The Daily Interaction of Housing and Labour Markets in North West England

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Abstract

The importance of the daily spatial interaction of housing and labour markets has long been recognised due to the role that housing and labour market interaction plays in structuring cities and regions. However, the extent to which policies are sensitised to the interaction of residential and workplace locations is questionable. This paper undertakes a systematic examination of the daily interaction of sub-regional housing and labour markets drawing on 2001 Census commuting data from North West England. The intention is to provide evidence of the nature of the daily spatial interaction of housing and labour markets to inform policy.

Key Words

Housing Markets, Labour Markets, Commuting, Daily Interaction

JEL Codes

J40; J60 ; R31; R3

Introduction

The importance of the interaction of housing and labour markets has long been recognised (HANSON and PRATT, 1988; ALLEN and HAMNETT, 1991; HANSON and PRATT, 1995; MORRISON and MONK, 2006). Since the early 1960s, the dominant view of the *daily* interaction of home and work has been provided through the access-space model of urban spatial structure (ALONSO, 1964; MUTH, 1969). This model illustrates how, under conditions of perfect competition, the household chooses its residential location to maximise utility, balancing the costs of location against the advantages of cheaper land with increasing distance from a single employment centre in the heart of the city. Since all externalities are assumed away in the model, the cost of the journey-to-work is considered the dominant factor underpinning residential location decision-making. The use of the access-space model as a way of conceptualising and empirically examining the interaction of home and work has been criticised on a number of grounds (see HANSON and PRATT, 1988) and attempts to build increasingly sophisticated econometric models to take account of such criticisms and to explain changes in commuting behaviour as a result of polycentric urban development (e.g. GORDON and Lamont, 1982; CRANE, 1996) have been met with limited success (VAN DER LAAN *et al.*, 1998).

However, the continued endeavour to better explain the daily interaction of home and work demonstrates the crucial role that housing and labour market interaction plays in configuring the spatial, social, and economic structures of cities and regions (WONG, 2002). There is evidence that residential and workplace locations have become increasingly separated over the last few decades in the UK, Europe, and US (CHAMPION *et al.*, 1998; BREHENY, 1999). National level policy in the UK has promoted the benefits of providing more housing in close proximity to employment opportunities in existing urban areas and in new

settlements in growth areas to reduce car dependent commuting and to stem the spatial disintegration of home and work (ODPM, 2003; BARKER, 2004). Whilst there can be no doubting the benefits of reducing car borne mobility and of creating places that have good access to jobs, housing and services, the extent to which current UK policies are fully sensitised to the complexities of the processes underpinning the interaction of residential and workplace locations has been questioned (WONG, 2002). The aim of the paper is to examine the *daily* spatial interaction of housing and labour markets through a case study of North West England. The next section seeks to unpack housing and labour market interaction with the intention of providing a conceptualisation of housing and labour market interaction which is followed in the third section with an outline of the study methodology. The fourth section reports the results of the analysis followed in the final section by a discussion of the implications of the study.

Unpacking the Daily Spatial Interaction of Housing and Labour Markets

The spatial interaction of housing and labour markets is influenced by the nature of the markets themselves (ALLEN and HAMNETT, 1991). Housing units tend to exhibit high levels of durability and as a result do not necessarily depreciate due to ageing. This has made housing an attractive option for investment for asset accumulation (QUIGLEY, 1979). The heterogeneity of housing means that even at the same market price, both suppliers and consumers can view housing units as significantly different. The implication of this is that in deciding on a residential location, households need to address their housing aspirations and requirements in relation to family life cycle needs, and to take into account positive and negative features of the local neighbourhood (HANSON and PRATT, 1988). Housing units are locationally fixed and their spatial characteristics with respect to other dwellings,

employment, retail centres and neighbourhood servicesare jointly consumed with the structural characteristics of the housing unit (QUIGLEY, 1979). The outcome is a locationally specific set of housing market segments that reflect the structure of available housing opportunities and the characteristics of the households able or willing to consume the housing services in that place (RANDOLPH, 1991).

Likewise, labour markets have unique characteristics that have the potential to influence the interaction of housing and labour markets (see BOSWORTH et al., 1996). Each worker sells their effort while retaining their inherent capital. Workers are not passive agents in the market and are heterogeneous with regard to demographic and socioeconomic characteristics (RANDOLPH, 1991). Workers also have preferences for certain types of jobs and places of employment and will often make employment decisions as a household rather than as individuals (JARVIS, 1999). The implication of this is that labour power is socially produced and reproduced through the operation of processes that are culturally embedded, institutionalised, and *locally* specific. This means that *local* labour markets[i] develop distinct characteristics, structures and dynamics in part as a result of institutional reproduction and social regulation of labour through education systems and kinship networks, for example, but also because the daily mobilisation of labour for waged employment is a locally constituted process (PECK, 2003: 142). As a result, the spatial organisation of labour markets reflects the strategies that are adopted by individuals and households '...at home, at work, and in between' (PECK, 2003: 142). The spatial organisation of labour markets is also determined by the 'segmentation' of labour (PECK, 1989; MORRISON, 1990; KALLEBERG, 2003). Labour segmentation is thought to reflect the combined effects of three factors: the segmentation of labour supply, demand, and workplace activities (e.g. PECK, 1996). As a result, labour markets are locally structured through the sifting and sorting

of workers which create 'structured differences' in job types, occupations, occupational mobility, salaries, and working conditions to name but a few (CASTREE *et al.*, 2004).

The evolution of the structure of local labour markets is also influenced by the location of jobs dictated by the decisions taken by businesses in their pursuit of profit maximisation. The concept of agglomeration holds that gains can be made in economic productivity through the geographical clustering of firms and people (GORDON and MCCANN, 2000). A key source of increased productivity resulting from agglomeration is lower training and recruitment costs due to the presence of a large and diversified labour pool (POLESE, 2005). The availability of appropriately skilled labour provides firms with the opportunity to expand and contract with minimal disruption by responding to shifts in product demand (KRUGMAN, 1991). Whilst particular agglomerations are likely to have emerged due to historical accident, production is likely to become grounded in a particular place through the combined effect of existing firms strengthening their links with contiguous firms and the relocation of new firms seeking to benefit from the economic capacity of agglomeration (CASTREE *et al.*, 2004: 78).

The structure of the spatial interaction of housing and labour markets is a reflection of the outcomes of these processes which shape the nature of local housing and labour markets. Commuting, the spatial process connecting housing and labour markets on a daily basis is linked to the decision-making processes that dictate where people live and work. Indeed, it has long been recognised that workers often adopt a simultaneous residential and job search strategy in order to minimise commuting costs (ROUWENDAL, 2004). OMMEREN *et al.* (1997) found that rather than accepting a residence-job combination which offers a unique optimal commuting distance, workers will often accept a wide range of combinations of residential and workplace locations as they search for better jobs and

residencies. This is particularly apparent in relation to professional and specialist skilled

workers who will often seek employment opportunities over a wide search area rather than

settling for the nearest employment alternatives (GORDON, 1999). This search process is

often coupled by a parallel trend of 'roots' effect in which households opt to live in a fixed

residential location and cope with job changes through commuting (BREHENY, 1999). This

reflects the fact that workers will seek to balance the demands of home and work by living

in a housing market and working in a labour market that suits the needs of the household.

Quality of life has been found to have a strong influence on residential location decisions

(FILION *et al.*, 1999) as has access to exogenous amenities (GOTTLIEB, 1995). The implication is

that whilst it is accepted that commuters are individuals, it is important to recognise that

households often comprise two or more individuals. As a result, the commute of one

individual in a household is unlikely to be fully independent of that of another individual in

the same household.

Where tensions arise between the choice of employment and residential location,

the solution commonly involves a lengthening of the journey-to-work (SPENCE and FROST,

1995). The journey-to-work is a derived utility which means that the majority of workers

will tend to commute to labour markets that are close to their residential location (OMMEREN

et al., 1997; LOWE, 1998) reflecting the rational commuters' desire to minimise commuting

costs (KAIN, 1962) and cope with commuting stress (EVANS *et al.*, 2002). However, a minority

of workers will not conform to the practice of 'live local, work local'. The interaction of

housing and labour markets is likely to be a suboptimal process reflecting the conflict

between residential and workplace location decision-making, differential supply and

demand for housing and labour, and the regulation of housing and labour market

functioning. As a result, although the majority of commuting will be between local housing

and labour markets, there will be a proportion of longer distance and more diverse commuting as workers substitute commuting for migration (e.g. GREEN *et al.*, 1999; GREEN, 2004).

Commuting is a demand and supply relationship expressed over geographical space. However, in their consideration of the home-work link, HANSON and PRATT (1988) demonstrate that assuming the existence a 'normal' commuter population, as many econometric models do, is overly simplistic. Rather, the authors argue that the interaction of housing and labour markets is underpinned by the demographic and socioeconomic characteristics of the commuter (see OWEN and GREEN, 2005). Early urban econometric models focused on the variables of male wage earners and full-time employment (RANDOLPH, 1991). However, this relationship fails to recognise the influence of wider demographic and socioeconomic characteristics on commuting including *age* (TURNER and NIEMEIER, 1997), *ethnicity* (KAIN, 1968), *household type* (VANDERSMISSEN *et al.*, 2003), and *socioeconomic characteristics* (GREEN *et al.*, 1986).

