

**REGIONAL INCOME DIFFERENTIALS
AND THE ISSUE OF REGIONAL EQUALISATION IN IRELAND**

GERRY BOYLE, TOM McCARTHY and JIM WALSH*

National University of Ireland, Maynooth

(read before the Society, 15 April 1999)

1. INTRODUCTION

Promoting balanced regional development has been a long-term public policy objective ever since the establishment of the *Congested Districts Boards* at the turn of the century. However, although *Regional Development Organisations* were set up in 1969, there has not been a clearly articulated strategy for regional policy. The only clear semblance of a regional policy which can be identified is the existence of measures such as regionally differentiated industrial grants, devised in an attempt to influence the spatial dispersion of mobile investment, and the *Compensatory Allowance Scheme* (“headage” payments) in the case of agriculture which is targeted towards the so-called *disadvantaged areas*.

The use of regionally differentiated grants followed on the enactment of the *Underdeveloped Areas Act* of 1952. These grants have been one of the main planks of regional policy. The radical Buchanan (1968) strategy of the late 1960s, with its proposal to select a small group of “growth centres”, was briefly considered but was

*Professor Boyle and Dr. McCarthy are members of the Department of Economics and Professor Walsh is Head of the Department of Geography at the National University of Ireland, Maynooth. This paper has resulted from the authors involvement in the recent study led by the Economic and Social Research Institute on investment priorities for the new *National Development Plan* (Fitz Gerald *et al.*, 1999). We are indebted to all those who worked with us in that study but we owe a special thanks to John Fitz Gerald and Edgar Morgenroth. We would also like to acknowledge the assistance received from Kevin McCormack of the Central Statistics Office, Annette McMahon of the Economics Department and Seamus Lafferty and Celine McHugh of the Geography Department and the comments received at a seminar in the Department of Economics, NUI Maynooth. Finally, we thank Danny McCoy and the Society’s referees for helpful comments that have considerably improved the paper. None of the aforementioned is implicated in any way with errors of commission or omission in the paper.

not adopted in any serious way. Instead, regional industrial grants were supplemented by other measures such as the building of industrial estates in anticipation of attracting inward investment (Walsh, 1989). During the 1980s the emphasis of the grants shifted towards job creation while the location of new firms became less important. More recently these regionally differentiated grants have been augmented by EU regional policy instruments such as the *Structural Funds*.

The EU has been pursuing a policy of promoting regional convergence over many years but the vigour with which it has been pursued was stepped up in the 1990s. The instruments used by the EU have been incorporated into the *Community Support Frameworks(CSF)* for Ireland and in other “Objective 1” regions in Europe. The impacts of these instruments provide important insights into the optimal regional policy for Ireland.

The explicit strategy underlying the CSF is that the transfer of resources to the poorer Member States should make a permanent contribution to the process of convergence between regions. This has involved a policy of trying to confine the use of EU transfers to funding investment rather than using them to directly support living standards. If successful, this policy should result in a process of permanent convergence in living standards, measured as output per head, across the EU that will extend beyond the life of the transfers. In other words, the focus on the enhancement of productivity will lead, all other things being equal, to an enhancement of living standards. The evidence for Ireland is that the strategy has been successful as far as the country as a whole is concerned. If the EU funding were to be terminated now it has been estimated that Irish GNP would remain at least two percentage points higher than it would have been without the transfers (Honohan, 1997).

The options for regional policy within a nation state, and especially a small state like Ireland, are in many respects more complex than those which are presented at EU level. One point of difference is that at EU level there is no commitment to a permanent flow of transfers to poorer regions. By contrast, within a country, the nature of the state makes it possible for such transfers to continue indefinitely. Thus it is perfectly feasible for Irish governments to determine that balanced regional development within the country should be achieved by the delivery of transfers through the welfare and taxation systems with the aim of progressing the equalisation of regional disposable *per capita* income. Such a strategy would be quite consistent with a policy objective of maximising national productivity since the latter would maximise the resources available for re-distribution within the state according to any number of appropriate criteria, including the regional dimension. The question is whether there is any role for a regional investment strategy within the state akin to the CSF at EU level in the promotion of balanced regional development. And if so what form should it take?

