literature review and empirical data analysis contributes to the grounding a number of theoretical perspectives that are central to contemporary discourses within economic geography and spatial planning. The evolution of perspectives of labour through the application of labour market segmentation theory was shown to be highly significant in understanding the production and reproduction of workers. It is, however, partial. The theorisation of labour processes and the resulting spatial structures has largely followed from case studies focusing on similar groups of workers, generally unskilled or semi-skilled females, living and working in similar types of places, i.e. urban and suburban areas. The evaluation of where people live and work, focusing on both 'Unskilled' and 'Higher Professional' groups of male and female workers, established that whilst the general patterns observed reflect much of the geographic literature in this area, there are a number of exceptions. A small number of local labour market areas, contrary to the theory, record more men than women both living and working locally. These places tend to be located adjacent or accessible to labour markets with large urban centres and correspondingly, higher numbers of jobs associated with the Commerce and Education, Health and Social Work sectors. This result highlights the changing position of women within the labour force and demonstrates the need for comprehensive research to understand how improved

personal mobility and evolving economic structures are contributing to contemporary female labour geographies. It also highlights the continued segmentation of employment with limited opportunities for certain women, i.e. those with higher levels of education classified as 'Professionals' in rural areas.

The thesis evaluated labour's role within the spatial planning concept of polycentricity. At both EU and Irish levels this concept was developed and adapted as a means of addressing a number of conflicting concerns pertaining to dominant economic development patterns. At the EU scale the concern centred on the increasing consolidation of growth within the core or pentagon whilst, at the national level, it attempted to address similar concerns in terms of perceived over-development of the Greater Dublin Area. The review of spatial planning and economic geography literature identified that polycentricity is a concept that recognises the role of agglomeration in supporting economic growth. Drawing from the industrial districts literature, polycentricity seeks to foster the potential of regional level agglomeration of specialised activities through greater embedding of economic activities within integrating flows of knowledge, capital and materials. The theoretical significance of polycentricity is its fusing of processes of agglomeration and specialisation with the unfolding of the spatial divisions of labour within spatially constrained contexts such that the activities in one region are complementary to the growth of adjacent regions.

9.2.2 Data and Methods

The research presented in this thesis drew on advancements in the quality of data available to evaluate travel-to-work patterns in Ireland and combined these with an internationally recognised method for the identification of local labour market areas, the European Regionalisation Algorithm (ERA). This method enabled local labour market areas to be identified using selected characteristics, namely the number of people living and working locally and the size of the population of workers resident in each area. The research involved a critical evaluation of the ERA and development of an objective approach to identify those criteria used to identify local labour market areas. Modifying the technique in this way overcomes a significant

criticism of earlier applications of the ERA, namely the use of subjective criteria to define the boundaries of local labour market areas.

Whilst the data available to researchers in Ireland to evaluate labour processes and travel-to-work patterns is excellent, their use in any analysis needs to be carefully considered. The research established that a substantial proportion of the records contained within the POWCAR database do not have place of work information. Conventionally, such data are assigned a place of work corresponding to the individual's residential location. Research undertaken as part of this thesis demonstrates that doing so distorts the identification of travel-to-work areas as such records are unevenly distributed, i.e. they tend to occur disproportionately closer to large urban centres and in peripheral labour market areas.

9.2.3 Empirical Findings

Much of the empirical content of the thesis focused on the identification of functional regions. Following an evaluation of different regionalisation methods the research initially considered two different perspectives of functional areas produced in the course of developing the NSS. This found that the structure outlined in the NSS, rather than the earlier *Indications* (2001) report, is reflective of travel-to-work patterns at a very low scale. The level of data aggregation, into 12 areas, allows for a minimum self-containment in excess of 84% to be used in the identification of these spaces. The results of this comparative assessment establish that there are significant issues associated with the identification of some of the areas suggested in the *Indications* (2001) report. The Portlaoise – Kilkenny and Wexford – Waterford areas, in particular, did not emerge, in conjunction with 11 other spaces, as distinctive spaces. The research also established that changing the minimum value has a greater effect on the number of areas that will be identified. An evaluation of travel-to-work patterns within each of the 12 areas demonstrated that there is relatively limited interaction between large parts of these spaces and those places identified within the NSS as either Gateways or Hubs.

This led to an assessment of a larger scale geography of functional areas. Using lower minimum and target self-containment values, 66% and 74% respectively, 41

local labour market areas were identified that most closely approximate the spatial structure associated with Gateways, Hubs and Other Towns. A rules based evaluation of this solution found it to be valid and robust. The analysis did however identify some variation in the spatial pattern of self-containment. Whilst most of the labour market areas recorded both minimum and target self-containment values in excess of 75%, 13 did not. Of the latter group, ten reported a supply and demand side self-containment value less than 75% but greater than 66%. The spatial distribution of these local labour market areas suggests that their location relative to other, larger labour markets may be one explanatory factor. This is particularly true for the Mullingar, Tullamore, Dungarvan and Mallow areas. The proximity of these areas to larger labour markets, namely those associated with Dublin, Cork and Limerick, points to the potential impacts of both counterurbanisation and restructuring of the economy. These processes are thought to have resulted in both supply and demand spatial mismatches in labour. These results raise fundamental questions regarding the sustainability of Ireland's model of economic and residential development, cf. Horner, 1999. In effect, this finding echo's the original rationally for the introduction of a spatial strategy and highlights the continuing need for policy initiatives the encourage more sustainable residential and economic development.

A further three labour market areas, Portlaoise, Carlow and Gorey – Enniscorthy, all located adjacent to the southern and western boundaries of the Dublin labour market area, recorded lower levels of supply side self-containment. Here too the spatial mismatch hypothesis is helpful in understanding the commuting of relatively large proportions, 20% - 21%, of the resident workforce to other labour market areas, particularly that of the Dublin area.

The emergence of 12 additional 'Other Places' from this assessment highlights the limited engagement, within the NSS, with the economic geography of rural areas distant from or inaccessible to larger urban centres. Those 'Other Places' located along the West coast can be understood in terms of distance from larger urban centres and their associated labour markets. The presence of these areas suggests that a number of locally significant economies remain unidentified within the NSS. Distance from larger labour market areas, or geographical peripherality, fails to explain the existence of a small number of 'Other Places', i.e. Gorey – Enniscorthy

and Birr – Roscrea. These spaces point to the complexity of Ireland's economic geography wherein urban dominated places co-exist alongside strong rural economies. It is entirely possible that dominant patterns of counterurbanisation that were in train whilst the NSS was being formulated and continued beyond the 2006 Census of Population may have resulted in enhanced local consumption arising from population growth within all of the 'Other Places', which boosted the scale of local economic activity, particularly in property related activities, e.g. domestic and commercial construction, financial services and retail enterprises.

The thesis presented an evaluation of critical mass within the Atlantic Corridor local labour market areas and compared it to that of the Dublin. Using indicators of critical mass or agglomeration suggested within the NSS, the mass of the Corridor was found to be lower in terms of population size, density and proportion living in urban areas compared to that of the Dublin labour market area. The Atlantic Corridor has, relative to its overall population, a smaller labour force than the Dublin area due to lower participation levels amongst women throughout the entire Corridor and amongst males living within the Limerick labour market area. The economic structure of the Corridor is substantially different to that of the Dublin area. Employment in Commerce is highly significant to the economy of the Dublin labour market area where the sector accounts for 38.23% of all jobs, compared to 27.80% in those labour markets that comprise the Atlantic Corridor. Manufacturing and related activities within the Corridor is a very significant sector employing 20.57% of persons compared to 12.31% in the Dublin area.

One of the primary findings emerging from this element of the research was the highly heterogeneous nature of the labour markets that comprise the Atlantic Corridor. Substantial differences were observed across a range of indicators between those labour markets containing the main urban centres, i.e. Galway, Ennis, Limerick, Cork and Waterford, and those spaces associated with Mallow and Dungarvan.

Interaction analysis, measured in terms of the numbers of people traveling to work between those labour market areas that comprise the Atlantic Corridor, established the fragmented nature of critical mass within the Corridor. The labour markets

associated with the Mallow and Dungarvan areas, in particular emerged as being relatively small. This accounts for some of the inter-area commuting between these spaces and Waterford, Cork and Limerick identified by the analysis. The highest levels of travel-to-work based interaction were found between neighbouring labour markets, particularly Shannon – Ennis and Limerick, Mallow and Limerick and Mallow and Cork. A further significant finding was the limited interaction between the Waterford and Galway labour market areas and those other constituent elements that comprise the Corridor. These results indicate that the Atlantic Corridor is neither polycentric nor is the critical mass enhanced through inter-area commuting.

The analysis of core critical mass confirmed the findings of earlier research into aggregate critical mass as evidenced by a group of High Density Nodes more than 10 km from a Gateway, Hub or Other Town within the Atlantic Corridor. A detailed evaluation of the core critical mass associated with manufacturing activities in the Atlantic Corridor suggests it is enhanced through the presence of a number of clusters. These are located proximal to the main cities though there are also a small number in rural areas.

More detailed analysis of who works where or labour market segmentation established that the patterns observed in Ireland are, generally, reflective of those reported in the international literature. Significantly, despite very different conditions of employment, it was found that female workers, regardless of whether they were employed in 'Higher Professional' or 'Unskilled' jobs, recorded shorter journeys to work and that these jobs are concentrated in urban centers. It was also established that residential proximity to the boundary of a labour market area has a limited effect on the level of interaction with other labour markets supporting the contention that other, socio-economic, factors are highly important is determining who works where.

9.2.4 Policy Implications

Overall, the results emerging from the analyses presented in Chapters Five, Six and Seven, bring into question the number of places classified within the NSS as either Gateways or Hubs. Furthermore it raises critical issues with regard to the role of certain places, i.e. those Hubs functioning as bridges between Gateways. If a spatial

strategy is to be strategic it is necessary to select a limited number of places that have the potential to develop. Classification of additional places where potential is not present and cannot be fostered undermines the strategic content of any such plan.

Fundamental to the development of a coherent strategy is the identification of an appropriate scale of intervention. Scale and critical mass emerged as issues of significant concern and were central to those discourses surrounding the development of the NSS. Tensions between different perspectives (scales) of economic development and how it might be engendered underpinned the rejection of regional scale functional areas and the interpretation of polycentricity as a means of aggregating smaller places into larger spaces. Whilst the conceptualisation of functional areas presented in the NSS is accurate, as demonstrated in Chapter Five, the extent to which these spaces reflect the daily travel-to-work experience of most workers is limited. The development of spatial strategies demands detailed analysis of how places are integrated within functional areas and by economic processes. The NSS was hindered in this regard by the absence of adequate data at the time when the strategy was drafted. Comprehensive spatial analysis of economic processes is a prerequisite if those responsible for policy formulation, elected representatives, in particular, and the general population are to understand how economic processes operating at a variety of scales shape places and their roles.

Moving to a larger scale, that of Gateways, Hubs and Other Towns, finds that this perspective is an incomplete conceptualisation of Ireland's economic geography. When identifying the spatial structure associated with those places identified within the NSS, an additional 12 'Other Places' emerge from the analysis. In most instances these are located in areas that are remote or inaccessible to the Gateways, Hubs and Other Towns. The presence of so many 'Other Places' points to the limited engagement within the NSS with the economic geography of what are socially, economically and geographically diverse rural areas. The existence of these areas emphasises the complexity and differentiated nature of Ireland's economic geography. The analysis presented in Chapters Five and Six also highlights substantial differences in the size and structure, in terms of self-containment, of the Gateways, Hubs and Other Towns. The classification of, in particular Athlone, Tullamore and Mullingar as a Gateway is highly questionable. The evaluation of

travel-to-work patterns presented in Chapter Six indicates that the identification of functional areas associated with these areas is challenging. Small changes in self-containment values can result in the aggregation of these spaces within different spatial structures. The high proportion of workers classified as 'Mobile' living in these areas points to spatial mismatches between the skills of these individuals and the jobs available within the locality. It also points to the increasing integration of the Midland Region into, particularly, the economies of the Greater Dublin Region and the Greater Galway Region.

Within the context of the NSS, polycentricity was used to overcome resistance to the concept of functional areas that, firstly did not take into consideration long established administrative boundaries and, secondly were largely focused on a small number of cities and towns. Enhancing polycentric arrangements between selected places, the Gateways, Hubs, Other Towns and their attendant functional spaces, is the primary mechanism through which the NSS seeks to achieve balanced regional development. Key to this goal is fostering economic growth within the Atlantic Corridor, an arc of functional spaces associated with cities and towns extending from Waterford in the Southeast to Galway in the West. Exploring patterns of interaction between the constituent local labour markets of the Atlantic Corridor found that relatively few workers commute between areas. This indicates that, whilst the Atlantic Corridor is morphologically polycentric, the integrating cross-flows that characterise polycentric areas are not present. The highest levels of travel-to-work based interaction were found, as previously stated, between neighbouring labour markets, particularly Shannon – Ennis and Limerick, Mallow and Limerick, and Mallow and Cork. These patterns of interaction are not reflective of functional polycentricity.