Likewise, commuting is affected by spatial context. Space is not undifferentiated but consists of different residential and workplace locations with different characteristics which are spatially connected by commuters with different socioeconomic and demographic profiles. A number of studies have pointed to the influence of employment and population decentralisation (O'SULLIVAN, 1999) and the balance of jobs and housing (GIULIANO and SMALL, 1993) on the structure of space. Whilst it is difficult to identify a causal relationship between decentralisation and the balance of jobs and housing and the structure of commuting, it is possible to explore how spatial structure, underpinned by such processes, affects commuting (SOHN, 2005; SHEARMUR, 2006). In order to understand the underlying structure of housing and labour market interaction, the effectiveness of demographic,

socioeconomic characteristics and spatial structure on commuting need to be given careful consideration.

Emerging from this discussion are three research questions which focus on addressing the daily interaction of sub-regional housing and labour markets through a case study of North West England: apologise

1. What is the commuting structure of the daily interaction of sub-regional housing and labour markets in North West England?

2. How do the demographic and socioeconomic characteristics of commuters impact on the structure the daily interaction of sub-regional housing and labour markets in the region?

3. What impact does spatial structure have on the daily interaction of sub-regional housing and labour markets in the region?

Before attempting to address these questions, it is first necessary to map out the study methodology.

Methodology

Identifying Sub-Regional Housing and Labour Markets in North West England

In order to explore the spatial interaction of sub-regional housing and labour markets it is necessary to identify appropriate spatial housing and labour markets. A review of the conceptual and methodological approaches used to delineate housing markets was undertaken and the housing market area approach was identified as the most appropriate for delineating sub-regional housing markets (HINCKS, 2007). Housing market areas (HMAs) are functional areas within which households search for alternative accommodation without necessarily changing jobs (O'SULLIVAN *et al.*, 2004). Over the last decade or so research in

the UK has focused on delineating and applying HMAs in Scotland (see JONES, 2002; JONES *et al.*, 2005) but it is only recently that HMA delineation has attracted the attention of researchers and policymakers in England (see BIBBY, 2005; COOMBES and CHAMPION, 2006). This study applies a set of 25 sub-regional HMAs previously delineated for North West England by BROWN and HINCKS (2008) (Figure 1). Conceptually, the framework developed by BROWN and HINCKS (2008) loosely mirrors other HMA frameworks by applying a measure of effective supply and demand for housing captured by migration flows (COOMBES and CHAMPION, 2006). However, the methodology underpinning BROWN and HINCKS' (2008) framework differs from other HMA approaches applied in the UK (e.g. JONES, 2002; COOMBES and CHAMPION, 2006) in the functional regionalisation method adopted as well as in the use of housing market professionals (estate agents) to inform the delineation of the functional boundaries[ii]. BROWN and HINCKS (2008) offer a detailed account of the HMA delineation framework applied in this paper as well as an account of the alternative approaches that have also been applied in England.

In terms of the labour market framework, travel-to-work-areas (TTWAs) have long been used as approximations to labour markets in the UK and are delineated through Census commuting data. The framework is based on the principle that a TTWA should have a minimum of 3,500 residential workforce and a minimum of 75% of all the journey-to-work trips with both their origin and destination within the same area, but for large TTWAs, with a resident workforce in excess of 20,000, the self-containment level is reduced to 70% (COOMBES and ONS, 1998). At the time of the research, the 2001 TTWAs had not been released. In order to overcome this obsolescence, a validation process was adopted to assess the robustness of the 1991-based TTWAs in relation to the 2001 Census commuting

data and the revised 2001 Census ward boundaries. The validation exercise involved three stages:

1. Examine whether the 2001 wards provide a good fit to the 1991-based TTWA boundaries. If there were overlaps between 2001 wards and the 1991-based TTWA boundaries, the TTWA boundaries were optimised by allocating those cross-cutting wards to a specific TTWA based on the strength of commuting links (COOMBES and ONS, 1998).

2. Establish the level of working population in each TTWA.

3. Calculate the self-containment level of each TTWA using a function developed by COOMBES and ONS (1998)[iii].

The analysis led to the adaptation of some of the 1991-based travel-to-work areas due to the overlap of 2001 wards and 1991-based TTWA boundaries (stage 1 above). The validation process revealed that all of the 1991-based North West TTWAs had a working population that exceeded the minimum workforce threshold and that the majority of the TTWAs retained comparatively high levels of self-containment. As such, the use of the 1991-based TTWAs was validated which resulted in the inclusion of 23 North West TTWAs in the study (Figure 1).

[Figure 1]

Analysing Commuting between Sub-Regional Housing and Labour Markets

The analysis of the interaction of the housing and labour markets draws on origin and destination commuting data from the Special Workplace Statistics (SWS) recorded in the

2001 Census of Population[iv]. The analysis of commuting flows involved a number of methodological steps:

(1) The aggregation of ward level commuting flow data from the 2001 Census of Population SWS to a 25 by 23 origin (HMA) and destination (TTWA) matrix:

(2) Standardisation of commuting flows:

In order to simplify the complexity of the origin and destination matrix of commuting, the flow standardisation method developed by HINCKS and WONG (2007) was applied. The standardisation method involves the following steps:

- Commuting inflows to a particular TTWA were first converted into standardised-scores (z-scores). The conversion was undertaken individually for each destination TTWA.

- The inflows of exceptional magnitudes, based on the z-score value of over 1.65 ($p<0.05$) for a one-tailed test, were then identified for each destination. These represent the dominant first-order flows to each destination.

- The dominant flows were then removed from the matrix and the mean of the remaining non-salient flows for each destination was calculated. The flows above the non-salient mean value (using the same z-score values calculated as above) were taken to represent the second-order flows for each destination TTWA, and those below the mean value represented the third-order flows. These flows were then reconverted to percentages (of total number of commuters) to aid interpretation.

A number of methods have been developed to reduce the complexity of spatial flows and to identify threshold values for defining flow structures (see VAN NUFFEL, 2007 for a more detailed review). However, the major disadvantage of many existing approaches is

that the identification of threshold values is reliant on subjective interpretation and the values can be arbitrary (VAN NUFFEL, 2007). The flow standardisation method provides a way of categorising flows based on statistical significance rather than relying on arbitrary cut-off thresholds. This is useful for identifying the configuration of commuting flows and for establishing their role in the structuring of geographical space (VAN NUFFEL, 2007).

Exploring the Impact of Demographic and Socioeconomic Factors on Commuting

The impact of demographic and socioeconomic factors on the spatial interaction of housing and labour markets at sub-regional level was analysed through the following methodological steps:

1) The commuting flows were aggregated from ward level to create a 25 x 23 origin (HMA) and destination (TTWA) matrix of commuting based on the different demographic and socioeconomic characteristics recorded in the 2001 SWS dataset.

2) The sub-regional HMAs and TTWAs were mapped and their boundaries were compared to identify adjacent and non-adjacent housing and labour markets. HMAs and TTWAs that intersect or border one another are defined as adjacent whilst HMAs and TTWAs that did not border or intersect are defined as non-adjacent.

3) In a sequence of paired comparisons, the disaggregated SWS demographic and socioeconomic flows were split into adjacent and non-adjacent interaction samples. The analysis was intended to explore the influence of people factors on: (1) the interaction of adjacent housing and labour markets associated with first-order interactions and (2) the interaction of non-adjacent housing and labour markets associated with second and third-order interactions. In each case for both adjacent

and non-adjacent interaction, an independent samples t-test was used to test for the presence of a significant difference in the composition of the commuters.

Exploring the Impact of Spatial Structure on Commuting

To analyse the impact of spatial structure on commuting, a six-way ward based urban-rural classification was developed as a proxy of area types (Table 1). The classification adopts the official urban-rural classification (BIBBY and SHEPHERD, 2004) which classifies wards into urban, town and fringe, and village and dispersed area types. However, the standard three-way classification fails to distinguish city centre and town centre locations. This was overcome using city and town centre locations previously identified for the North West (HINCKS, 2007). Finally, the broad urban category defined by BIBBY and SHEPHERD (2004) was disaggregated further to distinguish between urban and suburban categories using geo-demographic descriptors of ward types derived from the *People and Places* typology developed by BATEY and BROWN (2004). This resulted in the six-way ward classification of area types.

