

ANALYSIS
OF THE
ECONOMIC,
EMPLOYMENT
AND SOCIAL
PROFILE
OF THE GREATER
DUBLIN REGION

EDGAR L.W. MORGENROTH

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PREFACE

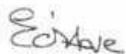
The current period of sustained economic growth has created great benefits for the Dublin and Mid-East Regions. It has also produced a range of challenges for local and regional authorities, statutory agencies, Government Departments and all others engaged with infrastructural, economic and social planning.

Many of the bottlenecks arising from this economic growth were already becoming apparent in the mid-1990s during the process which concluded with the *Strategic Planning Guidelines for the Greater Dublin Region* in 1999. It was in this context – and to complement the *Strategic Planning Guidelines* – that the Dublin Employment Pact, the Dublin Regional Authority and the Mid-East Regional Authority drafted terms of reference for a comprehensive study of the economic, employment and social profile of the Greater Dublin Region.

The results of the work carried out by Mr Edgar Morgenroth and his colleagues at the ESRI greatly exceed what were our initial expectations. Many of the areas examined had never before been investigated at such empirical depth. The dearth of hard data available for many crucial fields affecting the Greater Dublin Region had long been a major handicap for those engaged with policy and planning at all levels. The extent of the new data collated, analysed and interpreted will be of critical significance to planners, policy makers and practitioners across the public and private sectors, as well as the community and voluntary sector, as major infrastructural, economic and social projects are implemented over the years of the National Development Plan.

We would like to thank Mr Morgenroth and his colleagues on their achievement, and also for the co-operative and friendly way in which this work was carried out in close consultation with our staff.

Mr. Eamonn O'Hare
Chairman,



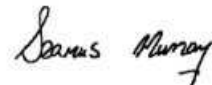
Dublin Employment
Pact

Cllr. Michael Kennedy
Chairman,



Dublin Regional Authority

Cllr. Seamus Murray
Chairman,



Mid-East Regional
Authority

EXECUTIVE SUMMARY

The purpose of this study was to provide a comprehensive profile of the counties that make up the Greater Dublin Region (the Dublin Counties and Kildare, Meath and Wicklow). As such this study is an attempt to fill gaps in our knowledge about the region. Such a profile is of major importance for policy making at the national, regional and local level since, without a clear characterisation of the region and local areas within it, it is difficult to identify problems which may require policy intervention.

The counties of the Greater Dublin Region are quite heterogeneous in terms of the size of their population and the basic demographic characteristics of their population. Thus, the Dublin County Borough has a population which is more than four times as large as that of County Wicklow or County Meath. This difference in the absolute size of the population is explained by large differences in population density which in turn is determined by the degree of urbanisation. There are also large differences in the age distribution of the population. The Dublin County Borough and Dun Laoghaire-Rathdown have a lower proportion of young people and a higher proportion of older people while the opposite is true for the other counties. Furthermore, within the counties there are also large differences regarding the age distribution. The proportion of people aged 50 years and over was found to be particularly high in the city centre areas of Dublin and in the more remote (relative to Dublin) rural areas of the three counties, Kildare, Meath and Dublin. The percentage of the younger people aged under ten years of age was found to be high in suburban areas of Dublin and to a lesser extent in the areas of the counties of the Mid-East Region that are located closer to Dublin. This has implications for the provision of public services such as schools for young people and geriatric care for older people since these can be more effectively provided, if they are targeted to areas where they are needed more. The population of the counties is growing at substantially different rates, with the population of the Dublin County Borough and Dun Laoghaire-Rathdown growing relatively slowly while the other counties are growing much faster. Overall the population of the Greater Dublin Region is projected to exceed 1.6 million by 2006. There are also differences in household size which is decreasing, thus increasing the demand for housing units (houses or apartments) since for a given increase in the population more households will be formed due to this decrease in the size of households. This trend towards smaller households along with the projected increase in the population has important planning consequences. Thus, if these trends are maintained a substantial number of additional housing units need to be provided than would have hitherto been needed given the projects population growth. Of course, the requirement for additional housing units requires that additional land is zoned and serviced with sewerage and other essential services.

Dublin dominates the urban structure of the region, with other centres being significantly smaller. The rural areas of the Mid-East Region in particular tend to be further away from larger centres, which may hamper their economic development due to the absence of scale effects both in terms of the labour market and the range of locally provided services. Nevertheless, excluding the contiguously built-up area of Dublin, in 1996 there were 47 urban centres with a population in excess of 1,000 persons. This suggests that rather than planning additional new urban centres the focus of development policy should be on strengthening the existing urban network. Here a particular focus should be on the scale of a few centres which, if they were large enough could attract more employment.

Dublin accounts for a particularly large proportion of national output. Both the Dublin and Mid-East Regions have improved their relative position with regard to per capita gross value added (GVA) which is a measure of output, but the Mid-East Region has been growing faster than the Dublin Region and is therefore catching up. However, while the Mid-East Region has been converging to the national average it still lags significantly behind the Dublin Region. Among the counties Meath has the lowest GVA. These differences in per capita GVA are likely to be due to the way this variable is measured. Since GVA is measured in the region where output is produced this measure will underestimate the output produced by the individuals of one region if they commute to another region. However, there may also be differences between the regions which can not be accounted for by commuting. These differences are likely to be explained by differences in industrial structure and productivity.

The Manufacturing; Building and Construction and Agriculture, Forestry and Fishing sectors are more important in the Mid-East Region than in Dublin where services are most important. This pattern is repeated in the employment data which also points towards some important differences in the industrial structure. The differences in gross disposable per capita income (PDI) among the counties are less marked, but again Dublin has a considerably higher PDI than the other counties. Again, Kildare has been converging rapidly to the national average. The fact that the differences between the counties with respect to disposable income are less marked is evidence for the effect of commuting since income is measured according to place of residence rather than where it is acquired, and is therefore a better measure of the prosperity within the counties.

A thorough analysis of the Manufacturing sector and a somewhat more limited analysis of the Service and Agricultural sectors shows that there are large differences between the counties both in terms of the absolute size of the sectors and the industrial structure. Overall manufacturing employment is higher today than in 1973 in Counties Kildare, Wicklow and Meath. However, this high level of employment in manufacturing was preceded by a period of prolonged stagnation from which manufacturing employment in the Dublin Region has not recovered. Along with the decline in total employment in the sector there has also been a relocation of manufacturing employment in Dublin. Thus, the share of employment in suburban locations has grown while that of more central locations has declined.

The analysis of the Census of Industrial Production showed that industry in County Meath lags behind that of the other counties. This is also borne out by the low share of employment in the five fastest growing sectors in County Meath. Dublin does particularly well in terms of the employment share in the fastest growing sectors, but it must be borne in mind that Dublin also has a high share of employment in the five slowest growing sectors. Employment in these sectors is more vulnerable to shocks since these sectors are not as profitable which may result in relocating in other countries due to cost differences.

Each county has high concentrations of employment in a number of different sectors and local clusters can be detected in all counties. However, the number of local clusters is much higher in Dublin than the other counties despite the fact that the measure used accounts for differences in the absolute size of the Manufacturing sector. Thus, even controlling for size differences Dublin has more clusters than would be expected. Thus, the analysis suggests that there are scale effects in the formation of cluster. The percentage of employment in foreign owned manufacturing firms is highest in Kildare and lowest in County Meath.

The analysis of the Service sector and Agriculture was severely limited by data availability. However, with regard to Market Services, Dublin has a higher concentration of employment in Other Business Services which includes Professional Services. The Building and Construction sector was found to be more important in the counties of the Mid-East Region.

With regard to the labour market and social profile some interesting differences between areas within the region emerge. For example, the educational profile of Dun Laoghaire-Rathdown is somewhat better than that of other counties. Within the counties the more deprived areas, such as Tallaght or Clondalkin have poor

educational profiles. Similarly, more rural areas of Counties Kildare, Meath and Wicklow have a worse educational profile than areas closer to Dublin. This type of pattern is repeated with regard to the other measures such as social class and unemployment. For this reason these more deprived areas are often referred to as areas of multiple deprivation. However, this is somewhat misleading since these indicators measure essentially the same thing. Since deprivation appears to be concentrated in certain areas policy responses should be targeted at specific areas rather than applied uniformly across all areas.

The analysis of unemployment showed that this has declined dramatically since 1996. However, the unemployment rate alone is not a good measure since the absolute number of unemployed people is still high, particularly in the Dublin Region. There is a large difference between the unemployment rates across space, which results in more moderate unemployment rates due to averaging out of differences. Unemployment is spatially concentrated and there still exists a pool of potential workers. This is despite the fact that a significant proportion of firms are seeking employees, which suggests that there is some mismatch between the skills of the unemployed and the skills sought by employers. This mismatch is likely to be due to the fact that the unemployed do not have sufficient skills rather than the wrong skills. This is indicated by the high correlation between areas of high unemployment and areas of poor educational attainment. An interesting finding is that where a mixed picture emerged regarding the presence of clusters is in the areas with highest unemployment. This might give rise to a spatial mismatch where jobs are located in areas where workers are harder to find.

The Greater Dublin Region has access to an extensive network of transport infrastructure, both in terms of roads but also other infrastructure such as a relatively well developed rail network. However, this level of access has to be seen in the light of very heavy usage of all types of infrastructure. Thus, the service levels are only partial indicators since commuting into the region adds to the pressure on the infrastructure.

Commuting is a very extensive phenomenon in the Greater Dublin Region, and indeed the commuting belt around Dublin extends to the neighbouring regions. Commuting flows using public as well as private means of transport are substantial. This has a number of consequences. First, the level of commuting puts great pressure on the existing transport infrastructure, both public and private. Second, as congestion has increased this is likely to have negative consequences for the economic development of the region since congestion gives rise to higher transport costs. Third, the level of commuting and congestion has a negative impact on the environment. Finally, commuting, and particularly long distance commuting has a social cost in that individuals spent time travelling which they could spend doing other things. Furthermore, individuals have a more stressful and longer day due to long distance commuting which is likely to have a negative impact both in terms of their work and social life. Thus, there is a need for public policy to address the issue of commuting. Given the pressure on the existing infrastructure is now so great that additional investment in infrastructure is urgently required. This is planned for in the National Development Plan, however, delays in the implementation of the infrastructure component of the National Development Plan are likely to occur. There is, therefore, a need for other measures such as congestion pricing which are likely to affect the behaviour of individuals and businesses. Indeed, such a measure could be used to channel business activities into the more deprived areas of the region as a whole by exempting businesses located in these areas from such charges.

Social, cultural and recreational capital is an important determinant of the quality of life in the region and local areas. Furthermore, such facilities, especially universities, can play an important role in the development of a region. While it was possible to collect comprehensive data for facilities such as schools, hospitals and arts facilities it proved difficult to obtain comprehensive data on sports facilities. Therefore, the profile of these facilities is only a partial one. Furthermore, the spatial equity of access to particular facilities was not explored in detail. A detailed study such as suggested by Talen and Anselin (1998) would require a level of detail regarding services that was not available for this study. However, such an analysis is likely to yield important insights

into spatial mismatch between supply and demand of facilities and inequity in service provision. Therefore further research in this area is warranted.

There appear to be significant differences between the counties with regard to cultural facilities, with which Dublin and particularly the Dublin County Borough are well endowed. Furthermore, there are large differences with regard to further education establishments which are again concentrated in Dublin. The fact that these facilities are clustered in Dublin is not surprising since they are often of national significance and therefore located in the capital. Furthermore, this concentration may also be the result of a threshold effect regarding the minimum demand that is necessary to sustain a facility. Differences regarding post primary schools are quite small and at least in part reflect differences in population density, which result in smaller catchments in rural areas. Differences regarding hospital provision are also small once the level of inpatient admissions is taken into account. However, County Wicklow is not well served with hospitals.

While seen in isolation each of the topic analysed in this report are of a high importance, they are intrinsically linked to each other and these links must be borne in mind for policy analysis. For example, the pattern of population change is related to issues such as house prices which in turn depend on the supply of housing. The supply of housing in turn is related to the supply of development land. As population growth has taken place outside of Dublin this has resulted in high levels of commuting which give rise to congestion. The levels of commuting are a function of the availability of jobs which depends on the structure of economic activity. This implies that the problem of congestion is not one that is easily solved as it is a result of a complex process. Similarly the underlying process that determines issues such as unemployment and disadvantage are also multifaceted.

1. INTRODUCTION

With the establishment by the Government, in 1994, of eight Regional Authorities the regional dimension to public policy and policy implementation has gained importance. These eight Regional Authorities have responsibility for the co-ordination of public services as well as encouraging co-operation between the different agencies in the delivery of services. They also fulfil important planning and monitoring functions through the production of regional reports which identify the region's development requirement and reviews of public service provision.

The regional authorities have been asked to contribute to the current National Development Plan through regional submissions of priorities for investment. Indeed the National Development Plan for the period from 2000 to 2006 (Department of Finance, 1999) explicitly addresses the objective of a balanced geographic distribution of economic activity.¹ This aim of a balanced geographic distribution of economic activity cannot be achieved without proper spatial and physical planning, both at a national and regional level, and the need for this has recently been re-emphasised (see Fitz Gerald, Kearney, Morgenroth and Smyth, 1999; Brady Shipman Martin *et al.*, 1999). The importance of spatial and physical planning has been amplified by economic and population growth and the related housing boom and traffic congestion which are particularly apparent in the Dublin and Mid-East Regions. These developments will have long lasting spatial consequences through their influence on the distribution of the population which in turn will impact on public service provision, infrastructure requirements and the environment.

While the recent economic success has benefited many individuals it has also given rise to a number of problems such as infrastructure constraints, a housing shortage as well as skill and labour shortages. Furthermore, poverty and long-term unemployment have not been eliminated, and here too efficient planning can be used to good effect.

In order to draw up regional/local plans which will successfully tackle any of these problems comprehensive information about the regions, not only at the aggregate regional level but also at county level and at a micro level (District Electoral Division or Electoral Ward) is required. For example, without knowledge of local population change it is difficult to develop a plan for housing needs. Population change in turn, at least in part, depends on the location of employment opportunities which are influenced by the availability of a work force, infrastructure, as well as market conditions. Similarly, it is difficult to tackle long-term unemployment and poverty without a thorough knowledge of all causal and related factors at a local as well as national level. Such knowledge can then be used to develop and target measures more efficiently.

While there has been some analysis of data at a regional level, with few exceptions this has tended to focus on interregional comparisons (e.g. Walsh, 1995) and the study of specific issues such as poverty (e.g. Nolan, Whelan and Williams, 1998). Both the Report on the *Strategic Planning Guidelines for the Greater Dublin Region* (Brady Shipman Martin *et al.*, 1999) and the *Southern and Eastern Region Development Strategy 2000-2006* (Fitzpatrick Associates, 1999) have collected data on a range of topics for the Dublin and Mid-East Regions, however neither of these provides a thorough profile of the

¹ The other objectives of the present National Development Plan include the enhancement of our economic potential, the maintenance of the growth in sustainable employment, the reduction of long-term unemployment as well as enhanced cross-border co-operation.

regions. In particular these reports provide only limited or no information in the areas of industrial structure, skill levels (and shortages), educational attainment, commuting patterns and social and recreational capital (especially at a sub-county level). Thus, there exists no single source which offers a comprehensive profile of the Greater Dublin Region at the micro level and which covers all the relevant information for regional planning. However, only such a comprehensive profile can seek to integrate all-important factors and analyse the interactions between these factors.

This report addresses this knowledge gap for the Greater Dublin Region. Map 1 shows the extent of the Regional Authorities and their constituent counties. In particular the map identifies the Greater Dublin Region which is made up of the Dublin and Mid-East Regional Authorities and which is the focus in this report. Due to the strong functional links between the Dublin and the Mid-East Regions it is important to carry out the analysis for the Greater Dublin Region rather than the two Regional Authorities separately. For example, the two regions jointly comprise one single labour market (through commuting), are seen as one region for the purpose of firm location, and they are strongly linked through shared infrastructure (Dublin Airport and the National Primary Road network). It is therefore important to analyse both regions together since developments in one region will also impact on the other.

An important feature of this report is the presentation of information in map form (GIS) which facilitates the analysis of spatial patterns which are often ignored but which can be of particular importance to policy makers. Significantly, the study provides not merely a static picture of the two regions as they are now, but also examines important changes over time and provides projections of the population into the future. Furthermore, this report explores the relationship between the different variables which are to be used to identify the implications for the regions of the future development.

Specifically the study will examine the following:

1. Population and Urban Structure.
2. Economic Activity and Employment.
3. Sectoral Analysis.
4. Labour Market Profile.
5. Transport Infrastructure and Commuting.
6. Social, Cultural and Recreational Infrastructure.

2. POPULATION AND URBAN STRUCTURE

2.1 Current Population and Projections

This chapter is concerned with the distribution and characteristics of the population. Here the focus will be on the location of the population and its spatial distribution. This has important implications for policy making as it impacts directly on the level of public service provision that is required as well as impacting on all aspects of economic and social life. This also means that the most up-to date figures will be required. This entails estimating the number of persons living in Ireland in 1999 as the last Census of Population was carried out in 1996.

Table 2.1 gives a breakdown of the total population in the counties of the Greater Dublin Region. Of those the Dublin County Borough has by far the highest population, with the counties of the Mid-East Region having the lowest populations. This reflects the low population densities (see Map 8), which are a function of the degree of urbanisation which will be discussed below. There is some variation regarding the average household size which ranges from 2.7 in Dublin County Borough to 3.5 in South Dublin and Fingal. These differences arise out of differences in the age structure, since areas which have a younger population inevitably have a higher average household size.

Table 2.1: Total Population and Households, 1996

	Population	Number of Households	Average Household Size (Persons)
Dublin County Borough	481,854	172,189	2.7
South Dublin	218,728	61,437	3.5
Fingal	167,683	47,271	3.5
Dun Laoghaire-Rathdown	189,999	61,359	3.0
Kildare	134,992	38,582	3.4
Meath	109,732	31,592	3.4
Wicklow	102,683	30,806	3.2
Greater Dublin Region	1,405,671	443,236	3.1

Source: Central Statistics Office, Census of Population 1996.

Before turning to an analysis of recent changes in the size and composition of the population it is important to consider the changes that have occurred over a longer period. Table 2.2 shows both the total population and the percentage change in the total population between periods. Over the period 1966 to 1996 the population of Dublin increased by over 200,000 people. However, much of this change occurred during the period 1966 and 1979. Similarly in the other counties the most rapid population growth occurred in this period, with recent periods displaying much more modest increases. An exception to this is Kildare which experienced substantial population growth from 1986 to 1996. All counties, except for Dublin during the period 1979 to 1986, experienced population growth in excess of that for the State as a whole over the period 1966 to 1996. Overall this shows that while population growth in recent times is relatively modest relative to that in the 1960s there has been

sustained growth in excess of the national average growth in the Greater Dublin Region, thereby increasing the share of the national population in that region from 34 per cent to almost 39 per cent.

Table 2.2: Total Population and Population Change, 1966-1996

	1966	1979	1986	1996
Dublin	795,047	983,683	1,021,449	1,058,264
Kildare	66,404	97,185	116,247	134,992
Meath	67,323	90,715	103,881	109,732
Wicklow	60,428	83,950	94,542	102,683
State	2,884,002	3,368,217	3,540,643	3,626,087
		Annual % change (1966-1979)	Annual % change (1979-1986)	Annual % change (1986-1996)
Dublin		1.7	0.4	0.4
Kildare		3.3	2.0	1.6
Meath		2.5	1.5	0.6
Wicklow		2.8	1.3	0.9
State		1.2	0.5	0.2

Source: Central Statistics Office, Census of Population various issues.

Table 2.2 shows that these basic demographic variables have changed substantially since 1991 and that this change has not been even throughout the region. The population grew fastest in Fingal and Kildare and slowest in Dublin County Borough and Dun Laoghaire-Rathdown. There are also differences regarding the change in the number of households. Not surprisingly, the two counties with the fastest population growth also have the fastest growth in the number of households. However, South Dublin which had below average population growth experienced a more rapid growth in the number of households. This is explained by the fact that the average household size declined particularly rapidly in this county. Overall, the household size declined by 5.6 per cent.

Table 2.3: Percentage Change in the Total Population, Households and Household Size, 1991-1996

	Population	Number of Households	Average Household Size (Persons)
Dublin County Borough	4.8	8.2	-6.5
South Dublin	6.0	12.1	-7.1
Fingal	11.7	16.2	-5.1
Dun Laoghaire-Rathdown	5.1	8.9	-6.5
Kildare	12.8	17.1	-6.4
Meath	5.8	9.7	-5.6
Wicklow	7.6	9.8	-5.9
Greater Dublin Region	6.8	10.6	-5.6

Source: Central Statistics Office, Census of Population, 1991 and 1996.

The average household size only captures part of the differences in the distribution of different household sizes which can be further explored by examining the percentage of households broken down by the number of persons. Table 2.4 shows the percentage of individuals living in households of different size. Almost one-third of the population of Dublin County Borough live on their own compared to just over a fifth in the Greater Dublin Region. This reflects the presence of a larger number of students and other people who have not started a family, as well as a high proportion of older people. The proportions in households of between two and four individuals are relatively similar in all counties. However, Dublin County Borough and Dun Laoghaire-Rathdown have a smaller proportion of individuals in large households. This is explained by the same factors that explain the high proportion of single person households in these counties.

Table 2.4: Percentage of Population by Size of Household, 1996

Number of Persons	1	2	3	4	5	6 and more
Dublin County Borough	30.4	26.3	15.3	13.4	8.1	6.6
South Dublin	12.3	20.4	18.0	22.3	15.1	11.9
Fingal	13.0	20.6	17.5	22.5	15.5	11.0
Dun Laoghaire-Rathdown	20.8	24.7	17.5	18.3	11.5	7.3
Kildare	14.7	21.4	17.0	21.1	14.2	11.5
Meath	16.1	21.1	16.1	19.5	14.2	12.9
Wicklow	17.9	23.2	16.7	19.0	12.8	10.3
Greater Dublin Region	21.4	23.6	16.5	17.8	11.6	9.0

Source: Central Statistics Office, Census of Population, 1996.

The difference between the counties with regard to the age distribution of the population are shown in Table 2.5. This indicates that a larger proportion of the population of Dublin County Borough, Dun Laoghaire-Rathdown and Wicklow are above the age of 65 years. In absolute terms Dublin County Borough and Dun Laoghaire-Rathdown also have the largest numbers of older people. Further detail on the age distribution in the Greater Dublin Region is presented in Maps 2-5. In particular Map 2 and 3 show the percentage of the population aged 50 years and over. Since the data refers to 1996, persons aged 50 at the time of the census are now aged 55 so the map measures the concentration of individuals who are currently pensioners (those aged 65 and more) and those who will become pensioners in the next ten years. Since persons aged over 50 years are relatively immobile it is reasonable to expect that these concentrations are stable over the short to medium term. The two maps show that those aged 50 years and more constitute a large group in more remote rural areas further away from Dublin, while within Dublin this age group is more concentrated in city centre areas. The particular spatial distribution of pensioners and those who will become pensioners in the medium term has important implications for the provision of services specific for this age group. Thus, the fact that there appear to be concentrations implies that services for the elderly need to be particularly targeted at these areas. Importantly, the fact that the areas where there are concentrations of elderly and those who will become elderly in the medium term include more remote rural areas implies that transport and access to facilities should be important considerations in the provision of services.

Maps 4 and 5 show the percentage of the population which is less than ten years of age relative to the total population. Again the fact that the data refers to 1996 this measures concentrations of people under 15 years of age in 2001. The Maps show that within Dublin young people constitute a particularly large proportion of the population in the areas outside of the city centre, particularly in the west and south and to a lesser extent in the north. Outside of Dublin it is more difficult to determine a clear pattern. However, concentrations of young people appear more regularly closer to Dublin. Thus, the general pattern appears to be the opposite to that found with regard to older people. Again this has important implications for public service provision, particularly with regard to schools and childcare facilities which are particularly needed in areas with a high concentration of young people.

Table 2.5: Age Distribution, 1996

	Persons Aged 0-19	Persons Aged 20-64	Persons Aged 65+	Per Cent Aged 0-19	Per Cent Aged 20-64	Per Cent Aged 65+
Dublin County Borough	125,964	292,956	62,934	26.1	60.8	13.1
South Dublin	83,091	124,208	11,429	38.0	56.8	5.2
Fingal	62,568	95,776	9,339	37.3	57.1	5.6
Dun Laoghaire-Rathdown	56,072	112,441	21,486	29.5	59.2	11.3

Kildare	49,199	76,130	9,663	36.4	56.4	7.2
Meath	39,465	59,641	10,626	36.0	54.4	9.7
Wicklow	35,170	57,093	10,420	34.3	55.6	10.1
Greater Dublin Region	451,529	818,245	135,897	32.1	58.2	9.7

Source: Central Statistics Office, Census of Population 1996.

So far the focus has been on the data from the 1996 Census of Population. However, for planning purposes it is important to have up-to-date figures for the total population as well as projections of the population to some future date. Since the Central Statistics Office does not publish population estimates and projections for areas below the regional level these have to be calculated independently. There are a number of ways in which such estimates can be produced. First, life table methods can be used. This involves disaggregating the Census data by cohort and then moving these cohorts along their life cycle. Furthermore, this method requires assumptions regarding fertility, mortality and migration. The latter are particularly difficult at the regional and county level. The second method uses data other than the Census data in order to apportion changes in the population. For example, the electoral register which is updated annually can be used to estimate the population. Again using this approach requires strong assumptions which may not hold in practice. However, this method is more simple to put into practice and it has the added advantage that it could also be extended to relate population movements to economic variables such as housing.

In order to achieve this we use the Electoral Register for 1996 and the first quarter of 1999 to calculate the population for each county. The former is used to calculate the ratio of actual population in 1996 to the population on the electoral register. Under the assumption that this ratio is constant over time this can then be used in conjunction with the Electoral Register for 1999 to estimate the population in 1999 at the District Electoral Divisions (DED) or county level. These county estimates can then be aggregated into regional estimates that can be compared to the CSO regional estimates. The number of persons on the register can be attributed to District Electoral Divisions or Wards which can then be summed to the desired level of aggregation. The estimates along with the population for each county in 1996 and the CSO regional estimates are set out in Table 2.6. At the level of the Greater Dublin Region the estimates are almost identical to those calculated by the CSO, while there are minor differences for the estimates of the Dublin and Mid-East populations.

A striking feature of the demographic development is that the population is growing at considerably different rates in the various counties. Thus, the population appears to be growing fastest in Co. Meath (10.1 per cent) while it is growing at a relatively slow rate in Dun Laoghaire-Rathdown (0.9 per cent) and to a lesser extent Dublin County Borough. These differences reflect variations in the scope for development between the counties as well as changes in the settlement and commuting patterns, particularly due to high house prices.