This raises the issue of the classification of some places as Hubs, i.e. Dungarvan, Mallow and Tuam. As places located between larger urban centres it is questionable whether they can function, as envisaged in the NSS, as integrating bridges between places. The analysis demonstrates that these places are sources of labour rather than places that attract workers. These results highlight a key challenge confronting any attempt to foster polycentric development, namely the predominantly linear structure of the Atlantic Corridor. This largely precludes the development of integrating flows

throughout the entire space and demonstrates the complexity of trying to adapt spatial conceptualisations of economic and labour processes developed in other countries to Ireland's dispersed settlement structure.

9.3 Future Research

The research developed within this thesis, in terms of contributions to theory, methodology and empirical analysis has assumed increased importance in light of recent developments affecting Ireland's economy. Discourses concerning the production and reproduction of labour have returned to the fore in recent years as Ireland struggles to respond to a dramatic reversal of economic fortunes following the attendant crises affecting the global financial system and collapse of the domestic property market. The latter event precipitated a systemic crisis within Ireland's economy resulting in, initially, reduced employment and increased unemployment amongst specific segments of workers, i.e. those engaged in 'Construction' and 'Commerce' related activities, before spreading to most, but not all, other sectors (Meredith, 2011). These developments are part of a wider restructuring of economic systems at a variety of scales ranging from the household through to European and global levels. The socially constructed and spatially differentiated impacts of change give rise to a range of theoretical and empirical research questions. Theoretically, the shift in the global employment regime to one of surplus labour has the potential to reduce labour power and result the re-emergence of capital as the dominant factor shaping the production and reproduction of labour. In the face of limited or no employment opportunities in their local or national labour markets, some groups of workers from industrialised countries are becoming increasingly mobile in their search for jobs. This necessitates an evaluation of locally, regionally and globally uneven processes of economic restructuring and the attendant impacts on labour market segmentation through cohort specific migration patterns. Associated with this issue is the need to consider the influence of regulatory frameworks that seek to influence capital investment and disinvestment processes. The role of labour in these frameworks, whether through 'willing' participation in cost reduction processes or resistance to disinvestment is important and demands further consideration.

From an empirical perspective the emergence of new spatial divisions of labour gives rise to the need for analysis of the impacts of economic restructuring on the spatial structure of local labour market areas within Ireland. The changing locations of work, increasingly concentrated in larger urban centres, can be expected to have resulted in substantial changes to the spatial structure of some labour markets in the relatively short period of time since 2006. In addition to evaluating the evolution of labour market area boundaries there is a need to understand the social and economic processes underpinning these developments. As part of the research into labour market segmentation attention should be given to the implications of changing roles within households. This is particularly important given the highly gendered impacts of increasing unemployment, i.e. female workers have not experienced the same level of job losses as their male counterparts though the quality of their employment has un-doubtable has deteriorated in line with most other workers. Additional research is also required to evaluate the impacts of the economic downturn on the composition of 'Mobile Workers' who, as a distinctive segment of the workforce dependent on the construction sector, can be expected to have witnessed significant changes in recent years.

The production of a new POWCAR from the 2011 Census of Population will facilitate engagement with the research outlined above. Researchers and policy makers interested in these issues should consider, where possible, international collaboration. Such initiatives are facilitated by the international cycle of census taking, wherein many countries completed their Census of Population in 2010 – 2011, and the greater availability of place of work datasets. After all, the current drivers of economic restructuring are giving rise to greater linkages and integration between places. Internationalisation of research considering labour market segmentation and industrial restructuring will provide greater insights into the structuring forces at work and mediating influence of local settings. This approach foregrounds the importance of interactions between global and local social, institutional and economic processes in determining patterns of uneven development. Theoretically, it also offers the potential to answer the question of just what is local about local labour market areas.

Appendices

1. Appendix 1: Description of changes to variables in the POWSAR and POWCAR

Residence Town and Town of Work Data

a. The 2002 POWSAR contains a residence town and town of work classification for those persons living in or proximal to towns with greater than 1,500 persons. The POWCAR dataset contains the same information but the ‘town’ population threshold has been lowered to 1,000 persons. As a result the number of ‘towns’ identified within the data has increased from 144 to 233.

b. In the POWSAR larger towns and cities were organised within a spatial typology that distinguished between places of work located in the suburbs and those in areas classified as the centre. Central spaces correspond to the areas classified as urban in the Local Government Act 2000. Suburbs are the adjacent urban areas.

c. The POWCAR data contains a typology of cities, towns, census towns and non town 1,000+ areas.

2. Household composition

   a. In POWSAR the data was classified into the following groups:

      i. 'Single person',
      ii. 'Lone parent with children',
      iii. 'Couples with/without children but no others',
      iv. 'Couples with/without children with others' and
      v. 'Other households'.

   b. Additional categories have been included in POWCAR. These provide greater insight into the stage of family cycle amongst lone parents and couples with children. What is missing from the POWCAR however is an indication of whether there are dependents in the household other than children e.g. an elderly relative. The POWCAR household composition variable includes:

i. 'Single Person',
ii. 'Lone Parent with at least one resident child aged 19 or under',
iii. 'Lone Parent with resident children but none aged 19 or under',
iv. 'Couple with at least one resident child aged 19 or under',
v. 'Couple with resident children but none aged 19 or under', and
vi. 'Couple with no resident children' and 'Other Households'.

3. Year accommodation built
   a. POWSAR includes nine categories:
      i. '1' = 'Before 1919' '2' = '1919 – 1940' '3' = '1941 – 1960' '4' = '1961 – 1970' '5' = '1971 – 1980' '6' = '1981 – 1990' '7' = '1991 – 1995' '8 '= '1996 or later'
   b. POWCAR has one additional category:
      i. '1' = 'Before 1919', '2' = '1919 – 1940', '3' = '1941 – 1960', '4' = '1961 – 1970', '5' = '1971 – 1980', '6' = '1981 – 1990', '7' = '1991 – 1995', *'8'= '1996 – 2000'*, '9 '= '2001 or later', '*' = Not stated

      This allows those individuals living in residential accommodation built between 1996 – 2001 and after 2001 to be identified..

4. Nature of Occupancy
   a. The POWSAR provided detailed information on the nature of residential occupancy including:
      i. Owner occupied where loan or mortgage repayments are being made,
      ii. Owner occupied where no loan or mortgage repayments are being made,
      iii. Being purchased from a Local Authority (Corporation, County or Urban District Council) under a Tenant Purchase Scheme,
      iv. Rented from a Local Authority,
      v. Rented unfurnished other than from a Local Authority,
      vi. Rented furnished or part furnished other than from a Local Authority,
      vii. Occupied free of rent (caretaker, company official, etc.), and
      viii. Not stated .

b. These eight categories are reduced to three broad groups in POWCAR for confidentiality purposes. The new classification is divided between:
    i. Purchaser/Owner Occupied,
    ii. Rented incl. free rent, and
    iii. Not stated

5. The number of cars / vans available to the household
    c. In POWSAR there was a classification for households 1, 2, 3, 4 and 5 or more cars. The latter category is excluded from POWCAR where all households with more than 4 cars are grouped under the heading 'Four or More'.
6. Martial Status
    d. POWSAR recorded four possible marital conditions;
        i. never married,
        ii. married,
        iii. separated (including divorced), and
        iv. widowed.
    e. POWCAR records two classification,
        i. single (never married, and
        ii. ever married (including divorced).
7. Time of Departure
    f. POWCAR provides additional time period classifications for particularly early risers, before 6am and between 6.30 and 7.00.
    g. POWSAR recorded these individuals in one group, Before 7am.
8. Journey distance
    h. This is recorded as kilometres in POWCAR rather than miles as it was in POWSAR.

2. Appendix 2: Results of the assessment of self-containment values yielding 12 functional areas

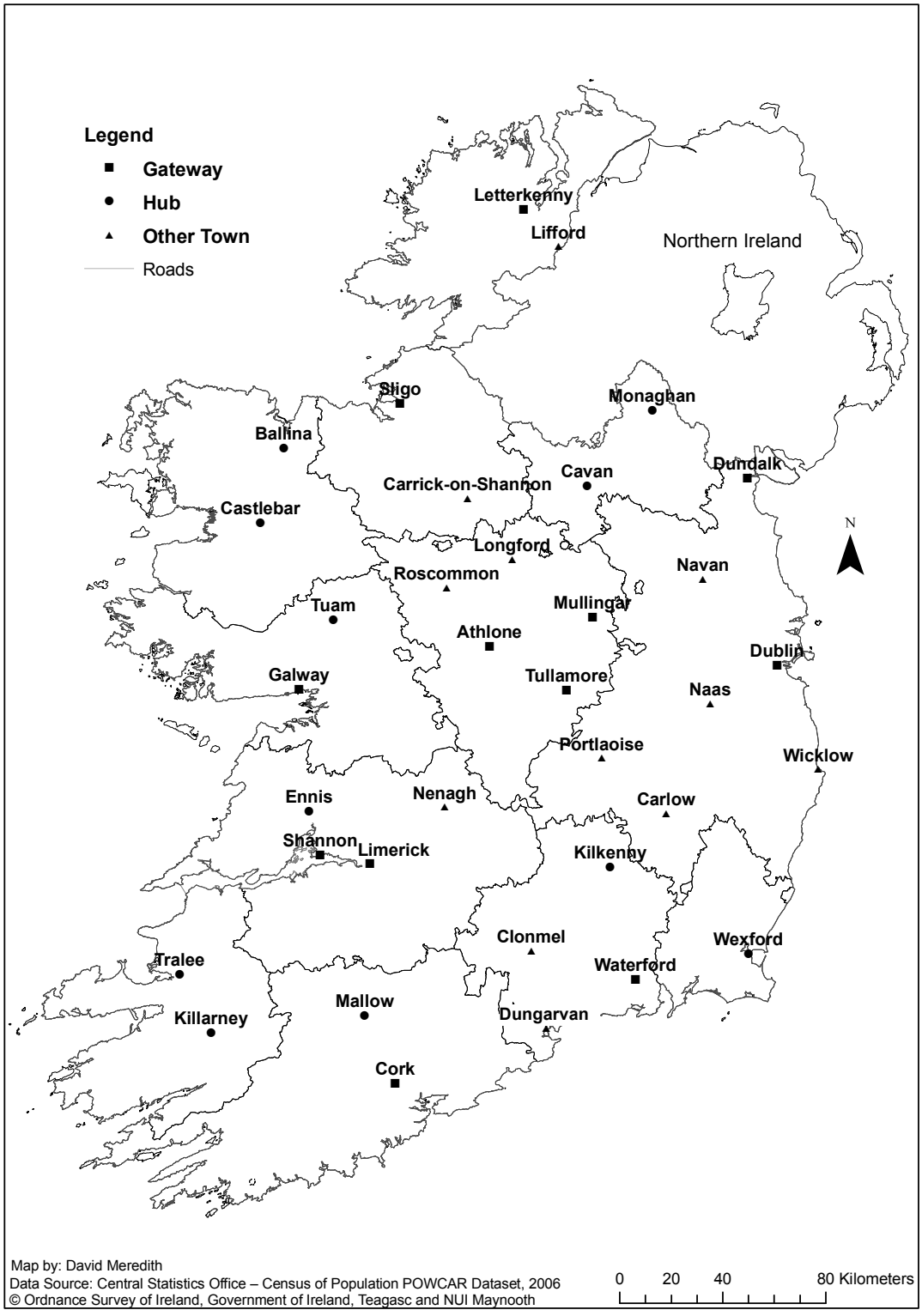


Figure 5A.9.1 Twelve Functional Areas: Solution 1

	Minimum	Target
Self-containment	84%	100%
Population	6,500	20,500

Table 5A.1 Description of Solution 1 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	877958	722118	729564	708844	98.16	97.16
Wexford	48636	38824	36480	33400	86.03	91.56
Waterford	102909	83574	85712	76899	92.01	89.72
Cavan	48198	36609	35717	31831	86.95	89.12
ATM	92592	72342	71321	62017	85.73	86.95
Limerick	157536	128284	127406	120411	93.86	94.51
Galway	93305	73812	73685	69245	93.81	93.97
Cork	207205	167551	166833	161913	96.64	97.05
Killarney	57083	43849	42699	40941	93.37	95.88
Castlebar	51003	39017	37927	35679	91.44	94.07
Sligo	44108	34867	33767	30899	88.62	91.51
Letterkenny	53939	38909	38645	38019	97.71	98.38