[Table 1]

The classified wards were allocated to an origin HMA and destination TTWA. The commuting flows were then aggregated to give a total for outgoing commuting from HMAs and incoming commuting to TTWAs. In order to simplify the complexity of the interaction of different area types, the flows were subjected to the flow standardisation method outlined above. This allowed the strength of the interaction between different area types to be measured. Following on from this, the relationship between different residential and workplace locations and commuting distance was examined using Spearman Rank

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Correlation for both the home and work-end trips of the commuting process. The commuting distance bands from the 2001 census for residential and workplace populations were classified into short distance (less than 2 kilometres to less than 5 kilometres), medium distance (greater than 5 kilometres to less than 20 kilometres), and long distance (20 kilometres and over). The classification of the distance bands was informed by previous research. Green and Owen (2006) define short distance commuting as 5 kilometres or less. Champion *et al* (2008) define long distance commuting as being 20 kilometres or over. On this basis medium distance commuting was defined for this research as the distances in between 5 and 20 kilometres. The adoption of these different distance bands meant that the impact of different types of residential and workplace locations on different commuting distance trends could be explored to a greater extent than simply using the individual distance groups recorded in the 2001 Census.

Results

Structure of the Spatial Interaction of Sub-Regional Housing and Labour Markets

The flows recorded in the 25 by 23 matrix shows that 82% of commuting flows with a magnitude of 10 commuters or more had less than 3,640 commuters, which contrasts significantly with the 3% of flows that had more than 59,000 commuters. This reflects the diversity of commuting patterns in the region, with a large number of comparatively low magnitude flows and a small number of dominant flows that contain high concentrations of commuters. In order to compare the magnitude of the interaction of the HMAs and TTWAs, the absolute flows were subjected to the flow standardisation method. One striking feature of the emerging patterns was that the dominant flows into each of the TTWAs originate

from geographically coincident HMAs. As an example, Figure 2 records the first-order flows between housing and labour markets in Cheshire, Lancashire and across the urban-industrial belt. The dominant flows account for over two-thirds of all commuters in these sub-regions. This demonstrates that the majority of workers commute to a limited number of localised labour markets (see Lowe, 1998) and supports the assumption that workers will attempt to balance residential and workplace locations to minimise commuting costs (Kain, 1962).

The second-order flows are of significantly lower magnitudes when compared to the first-order flows. Across the region a much smaller proportion of commuters (a quarter of total regional commuters) are concentrated in the second-order flows. This is demonstrated in Figure 3 which focuses on the urban-industrial belt. It shows that there is relatively strong interaction between the housing and labour markets located across the urban-industrial belt. However, it also indicates that there is a degree of balance cross-commuting taking place between the housing and labour markets of the urban-industrial belt and Lancashire. This contrasts with the interaction between the urban-industrial belt and Cheshire in which the labour markets in the urban-industrial belt attract significant proportions of workers from Cheshire housing market areas (Figure 3). This shows the importance of Cheshire as a labour market catchment area for the metropolitan areas, and illustrates the practice whereby workers locating in desirable residential areas for quality of life benefits take up jobs in older industrial areas (Wong and Madden, 2000).

Another key finding was that there was negligible interaction between Cumbria in the north of the region and the rest of the region. Figure 4 demonstrates that with the exception of interaction between the Lancaster and Morecambe HMA and the Kendal TTWA, the northern and southern parts of the region are two highly self-contained areas in terms of the daily interaction of housing and labour markets.

In contrast to the patterns of the second-order flows, third-order flows connect housing market areas to more distant labour markets. Third-order flows tend to capture longer distance commuters but in analysing the third-order flows, it was apparent that there was no established pattern of interaction between the HMAs and TTWAs. Across the region, just 6% of commuters are concentrated in third-order flows. However, the third-order flows are unique in that they provide a link between the HMAs and TTWAs of the same sub-region, as well as between the two markets in disconnected sub-regions. In particular, there is evidence of greater diversity in the interaction between the north and south of the region through third-order interaction when compared to the limited interaction observed through the second-order flows observed in Figure 4.

[Figure 2]

[Figure 3]

[Figure 4]

The Impact of Commuter Characteristics and Spatial Structure on the Interaction of Housing and Labour Markets

Commuter Characteristics

Conventional models of the interaction of housing and labour markets have tended to focus on the effect of male wage earners and full-time employment on commuting (HANSON and PRATT,, 1988). However, research has found that commuting trends and commuter behaviour are influenced by differences between males and females (MADDEN, 1981), age groups (Levinson, 1998), white and non-white workers (KAIN, 1968), full-time and part-time

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workers (Hanson and Pratt, 1995), household types (ROUWENDAL and RIETVELD, 1994) and professional/managerial workers and lower status workers (TUROK, 1999). In 2001, a 100% census of Special Workplace Statistics (SWS) was released for the first time in the UK which included datasets that capture the commuting patterns of workers based on gender, age, employment status, and socioeconomic status. This provided an opportunity to explore the impact that a limited number of demographic and socioeconomic variables have on commuting using the UK's most comprehensive resource of origin-destination commuting data. The influence of each of the variables on adjacent and non-adjacent housing and labour market interaction is explored in this section through a series of paired comparisons using independent sample t-tests.

The division of the variables into two groups was undertaken to reflect the findings of previous research (e.g. MADDEN, 1981; HANSON and PRATT, 1995; LEVINSON, 1998). The analysis of commuting patterns in the previous section demonstrates that first-order interaction is concentrated between adjacent housing and labour markets, whilst second-order and third-order flows are much more diverse and underpin the interaction of non-adjacent housing and labour markets. In light of these findings, the analysis was intended to explore the 'structural' differences in commuter characteristics underpinning the patterns of interaction between adjacent and non-adjacent housing and labour markets in the region. The problem, however, is that the SWS do not cover variables such as ethnicity or household type. Therefore, the analysis of the impact of demographic and socioeconomic factors on commuting was restricted in this analysis to those variables that were available through the SWS datasets (Table 2).

[Table 2]

A number of studies have found that commuting patterns are influenced by differences in gender. Research has shown that women tend to have shorter and more concentrated commutes than men (MADDEN, 1981; WYLY, 1998). The analysis of commuting patterns based on gender reveals that for adjacent interaction there is no significant difference in the gender composition of the commuters (Table 3). In contrast, there is a significant gender difference in non-adjacent interaction (t-ratio=2.971; $p<0.01$) (Table 4). The analysis found that females are less likely than males to commute beyond adjacent labour markets. This is likely to reflect the desire/need of women to work in close proximity to schools and childcare facilities, and the constraints imposed on female commuting by family responsibilities, poorer access to private transport, and lower wages when compared to men (MCDONALD, 1999).

The composition of the age groups was constructed to reflect the assumption of bi-modality in relation to age and commuting (MCQUAID, 2003), specifically that younger and older workers have a lower propensity to commute beyond their adjacent labour market than middle-aged workers (LEVINSON, 1998) (Table 3). The analysis reveals a significant difference between the age groups in relation to both adjacent (t-ratio=-3.589; $p<0.01$) and non-adjacent interaction (t-ratio=-6.300; $p<0.01$) (Table 4). In relative terms, the younger and older age groups appear less willing to commute to non-adjacent labour markets when compared to middle age groups. Of all commuters travelling between non-adjacent housing and labour markets, 86% are within the middle age groups, whilst the remaining 14% are workers within the younger and older age groups. This could reflect the fact that younger workers are less able to afford the costs associated with commuting longer distances to work as a result of being employed in lower paid jobs whilst older workers are less likely to accept longer distance commutes (LEVINSON, 1998).

A number of studies have found that full-time workers are more likely to have longer commutes than part-time workers (HANSON and PRATT, 1995; MACDONALD, 1999). As VAN DER LAAN (1998) found, part-time workers have a more limited spatial range when compared to full-time workers. He attributes this to the fact that if a worker seeks a part-time job it would preferably be close to their home. However, there is also the fact that full-time workers are able to offset the costs associated with longer distance commuting (GREEN et al., 1999). The analysis of employment status reveals that there is a significant difference in the composition of the flows between full and part-time workers in relation to adjacent interaction (t-ratio=3.037; p<0.01) (Table 3) and non-adjacent interaction (t-ratio=4.139; p<0.01) (Table 4). The analysis found that full-time workers account for the highest levels of commuting in relation to both adjacent and non-adjacent interaction. Full-time workers account for three-quarters of the workforce in the region and therefore have a greater impact on the structure of the interaction of housing and labour markets than part-time workers.

When the analysis was extended to account for differences in employment status based on gender, the analysis found no significant difference in the gender composition of full-time workers commuting to adjacent housing and labour markets (Table 3), but there is a significant difference in relation to non-adjacent interaction (t-ratio=4.139; p<0.01) (Table 4). In contrast, there is a significant difference in the gender composition of part-time commuting in relation to adjacent interaction (t-ratio=-3.997; p<0.01) and non-adjacent interaction (t-ratio=-4.581; p<0.01). The commuting flows reveal the inherent differences that exist in the nature of housing and labour market interaction depending on gender and employment status. Only a quarter of full-time female workers and a tenth of part-time female workers commute to non-adjacent labour markets. This is likely to reflect the fact

that women tend to experience much greater levels of entrapment in localised labour markets compared to men (MACDONALD, 1999). Indeed, men often benefit from the use of private transport, whilst women tend to rely to a greater extent than men on public transport which means that women can be restricted in their ability to access jobs that are located at a greater distance from their home unless they are employed in high status jobs (GREEN et al., 1999).