Table 2.6: Population by County and Region in 1996 and 1999

County/Region	1996	1999 (estimated)	Percentage Change
Dublin Co. Borough	481,854	492,378	+2.2
South Dublin	218,728	220,657	+7.5
Fingal	167,683	181,049	+8.0
Dun Laoghaire-Rathdown	189,999	204,338	+0.9
Dublin Region	1,058,264	1,099,067	+3.9
CSO Estimate		1,096,700	+3.6
Kildare	134,992	144,853	+7.3
Meath	109,732	120,857	+10.1
Wicklow	102,683	108,910	+6.1
Mid-East Region	347,407	374,619	+7.9
CSO Estimate		378,300	+8.8

Greater Dublin Region	1,405,671	1,473,686	+4.9
CSO Estimate		1,475,000	+4.9

Source: CSO Census of Population 1996, CSO Population and Migration Estimates, 1999 and own calculations.

Another important issue is the rate of change of the population at the local level. As was shown above the population has grown in all counties. However this rate of change is not evenly distributed. Map 6 shows the population change in the region between 1991 and 1996 using the Census of Population (1991 and 1996). The map shows that population change was greatest closer to Dublin while some areas actually had a declining population. These latter areas tended to be rural areas or areas in the Dublin County Borough.² Map 7 shows the population change between 1996, the last census year, and 1999. The figures for 1999 were estimated using the electoral register. The map clearly shows that population growth was more widespread and that areas further away from Dublin experience population growth. Nevertheless, some areas still appear to have experienced a population decline. Again these areas include parts of the Dublin County Borough and areas far away from Dublin.

For planning purposes it is important to have an idea about future developments of the population. Clearly population trends are at least in part dependent on future policies such as the zoning of land. Since such policies are not known in advance it is difficult to precisely predict population changes in the future. This also increases the forecast error particularly if the forecast horizon is very long. For these reasons the projections outlined below are of a relatively short run nature, based on current trends which assume no significant changes to policy. Thus, if major policy changes occur the outcome regarding population is likely to be different than that predicted. Three methods are used here to project the population and all are “trend” techniques.³ These methods rely on the assumption that current trends are maintained over the forecast horizon and are therefore only useful over the short to medium term. The methods used here are distinguished by the way current trends are treated. The LINE method simply linearly projects the existing growth rates into the future, while the EXPO method projects these trends exponentially. The SHARE method holds fixed the current share of the national population and uses national forecasts to project the population in the counties. Finally, we take the average of these three forecasts to derive the AVERAGE projection.

The techniques that are used here are distinct from the cohort component/life table methods that are commonly used for national projections. The advantage of these simpler trend methods is that they require less data which makes them particularly suitable for population projection at a spatially disaggregated level for which data for some variables required for the cohort component method may not be available. The disadvantage of these methods is that they use past trends to predict the future whereas the cohort component model tracks individual cohorts on the basis of an assumed life expectancy. Both the trend and the cohort component methods have the disadvantage that they do not explicitly account for changes in policy which would require a structural modelling approach which would capture the effect of policy on migration and fertility.

The projected population for each county in 2001 is set out in Table 2.7.⁴ There are some differences using the different techniques. For example, the SHARE which constrains the sum of the county projections to add up to the CSO national projections yields the lowest figures for all counties of the Greater Dublin Region. The EXPO method on the other hand yields the highest figures. The projections up to 2006 are set out in Table 2.8 which indicates that the population of the Greater Dublin Region will increase to over 1.6 million. Since these projections are based on the same methods

² Some areas in the Wicklow mountains experienced a strong percentage increase in their population. However, the absolute numbers of additional persons is relatively small and the percentage increase should, therefore, not be taken to indicate a large increase in the service provision requirement.

³ See the Appendix for a full derivation of these techniques.

⁴ Projections for 2006 are set out in the Appendix.

used for those to 2001 the differences between the methods follow the same pattern as discussed above.

Table 2.7: Population Projections for the Greater Dublin Region, 2001

County /Region	Method:	LINE	EXPO	SHARE	AVERAGE
Dublin County Borough		499,394	499,600	490,165	496,386
South Dublin		221,943	221,958	217,701	220,534
Fingal		189,960	190,931	186,930	189,273
Dun Laoghaire-Rathdown		213,889	214,873	210,441	213,067
Dublin Region		1,125,186	1,127,362	1,105,236	1,119,261
Kildare		151,427	152,082	148,971	150,827
Meath		128,273	129,307	126,335	127,972
Wicklow		113,061	113,403	111,168	112,544
Mid-East Region		392,761	394,792	386,474	391,343
Greater Dublin Region		1,517,947	1,522,154	1,491,710	1,510,604

Table 2.8: Population Projections for the Greater Dublin Region, 2006

County/Region	Method:	LINE	EXPO	SHARE	AVERAGE
Dublin County Borough		516,934	518,121	495,294	510,117
South Dublin		225,158	225,245	214,730	221,711
Fingal		212,237	218,058	206,770	212,355
Dun Laoghaire-Rathdown		237,779	243,662	231,412	237,618
Dublin Region		1,192,108	1,205,086	1,148,206	1,181,801
Kildare		167,863	171,773	163,270	167,635
Meath		146,814	153,110	143,742	147,888
Wicklow		123,438	125,463	119,674	122,858
Mid-East Region		438,115	450,346	426,686	438,381
Greater Dublin Region		1,630,224	1,655,432	1,574,892	1,620,183

The population projections have important implications for the number of additional housing units required in the period 1996 and 2006. On the basis of the average household size in 1996 the number of households in 2006 can be predicted. As shown in Table 2.9 the population projections imply a substantial increase in the number of households which are expected to rise to over half a million. This increase implies that over 80 thousand additional housing units will be required over the period 1996 to 2006 in the Greater Dublin Region.

Table 2.9: Predicted Number of Households, 2006

County/ Region	1996	2006	Change	% Change
Dublin County Borough	172,189	188,932	16,743	9.7
South Dublin	61,437	63,346	1,909	3.1
Fingal	47,271	60,673	13,402	28.4
Dun Laoghaire-Rathdown	61,359	79,206	17,847	29.1
Dublin Region	342,256	392,157	49,901	14.6
Kildare	38,582	49,304	10,722	27.8
Meath	31,592	43,496	11,904	37.7
Wicklow	30,806	38,393	7,587	24.6
Mid-East Region	100,980	131,194	30,214	29.9
Greater Dublin Region	443,236	523,351	80,115	18.1

2.2 Urban Structure

An important aspect for the development of any region is its urban structure. The reason for this is that agglomeration economies are an important factor in the location of the more dynamic high technology industries. Such agglomeration economies arise from the existence of a number of firms working in the same or related industries.

Thus, these firms share a larger common labour market where the required skills are more prevalent, they exchange information, they make use of the same ancillary service industries and they use a common infrastructure. Agglomeration economies also exist in terms of service provision since it is easier to maximise access to public services in more densely populated areas and since the provision of many public services is subject to increasing returns to scale. This means that the cost per person of the provision for a particular public service is lower when this public service is supplied in a large town than in a small town. In general the economic literature suggests that agglomeration through high densities and close proximity of individuals promotes information spillovers, facilitates the functioning of labour markets and reduces transport costs both to industry and to individuals (see Ciccone and Hall, 1995 and Fujita, Krugman and Venables, 1999). For agglomeration economies to be present centres need to be of a sufficient size. However, excess agglomeration in one centre can also have negative effects since this can lead to congestion, high costs of living and high production costs, long commuting distances and high transport costs thus undermining the benefits of agglomeration (see Henderson, 2000).

Overall the degree of urbanisation is relatively high almost 80 per cent of the population living in urban centres with more than 10,000 inhabitants (see Table 2.10). However, there are some marked differences between the counties. County Meath in particular has a very low rate of urbanisation with only 12 per cent of the population living in urban centres with more than 10,000 inhabitants. Even using a looser definition of urbanisation which encompasses the population in centres of above 1,500 inhabitants, Meath is well below the degree of urbanisation of Counties Kildare and Wicklow.

The settlement pattern and the degree of urbanisation are also reflected in the population density, which is displayed in Map 8. This map shows clearly that the population density is highest around Dublin City, other urban centres and along the major roads leading to Dublin. The latter is particularly noticeable along the N1, N3, N4/N7 and the N11. Another notable feature of the urban structure is the exceptional dominance of Dublin. Thus, once the contiguously built up area of Dublin is excluded, then in 1996 no centre in the Greater Dublin Region contained a population larger than 30,000 (see Table 2.11). Furthermore, only eight of the twenty largest centres had a population of more than 10,000.⁵ In addition to this, the geographical distribution of the urban centres is very uneven. This is demonstrated in Map 9 which shows that with increasing distance from Dublin fewer larger urban centres are found. This is particularly noticeable in County Meath where only Navan has a population over 10,000. Wicklow also has a relatively poor urban structure but this is likely to be explained by the topography of the county which includes the Wicklow Mountains which are only thinly populated.

Table 2.10: Urbanisation in the Greater Dublin Region

	Percentage of Population in Towns Over 10,000	Percentage of Population in Towns Over 1,500
Dublin County Borough	100.0	100.0
South Dublin	95.4	96.3
Fingal	67.5	88.1
Dun Laoghaire-Rathdown	100.0	100.0
Kildare	39.4	60.6
Meath	11.7	33.2
Wicklow	38.2	60.5
Greater Dublin Region	78.2	86.1

Source: CSO Census of Population, 1996.

⁵ Excluding Dublin, there were 47 urban centres with a population of more than 1,000 persons in the Greater Dublin Region.

The ranking of the largest twenty centres is not constant when compared to that in 1981 (see Table 2.11). The centres which have a higher ranking in 1996 than in 1981 include Naas, Malahide, Celbridge, Greystones, Maynooth, Rush, and Ashbourne.⁶ The centres that have a lower rank in 1996 than in 1981 are Newbridge, Navan, Portmarnock, Arklow, Balbriggan, Skerries, Wicklow, Athy and Kildare. Thus, while all urban centres listed have a larger population in 1996 than in 1981, population growth has not been even. Some of the larger centres which are further away from Dublin such as Arklow, Navan, Newbridge, and Wicklow have either stagnated or grown at a much slower rate than some of the centres closer to Dublin such as Celbridge, Malahide, Maynooth and Ashbourne which have grown extremely rapidly. This may be explained by the growth in commuting which will be discussed below. However, this pattern is not uniform, and is thus influenced by other factors as well, such as the availability of zoned and serviced land which could be developed. While more up-to-date figures are not available at the urban centre level, the population estimates for 1999 presented above along with Map 9 indicate that growth has spread to areas further away from Dublin, and as such higher rates of population growth would be expected in the towns which have been stagnating during the period 1981 to 1996.

Table 2.11: Size of the Largest Urban Centres excluding Dublin, 1981 and 1996

Centre	Rank 1981	Rank 1996	Population 1981	Population 1996	Population Change (%)
Bray	1	1	22,853	27,923	+22.2
Lucan*	2	-	11,763	-	-
Swords	3	2	11,138	22,314	+100.3
Navan	4	7	11,136	12,810	+15.0
Newbridge	5	6	10,716	13,363	+24.7
Leixlip	6	5	9,306	13,451	+44.5
Malahide	7	4	9,158	13,539	+47.8
Arklow	8	11	8,646	8,557	-1.0
Naas	9	3	8,345	14,074	+68.7
Portmarnock	10	10	8,212	9,145	+11.4
Greystones	11	9	7,442	9,995	+34.3
Balbriggan	12	13	6,708	8,473	+26.3
Skerries	13	14	5,793	7,339	+26.7
Athy	14	17	5,565	5,306	-4.7
Wicklow	15	15	5,341	7,290	+36.5
Celbridge	16	8	4,583	12,289	+168.1
Kildare	17	20	4,016	4,278	+6.5
Rush	18	16	3,864	5,429	+40.5
Kells	19	23	3,663	3,542	-3.3
Trim	20	19	3,526	4,405	+24.9
Maynooth	21	12	3,388	8,528	+151.7
Ashbourne	24	18	2,325	4,999	+115.0

Source: Census of Population, 1991 and 1996, Volume 1. The table excludes the contiguously built up Dublin area. * Lucan is counted as part of the built up Dublin area in 1996.

2.3 Summary

The counties of the Greater Dublin Region are quite heterogeneous in terms of the size of their population and the basic demographic characteristics of their population. Thus, the Dublin County Borough has a population which is more than four times as

⁶ Lucan is not considered since it is subsumed into the contiguously built up Dublin area.

large as that of County Wicklow or County Meath. This difference in the absolute size of the population is explained by large differences in population density which in turn is determined by the degree of urbanisation. There are also large differences in the age distribution of the population. The Dublin County Borough and Dun Laoghaire-Rathdown have a lower proportion of young people and a higher proportion of older people while the opposite is true for the other counties. Furthermore, within the counties there are also large differences regarding the age distribution. The proportion of people aged 50 years and over was found to be particularly high in the city centre areas of Dublin and in the more remote (relative to Dublin) rural areas of the three counties, Kildare, Meath and Dublin. The percentage of the younger people aged under ten years of age was found to be high in suburban areas of Dublin and to a lesser extent in the areas of the counties of the Mid-East Region that are located closer to Dublin. This has implications for the provision of public services such as schools for young people and geriatric care for older people since these can be more effectively provided if they are targeted to areas where they are needed more.

The population of the counties is growing at substantially different rates, with the population of the Dublin County Borough and Dun Laoghaire- Rathdown growing relatively slowly while the other counties are growing much faster. There are also differences in household size which is decreasing, thus increasing the demand for housing units (houses or apartments) since for a given increase in the population more households will be formed due to this decrease in the size of households. This trend towards smaller households along with the projected increase in the population has important planning consequences. Thus, if these trends are maintained a substantial number of additional housing units need to be provided. These can only be built if additional land is zoned and provided with sewerage and other essential services.

The urban structure of the region is dominated by Dublin, with other centres being significantly smaller. The rural areas of the Mid-East Region in particular tend to be further away from larger centres, which may hamper their economic development due to the absence of scale effects both in terms of the labour market and the range of locally provided services. Nevertheless, excluding the contiguously built-up area of Dublin, in 1996 there were 47 urban centres with a population in excess of 1,000 persons. This suggests that rather than planning additional new urban centres the focus of development policy should be on strengthening the existing urban network. Here a particular focus should be on the scale of a few centres which, if they were large enough could attract more employment.

3. ECONOMIC ACTIVITY AND EMPLOYMENT

Recent research has shown that there exist substantial differences between regions with respect to economic activity (see Boyle, McCarthy and Walsh, 1999; O'Leary, 1999; O'Connor, 1999). This also applies to the activity of manufacturing firms with respect to which it has been shown that the differences within the regions (at county level) appear to be greater than those between the regions (Bradley & Morgenroth, 1999). These differences are likely to be even larger within the counties and in particular one would expect large differences between urban/rural areas and between areas which contain multinational companies and those with more traditional firms.

Multinational firms in particular have been a crucial factor in the recent success of the economy and will clearly continue to be an important factor in the years to come. Furthermore, differences in the level of economic activity are also likely to be found in the service sector and agricultural sectors. These disparities are also reflected in the unemployment rates and disposable income of the population at the local and regional level.

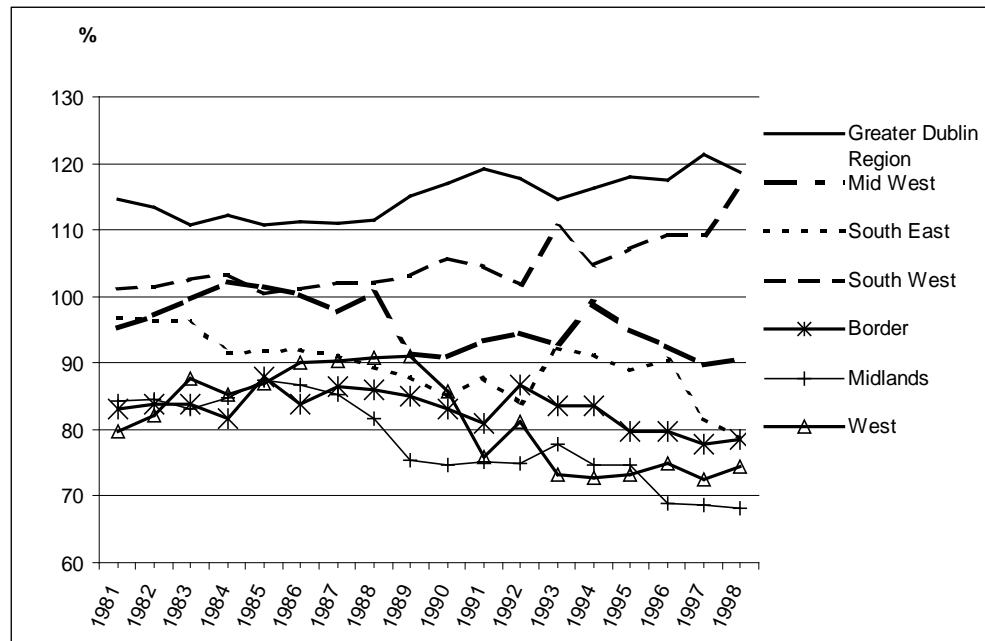
This chapter outlines the similarities and differences of the counties regarding a range of indicators of aggregate economic performance.

3.1 Aggregate Output

Regional Gross Value Added (GVA) is a commonly used measure of regional output and indeed is used by the EU Commission for Structural Funds eligibility purposes. While this variable is the most widely used measure of the level of economic activity in an area, it has the drawback that it is affected by distortions due to commuting and the practice of transfer pricing/profit shifting which appears to be common among foreign multinational enterprises that make use of Ireland's favourable corporate tax regime (see O'Leary, 1999). Figure 3.1 shows the evolution of GVA per capita among the NUTS III regions of Ireland, where Dublin and the Mid-East are taken to be one region.⁷ The Greater Dublin Region is clearly characterised by above average GVA per capita which is at least 10 per cent above the national average at every point in time, and as much as 21 per cent higher in 1997. The graph shows that this difference is trending upwards while a number of regions are experiencing a decline in their relative position against the national average, most notably the Border, Midlands and West regions, but also the Mid-West and South East.

⁷ Separate data for the Mid-East and the Dublin Regions is not available before 1991 and for 1992.

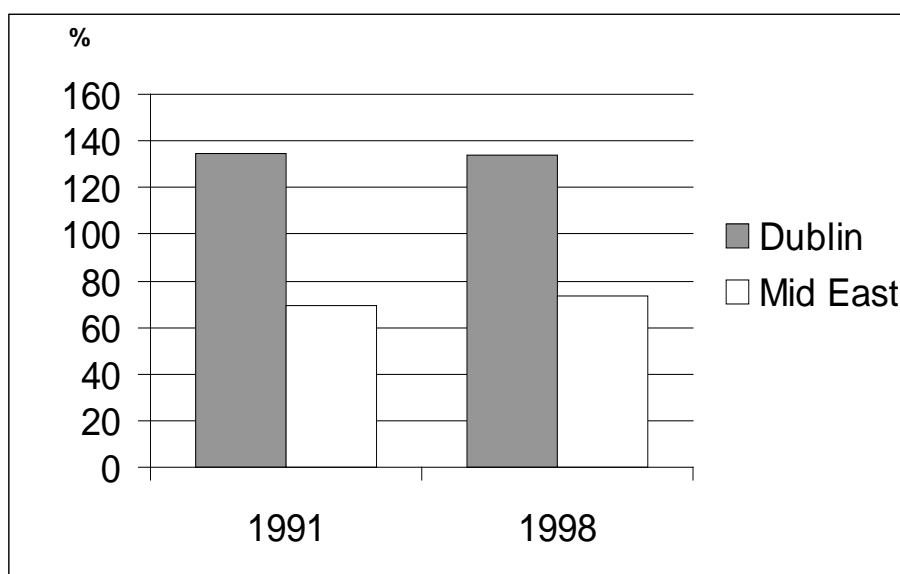
Figure 3.1: The Evolution of Indices of Regional Gross Value Added Per Capita as Measured Against the National Average from 1981 to 1998



Source: CSO Regional Accounts various issues and ESRI calculations. (State = 100).

It is also useful to analyse the differences in GVA within the Greater Dublin Region. First we compare the relative positions of the Dublin and Mid-East Regions. Figure 3.2 clearly shows that the Dublin Region has a GVA per capita far in excess of the national average while the Mid-East Region has below average GVA per capita. However, the Mid-East has been growing faster than the national average over the period from 1991 to 1997 such that the gap between the regional GVA per capita and the national average has declined from 31 per cent to 13 per cent. Of course, these figures are distorted by commuting since the output is measured where it is produced rather than where the individuals who produce the output live. Since large numbers of people from the Mid-East Region commute to Dublin for work, the GVA produced by these people is attributed to the Dublin Region rather than the Mid-East Region. For this reason it is often more instructive to take the two regions as one region as argued in Bradley and Morgenroth (1999). However, the differences in GVA nevertheless reflect some real differences in economic activity.

Regional GVA can also be broken down by branch to which it can be attributed, and this highlights some interesting differences between the Mid-East and Dublin Regions (see Table 3.1). While manufacturing, building and construction increases in importance from 1991 to 1997 in the Dublin Region and in the State as a whole, it increases very considerably in importance in the Mid-East. At the same time the importance of services reduces. Similarly, the importance of agriculture declines, with this decline being particularly marked in the Mid-East Region where agriculture had contributed above the national average share to GVA in 1991, such that it contributed less than the average national share in 1997. Of course, the dramatic increase in the importance of Manufacturing, Building and Construction is at least to some extent attributable to the increasing role of foreign multinationals such as Intel which have set up operations in the Mid-East Region. This also explains the convergence of the Mid-East Region towards the national average GVA per capita since 1991 (see Figure 3.2).

Figure 3.2: Indices of Per Capita Gross Value Added in the Mid-East and Dublin Regions, 1991 and 1998

Source: CSO Regional Accounts. (State = 100).

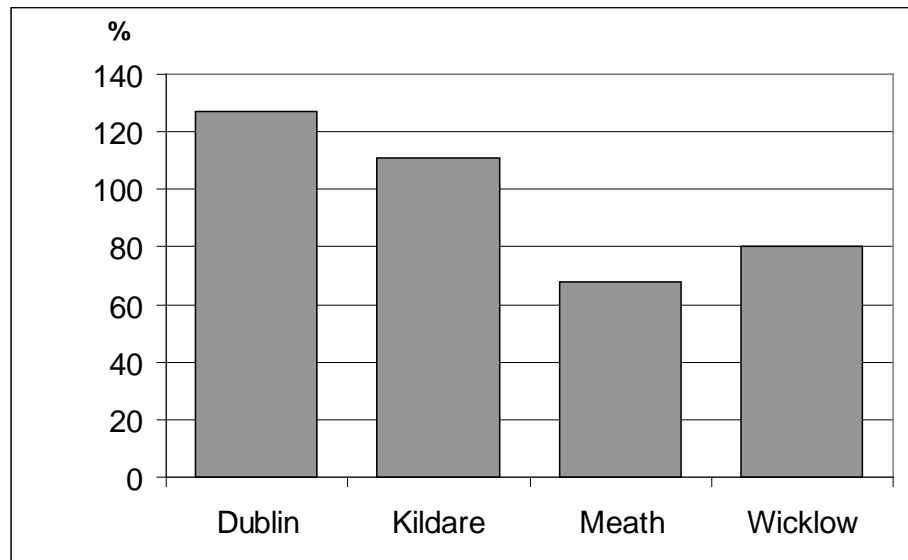
Table 3.1: Percentage of GVA Classified by Region and Branch in 1991 and 1998

Region	Year	Manufacturing Building and Construction	Market and Non- Market Services	Agriculture Forestry and Fishing
Dublin	1991	28.8	70.7	0.5
	1998	30.8	68.8	0.3
Mid-East	1991	36.9	51.0	12.1
	1998	50.1	44.6	5.3
State	1991	35.2	56.6	8.2
	1998	38.7	56.5	4.8

Source: CSO Regional Accounts, 1998.

Overall the Dublin Region produced 39.6 per cent of total national GVA in 1998 while the Mid-East produced 7.3 per cent. In terms of the sectoral share Dublin accounted for 31.6 per cent of manufacturing GVA, 48.2 per cent of Services GVA and 2.6 per cent of agricultural GVA. The Mid-East accounted for 9.5 per cent of manufacturing GVA, 5.8 per cent of services GVA and 8.1 per cent of agricultural GVA. These figures indicate the dominant position of the Dublin Region, particularly with regard to services, which are particularly concentrated in Dublin due to the administrative role as the capital city, but also the primacy of Dublin in terms of size.

Unfortunately time series of GVA per capita are not available at the county level, however for 1995 such data was published by the CSO, and these are set out in Figure 3.3. Again the commuting patterns of individuals distorts the figures. The graph shows that within the Mid-East Region, Kildare has a per capita GVA above the national average while the other two counties are substantially below the national average.

Figure 3.3 Indices of Per Capita GVA by County for 1995

Source: CSO. (State = 100).

3.2 Disposable Income

Another measure, which is useful in describing the economic development of a region or county, is per capita disposable income (PDI). This variable has the advantage that it is available at the county level and is invariant to commuting and transfer pricing/profit shifting. However, it suffers from distortions due to state transfers and does not reflect regional differences in the cost of living. Table 3.2 shows that the differences between the counties with regard to per capita personal disposable income are not as marked as for per capita GVA. However, measured by PDI, as with GVA, Kildare has improved its relative position significantly between 1991 and 1998 while Wicklow only marginally improved its relative position. County Meath suffered a small decline in its position relative to the national average. These figures show that the growth rate of disposable income in the period 1991 to 1998 was above that for the country as a whole in all the counties of the Greater Dublin Region except for County Meath.

Table 3.2: Indices of Per Capita Personal Disposable Income

	1991	1998
Dublin	115.3	116.1
Kildare	91.9	100.6
Meath	90.7	89.9
Wicklow	92.8	93.3

Source: CSO Household Incomes, Regions and Counties, 2001.
(State = 100).

3.3 Employment

A vital aspect of the economic development of a county or region is the level and type of employment. Thus, differences in income and output are to a large extent determined by industrial structure. If a region has a large number of employees in unproductive or declining sectors then output and income in that region is likely to be lower than if much of the employment were in high output dynamic sectors. The industrial structure can be measured by employment in firms in one region or county. This is particularly appropriate if one wants to explain differences in Gross Value Added (GVA) between regions or counties, since GVA is measured in the county where it is produced. However, if one is interested in explaining differences in income it is more appropriate to examine the distribution of the labour force (employees) across different sectors and industries since income is measured at the place of residence of individuals.

