1. INTRODUCTION

This report summarises the results of a study commissioned by the Scottish Executive to investigate long distance commuting in Scotland. Scottish Household Survey (SHS) data, Census data, transport modelling techniques and focus group research were used to investigate the pattern and prevalence of long distance commuting in Scotland. While this research was funded by the Scottish Executive and the resulting report reviewed by their representatives, the view expressed here are those of the authors alone and do not necessarily represent those of the Scottish Executive or Scottish ministers.

The research and analysis is separated into six main sections, as follows:

- the impact of long distance commuting on the Scottish transport network;
- current geographic pattern of long distance commuting;
- trends in long distance commuting;
- understanding the long distance commuter – quantitative analysis;
- understanding the long distance commuter – qualitative research; and
- conclusions and policy considerations.

2. IMPACT OF LONG DISTANCE COMMUTING ON THE SCOTTISH TRANSPORT NETWORK

The Transport Model for Scotland (TMfS) was used to assess in detail the impact, on traffic related matters, of the current level of long distance commuting in Scotland.

2.1 Traffic levels and congestion

A key Scottish Executive policy objective (Scotland’s Transport Future 2004) is reducing the growth rate of traffic volumes and reducing congestion levels. The current research considered the contribution of long distance commuting to traffic volumes and impacts on congestion. TMfS (base year 2002) provided estimates of absolute numbers of long distance commuters in the AM peak hour on each road link. It may be seen from Figure 2.1 that the highest volumes of long distance commuting traffic are on the key trunk road routes (M8, M9/A9, Forth Road Bridge, M77/A77, M80, A92 etc)
Whilst the proportion of long distance commuting vehicles relative to other vehicles tends to be fairly low (often less than 20%) within the main urban areas, inter-urban routes and key trunk roads have significant percentages (often exceeding 50%) of AM Peak traffic made up of long distance commuter vehicles. Clearly these vehicles have a significant impact on the trunk road network – if, for example, all long distance car commuters were removed from the road network modelling indicates that the average speed on all Scottish motorways would increase by 7km/hr. In addition, significant increases (often exceeding 50%) in AM Peak vehicle speed would be achieved within Edinburgh, Glasgow and Aberdeen city centres and on the Forth Road Bridge. Figure 2.2 illustrates the predicted percentage change in vehicle speed on each road link in the AM Peak following the total removal of long distance commuters from the TMfS transport network.

2.2 Environmental Impacts

‘Scotland’s Transport Future’ (2004) indicates that emissions from motor vehicles are the largest single cause of local air pollution in Scotland. A number of primary or secondary pollutants linked to vehicle emissions, notably nitrogen dioxide and particulates, can have a significant negative impact on respiratory health.

‘Scotland’s Transport Future’ (2004) further indicates the importance of tackling climate change and working to meet both the UK targets of reducing 1990 levels of greenhouse gas emissions by 12.5% by 2008-2012 and of reducing UK carbon dioxide emissions to 20% below 1990 levels by 2010. Beyond this, there is an objective to put the UK on a path to reduce carbon dioxide emissions by some 60% by around 2050.

The current research indicated that the impact of completely removing long distance car commuters from the Scottish transport AM peak network on vehicle emissions are as follows:

- 34% decrease in Carbon Monoxide emissions;
- 27% decrease in Hydro-carbons (HC) emissions;
- 13% decrease in NO\textsubscript{X} emissions;
- 10% decrease in PM\textsubscript{10} and PM\textsubscript{2.5}; and
- a 21% decrease in CO\textsubscript{2} emissions.

While the complete removal of these trips from the road network is not a realistic possibility, the scale of these reductions shows the current impact of long-distance commuting by car.
3. GEOGRAPHIC PATTERN OF LONG DISTANCE COMMUTING IN SCOTLAND

3.1 Geographic pattern of long distance commuting (Datazones and Regional Transport Partnerships)

The analysis of the geographic pattern of long distance commuting is predominantly based on the 2001 Census travel to work data, supplemented by robust estimates of the relevant road network travel distances between the various data zone pairs.