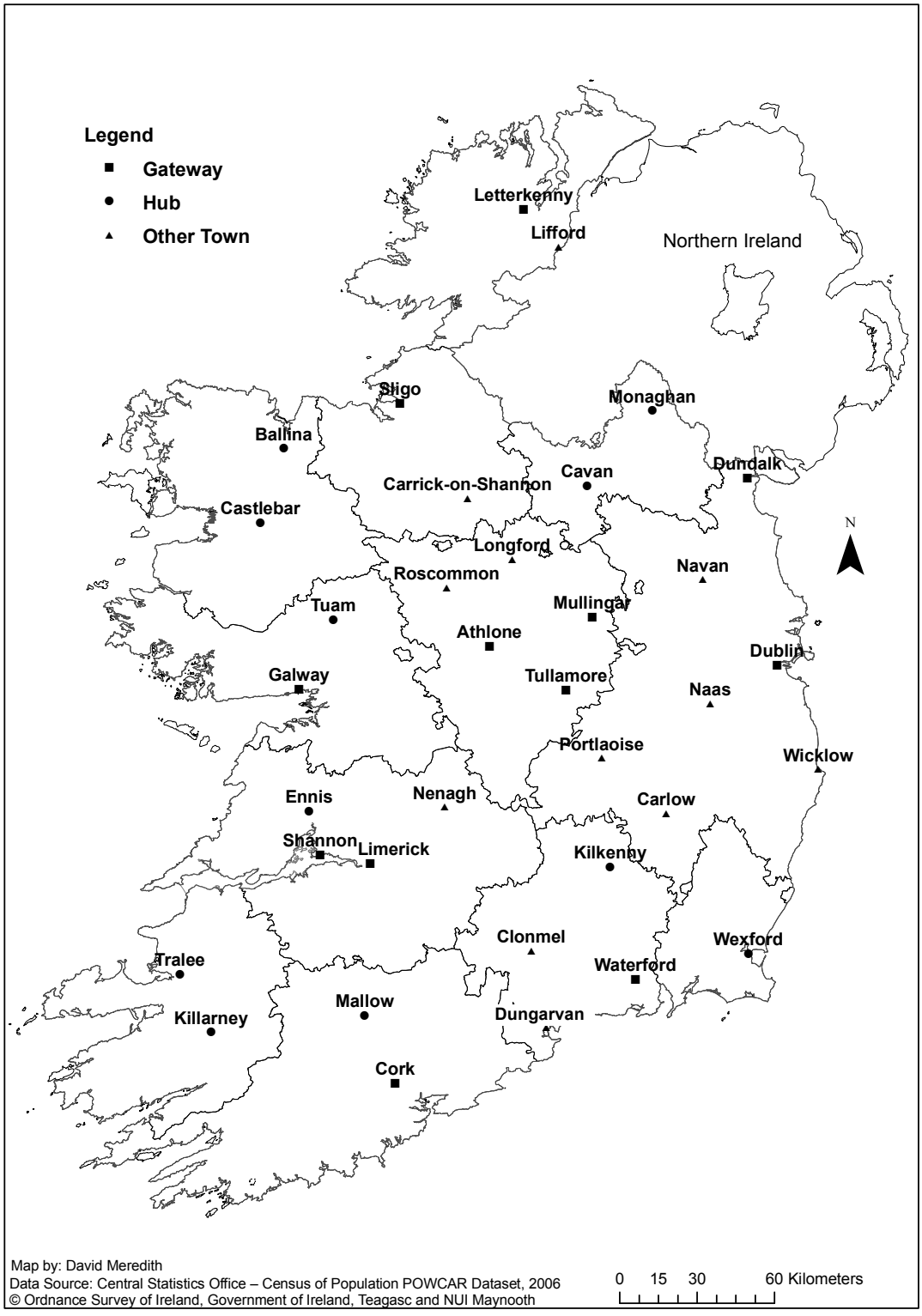


Figure 5A.9.2 Twelve Functional Areas: Solution 2

	Minimum	Target
Self-containment	83%	100%
Population	6,500	20,500

Table 5A.2 Description of Solution 2 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	877958	722118	729564	708844	98.16	97.16
Wexford	48636	38824	36480	33400	86.03	91.56
Waterford	102909	83574	85712	76899	92.01	89.72
Cavan	48198	36609	35717	31831	86.95	89.12
ATM	92592	72342	71321	62017	85.73	86.95
Limerick	154084	125642	125138	117909	93.85	94.22
Galway	93305	73812	73685	69245	93.81	93.97
Cork	207148	167509	166824	161890	96.65	97.04
Killarney	60592	46533	44976	43223	92.89	96.1
Castlebar	51003	39017	37927	35679	91.44	94.07
Sligo	44108	34867	33767	30899	88.62	91.51
Letterkenny	53939	38909	38645	38019	97.71	98.38

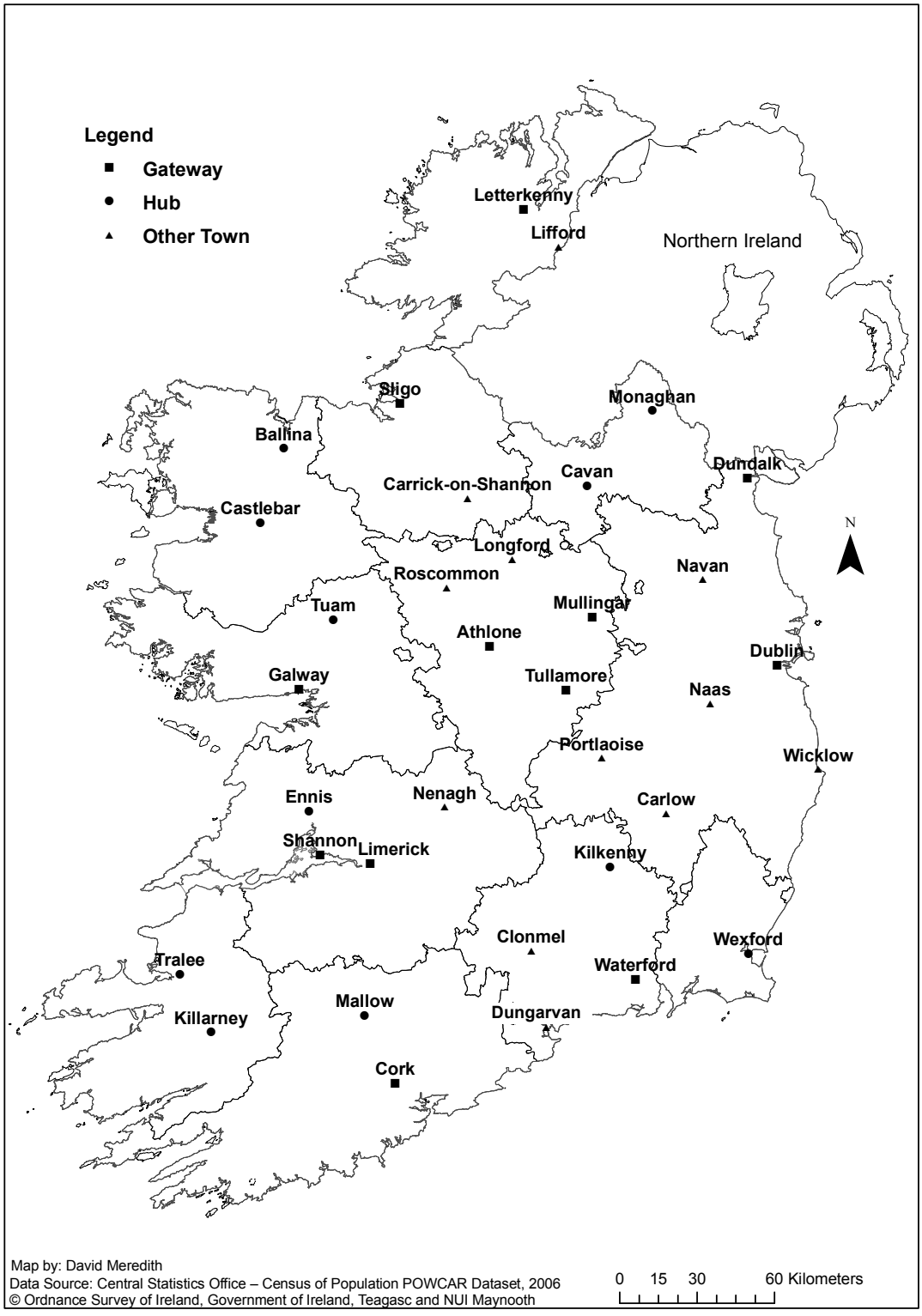


Figure 5A.9.3 Twelve Functional Areas: Solution 3

	Minimum	Target
Self-containment	84%	99%
Population	6,500	20,500

Table 5A.3 Description of Solution 3 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	877958	722118	729564	708844	98.16	97.16
Wexford	48636	38824	36480	33400	86.03	91.56
Waterford	102909	83574	85712	76899	92.01	89.72
Cavan	48198	36609	35717	31831	86.95	89.12
ATM	92592	72342	71321	62017	85.73	86.95
Limerick	157536	128284	127406	120411	93.86	94.51
Galway	93305	73812	73685	69245	93.81	93.97
Cork	207205	167551	166833	161913	96.64	97.05
Killarney	57083	43849	42699	40941	93.37	95.88
Castlebar	51003	39017	37927	35679	91.44	94.07
Sligo	44108	34867	33767	30899	88.62	91.51
Letterkenny	53939	38909	38645	38019	97.71	98.38

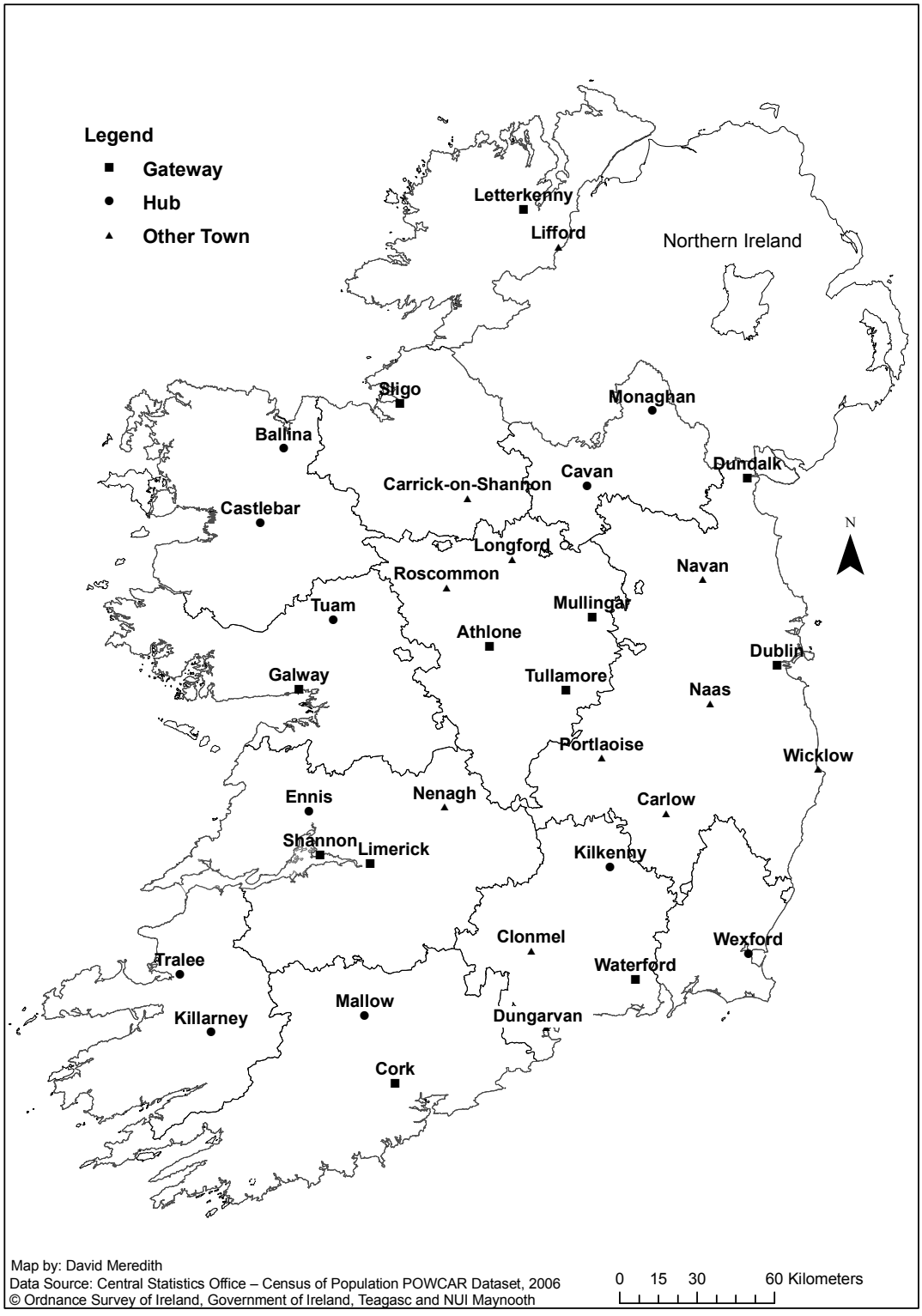


Figure 5A.9.4 Twelve Functional Areas: Solution 4

	Minimum	Target
Self-containment	83%	99%
Population	6,500	20,500

Table 5A.4 Description of Solution 4 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	877958	722118	729564	708844	98.16	97.16
Wexford	48636	38824	36480	33400	86.03	91.56
Waterford	102909	83574	85712	76899	92.01	89.72
Cavan	48198	36609	35717	31831	86.95	89.12
ATM	92592	72342	71321	62017	85.73	86.95
Limerick	157536	128284	127406	120411	93.86	94.51
Galway	93305	73812	73685	69245	93.81	93.97
Cork	207205	167551	166833	161913	96.64	97.05
Killarney	57083	43849	42699	40941	93.37	95.88
Castlebar	51003	39017	37927	35679	91.44	94.07
Sligo	44108	34867	33767	30899	88.62	91.51
Letterkenny	53939	38909	38645	38019	97.71	98.38