The CSO Census of Population covers details of employment by sector which is summarised in Table 3.3. The table highlights some important differences in the sectoral distribution of employees between the Dublin and Mid-East Regions. Not surprisingly few employees from the Dublin Region are engaged in agriculture, which however is important in the counties of the Mid-East. Manufacturing is somewhat more important in the Mid-East Region than in the Dublin Region, where all service sectors except for retail distribution are considerably more important. This difference is particularly marked with regard to Insurance, Finance and Business Services. Within the Manufacturing sector, Food; Wood and Wood Products (excluding Furniture); Chemical; Rubber and Plastics and Metals and Metal Products are more important in the Mid-East than in Dublin.

Table 3.3: Persons Aged 15 years and Over and At Work in Each Regional Authority, Classified by Detailed Industrial Group, 1996

Industrial Group	Dublin	Share %	Mid-East	Share %
Agriculture, Forestry and Fishing	2,792	0.7	11,876	9.3
Mining, Quarrying and Turf Production	388	0.1	1,292	1.0
Manufacturing Industries	63,741	15.6	24,781	19.3
<i>Food Industries</i>	7,842	1.9	3,550	2.8
<i>Beverages and Tobacco</i>	2,772	0.7	554	0.4
<i>Textiles, Clothing, Footwear and Leather</i>	4,982	1.2	2,059	1.6
<i>Wood and Wood Products</i>	3,840	0.9	3,114	2.4
<i>Paper, Paper Products, Printing and Publishing</i>	12,265	3.0	2,191	1.7
<i>Chemical, Rubber and Plastic Products</i>	6,682	1.6	3,142	2.5
<i>Glass, Pottery and Cement</i>	1,901	0.5	1,681	1.3
<i>Metals, Metal Products, Machinery and Engineering</i>	20,141	4.9	7,208	5.6
<i>Other Manufacturing (incl. Transport Equipment)</i>	3,316	0.8	1,282	1.0
Electricity, Gas and Water Supply	3,864	0.9	1,039	0.8
Building and Construction	21,420	5.2	10,381	8.1
Commerce	61,978	15.1	19,625	15.3
<i>Wholesale Distribution</i>	20,434	5.0	5,812	4.5
<i>Retail Distribution</i>	41,544	10.1	13,813	10.8
Insurance, Finance and Business Services	46,383	11.3	7,707	6.0
Transport, Communication and Storage	34,704	8.5	6,760	5.3
Public Administration and Defence	29,863	7.3	9,026	7.0
Professional Services	86,878	21.2	22,124	17.3
Personal Services	34,840	8.5	8,649	6.7
Recreational Services	9,828	2.4	3,080	2.4
Other Industries or Industry Not Stated	12,474	3.0	1,857	1.5
All Industries	409,153	100.0	128,197	100.0

Source: Census of Population, 1996. Hotels and Restaurants are counted as Personal Services.

At the county level the data can not be disaggregated to the same level, but one can nevertheless examine the data for differences between broad sectors which are shown in Table 3.4 and Table 3.5. Mining has a higher importance in County Meath than in all other counties. This is explained largely through the existence of mineral deposits such as lead and zinc in County Meath. Building and Construction is also more important in County Meath. The Dublin Counties again have a higher share of employees in the Service sectors, particularly Dublin County Borough and Dun Laoghaire-Rathdown while manufacturing is more important in Kildare, Meath and South Dublin.

Table 3.4: Percentage Share of Persons Aged 15 years and Over At Work by County in the Dublin Region, Classified by Industrial Group, 1996

	Dublin County Borough	South Dublin	Fingal	Dun Laoghaire	Dublin
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				Rathdown	
Agriculture, Forestry and Fishing	0.4	0.4	2.1	0.4	0.7
Mining and Quarrying	0.1	0.1	0.1	0.1	0.1
Manufacturing & Other Production	15.6	19.5	15.2	11.7	15.6
Electricity, Gas & Water Supply	0.9	1.0	0.9	1.0	0.9
Building & Construction	4.8	7.0	5.2	4.4	5.2
Commerce, Insurance, Finance & Business Services	24.1	27.2	26.0	31.8	26.5
Transport & Communication	8.8	8.0	11.8	5.4	8.5
Public Administration	7.8	7.4	8.2	5.1	7.3
Professional Services	21.5	17.0	19.2	27.0	21.2
Other	16.1	12.3	11.3	13.0	14.0
TOTAL	100.0	100.0	100.0	100.0	100.0

Source: Census of Population, 1996. Hotels and Restaurants are counted in the "Other" category.

Table 3.5: Percentage Share of Persons Aged 15 years and Over at Work by County in the Mid-East Region, Classified by Industrial Group, 1996

	Kildare	Meath	Wicklow	Mid-East
Agriculture, Forestry and Fishing	7.1	12.7	8.5	9.3
Mining and Quarrying	0.7	2.0	0.3	1.0
Manufacturing & Other Production	20.1	20.0	17.5	19.3
Electricity, Gas & Water Supply	0.8	0.6	1.0	0.8
Building & Construction	7.7	9.0	7.7	8.1
Commerce, Insurance, Finance & Business Services	21.3	19.4	23.6	21.3
Transport & Communication	5.0	5.6	5.3	5.3
Public Administration	9.8	5.3	5.1	7.0
Professional Services	17.1	16.7	18.1	17.3
Other	10.3	8.8	12.9	10.6
TOTAL	100.0	100.0	100.0	100.0

Source: Census of Population, 1996. Hotels and Restaurants are counted in the Other category.

More up-to-date published data is only available for the two regions from the CSO Quarterly National Household Survey (QNHS) which is set out in Table 3.6. However, since the QNHS data refers to the labour force rather than those at work and since the classification has changed somewhat it is more difficult to make a comparison between 1996 and 2000. Nevertheless, a comparison of the percentage shares in each industry indicate how these have evolved since 1996. There are important differences between the regions. Again, Agriculture, Forestry and Fishing are relatively unimportant in the Dublin Region while these sectors are more important in the Mid-East. On the other hand, Financial and Other Services are particularly important in Dublin but less so in the Mid-East. Other Production Industries are slightly more important in the Mid-East Region than in Dublin.

Table 3.6: Persons Aged 15 years and Over in the Labour Force (ILO) Classified by Regional Authority and Economic Sector, 2nd Quarter 2000

Description	Dublin	Share %	Mid-East	Share %
Agriculture, Forestry and Fishing	4,400	0.8	12,400	6.7
Other Production Industries	79,300	14.3	34,800	18.9
Construction	40,800	7.4	22,100	12.0

Wholesale & Retail	80,200	14.5	25,300	13.7
Hotels & Restaurants	34,900	6.3	10,500	5.7
Transport, Storage & Communication	47,500	8.6	10,300	5.6
Financial & Other Services	114,500	20.7	22,200	12.0
Public Administration, Defence & Social Security	30,600	5.5	9,900	5.4
Education & Health	79,600	14.4	24,100	13.1
Other	41,200	7.5	12,800	6.9
Total	552,800	100.0	184,500	100.0

Source: CSO Quarterly National Household Survey, 2000, 2nd Quarter.

3.4 Summary

This chapter has shown that Dublin accounts for a large proportion of national output. Both the Dublin and Mid-East Regions have improved their relative position with regard to GVA but the Mid-East has been growing faster than the Dublin Region and is therefore catching up. Among the counties Meath has the lowest GVA. While the Mid-East Region has been converging to the national average it still lags significantly behind the Dublin Region. These differences in per capita GVA are likely to be due to the way this variable is measured. Since GVA is measured in the region where output is produced this measure will underestimate the output produced by the individuals of one region if they commute to another region. However, there may also be differences between the regions which can not be accounted for by commuting. These differences are likely to be explained by differences in industrial structure and productivity. The Manufacturing; Building and Construction and Agriculture, Forestry and Fishing sectors are more important in the Mid-East Region than in Dublin where services are most important. This pattern is repeated in the employment data which also points towards some important differences in the industrial structure which will be further explored in the next chapter. The differences in gross disposable per capita income among the counties are less marked, but again Dublin has considerably higher PDI than the other counties. Kildare has been converging rapidly to the national average. The fact that the differences between the counties with respect to disposable income are less marked is evidence for the effect of commuting since income is measured according to place of residence. Furthermore, the welfare system will also result in smaller differences in income measures than in output measures since this will give an income to individuals who are not working, e.g. the unemployed.

4. SECTORAL ANALYSIS

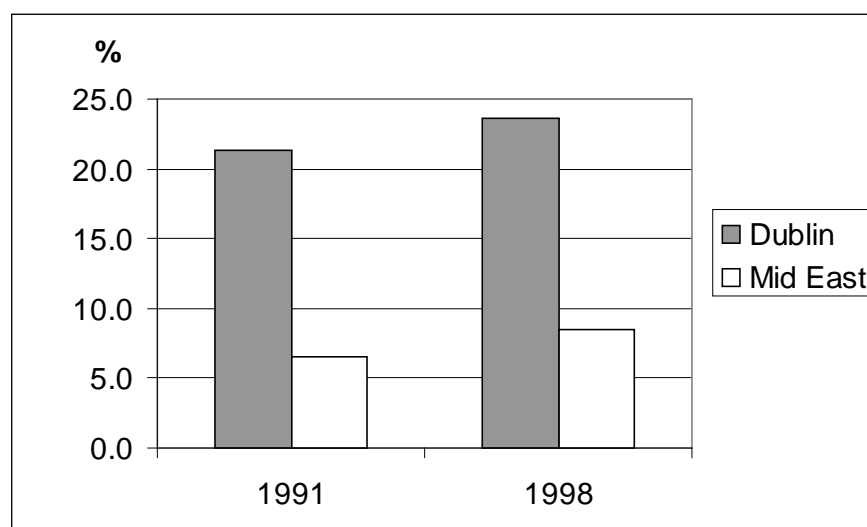
Chapter 3 has highlighted some important differences between the regions with respect to output, income and employment. It also showed that there are important differences with respect to the industrial structure between the regions and counties which, along with socio-economic and location factors, are likely to explain some of the differences in output and income. In order to explore these differences further it is important to analyse the three broad sectors, Manufacturing, Services and Agriculture in some more detail.

4.1 Manufacturing

In Section 3.1 both the contribution of Manufacturing, Building and Construction to GVA and the size and distribution of the labour force engaged in manufacturing were discussed. The sectoral distribution of the labour force does not fully measure the distribution of industry. This issue is investigated in more detail in this section, which focuses on key variables including the distribution of employment in the sector.

The GVA figures for Manufacturing, Building and Construction taken from the Regional Accounts cannot be broken down to the county level. It is however possible to analyse the sector in some more detail using data from the annual CSO Census of Industrial Production which provides some useful data on manufacturing at the county level. In particular it contains consistent data on output and employment as well as a sectoral breakdown of the number of firms and thus allows an analysis of the differences with regard to output and employment as well as the underlying differences in the structure of the Manufacturing sector between the regions, which causes these differences.

A useful starting point is an examination of the role of manufacturing in the Greater Dublin Region relative to the national output. Figure 4.1 shows that the Dublin Region produces more than 24 per cent of all output in the Manufacturing sector and the Mid-East produces 8 per cent of output. These relative shares have been increasing when compared to those in 1991. However, we can further break down the manufacturing output data by county. This breakdown shows that Dublin County Borough in particular produces a significant share of national manufacturing output. Within the Mid-East Region Kildare has almost doubled its share of national manufacturing output (see Table 4.1).

Figure 4.1: The Percentage Share of State Gross Output of the Manufacturing Sector Produced in the Greater Dublin Region

Source: CSO Census of Industrial Production, 1991, 1998.

Table 4.1: The Percentage Share of State Gross Output of the Manufacturing Sector Produced in the Counties of Greater Dublin Region

	Dublin Co. Borough	Dun Laoghaire-Rathdown	Fingal	South Dublin	Kildare	Meath	Wicklow
1991	11.9	1.7	3.7	4.1	2.5	2.3	1.8
1998	9.4	5.9	5.4	2.9	4.9	1.4	2.2

Source: CSO Census of Industrial Production, 1991, 1998.

The Census of Industrial Production allows for a thorough analysis of the manufacturing sector as a whole (see Bradley and Morgenroth, 1999). In order to carry out this analysis of the structure of manufacturing we use the following set of variables:

- (i) The number of local units (or plants) gives a rough idea of the density of manufacturing activity in any area.
- (ii) The ratio of industrial to administrative/technical workers is a proxy measure for the complexity of the regional industrial base (a high ratio indicates a more traditional type of manufacturing process) as well as a measure of the prevalence of headquarters among the units.
- (iii) Gross output, net output and employees per local unit indicate average size of plants.
- (iv) Average wages per employee and per industrial worker is another measure of process sophistication.
- (v) Net output per employee is a measure of average regional productivity, but can be seriously distorted by transfer pricing.
- (vi) The wage bill expressed as a share of net output gives a measure of the profitability of the regional manufacturing base.

Details regarding these variables, for the counties, regions and the State as a whole are set out in Tables 4.2 and 4.3. These show that Dublin County Borough and South Dublin have the highest density of manufacturing units while Fingal has the lowest. All counties bar Meath and Wicklow have a smaller ration of industrial to administrative workers than the national average. This reflects the fact that proportionately more units are headquarters of a particular company and will consequently have more administrative workers. However, this also reflects a higher degree of process sophistication which requires a higher level of administration e.g. export activity.

In terms of average size of local units Dublin County Borough, South Dublin, Meath and Wicklow are below the national average, while Kildare, Dun Laoghaire-Rathdown and Fingal are above the national average. The average wage indicators

show that process sophistication is highest in Fingal and Dun Laoghaire-Rathdown and lowest in Meath and Wicklow. Net output per employee is above the national average in all counties except Dublin County Borough, South Dublin and Meath while it is particularly high in Dun Laoghaire-Rathdown. This variable should however be interpreted with caution as it is subject to distortions due to transfer pricing⁸. Finally, profitability can be measured as the percentage of net output which is accounted for by the wage bill. A high value for this variable indicates low profitability. This measure indicates that profitability is particularly high in Dun Laoghaire-Rathdown, above the national average in Fingal, Kildare and Wicklow and below the national average in the remainder of counties.

Overall, the variables confirm the differences among the counties in the Mid-East Region which were apparent using county per capita GVA i.e. County Meath appears to lag behind the other two counties, but particularly Kildare. The figure for Wicklow needs to be interpreted cautiously as there appears to be some evidence of transfer pricing (relatively low wages but high output per employee). Similarly one might suspect that the figures for Kildare are distorted due to transfer pricing especially given the location of large multinational firms such as Intel. Within the Dublin Region the CIP data indicate that manufacturing enterprises in Dublin County Borough and South Dublin are not as profitable as those in Dun Laoghaire-Rathdown or Fingal. Furthermore, firms in these two counties tend to pay a lower wage.

Table 4.2: Manufacturing Characteristics in the Dublin Region, 1998

	Dublin County Borough	Dun Laoghaire- Rathdown	Fingal	South Dublin	Dublin Region	State
Local Units (nos.)	788	174	121	250	1,333	4,932
Ind/Admin empl. Ratio	1.87	1.15	1.53	2.04	1.75	2.45
GO/ local unit (£000)	6,042	17,359	22,582	5,916	8,997	10,304
NO/ local unit (£000)	3,403	14,692	13,391	2,755	5,662	5,639
Employees/ local unit (nos.)	44	37	79	50	48	53
Average wage/ employee (£pa)	19,959	20,278	21,066	19,024	19,973	18,106
Average wages/ ind. Worker (£pa)	17,139	18,001	18,065	15,704	17,046	15,511
NO/ employees (£000)	76,623	395,677	170,260	54,914	118,820	106,824
Wage bill/NO (%)	25.9	5.1	12.3	34.5	16.7	16.9

Source: Census of Industrial Production, 1998.

Table 4.3: Manufacturing Characteristics in the Mid-East Region, 1998

	Kildare	Meath	Wicklow	Mid-East Region	State
Local Units (nos.)	164	151	146	461	4,932
Ind/Admin empl. Ratio	1.24	3.15	2.73	1.86	2.45
GO/ local unit (£000)	15,300	4,619	7,585	9,358	10,304
NO/ local unit (£000)	8,198	1,710	5,059	5,079	5,639
Employees/ local unit (nos.)	76	42	41	54	53
Average wage/ employee (£pa)	18,101	17,289	16,593	17,528	18,106
Average wages/ ind. worker (£pa)	13,833	15,230	14,602	14,462	15,511
NO/ employees (£000)	108,167	40,344	123,190	94,309	106,824

⁸ This may for example explain the remarkable expansion of the Gross Output in Dun Laoghaire-Rathdown.

Wage bill/NO (%)	16.7	42.6	13.4	18.5	16.9
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Source: Census of Industrial Production, 1998.

The foregoing highlighted the differences between the counties regarding, size, process sophistication and profitability in the Manufacturing sector. Clearly these differences are at least partly driven by the structure and nature of manufacturing enterprises within these counties. Thus, a county which has more firms in rapidly growing sectors such as Electronic and Optical Equipment which includes the computer industry is likely to have higher wages and higher profitability. Furthermore, the presence of foreign multinationals is of crucial importance. The Census of Industrial Production (CIP) allows for some disaggregation of the data to the sectoral level.

Tables 4.4 and 4.5 show a more detailed breakdown of the number of local units broken down by industry and county in which these businesses are located. As might be expected, the Dublin Region accounts for a large proportion of the total number of local units. However, the table also highlights some interesting differences regarding industrial specialisation between the counties and regions. For example, the Dublin Region has a large share in the paper/printing/publishing industry which is to a great extent explained by the fact that Dublin is the major service centre for the country as a whole, which in turn is likely to be due in no small part to its function as the capital. This is also supported by the fact that many of these units are located in the Dublin County Borough.

A more up-to-date breakdown of the Manufacturing sector is not available from published sources. Similarly, it is not possible to obtain data on a spatially more disaggregated level nor can one obtain figures on employment by sector at the county level from the CSO. It is therefore necessary to draw on other sources of data on industrial activity. One particularly useful source is the Forfás annual employment survey which has conducted in a consistent manner from 1973 onwards. Unfortunately, this data covers a limited set of variables such as rough location (nearest town) sector and employment for those firms which have had contact with one of the Semi-State bodies Forfás, Enterprise Ireland, IDA Ireland and Shannon Development.

Table 4.4: Number of Local Units Broken Down by Industry and County of Location, 1998

Industry	Dublin County Borough	Dun Laoghaire- Rathdown	Fingal	South Dublin	Dublin Total	State Total
Mining & Quarrying	3	5	3	3	14	144
Food, Beverages & Tobacco	84	15	16	22	137	810
Textile & Textile Products	85	7	7	11	110	344
Leather	1	-	-	-	1	28
Wood and Wood Products	18	3	3	5	29	226
Pulp, Paper, Publishing	207	40	24	51	322	581
<i>Pulp and Paper</i>	34	5	6	15	60	110
<i>Publishing Printing and Media</i>	173	35	18	36	262	471

<i>Publishing & Printing</i>	160	27	10	30	227	429
<i>Reproduction of Computer Media</i>	13	8	8	6	35	42
Chemical Products and Man-made fibres	31	14	16	16	77	242
Rubber & Plastics	35	5	6	12	58	273
Non-metallic Mineral Products	32	17	4	7	60	290
Basic Metals and Fabricated Products	88	9	7	37	141	535
Machinery	31	15	8	24	78	370
Electrical and Optical Equipment	71	27	16	31	145	454
<i>Machinery and Computers</i>	14	7	8	5	34	78
<i>Electrical Machinery</i>	34	8	3	17	62	181
<i>Radio, Televisions and Telecommunications</i>	8	5	3	4	20	52
<i>Medical, Precision and Optical Equipment</i>	15	7	2	5	29	143
Transport Equipment	17	1	3	6	27	125
Other	80	13	8	23	124	424
Total	783	171	121	248	1,323	4,846

Source: CSO Census of Industrial Production 1998. The CSO only counts establishments which have three or more persons engaged.

As such the data does not cover all firms. However, the coverage is nevertheless quite good as the total number of firms in the Forfás data exceeds that of the Census of Industrial Production while the figures for employment are slightly lower in the Forfás data.⁹ Details regarding trends in employment in Manufacturing over time are presented in Table 4.6. This table shows that employment in the Manufacturing sector declined from 1973 to 1987 in the case of the counties of the Mid-East Region and until 1994 in the case of Dublin. However, employment in the Manufacturing sector has increased and is now higher than it was in 1973 in Kildare, Meath and Wicklow. However, in the Dublin Region the Manufacturing sector has not regained its former importance.

Table 4.5: Number of Local Units Broken Down by Industry and County of Location, 1998

Industry	Kildare	Meath	Wicklow	Mid-East Total	State Total
Mining & Quarrying	3	7	6	16	144
Food, Beverages & Tobacco	34	21	17	72	810
Textile & Textile Products	11	9	8	27	344
Leather	1	-	1	2	28
Wood and Wood Products	8	4	13	25	226
Pulp, Paper, Publishing	13	10	17	40	581
<i>Pulp and Paper</i>	2	5	6	13	110
<i>Publishing Printing and Reproduction of Media</i>	11	5	11	27	471
<i>Publishing & Printing</i>	11	5	11	27	429
<i>Reproduction of Computer Media</i>	-	-	-	-	42
Chemical Products and Man-made Fibres	10	5	13	28	242
Rubber & Plastics	8	11	11	30	273
Non-metallic Mineral Products	10	10	11	31	290
Basic Metals and Fabricated Products	15	17	12	44	535
Machinery	17	9	12	38	370
Electrical and Optical Equipment	13	10	8	31	454

⁹ A comparison of the 1998 Forfás data with the 1998 Census of Industrial Production (CIP) shows that for the Mid-East the total number of firms in the Forfás data is somewhat higher (106 per cent) than in the CIP while employment is somewhat lower (90.5 per cent). A similar picture emerges for the Dublin Region with the number of firms being 10 per cent higher but employment is just 85 per cent of the CIP. There are however some differences in the sectoral distribution of the number of firms. For example, there are fewer firms in the Mining sector in the Forfás data while there are more Food, Drink and Tobacco firms for Dublin in the Forfás data.

<i>Machinery and Computers</i>	1	1	1	3	78
<i>Electrical Machinery</i>	7	4	5	16	181
<i>Radio, Televisions and Telecommunications</i>	1	1	-	2	52
<i>Medical, Precision and Optical Equipment</i>	4	4	2	10	143
Transport Equipment	9	5	2	16	125
Other	11	36	12	59	424
Total	163	154	143	459	4,846

Source: CSO Census of Industrial Production 1998. The CSO only counts establishments which have three or more persons engaged.

Table 4.6: Manufacturing Employment in selected years

County	1973	1979	1987	1994	1999
Dublin	84,900	78,555	53,982	49,223	55,598
Kildare	6,221	7,681	4,959	7,119	11,837
Meath	4,242	4,891	3,967	4,646	5,174
Wicklow	4,930	6,759	4,288	5,120	6,038

Source: Forfás Employment Survey.

Table 4.7 and 4.8 outline the coverage of the Forfás data for the year 1999 in terms of the number of firms. The table clearly shows that the vast majority of manufacturing firms of the Greater Dublin Region are located in Dublin. While the total number of firms is relatively evenly distributed among the counties of the Mid-East Region, differences regarding the sectoral distribution of firms are apparent. For example, a larger number of firms engaged in the food, drink and tobacco sector are located in Kildare as compared to Meath and Wicklow.

Using the Forfás data it is possible to break down the employment in each county by sector. The two most important sectors in terms of employment are Food, Drinks and Tobacco and Electrical and Optical Equipment, the latter being particularly important in County Kildare. Textiles, Wood and Wood Products and Basic Metals are of a higher importance in County Meath than in the other counties. Coke, Petroleum and Chemicals are of a higher importance in County Wicklow. In Dublin the Pulp, Paper and Publishing sector accounts for an above average employment.

Table 4.7: Forfás Employment Survey: Number of Local Manufacturing Units Broken Down by Industry and County of Location, 1999

Sector	Dublin	Kildare	Meath	Wicklow	Total
Food, Drink, Tobacco	167	34	26	24	251
Textiles	120	15	12	11	158
Leather	17	3	0	0	20
Wood	25	7	5	10	47
Pulp, Paper, Publishing	189	7	5	21	222
Coke, Petroleum, Chemicals	97	14	7	14	132
Rubber, Plastics	62	9	9	10	90
Non-met. Minerals	62	6	20	13	101
Basic Metals, Fabricated Products	167	18	22	18	225
Machinery	64	10	10	11	95
Electrical and Optical Equipment	197	18	15	17	247
Transport Equipment	39	8	4	3	54
Miscellaneous (incl. Furniture)	201	16	46	19	282
Total	1,407	165	181	171	1,924

Source: Forfás Employment Survey. The small number of firms involved in the Mining & Quarrying sector might allow for individual firms to be identified. Hence, no figures are reported on this sector.

Table 4.8: Forfás Employment Survey: Employment in Manufacturing Broken Down by Industry and County of Location, 1999

Sector	Dublin	Kildare	Meath	Wicklow	Total
Food, Drink, Tobacco	10,100	1,972	939	1,074	14,085
Textiles	2,461	383	375	206	3,425
Leather	215	23	3	0	241
Wood	510	130	437	183	1,260
Pulp, Paper, Publishing	8,722	203	28	747	9,700
Coke, Petroleum, Chemicals	5,230	1,578	373	1,055	8,236
Rubber, Plastics	1,690	338	242	661	2,931
Non-met. Minerals	1,792	336	163	455	2,746
Basic Metals, Fabricated Products	4,307	330	578	331	5,546
Machinery	2,746	137	155	199	3,237
Electrical and Optical Equipment	12,591	5,419	858	981	19,849
Transport Equipment	3,095	737	48	35	3,915
Miscellaneous (incl. Furniture)	2,139	251	138	111	2,639
Total	55,598	11,837	4,337	6,038	77,810

Source: Forfás Employment Survey. The small number of firms involved in the Mining & Quarrying sector might allow for individual firms to be identified. Hence, no figures are reported on this sector.

An important issue in the industrial structure of a county is the dynamic performance of each sector in terms of employment creation and output. Table 4.9 gives details of the percentage change of employment in the various sectors. The table clearly shows that there are distinct differences between the sectors and the counties. Four sectors, Coke, Petroleum and Chemicals, Rubber and Plastics, Basic Metals and Machinery, have grown in all counties between 1994 and 1999. Textiles is the only sector which did not grow in any county while the remaining sectors grew in one or more counties but also declined in one or more counties. For example, Wood and Wood Products grew in Kildare and Dublin but declined in Meath and Wicklow. Pulp, Paper and Publishing grew in all counties except Dublin where it has traditionally been an important sector. Non-metallic Minerals did not perform well in terms of employment creation in all counties except Meath. On the other hand Electrical and Optical Equipment has performed well except in County Meath.