The percentage of long distance out-commuters (ie from home to work) produced from each datazone are detailed on Figure 3.1.

The percentages of long distance commuters travelling between and within Regional Transport Partnerships is detailed in Table 3.1. The rows on the left show the Regional Transport Partnerships for long distance commuters place of residence, whilst the columns along the top show the Regional Transport Partnership of place of work. It can be seen that the Regional Transport Partnership areas are relatively 'self contained'. The majority (83%) of long distance commuting trips are 'internal' (i.e. the location of home and work are within the same RTP).

Table 3.1 Percentage of long distance commuting by Regional Transport Partnerships (Census 2001)

<table>
<thead>
<tr>
<th>Home</th>
<th>Work</th>
<th>Central &amp; Tay</th>
<th>Highlands &amp; Islands</th>
<th>North East</th>
<th>Shetland</th>
<th>South East</th>
<th>South West</th>
<th>West</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central &amp; Tay</td>
<td>5.7%</td>
<td>0.1%</td>
<td>0.8%</td>
<td>0.0%</td>
<td>1.9%</td>
<td>0.0%</td>
<td>1.1%</td>
<td>9.6%</td>
<td></td>
</tr>
<tr>
<td>Highlands &amp; Islands</td>
<td>0.1%</td>
<td>6.9%</td>
<td>1.2%</td>
<td>0.0%</td>
<td>0.1%</td>
<td>0.0%</td>
<td>0.3%</td>
<td>8.6%</td>
<td></td>
</tr>
<tr>
<td>North East</td>
<td>0.2%</td>
<td>0.3%</td>
<td>9.4%</td>
<td>0.0%</td>
<td>0.1%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>9.9%</td>
<td></td>
</tr>
<tr>
<td>Shetland</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.5%</td>
<td></td>
</tr>
<tr>
<td>South East</td>
<td>2.0%</td>
<td>0.0%</td>
<td>0.5%</td>
<td>0.0%</td>
<td>23.4%</td>
<td>0.1%</td>
<td>2.7%</td>
<td>28.7%</td>
<td></td>
</tr>
<tr>
<td>South West</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.1%</td>
<td>2.3%</td>
<td>0.2%</td>
<td>2.6%</td>
<td></td>
</tr>
<tr>
<td>West</td>
<td>0.6%</td>
<td>0.2%</td>
<td>0.6%</td>
<td>0.0%</td>
<td>4.1%</td>
<td>0.2%</td>
<td>34.5%</td>
<td>40.1%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>8.6%</td>
<td>7.5%</td>
<td>12.4%</td>
<td>0.5%</td>
<td>29.6%</td>
<td>2.5%</td>
<td>38.8%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

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3.2 Analysis of long distance commuting by the Scottish Executives standard 6-way Rural/Remoteness classification

Consideration was given to the levels of long distance commuting to/from remote and urban areas. Table 3.2 details proportions and associated ratios of long distance in-commuters by Scottish Executives 6-Fold Urban Rural Classification. The ratio of percentage of long distance commuters to percentage of all employed, for each urban/rural category, provides an indication of higher than average rate of long distance commuting.

Table 3.2 Long distance out-commuters: 6-Fold urban rural classification

<table>
<thead>
<tr>
<th>Place of residence Scott. Executive urban classification</th>
<th>All people 16-74 in employment by local authority</th>
<th>Proportion of total employment (A)</th>
<th>Proportion of total long distance commuting (LD)</th>
<th>LD/A Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessible rural</td>
<td>318,296</td>
<td>15%</td>
<td>22%</td>
<td>1.50</td>
</tr>
<tr>
<td>Accessible small towns</td>
<td>219,863</td>
<td>10%</td>
<td>15%</td>
<td>1.47</td>
</tr>
<tr>
<td>Remote rural</td>
<td>129,116</td>
<td>6%</td>
<td>8%</td>
<td>1.27</td>
</tr>
<tr>
<td>Other urban areas</td>
<td>610,666</td>
<td>29%</td>
<td>33%</td>
<td>1.14</td>
</tr>
<tr>
<td>Remote small towns</td>
<td>59,123</td>
<td>3%</td>
<td>3%</td>
<td>0.93</td>
</tr>
<tr>
<td>Large urban areas</td>
<td>778,813</td>
<td>37%</td>
<td>19%</td>
<td>0.51</td>
</tr>
<tr>
<td>Total</td>
<td>2,115,877</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