One option that is championed in many quarters is for the state to encourage a more

even dispersal of the factors of production, and especially public goods, across the sub-national regions. This implies the restriction of economic development in certain regions and its promotion in others. The crucial policy issue that arises is whether such a strategy is consistent with maximising national productivity and ultimately welfare? We will argue that the concentration of economic activity in some regions is a reflection of fundamental agglomeration economies that the state should not be quick to ignore or to deliberately downplay. We will also argue that given certain geographical fundamentals pertaining to the urban hierarchy within Ireland there may be limited scope for the creation of new poles of attraction for the location of economic activity of sufficient critical mass. At the same time it has to be recognised that the concentration of economic activity creates negative externalities mainly relating to congestion. These congestion effects are not due to the location of economic activity *per se* but they relate in large part to the population settlement patterns that result. Poor infrastructure in terms of roads and social capital and inadequate public transport systems create negative congestion effects which can offset the positive agglomeration effects associated with the concentration of the factors of production, especially labour. At the same time it is legitimate for the state to be concerned about the decline in population and the decay of communities in areas beyond the commuting compass of these areas of concentration.

The policy perspective we will argue for in this paper has three broad aspects. First, we will argue that policies of redistribution that have an explicit regional emphasis are unlikely to be justified in Ireland's unitary state. Second, we will stress the importance of agglomeration economies in sustaining regional productivity imbalances at least in the 1990s. Third, we will argue that there is a key role for state investment strategies and user-cost pricing schemes which concentrate on expanding the commuting compass of those existing centres of concentration that have sufficient critical mass to generate and re-generate agglomeration economies.

The plan of the paper is as follows. Section 2 examines a variety of data sources and welfare measures that can be used to determine the degree of regional convergence. We look at both output data and income data at the level of the eight Regional Areas. In Section 3 we introduce two measures of convergence that provide useful and different insights into the convergence process at regional level. We then apply these measures to the data on regional welfare. Section 4 takes a first step in understanding the sources of regional disparities in economic welfare. We decompose the inter-regional variation in economic welfare into a number of components relating to participation, employment, dependency and productivity rates. We also decompose the regional variation in productivity into "within" and "between" sector effects. In Section 5 we consider a largely theoretical explanation of the inter-regional productivity differentials by focusing on the role of urbanisation and particularly agglomeration economies. We also provide some indicative tests of the agglomeration hypothesis. We explore aspects of the geography of the urban hierarchy and population settlement patterns in Section 6 which emphasises the constraints of history under which regional policy must operate in Ireland. In

Section 7, we consider the basis for regional policy in a country such as Ireland. We outline the arguments in respect of (i) a policy of re-distribution that contains explicit regional targeting and (ii) a policy related to the exploitation of economies from agglomeration. Finally, in Section 8 we present some conclusions.

2. REGIONAL MEASURES OF ECONOMIC WELFARE

The interest in conducting regional comparisons of income or output is presumably to determine the relative level of economic welfare across regions and over time. Most economists would accept that the most useful measure of economic welfare for this purpose is *real GDP per capita*. There has been a proliferation of studies to assess the extent of cross-country convergence in economic welfare measured in this sense (see for example Barro (1991), Sala-i-Martin, (1994), Mankiw, Romer and Weil (1992)). Among the many problems confronted in these studies has been the departure of nominal exchange rates from Purchasing Power Parity (PPP) which has lead virtually all analysts in this field to use what are termed “international prices”, that is PPPs suitably adjusted instead of a common currency standard (see, for example, Summers and Heston, 1991).

Ideally, in the context of regional comparisons of economic welfare within countries, which is the focus of our study, one should employ region-specific price deflators. The motivation for the compilation of such deflators includes the under-pricing of public utilities in regions of low population density and divergences in transport costs. But the ubiquitous example of the haircut price in New York and Karachi also readily transposes to Letterkenny and Tralee. Moreover, there is no reason to suppose that these regional deflators would display a similar inter-temporal trend. However, as we lack the necessary information to compile such regional-specific indices we proxy regional welfare using nominal measures.