Table 4.9: Forfás Employment Survey: Changes in the Number of Employees Broken Down by Industry and County of Location, 1994-1999

Sector	Dublin	Kildare	Meath	Wicklow
Food, Drink, Tobacco	-0.2	25.4	-11.3	26.5
Textiles	-41.9	-36.3	0.0	-22.3
Leather	-31.1	-8.0	24.1	
Wood	1.2	46.1	-58.8	-29.1
Pulp, Paper, Publishing	-6.4	63.7	42.4	22.7
Coke, Petroleum, Chemicals	24.7	86.7	50.3	24.7
Rubber, Plastics	4.6	36.3	11.6	26.6
Non-met. Minerals	-2.1	-6.4	16.3	-14.0
Basic Metals, Fabricated Products	35.1	0.3	10.7	21.2
Machinery	170.5	29.2	22.2	28.4
Electrical and Optical Equipment	77.0	167.1	-12.7	40.5
Transport Equipment	-25.0	41.5	-0.7	75.0
Miscellaneous (incl. Furniture)	29.4	-7.4		15.6

Source: Forfás Employment Survey. The small number of firms involved in the Mining & Quarrying sector might allow for individual firms to be identified. Hence, no figures are reported in this sector.

Within the counties an interesting pattern with regard to the change of employment can be observed. As Table 4.10 shows, there has been a marked decline in the share of manufacturing employment in Dublin located in Central Dublin, while there has been a

corresponding increase in the employment share of suburban areas.¹⁰ This is explained through the emergence of suburban industrial estates and business parks. These industrial estates and business parks are more suitable to industry than city centre sites since there is often no possibility to expand in the latter and since environmental issues such as noise are more important in city centre sites.

Table 4.10: Percentage Share of Employment in the Dublin Region located in Central Dublin, Suburban Areas and Rural Areas

	1973	1979	1987	1994	1999
Rural	1.3	1.2	0.7	0.6	0.7
Central	76.2	73.8	70.3	66.4	61.5
Suburban	22.5	25.0	29.0	32.9	37.7

Source: Forfás Employment Survey.

Unfortunately, it is considerably more difficult to identify a clear pattern in the changes in employment outside of the Dublin Region even though the absolute level of employment can be explained by a number of factors. Thus, the number of employees is strongly related to both the size of the nearest town¹¹ and the proximity to a national primary road while the proximity to a national secondary road has no significant effect on the level of employment.

Another way to judge the performance of the various sectors is to analyse the production index which measures output growth of a sector relative to a base date. If a county has a high share of total employment in the fastest growing sectors then that county can be expected to have higher output growth and as a consequence income growth than a county with a high share of the slower growing sectors. Therefore, from a policy perspective, the fastest growing sectors are particularly important. On the other hand the slowest growing sectors and in particular those which are shrinking in terms of employment are likely to shed more jobs. The five fastest and slowest growing sectors are set out in Table 4.11. With the exception of Wood and Wood Products the fastest growing sectors are all high technology industries, while the slowest growing sectors are more traditional.

Table 4.12 indicates the aggregate share of employment in each county in the five fastest and slowest growing sectors.¹² Dublin in particular has a high proportion of employment in the top sectors. On the other hand Meath has a very small share of total employment in the top sectors. However, Dublin also has the highest share of employment in the slowest growing sectors. Wicklow and Kildare have an intermediate share of employment in the top sectors but only a relatively small share in the bottom five sectors.

Table 4.11: The Fastest Growing and Fastest Declining Industrial Sectors

Rank	NACE Code	Sector	Production Index November 1999 (Base 1995 = 100)
1	24	Chemicals, Chemical Products and Man-made Fibres	255
2	31	Electrical Machinery and Apparatus	213
3	33	Medical, Precision and Optical Instruments, Watches and Clocks	211
4	22	Publishing, Printing, and Reproduction of Recorded Media	199

¹⁰ The rural areas are: Balbriggan, Brittas, Donabate, Garristown, Naul, Rush and Skerries. The central areas are (using post codes) Dublin 1,2,3,4,5,6,7,8,9,10,11,17. The suburban areas are: Baldoyle, Blanchardstown, Dublin 13,14,15,16,18, Lucan, Portmarnock, Swords and Tallaght. While the actual percentages in each category are sensitive to the classification of areas into the three groups, the overall result that the share of manufacturing employment has declined in the central areas is robust to changes in the classification. Details of which areas are central, suburban and rural can be found in the Appendix.

¹¹ It is necessary to use the figure for 1971 since this precedes the period over which the data are collected, thus ensuring that the effect of population size is properly identified.

¹² Since Mining and Quarrying is underrepresented in the Forfás data the figures for employment in the bottom 5 sectors is also biased downwards. This is particularly the case for County Meath, which has a higher share of employment in this sector.

5	20	Wood and Wood Products	185
18	29	Machinery and Equipment	95
19	19	Leather and Leather Products	94
20	17	Textiles	90
21	18	Wearing Apparel; Dressing and Dyeing of Fur	85
22	10-14	Mining and Quarrying	78

Source: CSO Industrial Production Index.

Table 4.12: Forfás Employment Survey, Percentage of Employment in the Five Fastest and Slowest Growing Sectors

	Top 5	Bottom 5
Dublin	28.6	9.8
Kildare	16.5	4.9
Meath	3.6	6.7
Wicklow	18.3	3.4

Note: Using the CSO Industrial Production Index at the NACE 2 level see Table 4.10.

Another important issue is the existence (or absence) of clusters of industries which through agglomeration economies can generate a self-sustaining virtuous circle of growth (Fujita, Krugman and Venables, 1999; Porter, 1990). These clusters may either be a group of firms which are engaged at the same stage of production in the same or closely related industries, or alternatively a cluster can also consist of a group of firms which operate at different stages in the production process but are linked into the supply chain with other firms. Such industrial clusters can play a significant role in the growth of individual towns, cities and sub-region since these provide opportunities for agglomeration economies to emerge through the development of a suitable skill base and the establishment of closely related firms.

There are different ways of measuring the existence of an industrial cluster. The measures typically used in the new economic geography literature are particularly concerned with the concentration of employment without considering the number of firms involved (Ellison and Glaeser, 1997; Maurel and Sedillot, 1999; and Devereux, Griffith and Simpson, 1999). Thus, the concentration of employment in particular areas is taken as evidence for clustering even if this involves one large firm in each region. A further problem with these measures is that they are aggregate measures for concentration in the whole county which does not directly yield information regarding the location of concentrations, rather they identify whether employment is more concentrated than expected or not.

Another method of identifying clusters was put forward by Porter (1990) and this has been widely applied (see Beije and Nuys, 1995; O'Connell, van Egeraat and Enright, 1997; O'Malley and van Egeraat, 2000). This is based on the concept that successful industries develop through linkages (horizontal or vertical) where successful is synonymous to internationally competitive. This view would indicate that industrial policy should promote industries that are linked to each other and which enjoy a national competitive advantage. However, one of the main drawbacks of this approach is that it is based on the international competitiveness of industries, based on their share in world trade. Since data on national or international trade flows for Irish regions does not exist an analysis along these lines is impossible.

Clearly neither of the methods described above is appropriate in this case and it is therefore necessary to find an alternative method. A simple two step method can be implemented which uses a location quotient (see Isard *et al.*, 1998) which identifies higher concentrations of employment in a particular sector, followed by counting the number of firms in that sector for the county concerned. The location quotient is

calculated as the ratio of the county's employment share in a particular sector or industry to the county's share in total employment (labour force).¹³ A location coefficient equal to one indicates a share of the employment in a particular sector which is proportional to the total employment share of the county. A quotient larger than one indicates a higher concentration and a coefficient below one a lower concentration of employment than that of the total employment share of that county. This measure has the advantage that it removes the effect of different sizes of counties with regard to the total number of people employed. Thus, the effect of having a large population is removed which if not corrected for would indicate a high concentration of employment in every sector in Dublin. Furthermore, this measure is invariant to differences in participation rates and unemployment rates across counties and instead focuses on the concentration of people that are in employment. Since this section is concerned with manufacturing total employment is taken to be total employment in manufacturing.

The results of applying this procedure are set out in Tables 4.13 to 4.16. These tables show that in the case of each county a number of sectors exist which are characterised by a concentration of employment that would not have been expected if sectoral employment were evenly distributed according to the share in the total number of employees. This particularly applies to the sectors with a location quotient above two which indicates that the concentration of employment in these sectors is over twice that which would have resulted from an even spread of employment. Nevertheless, in a number of cases these concentrations of employment are accounted for by a small number of firms which implies that there are no clusters in these sectors. Of course the fact that there is a high concentration of employment in a sector which also contains a number of firms still does not necessarily prove the existence of a cluster since these firms could be evenly distributed throughout a county. It is therefore necessary to explore the distribution of employment and firms at a sub-county level. Furthermore, the relationship between these firms can not be ascertained on the basis of this type of analysis.

Table 4.13: Sectors with High Concentrations as Measured by the Location Quotient In Dublin

Sector	Location Quotient	Number of Firms
Publishing, Printing & Reproduction of Recorded Media	2.6	123
Pulp, Paper and Paper Products	2.4	62
Transport Equipment	2.3	13
Tobacco Products	2.2	2
Wearing Apparel, Dressing & Dying of Fur	1.6	76
Radio, Television & Communications Equipment	1.4	22
Office Machinery	1.1	55

Note: These calculations are based on the Forfás Employment Survey, 1999.

Table 4.14: Sectors with High Concentrations as Measured by the Location Quotient in County Kildare

Sector	Location Quotient	Number of Firms
Office Machinery	4.7	4
Motor Vehicles, Trailers & Semi -trailers	1.9	8
Mining & Quarrying	1.6	1
Chemicals & Chemical Products	1.4	14
Textiles	1.2	12

Note: These calculations are based on the Forfás Employment Survey, 1999.

Table 4.15: Sectors with High Concentrations as Measured by the Location Quotient in County Meath

Sector	Location Quotient	Number of Firms
Other Manufacturing	4.6	44

¹³ The location quotients based on a breakdown of the labour force by sector for all regions are shown in the Appendix.

Non-Metallic Mineral Products	3.1	20
Textiles	2.8	7
Pulp, Paper & Paper Products	2.6	3
Basic Metals	2.2	1
Radio, Television & Communications Equipment	1.9	1
Machinery & Equipment	1.2	10
Rubber & Plastics	1.2	9

Note: These calculations are based on the Forfás Employment Survey, 1999.

Table 4.16: Sectors with High Concentrations as Measured by the Location Quotient in County Wicklow

Sector	Location Quotient	Number of Firms
Rubber & Plastics	2.7	10
Publishing, Printing & Reproduction of Recorded Media	2.0	12
Pulp, Paper & Paper Products	2.0	8
Chemicals & Chemical Products	1.8	13
Non-Metallic Mineral Products	1.7	12
Textiles	1.3	9
Wood & Wood Products	1.2	10
Office Machinery	1.1	5

Note: These calculations are based on the Forfás Employment Survey, 1999.

In order to identify local clusters the same method is used again. However, to focus the analysis this will only examine the sectors identified in Table 4.13-4.16 for each county. Furthermore, a sector in a local area must consist of at least three firms and must have a location quotient above one. Tables 4.17-4.20 indicate the existence of a substantial number of clusters in the Dublin Region. However, only three clusters are located in County Kildare (see Table 4.18). Notable is the cluster of Other Manufacturing firms in Navan. Other Manufacturing includes the manufacture of furniture which has traditionally been concentrated in County Meath and particularly Navan.

Table 4.17: Clusters Within Dublin as Measured by the Location Quotient and Number of Firms

Sector	Area	Location Quotient	Number of Firms
Publishing, Printing & Reproduction of Recorded Media	Baldoyle	4.5	16
	Dublin 2	2.7	16
	Dublin 1	3.6	10
	Dublin 6	3.3	4
	Dublin 8	1.3	15
	Dublin 9	2.6	6
	Dublin 11	1.5	9
	Dublin 13	1.6	5
Pulp, Paper and Paper Products	Dublin 3	1.4	3
	Dublin 10	2.0	4
	Dublin 11	2.9	7
	Dublin 12	2.5	12
	Dublin 13	1.4	3
	Dublin 18	1.1	4
Transport Equipment	Lusk/ Ballyboghil	17	4
Wearing Apparel, Dressing & Dying of Fur	Dublin 1	3.1	13
	Dublin 3	1.9	3
	Dublin 6	1.7	4
	Dublin 7	6.4	7
	Dublin 8	2.5	11
	Dublin 11	2.3	6
	Dublin 12	1.6	5
Radio, Television & Communications Equipment	Tallaght	2.3	3
Office Machinery	Dublin 3	1.1	4
	Dublin 5	3.1	3
	Dublin 15	2.7	6

Dublin 18	1.1	3
Dun Laoghaire	3.1	6
Swords	1.8	4

Note: These calculations are based on the Forfás Employment Survey, 1999.

Table 4.18: Clusters Within County Kildare as Measured by the Location Quotient and Number of Firms

Sector	Area	Location Quotient	Number of Firms
Motor Vehicles, Trailers & Semi-trailers	Naas	4.8	6
Chemicals & Chemical Products	Newbridge	5.4	6
Textiles	Monasterevin	21.3	3

Note: These calculations are based on the Forfás Employment Survey, 1999.

Table 4.19: Clusters Within County Meath as Measured by the Location Quotient and Number of Firms

Sector	Area	Location Quotient	Number of Firms
Other Manufacturing	Dunshaughlin	1.4	3
	Navan	2.3	19
	Oldcastle	2.1	6
Non – Metallic Mineral Products	Slane	1.5	3
Rubber & Plastics	Navan	2.2	3

Note: These calculations are based on the Forfás Employment Survey, 1999.

Table 4.20: Clusters Within County Wicklow as Measured by the Location Quotient and Number of Firms

Sector	Area	Location Quotient	Number of Firms
Rubber & Plastics	Bray	2.1	6
Publishing, Printing & Reproduction of Recorded Media	Bray	2.4	10
Chemicals & Chemical Products	Arklow	2.6	5
Non-Metallic Minerals	Blessington	4.2	3
	Arklow	2.6	3
Textiles	Bray	2.1	6
Office Machinery	Bray	2.0	3

Note: These calculations are based on the Forfás Employment Survey, 1999.

One of the key features in Ireland's recent economic boom has been the impact of foreign owned firms (see Barry, Bradley and O'Malley, 1999). The contribution of these firms is therefore an important aspect of the industrial structure of the regions. Table 4.21 shows that while foreign firms make up only a relatively modest share of the total number of firms they account for almost half the employment and almost three-quarters of output produced in the manufacturing sector. The table also indicates that the contribution of foreign firms has increased since 1999 although their share of the total number of firms has declined slightly.

Table 4.21: Percentage of Firms, Employment and Gross Output in Foreign Owned Manufacturing Firms

	1991	1998
Percentage of Firms	16.4	15.4
Percentage of Employees	44.1	47.5
Percentage of Gross Output	53.4	72.3

Source: CSO Census of Industrial Production, 1991, 1998.

Since the presence of foreign firms is so important it is important to identify whether there are differences regarding their location. Table 4.22 indicates that County Kildare has a high proportion of foreign owned firms and a particularly high

percentage of employees in foreign owned firms. County Meath on the other hand has a low percentage of foreign owned firms and a low percentage of employment in these firms. Wicklow also has a relatively low share of employment in foreign owned firms while Dublin has a share similar to the national average.

Table 4.22: Percentage of Firms and Employment in Foreign Owned Manufacturing Firms, 1999

	Percentage of Firms	Percentage of Employees
Dublin	16.5	44.4
Kildare	22.9	71.8
Meath	9.9	24.0
Wicklow	18.1	32.5
State	18.3	48.0

Source: Forfás Employment Survey.

4.2 Building, Construction, Market Services and Agriculture

So far we have concentrated on the Manufacturing sector. However, as Table 3.1 shows, the Service sector also accounts for a large share of regional output. Furthermore, manufacturing industries rely heavily on the Service sector for many specialised activities such as legal advice or transport. Furthermore, the availability of a diverse set of services can also be important for the quality of life in a particular area. The lack of a suitable Service sector may therefore retard the development of a dynamic Manufacturing sector. The analysis of the Manufacturing sector should therefore go hand in hand with an analysis of the Service sector which is the subject of this section.

While a considerable amount of data for the Manufacturing sector has been published by the Central Statistics Office, this is not the case for Services. Thus, for example, the last Census of Services was carried out in 1988, and since then the only data available on an annual basis is the Services Inquiry, however, the data is published only at the national level. More detailed data on service activities therefore has to be drawn from other sources. This data is drawn from details supplied by the Revenue Commissioners and a unique database which is being maintained by the ESRI. Unfortunately, both data sources have some important drawbacks. First, the data supplied by the Revenue Commissioners refers to the total number of firms in a particular sector where firms are counted as units, which make tax returns. Since tax returns are typically made only by the headquarters, this data represents an undercount of enterprises. This will result in an undercount of firms outside of Dublin and since employees are counted at the headquarters rather than all the establishments of a particular firm the employment numbers for Dublin are biased upward while those for other counties are biased downward. Furthermore, there appears to be an undercount in the Building and Construction sector. The ESRI business database which contains establishments rather than headquarters is not subject to this bias, but nevertheless has two shortcomings. First, the sector in which each establishment is active is not well recorded, and second, employment numbers are not well recorded. Therefore, neither of these two data sources allows for a precise analysis. It is however possible to improve the precision of the data by re-weighting the Revenue Commissioners data using weights from the business database and from the 1996 Census of Population in order to reduce the bias due to the headquarters problem. Overall, as a direct consequence of this lack of detailed data it is impossible to provide an analysis which is as comprehensive as that presented for the Manufacturing sector.

Table 4.23 indicates the estimated number of firms in each of the sectors. Wholesale and Retail clearly has the highest number of firms followed by Other Business and Personal Services which includes services such as real estate, rental, accounting and legal services. The lowest number of firms is recorded in the Finance and Insurance sector.

Table 4.23: Estimated Number of Building Construction and Market Service Firms, 2000

	Dublin	Kildare	Meath	Wicklow	Total
Building and Construction	4,196	890	1,092	813	6,990
Wholesale and Retail	8,381	1,003	1,117	1,169	11,669
Hotels, Restaurants and Catering	2,535	317	366	440	3,658
Transport and Communication	1,625	237	259	194	2,315
Finance and Insurance	1,587	73	55	83	1,798
Other Business and Personal Services	7,972	614	610	734	9,930
Other Services	3,365	352	339	403	4,459
Total	28,661	3,486	3,838	3,838	40,821

Source: Own calculations.

While the figures on employment in the Service sector in each county which are shown in Table 4.24 give a rough idea of the extent of each sector, these figures should be interpreted with caution. The first noticeable feature of the table is that the Service sector involves considerably larger numbers of employment than the Manufacturing sector. Again, as with the number of firms, the Wholesale and Retail sector is the largest sector and accounts for more employees than the whole Manufacturing sector. While the total number of employees in the Insurance and Finance sector appears reasonable, the distribution across counties does not appear reasonable, particularly with regard to County Meath. Overall, Dublin has a considerably larger concentration of service sector employment than the counties of the Mid-East. This is of course not surprising since services are particularly concentrated in urban areas.

Table 4.24: Estimated Number of Persons Engaged in Building Construction and Market Service Firms, 2000

	Dublin	Share %	Kildare	Share %	Meath	Share %	Wicklow	Share %
Building and Construction	22,872	6.8	4,966	12.1	3,719	18.1	2,466	9.0
Wholesale and Retail	75,678	22.6	9,925	24.3	6,319	30.8	7,814	28.6
Hotels, Restaurants and Catering	27,731	8.3	3,146	7.7	1,878	9.1	3,056	11.2
Transport, Communication and Storage	34,765	10.4	2,416	5.9	2,126	10.4	2,277	8.3
Finance and Insurance	58,649	17.5	7,273	17.8	760	3.7	1,987	7.3
Other Business Services	66,899	20.0	7,094	17.4	3,310	16.1	6,430	23.6
Other Market Services	47,609	14.2	6,053	14.8	2,416	11.8	3,245	11.9
Total	334,203	100	40,873	100	20,528	100	27,275	100

Source: Own calculations.

Table 4.24 shows some interesting differences regarding the distribution of employment within the Service sector. Dublin has a high concentration of employment in Finance and Insurance and Other Business Services. The former is also important in Kildare. The Building and Construction sector appears to be more important in the counties of the Mid-East Region. Similarly, Wholesale and Retail is more important in these counties, which to some extent reflects the fact that other services are somewhat less important in the Mid-East.

The Greater Dublin Region also encompasses a large rural area where agriculture is still of importance and thus has a strong influence in the well being of the population. Agriculture has been subject to dramatic changes over the last thirty years and this has impacted on rural areas. It is thus also important to analyse the activity of the Agricultural sector. However, data limitations again apply, since the latest Census of Agriculture data refers to 1991 and since spatially disaggregated data is often not available. A thorough analysis of the Agricultural sector is contained in Lafferty *et al.* (1999) who consider every aspect of agriculture. However, this study too is limited in that it refers mainly to 1991 and before. Since the data for the Agricultural sectors is not up to date we focus merely on some of the main indicators only.

One of the most important variables is the size of the farms in an area. This is important since this is a major determinant of the farm income which in turn determines whether a farm is viable as a full-time enterprise or is only likely to be farmed on a part-time basis. Table 4.25 shows the distribution of the number of farms by size for Dublin and the counties of the Mid-East Region. Noticeable is the smaller

total number of farms for Dublin is considerably smaller than that for the other counties. This is of course due to the fact that a large proportion of Dublin is built up and urban. However, the size structure of the Agricultural sector is also different in Dublin with a higher proportion of farms in the smaller size classes than in the other counties.

Table 4.25: Number of Farms in Each Size Group, 1991

Hectares	Dublin	Per Cent	Kildare	Per Cent	Meath	Per Cent	Wicklow	Per Cent
< 1	61	4.2	36	1.1	76	1.4	35	1.3
1 - < 2	87	5.9	100	3.1	142	2.5	32	1.2
2 - < 5	199	13.6	333	10.5	523	9.4	197	7.3
5 - < 10	193	13.1	366	11.5	692	12.4	257	9.5
10 - < 20	275	18.7	590	18.5	1,287	23.0	469	17.4
20 - < 30	173	11.8	473	14.9	848	15.2	480	17.8
30 - < 50	201	13.7	507	15.9	970	17.3	581	21.5
50 - < 100	189	12.9	562	17.7	749	13.4	475	17.6
>= 100	90	6.1	216	6.8	306	5.5	175	6.5
Total	1,468	100.0	3,183	100.0	5,593	100.0	2,701	100.0

Source: CSO Census of Agriculture, 1991.

It is also possible to provide a more up-to date breakdown of average farms for broader size categories, using data from the Census of Population, 1996. This is displayed in Map 10 and Table 4.26, which again show that the proportion of larger farms falls with proximity to Dublin. One explanation of this distribution of larger and smaller farms may be that smaller farmers closer to Dublin have had more opportunities for off-farm employment and have consequently been able to farm on a part-time basis only, whereas farmers whose holdings are further away from Dublin have not been able to avail of off farm employment and have instead chosen to increase the size of their holdings in order to make them viable businesses. Another explanation may involve the type of enterprise carried out on the farm. Thus, high value to area enterprises like market gardening do not require as much land as more extensive lower value enterprises such as drystock.

Table 4.26: Percentage of Farmers Classified by Farm Size, 1996

	< 30 acres	30-50 acres	50+ acres
South Dublin	39.0	14.3	46.8
Fingal	34.9	7.5	57.6
Dun Laoghaire-Rathdown	44.2	9.3	46.5
Kildare	14.9	9.9	75.3
Meath	15.5	15.3	69.2
Wicklow	11.0	7.5	81.5

Source: Census of Population, 1996, Small Area Population Statistics.

Some interesting differences in the productivity of farms were identified by Lafferty *et al.* (1999). They found that the index of European Size Units (ESU) per Annual Work Unit (1,800 hours per person per annum or more), differs between the regions. Thus this index is 31 per cent and 36 per cent higher for the Dublin Region and the Mid-East Region respectively than for the national average. This suggests that the agricultural enterprises in the Greater Dublin Region are significantly more productive than those in other parts of the country. Nevertheless, it must be borne in mind that the agricultural sector is quite heterogeneous in the region, covering disadvantage, severely disadvantaged areas as well as some of the best land in the country. The disadvantaged areas also consist of the more peripheral areas such as the north and west of counties Meath and Kildare as well as much of County Wicklow.

4.3 Summary

This chapter provided a thorough analysis of the Manufacturing sector and a somewhat more limited analysis of the Service and Agricultural sectors. The analysis overall shows that there are large differences between the counties both in terms of the absolute size of the sectors and the industrial structure.

Overall manufacturing employment is higher today than in 1973 in Counties Kildare, Wicklow and Meath. However, this high level of employment in manufacturing was preceded by a period of prolonged stagnation from which manufacturing employment in the Dublin Region has not recovered. Along with the decline in total employment in the sector there has also been a relocation of manufacturing employment in Dublin. Thus, the share of employment in suburban locations has grown while that of more central locations has declined.

The analysis of the Census of Industrial Production showed that industry in County Meath lags behind that of the other counties. This is also borne out by the low share of employment in the five fastest growing sectors. Here Dublin does particularly well, but it must be borne in mind that Dublin also has a high share of employment in the five slowest growing sectors. Employment in these sectors is more vulnerable to shocks since these sectors are not as profitable which may result in relocating in other countries due to cost differences.

Overall, each county has higher concentrations of employment in a number of different sectors and local clusters can be detected in all counties. However, the number of local clusters is much higher in Dublin which is explained by considerably larger number of firms located in Dublin which increases the scope of forming a cluster. Thus, the analysis suggests that there are scale effects in the formation of cluster. The percentage of employment in foreign owned manufacturing firms is highest in Kildare and lowest in County Meath.

The analysis of the Service sector and Agriculture was severely limited by data availability. With regard to Market Services, Dublin has a higher concentration of employment in Other Business services which includes Professional Services. The Building and Construction sector was found to be more important in the counties of the Mid-East Region.

5. LABOUR MARKET PROFILE

With the recent economic and employment growth, skills and labour shortages have become apparent. For the development of the regions it will be vital to identify and address these shortages. It is therefore important to establish a profile of labour force characteristics. This chapter sets out to identify the strengths and weaknesses of the labour force in the two regions. The issues that will be addressed will include the skill profile, participation rates, labour or skill shortages and unemployment. The level of unemployment and female labour force participation are of particular interest since these identify the potential for labour expansion. Furthermore, the unemployment rates is also a useful variable in identifying particular problems regarding deprivation and social exclusion. This issue will also be explored and a social profile will be established which will focus on measures of social class and lone parenthood. The latter is of particular significance for policy makers since it has implications both for service provision and for social policy initiatives.