Socioeconomic status has long been identified as a key influence on commuting patterns, the impact of which has been compounded by major structural changes in the UK economy in recent decades due to deindustrialisation and the decline of the manufacturing sector. These changes to the UK economy have resulted in a spatial skills mismatch with demand for certain types of workers, particularly higher skilled workers, exceeding supply in many areas. This has led to extensive cross-commuting much of which can be attributed to the longer distance commuting behaviour of higher status workers, particularly professional and managerial workers (HANSON and PRATT, 1995). In contrast, lower status workers are likely to commute shorter distances to work (COOMBES et al., 1988) because they tend to have lower levels of car ownership and are less able to offset the costs associated with commuting longer distances (TUROK, 1999).

However, the analysis of the influence of socioeconomic groupings on commuting requires careful interpretation. There is a significant difference between the higher socioeconomic groups and the other groups in terms of adjacent interaction (t-ratio=-2.484; $p<0.05$) (Table 3) but there is no significant difference in relation to non-adjacent interaction (Table 4). The analysis reveals that all socioeconomic groups structure adjacent interaction but that commuting between adjacent housing and labour markets is especially important for lower status workers (see COOMBES et al., 1988; HANSON and PRATT, 1995; GORDON, 1999).

Lower status workers often have poorer access to private transport and are unable to offset the costs associated with commuting longer distances (TUROK, 1999). In contrast, higher status workers will tend to commute to non-adjacent housing markets to a greater extent than lower status workers because they are able to offset commuting costs and will trade-off longer commutes for better residential locations (GREEN *et al.*, 1999; WONG *et al.*, 2000). This is reflected in the fact that in relation to non-adjacent interaction, higher status workers account for half of all flows between non-adjacent housing and labour markets (50%) followed by intermediate workers (25%) and lower status workers (25%). The implication of this is significant for policymaking. As the workforce becomes increasingly professionalised in the region, the complexity of the interaction of housing and labour markets will increase requiring much more sophisticated policy interventions in the future.

[Table 3]

[Table 4]

Spatial Structure

According to the assumptions of the access-space model, people live in urban residential locations and commute to jobs located in the city centre. However, evidence demonstrates that since the 1970s in the UK, Europe and US people have been leaving traditional residential locations in the city to live in suburban locations, small towns, villages, and rural areas (e.g. CHAMPION *et al.*, 1998). WONG and MADDEN (2000) found that suburban, town and fringe and village and dispersed locations in North West England on average gained population between 1981 and 1991 at the expense of urban areas. An analysis of 2001 SMS

data at ward level, using the six-way area type classification, reveals similar trends (Figure 5) in which population is flowing down the settlement hierarchy.

[Figure 5]

In terms of employment trends in the North West, urban areas lost employment between 1981 and 1991 whilst town and fringe and village and dispersed areas gained employment (WONG *et al.*, 1999). Although it is not possible to explore compositional change in employment for different area types because of changes to ward geography between 1991 and 2001 it is possible to determine the employment composition of different areas in 2001 (Table 5). The analysis reveals that slightly less than half of the regions' employment base is located in urban areas (47%), just over a quarter (27%) is located in suburban areas whilst city centres account for less than 10% of the total employment base in 2001.

[Table 5]

The lack of consistency in data collection methods and geographies at ward level in the UK does not allow analysis of the impact of changing spatial structure on commuting over the last 10 or 20 years to be undertaken[v]. However, the snap shot evidence of employment concentrations and migration flows provided by the 2001 census in conjunction with existing analyses undertaken using 1991 census data in the North West (WONG *et al.*, 1999) certainly demonstrates the importance of developing an understanding

of the impact of spatial structure on the interaction of home and work with the data that is available.

The analysis of commuting between different area types reveals that in terms of adjacent interaction, there is strong within-area interaction (Table 6). This is particularly apparent in relation to urban, suburban, town and fringe, and village and dispersed locations. Although there is evidence of within-area commuting, the analysis suggests that there is also extensive cross-commuting taking place between different area types. Urban areas tend to be the dominant destinations for workers followed by suburban locations, a finding that is supported by the prominence of first and second-order flows. The findings of the analysis contrast with traditional monocentric assumptions that the city centre is the dominant destination for commuting from urban and suburban locations. While urban and suburban areas account for a significant proportion of total in-commuting to city centre locations, the analysis shows that as a total of all outgoing commuting from urban and suburban areas, city centre locations appear to represent a 'secondary' workplace location for workers living in urban and suburban areas. In contrast, urban areas are important workplace locations for workers living in village and dispersed residential areas, whilst combined village and dispersed, and town and fringe areas attract comparative levels of workers from urban areas as city centre locations. Thus, town and fringe and village and dispersed locations are economically dependent on urban areas in particular as sources of employment for resident workers. However, the analysis found that these areas also have important economic functions to fulfil as workplace locations for urban and suburban workers. The implication is that while urban areas are relatively self-sufficient as residential and workplace locations, town and fringe and village and dispersed locations offer important alternative employment locations for workers living in urban areas.

What is also evident from the analysis is that non-adjacent interaction is characterised by a much looser relationship between residential and workplace location area types (Table 6). Urban areas continue to dominate but there is a diversification in the way that other areas interact, especially town and fringe and village and dispersed locations. This owes much to the higher levels of third-order interaction which tend to be longer distance and spatially complex and generally account for much smaller proportions of total incoming commuting into destination area types compared to first or second-order flows.

[Table 6]

Table 7 summarises the results of the Spearman Rank Correlation of commuting distance at the residential-end of the home-work trip and Table 8 records the correlation of commuting distance at the workplace-end.

[Table 7]

[Table 8]

In analysing the impact of spatial structure on commuting distances, it is apparent from Table 7 that residents of urban areas tend to commute shorter distances and undertake significantly fewer medium and long distance commutes reflecting the close proximity of jobs, housing and services in urban areas. In contrast, residents of village and dispersed locations are more likely to engage in long and medium distance commuting than short distance commuting (COOMBES et al., 1996; CHAMPION, 2009). This is likely to reflect the

reliance of village and dispersed locations on urban areas for employment (HODGE *et al.*, 2002) and rural residents accepting longer commutes as a trade-off between quality of life and workplace location (FILION *et al.*, 1999). The relationship between workplace location and commuting distance is explored in Table 8. Urban workplace locations tend to attract workers from nearby urban residential locations reflecting the greater integration of urban residential and workplace locations which allows short distance commuting to be supported. Village and dispersed locations attract greater levels of non-local workers than urban areas. This reflects the disintegration of residential and workplace locations village and dispersed locations and the process of reverse commuting from more distant urban areas. However, the analysis also reveals a degree of uncertainty surrounding the nature of the relationship between commuting distance and city centres, town centres, and suburban areas. The analysis suggests that workers living in city centre, town centre, and suburban areas commute across a wide range of distances but that in-commuters to these areas also travel across a range of distances to access employment. This trend of commuting to non-traditional workplace locations is captured by the second and more importantly third-order flows in Table 6. The diverse nature of third-order flows supports recent calls for a greater focus on the monitoring of inter and intra-urban interactions as well as non-urban interactions and cross-boundary movements (HINCKS and WONG, 2007).

Discussion and Conclusion

The aim of this paper was to undertake a systematic examination of the daily interaction of housing and labour markets drawing on evidence from North West England. The first research question sets out to explore the commuting structure underpinning the interaction of housing and labour markets. The interaction of sub-regional housing and labour markets

in the North West is highly complex, underpinned by local interaction (first-order flows) as well as more diverse second-order flows and long distance third-order flows. The majority of commuting in the region is concentrated between geographically coincident housing and labour markets. This reflects the fact that complementary functional housing and labour markets serve the same geographical area. Given the high commuting (TTWA) and migration (HMA) self-containment thresholds adopted in developing the functional housing and labour market geographies, it was expected that first-order interaction would be highly localised. The pattern of first-order flows suggests that the segmentation of housing and labour markets along with the rationale commuters' desire to minimise commuting costs have contributed to the evolution of a relatively efficient sub-regional interaction of housing and labour markets in the region.

In contrast to the efficient structuring of housing and labour market interaction provided through the first-order flows, the second-order flows support extensive cross-commuting within the same sub-region as well as across sub-regional boundaries. This is particularly apparent in the extensive in-commuting into the urban-industrial belt from the Cheshire hinterland. Even more extreme than this, the third-order flows show few discernable patterns of structured interaction but instead capture the small proportion of the population (6% of regional commuters) who do not conform to the practice of 'live local, work local' and opt to substitute commuting for migration by travelling longer distances to work. Over a quarter of commuters are concentrated in second and third-order flows. These flows are representative of the increasing professionalisation of the workforce and increasing flexibility of labour market functioning. It is these cross-commuting patterns that require more systematic and rigorous monitoring given that these flows add significant complexity to the policymaking process, particularly with regard to the supply of new

housing and jobs and the achievement of environmental policy objectives (HINCKS and WONG, 2007).