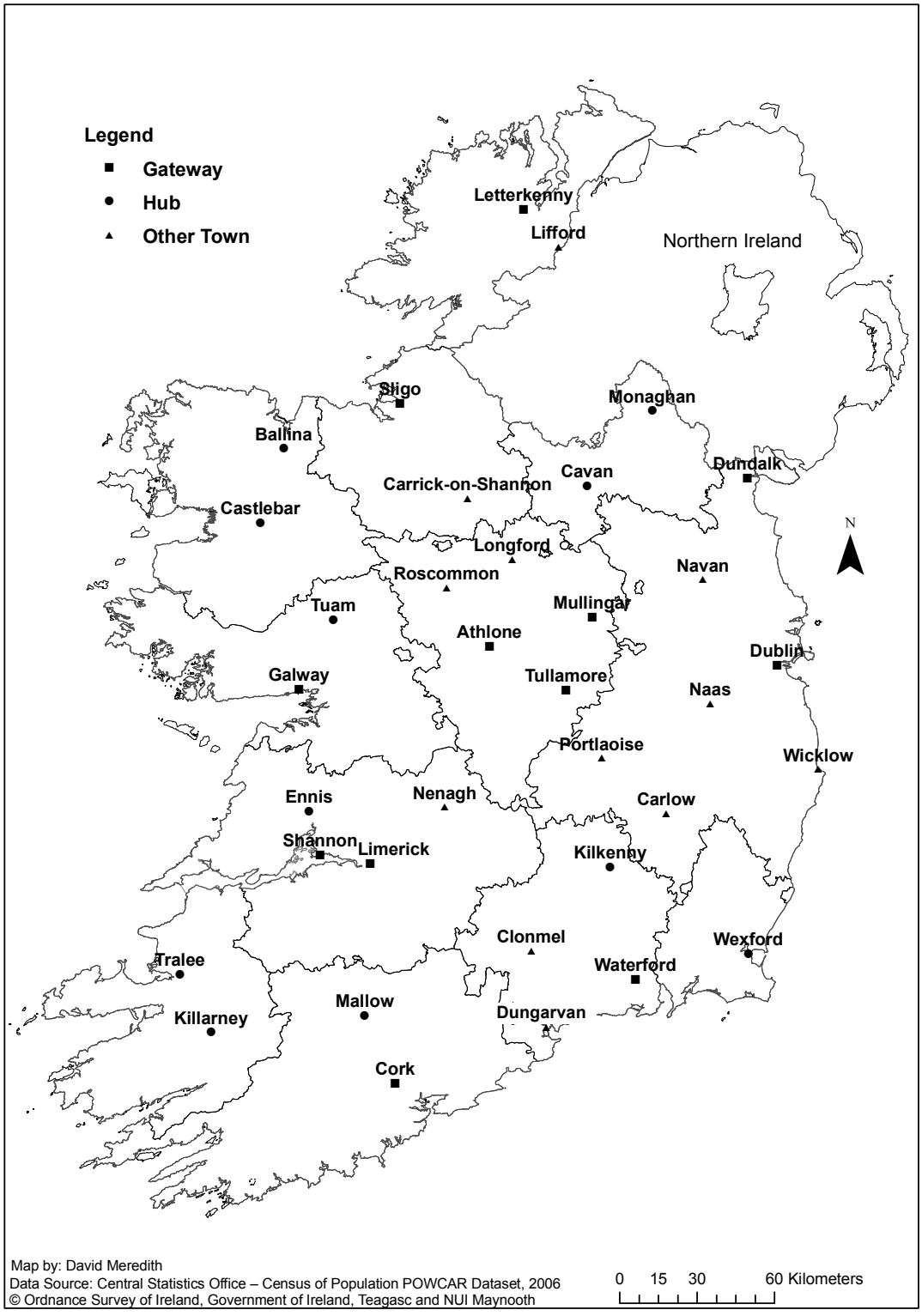


Figure 5A.9.5 Twelve Functional Areas: Solution 5

	Minimum	Target
Self-containment	84%	98%
Population	6,500	20,500

Table 5A.5 Description of Solution 5 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	877958	722118	729564	708844	98.16	97.16
Wexford	48636	38824	36480	33400	86.03	91.56
Waterford	102909	83574	85712	76899	92.01	89.72
Cavan	48198	36609	35717	31831	86.95	89.12
ATM	92592	72342	71321	62017	85.73	86.95
Limerick	157536	128284	127406	120411	93.86	94.51
Galway	93305	73812	73685	69245	93.81	93.97
Cork	207205	167551	166833	161913	96.64	97.05
Killarney	57083	43849	42699	40941	93.37	95.88
Castlebar	51003	39017	37927	35679	91.44	94.07
Sligo	44108	34867	33767	30899	88.62	91.51
Letterkenny	53939	38909	38645	38019	97.71	98.38

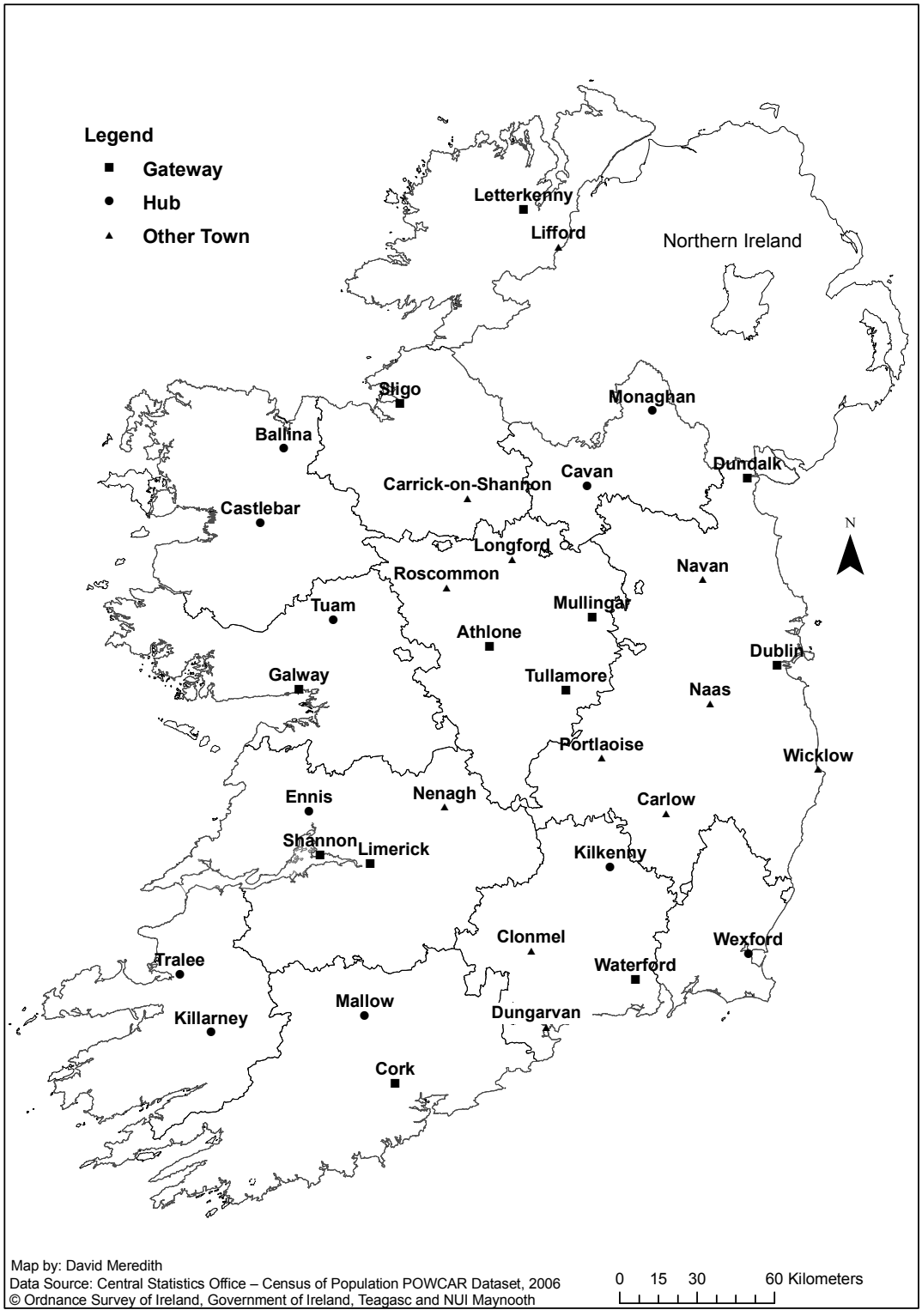


Figure 5A.9.6 Twelve Functional Areas: Solution 6

	Minimum	Target
Self-containment	83%	98%
Population	6,500	20,500

Table 5A.6 Description of Solution 6 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	877958	722118	729564	708844	98.16	97.16
Wexford	48636	38824	36480	33400	86.03	91.56
Waterford	102909	83574	85712	76899	92.01	89.72
Cavan	48198	36609	35717	31831	86.95	89.12
ATM	92592	72342	71321	62017	85.73	86.95
Limerick	157536	128284	127406	120411	93.86	94.51
Galway	93305	73812	73685	69245	93.81	93.97
Cork	207205	167551	166833	161913	96.64	97.05
Killarney	57083	43849	42699	40941	93.37	95.88
Castlebar	51003	39017	37927	35679	91.44	94.07
Sligo	44108	34867	33767	30899	88.62	91.51
Letterkenny	53939	38909	38645	38019	97.71	98.38