5.1 Education

Among the most important labour supply issues is the educational profile of the labour force. This is due to the fact that the educational attainment of individuals acts as a signal to employers with respect to the tasks a person could fulfil. Therefore, those with a low level of educational attainment are unlikely to gain high wage employment, and their probability of being unemployed is considerably higher than for those with higher levels of education. Table 5.1 shows the share of the population broken down by their highest level of completed education in 1996. The table indicates that Counties Dun Laoghaire-Rathdown and Fingal have a considerably lower share of persons with primary education only. On the other hand, the Dublin County Borough is the only county in the Greater Dublin Area which has a higher share than the national average share of population with only primary education. With regard to degree third level qualifications Dun Laoghaire-Rathdown stands out in that the share of the population with such qualification is more than twice the national average. County Meath has a lower than average share of the population with a degree level qualification. Of course it must be borne in mind that the figures for third level education may be somewhat distorted by the location of third level institutions. Thus, post-graduate student who will have completed a third level qualification will be counted at their place of residence which at the time of the census, the month of May, is likely to have been close to the third level institutions. This will result in an overestimate of individuals with a third level institution since these students may not be permanently resident in the area where they are counted for census purposes. Another factor which must be taken into account is the demographic structure, which was discussed in Chapter 2. Since older people are less likely to have higher qualifications, perhaps due to the fact that post primary education was not free when they were young, areas with a higher proportion of older people will also show up as areas with lower educational attainment, all other things being equal.

Table 5.1: Share of the Population Classified by Highest Level of Education Completed, 1996

County	Primary	Lower Secondary	Upper Secondary	Third level		
				Non Degree	Degree	Not Stated
Kildare	24.0	21.0	32.4	11.0	9.8	1.9
Meath	27.2	22.0	30.5	9.7	8.2	2.4
Wicklow	26.1	20.3	30.2	10.8	10.0	2.5
Dublin County Borough	29.6	17.8	25.4	8.7	12.4	6.1
Dun Laoghaire- Rathdown	14.2	13.8	31.4	13.6	24.2	2.8
Fingal	17.6	19.8	34.7	11.8	12.7	3.4
South Dublin	23.3	22.7	32.3	10.0	9.4	2.3
	28.6	20.2	28.9	9.3	9.8	3.3

Source: Census of Population 1996, Volume 8, Education, Scientific and Technological Qualifications.

Of course there is likely to be a high degree of variation within counties regarding the educational profile of the population. This is shown in Map 8 and Map 9. With regard to the Mid-East Region areas more distant from Dublin have a higher percentage of people with no formal education or primary education only. Within Dublin there is also a clear distinction with the North and South Inner City; Ballymun; Finglas; Tallaght and Clondalkin having a high proportion of individuals with no formal or primary education only.

It is also important to identify trends in the educational profile of the region. Changes in the shares of individuals with different educational attainment are shown in Table 5.2. Unfortunately, the 1991 Census does not break down third level education into degree and non-degree qualifications. Overall, a clear trend emerges from the figures. There has been a strong decline in the share of the population with primary education only. Furthermore, the share with secondary education only has also declined slightly. However, the share of the population with a third level qualification has risen substantially in all counties. While these general patterns hold in all counties there are differences between the counties. For example the increase in the share of those with a third level qualification increased particularly strongly in Dun Laoghaire-Rathdown which also experienced the largest decline in the share of those with upper second level education. These changes are due to demographic factors as described above, which means that as older cohorts decline the share of young cohorts with higher levels of education increases. However, other underlying factors such as attitudes to education and perceptions about usefulness and access to education, and particularly third level education, which can not be uncovered with census data may account for differences in educational attainment between areas.

Table 5.2: Changes in Educational Attainment 1991 to 1996

	Primary	Lower Secondary	Upper Secondary	Third Level	Not Stated
Kildare	-4.7	-1.6	-0.4	7.6	-0.9
Meath	-4.2	0.0	-1.5	5.8	0.0
Wicklow	-4.8	-1.7	-0.2	6.9	-0.2
Dublin County Borough	-4.5	-0.2	-3.1	6.9	0.9
Dun Laoghaire-Rathdown	-2.6	-1.7	-3.8	8.4	-0.4
Fingal	-3.7	-1.8	-1.8	6.9	0.4
South Dublin	-2.8	-0.7	-1.7	5.6	-0.4
State	-4.7	-0.3	-0.8	6.0	-0.2

Source: Census of Population 1996, Volume 8, Education, Scientific and Technological Qualifications and Census of Population, 1991, Volume 9, Education.

A further indication of skills levels is the socio-economic group to which individuals belong. Table 5.3 and Table 5.4 indicate that the largest proportion of the Labour Force in the Dublin and Mid-East Regions is classified as Non-manual, with the highest proportions by county in all the Dublin Counties. However, Dun Laoghaire-Rathdown has a higher proportion of Employers and Managers than Non-manual workers. The Dublin County Borough has the lowest percentage of Employers

and Managers. Non-manual employment is lower than average in Counties Meath and Wicklow. The proportion of Non-manual employment is directly related to Service sector activity. The Dublin Region had a higher proportion of Higher Professional workers than the Mid-East Region.

Table 5.3: Percentage of the Labour Force in Each Broad Socio-Economic Group, for the Dublin Region, 1996

Occupation	Dublin County Borough	Dun Laoghaire – Rathdown	Fingal	South Dublin	Dublin
Employers & Managers	9.9	21.7	17.8	13.8	14.1
Higher Professional	5.2	12.4	6.1	4.2	6.4
Lower Professional	8.3	12.7	10.4	8.1	9.4
Non-manual	21.7	21.0	22.7	23.0	22.0
Manual Skilled	14.3	7.6	12.9	17.1	13.5
Semi-skilled	10.6	5.5	8.4	10.7	9.4
Unskilled	8.1	3.8	5.4	6.4	6.6
Own Account Workers	3.7	4.8	5.5	6.3	4.8
Farmers	0.1	0.2	1.3	0.2	0.3
Agricultural Workers	0.3	0.2	0.9	0.2	0.4
Others	17.6	10.2	8.5	10.0	13.3
Total	100.0	100.0	100.0	100.0	100.0

Source: Census of Population 1996, Volume 7, Occupations.

Table 5.4: Percentage of the Labour Force in Each Broad Socio-Economic Group, for the Mid-East Region, 1996

Occupation	Kildare	Meath	Wicklow	Mid-East
Employers & Managers	14.2	13.2	14.2	13.9
Higher Professional	4.1	3.8	4.9	4.3
Lower Professional	8.4	7.9	8.1	8.2
Non-manual	20.4	15.3	16.8	17.7
Manual Skilled	14.4	15.5	14.2	14.7
Semi-skilled	8.7	8.7	9.4	8.9
Unskilled	7.0	7.4	7.8	7.4
Own Account Workers	5.6	7.0	6.6	6.4
Farmers	4.3	9.4	5.1	6.1
Agricultural Workers	3.1	3.9	2.8	3.3
Others	9.6	8.0	10.1	9.3
Total	100.0	100.0	100.0	100.0

Source: Census of Population 1996, Volume 7, Occupations.

Unfortunately up-to-date comparable data is not available since there has been a change in the classification scheme since 1996. However, the Quarterly National Household Survey (QNHS) does provide an occupational breakdown of the Labour Force. Table 5.5 indicates a higher proportion of Managers in the Mid-East than in the Dublin Region which reverses the situation of 1996. Again the Mid-East has a lower proportion in the professional occupations. The Dublin Region has a higher proportion of Clerical workers which is of course explained by the administrative role of Dublin, both as the capital city but also as the location of many firms' headquarters.

Table 5.5: Percentage of the Labour Force in Each Broad Occupational Category, 2000

Occupation	Dublin	Mid-East	Greater Dublin Region	State Region
Managers	15.1	18.4	16.0	17.4
Professional	12.3	8.8	11.4	9.6
Associate Professional and Technical	10.8	7.7	10.1	8.1
Clerical Secretarial	15.8	12.1	14.9	11.9

Craft and Related	10.9	14.7	11.9	13.6
Personal and Protective Service	9.6	10.4	9.8	9.9
Sales	9.0	7.0	8.5	8.1
Plant and Machine Operators	7.7	10.3	8.4	10.8
Other	8.7	10.6	9.2	10.6
Total	100.0	100.0	100.0	100.0

Source: CSO Quarterly National Household Survey, 2nd Quarter 2000, special tabulations.

5.2 Female Labour Force Participation

The female labour force participation is a crucial variable for the development of an area since this along with the unemployment rate indicates the potential labour pool. As Table 5.6 shows, the labour force participation of men is substantially higher than that of woman. The table also shows that male labour force participation has declined slightly between 1991 and 1996. Female labour force participation on the other hand grew substantially between 1991 and 1996. Overall female labour force participation exceeds the national average in all counties of the Greater Dublin Region except Meath and Wicklow. The strong growth in female participation coupled with the already higher than average participation in the labour market by women suggests that there is less scope to expand the labour pool through further increases in female labour force participation in the Greater Dublin Region than elsewhere. Interestingly, the male labour force participation in Dun Laoghaire-Rathdown is lower than the national average. This is likely to be due to demographic factors such as a higher proportion of pensioners or a higher participation in third level education. These factors are also likely to explain the slight drop in the male labour force participation.

Table 5.6: Labour Force Participation by Gender, 1991 and 1996

	1991 Male	1996 Male	Change	1991 Female	1996 Female	Change
Dublin County Borough	70.7	70.1	-0.6	43.1	47.3	4.2
Dun Laoghaire-Rathdown	70.2	69.6	-0.6	39.9	44.5	4.6
Fingal	77.3	75.3	-2	40.5	47.3	6.8
South Dublin	78.4	76.4	-2	41	46.9	5.9
Kildare	74.6	74.1	-0.5	36.1	42.3	6.2
Meath	74.8	73.8	-1	32.8	39.5	6.7
Wicklow	73	72.2	-0.8	33.5	39.1	5.6
State	71.7	70.7	-1	35.9	40.7	4.8

Source: Census of Population 1996.

It is also of interest to analyse the sectors in which females participate more strongly, which indicates on the one hand the preferences of women and their skills profile and on the other hand preference of industry. Table 5.7 shows that females are particularly well represented in Commerce and Other Service industries and are particularly underrepresented in the Building and Construction industry.

Table 5.7: Females as a Percentage of Those at Work, Classified by Industrial Group, 1996

Sector	Dublin County Borough	South Dublin	Fingal	Dun Laoghaire Rathdown	Kildare	Meath	Wicklow
Agriculture	12.13	15.53	10.84	20.48	14.67	11.58	14.18
Mining	25.00	14.63	8.06	17.33	10.00	6.54	6.30
Manufacturing	35.74	29.82	30.01	26.81	28.77	26.36	27.19
Building & Construction	8.89	7.66	6.91	9.60	5.73	4.04	5.11
Electricity & Gas	26.45	19.65	22.96	20.08	15.02	15.85	16.08
Commerce	47.61	45.00	43.18	40.62	43.09	42.73	41.78
Transport	26.59	19.15	27.55	27.95	20.45	24.01	19.20
Public Administration	40.14	34.67	34.21	34.17	24.42	36.86	29.99

Professional Services	65.58	66.20	63.69	59.85	66.30	68.03	63.45
Other	53.21	55.09	54.45	52.86	51.66	57.93	51.66
TOTAL	45.89	41.02	41.02	43.08	36.76	35.35	37.06

Source: Census of Population, 1996.

5.3 Unemployment

One of the most important variables for policy makers is the unemployment rate. This is measured in a number of different ways which makes it more difficult to establish the actual incidence of unemployment and particularly long-term unemployment (see Fitzgerald, Ingolsby and Daly, 2000). Thus for instance the Quarterly National Household Survey (QNHS) follows the International Labour Office (ILO) convention to count as unemployed only those who were taking specific steps to find employment in the four weeks preceding the survey. This is likely to underestimate the true level of unemployment since many long-term unemployed have given up looking for employment. Furthermore, since the QNHS is based on a national sample of households this does not allow for the calculation of unemployment rates at a spatially highly disaggregated level. The Census of Population employs the Principle Economic Status (PES) measure of unemployment where individuals themselves describe their employment status. This allows for the calculation of unemployment rates at the local level. However, since the last Census was taken in 1996 the data is not up-to-date. Finally, the Live Register counts the number of individuals who sign on at a particular Office of Registration. This measure has the disadvantage that, due to the fact that individuals may sign on in an area they do not live in, it is difficult to calculate accurate unemployment rates for local areas.¹³ Furthermore, the Live Register contains part-time workers as well as some who are working in the black economy all of which will lead to an overestimate of unemployment.

Table 5.8 allows for a comparison of the different methods of calculating unemployment both in terms of the absolute number of unemployed persons and the unemployment rate. The CSO Quarterly National Household Survey, measures the rate of unemployment in the regions on the ILO basis.¹⁴ This shows that the unemployment rate in Dublin stood at 3.4 per cent during March - May 2000, while it stood at 3.7 per cent in the Mid-East. Both these figures are below the national average of 4.3 per cent. When measured on the PES basis the figures are substantially higher although they are still below the national average. This difference between the figures measured on the ILO and the PES basis is also a useful indicator of long-term unemployment. In absolute terms the number of long-term unemployed was 13,300 in the Dublin Region and 2,200 in the Mid-East Region, which amounts to just over 41 per cent and 24 per cent respectively of all unemployed in the two regions. These figures clearly demonstrate that unemployment and particularly long-term unemployment are still important problems in the Greater Dublin Region, despite the recent rapid decline of the unemployment rate. This rapid decline is revealed through a comparison of the 1996 and 2000 unemployment figures which shows that the unemployment rate halved over this period. Nevertheless there are still a significant number of unemployed in the Greater Dublin Region and particularly in Dublin.

Table 5.8: Number of Unemployed People and Unemployment Rate in 1996 and 2000 (2nd Quarter)

Definition	PES 1996	PES 2000 (Q2)	ILO 2000 (Q2)	Live Register 2000 (June)
Dublin	65,200	32,300	19,000	40,105
(%)	(13.8)	(6.0)	(3.4)	
Mid-East	14,300	9,100	6,900	10,411
(%)	(10.1)	(5.1)	(3.7)	
Greater Dublin Area	79,500	41,400	25,900	50,516

¹³ This is further exaggerated by the closure of individual offices. For example the Blessington office (Wicklow) was transferred to Tallaght (South Dublin).

¹⁴ The figures on the PES basis were derived from special tabulations supplied by the CSO.

(%)	(12.9)	(5.8)	(3.7)	
State	269,300	109,800	74,900	156,753
(%)	(12.9)	(6.5)	(4.3)	

Source: Labour Force Survey, 1996, Quarterly National Household Survey, 2000 2nd Quarter, and Live Register Area Analysis, August 2000.

The Greater Dublin Region contains areas of high unemployment which are “averaged out” in the above aggregate figure. In order to identify these areas of high unemployment one has to use small area statistics which unfortunately are not available after 1996, the year of the last Census of Population. Using the Census of Population, the unemployment rate for Dublin, was 15.5 per cent while that for the State as a whole was 14.8 per cent. The fact that such an average does not reflect well the disparities within Dublin can be shown as follows. Table 5.9 shows for each county the highest and lowest unemployment rate in individual Wards/DEDs. The table clearly shows that there is a substantial difference between areas. Thus for instance in Dublin County Borough and South Dublin the higher unemployment rate is over ten times the lowest.¹⁵ These large differences in unemployment rates are also evident in Map 10. An important aspect of the map is the spatial concentration of unemployment in the city centre and the western outskirts of Dublin. Some of these areas correspond with areas where industrial clusters were identified while others do not. This points to the possibility of a spatial mismatch in the case of some areas where employment is most needed. This means that some of the clusters which are likely to have high growth, such as Office Machinery sector, are located in areas where unemployment is low. On the other hand the clusters in the slower growing Wearing Apparel sector are located in high unemployment areas. This may of course also reflect skill levels in these areas, however, this also means that if the skill level in these areas were improved the right jobs may not be available locally increasing commuting flows.

Another way to measure these disparities is to calculate the standard deviation around the mean of the unemployment rates for each county. This measures the spread of area unemployment rates around the mean. The results of this calculation are presented in Table 5.10. The larger the standard deviation the more spread are the observations. Dublin has the highest standard deviation of all counties, with only Mayo coming close to the value for Dublin. The table also shows that the highest average rates of unemployment are found in Donegal, Louth and Carlow.

Table 5.9: Highest and Lowest Unemployment Rates for DEDs/Wards in each County, 1996

County	Highest Unemployment	Lowest Unemployment
	Rate (%)	Rate (%)
Dublin County Borough	59.0	4.4
South Dublin	47.9	3.4
Fingal	44.6	4.7
Dun Laoghaire-Rathdown	30.0	3.5
Kildare	28.1	3.5
Meath	21.5	3.2
Wicklow	38.1	2.4

Source: CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Note: The unemployment rate is calculated as the percentage of those who are aged over 15 and who are in the labour force (employed, seeking first job and unemployed).

Table 5.10: Average Unemployment Rate Per County and Standard Deviation, 1996

County	Unemployment Rate	Standard Deviation
Dublin County and County Borough	15.5	11
Kildare	11.2	6
Meath	11.2	4.1
Wicklow	14.5	5.9

¹⁵ The tables in the Appendix indicate for each county the five DEDs/Wards with the highest/lowest unemployment rates.

Carlow	17.5	5.5
Cavan	11.5	6.4
Clare	11.6	5.6
Cork Co. and Co. Borough	13.9	7.1
Donegal	22.2	8.1
Galway Co. and Co. Borough	14.0	9.3
Kerry	15.6	6.1
Kilkenny	13.3	5.1
Laois	13.9	5.9
Leitrim	12.6	6.2
Limerick Co. and Co. Borough	14.2	8.4
Longford	14.6	5.3
Louth	18.2	4.4
Mayo	16.3	10.5
Monaghan	12.9	4.3
Offaly	15.2	6.0
Roscommon	9.6	5.7
Sligo	13.4	6.0
Tipperary, N.R.	12.3	4.7
Tipperary, S.R.	15.1	5.6
Waterford Co. and Co. Borough	16.2	7.7
Westmeath	13.1	5.1
Wexford	16.8	4.9
State	14.8	7.8

Source: CSO Census of Population, 1996. Small Area Population Statistics.

More up-to-date data on the unemployment rate is not available at the more disaggregated level. However, the number of persons on the live register is available for each local office of registration. This data is subject to the reservations outlined above, but nevertheless allows for some analysis of the recent trends at a local level. As Table 5.11 shows, there has been a decline of the persons on the live register in every year since 1997. However, there are differences between the counties and between years. Overall, Dublin and Kildare experienced a larger percentage decline in the numbers of persons on the live register while Meath and Wicklow fared less well. The largest overall decline was recorded from 1999 to 2000 while the lowest decline was recorded from 1997 to 1998. County Meath experienced a particularly small decline from 1998 to 1999 when compared to the other counties.

Table 5.11: Percentage Change in the Live Register from Year to Year

	1997-1998	1998-1999	1999-2000	1997-2000
Dublin	-13.0	-26.3	-27.9	-53.8
Kildare	-13.0	-23.6	-30.4	-53.7
Meath	-10.2	-13.5	-29.5	-45.2
Wicklow	-9.6	-21.0	-20.8	-43.4

Given that the areas covered by the different registration offices varies it is impossible to compare the absolute number of persons on the live register between offices. However, these figures nevertheless indicated the level of job creation that is necessary to make a substantial difference to the level of unemployment. There are significant differences regarding trends in the number of persons registered. Thus, among the offices located in the Dublin Region, the number of persons on the register has declined for every office but some offices have experienced a consistently lower percentage decline as compared to the average for the region, while some offices experienced a consistently above average decline. Those that have experience below average declines are Gardiner Street, Navan Road, Ballymun and Balbriggan, while

those with above average declines in all years are Tara Street and Rathfarnham (see Table 5.12). Within the Mid-East Region, Maynooth experienced the largest decline while Arklow experienced the smallest decline of the number of persons on the live register (see Table 5.13).

Table 5.12: Number of Persons on the Live Register, Dublin

Local Office of Registration	October 1997	October 1998	October 1999	October 2000
Gardiner Street	5,301	4,667	3,570	2,893
Werburgh Street	5,925	5,221	3,785	2,477
Victoria Street	2,821	2,324	1,458	993
Cumberland Street	8,865	7,392	5,593	4,136
Navan Road	8,413	7,698	6,191	4,952
Thomas Street	4,935	4,470	3,202	2,152
Tara Street	3,096	2,539	1,610	1,081
Tallaght	6,174	5,218	4,106	2,912
Ballymun	2,154	1,963	1,549	1,199
Clondalkin	4,043	3,820	2,746	1,941
Rathfarnham	3,709	3,088	2,198	1,469
Kilbarrack	4,029	3,378	2,790	2,210
Dun Laoghaire	5,952	4,878	3,631	2,586
Balbriggan	1,713	1,609	1,219	943
Ballyfermot	3,239	2,872	1,801	955
Finglas	3,810	3,395	2,117	1,377
Total	74,179	64,532	47,566	34,276

Source: CSO Live Register Area Analysis, various issues.

Another important policy variable is the extent of youth unemployment which, for the purposes of this study encompasses those unemployed who are aged under 25 years. The reason for this concern with youth unemployment is that those who become unemployed at a young age will inevitably have little labour market experience which will subsequently reduce their chance to gain employment. This can become a cumulative self reinforcing effect which keeps the individuals concerned trapped in unemployment (Breen, 1991). This implies that there are substantial returns over the longer-term in measures that help individuals gain employment. Table 5.14 clearly shows that the extent of youth unemployment varies between the counties and the offices of registration. Meath has the lowest proportion of young unemployed while Kildare has the highest proportion. The variation between offices of registration is large with the lowest percentages registered in Dun Laoghaire and Rathfarnham and the highest in Tallaght and Ballymun.

Table 5.13: Number of Persons on the Live Register, Mid-East

Local Office of Registration	October 1997	October 1998	October 1999	October 2000
Kildare				
Athy	1,045	1,056	851	578
Kildare	956	827	629	-
Maynooth	2,057	1,543	1,109	814
Newbridge	2,739	2,486	1,928	1,752
Total	6,797	5,912	4,517	3,144
Meath				
Kells	707	667	596	404
Navan	1,996	1,736	1,488	1,051
Trim	971	895	770	558
Total	3,674	3,298	2,854	2,013
Wicklow				
Arklow	1,348	1,293	1,047	957
Baltinglass	638	567	527	357
Blessington	326	247		
Bray	3,388	3,035	2,425	1,772
Wicklow	1,006	920	791	708

Total	6,706	6,062	4,790	3,794
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Source: CSO Live Register Area Analysis, various issues. Claims from Kildare were transferred to Newbridge and claims from Blessington were transferred to Tallaght.

Table 5.14: Persons on the Live Register Aged Less than 25 Years as a Percentage of all Persons on the Live Register

Local Office of Registration	% of the Unemployed Aged Under 25 Years	Local Office of Registration	% of the Unemployed Aged Under 25 Years
Gardiner Street	16.8	Athy	21.3
Werburgh Street	13.4	Maynooth	13.1
Victoria Street	14.9	Newbridge	17.3
Cumberland Street	14.5	Kildare	17.0
Navan Road	16.8		
Thomas Street	15.8		
Tara Street	11.6	Kells	14.4
Tallaght	25.1	Navan	15.0
Ballymun	24.2	Trim	12.4
Clondalkin	21.4	Meath	14.2
Rathfarnham	9.3		
Kilbarrack	13.4	Arklow	18.7
Dun Laoghaire	9.2	Baltinglass	16.0
Balbriggan	12.4	Bray	13.1
Ballyfermot	21.2	Wicklow	16.1
Finglas	17.6	Wicklow	15.4
Dublin	16.1		

5.4 Part-Time Working

The extent of part-time employment can also be a problem if individuals who are part-time workers would prefer to be employed on a full-time basis. On the other hand, many individuals who are working on a part time basis may prefer to do so which means that higher levels of part-time employment may indicate a high level of flexibility in the labour market.

Table 5.15 to Table 5.17 outline the extent of part-time working in 1996. For the State as a whole 14.6 per cent of workers were employed on a part-time basis during 1996. With the exception of County Wicklow the extent of part-time working was at or below the national average. Not surprisingly the extent of part-time working is considerably more extensive among women. There are some differences between the counties. Part-time working among men was particularly low in Counties Fingal and South Dublin, while for women the lowest rates are found in Dublin County Borough and Dun Laoghaire-Rathdown. The extent of part-time working among women is at least as high as the national average in all the Counties of the Mid-East along with Fingal and South Dublin.

Table 5.15: Percentage of Persons at Work in Each County Distinguished by Full-time and Part-time Workers, 1996

	Full-time	Part-time	Not Stated
Dublin County Borough	80.3	13.6	6.1
Dun Laoghaire-Rathdown	83.4	14.0	2.6
Fingal	83.8	13.4	2.8
South Dublin	82.4	14.6	3.0
Dublin Region	81.9	13.9	4.3
Kildare	84.1	13.5	2.3
Meath	83.5	13.5	3.0
Wicklow	80.8	16.4	2.8

Mid-East Region	83.0	14.3	2.7
State	81.3	14.6	4.1

Table 5.16: Percentage of Males at Work in each County Distinguished by Full-time and Part-time Workers, 1996

	Full-time	Part-time	Not Stated
Dublin County Borough	86.9	6.4	6.7
Dun Laoghaire-Rathdown	92.2	5.6	2.3
Fingal	92.7	4.8	2.5
South Dublin	91.9	5.2	2.9
Dublin Region	89.9	5.7	4.3
Kildare	91.0	6.7	2.4
Meath	90.8	6.2	3.0
Wicklow	88.5	8.7	2.8
Mid-East Region	90.2	7.1	2.7
State	87.9	7.9	4.2

Table 5.17: Percentage of Females at Work in each County Distinguished by Full-time and Part-time Workers, 1996

	Full-time	Part-time	Not Stated
Dublin County Borough	72.5	22.2	5.3
Dun Laoghaire-Rathdown	71.9	25.1	3.0
Fingal	70.9	25.7	3.3
South Dublin	68.8	28.1	3.2
Dublin Region	71.4	24.4	4.2
Kildare	72.4	25.3	2.3
Meath	70.3	26.7	3.0
Wicklow	67.6	29.5	2.9
Mid-East Region	70.4	27.0	2.7
State	70.9	25.3	3.8

Source: Census of Population, 1996

The Quarterly National Household Survey also records the extent of part-time working. This Survey also breaks down part-time working into those who are fully employed and those who are underemployed and would prefer to work full time. As Table 5.18 indicates, part-time employment has increased in importance since 1996. Also, part-time employment is now more important in the Dublin Region than in the Mid-East. Most importantly, the data on the percentage of people who are employed on a part-time basis but who are underemployed is very small, accounting for 0.1 per cent to 0.2 per cent. This suggests that the vast majority of those who are working on a part-time basis prefer to do so. This runs counter to the widely held view that part-time jobs are somehow inferior and that workers would prefer to work full time.