The second research question considers the impact of demographic and socioeconomic characteristics on the interaction of housing and labour markets. The analysis reveals that housing and labour market interaction at sub-regional level is influenced by the composition and characteristics of workers in relation to both adjacent and non-adjacent interaction. Existing research demonstrates that gender is a key influence on commuting. The analysis found that there is no significant difference in the gender composition of commuting flows between adjacent housing and labour markets. However, there is a significant difference in the gender composition of the flows between non-adjacent housing and labour markets with higher proportions of men than women travelling between non-adjacent markets. One explanation of this is the willingness of men to travel longer-distances to work than women (MADDEN, 1981) and the fact that the ability of women to access labour markets is often constrained by family responsibilities, poorer access to private transport, and lower wages when compared to men (MCDONALD, 1999). A further layer to the analysis found that in terms of gender and employment status, a higher proportion of full-time male workers commute between adjacent and non-adjacent housing and labour markets, when compared to full-time female commuters. However, there are much higher levels of part-time female workers commuting between adjacent and non-adjacent housing and labour markets when compared to part-time male workers reflecting the general dominance of women in part-time work (HANSON and PRATT, 1995).

In relation to age, the analysis reveals that the composition of commuters between adjacent and non-adjacent housing and labour markets contains a significantly greater proportion of middle-aged workers when compared to younger and older workers. Thus,

the analysis highlights that in relative terms, the younger and older age groups are less willing to commute to non-adjacent labour markets when compared to the middle-age groups demonstrating bi-modality associated with age and commuting (McQuaid, 2003). In addition, it was demonstrated that all socioeconomic groups play an important role in adjacent interaction but that commuting between adjacent housing and labour markets is especially important for lower status workers. In contrast, the analysis found that higher status workers have a greater propensity to commute to non-adjacent housing markets than lower and intermediate status workers.

Conventional urban models have been criticised for focusing on the impact of male wage earners and full-time employment (Hanson and Pratt, 1988). However, it is clear from the analysis in this paper that this conceptualisation underestimates the complexities introduced into the spatial interaction of housing and labour markets by different demographic and socioeconomic characteristics. In spite of the recognition that demographic and socioeconomic characteristics affect commuting, there is a paucity of dynamic spatial data available in the UK that captures demographic and socioeconomic characteristics of commuters. This has constrained opportunities for in-depth analyses of the influence of demographic and socioeconomic characteristics on the home-work link in the UK. Therefore, a more comprehensive range of commuting datasets is needed at different spatial scales if a better understanding of the impact of particular demographic and socioeconomic characteristics on the interaction of housing and labour markets is to evolve and subsequently be used to inform the development of 'spatial intelligence' that can be used to underpin spatial policymaking (see Wong, 1998; Rae, 2009).

The third research question sets out to explore the impact of spatial structure on the interaction of housing and labour markets. The dominant relationship in the North West is

between urban and suburban residential and workplace locations. Although village and dispersed locations are relatively self-contained in terms of employment and residential activity, there is an important urban-rural dynamic in operation in the region. People living in village and dispersed areas are reliant on urban areas for employment; however, there is also evidence that village and dispersed locations provide important employment opportunities for urban residents. The analysis indicates that short distance commuting is associated with living and working in urban areas, and longer distance commuting tends to be associated with living and working in rural locations. However, interestingly, the relationship between commuting distance and suburban residential and workplace locations was difficult to interpret. Where statistically significant correlations were recorded, the association tended to be weak. This suggests that suburban locations exhibit diverse commuting adjustment mechanisms as a means of balancing home and workplace locations, particularly because of changes in urban form and the spatial mismatch of jobs and housing. Thus, the analysis supports the argument for policy interventions designed to address housing and labour market interaction to be tailored to take account of specific spatial contexts rather than relying on a broad-brush spatial approach to policy development and implementation (WONG, 2002).

The rediscovery of space in public policy during the last decade of the twentieth century has led to increasing recognition that territory matters (DAVOUDI, 2009). Consequently, policymakers have had to come to terms with the spatial processes that are at work shaping and structuring cities and regions. The daily interaction of housing and labour markets is one of the major processes underpinning the structural evolution of cities and regions yet the interaction of home and work has acquired a relatively narrow focus within national and regional policy agendas in the UK (WONG, 2002). Recent policies have

promoted the idea that new housing should be located in close proximity to employment in order to encourage people to live and work locally (e.g. ODPM, 2003)[vi]. This study found that at sub-regional level in the North West the majority of workers commute between their local housing and labour markets. However, the second and third-order flows demonstrate that simply providing more housing near to employment is a far too simplistic response to the challenge of addressing the spatial interaction of home and work. This problem is further exacerbated by the fact that existing policies tend to overlook the spatial interaction of non-urban residential and workplace locations and tend to neglect the influence of different socioeconomic and demographic characteristics on commuting. Thus, the findings of the study suggest that without a step change in the way that housing and labour market interaction is conceptualised in policymaking, future policy agendas in the UK are unlikely to have the scope or capacity needed to effectively address the daily spatial interaction of housing and labour markets or mediate the resultant spatial outcomes of the process.