In the Irish context it is well known that the difficulties associated with profit repatriations by multinationals render GDP a misleading index of economic welfare. Profit repatriations indicate that a significant quantity of capital used to produce output is owned by non-Irish residents. This has meant that GDP exceeds GNP by a factor which has averaged about 15 percent in recent years.

In this paper the regional unit generally referred to is the Regional Authority Area. There are eight regions comprised of the following counties:

- *Border:* Cavan, Donegal, Leitrim, Louth, Monaghan and Sligo;
- *Dublin:* Dublin Corporation Borough, Dun-Laoghaire and Rathdown, Fingal and South Dublin;
- *Mid-East:* Kildare, Meath and Wicklow;
- *Midlands:* Laois, Longford, Offaly and Westmeath;
- *Mid-West:* Clare, Limerick Corporation Borough, Limerick and Tipperary

- North;
- *South-East*: Carlow, Kilkenny, Tipperary South, Waterford Corporation Borough, Waterford and Wexford;
- *South-West*: Cork Corporation Borough, Cork and Kerry;
- *West*: Galway Corporation Borough, Galway, Mayo and Roscommon.

We now consider two general measures of welfare that are employed throughout this paper.

Gross Value Added

Two data sources may be used to assess the extent of convergence of regional incomes. The first is the *Central Statistics Office (CSO)* publication on *Regional Accounts* (1998) which is the series that determines the eligibility for “Objective 1” status in the context of the allocation of EU *Structural Funds*. The Regional Accounts provide estimates of each region’s Gross Value Added (GVA), or approximately GDP, and estimates are available from 1991 to 1996. The CSO produce two main concepts of GVA:

GVA at basic prices is a measure of the value of goods and services produced in a region priced at the value which the producers receive minus any taxes payable and plus any subsidies received as a consequence of their production or sale.

and

GVA at factor cost is a measure of the value of goods and services produced in a region priced at the value which the producers receive minus any taxes payable and plus all subsidies.

GVA at factor cost would seem to be the most economically relevant income concept if the objective is to assess the level and growth of economic welfare in a region. As the CSO (1998) note this is the concept which is used by Eurostat in determining “Objective 1” eligibility. GVA at basic prices excludes what are termed “overhead” subsidies or “subsidies not related to sales”. In the case of the agricultural sector this involves excluding all payments under the “headage” and comparable payments funded out of FEOGA-Guarantee (e.g., livestock premia and cereal “set aside” compensation). Given the growth in such direct payments to the agricultural sector in recent years - in 1997 they amounted to almost £1 billion, or nearly 50% of national farm income - GVA at basic prices will thus give a misleading indication of the welfare of the agricultural sector and hence of regions where the agricultural sector is dominant.

When viewed from the perspective of the relevant prices which producers face, the exclusion of “subsidies not related to sales” would not be inappropriate if these

subsidies were considered to be “decoupled” from product supply and input demand decisions. In other words, the point at issue is whether it is reasonable to consider such subsidies as lump sum transfers to producers. Given the conditions attaching to receipt of these payments, the most reasonable assessment is that *ex ante* they ought to be considered “partially decoupled” transfers (see Boyle, 1995).

The exclusion of taxes may also distort the relative input prices facing agricultural producers. Since non-agricultural producers are registered for VAT the relevant input prices are the VAT exclusive prices. The situation with agriculture is a little more complex. Most producers are not registered for VAT but are compensated for VAT paid on inputs through a flat-rate rebate mechanism that effectively involves the payment of a production subsidy.

As noted above, there are more general problems that afflict the GVA measure which render it a very deficient index of economic welfare. Regional GVA, or GDP, measures the value of goods and services produced within a region regardless of where the ownership of the factors of production generating the output resides. The phenomenon of profit repatriations by multinationals which renders GDP deficient as a welfare measure at the national level becomes even more magnified at the regional level, where the dependency of a region’s output on multinational investment will be much more apparent than at the national level. But added to this difficulty will be the fact that at regional level - unlike at the national level - a significant fraction of the labour input which produces the output in a given region may reside outside that region. The most obvious examples are the Dublin and Midlands-East regions where there is substantial inter-regional commuting by labour.