Table 5.18: Part-time Employment in the State, Dublin and the Mid-East Regions, 2000

	Percentage in Full-time Employment	Percentage in Part-time Employment	Percentage Part-time, not Underemployed	Percentage Part-time, Underemployed
Dublin	83.7	16.3	16.2	0.1
Mid-East	84.4	15.6	15.5	0.2
State	84.0	16.0	15.8	0.2

Source: CSO Quarterly National Household Survey, 3rd Quarter 2000.

5.5 Vacancies

While unemployment is still a problem in some areas and the absolute number of unemployed is substantial, many firms are finding it difficult to attract staff. This is indicated by the high percentage of firms which report vacancies. Table 5.19 shows that 27 per cent of all companies in the State had vacancies as measured by the National Survey of Vacancies in the Private Non-Agricultural Sector, 1998. However, the percentage of firms with vacancies is considerably higher in the Dublin Region where almost 33 per cent of firms recorded vacancies. This indicates the tightness of the labour market in Dublin. However, given the number of unemployed persons in Dublin this also indicates a substantial mismatch between the type of employees demanded and those available for work.

Table 5.20 shows that there are large differences with regard to vacancies in firms of different sector. In the Greater Dublin Region vacancies are reported by over 60 per cent of manufacturing firms with High-Tech Manufacturing reporting a slightly higher rate than Traditional Manufacturing. On the other hand the Construction sector reported the lowest number of firms with vacancies both within the Greater Dublin Region as well as the rest of the country, which is somewhat surprising given the boom in the building industry.

Table 5.19: Percentage of Firms which have Vacancies Broken Down by Region, 1998

	Dublin	Mid-East	Rest of the Country	Total
No Vacancies	67.4	77.6	76.2	73.0
Vacancies	32.6	22.4	23.8	27.0

Source: National Survey of Vacancies in the Private Non-Agricultural Sector, 1998.

Table 5.20: Percentage of Firms which have Vacancies Broken Down by Sector, 1998

	Greater Dublin Region		Rest of the Country	
	No Vacancies	Vacancies	No Vacancies	Vacancies
Traditional Manufacturing	39.9	60.1	53.0	47.0
High-Tech Manufacturing	35.6	64.4	77.1	22.9
Construction	77.1	22.9	84.5	15.5
Wholesale and Retail	69.8	30.2	84.5	15.5
Financial, Insurance and Business Services	75.8	24.2	83.6	16.4
Transport, and Other Services	64.2	35.8	65.0	35.0
Total	69.2	30.8	76.2	23.8

Source: Williams J. and G. Hughes, *National Survey of Vacancies in the Private Non-Agricultural Sector, 1998*.

5.6 Social Characteristics

Social Class is an indicator of how individuals view themselves both in terms of their status but also in terms of their income. With regard to social characteristics the Census of Population contains details on social class of individuals. The proportions of individuals in each social class are shown in Table 5.21. The table indicates that Professionals constitute a substantially larger proportion in Dun Laoghaire-Rathdown than in the State as a whole. The same is also true for the Managerial and Technical class which is also represented more strongly in Fingal. The percentage of Skilled Manual is considerably lower in Dun Laoghaire-Rathdown than the national average.

Similarly the percentage of Unskilled is particularly low in Dun Laoghaire-Rathdown and to a lesser extent in Fingal and South Dublin while this proportion is higher in County Meath.

Table 5.21: Percentage of the Population in each Social Class, 1996

	Dublin Co. Borough	Dun Laoghaire Rathdown	Fingal	South Dublin	Kildare	Meath	Wicklow	State
Professionals	5.5	13.3	6.9	4.6	5.3	5.4	6.1	5.4
Managerial and Technical	18.4	34.1	28.6	22.1	23.9	23.4	24.0	22.0
Non-manual	18.8	19.8	21.4	21.4	20.7	17.3	17.3	18.4
Skilled Manual	18.8	11.9	18.3	23.0	20.1	23.3	20.7	20.5
Semi-skilled	13.2	7.2	10.7	13.0	11.0	11.8	12.5	12.8
Unskilled	8.0	3.6	5.7	6.0	9.2	10.1	8.9	8.5
Unknown	17.4	10.1	8.4	9.8	9.8	8.7	10.4	12.4

Source: CSO Census of Population, 1996.

An indicator which is a measure of the number of people with a low income is the number of medical cards and the number of persons covered by a medical card. These indicators are outlined in Table 5.22 which shows that the number of medical cards has fallen since 1996 which indicates that the average income of the population has been increasing. Nevertheless, the absolute number of persons covered by the medical card is still substantial. Furthermore, the percentage of the population covered by a medical card is lower in all counties than the national average, both in 1996 and 2000.

Table 5.22: Number of Medical Cards and Percentage of Population Covered by Medical Cards, 1996 and 2000

	Number of Medical Cards		Persons Covered by Medical Cards		Percentage of Population Covered By Medical Card	
	1996	2000	1996	2000	1996	2000
Dublin	168,444	167,840	282,872	270,476	26.7	24.4
Kildare	20,318	21,484	35,004	35,582	25.9	24.1
Meath	23,028	18,409	38,645	30,500	35.2	24.5
Wicklow	20,354	20,453	35,068	33,191	34.2	30.0
State	742,930	714,632	1,252,384	1,157,191	34.5	30.6

Source: Department of Health and Children. The percentage of the population covered by the medical card for the year 2000 was calculated using the population estimates contained in this report.

5.7 Lone Parents

The number of lone parent households is an important variable since lone parents, and particularly lone mothers, often find themselves locked out of the labour market since they find it difficult to afford childcare. Thus, lone parents constitute a group which has particular service needs, especially in terms of childcare but also in terms of other services. Lone mothers constitute an important part of the untapped labour pool. However, lone mothers also find themselves trapped in poverty and deprivation since, if they can not work, they have to rely on one parent family payment and child benefit for their income. They, therefore, also constitute a group of people with particular social problems. Table 5.23 shows the percentage of households in 1996 which are either lone parent households with children or lone parent households with children and other persons. The percentage of lone parent households is above the national average in the Dublin County Borough, South Dublin and Wicklow, while they constitute a smaller share in the other counties. Furthermore, the table shows that relatively few lone parent households also contain other persons. This implies that many of the lone parents do not have the benefit of an additional adult in their household who could be of assistance either with childcare or through other benefits. Of course, it is impossible to establish the extent of the childcare needs using the census data.

Table 5.23: Percentage of Lone Parent Households, 1996

	Lone Parent with Children	Lone Parent with Children and Other Persons	Total including Lone Parent and Children
Dublin County Borough	10.8	2.0	12.8
Dun Laoghaire-Rathdown	9.0	1.8	10.8
Fingal	9.1	1.7	10.8
South Dublin	11.3	1.9	13.2
Dublin	10.4	1.9	12.3
Kildare	9.0	1.7	10.7
Meath	8.7	1.6	10.3
Wicklow	9.9	1.8	11.7
Mid East	9.2	1.7	10.9
State	9.4	1.8	11.2

Source: CSO Census of Population, 1996.

Of course, the number of households does not yield information about the number of children living in single parent households. The percentage of children under the age of 15 who live in lone parent households are indicated in Map 12 and Map 13. This clearly shows that these types of household are spatially concentrated in the more deprived areas such as Ballymun or Finglas. In these areas children who grow up in lone parent households account for a large proportion of all children.

5.8 Summary

In this chapter a wide range of labour force and social characteristics were analysed. Some interesting differences between areas within the region emerge. For example, the educational profile of Dun Laoghaire-Rathdown is somewhat better than that of other counties. Within the counties the more deprived areas, such as Tallaght or Clondalkin have poor educational profiles. Similarly, more rural areas of Counties Kildare, Meath and Wicklow have a worse educational profile than areas closer to Dublin. This type of pattern is repeated with regard to the other measures such as social class and unemployment. For this reason these more deprived areas are often referred to as areas of multiple deprivation. However, this is somewhat misleading since these indicators measure essentially the same thing. Since deprivation appears to be concentrated in certain areas, policy responses should be targeted at specific areas rather than applied uniformly across all areas.

The analysis of unemployment showed that this has declined dramatically since 1996. However, the unemployment rate alone is not a good measure since the absolute number of unemployed people is still high, particularly in the Dublin Region. There is a large difference between the unemployment rates across space, which results in more moderate unemployment rates due to averaging out of differences. Unemployment is spatially concentrated and there still exists a pool of potential workers. This is despite the fact that a significant proportion of firms are seeking employees, which suggests that there is some mismatch between the skills of the unemployed and the skills sought by employers. This mismatch is likely to be due to the fact that the unemployed do not have sufficient skills rather than the wrong skills. This is indicated by the high correlation between areas of high unemployment and areas of poor educational attainment. An interesting finding is that within the areas there is a mixed picture regarding the presence of clusters in the areas with highest unemployment. This might give rise to a spatial mismatch where jobs are located in areas where workers are harder to find.

6. TRANSPORT INFRASTRUCTURE AND COMMUTING

6.1 Road Infrastructure

Important both for industry and the population is an adequate and efficient infrastructure which encompasses not only transport infrastructure (roads, ports, airports and public transport) but also environmental infrastructure such as the sewage system and water supply. Here we focus particularly on the transport infrastructure which is a key variable in economic development. Of course the availability of infrastructure is strongly influenced by the demand for that infrastructure and this has become apparent with regard to the road network in the Greater Dublin and Mid-East Regions where the existing infrastructure is under considerable strain. A key feature of this increase in demand is the pattern of commuting.

The distribution of the road network among the counties is indicated in Table 6.1 which shows that the region has an extensive network of roads, particularly with regard to national primary roads. In addition to the extent of the network, the spatial distribution of roads is quite favourable as can be seen from Map 14. Also noticeable in this map is the topographical constraint imposed by the Dublin and Wicklow mountains.

Tables 6.1 to Table 6.4 give measures of the density and usage levels of the roads in the Counties of the Greater Dublin Region and the State as a whole. With regard to density all counties except Wicklow have a higher than average density of National Primary roads while all except South Dublin and the Dublin County Borough have a lower density of National Secondary roads. All counties have a higher than average density of regional roads while the Counties of the Mid-East Region have a lower density of local roads which is likely to be due to the considerably lower degree of urbanisation.

Table 6.1: Road Density Measured by Kilometres of Road per Square Kilometre of Area, 1997

County	Primary	Secondary	Regional	Local	Total
Kildare	0.07	0.02	0.23	1.04	1.35
Meath	0.05	0.03	0.20	1.05	1.34
Wicklow	0.03	0.02	0.21	0.81	1.07
Dun Laoghaire-Rathdown	0.16		0.82	3.90	4.88
Fingal	0.14		0.43	1.67	2.23
South Dublin	0.14	0.10	0.44	2.72	3.40
Dublin County Borough	0.30	0.05	1.44	8.21	10.00
State	0.04	0.04	0.17	1.14	1.39

Note: Calculated using data from the Department of the Environment and Local Government, Roads Inventory, 1997.

Table 6.2: Index of Road Density, 1997

County	Primary	Secondary	Regional	Local	Total
Kildare	166.4	38.6	134.9	90.8	96.9
Meath	130.7	84.2	119.8	92.2	96.5
Wicklow	66.5	53.0	123.3	70.9	76.6
Dun Laoghaire-Rathdown	402.6		482.2	341.8	351.1
Fingal	340.6		255.0	146.0	160.7
South Dublin	348.5	248.1	262.0	238.4	244.8
Dublin County Borough	760.9	128.3	846.6	719.7	719.7
State	100.0	100.0	100.0	100.0	100.0

Note: Calculated using data from the Department of the Environment and Local Government, Roads Inventory, 1997.

While the data on road density appears to suggest that the Greater Dublin Region is particularly well endowed with road infrastructure, the density of roads has to be viewed in terms of the large population. Tables 6.3 and 6.4 show that when the number of persons per kilometre of roads, which measures the level of potential usage or the service level, is used as a measure the picture changes somewhat. This measure indicates that the Greater Dublin Region has a below average endowment of roads in the Counties of the Dublin Region, Wicklow, and Kildare. However, the latter has an above average service level with respect to National Primary roads.

Table 6.3: Road Service Level Measured by Thousands of People per Kilometres of Road, 1997

County	Primary	Secondary	Regional	Local	Total
Kildare	1.20	5.27	0.35	0.08	0.06
Meath	0.90	1.43	0.23	0.04	0.04
Wicklow	1.91	2.44	0.24	0.06	0.05
Dun Laoghaire-Rathdown	9.36		1.84	0.39	0.31
Fingal	2.71		0.85	0.22	0.17
South Dublin	7.03	10.08	2.20	0.36	0.29
Dublin County Borough	13.50	81.67	2.85	0.50	0.41
State	1.32	1.35	0.31	0.05	0.04

Note: Calculated using data from the Department of the Environment and Local Government, Roads Inventory, 1997 and the population by county taken from the 1996 Census of Population.

Table 6.4: Index of Road Service Level, 1997

County	Primary	Secondary	Regional	Local	Total
Kildare	109.83	25.52	89.11	60.00	64.01
Meath	146.41	94.30	134.18	103.35	108.09
Wicklow	68.98	55.04	127.99	73.56	79.55
Dun Laoghaire-Rathdown	14.09		16.88	11.97	12.29
Fingal	48.61		36.39	20.83	22.94
South Dublin	18.76	13.35	14.10	12.83	13.17
Dublin County Borough	9.77	1.65	10.87	9.24	9.24
State	100.00	100.00	100.00	100.00	100.00

Note: Calculated using data from the Department of the Environment and Local Government, Roads Inventory, 1997 and the population by county taken from the 1996 Census of Population.

6.2 Modal Split

The mode of transport used by individuals is an important variable since this has wide ranging policy implications. For instance, a high level of car usage results in higher levels of road congestion, which could be tackled either by building more roads or by persuading car users to use other modes of transport. However, a shift in transport mode is only feasible if there are adequate alternatives such as public transport which in turn might need to be expanded. A high level of public transport usage might also result in overcrowding of buses or trains which again would need to be addressed otherwise passengers may prefer to use private transport such as cars.

Table 6.5 gives a breakdown of the means of transport as measured by the percentage of those travelling to work who use each of the means of transport listed. This data is drawn from the 1996 Census of Population and the special module on Travel to Work in the Quarterly National Household Survey, 2000. The table clearly shows that the car is by far the most frequently used means of travel to work. Bus travel is only important in the Dublin Region while walking ranks high both in the Dublin Region and in the Mid-East Region.

Table 6.5: Percentage of Those Travelling to Work by Means of Transport, 1996 and 2000

Region	Car (driver)	Car (passenger)	Motor-cycle	Bus	Train or Dart	On Foot	Bicycle	Other or Not Stated	Working from Home
1996									
Dublin	45.1	6.1	1.1	17.0	4.2	11.2	5.6	5.6	4.0
Mid-East	51.8	9.2	0.9	4.8	2.8	9.7	2.7	7.3	10.7
State	46.3	8.7	0.9	7.6	1.7	11.5	3.6	7.4	12.3
2000									
Dublin	50.3	5.1	1.4	16.1	4.0	12.1	3.7	5.1	2.2
Mid-East	59.7	10.1	0.7	4.6	1.8	8.3	1.0	5.9	7.9
State	54.1	8.6	0.8	6.9	1.6	11.0	2.0	5.0	10.0

Source: Central Statistics Office, Census of Population, 1996, Volume 6 and Quarterly National Household Survey, Travel to Work, 1st Quarter 2000.

A comparison of the figures for 1996 and 2000 reveal a number of related trends. First, the percentage of people driving a car to work has increased in the regions and nationally. Second, the percentage using both forms of public transport as well as cycling have decreased in importance. Third, travelling as a passenger in a car or van has increased marginally in the Mid-East Region while it declined in the Dublin Region. Finally, walking to work has increased in the Dublin Region while it declined in the Mid-East Region.

The increase in car usage is likely to be a result of a number of reasons. With increased prosperity, car ownership has increased dramatically over recent years. The dispersion of employment to suburban business parks, which are more difficult to reach with public transport than more central locations necessitates the use of a car. More dispersed settlement patterns, particularly outside of the major urban centres, have resulted in a smaller proportion of individuals having access to public transport. Finally, public transport is either seen as impractical, expensive and unreliable. Clearly, this increase in the use of a car has important implications. Car based commuting generates a higher level of pollution per person transported than any other form of land transport since it involves the use of a motor vehicle for the use of a small number of people. Furthermore, this increase in car usage also increases congestion which reduces the usefulness of roads, increases the cost of transport to the individual both directly through higher fuel costs and through longer time spent travelling and finally increases transport costs to industry, making Ireland less competitive and a less attractive location for foreign direct investment.

6.3 Commuting and Transport Usage

As mentioned above, the availability of infrastructure also crucially depends on the usage of that infrastructure, since congestion reduces the usefulness of such facilities. The transport infrastructure usage is influenced strongly by the pattern and level of commuting, which is both a cause and effect of settlement patterns and as has been mentioned above leads to a distortion of GVA at regional level. Commuting can be defined in many ways. Here we are mainly concerned with commuting (travel to work, school etc.) between the territories of the regional authorities and between the counties. However, the commuting patterns within regions are also of interest.

In order to gauge the extent of usage of the road infrastructure data on traffic flows on the national roads system as measured annually by the National Roads Authority can be utilised. Furthermore, the data contained in the 1996 Census of Population and the Quarterly National Household Survey Travel to Work module, shed light on the commuting behaviour of individuals both in terms of distance travelled and transport mode used. One of the difficulties with the Census and QNHS data is that neither

records the destination of travel which limits the usefulness of the data. In order to assess the extent of commuting into Dublin it is necessary to draw on another source of data, namely a unique data set provided by the Revenue Commissioners which contains the total number of workers resident in one county and working in another. In the analysis below all these data sources are utilised to provide a comprehensive picture of the extent of commuting.

In order to establish the overall level of commuting one can calculate the percentage of people who travel more than 15 miles to work or school using the data from the 1996 Census of Population. This is displayed in Map 16 which shows a clear commuter belt around Dublin as measured by the percentage of those travelling to work/school (see also Table 6.6). Interestingly, the extent of this commuting belt has not increased between 1991 and 1996 using this measure, although there has been a substantial increase in the absolute number of people travelling more than 15 miles (see Table 6.6). This increase in the number of commuters has also been reflected in the density of traffic on the national road network. Map 15 indicates the level of traffic as measured by the Annual Average Daily Traffic (AADT) and shows that this is highest closer to Dublin and in particular in and around the M50. This pattern of road usage is due to the absolute size of the Dublin population and the availability of employment which results in commuting into Dublin from the surrounding hinterland, as well as shopping and recreational facilities and the existence of major international transport infrastructures such as Dublin Port and Dublin Airport. Table 6.8 indicates the average increases in traffic flows on some of the major national roads in the region. The traffic density has increased particularly strongly on the M50, N2 and N3.

Table 6.6: Percentage of Persons Aged 15 Years and Over in Each County Classified by Distance Travelled to Work, 1996

County	0 miles	1 mile	2 miles	3 miles	4 miles	5 - 9 miles	10 - 14 miles	15 miles and more	Not stated
Dublin County Borough	3.6	15.5	14.2	15.0	10.4	21.7	4.9	2.2	12.6
Dun Laoghaire-Rathdown	4.6	8.3	8.5	10.2	9.7	36.6	10.4	3.9	7.7
Fingal	4.6	7.2	4.9	5.4	4.9	31.2	20.7	12.8	8.3
South Dublin	3.8	8.2	8.4	9.8	10.0	36.1	10.8	4.0	8.9
Kildare	7.3	13.9	6.0	4.7	4.1	13.9	14.8	24.8	10.3
Meath	10.7	9.9	5.9	4.6	3.3	14.4	11.6	26.4	13.2
Wicklow	9.7	15.2	6.4	3.8	2.9	11.9	13.4	24.2	12.5
Greater Dublin Area	5.2	11.7	9.4	9.8	7.9	25.2	10.5	9.5	10.6
State	11.0	14.0	9.2	8.1	5.8	18.5	9.1	10.9	13.3

Source: CSO Census of Population, 1996. Volume 6, Travel to Work, School and College.

Table 6.7: Change in Absolute Numbers of Commuters Travelling Over 15 Miles, 1991 to 1996

County	Percentage Change 1991-1996	Annual Increase
Dublin County Borough	84.5	16.9
South Dublin	90.5	18.1
Fingal	52.4	10.5
Dun Laoghaire-Rathdown	50.6	10.1
Kildare	63.1	12.6
Meath	64.9	13.0
Wicklow	54.9	11.0

Note: The above figures were calculated using the CSO Census Small Area Population Statistics (SAPS), 1991 and 1996.

Table 6.8: Changes in the Volume of Traffic on Selected National Roads, 1996-1998

Road	Percentage Change	Road	Percentage Change
N1	+13.9	N7	+15.3
N2	+23.0	N9	+22.2
N3	+26.1	N11	+1.9
N4	+18.0	M50	+55.3

Source: Calculations based on data from the National Roads Authority, Traffic Flows, 1996 and 1998.

It is generally accepted that commuting has increased in more recent times and it is therefore necessary to draw on other sources of data to establish the current extent of commuting. The Quarterly National Household Survey, Travel to Work (2000), contains more up-to date data on commuting but is limited, in that it does not contain information regarding the destination of commuters and the data is only available by region. However, since the data refers to the same questions as those asked in the Census of Population it allows for a comparison between the situation in 1996 and that in 2000.

Table 6.9 shows that for residents of the Dublin Region distances from work between one and nine miles are most common with very short and very long distances being less common. In contrast for the Mid-East Region most commuting distances are either short or long with lower importance of intermediate distances. Particularly noticeable is the high level of long commuting distances for workers resident in the Mid-East Region, which is likely to be explained by commuting to Dublin. The comparison between the figures for 1996 and 2000 reveals that short distances to work have increased while longer distances have decreased for the Dublin Region. In contrast the proportion of individuals with long commuting distances has increased for the Mid-East Region.

Table 6.9: Percentage of Persons Aged 15 years and Over in each Region Classified by Distance Travelled to Work, 1996 and 2000

Region	0 miles	1 mile	2 miles	3 miles	4 miles	5 - 9 miles	10 - 14 miles	15 miles and more	Not stated or no fixed distance
1996									
Dublin	4.0	11.3	10.5	11.5	9.3	28.9	9.6	4.6	10.3
Mid-East	9.0	13.0	6.1	4.4	3.5	13.5	13.4	25.1	11.8
State	11.0	14.0	9.2	8.1	5.8	18.5	9.1	10.9	13.3
2000									
Dublin	9.3	12.1	13.4	12.0	12.3	23.2	8.1	4.0	10.4
Mid-East	12.4	9.0	4.1	3.6	3.6	13.5	15.9	27.4	5.6
State	14.8	12.6	9.6	7.8	7.8	17.1	9.6	12.4	8.3

Source: Central Statistics Office, Census of Population, 1996, Volume 6 and Quarterly National Household Survey, Travel to Work, 1st Quarter 2000.

It is also possible to gain some further insights into the extent of commuting using public transport modes. Table 6.9 shows the extent of commuting between Dublin and its hinterland using the Bus Éireann services broken down by route. The table shows that these commuter routes are frequented by over 44,000 passengers each week, with the highest number of passengers on the Kildare–Dublin; Kells/Navan–Dublin and Ashbourne–Dublin route, a service provided for urban centres with a large population. The utilisation of the bus service increased on most routes from 1998 to 1999.¹⁶ Of course not all of these journeys are due to commuters, and some will be due to tourists, shoppers or day trippers. As such the figures presented in the table overestimate the level of commuting.

Table 6.10: Number of Passengers Transported by Bus Éireann on Commuter Routes During 1998 and 1999

Origin	via	Destination	Annual Passengers 1998	Annual Passengers 1999	Percentage Change 1998-99	Weekly 1999	Weekly 1998
Ardcath		Dublin	15,199	16,263	7.00	313	292
Ashbourne		Dublin	332,143	372,000	12.00	7,154	6,387

¹⁶ The substantial decline on the Carnew–Dublin route is explained by a reduction in the frequency of that service.

Kingscourt		Dublin	40,000	42,000	5.00	808	769
Kells	Navan	Dublin	410,714	460,000	12.00	8,846	7,898
Granard		Dublin	124,074	134,000	8.00	2,577	2,386
Longford	Mullingar	Dublin	94,792	91,000	-4.00	1,750	1,823
Edenderry	Clane	Dublin	159,091	175,000	10.00	3,365	3,059
Mountmellick	Portlaoise	Dublin	22,642	24,000	6.00	462	435
Kildare	Newbridge/Naas	Dublin	670,000	670,000	0.00	12,885	12,885
Kilkenny		Dublin	41,441	46,000	11.00	885	797
Carnew		Dublin	5,263	4,000	-24.00	77	101
Wicklow		Dublin	292,929	290,000	-1.00	5,577	5,633
		Total	2,208,288	2,324,263	5.25	44,697	42,467

Note: The data for this table was supplied by Bus Éireann.

Detailed figures on Rail and Dart usage which were supplied by Iarnród Éireann, are contained in Tables A9.10 to A9.14 in the Appendix. These tables show that the dart and rail system is utilised by a large number of individuals. Again the number of inward journeys overestimates the level of commuting. The weekly number of inward journeys was just over 200,000 between Rail and Dart. The origins with the highest number of train passengers were Drogheda, Malahide, Dundalk, Donabate on the Dundalk--Dublin route, Newbridge, Sallins/Naas, and Kildare on the Kildare--Dublin route. For the Dart the origins with the highest number of journeys were Bray, Dun Laoghaire, Blackrock, and Killester.

The data presented so far does not allow for a clear identification of the commuter belt/travel to work area around Dublin, as the Census and QNHS data does not contain information on the destination of individuals. However, the data on public transport usage suggests that the commuter belt extends outside of the Greater Dublin Region. In order to identify the extent of the travel to work area around Dublin a unique up to-date data set supplied by the Revenue Commissioners is utilised. This data set which consists of total numbers of workers who are resident, during the second quarter of 2000, in a particular county classified by the county where their employer is located. This data can be used to estimate the relationship between the distance between counties, other variables and the extent of commuting.

To model these flows a simple gravity model is used (see Sen and Smith, 1995).¹⁷ The gravity model relates the size of the flow (the number of people who commute) from one county to another county to the distance between the two locations and a variable which captures the strength of attraction of a location and the potential flow from a location. In keeping with the international literature (see Sen and Smith, 1995) we use the population in a county in 1996 to measure the strength of attraction and the potential flow out of a county. The model then relates the total number of commuters from one county to another to the distance between these two counties and the population in each county. In order to measure the impact of these variables on the total number of commuters from one county to another this relationship is estimated using the ordinary least squares (OLS) regression techniques. This relationship can then be used to predict the flows from one DED to another DED. The results from this estimation procedure can then be utilised to spatially interpolate the commuting flows from a given District Electoral Division (DED) to another point, in this case Dublin, which can then be mapped. In order for this methodology to be valid the estimated relationship must be able to predict the flows accurately. Overall, the predictive performance of the estimated gravity model is very good which means that the interpolation results will also be reasonably accurate.