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Figure 1: Left: Housing Market Areas (HMAs) in North West England; Right: Adjusted Travel to Work Areas in North West England (based on 1991 TTWA boundaries)
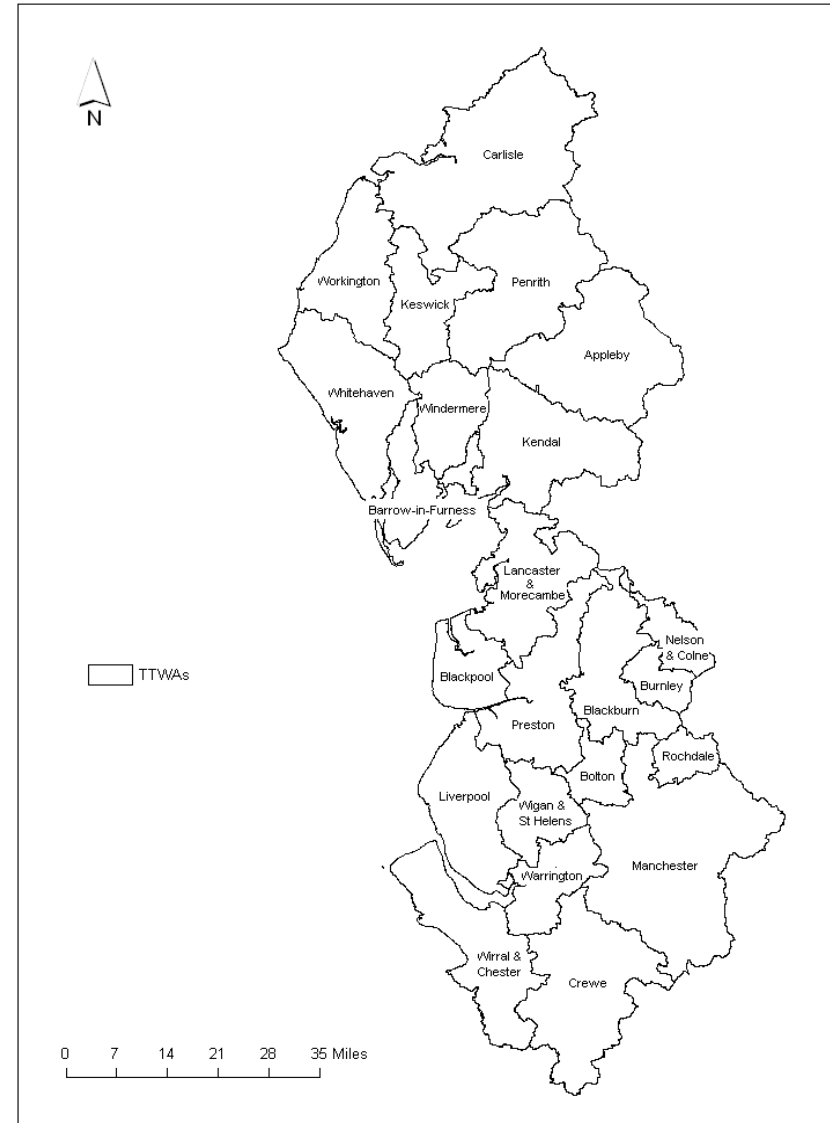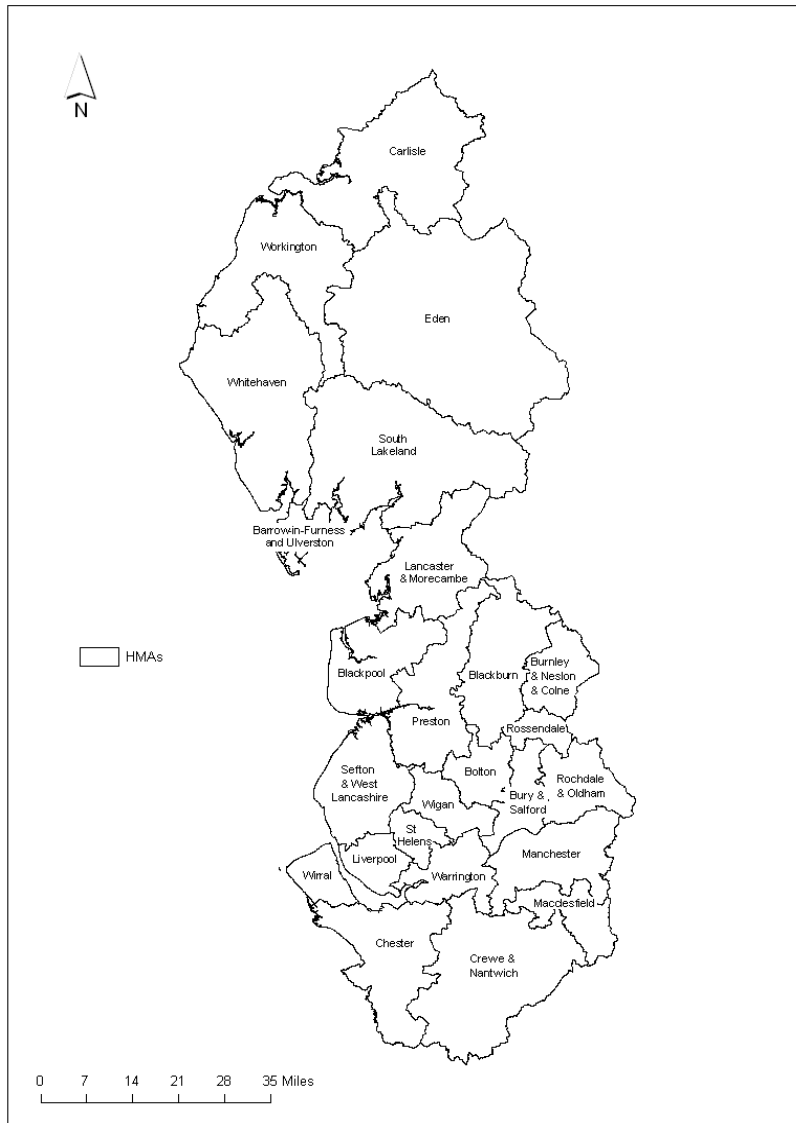
Figure 2: Example of First-Order Commuting Flows between HMAs and TTWAs of the Urban-Industrial Belt and Other Large Urban Centres
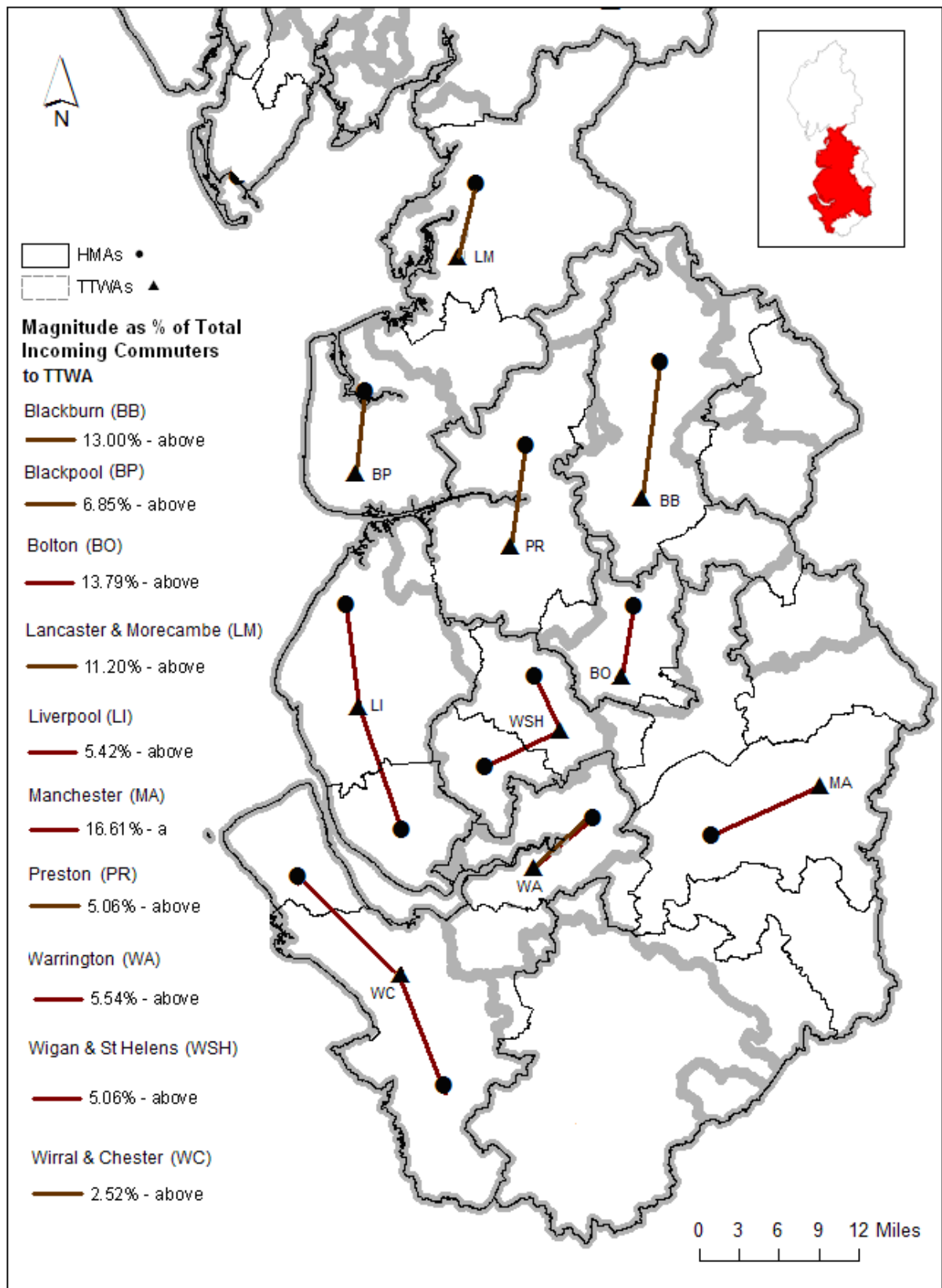
Figure 3: Example of Second-Order Commuting Flows into the TTWAs of the Urban-Industrial Belt from Cheshire and Lancashire
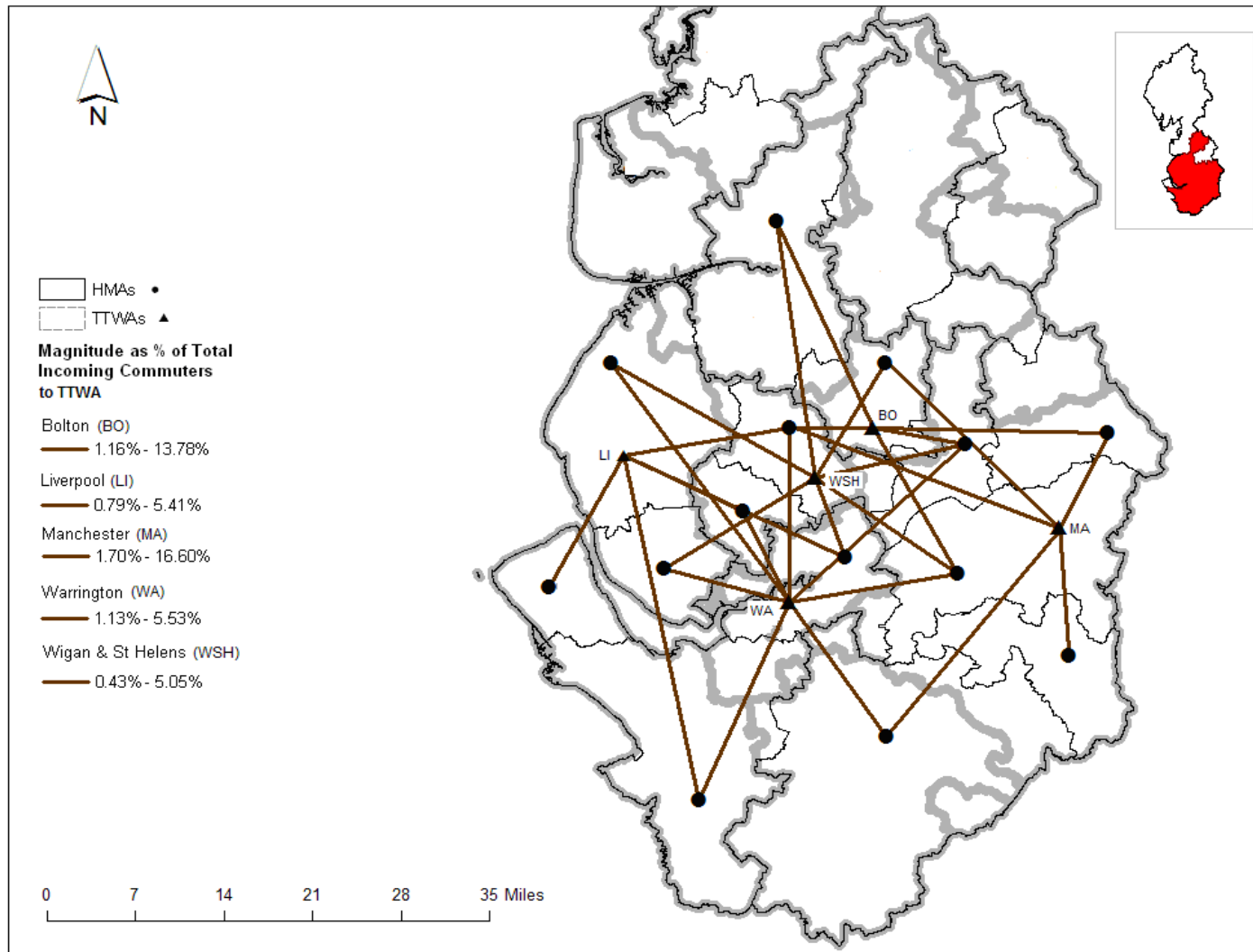
Source: Hincks and Wong (2007)