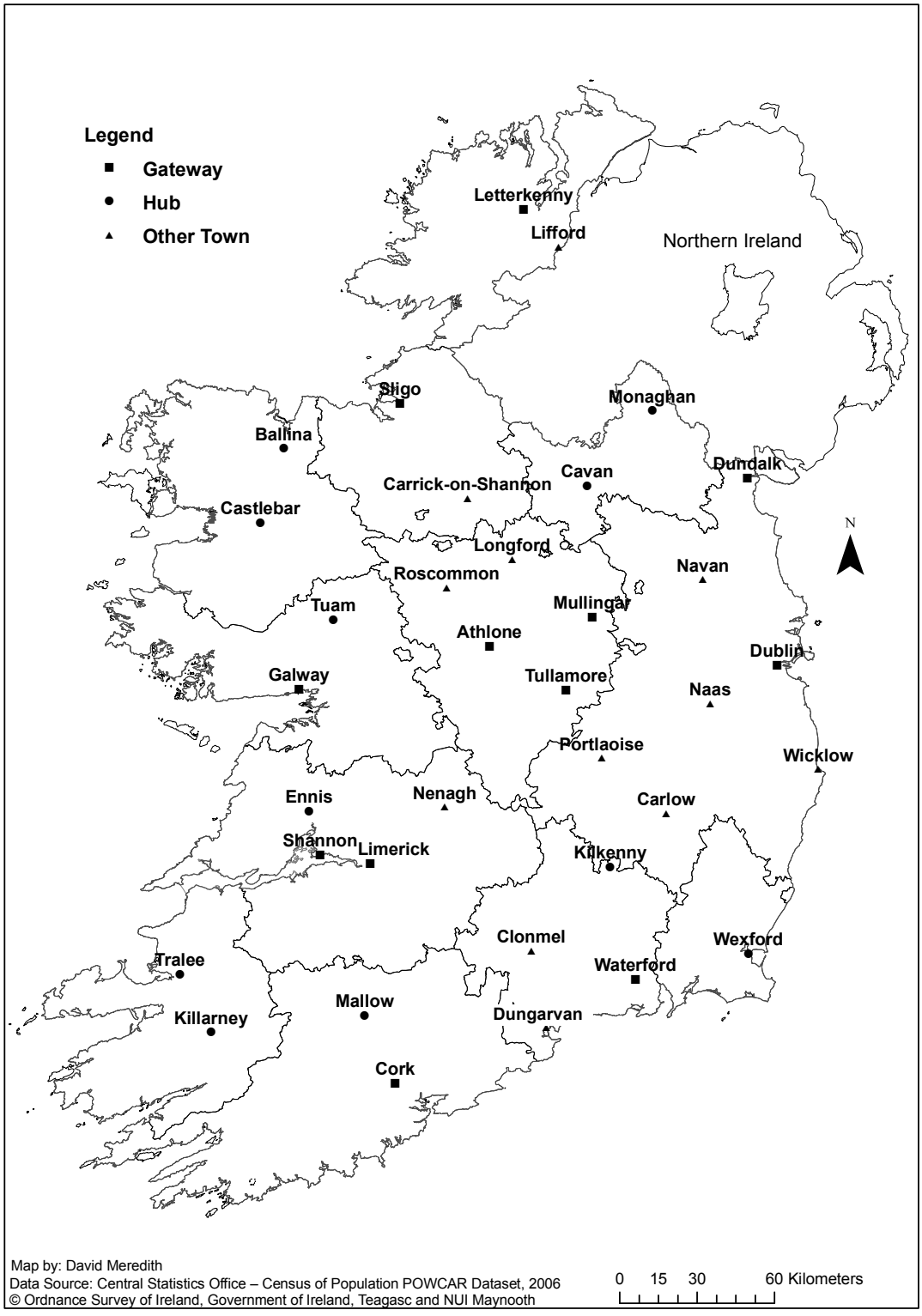


Figure 5A.9.7 Twelve Functional Areas: Solution 7

	Minimum	Target
Self-containment	83%	97%
Population	6,500	20,500

Table 5A.7 Description of Solution 7 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	882537	725837	732706	711623	98.04	97.12
Wexford	48724	38887	36504	33427	85.96	91.57
Waterford	98276	79817	82560	72987	91.44	88.4
Cavan	48198	36609	35717	31831	86.95	89.12
ATM	92592	72342	71321	62017	85.73	86.95
Limerick	157536	128284	127406	120411	93.86	94.51
Galway	93305	73812	73685	69245	93.81	93.97
Cork	207205	167551	166833	161913	96.64	97.05
Killarney	57083	43849	42699	40941	93.37	95.88
Castlebar	51003	39017	37927	35679	91.44	94.07
Sligo	44074	34842	33753	30874	88.61	91.47
Letterkenny	53939	38909	38645	38019	97.71	98.38

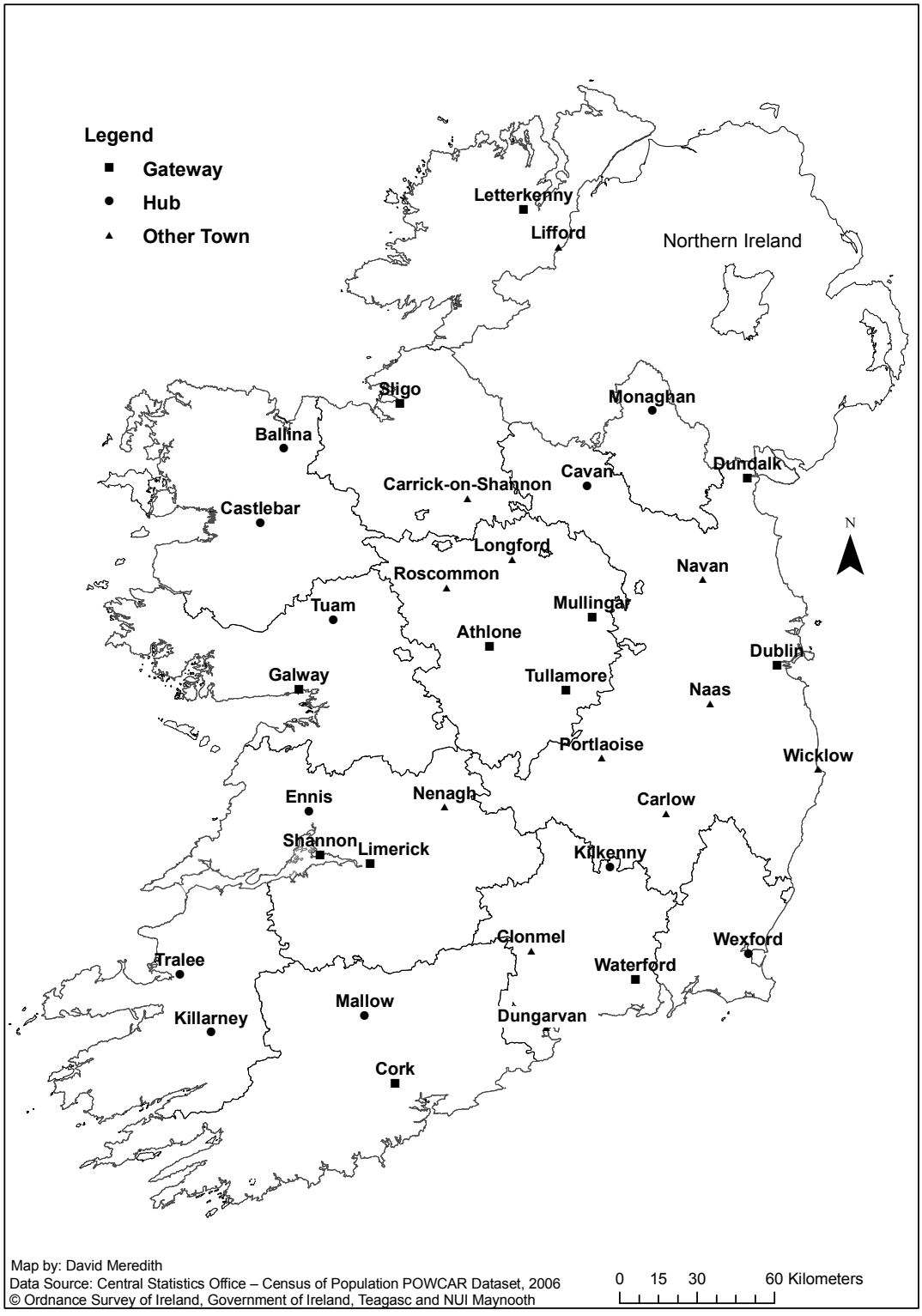


Figure 5A.9.8 Twelve Functional Areas: Solution 8

	Minimum	Target
Self-containment	83%	96%
Population	6,500	20,500

Table 5A.8 Description of Solution 8 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	905289	743142	749660	727574	97.91	97.05
Wexford	48724	38887	36504	33427	85.96	91.57
Waterford	93023	75604	79362	68865	91.09	86.77
Monaghan	31476	23982	22598	20166	84.09	89.24
ATM	89231	69719	68775	59986	86.04	87.22
Limerick	153060	124820	124657	117030	93.76	93.88
Galway	93305	73812	73685	69245	93.81	93.97
Cork	212481	171744	171002	164993	96.07	96.49
Killarney	60255	46311	43987	42385	91.52	96.36
Castlebar	51003	39017	37927	35679	91.44	94.07
Sligo	42686	33809	32954	29947	88.58	90.88
Letterkenny	53939	38909	38645	38019	97.71	98.38

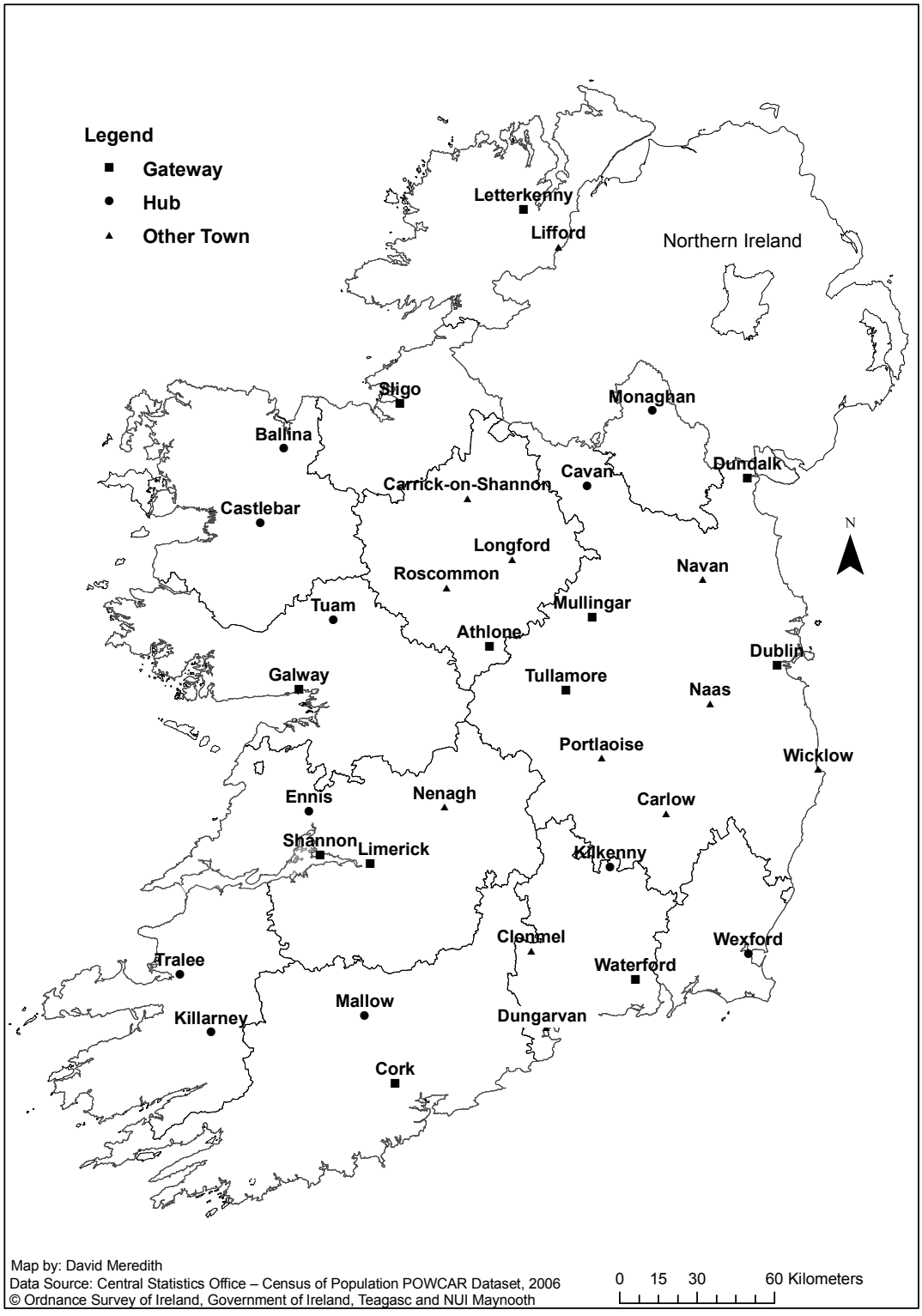


Figure 5A.9.9 Twelve Functional Areas: Solution 9

	Minimum	Target
Self-containment	83%	95%
Population	6,500	20,500

Table 5A.9 Description of Solution 9 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	940110	770538	775701	756160	98.13	97.48
Wexford	48271	38533	36306	33257	86.31	91.6
Waterford	86851	70693	74875	64159	90.76	85.69
Cavan	31476	23982	22598	20166	84.09	89.24
ATM	157994	128681	128435	120514	93.65	93.83
Limerick	58847	45525	45468	38832	85.3	85.41
Galway	97672	77227	77198	72758	94.21	94.25
Cork	220640	178274	176402	169428	95.04	96.05
Killarney	59266	45488	43463	41633	91.53	95.79
Castlebar	50302	38504	37577	35300	91.68	93.94
Sligo	31773	25353	25218	22791	89.89	90.38
Letterkenny	51270	36958	36515	35989	97.38	98.56