Household Income

The Household Budget Surveys (HBSs), which have been conducted by the CSO from the early 1960s, provide another source for determining the extent of income convergence. By construction this source cannot capture all economic activity but it will capture a significant component. Moreover, as far this component is concerned income estimates from the HBS do not suffer from the mismatch between region of output generation and region of residence of the labour resource which afflicts the GVA measure. A number of income concepts can be determined from the HBSs (CSO, 1997). In this study we use three concepts:

Direct Household Income (DIHI) includes all gross money receipts (that is, before deduction of income tax and social insurance contributions) which accrue to the household together with the value of any free goods and services regularly received by household members and the retail value of own farm or garden produce consumed by the household. The measure includes wages and salaries of employees; self employment income; retirement pensions and investment and property income.

Gross Household Income (GHI) is defined as DIHI plus State transfer payments.

Disposable Household Income (DPHI) is defined as GHI less direct taxation (including social insurance contributions).

It will be noted that DIHI includes factor payments from abroad and GHI incorporates transfers in the form of social welfare payments so in these respects they provide a more comprehensive estimate of personal incomes than that implied by the GVA measures.

3. REGIONAL CONVERGENCE IN ECONOMIC WELFARE

Theory and Measurement

The concern of this paper is not with the level of regional economic welfare in the determination of eligibility for “Objective 1” *Structural Fund* status. Rather our focus is with the phenomenon of regional convergence. Specifically we want to first of all establish the extent of regional convergence in measures of economic welfare and second to explore the possible factors that might underlie the observed convergence trends.

The literature on convergence in both its theoretical and empirical aspects is voluminous. The neoclassical model of economic growth predicts that to the extent that a country or region is off its steady state growth path at some initial point in time it will converge to that steady state over time (see Romer (1996) for a lucid exposition). Convergence in this sense is now usually referred to as conditional convergence in that it implies that a country’s or region’s economic welfare will converge to that in other countries or regions conditional on the determinants (e.g., physical capital and human capital stocks) of its unique steady state welfare level. The implication of this concept of convergence is that gaps in welfare across regions may be preserved over the long run due to different steady states across regions. Thus there is no reason to expect absolute convergence of economic welfare across regions in the sense that all regions will ever attain the same level of welfare. The important question then is to understand the reasons for inter-regional income differences so as to shed light on the possible role for policy to address these differences.

The measurement of convergence has proved to be controversial. Arising from the neoclassical model of economic growth it was natural to establish the degree of convergence by regressing the growth in economic welfare (typically GDP *per capita*) over a given period on the initial level of GDP *per capita* and on the determinants of steady state welfare. This has certainly been the approach since the Mankiw, Romer and Weil (1992) paper, although earlier work excluded the latter variables. This regression approach has been termed Barro regressions and/or tests of β -convergence. A statistically significant β (the coefficient on the initial level of

GDP *per capita*) it is argued would allow one to conclude that poor countries or regions grow faster than rich regions.

Barro regressions have been subject to severe criticism on the grounds that they fall foul of Galton's regression fallacy³ (see Friedman, 1992 and Quah, 1993) and hence the method is biased towards finding a negative β . Friedman (1992) first proposed a simple alternative that is not subject to Galton's fallacy. His proposal involves the computation of the coefficient of variation (COV) of cross-regional welfare measures for each time period. Convergence would be implied by a falling COV over time. This form of convergence has been labeled σ -convergence by Sala-i-Martin (1994). It will be noted that Friedman's approach does not easily take account of the need to control for the determinants of 'steady state' welfare as required by theory although in principle it is clear that this can be done.

Sala-i-Martin (1994), in an attempt to rehabilitate the flawed Barro-regression procedure, shows that while σ -convergence implies β -convergence, the absence of σ -convergence does not imply the absence of β -convergence. He constructs the ingenious example of a football league where the number of teams is constant over a given time period. By construction in this example σ -convergence is constant yet it is clearly possible for β -convergence to be observed over time as the position of teams in the league changes through time. In other words β -convergence captures the extent of intra distributional mobility. He then goes on to imply that the only way of capturing this phenomenon is to perform Barro-regressions despite the fundamental Friedman-Quah (FQ) critique.

Quah (1993), however, has proposed an alternative methodology which captures the degree of intra-distributional mobility but which does not suffer from the FQ critique. It involves the use of Markov chains to analyse the intertemporal transition of income distributions. His approach is however labourious to implement and simpler approaches will convey much of the important information given by the Quah methodology.