Figure 4: Example of Second Order Commuting Flows into the TTWAs of Cumbria
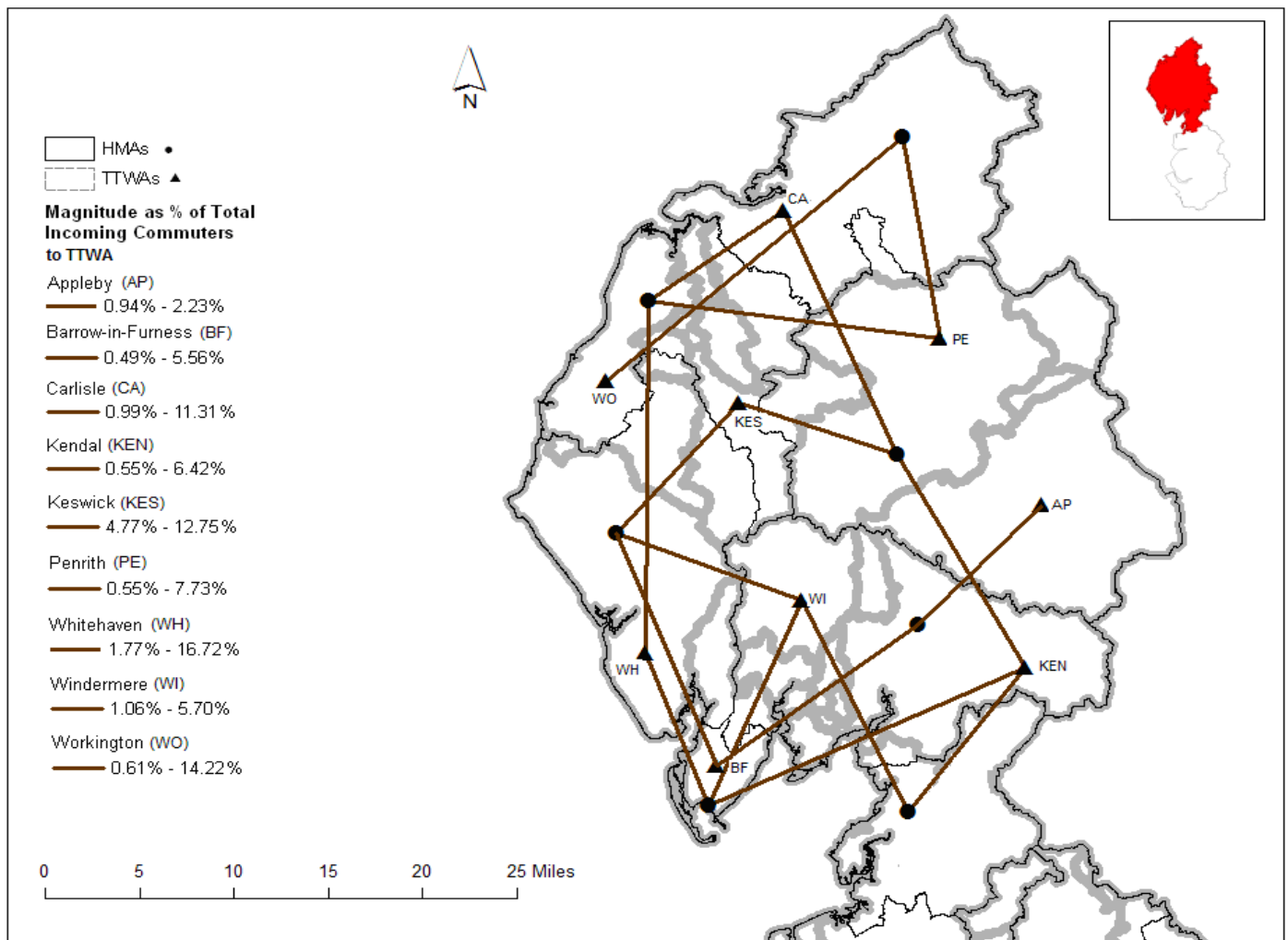
Source: Hincks and Wong (2007)

Figure 5: Net Migration for Different Area Types in the North West (2001)
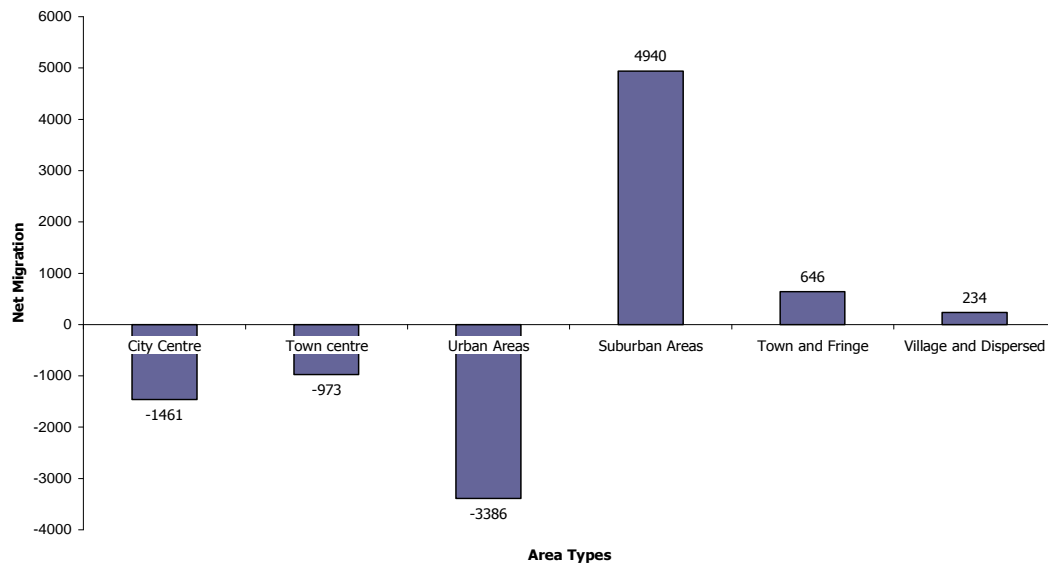
Source: 2001 Census of Population, Special Migration Statistics (Table MG201)

Table 1: Ward-based Classification of Area Types

Type Descriptor	No Wards	Source of Type	Area Type Definition
Village and Dispersed	142	Bibby and Shepherd (2004)	Original Area Type Retained
Town and Fringe	104	Bibby and Shepherd (2004)	Original Area Type Retained
Suburban Area	329	Bibby and Shepherd (2004) and Batey and Brown (2004)	Isolation of 'suburban' areas within Bibby and Shepherd (2004) 'urban' category based on satisfying the condition that more than 65 per cent of the ward population is located in adapted People & Places Trees (Batey and Brown, 2004) that are judged to be largely suburban in character
Urban Area	405	Bibby and Shepherd (2004)	
Town Centre	18	Hincks (2007)	Based on identifying wards with statistically significant employment density values. Employment density for each ward was transformed into z-scores. Wards with z-scores of 1.65 (95% significant) were identified as town centres.
City Centre	7	Hincks (2007)	Based on identifying wards with statistically significant employment density values. Employment density for each ward was transformed into z-scores. Wards with z-scores of 2.33 (99% significant) were identified as city centres.