It should be noted that the nature of the location of the employment has much less impact on the proportion of long distance commuting than the corresponding location of the worker’s home (out-commuting ratios ranged from 1.50 to 0.51, compared to the in-commuting range of 1.21 to 0.87). This implies that it is probably not worth endeavouring to influence the balance of employment between the six urban/rural sectors if trying to reduce long distance commuting.

4. GENERAL TRENDS OF LONG DISTANCE COMMUTING

Initial comparisons of the 1991 and 2001 Census datasets indicate slight increases in average commuting distance and percentages long distance commuting. In 1991, 26.0% of out-commuting trips were long distance (greater than 15km). In 2001, 26.7% of out-commuting trips were long distance. This represents a 2.7% increase in the percentage of long distance commuting over the decade.
Figure 4.1 illustrates historic trends over time for Census, NTS Scotland and SHS data. Generally the data sources indicate growth in long distance commuting in the 80's and early 90's, levelling off recently.

It can be seen that:

- NTS (Scotland) data indicates that there was steady growth in average commuting distance in the 1980s and early 1990s (e.g. between 1985 and 1995 average commuting distance increased by 4% per year). But this may now have levelled off, or started to decrease. Results indicate a slight decrease in average commuting distance between 1995 and 2003 (-0.2% per year);

- the NTS estimate of growth in average commuting distance between 1991 and 2001 (2.9% per year) is significantly higher than the estimation from the Census (0.5% per year); and

- the SHS data suggests a slight decline of around -1% per annum, in average commuting distance since 1999.

Forecasts for the next 10 years (from TMsF) show only a small growth (0.3% per year) in the proportion of car long distance commuters, as a percentage of total car trips. However this still implies a significant growth in the absolute number of long-distance car trips, since car commuting is predicted to grow over time unless significant restraint policies are adopted.
5. QUALITATIVE ANALYSIS OF SHS DATA

Using Scottish Household Survey data, we considered explanatory variables influencing the likelihood of commuting long distances. Our findings suggest the following factors are associated with a long commute:

- train-commuters commute further (average of 26km) than car commuters (15km) and bus commuters (10km); 
- those employed full time travel further to work (mean 13km) compared to part-time workers (mean 7km) and the self employed (mean 4km); 
- those from two car households travel an average of 15km to work, compared with those from one car household who travel 11km and those from households without a car who travel an average of 7km; 
- those aged between 20 and 60 years travel, on average, 11km to work, slightly further to work than the under 20s (mean 9km) or the 'still-working past 60’s' (8km); 
- those in professional occupations travelled an average of 14km to work, those in managerial and technical occupations travelled an average of 13km; those in partly-skilled occupations travelled an average of 9km and unskilled occupations travelled an average of 7km; 
- on average, commuters living in ‘accessible rural’ areas (mean distance 15km) and ‘accessible towns’ (14km) travel much further than those living in ‘large urban’ areas (8km) and ‘small remote towns’ (8km); 
- in general commuting distance tends to increase with increasing household income - those from households with more the £40,000 annual net household income commute an average of 17km, compared with those in households with income less than £10,000 whose average commute is only 8km; 
- members of ‘small family households’ (mean commute 12km) and ‘large family household’ members (12km) tend to generate slightly longer commutes than single adult households which have an average commute of 11km and single parents (8km).

Our analysis suggests there is a significant gender difference in commuting distances. Even when variables such as income, car availability and number of children are taken into account, females in almost all sub-categories tend to commute a significantly shorter distance than their male counterparts.

An analysis was undertaken using SPSS Classification-Tree software to compare those who travelled further than 15km with those who travelled less than 15km. The analysis suggested that mode used for commuting provided the most significant variation in the proportion of long distance commuting. 56% of train-
commuters travel further than 15km to work (i.e. are long distance commuters) and 33% of car commuters travel further than 15km to work.