Boyle and McCarthy (1997, 1999) propose that an index of rank concordance, to be labeled as γ -convergence, be used in conjunction with the index of σ -convergence in testing for β -convergence. The advantages of this index, apart from its simplicity, are twofold. First, it allows one to determine whether β -convergence exists in a situation where σ -convergence is constant. Second, while γ -convergence clearly doesn't capture all the potentially rich features of changing income distributions, which Quah's methodology allows², it nonetheless provides an important additional summary indicator to σ -convergence in assessing the nature of the evolving distribution.

The two indices which we use to determine the degree of regional convergence in measures of economic welfare are thus:

$$\sigma = \left(\frac{\text{Var}(Y_{it}) / \text{Mean}(Y_{it})}{\text{Var}(Y_{t_0}) / \text{Mean}(Y_{t_0})} \right) \quad \text{and} \quad \gamma = \left(\frac{\text{Var}(RY_{it} + RY_{t_0})}{\text{Var}(RY_{t_0} * 2)} \right) \quad (1)$$

where $\text{Var}(Y)$ refers to the variance of the particular measure of economic welfare for the cross-section of regions; and $\text{Var}(RY)$ is the corresponding variance of the ranks; t_i refers to year i and t_0 is the base year.

Application to the Irish Regions

Table 1 furnishes data on GVA at basic prices from 1991 to 1996.³ In broad terms a threefold classification of regions exists. Taking the GVA *per capita* for all regions in 1995 as 100, the index ranges from 121 for the East (Dublin + Mid East) to 97 in the group containing the Southwest, Southeast and Mid-West and 74 in the combined West, Midlands and Border regions.

Table 1: Regional GVA Per Capita (£) at Basic Prices 1991 to 1996

Region	1991	1992	1993	1994	1995	1996
Border	5982	6444	6752	7236	7743	8431
Dublin	9491	10161	10898	12122	13342	14592
Mid-East	4995	5356	5610	6764	8905	9096
Midland	5256	5574	6067	6266	6681	7331
Mid-West	6697	7304	7661	8552	9261	9825
South-East	6515	7082	7781	8277	8848	9786
South-West	7478	8289	9282	9635	10900	11680
West	5489	5845	6135	6375	7291	8057
σ -convergence	21.14	21.49	22.47	22.79	22.04	22.12
γ -convergence	1.00	1.00	0.99	0.75	0.40	0.58
IRELAND	7169	7742	8322	9058	10106	10952

Source: CSO (1998) and Department of Finance (1998).

Over the six years it is apparent that there is absolutely no evidence of σ -convergence. The substantial inter-regional gaps in GVA *per capita* have persisted over time. There is some evidence of γ -convergence in 1994 and 1995 but this is mainly due to an altering in the ranking of those regions which were initially the most lowly ranked.

GVA *per capita* data at factor cost are available from 1994 and are presented in Table 2. This measure incorporates certain overhead subsidies that as noted earlier are especially important in the agricultural sector and hence would be expected to

affect the regions that have a heavy concentration in agriculture. The main message here again is the absence of convergence in either its σ or γ manifestations. It is evident, however, that the inclusion of the agricultural subsidies in particular render the magnitude of the coefficient of variation lower and hence indicate a slightly more equal distribution of welfare across the regions.

Table 2: Regional GVA Per Capita (£) At Factor Cost 1994-1996

Region	1994	1995	1996
Border	7473	8017	8963
Dublin	11649	12939	14572
Mid-East	6863	9082	9302
Midland	6509	7002	7698
Mid-West	8694	9375	10084
South-East	8511	9122	10090
South-West	9752	11047	11820
West	6722	7636	8458
σ -convergence ^a	20.03	19.46	20.17
γ -convergence	1.00	0.95	0.94
IRELAND	9060	10151	11162

Source: CSO (1998) and Department of Finance (1998).