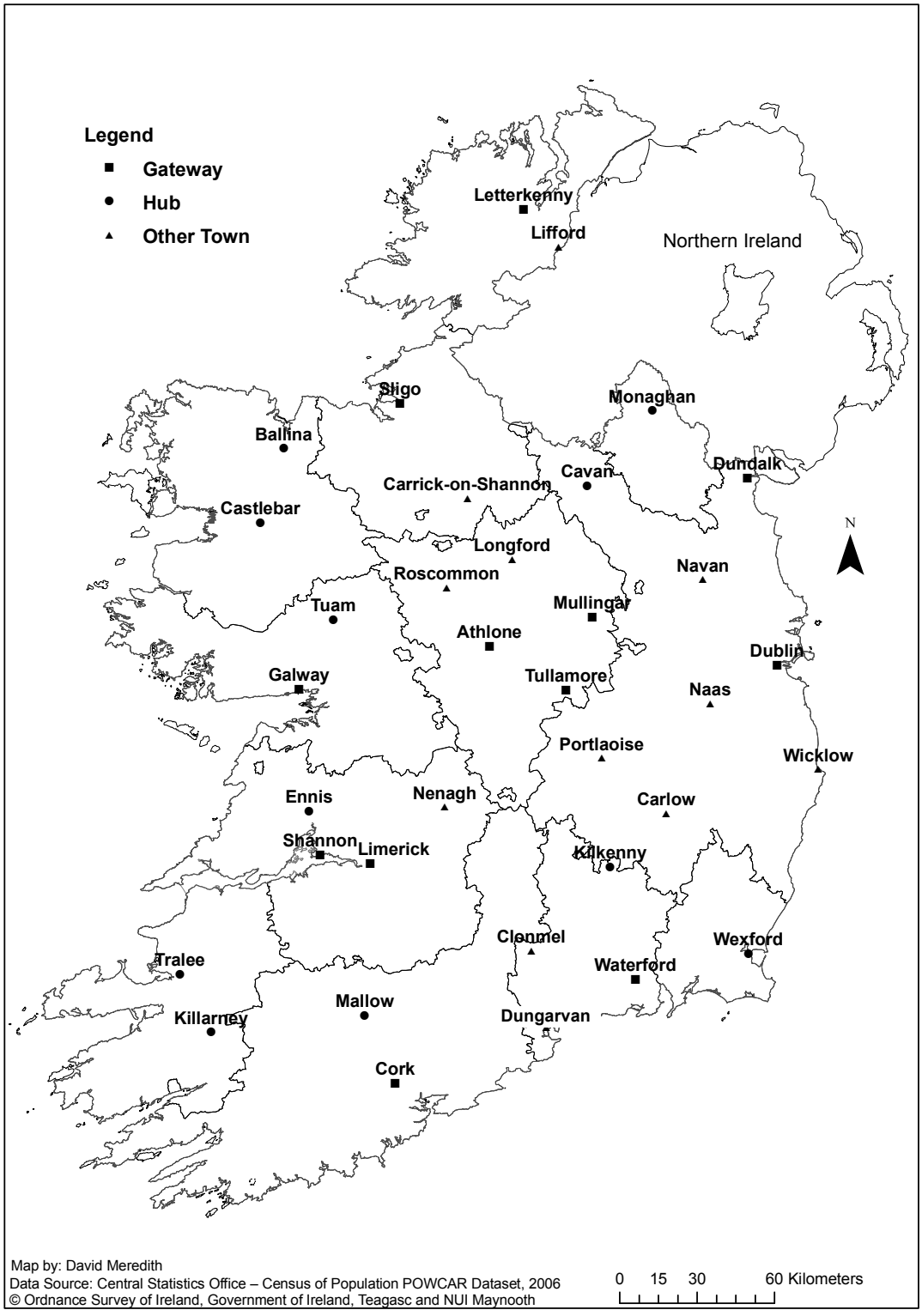


Figure 5A.9.10 Twelve Functional Areas: Solution 10

	Minimum	Target
Self-containment	83%	94%
Population	6,500	20,500

Table 5A.10 Description of Solution 10 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	900790	739799	746575	725437	98.06	97.17
Wexford	46059	36794	34411	31958	86.86	92.87
Waterford	84869	69119	73343	62546	90.49	85.28
Cavan	31476	23982	22598	20166	84.09	89.24
ATM	93503	73038	72542	62727	85.88	86.47
Limerick	142868	116517	116804	109873	94.3	94.07
Galway	93305	73812	73685	69245	93.81	93.97
Cork	233958	189039	186053	178076	94.2	95.71
Killarney	58038	44541	43165	40922	91.87	94.8
Castlebar	51003	39017	37927	35679	91.44	94.07
Sligo	47201	37038	36082	32978	89.04	91.4
Letterkenny	51402	37060	36571	36064	97.31	98.61

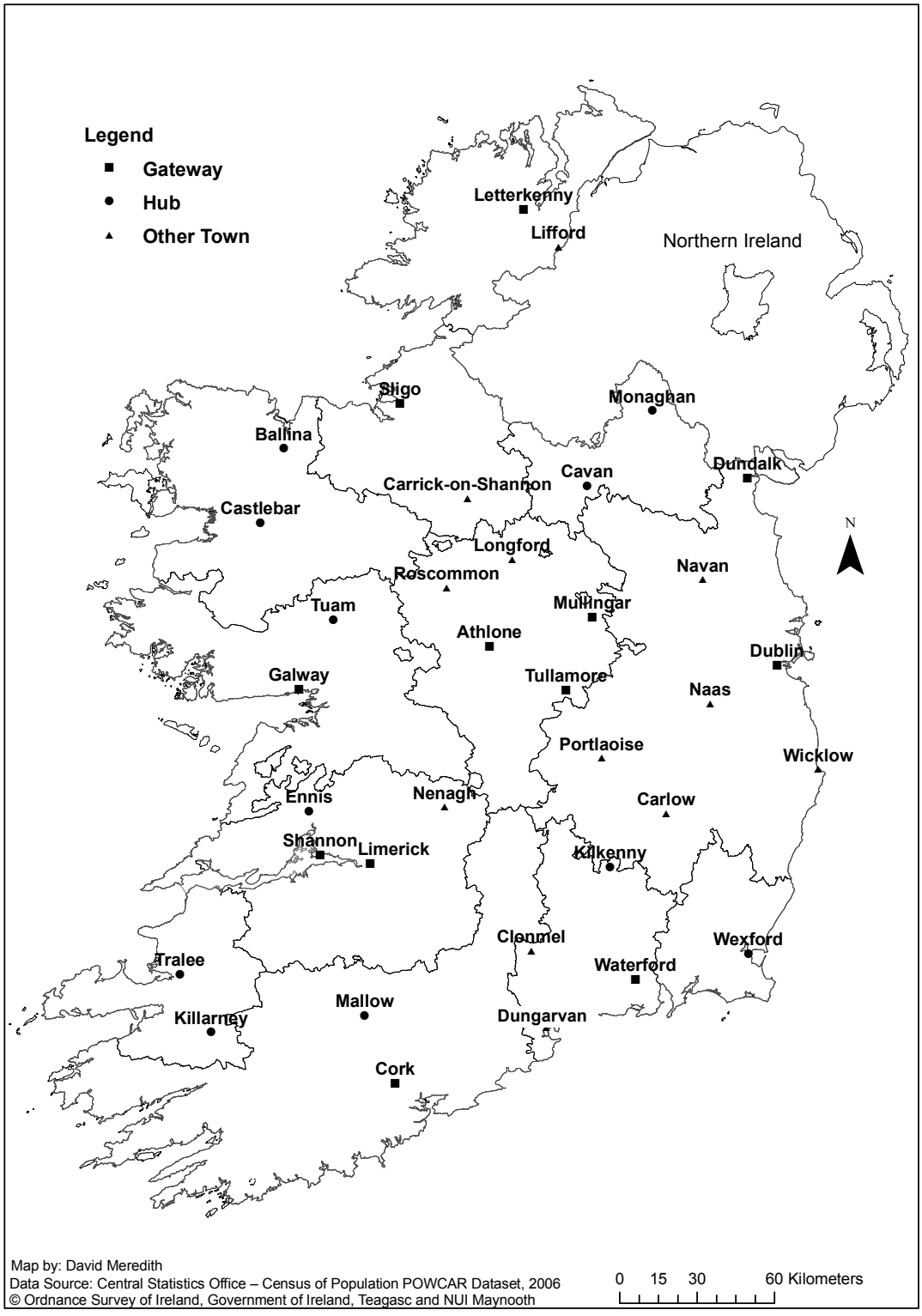


Figure 5A.9.11 Twelve Functional Areas: Solution 11

	Minimum	Target
Self-containment	84%	92%
Population	6,500	20,500

Table 5A.11 Description of Solution 11 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	889022	730855	736394	715914	97.96	97.22
Wexford	46681	37267	34599	32212	86.44	93.1
Waterford	84804	69071	73330	62533	90.53	85.28
Cavan	45955	34952	34314	30433	87.07	88.69
ATM	88708	69342	69258	59355	85.6	85.7
Limerick	141682	115774	116344	108368	93.6	93.14
Galway	99515	78439	77302	72108	91.93	93.28
Cork	239468	193011	190070	181744	94.16	95.62
Killarney	47652	36823	36139	33624	91.31	93.04
Castlebar	55847	42440	41221	38432	90.56	93.23
Sligo	43736	34722	34214	31180	89.8	91.13
Letterkenny	51402	37060	36571	36064	97.31	98.61

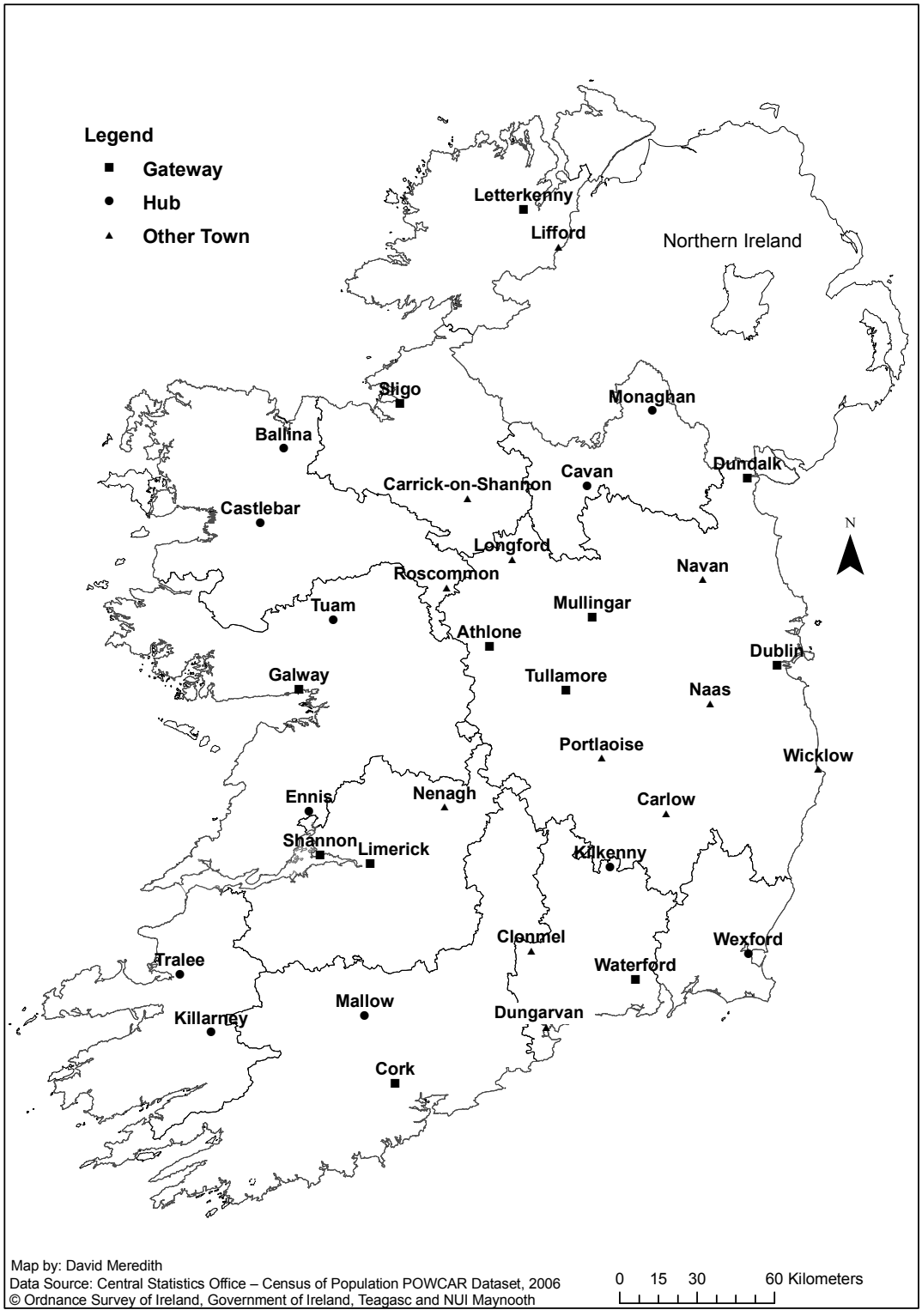


Figure 5A.9.12 Twelve Functional Areas: Solution 12

	Minimum	Target
Self-containment	84%	90%
Population	6,500	20,500

Table 5A.12 Description of Solution 12 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	958173	785284	791214	771443	98.24	97.5
Wexford	46681	37267	34599	32212	86.44	93.1
Waterford	84804	69071	73330	62533	90.53	85.28
Cavan	47837	36284	35399	31283	86.22	88.37
Limerick	123210	101230	104557	92824	91.7	88.78
Galway	129154	101453	97062	91337	90.03	94.1
Cork	234128	189192	186159	178104	94.14	95.67
Killarney	53397	40969	40229	37973	92.69	94.39
Castlebar	60522	46129	45656	41426	89.8	90.74
Sligo	45164	35817	34980	31942	89.18	91.32
Inishowen	10365	5977	5969	5309	88.82	88.94
Letterkenny	41037	31083	30602	29530	95	96.5