Within the car based commuter category, the strongest variations in proportions long distance commuting were the urban/rural classification of the respondents’ home. For example, a much higher percentage of car commuters living in ‘accessible rural’ areas travelled long distances (48%) to their work than car commuters living in ‘urban settlements’ (18%).

6. FOCUS GROUP FINDINGS

Focus groups were undertaken in order to explore in more depth the circumstances, characteristics, behaviour, attitudes and life-style which influence commuting length. In addition, consideration was given to the likelihood of people changing their travel patterns in the future. To achieve a good geographic spread of attendees, focus groups were held in Glasgow, Edinburgh, Aberdeen, Stirling and Dundee.

Below we consider the factors associated with long distance commuting under the separate headings of economic, demographic, social and cultural issues.

6.1 Economic Factors

Our focus group findings suggest that economic factors associated with long distance commuters include:

- people are making long-term location choices to be able to access a wide range of jobs and services;
- jobs are less secure and people are less willing to move simply to reduce the cost and convenience of getting to any one job;
- jobs have become increasingly specialised making them harder to fill with local people;
- families do not necessarily relocate to the workplace of the main worker; and
- high property prices in Scottish cities often prevent people living closer to their work.

6.2 Demographic Factors

Demographic factors associated with long distance commuting include migration patterns where people move out of larger towns and cities. Focus group findings stressed the importance placed by some of living in a rural location.
6.3 Cultural Factors

Cultural trends indicate that many people have become accustomed to looking for work further from home and focus group findings suggest that long distance commuters maybe resigned to their situation and see a long commute as a ‘fact of life’.

6.4 Social Factors

The focus group research indicated social factors associated with long distance commuting such as living near family and friends (eg partners requirements or looking after elderly parents). A ‘sense of community’ was also highlighted as important. This side of long distance commuting correlates with ‘native’ populations in rural and remote areas travelling to the nearest employment centre rather than relocating.

7. CONCLUSIONS AND POLICY CONSIDERATIONS

7.1 Introduction

In the 2004 Transport White Paper ‘Scotland’s Transport Future’, the Scottish Executive indicated the long term policy objectives:

- to reduce the growth in road traffic volumes/ reduce traffic congestion;
- to reduce noise pollution;
- to reduce air pollution;
- to promote bus and rail travel;
- to decrease the number of road casualties.

Reducing the number of car driving long distance commuters may be an effective way of achieving some, or all, of these aims. We explore the possible links in this chapter.

7.2 Policies to Encourage Long Distance Commuters to Use Public Transport

‘Scotland’s Transport Future’ (2004) emphasised the need for a higher priority for public transport:

‘Perhaps the biggest challenge we face is changing attitudes to transport choices where such choices exist. The car need not always be the automatic choice…………Service improvements are making a difference but we have to work harder at changing perceptions and encourage more people to choose public transport’.

For long distance commuters there was a trend towards greater reliance on the car for travel to work. Comparison of the Census 1991 and 2001 indicates that mode share for car (driver/passenger) increased slightly (77% to 79%) for long distance commuting over this period. For public transport, rail mode share has also

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increased (6% to 7%), while bus mode share for these long-distance commuting journeys has decreased from 12% to 8%.

‘Scotland’s Transport Future’ (2004) indicates that improvement in public transport provision will have a positive effect in achieving road traffic reduction, but road pricing and other measures may hold a greater prospect of changing the pattern of road use. However our research suggests that the long distance commuter is more likely to be car dependent than others and so measures which change car use may in practice be less effective in changing the behaviour of this group.

In particular, the SHS (February 1999 to March 2005) data suggest that long distance car commuters (37%) were significantly less likely to claim to have the option of using public transport when compared to short distance car commuters (49%).

Our analysis of SHS data indicated that long distance car commuters who live and/or work outside urban areas are the least likely to have a public transport option available.

Findings from the current research indicate that train is preferred over the bus for long commutes. SHS data indicates that 56% of train commuters travel further than 15km to work. In contrast, only 18% of bus commuters travel further than 15km.