Regional estimates of GVA *per capita* are output measures and should not be regarded as ideal measures of living standards. Given the data limitations and also that the regional pattern of GVA is largely influenced by the location decisions of major private investors, who may contend that there are very few alternative locations that will meet their requirements, it is necessary to consider some alternative indicators of incomes as a measure of the standard of living which people experience in each of the regions. The CSO Household Budget Surveys provide data on household incomes segregated by source for each region for 1973, 1980, 1987 and 1994.

From this data one can establish the extent of differences between regions and trends over time. Table 3 furnishes the relevant data. Three measures of income are reported for the regions: *Direct Income*, *Gross Income* and *Disposable Income*. The *Direct Income* concept is closest to the GVA measures and reflects underlying productivity relationships.

Table 3: Regional Household Income Per Capita Per Week (£) 1973-1994

<i>Direct Income</i>				
Region*	1973	1980	1987	1994
Donegal and North-West	5.34	18.65	41.16	65.10
North-East	8.65	24.64	47.08	74.45
East	10.58	36.49	68.40	108.81
Midland	7.04	27.12	46.92	75.88
Mid-West	8.27	26.45	60.02	74.76
South-East	9.49	25.60	51.45	71.48
South-West	9.25	30.12	55.93	76.60
West	6.93	23.68	51.09	78.04
σ -convergence	20.48	19.44	13.84	16.67
γ -convergence	1.00	0.86	0.73	0.90
<i>Gross Income</i>				
Region*	1973	1980	1987	1994
Donegal and North-West	6.90	24.40	57.59	86.25
North-East	7.72	28.77	61.94	92.77
East	11.40	39.51	80.30	125.22
Midland	8.12	30.78	58.96	92.90
Mid-West	9.48	30.63	71.93	92.66
South-East	10.52	30.08	64.47	90.35
South-West	10.29	33.90	67.59	94.37
West	8.35	28.59	63.50	94.70
σ -convergence	17.19	14.30	11.31	12.53
γ -convergence	1.00	0.68	0.94	0.65
<i>Disposable Income</i>				
Region*	1973	1980	1987	1994
Donegal and North-West	6.45	21.88	50.02	74.62
North-East	8.87	25.28	51.97	77.53
East	9.86	32.24	62.51	98.93
Midland	7.66	27.06	49.47	79.86
Mid-West	8.71	26.72	58.85	78.85
South-East	9.70	26.48	53.82	75.92
South-West	9.37	29.16	55.61	79.46
West	7.65	25.18	54.39	80.42
σ -convergence	13.90	11.35	8.09	9.46
γ -convergence	1.00	0.86	0.40	0.73

* Data up to 1994 are available on the old 'Planning Region' basis whereas data for 1994 are available on a 'Regional Authority' basis. We have adapted the 1994 data to roughly conform to the older regional categories.

Source: CSO Household Budget Surveys (various years).

The change in the ranking by income compared to output across regions in 1994 is striking. Using income data, the Southeast region ranks second lowest after Donegal and the North-West, while the West and Midlands are close to the economy-wide average. Furthermore, the range of the distribution of income is more compressed than that for output. Clearly a very significant amount of income redistribution is being achieved through the tax and welfare system.

There are a number of specific features of this table worth noting. First, for nearly all income measures there is strong evidence of both σ and γ -convergence up to the late 1980s, the exception is γ -convergence for Gross Income. This point was also noted by the National Economic and Social Council (NESC, 1997). However, between the 1987 and 1994 surveys there is strong evidence of a reversal of this trend. These results would thus appear to confirm the impression generated by the GVA measures. A second feature is that the absolute magnitude of the coefficient of variation is substantially less than the GVA measures indicating a narrower variation in incomes. Thirdly, we note that state transfers and the impact of direct taxation serve to substantially narrow the *per capita* income gap between the regions, as is evidenced by the significantly lower coefficients of variation for Gross Income and Disposable Income.

The average weekly household disposable income in 1994 in the East had an index of 115 (Ireland = 100) followed by the Midlands, West and Southwest (all between 94 and 97) with the lowest in the Midwest (91), Border (90) and Southeast (88). The average household income in Dublin exceeded that in the Southeast by 29 percent. The range across regions for household income indices is only half that for the *per capita* GVA indices. Furthermore there is no correlation between the two distributions. While the East has the highest indices on both distributions, the second highest average household incomes are in the West and Midlands regions which have the lowest *per capita* GVA indices.