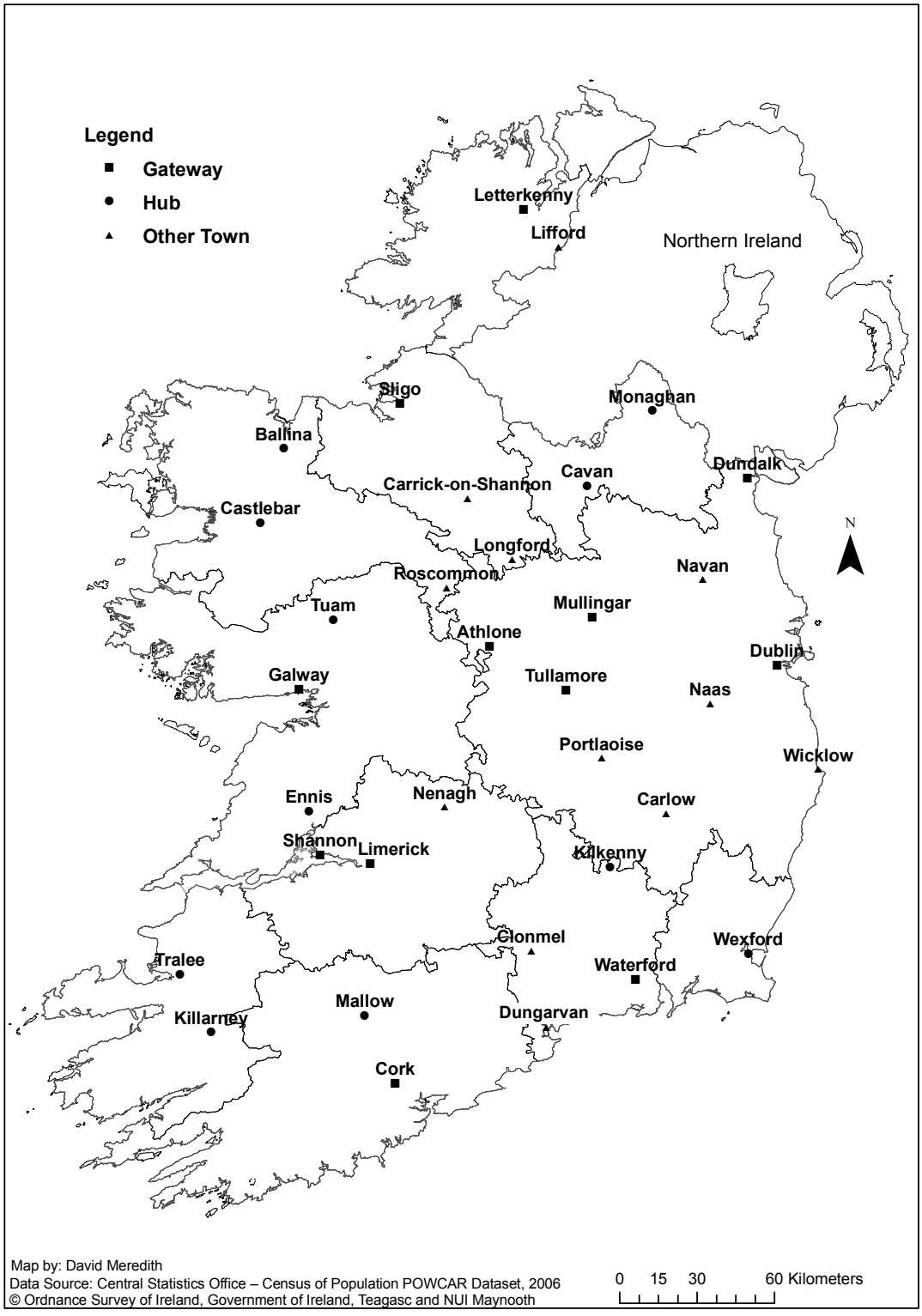


Figure 5A.9.13 Twelve Functional Areas: Solution 13

	Minimum	Target
Self-containment	84%	89%
Population	6,500	20,500

Table 5A.13 Description of Solution 13 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	953042	781292	786390	766656	98.13	97.49
Wexford	46681	37267	34599	32212	86.44	93.1
Waterford	93468	75999	80283	69300	91.19	86.32
Cavan	47175	35837	35221	31046	86.63	88.15
Galway	131895	103636	98879	93162	89.89	94.22
Limerick	126234	104137	106206	94769	91	89.23
Cork	213602	172600	170854	165447	95.86	96.84
Killarney	57449	44064	42837	40676	92.31	94.96
Castlebar	60676	46267	45737	41535	89.77	90.81
Sligo	50136	39621	40084	35227	88.91	87.88
Letterkenny	43749	33059	32697	31554	95.45	96.5
Inishowen	10365	5977	5969	5309	88.82	88.94

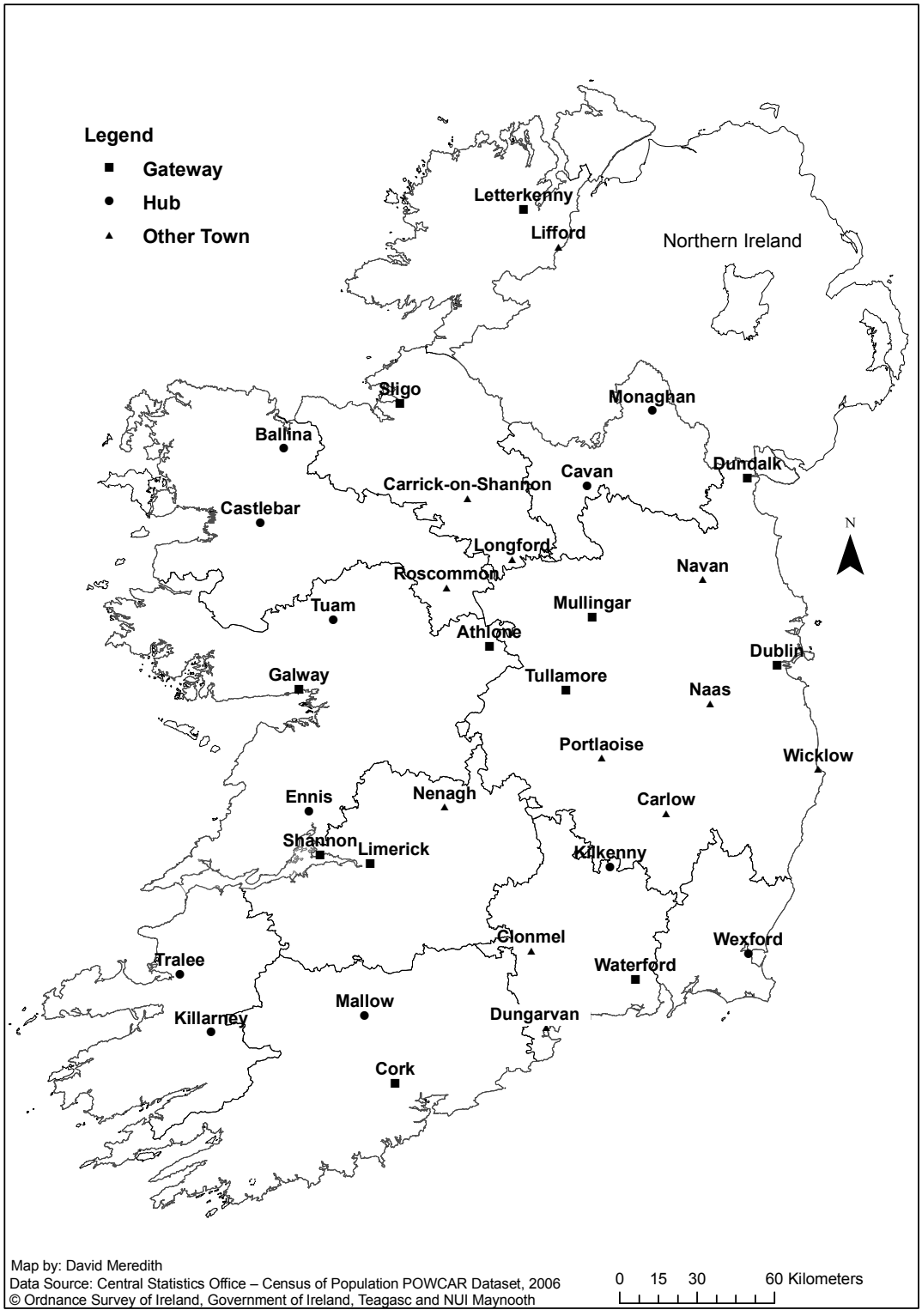


Figure 5A.9.14 Twelve Functional Areas: Solution 14

	Minimum	Target
Self-containment	85%	88%
Population	6,500	20,500

Table 5A.14 Description of Solution 14 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	936007	767406	769718	751276	97.9	97.6
Wexford	46681	37267	34599	32212	86.44	93.1
Waterford	93468	75999	80283	69300	91.19	86.32
Cavan	47450	36040	35340	31159	86.46	88.17
Galway	145871	115162	112565	103785	90.12	92.2
Limerick	127628	105065	108551	95981	91.35	88.42
Cork	213487	172520	170656	165397	95.87	96.92
Killarney	57309	43959	42783	40609	92.38	94.92
Castlebar	62260	47647	46531	42315	88.81	90.94
Sligo	50197	39655	40064	35190	88.74	87.83
Letterkenny	43749	33059	32697	31554	95.45	96.5
Inishowen	10365	5977	5969	5309	88.82	88.94