Focus group discussions suggest long distance commuters would choose rail as the first alternative to car, but for many this would require enhancements to the services and possibly a reduction in the relative level of fares.

‘Scotland’s Transport Future’ (2004) states that there will be considerable enhancements to the Scottish rail network, creating capacity for the future. ‘Scotland’s Transport Future’ (2004) also indicates the need for new trains, longer trains and longer platforms and indicates that by 2007 there will be lengthened platforms across the busiest commuter routes including the Fife Circle and East Kilbride to Glasgow Central routes. In addition preparations are under way for major new rail projects, including Stirling-Alloa-Kincardine, Borders railway, Airdrie-Bathgate, Glasgow and Edinburgh Airport rail links and the expansion of Waverley Station.

It is not clear whether these measures, and others in a similar vein, will lead to a switch of modes by existing car users, or simply encourage an increasing number of people to travel further by public transport.

7.3 Policies to Discourage People from Commuting Long Distances by Car

‘The Mode Choice Topic Report’ (Connolly and Barker 2004) provides details of the measures which might encourage people to use public transport in preference to cars. This highlights some key points:

- it is the difference in the overall ‘cost’ of the journey by different modes which is the primary influence on choice – this gap can be changed by

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either increasing the ‘cost’ of private transport or reducing the cost of public transport;

- the most effective measures for influencing choice in favour of public transport are those which directly increase the cost of the car journey – parking charges and/or limited availability, and tolls;

- there must be an acceptable public transport equivalent – in terms of overall journey time and frequency of service.

The mode choice topic report suggested that possibly the greatest potential for increasing public transport mode share from car is focusing investment in areas where public transport is already fairly competitive. The current research suggests that for long distance commuters there is less likely to be public transport available that is competitive with the car commute (with the possible exception of train travel) and a high proportion of those involved do not believe there is an acceptable public transport alternative.

The conclusions from the Mode Choice Topic Report are important in considering the place of long distance commuting by car. There are at least two broad types of long distance commuter:

- those who have grown up in an area and need to travel to find suitable employment (which includes those native to rural and remote areas); and

- those who have chosen to move to a ‘more-attractive’ (or possibly cheaper) location but continue to work in the relevant town/city centre.

A policy which has a significant impact on choice of mode for long distance commuting is likely to be indiscriminate in its impact on these two groups unless carefully targeted – this has potentially serious implications for rural policy as simply increasing the cost of travel may result in lower levels of economic activity in such areas.

The initial conclusions could suggest that the ‘long distance car commuter’ is the ‘villain’ – causing congestion and pollution, particularly on the trunk road network. However it is also clear that it is more difficult to offer acceptable alternatives to the long distance commuter – a policy conclusion may be that long distance commuting by car is a necessity for a sizeable group of people (20% of the population) and that other road users, who are more likely to have an acceptable public transport alternative, should be targeted by measures to encourage modal shift.

### 7.4 Park and Ride

Park and Ride is a transport option which, through encouraging use of public transport for a significant part of a journey and providing a ‘seamless’ journey for the travelling public, fits in well with Government objectives for integrated and sustainable transport. Car has long been a significant means of access to the rail

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network, but bus Park and Ride is a recent feature of the transport landscape in Scotland, with operational bus sites being implemented during the 1990's. Our Focus Group research suggested that many long distance commuters would be happy to consider a bus-based Park and Ride option, especially on congested routes into city centres.

Park and Ride in its many guises provides a key option in the policy tool kit for connecting dispersed origins with a more concentrated employment centre, travelling along a core corridor. The research suggests that this is a topic for further exploration at a local level in areas where there are high levels of long distance car based commuting along congested corridors – but where there is little chance of providing realistic levels of public transport for the full journey.

NB Many of the existing ‘rail’ commuting journeys will already be in practice ‘car plus rail’.