The results from this interpolation are displayed on Map 17. This map shows an inner commuting belt which roughly corresponds to the commuting belt indicated in

¹⁷ The detailed methodology employed for this analysis is outlined in the Appendix.

Map 16. However, the analysis reveals that substantial numbers of individuals commute to Dublin from outside the Greater Dublin Region. The extent of this outer commuting belt is dependent on the cut-off point chosen since even outside this belt some individuals commute to Dublin.¹⁸ Given the chosen cut-off point (see the Appendix for details) it appears that a substantial number of people travel in excess of 40 miles, such that Counties Louth, Laois, Offaly and Westmeath are to a large extent part of this commuter belt while there also appear to be significant numbers of commuters from Carlow, Cavan, Longford, Monaghan and Wexford.

6.4 Summary

The Greater Dublin Region has access to an extensive network of transport infrastructure, both in terms of roads but also other infrastructure such as a relatively well developed rail network. However, this level of access has to be seen in the light of very heavy usage of all types of infrastructure. Thus the service levels are only partial indicators since commuting into the region adds to the pressure on the infrastructure.

Commuting is a very extensive phenomenon in the Greater Dublin Region, and indeed the commuting belt around Dublin extends to the neighbouring regions. Commuting flows using public as well as private means of transport are substantial. This has a number of consequences. First, the level of commuting puts great pressure on the existing transport infrastructure, both public and private. Second, as congestion has increased this is likely to have negative consequences for the economic development of the region since congestion gives rise to higher transport costs. Third, the level of commuting and congestion has a negative impact on the environment. Finally, commuting, and particularly long distance commuting has a social cost in that individuals spent time travelling which they could spend doing other things. Furthermore, individuals have a more stressful and longer day due to long distance commuting which is likely to have a negative impact both in terms of their work and social life. Thus, there is a need for public policy to address the issue of commuting. Given that pressure on the existing infrastructure is now so great the additional investment in infrastructure is urgently required. Additional infrastructure is planned for in the National Development Plan, however, delays in the implementation of the infrastructure component of the National Development Plan are likely to occur. There is, therefore, a need for other measures such as congestion pricing which are likely to affect the behaviour of individuals and businesses. Indeed, such a measure could be used to channel business activities into the more deprived areas of the region as a whole by exempting businesses located in these areas from such charges.

¹⁸ While a different cut-off point changes the extent of the commuter belts, large changes are required to significantly change the commuter belts depicted in Map 17.

7. SOCIAL CULTURAL AND RECREATIONAL FACILITIES

With the recent high rate of job creation, and the corresponding decline in unemployment, attracting and maintaining a skilled labour force will become more difficult. This is due to the fact that an increasingly mobile labour force which is less constrained with regard to location choice due to job availability, will move to areas which are attractive to live in. An attractive area one, which not only possesses a pleasant environment but one, which in addition to this possesses a range of facilities such as shops, theatres, parks, public and historic buildings, gardens, sports facilities, childcare facilities etc. These types of facilities are often referred to as social and recreational infrastructure. While such infrastructure will in many cases be efficiently provided by the private sector there remains a need for the public sector to become involved where the private sector is unable to provide the required facilities. This is particularly true in deprived areas where social and recreational infrastructure can play an important social role.

As highlighted by the ESRI report on *National Investment Priorities* (Fitz Gerald, Kearney, Morgenroth and Smyth, 1999) it is important to establish what gap there exists in relation to social and recreational infrastructure and which groups do or do not have access to existing facilities. This chapter attempts to enumerate the various facilities which are available in the Greater Dublin Region. In doing so the focus is on public facilities since only these are available to every person.

7.1 Cultural Capital

Cultural facilities consist of art centres, galleries, museums, music venues, theatres and cinemas. Table 7.1 shows that cultural facilities are particularly concentrated in Dublin and in particular in the Dublin County Borough. This is due in part to the fact that Dublin is the capital city and therefore possesses some of the national facilities. However, the concentration of facilities in the Dublin County Borough is quite striking and this must reflect more than the role of the capital city. Indeed it is likely that the location of these facilities is to a great extent determined by access considerations. They are therefore

Table 7.1: Arts Facilities in the Greater Dublin Area, by Type and County, 2000

	Arts Centre (multi- purpose)	Gallery/ Museum	Music Venue	Theatre	Cinema
Dublin County Borough	6	16	3	13	11
Dun Laoghaire-Rathdown	0	1	0	2	3
Fingal	2	1	0	0	2
South Dublin	0	2	0	1	1
Kildare	1	1	0	0	2
Meath	0	1	0	0	1
Wicklow	1	1	0	0	4
Greater Dublin Area	10	23	3	16	24

Source: Based on own sources and data supplied by the Arts Council.

located in the Dublin County Borough and in particular in the city centre since this ensures the largest possible audience within the region but also from outside the

region, due to the excellent transport links. This reasoning also points to a threshold effect regarding the size of the potential market. This means that it is likely to be difficult to develop such facilities outside of Dublin.

7.2 Recreational Capital

Recreational facilities include the many types of sports facilities such as sports centres, swimming pools, playing pitches and golf courses. Many of these facilities are provided by clubs and societies while other facilities are provided by local authorities. This section only covers those facilities that are publicly funded and open to the public, but excludes the facilities provided by clubs. This is due to the fact that currently no comprehensive lists of facilities are available.¹⁹ Furthermore, facilities such as swimming pools in hotels are not counted since these are not public facilities. As such the profile of facilities is only a partial one.

The two tables (7.2 and 7.3) give a rough indication of the facilities available. However, it must be borne in mind that these represent a small proportion of all the facilities, except in the case of swimming pools where all public pools are covered. There appear to be some differences with regard to recreational facilities in that the Dublin Counties appear to have more facilities which are publicly funded and maintained. In the Counties of the Mid-East there are fewer publicly funded and maintained facilities, perhaps since clubs have traditionally provided more of the facilities, and these may have received public support in the form of grants.

Table 7.2: Public Recreation Facilities in the Dublin Region, 2000

	Dublin County Borough	Dun Laoghaire- Rathdown	Fingal	South Dublin
Sports Centres	2		na	na
Swimming Pools	8	3		3
Playing Pitches	250	75	105	na
Tennis Courts	63	11 locations		na
Bowling Greens	1	2	1	na
Athletics Tracks		1	1	na
Cricket		1		na
Golf Courses	6	2	4	1

Source: Based on own sources. n.a. = not available

Table 7.3: Public Recreation Facilities in the Mid-East Region, 2000

	Meath	Kildare	Wicklow
Sports Centres	-	5	na
Swimming Pools	3	2	2
Playing Pitches	-	In excess of 135 acres of amenity land	na
Tennis Courts	-	-	na
Bowling Greens	-	-	na
Athletics Tracks	-	1	na
Cricket	-	-	na
Golf Courses	-	-	na

Source: Based on own sources. n.a. = not available

7.3 Social Capital

With regard to post primary schools all Counties of the Greater Dublin Region appear to be fairly evenly serviced. The average number of pupils per school reflects differences in the population density in so far as this is somewhat smaller in Counties Meath and Wicklow, which is necessary in order to limit the extent of the travel distance to school (see Table 7.4).

Table 7.4: Post Primary Schools, Pupil Numbers and Average School Size, 2000

	No. of Schools	No. of Pupils	Average School Size
Dublin	185	95,502	516

¹⁹ An inventory of such facilities for Kildare will be established by Kildare County Council during the summer of 2001.

Kildare	27	13,725	508
Meath	20	9,373	469
Wicklow	21	9,606	457
Greater Dublin Region	253	128,206	507
State	751	353,190	470

Source: Department of Education and Science.

The presence of higher level education facilities, and particularly universities has been suggested as a key issue in regional development. This is due to the fact that universities play a key role in improving the educational status of the labour force. Since universities are the sources for highly qualified workers, employers who require university graduates for their firms are more likely to locate closer to universities since this gives them an advantage in attracting graduates into their workforce. Furthermore, universities are important sources of innovations that are subsequently taken up by industry. This is particularly important in the high-tech sectors such as computers, software, pharmaceuticals and biotechnology. Indeed there are often close links between industry and universities in generating innovations through new research. Thus, through their research activities and their creation of human capital universities generate spillovers into industry that ultimately improve the performance of industry. However, these spillovers appear to be quite localised in areas close to universities (Anselin *et al.* 1997, 2000).

While there appears to be an equitable service level with regard to post primary schools, the same can not be said with regard to further education. The number of higher level education institutions in Table 7.5 clearly shows a lack of these facilities in Counties Meath and Wicklow. Of course, since by their nature these facilities need to be of a sufficient size in order to justify the investment required to establish them, not every county should have a university. However, access to higher level education is important since this can impart the skills needed for the more dynamic industries such as the computer industry. This suggests that rather than establishing new Third Level Institutions, outreach facilities linked to the existing institutions should be provided.

Table 7.5: Higher Level Education Institutions

	Universities	Institute of Technology	Colleges of Education	Other State-Aided Colleges	Private/Other Colleges
Dublin County Borough	2	1	4	1	13
Dun Laoghaire-Rathdown	1	1	2		3
Fingal		1			
South Dublin		1			1
Kildare	1				
Meath					
Wicklow					
Total	4	4	6	1	17

Another important social service is the health service. Here the availability of doctors and other health professionals are important indicators. One way of measuring the availability of health services is to measure the hospital service level. Of course, this has to be viewed in the light of service usage since there may well be “congestion” in the health service resulting in waiting lists and unsatisfactory treatment. Thus, the number of available beds is not a useful indicator if this is taken out of the context of service usage. The number of available beds and the number of inpatient admissions for hospitals in each county are shown in Table 7.6. There is a clear concentration of hospital beds in the Dublin County Borough. This is in part due to the fact that many of the national specialist services are located in the Dublin County Borough. However, the number of inpatient admissions is also considerably higher in the Dublin County Borough. For Counties Meath, Kildare and the Dublin County Borough the number of admissions per hospital bed are roughly similar (around 40) while this indicator is somewhat lower for Dun Laoghaire-Rathdown and Fingal, (26). The somewhat different numbers for Wicklow are explained by the fact that Wicklow has only two

community hospitals and no acute hospitals. Therefore, the service levels are not too dissimilar, although Wicklow clearly has a lower service level.

Table 7.6: Basic Indicators of Hospital Services and their Usage, 1998

County	Average Number of Inpatient Beds	Inpatient Admissions
Dublin County Borough	3,605	147,063
Dun Laoghaire-Rathdown	344	9,180
Fingal	329	8,830
South Dublin	470	17,980
Kildare	136	5,558
Meath	152	6,194
Wicklow	125	213
Total	5,161	195,018

Source: Department of Health and Children.

7.4 Summary

This chapter provides information about the availability of social, cultural and recreational infrastructure in the Greater Dublin Region. These facilities are important since they are significant in determining the quality of life of the region and local areas. Furthermore, these facilities, especially universities, can play an important role in the development of a region. While it was possible to collect comprehensive data for facilities such as schools, hospitals and arts facilities it proved difficult to obtain comprehensive data on sports facilities. Therefore, the profile of these facilities is only a partial one. Furthermore, the spatial equity of access to particular facilities was not explored in detail. A detailed study such as suggested by Talen and Anselin (1998) would require a level of detail regarding the services that was not available for this study. However, such an analysis is likely to yield important insights into spatial mismatch between supply and demand of facilities and inequity in service provision. Therefore further research in this area is warranted.

There appear to be significant differences between the counties with regard to cultural facilities, with which Dublin and particularly the Dublin County Borough are well endowed. Furthermore, there are large differences with regard to further education establishments which are again concentrated in Dublin. The fact that these facilities are clustered in Dublin is not surprising since they are often of national significance, and therefore, located in the capital. Furthermore, this concentration may also be the result of a threshold effect regarding the minimum demand that is necessary to sustain a facility. Differences regarding post primary schools are quite small and at least in part reflect differences in population density, which result in smaller catchments in rural areas. Differences regarding hospital provision are also small once the level of inpatient admissions is taken into account. However, County Wicklow is not well served with hospitals.

8. CONCLUSION

The purpose of this study was to provide a comprehensive profile of the counties that make up the Greater Dublin Region (the Dublin Counties and Kildare, Meath and Wicklow). As such this study is an attempt to fill gaps in our knowledge about the region. Such a profile is of major importance for policy making at the national, regional and local level since, without a clear characterisation of the region and local areas within it, it is difficult to identify problems which may require policy intervention.

The chapters presented above concentrated on specific topics largely disregarding the information presented in the other chapter. In this conclusion the results of each chapter are related to the results in other chapters in order to identify the underlying processes that determine the development of the region and the counties. This is of vital importance since only an understanding of the interconnected processes that operate in the region will facilitate the identification of appropriate policy interventions. The traditional approach in the economic literature is to build an economic model to uncover the relationship between variables. However, the data available for Irish regions is inadequate for such an exercise. However, it is possible to draw conclusions about the relationship between different variables from the preceding analysis.

The chapter on population and urban structure showed that the population in the Greater Dublin Region has been increasing but that the rate of increase differs between the counties. Furthermore, the population of the region and counties is projected to increase over the coming years. Importantly, the population is increasing more rapidly in the Mid-East Region than in the Dublin Region. This is likely to be due to a number of reasons. First, the potential for population increase is relatively low in the built up areas of Dublin since this would require an increase of the density of housing units. In the already built up areas this is impossible without re-development which would entail the demolishing existing structures. Second, high house prices in Dublin due to excess demand and insufficient supply of housing units forces individuals to move out of Dublin. Finally, it is possible that individuals simply prefer to live outside of Dublin due to quality of life reasons such as congestion.

This pattern of population growth is also reflected in changes in the urban structure of the region, since those urban centres closer to Dublin have grown faster over the period 1981 to 1996. While there are no published figures on population change in urban centres over recent years, the population estimates and associated growth rates calculated on the basis of the electoral register suggest that growth has spread out to areas further away from Dublin than was previously the case. However, there still appears to be a negative relationship between population growth and distance away from Dublin.

Of course, employment is considerably higher in the Dublin Region as compared to the Mid-East Region. Furthermore, while the Mid-East Region is catching up slowly with Dublin in terms of output as measured by per capita gross value added (GVA), the Mid-East Region is still substantially behind Dublin. This means that while the population is rising substantially in the Mid-East Region more people are commuting into Dublin. The fact that this is the case was shown in the chapter on transport infrastructure and commuting. Indeed the commuting belt around Dublin was shown to be very extensive, encompassing not just the Mid-East Region but also the surrounding counties of other regional authorities. Of course this high level of commuting has substantial costs. First, there is a high cost for the individuals who commute long distances in that they have to spend substantial periods travelling which

they could use in other more productive ways. This means that this is not just a personal cost but that this cost also has an impact on the economy as a whole since high levels of commuting are likely to reduce national income. Second, the high level of commuting results in traffic congestion which again is accompanied by personal and national costs since it increases travel times and therefore transport costs both for individuals as well as industry. Third, the high level of commuting results in excess pressure on infrastructure and therefore excess wear and high maintenance costs. Thus, the fact that the Greater Dublin Region possesses an extensive infrastructure network must be seen in the light of the very heavy usage that it is subject to. The analysis of the modal split in commuting showed that car usage is increasing, indicating that public transport is either inconvenient to users or not available, adding to the pressure on the road system. Finally and importantly for the development of the Counties of the Mid-East Region the high level of commuting means that the increase in the population does not have as significant an impact on the local economy as compared to a situation where most of the additional population work locally. This is due to the fact that they do not generate output locally which would at least to some extent draw on local services and other locally produced inputs. Furthermore, commuters are likely to spend a larger proportion of their income at the place they commute to than those who do not commute. Finally, they may also integrate less into local communities. Overall, this means that areas with a high proportion of commuters could become mere dormitories.

Of course there are reasons why Dublin continues to dominate the region in economic terms. First, Dublin is the national capital, and therefore many important administrative functions are located there, which makes Dublin an attractive location for many private services. Of course, the fact that many firms are already located in Dublin is an advantage to any new firm since the service activities that are likely to be required are already present. Similarly, other inputs are more likely to be available locally. This generates agglomeration economies which reinforce the dominance of Dublin. As the analysis of the manufacturing sector has shown, clusters of firms in particular industries exist in all counties. However even when controlling for the absolute size of the areas in terms of their total manufacturing employment, the Dublin Region has substantially more clusters than the counties of the Mid-East Region. This finding supports the existence of agglomeration economies. Of course this self-reinforcing process of agglomeration can also result in congestion as too many firms locate in one area.

While agglomeration economies are present in Dublin, there is little scope for these to emerge in the Counties of the Mid-East Region. This is suggested by the poor urban structure in the region which is totally dominated by Dublin and in which no town had a population exceeding 30,000 in 1996. Indeed the close proximity of Dublin is likely to reduce the possibility that a centre of sufficient size to generate agglomeration economies will emerge. However, the analysis of population change outside of Dublin city shows that rather than being concentrated in urban centres this is largely taking place in rural areas, which has two implications. First, this contributes to the volume of traffic since it is associated with low-density development in areas where services do not exist and where due to low population density they can not be profitably developed. Second, it does not add to the scale of the existing centres, thus maintaining the existing poor urban structure.

An important issue in the further development of the Greater Dublin Region is the scope for the expansion of the working population. This is crucially determined by two factors, namely the number of unemployed people and the female labour force participation. The unemployment rate has fallen dramatically over recent years. Nevertheless, the absolute number of persons unemployed remains substantial, particularly when a wider definition is used. This also shows that a large number of unemployed people have effectively withdrawn from the labour market. With regard to female labour force participation, this has been increasing strongly although it had already been above the national average. This suggests that the scope of increasing the labour force through an increase in the female labour force participation is becoming more difficult. As was shown most of the people in part-time employment are satisfied

with this type of employment which implies that this group will not move into full-time employment.

While the Greater Dublin Region has benefited from tremendous economic growth over recent years, unemployment and disadvantage still affect many people. In this regard the spatial concentration of disadvantage is an important issue. This is indicated by the fact that areas of high unemployment are also areas with poor educational attainment, a high concentration of lone mothers and concentrations of people in the lower occupational and social groups. These measures are likely to be related since, for example unemployment status is crucially determined by the level of education. This type of correlation also indicates a crucial problem in further reducing the number of unemployed, since there is likely to be a mismatch between the skills of those seeking employment (or those who are unemployed and have withdrawn from the labour market) and the requirements of employers. This mismatch arises due to a lack of skills and educational attainment among this group. This is indicated by the fact that many employers have vacancies. Furthermore, the high concentration of disadvantage is also likely to be the cause of social problems such as crime. Furthermore, given that disadvantage is highly concentrated there is the danger that this becomes a self-reinforcing problem where people become trapped in a culture of disadvantage.

The discussion above highlights a number of important issues that require policy interventions. The need for policy interventions arises out of the fact that some processes which have clear negative effects are unlikely to be alleviated by market forces. For example, the process that leads to high levels of commuting is one that is driven by market forces, which however result in negative effects both for individuals, industry and the country as a whole. This arises out of the fact that the costs of excess agglomeration are not borne by those who cause it but rather are borne by the whole economy. Tackling this problem requires a number of policy responses. First, development plans in Dublin should make provision for higher density residential development wherever new development is planned and particularly where there is scope for redevelopment in areas where densities are low. It should be borne in mind that this does not imply that high-rise development should be pursued, even though this would allow for the highest density. Second, residential development outside of Dublin city should be concentrated in existing urban centres. This, apart from reducing traffic flows, will also allow for the efficient provision of public services to individuals. Thus, steps should be taken to prevent the emergence of further ribbon development. Third, in order to manage the demand for road space measures such as road pricing should be introduced. Such measure should reduce the level of congestion, provided that public transport alternatives are available. Fourth, it is important to foster the development of industry and services in the larger urban centres in order to lay the foundations for self-sustaining industrial growth. Finally, in the light of the strong population growth, particularly outside of the Dublin Region, social, recreational and cultural facilities must be developed accordingly.

The analysis presented in this study should also result in more appropriate targeting and planning of public services. For example, the spatial concentration of disadvantage along with the spatial pattern in the age structure of the population suggests particular targeting of resources. Thus, provision for services for the elderly should be made in areas with a high proportion of elderly or age cohorts that will reach pension age in the medium term. Similarly, areas with high concentrations of children will require specific facilities such as schools, childcare and play grounds. In order to establish this profile an extensive array of data was assembled and analysed. In doing so many problems regarding the availability of data at the regional, county and sub-county level were encountered, which makes a serious analysis of some issues, impossible at a spatially disaggregated level. Therefore, one of the main recommendations of this study is that more data at the regional and local level be collected.

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9. APPENDIX

A9.1 Population Projection Techniques

First we define the following variables:

P_f = county population projection for the year f

P_a = county population at the start of the base (year a)

P_b = county population at the end of the base period (year b)

PS_f = state population projection for the year f

PS_a = state population at the start of the base (year a)

PS_b = state population at the end of the base period (year b)

x = number of years in the projection horizon

y = number of years in the base period

r = average annual growth rate during the base period.

The population projections methods are given by the three equations below.

Method 1 linear extrapolation (LINE)

$$P_f = P_b + \frac{x}{y}(P_b - P_a)$$

Method 2 exponential extrapolation (EXPO)

$$P_f = P_b \exp(rx)$$

Method 3 shares of state population (SHARE)

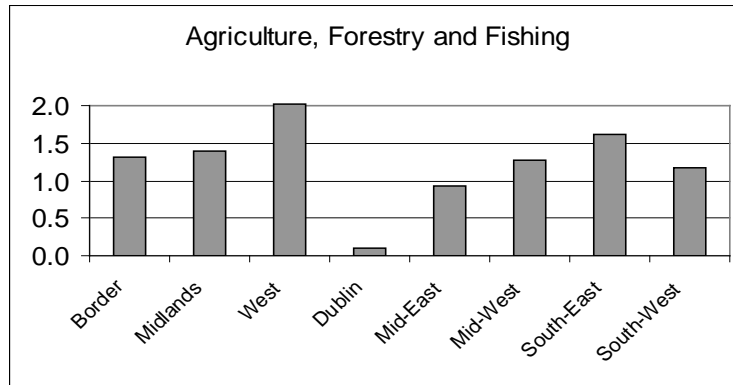
$$P_f = PS_f \left[\frac{P_b}{PS_b} + \frac{x}{y} \left(\frac{P_b}{PS_b} - \frac{P_a}{PS_a} \right) \right]$$

Method 4 average of the above three methods (AVERAGE).

A9.2 Location Quotients: Employment by Sector (2000q2)

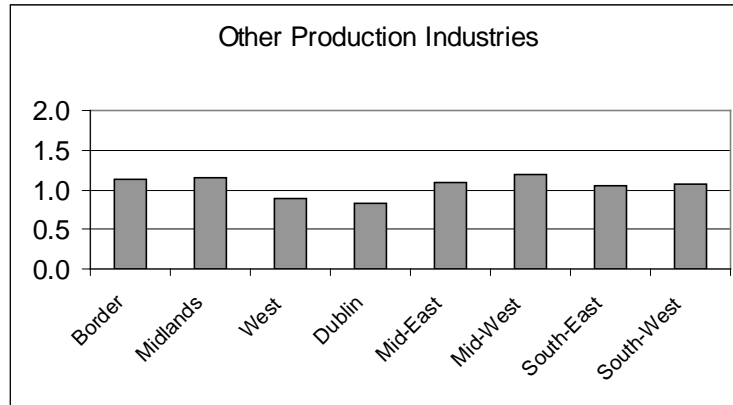
The Figures below show the concentration of industries relative to the concentration of the labour force. A location quotient of one indicates a share of employment in a particular sector is the same as the share of the labour force. A location quotient smaller than one indicates a share of employment smaller than the share of the population while a location quotient above one indicates a higher concentration of employment than suggested by the share of the labour force.

Figure A9.1: Location Quotient: Agriculture Forestry and Fishing



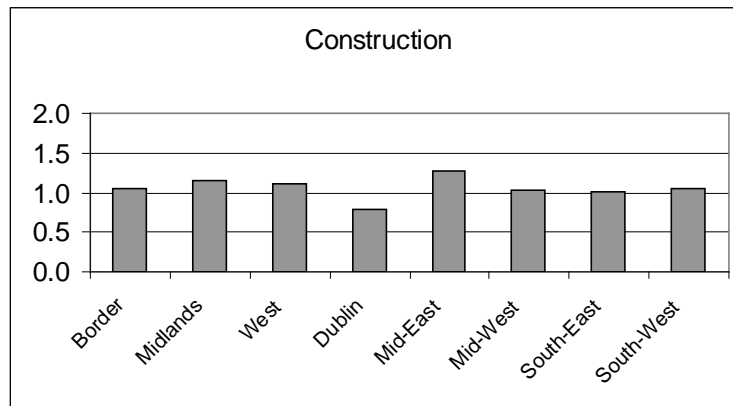
Source: CSO, Quarterly National Household Survey, 2000, 2nd Quarter, special tabulations provided by the CSO.

Figure A9.2: Location Quotient: Other Production Industries



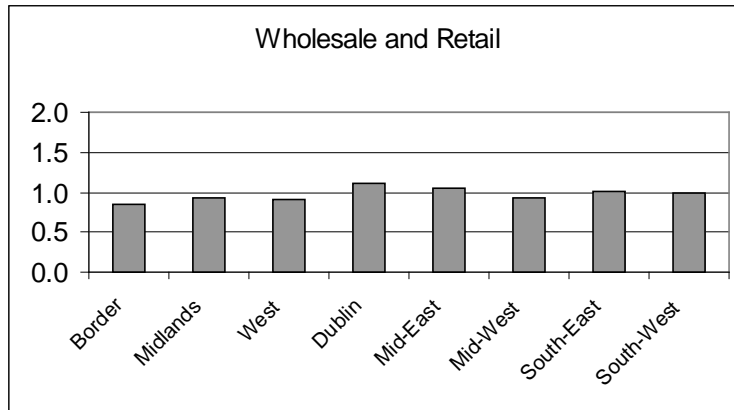
Source: CSO, Quarterly National Household Survey, 2000, 2nd Quarter, special tabulations provided by the CSO.