The regional pattern of change has been very uneven. Between 1987 and 1994 by far the largest increase in disposable incomes was recorded for the Midlands which had the second lowest level in 1987. Broadly similar increases occurred in the West, Border and East regions. By contrast, households in the Mid-West, Southwest and Southeast on average recorded only marginal increases. Excluding the East, these data suggest some convergence has taken place among households in the remaining regions.

A very significant amount of income redistribution has been achieved through the taxation system and welfare programmes as well as other state and EU-funded income supports. The contribution of these mechanisms has been greatest in the weaker regions. State transfers accounted for approximately one quarter of the average household disposable income in the Border region in 1994 compared to one-sixth in Dublin, despite the very high concentrations of low income households in the

city. It is evident that the tax and transfer system has had a very significant impact on reducing inter regional differences in household incomes. For example, in 1994 the average tax rate for Dublin households was 25 percent compared to 18.3 percent in the West, which has the second highest average direct household income (see O'Leary (1998)).

The published HBS data also permit us to examine the degree of convergence of incomes between urban and rural areas where the latter are divided into farm and non-farm categories. With only three spatial categories it does not make sense to compute measures of γ -convergence so we only present σ -convergence indices in Tables 4 and 5 for 1987 and 1994. It is apparent that as far as the rural/urban demarcation is concerned there is no evidence of significant convergence for any of the income measures. An exception is *Disposable Income* where the evidence suggests a trend towards divergence.

Table 4: Rural and Urban Household Income Per Capita Per Week (£) 1987 and 1994

	<i>Direct Income</i>		<i>Gross Income</i>		<i>Disposable Income</i>	
	1987	1994	1987	1994	1987	1994
Urban	64.24	95.64	76.40	113.54	59.96	91.19
Rural Farm	51.37	86.95	62.33	98.44	57.60	88.17
Rural Non-Farm	47.10	68.41	61.04	87.47	50.90	73.78
σ -convergence	16.46	16.63	12.80	13.11	8.37	11.03

Source: CSO Household Budget Surveys (various years).

We have also conducted an analysis of the distribution of incomes within these spatial categories using data available from the CSO's anonymised data files. We provide summary information in the form of coefficient of variation estimates in Table 5 for three different income concepts in respect or the rural/urban classification.

Table 5: σ -Convergence Within Urban and Rural Areas, 1987 and 1994

<i>Income Per Person</i>	<i>Urban</i>		<i>Rural-Farm</i>		<i>Rural-Non-Farm</i>	
	1987	1994	1987	1994	1987	1994
Direct	102.8	103.2	84.3	75.7	116.0	112.4
Gross	73.8	70.8	66.0	59.6	80.7	69.0
Disposable	62.1	63.0	66.9	60.5	57.9	62.4

Source: Anonymised CSO HBS files.

These data suggest three observations. First, *rural non-farm* households have the widest dispersion of *Direct Incomes*. Second, the dispersion converges across the

three spatial units in respect of *Gross Income* and *Disposable Income*. Third, there is considerable stability in the coefficients of variation over time with the exception of the *rural farm* category. The outcome for farm incomes is not unexpected given the inherent variability of farm income relative to wage income that would be the dominant source of earned income in urban and rural non-farm areas.

Table 6 conducts a similar analysis within towns of different population levels. While we do not have a perfect match in terms of town size categories for the two years, there is nonetheless sufficient overlap to permit a comparison between the two years. The coefficients follow a predictable pattern as far as income concept is concerned. But more importantly there is a remarkable degree of constancy over the two periods. These findings are consistent with the observation in NESCS (1997) that inequality does not have a particular spatial manifestation.

**Table 6: σ -Convergence Within Urban Areas By Population Size
1987 and 1994**

Town Size	1987			1994		
	Direct	Gross	Disposable	Direct	Gross	Disposable
Dublin	98.1	72.0	60.6	96.3	68.8	62.0
>10000	109.0	77.8	66.8			
>20000				110.7	71.4	62.5
1500-10000	94.4	65.5	54.6			
3000-20000				99.6	68.7	60.4
1000-3000				119.6	67.5	60.3
<1500	113.4	74.5	61.2			
<1000				113.1	70.7	64.5

Source: Anonymised CSO HBS files.