7.5 Travel Plans, Car Sharing and Working from Home

The Transport White Paper (2004) indicates that the Scottish Executive would like to see an increase in the number of organisations developing Travel Plans (TP). TPs usually cover how well a location is served by public transport, the availability of car parking, car-sharing, how cyclists are catered for, and issues such as broadband technology making home-working a more viable option. The White Paper suggests that TPs have the potential to make a difference in the way that people commute and road traffic growth can be constrained locally by using TPs in organisations that generate significant amounts of traffic.

Our findings suggest that the proportion of car sharing amongst long distance commuters is decreasing. Between 1991 and 2001 long distance mode share for car (driver) commuters increased (66% to 71%). During the same period, long distance car passenger mode share decreased (11% to 8%). These together imply that the average vehicle occupancy of long-distance car commuting trips is decreasing.

TPs that encourage car sharing (eg by giving ‘car sharers’ priority for limited parking spaces) may help reverse this trend. Findings from the focus group research indicated that car sharing was a viable option for some participants and some had car shared in the past. However, the focus group research indicated that car sharing may not be an easy option for long distance commuters as the nature of their home and work locations mean that they are unlikely to live near someone who works in the same location (especially for those working at small companies) and the number of alternative ‘back-up’ options is likely to be more limited that for those living more locally.

‘Scotland’s Transport Future’ (2004) indicated the aim to encourage more home working, and broadband technology now helps make home working a viable option in certain industries and for certain types of jobs (ie those which do not require face-to-face contact).

A small number of participants in the focus groups worked from home occasionally, others would like to have the option to do so if their employers allowed it.

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However, our research indicates that there were a number of perceived disadvantages to working from home such as the lack of ‘face-to-face contact, particularly amongst people who had responsibility for managing others.

7.6 Land-use Planning and Long Distance Commuting

In the classic theories underlying land use planning, commuting distance is determined by residential and workplace location - if there is a considerable mismatch between employment opportunities and housing availability commuting distances increase. This general understanding must now be questioned, with some key trends affecting this simple model:

- the increasing specialisation of employment, even in relatively unskilled occupations;
- the ease of travel;
- the wide variations in the cost of housing – particularly in parts of central Scotland;
- the concentration of employment into larger sites, necessarily distant from some homes;
- the rise in the proportion of households with two or more workers, each with specialist skills;
- the concentration of other activities – so that travel is needed as part of life, of which travel to work is just a part.

All these changes lead to people travelling further to find work, and to employers looking for increasingly large geographic catchment areas from which to draw skilled labour. It is not clear that simply co-locating employment and housing will necessarily reduce commuting distances or eliminate longer distance commuting.

‘Scotland’s Transport Future’ (2004) indicates that land use planning policies should be structured to reduce the need to travel; create the right conditions for greater use of sustainable modes; and restrict the adverse environmental impacts of travel to work. The analysis carried out for this topic report does not provide much encouragement that such policies will make a significant difference:

- the major growth in long distance commuting, particularly by car, appears to have followed the major expansion of the motorway and trunk road network – the transport infrastructure allowed people to travel further with ease;
- much of the long distance commuting is from rural and remote areas into centres of employment – it seems unlikely that the jobs accessed in this way will move quickly to the rural fringes to avoid the need for travel; and
- much of the reasoning behind moves to commuting longer distances are social rather than infrastructure based.

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7.7 Conclusions

The literature suggests that despite the numerous disadvantages of long distance commuting (e.g., fuel cost, environmental impacts, traffic congestion, ‘wasted’ time) there are considerable positive effects for families and communities. Long distance commuting enables workers to take advantage of lower property prices away from the city centre and provides economic links between urban centres and surrounding areas enabling workers to take advantage of low density housing, good schools, rural locations and low crime rates often found outside urban areas.

The most effective policy measure may be those that encourage existing long distance commuters to commute in more sustainable ways. Investment in the rail network, park and ride sites and car sharing schemes and encouraging home working may offer the greatest prospects of reducing car long distance commuting.

8. BIBLIOGRAPHY

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Figure 2.1: Long distance commuting – number of vehicles in AM peak all TMfS area (2002)
Figure 2.2: Long distance commuting - percentage of total AM peak traffic in TMfS area (2002)
Figure 3.1 Percentage of long distance out-commuters for long distance threshold of 15km