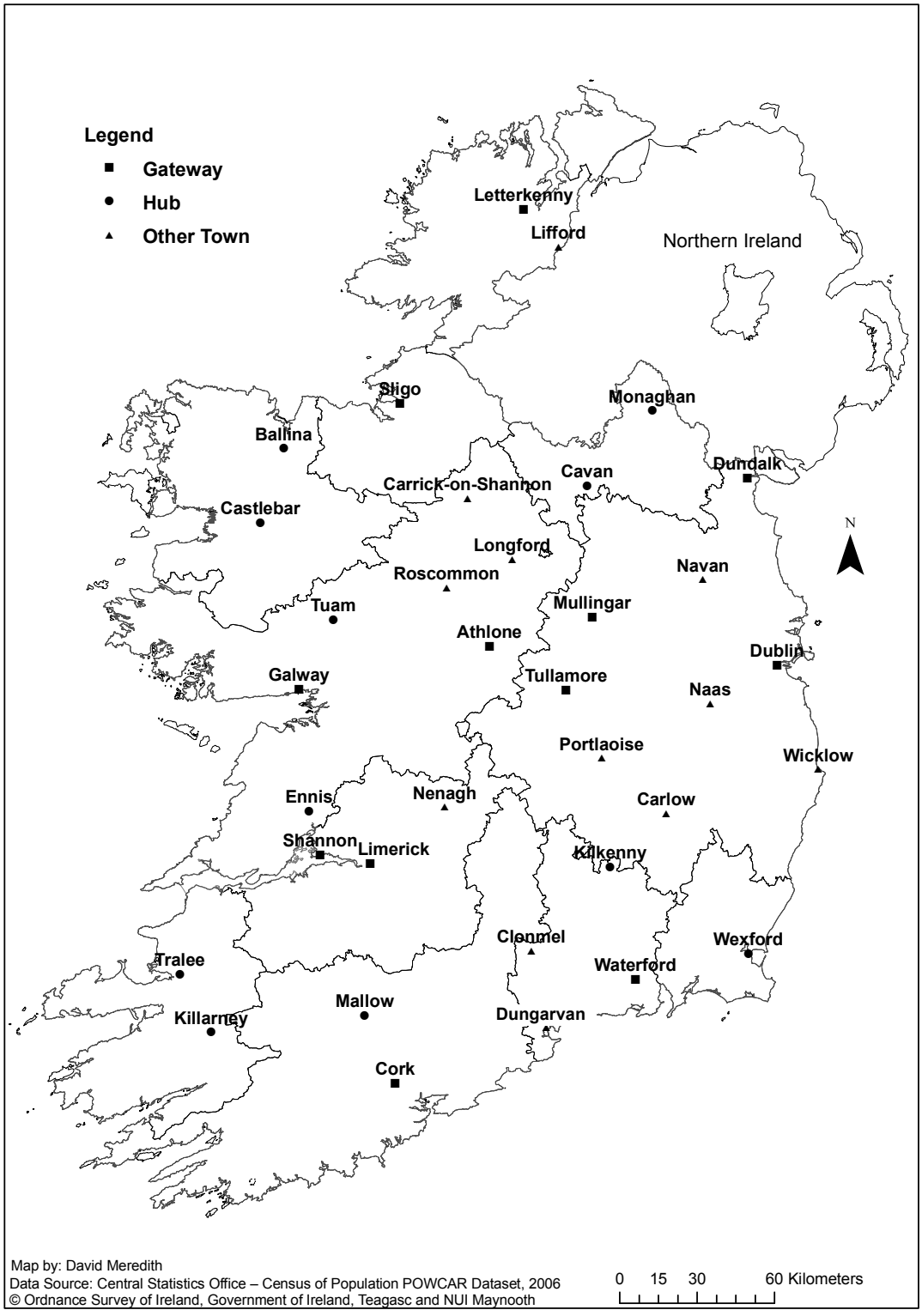


Figure 5A.9.15 Twelve Functional Areas: Solution 15

	Minimum	Target
Self-containment	84%	88%
Population	6,500	20,500

Table 5A.15 Description of Solution 15 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	928038	761428	766402	747504	98.17	97.53
Wexford	46681	37267	34599	32212	86.44	93.1
Waterford	84804	69071	73330	62533	90.53	85.28
Cavan	45680	34759	34094	30091	86.57	88.26
Galway	181637	142478	138357	128860	90.44	93.14
Limerick	121315	99788	103543	91775	91.97	88.63
Cork	234884	189737	186548	178538	94.1	95.71
Killarney	53397	40969	40229	37973	92.69	94.39
Castlebar	52627	40093	39068	36508	91.06	93.45
Sligo	31295	25130	24920	22305	88.76	89.51
Letterkenny	43749	33059	32697	31554	95.45	96.5
Inishowen	10365	5977	5969	5309	88.82	88.94

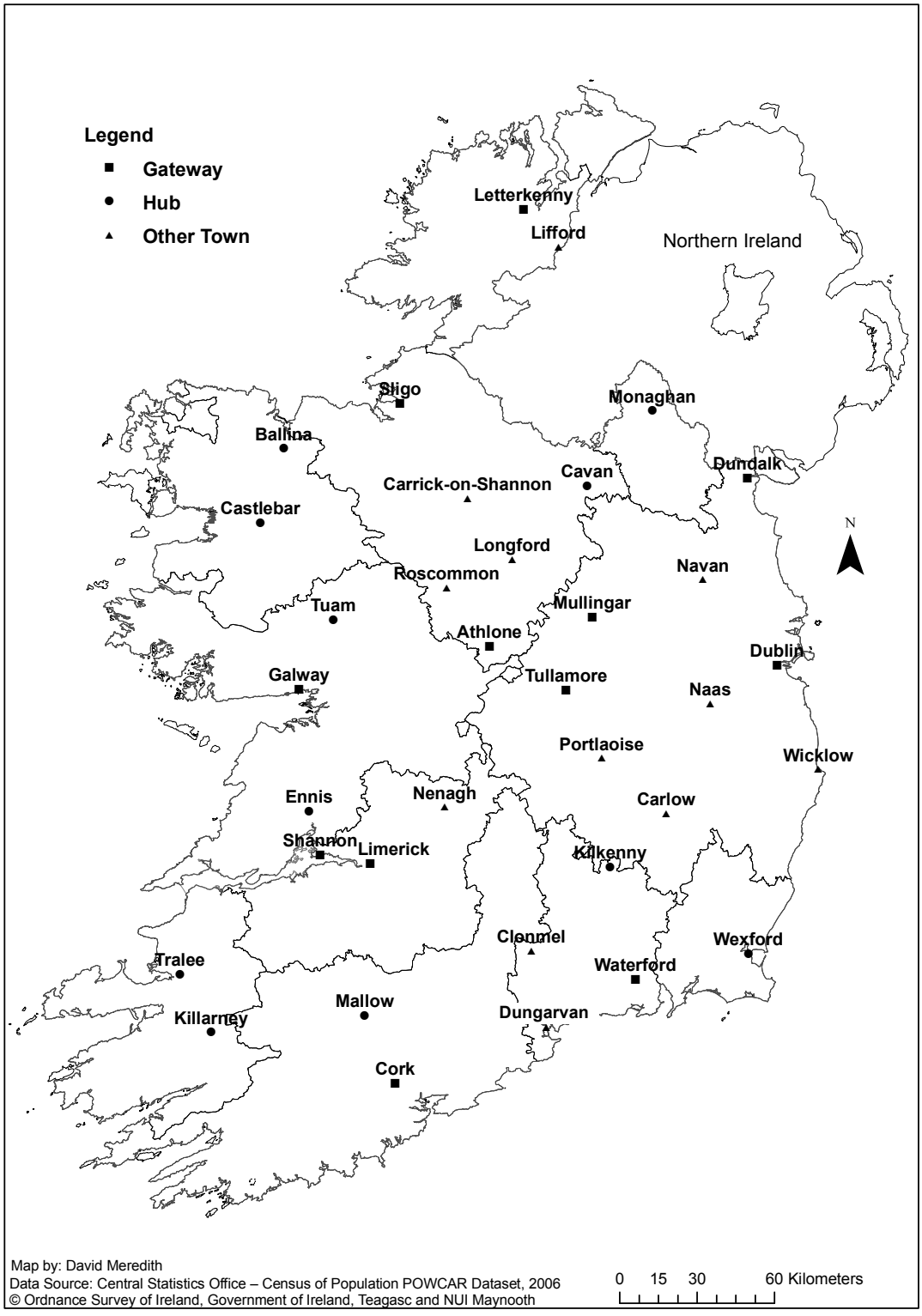


Figure 5A.9.16 Twelve Functional Areas: Solution 16

	Minimum	Target
Self-containment	83%	87%
Population	6,500	20,500

Table 5A.16 Description of Solution 16 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	928513	761762	766577	747988	98.19	97.58
Wexford	46681	37267	34599	32212	86.44	93.1
Waterford	84804	69071	73330	62533	90.53	85.28
Cavan	31325	23877	22573	20112	84.23	89.1
Galway	135870	106811	100134	94898	88.85	94.77
Sligo - Athlone	98647	77112	78421	69265	89.82	88.32
Limerick	117819	96998	101949	89247	92.01	87.54
Cork	234884	189737	186548	178538	94.1	95.71
Killarney	53397	40969	40229	37973	92.69	94.39
Castlebar	48418	37116	36730	33970	91.52	92.49
Letterkenny	43749	33059	32697	31554	95.45	96.5
Inishowen	10365	5977	5969	5309	88.82	88.94

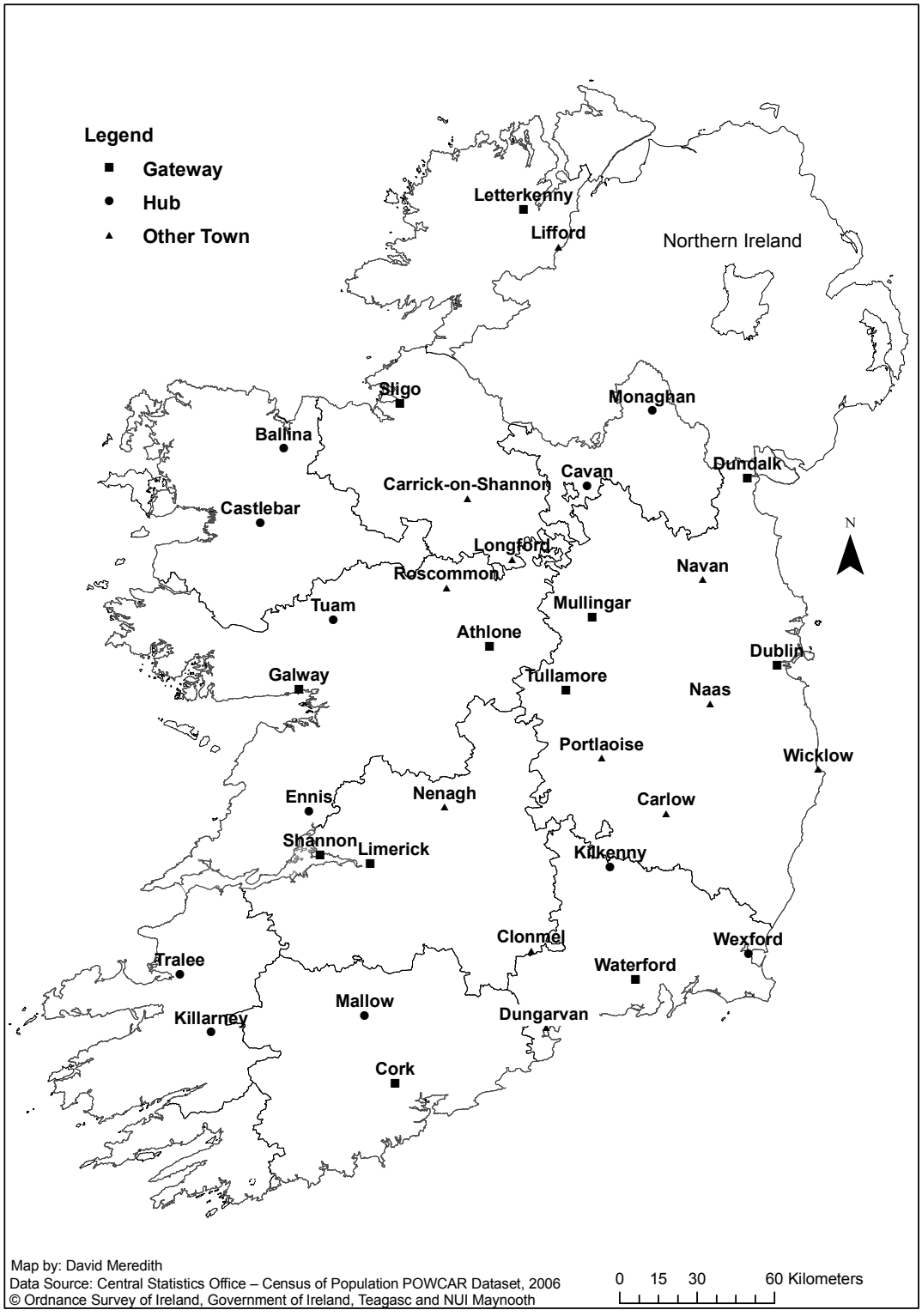


Figure 5A.9.17 Twelve Functional Areas: Solution 17

	Minimum	Target
Self-containment	83%	87%
Population	6,500	20,500

Table 5A.17 Description of Solution 17 Functional Areas

	No. Workers	Workers with a known place of work	Number of employment opportunities	Jobs filled by Residents	Supply side self-containment	Demand side self-containment
Dublin	924967	758710	763637	744991	98.19	97.56
Cavan	45503	34711	33874	29700	85.56	87.68
Waterford	116462	94492	95221	86025	91.04	90.34
Limerick	157155	128737	132059	118452	92.01	89.7
Galway	161955	127467	122231	113787	89.27	93.09
Cork	199502	162427	161637	155547	95.76	96.23
West Cork	11697	8342	8182	7202	86.33	88.02
Killarney	57153	43833	42703	40490	92.37	94.82
Castlebar	52515	40109	39422	36497	90.99	92.58
Sligo	53323	41787	42081	37022	88.6	87.98
Letterkenny	43749	33059	32697	31554	95.45	96.5
Inishowen	10491	6082	6012	5340	87.8	88.82

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