Table 2: Characteristics Explored for Differences in Commuting Flow Composition

Explanatory Variable	Group 1 Composition	Group 2 Composition
Gender	Male	Female
Age	Age Groups 16-24 and 60-74	Age Groups 25-34 and 35-59
Employment Status	Full-Time	Part-Time
Gender Full-Time	Full-Time Male	Full-Time Female
Gender Part-Time	Part-Time Male	Part-Time Female
Socio-Economic Status	Higher and Lower Managerial and Professional Status	Other Socio-Economic Groups

Table 3: Independent Samples *t*-test: Differences in Composition of Commuting Flows for the Interaction of Adjacent Housing and Labour Markets

Variable (Group 1, Group 2)	Mean Commuting (absolute numbers of commuters)		Mean Difference	*t*-value
	Group 1	**Group 2**		
Gender	24183.08	23135.40	1047.67	.153
Age	9305.04	37958.44	-28653.40	-3.589**
Employment Status	34052.96	11480.73	22572.23	3.037**
Gender Full-Time	21404.35	12648.62	8755.73	1.701
Gender Part-Time	2020.65	9460.08	-7439.42	-3.997**
Socio-Economic Status	13628.27	30099.85	-16471.58	-2.484*

* Significant at 0.05 ** Significant at 0.01

Table 4: Independent Samples *t*-test: Differences in Composition of Commuting Flows for

the Interaction of Non-Adjacent Housing and Labour Markets

Variable (Group 1, Group 2)	Mean Commuting *(absolute numbers of commuters)*		Mean Difference	*t*-value
	Group 1	Group 2		
Gender	527.02	296.20	230.81	2.971**
Age	118.88	703.41	-584.53	-6.300**
Employment Status	732.13	155.21	576.92	4.726**
Gender Full-Time	499.07	213.80	285.27	4.139**
Gender Part-Time	20.58	72.56	-51.99	-4.581**
Socio-Economic Status	356.00	359.66	-3.66	-0.53

* Significant at 0.05 ** Significant at 0.01

Table 5: Employment Concentrations of Different Area Types in the North West

Area Type	Total Employment in North West	% Total Employment in North West
City Centre	251,878	8.7
Town centre	184,309	6.3
Urban Areas	1,370,491	47.2
Suburban Areas	783,148	27.0
Town and Fringe	166,354	5.7
Village and Dispersed	146,638	5.1
Total	2,902,818	100.0

Source: 2001 Census of Population: Table UV28 – Economic Activity (Workplace Population)

Table 6: Commuting between Difference Residential and Workplace Location Area Types

Workplace Area Type / Residential Area Type	City Centres	% In-Commuting	Town Centres	% In-Commuting	Urban Areas	% In-Commuting	Suburban Areas	% In-Commuting	Town & Fringe	% In-Commuting	Village & Dispersed	% In-Commuting
City Centres												
Adjacent	**2**	10.8	**3**	0.4	**3**	1.4	**3**	1.0	**2**	1.0	**3**	0.8
% Out-Commuting	38.3		2.9		48.8		6.3		1.9		1.7	
Non-Adjacent	**3**	1.3	**3**	1.7	**3**	1.5	**3**	1.3	**3**	1.0	**3**	1.3
% Out-Commuting	4.2		13.3		62.9		11.4		4.5		3.7	
Town Centres												
Adjacent	**3**	0.1	**3**	2.3	**3**	0.4	**3**	0.2	**3**	0.1	**3**	0.2
% Out-Commuting	0.6		53.8		39.3		4.4		0.4		1.5	
Non-Adjacent	**3**	0.8	**3**	0.5	**3**	0.4	**3**	0.5	**3**	0.6	**3**	0.4
% Out-Commuting	8.4		12.2		53.2		14.1		8.7		3.4	
Urban Areas												
Adjacent	**1**	69.0	**2**	42.8	**1**	81.9	**2**	40.3	**2**	29.2	**2**	24.7
% Out-Commuting	6.5		8.6		74.9		7.1		1.5		1.4	
Non-Adjacent	**1**	66.0	**1**	71.3	**1**	69.3	**1**	64.8	**1**	46.0	**1**	40.8
% Out-Commuting	4.6		12.4		63.4		12.6		4.4		2.6	
Suburban Areas												
Adjacent	**2**	14.3	**2**	8.8	**2**	12.2	**2**	52.1	**3**	9.3	**2**	12.7
% Out-Commuting	5.4		7.2		45.4		37.1		2		3	
Non-Adjacent	**2**	18.4	**2**	17.7	**2**	18.6	**2**	19.6	**2**	18.7	**2**	15.9
% Out-Commuting	4.5		11.0		60.9		13.6		6.4		3.6	
Town and Fringe												
Adjacent	**3**	2.6	**2**	44.7	**3**	2.3	**3**	3.1	**1**	52.0	**3**	7.1
% Out-Commuting	1.6		60.0		13.9		3.6		18.1		2.8	
Non-Adjacent	**2**	7.2	**3**	5.0	**3**	6.0	**2**	8.2	**2**	25.4	**2**	14.6
% Out-Commuting	4.2		7.4		46.5		13.4		20.7		7.8	
Village and Dispersed												
Adjacent	**3**	3.2	**3**	1.0	**3**	1.9	**3**	3.4	**3**	8.4	**1**	54.6
% Out-Commuting	6.3		13.4		61.2		11.7		3.5		3.9	
Non-Adjacent	**3**	6.2	**3**	3.9	**3**	4.2	**3**	5.7	**3**	8.2	**3**	27.0
% Out-Commuting	4.6		11.5		60.6		12.8		6.4		4.2	

Note: 1 – 1st order commuting; 2 – 2nd order commuting; 3 – 3rd order commuting. Calculated based on total numbers of incoming commuters

Table 7: Correlation between Residential Area Type and Commuting Distance

Distance Area Type		Short Distance	Medium Distance	Long Distance
City Centre	**Rho**	.097**	-.109**	.027
	Sig (2-tailed)	.002	.001	.399
Town centre	**Rho**	.142**	-.120**	-.092**
	Sig (2-tailed)	.000	.000	.004
Urban Areas	**Rho**	.502**	-.334**	-.530**
	Sig (2-tailed)	.000	.000	.000
Suburban Areas	**Rho**	-.085*	.073*	.097**
	Sig (2-tailed)	.034	.031	.002
Town and Fringe	**Rho**	-.259**	.189**	.233**
	Sig (2-tailed)	.000	.000	.000
Village and Dispersed	**Rho**	-.445**	.280**	.443**
	Sig (2-tailed)	.000	.000	.000

*Significant at 0.05 ** Significant at 0.01 (For all cases N=1006)*

Table 8: Correlation between Workplace Area Type and Commuting Distance

Distance Area Type		Short Distance	Medium Distance	Long Distance
City Centre	**Rho**	-.0.39	.102**	.115**
	Sig (2-tailed)	.213	.000	.000
Town centre	**Rho**	.185**	.044	.019
	Sig (2-tailed)	.000	.162	.805
Urban Areas	**Rho**	.442**	.037	-.113**
	Sig (2-tailed)	.000	.238	.000
Suburban Areas	**Rho**	-.060	-.122**	-.054
	Sig (2-tailed)	.056	.000	.086
Town and Fringe	**Rho**	-.161**	.039	.067
	Sig (2-tailed)	.000	.215	.034
Village and Dispersed	**Rho**	-.465**	.034	.138**
	Sig (2-tailed)	.000	.282	.000

* Significant at 0.05 ** Significant at 0.01 (For all cases N=1006)

[i] CASTREE *et al.* (2004: 260) define *local* as 'the relatively small geographical scale at which daily life is played out'.

[ii] Estate agent knowledge was used in the delineation of HMAs based on the assumption that, in their catchment area, estate agents have specialist knowledge of housing market operation and are aware of the typical patterns of prospective-mover search behaviour (PALM, 1978). Initially, a number of settlements in the region were identified that were broadly consistent with those covered by TTWAs, reflecting the assumption that the HMAs and TTWAs should be geographically comparable (JONES, 2002). In these settlements, the branches of national estate agents were contacted to enable the compilation of a list of settlements, judged to constitute local markets that could be drawn upon in guiding the delineation of HMAs. In areas where national estate agent coverage was low, local estate agents were used, and this proved necessary in parts of Cheshire and Cumbria. The consultation was then extended, beyond the initial core settlements, to identify further settlements that might constitute the cores of additional HMAs. In total, 43 potential core HMA settlements were identified through estate agent consultation.

[iii] The function applied is as follows:

$$\min \left\{ \frac{Fa,a}{Ra} ; \frac{Fa,a}{Wa} ; 0.75 \right\} x$$

Where:

Fa,a is the number of people who both live and work in the area concerned.

Ra is the number of workers living in the area concerned (demand side)

Wa is the number of people who work in the area concerned (supply side)

[iv] The 2001 SWS records the origin and destination of commuters between their dominant place of work and their usual (primary) residential location

[v] The lack of consistency in ward geographies between census periods is part of the reason why the UK's most recent definitive analysis of counterurbanisation was undertaken using local authority boundaries which have remained more stable over time (see CHAMPION *et al.*, 1998).

[vi] For example, in the UK, the Urban White Paper *Our Towns and Cities - the future* (DETR, 2000), the Sustainable Communities Plan (ODPM, 2003), and more recently the Ecotowns agenda have all been implemented to promote the idea of the 'urban idyll' and to reduce long distance, car dependent commuting.