Figure A9.3: Location Quotient: Construction



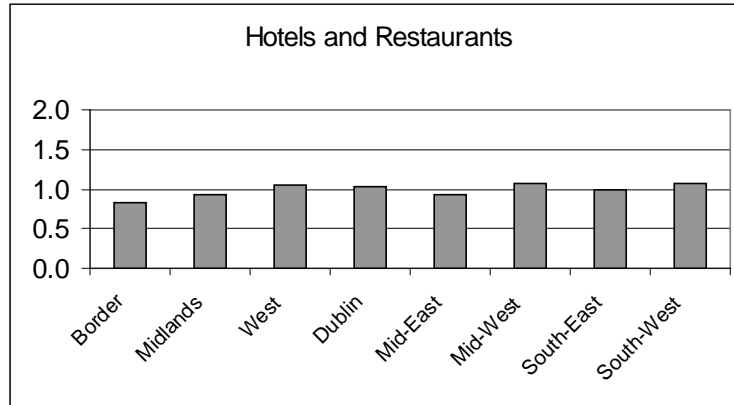
Source: CSO, Quarterly National Household Survey, 2000, 2nd Quarter, special tabulations provided by the CSO.

Figure A9.4: Location Quotient: Wholesale and Retail



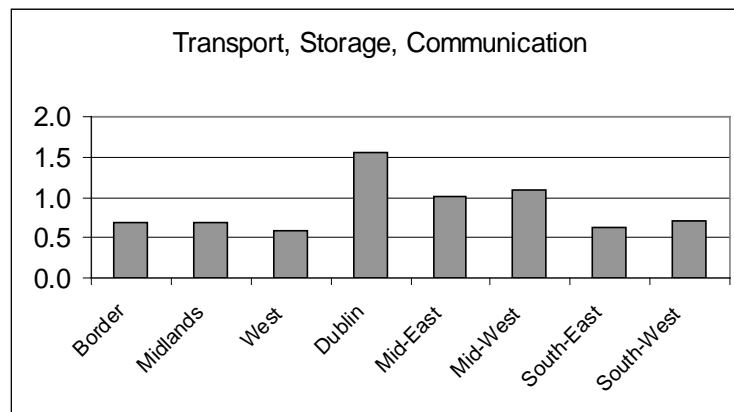
Source: CSO, Quarterly National Household Survey, 2000, 2nd Quarter, special tabulations provided by the CSO.

Figure A9.5: Location Quotient: Hotels and Restaurants

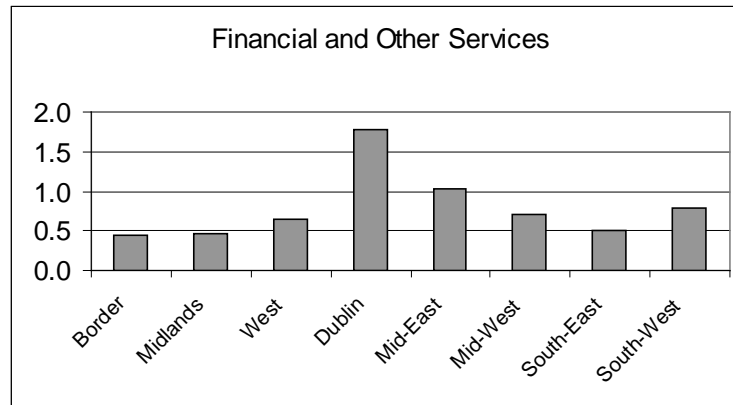


Source: CSO, Quarterly National Household Survey, 2000, 2nd Quarter, special tabulations provided by the CSO.

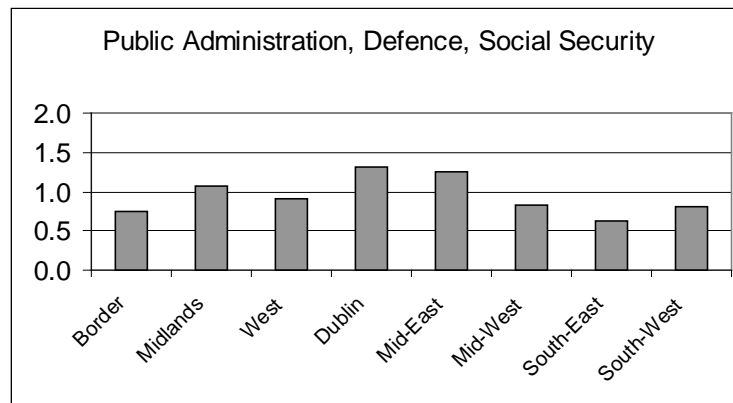
Figure A9.6: Location Quotient: Transport, Storage and Communication



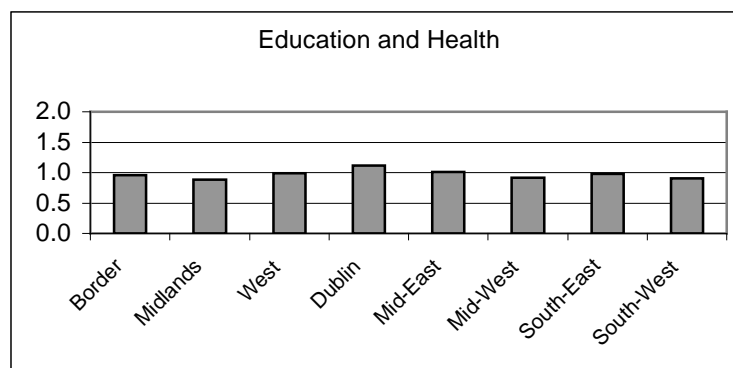
Source: CSO, Quarterly National Household Survey, 2000, 2nd Quarter, special tabulations provided by the CSO.

Figure A9.7: Location Quotient: Financial and Other Services

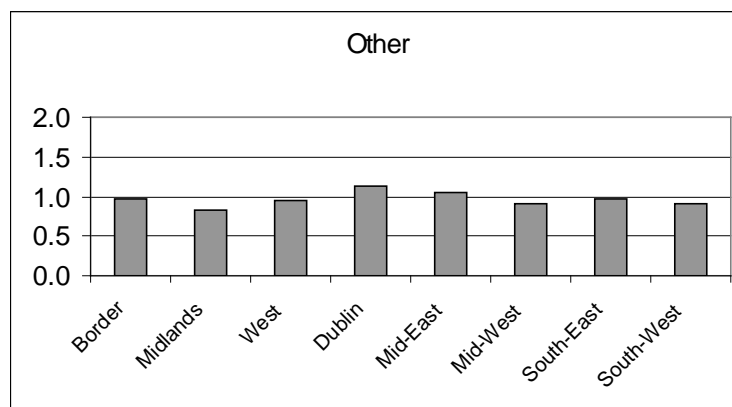
Source: CSO, Quarterly National Household Survey, 2000, 2nd Quarter, special tabulations provided by the CSO.

Figure A9.8: Location Quotient: Public Administration, Defence and Social Security

Source: CSO, Quarterly National Household Survey, 2000, 2nd Quarter, special tabulations provided by the CSO.

Figure A9.9: Location Quotient: Education and Health

Source: CSO, Quarterly National Household Survey, 2000, 2nd Quarter, special tabulations provided by the CSO.

Figure A9.10: Location Quotient: Other

Source: CSO, Quarterly National Household Survey, 2000, 2nd Quarter, special tabulations provided by the CSO.

A9.3 District Electoral Divisions or Wards with the Highest and Lowest Unemployment Rates for Each County

The tables below list the DEDs or Wards with the highest and lowest unemployment rates.

Table A9.1: Dublin County Borough Wards/DEDs with the Highest and Lowest Unemployment Rate, 1996

Ward/DED	Unemployment Rate (%)
Mountjoy A	59.0
Cherry Orchard C	52.9
Priorswood C	51.2
North Dock C	47.6
Mountjoy B	47.4
Pembroke West B	5.6
Pembroke East C	5.5
Pembroke East E	5.1
Clontarf East E	4.6
Clontarf East C	4.4

Source: CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Note: The unemployment rate is calculated as the percentage of those who are aged over 15 and who are in the labour force (employed, seeking first job and unemployed).

Table A9.2: South Dublin Wards/DEDs with the Highest and Lowest Unemployment Rate, 1996

Ward/DED	Unemployment Rate (%)
Tallaght-Fettercairn	47.91
Tallaght-Killinardan	43.5
Clondalkin-Rowlagh	36.84
Tallaght-Jobstown	35.98
Clondalkin-Moorfield	28.92
Rathfarnham-Hermitage	5.42
Ballyboden	5.38
Rathfarnham Village	5.24
Templeogue-Orwell	5.17
Firhouse-Ballycullen	3.39

Source: CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Note: The unemployment rate is calculated as the percentage of those who are aged over 15 and who are in the labour force (employed, seeking first job and unemployed).

Table A9.3: Fingal Wards/DEDs with the Highest and Lowest Unemployment Rate, 1996

Ward/DED	Unemployment Rate (%)
Blanchardstown-Tyrrelstown	44.6
Blanchardstown-Mulhuddart	39.6
Blanchardstown-Coolmine	31.8
Blanchardstown-Corduff	27.8
The Ward	20.6
Swords-Seatown	6.1
Lucan North	5.6
Portmarnock North	5.4
Castleknock-Park	4.9
Castleknock-Knockmaroon	4.7

Source: CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Note: The unemployment rate is calculated as the percentage of those who are aged over 15 and who are in the labour force (employed, seeking first job and unemployed).

Table A9.4: Dun Laoghaire-Rathdown Wards/DEDs with the Highest and Lowest Unemployment Rate, 1996

Ward/DED	Unemployment Rate (%)
Dun Laoghaire-Mounttown	30.0
Shankill-Rathsallagh	23.2
Dun Laoghaire-Sallynoggin West	22.7
Killiney South	21.4
Churchtown-Nutgrove	19.8
Stillorgan-Deerpark	4.2
Clonskeagh-Roebuck	4.1
Foxrock-Beechpark	4.1
Churchtown-Landscape	3.6
Blackrock-Glenomena	3.5

Source: CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Note: The unemployment rate is calculated as the percentage of those who are aged over 15 and who are in the labour force (employed, seeking first job and unemployed).

Table A9.5: Kildare DEDs with the Highest and Lowest Unemployment Rate, 1996

Ward/DED	Unemployment Rate (%)
Kilberry	28.1
Athy West Urban	27.0
Ballybrackan	26.0
Grangemellon	24.9
Skerries	22.8
Newtown	4.4
Kilteel	4.2
Drehid	3.7
Kildangan	3.6
Oughterard	3.5

Source: CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Note: The unemployment rate is calculated as the percentage of those who are aged over 15 and who are in the labour force (employed, seeking first job and unemployed).

Table A9.6: Meath DEDs with the Highest and Lowest Unemployment Rate, 1996

Ward/DED	Unemployment Rate (%)
Kells U.D.	21.5
Ardnamullan	21.5
Slane	20.7
Duleek	20.3
Navan U.D.	20.3
Boherboy	4.4
Killallon	4.4
Kilcooly	3.7
Ballinlough	3.2
Knocklough	3.2

Source: CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Note: The unemployment rate is calculated as the percentage of those who are aged over 15 and who are in the labour force (employed, seeking first job and unemployed).

Table A9.7: Wicklow DEDs with the Highest and Lowest Unemployment Rate, 1996

Ward/DED	Unemployment Rate (%)
Rathmichael (Bray)	38.1
Money	29.3
Bray No. 1	28.8
Cronebane	25.6
Ballinaclash	24.4
Calary	6.9
Altidore	6.7
Powerscourt	6.6
Kilbride	5.6
Tober	2.9
Ballycullen	2.4

Source: CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Note: The unemployment rate is calculated as the percentage of those who are aged over 15 and who are in the labour force (employed, seeking first job and unemployed).

A9.4 Method Used to Estimate the Extent of the Commuting Belt for Dublin

The data contained in the Census of Population is not suitable for the estimation of a commuting belt around Dublin since it does not contain information regarding the direction of travel. For this reason it is necessary to draw on data made available by the Revenue Commissioners. This dataset is organised as a matrix of the total number of individuals resident in one county by county in which they work. This matrix contains a total of 729 elements which refer to a commuting flow from one county to another for the second quarter of 2000.²⁰ This data is therefore much more up-to-date than the Census data.

This data has two drawbacks. First, the data is subject to measurement error since the employment is measured at the location from where the firm makes a tax return, which overcounts the employment in headquarters (from where tax returns are made) and undercounts the employment in branch plants and subsidiaries. Similarly, there may be some mismeasurement if individuals use a different address for tax matters than their usual address. However, in the regression framework outlined below mismeasurement of the dependent variable will not have any negative consequences. Second, the commuting behaviour in one county may be quite heterogeneous. Thus, residents of one county who live closer to another county are more likely to commute

²⁰ Dublin is broken down into Dublin County Borough and "Dublin County", while Tipperary could not be broken down into North Riding and South Riding.

to the neighbouring county than those who live further away. Since it is the aim to calculate the extent of the commuting belt relatively exactly, it is important to find a way to spatially disaggregate the data which can be achieved through the estimation of a model with its associated parameters. These parameters can then be used to predict the commuting flows at a more disaggregated level.

To model these flows a simple gravity model is used (see Sen and Smith, 1995). The gravity model relates the size of the flow (the number of people who commute) from location i to location j , to the distance between the two locations and a variable which measures “mass” of both locations. This “mass” variable captures the strength of attraction of one location. Since a high mass in the origin location will determine the potential size of the commuting flow from that location this mass variable is entered for the origin and the destination locations. This basic gravity model can be written as:

$$C_{ij} = D_{ij}^{\alpha} M_i^{\beta} M_j^{\gamma}$$

where C_{ij} denotes the commuting flow from the origin county i to the destination and M_i and M_j denote the mass of the origin and destination respectively and α , β and γ are parameters which need to be estimated. The parameters can then be estimated using ordinary least square. The parameter for distance is expected to be negative since one would expect the commuting flows to decline with increasing distance between the origin and the destination. The parameter for the destination mass is expected to be positive since a higher mass attracts a larger commuting flow. The sign of the parameter for the origin mass is expected to be positive since a higher origin mass will result in a higher absolute flow of commuters. However, since a higher mass in the origin will also constitute a force for preventing individuals from commuting thereby reducing the proportion of individuals who commute, the absolute size of the coefficient is expected to be smaller than that of the destination mass.

In order to estimate this model it is usual to apply a logarithmic transformation, and the addition of a constant and a disturbance term. The model can then be written as:

$$\log C_{ij} = \theta + \alpha \log D_{ij} + \beta \log M_i + \gamma \log M_j + e_{ij}$$

or

$$c_{ij} = \theta + \alpha d_{ij} + \beta m_i + \gamma m_j + e_{ij}$$

where the lower case variables denote the variables in logarithms.

Under the assumption that the estimated parameters are valid for commuting flows between spatially more disaggregated locations then these can be used to predict the flows between more disaggregated units as long as the same right hand side variables are available. In other words in order to interpolate the commuting flows between locations at a spatially more disaggregated level, the gravity model is first estimated in order to recover the parameters. Then, the same right hand side variables that were used for the county by county estimation but for the more spatially disaggregated units are entered on the left hand side of the estimated model in order to predict the left hand side – the absolute number of commuters.

In the case of commuting flows a number of different variables could be used to measure mass. These include employment, the number of firms, the labour force and the population. However, since this variable needs to be available for both the county level and the more disaggregated level – in this case the DED level, the only available variable is population or labour force in 1996. The fact that this data is not available for 2000 will not impact to much on the estimation since the use of up-to-date series might well be invalid due to endogeneity. In other words, the population resident at a particular location may also be determined by the commuting flows which would render the estimates inconsistent.

Clearly, commuting flows are likely to depend on more factors than simply populations and distance, such as house prices, family ties etc.²¹ However, since the focus is on interpolating at a spatially disaggregate level, the unavailability of such additional variables at this level precludes a more thorough exploration of the factors determining commuting. In order to take account of specific factors which may be important for flows to or from a particular location it is possible to enter dummy variables which take account of these specific differences. In the model estimated below, dummy variables are entered for flows to Dublin, flows within the Dublin Region and flows into and from the Mid-East Region in order to take account of the functional links between and within these regions and in order to take account of the primacy of Dublin. Furthermore, a contiguity dummy is added which takes account of the higher flows between counties that share a common boundary.

The results of the estimation are shown in Table A9.8. Overall the model explains 65 per cent of all commuting flows which is good considering the type of explanatory variables. As expected the coefficient for distance is negative, while those for the populations are positive. Thus, commuting flows decrease with increasing distance but increase with increasing population. As expected the coefficient for the origin destination is smaller than that for the destination population. Flows to and from Dublin are larger than those to and from other regions. While flows within the Dublin Region are smaller than flows across other counties. Flows in and out of the Mid-East Region to all other counties appear to be smaller than those elsewhere but this effect is not statistically significant. Finally, flows between contiguous counties are higher than those for counties that do not share a common border. Overall these results conform to those expected which is a necessary condition for the use of the parameters for spatial interpolation. However, as the observed commuting flows are not normally distributed the use of OLS may be questionable, since the mean may not well describe the central tendencies of the data, which can be better modelled using the Least Absolute Deviation method of estimation. Furthermore, since many of the flows are very small (say from Donegal to Dublin) the use of the TOBIT estimator may be more appropriate. Both these estimation methods did not yield results that were significantly different from the OLS results, and hence the latter are used.

The spatial interpolation now requires simply that for each DED the distance and the population variable are used to estimate the commuting flows. Since there are more than 3,500 DEDs in Ireland the results would be a 3,500 times 3,500 matrix of flows. However, the interest here is in the commuting behaviour from all DEDs outside of Dublin to Dublin which results in less than 3,500 flows. These are mapped on Map 17, where the DEDs within the Dublin area are added to the inner commuting belt. In order to define the extent of the commuting belt one has to choose a cut-off point since the probability of commuting from any DED in Ireland to Dublin is not zero. This introduces some arbitrariness which is, however, common in mapping in general. Here the cut-off point is chosen as a specific proportion of the population (5 per cent) below which a DED is excluded from the commuting belt. Varying this cut-off point showed that the extent of the commuting belt is not very sensitive to its choice.

Table A9.8: Results of the Gravity Model of Commuting Flows (2000)

Variable	OLS
Constant	-15.7 (14.8)
Ln Distance	-1.44 (11.7)
Ln Destination Population (1996)	1.40 (20.8)
Ln Origin Population (1996)	0.89 (14.2)
Dublin Dummy	0.82 (3.8)
Within Dublin Region Dummy	-3.1 (7.7)
Mid-East Dummy	-0.07 (0.5)

²¹ The differential in the unemployment rate in 1996 which is available was found not to be a statistically significant factor in the determination of commuting flows.

Contiguity Dummy	1.05 (6.9)
Adjusted R2	0.65
Log Likelihood	-1095

Note: Ln denotes the natural logarithm, T-statistics in parenthesis are derived from heteroskedasticity robust standard errors. Dublin Dummy is one for flows to and from Dublin County Borough and zero for all other flows, the Within Dublin Region Dummy is one for flows within the Dublin Region and zero for all other flows, the Mid-East Dummy is one for flows to and from the Mid-East and zero for all other flows and finally the Contiguity Dummy is one for flows between counties that share a common border and zero for those that do not.

A9.5 Commuting by Rail

Table A9.9: Number of Annual Inward Journeys to Dublin Stations by Station of Origin, 1999

From	To:					Total
	Clontarf	Connolly	Tara	Pearse	Landsdowne	
Longford	0	35,057	6	197	72	35,332
Edgeworthstown	0	2,412	0	0	2	2,414
Mullingar	197	57,505	16	2,069	699	60,486
Enfield	762	459	0	1,171	508	2,900
Kilcock	0	499	12	1,353	306	2,170
Maynooth	1,827	23,749	2,226	59,081	2672	89,555
Leixlip Louisa Br.	652	1,135	138	31,955	902	34,782
Leixlip Confey	143	287	70	30,697	529	31,726
Clonsilla	669	1,048	4	27,232	529	29,482
Coolmine	77	2,633	760	17,207	1863	22,540
Castleknock	482	294	80	23,726	1863	26,445
Ashtown	0	16	2	68	13	99
Broombridge	0	62	30	124	3	219
Drumcondra	191	2,075	85	1,960	838	5,149
Total	5,000	127,231	3,429	196,840	10,799	343,299

Source: Data supplied by Iarnrod Éireann.

Table A9.10: Number of Annual Inward Journeys to Dublin Stations by Station of Origin, 1999

Southbound From	To:					Total
	Clontarf	Connolly	Tara	Pearse	Landsdowne	
Dundalk	604	75,858	254	75,251	104,532	256,499
Drogheda	414	13,105	606	382,320	21,918	418,363
Laytown	2	697	194	48,300	1,107	50,300
Mosney	0	1,112	23	4,180	0	5,315
Gormanstown	0	7	12	14,524	451	14,994
Balbriggan	127	1,076	173	34,774	246	36,396
Skerries	63	1,598	1,281	36,387	406	39,735
Rush & Lusk	25	1,280	733	13,627	943	16,608
Donabate	46	740	186	150,825	130	151,927
Malahide	134	2,366	1,863	247,902	9,359	261,624
Portmarnock	0	41	247	8,587	2,401	11,276
Total	1,415	97,880	5,572	1,016,677	141,493	1,263,037

Source: Data supplied by Iarnrod Éireann.

Table A9.11: Number of Annual Inward Journeys to Dublin Stations by Station of Origin, 1999

Northbound From	To:					Total
	Clontarf	Connolly	Tara	Pearse	Landsdowne	
Greystones	13	11,280	189	532	516	12,530
Rathdrum	0	0	0	0	0	0
Wicklow	534	68,913	64	729	125	70,365
Kilcoole	0	8,737	15	397	23	9,172
Greystones	3	55,755	24	269	176	56,227
Total	550	144,685	292	1,927	840	148,294

Source: Data supplied by Iarnrod Éireann.

Table A9.12: Number of Annual Inward Journeys to Dublin Stations by Station of Origin, 1999

Eastbound From	To:		Total
	Heuston	City Centre	
Cherry Orchard	139	1,010	1,149
Clondalkin	319	4,198	4,517
Hazelhatch	3,300	39,342	42,642
Sallins & Naas	66,017	141,488	207,505
Newbridge	98,954	189,841	288,795
Kildare	83,012	115,037	198,049
Total	251,741	490,916	742,657

Source: Data supplied by Iarnrod Éireann.

Table A9.13: Number of Annual Inward Journeys on the Dart to Dublin Stations by Station of Origin, 1999

From	To:					Total
	Clontarf	Connolly	Tara	Pearse	Landsdowne	
Howth	5,948	5,571	8,636	234,486	16,945	271,586
Sutton	4,300	2,088	7,504	192,504	71,755	278,151
Bayside	1,676	756	1,071	108,713	6,380	118,596
Howth Junction	5,424	995	1,246	289,215	14,953	311,833
Kilbarrack	822	1,650	1,866	252,109	7,899	264,346
Raheny	5,995	8,944	28,543	362,717	34,691	440,890
Harmonstown	4,110	2,401	10,329	197,676	20,888	235,404
Killester	5,375	890	5,194	411,143	38,902	461,504
Clontarf Road		3,421	17,133	167,581	26,674	214,809
Connolly	28,776		1,698	11,629	54,309	96,412
Tara	68,609	1,401		3,365	70,143	143,518
Pearse	63,628	15,632	3,184		48,857	131,301
Landsdowne Road	11,062	206,326	21,472	7,518		246,378
Sidney parade	4,374	181,755	11,010	7,346	14,114	218,599
Boosterstown	5,532	171,643	13,508	5,078	21,610	217,371
Blackrock	10,689	347,179	40,847	22,696	63,635	485,046
Seapoint	4,487	161,809	27,546	8,706	24,196	226,744
Salthill	5,935	262,703	15,302	11,699	9,258	304,897
Dun Laoghaire	9,799	446,445	45,185	22,508	15,616	539,553
Sandycove	3,274	239,771	27,448	4,713	6,145	281,351
Glenageary	4,645	403,959	5,914	6,627	7,309	428,454
Dalkey	2,485	262,013	16,866	9,121	8,371	298,856
Killiney	3,144	160,850	10,079	9,736	34,905	218,714
Shankill	2,346	242,062	12,448	7,407	12,395	276,658
Bray	11,531	1,065,774	53,211	52,781	28,954	1,212,251
Total	273,966	4,196,038	387,240	2,407,074	658,904	7,923,222

Source: Data supplied by Iarnrod Éireann.

Map1: The Counties and Regions of Ireland

Map 2: Percentage of Population aged 50 years and more, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996 and 1991, Small Area Population Statistics (SAPS).

Map 3: Percentage of Population aged 50 years and more in the Dublin City Area, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996 and 1991, Small Area Population Statistics (SAPS).

Map 4: Percentage of Population aged less than 10 years, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996 and 1991, Small Area Population Statistics (SAPS).

Map 5: Percentage of Population aged less than 10 years in the Dublin City Area, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996 and 1991, Small Area Population Statistics (SAPS).

Map 6: Population Change in the Greater Dublin Region, 1991-1996

Note: The map was drawn using data from the CSO Census of Population, 1996 and 1991, Small Area Population Statistics (SAPS).

Map 7: Population Change in the Greater Dublin Region, 1996-1999

Note: The map was drawn using data from CSO Census of Population 1996, Small Area Population Statistics and own calculations based on the electoral register.

Map 8: Population Density in the Greater Dublin Region, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Map 9: Urban Centres in the Greater Dublin Region, 1996 (excluding the contiguously built up area of Dublin)

Note: The map was drawn using data from the CSO Census of Population, 1996, Small Area Population Statistics (SAPS). The blue lines indicate national roads which are included as a reference. Names are not included for clarity.

Map 10: Percentage of Farmers with Farms in Excess of 50 acres, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Map 11: Self Employed as a Percentage of those at Work in the Greater Dublin Region, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Map 12: Self Employed as a Percentage of those at Work in the Dublin City Area, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Map 13: Percentage of the Population with No Formal Education or Primary Education only in the Greater Dublin Region, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Map 14: Percentage of the Population with No Formal Education or Primary Education only in the Dublin City Area, 1996.

Note: The map was drawn using data from the CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Map 15: Unemployment in the Greater Dublin Region, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Map 16: Unemployment in the Dublin City Area, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Map 17: Children in Lone Parent Households as a Percentage of all Children in the Greater Dublin Area, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Map 18: Children in Lone Parent Households as a Percentage of all Children in the Dublin City Area, 1996

Note: The map was drawn using data from the CSO Census of Population, 1996, Small Area Population Statistics (SAPS).

Map 19: Infrastructure of the Greater Dublin Region

Note: The map was drawn using map data supplied by the Ordnance Survey Ireland.

Map 20: Traffic Flows on the National Roads Network of the Greater Dublin Region, 1998

Source: National Roads Authority, National Roads and Traffic Flow, 1998.

Map 21: Percentage of People Travelling over 15 Miles

Note: The map was drawn using data from the CSO Census of Population, 1996.

Map 22: Travel to Work Area for People Travelling to Dublin City

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