4. TOWARDS EXPLAINING INTER-REGIONAL WELFARE DIFFERENCES

It is clear from the foregoing analysis that a commitment by the state to an increased flow of permanent transfers to the weaker regions would bridge the income gap. As to whether this would be a desirable policy stance will be addressed in Section 7. For now we consider an alternative strategy for achieving regional balance. This strategy involves devising a set of policy instruments that promotes convergence in productivity levels measured as output per head.⁴ This policy, if successful, would

lead to convergence in living standards without the requirement to support permanent transfers to the regions. It is a policy that on the face of it is also consistent with the EU's *Community Support Framework*. In order to judge the efficacy of such a policy stance it is useful to analyse the sources of regional variation in *GVA per capita*.

The regional variation in *GVA per capita* at a point in time can be decomposed into four terms (see FitzGerald, Kearney, Morgenroth and Smyth (1999)) - productivity (GVA per worker), the employment rate, the participation rate and the dependency ratio:

$$\text{Log} \left[\frac{GVAC_i}{GVAC_S} \right] = \text{Log} \left[\frac{PROD_i}{PROD_S} \right] + \text{Log} \left[\frac{ER_i}{ER_S} \right] + \text{Log} \left[\frac{PR_i}{PR_S} \right] + \text{Log} \left[\frac{DR_i}{DR_S} \right] \quad (2)$$

where, i = region;

s = the state;

$GVAC$ = GVA *per capita*;

$PROD$ = GVA per worker;

ER = Employment Rate, that is, the ratio of numbers employed to the labour force;

PR = Participation Rate, that is, the ratio of the labour force to the population aged 15 to 64 years;

DR = Dependency Ratio which in this case is measured as the inverse of the population aged 15 to 65 years to the total population, that is,

$$\frac{1}{1 + \left(\frac{P_{<15+65>}}{P_{1565}} \right)}$$

where, $P_{<15+65>}$ is the dependent population aged under 15 to over 65 and P_{1565} is the potential working population aged 15 to 65.

The results of this decomposition are presented in Table 7 in respect of *GVA per capita* measured at basic prices for 1991 and 1996. These findings clearly show that the dominant explanation for the inter-regional variation in *per capita* GVA is productivity differentials. Over the two years the variation in the employment rate, the participation rate and the dependency ratio only ranges from 0 to about 6 percent.

The substantial variation that is observed for productivity arises in turn from differences between regions in sectoral productivity levels and also in the regional variation in the sectoral distribution of employment.

**Table 7: Decomposition of Regional Variation in GVA per Capita
(Log(Region/State) x 100) for 1991 and 1996**

Region	GVA per capita	Employment rate	Participation rate	Dependency Rate*	Productivity**
1991					
Border	-18.09	-2.56	0.86	-4.82	-12.81
Dublin	28.06	-2.01	1.62	6.37	22.69
Mid-East	-36.13	0.70	-2.93	0.00	-35.76
Midland	-31.03	1.91	-3.01	-3.64	-22.51
Mid-West	-6.80	1.87	-1.96	-1.23	-5.24
South-East	-9.56	-0.39	-1.17	-1.83	-7.15
South-West	4.23	1.84	-1.38	-0.62	4.92
West	-26.70	3.60	0.76	-5.41	-27.93
1996					
Border	-26.16	-3.87	-0.15	-4.45	-21.04
Dublin	28.70	-1.12	3.17	4.65	23.65
Mid-East	-18.57	3.05	7.34	-5.06	-16.47
Midland	-40.14	2.88	0.49	-3.82	-30.00
Mid-West	-10.86	3.08	-4.71	-1.29	-7.92
South-East	-11.26	-0.73	-1.63	-1.93	-11.26
South-West	6.44	0.41	-2.66	-0.65	9.20
West	-30.70	0.56	-1.15	-4.45	-34.02

*This value (say z) is related to the dependency ratio (dr) as $dr=(1/z)-1$.

**1995

Source: CSO (1998) and Department of Finance (1998).

We can see this more formally by noting the following decomposition of inter-regional productivity variation into the “within” and “between” sector effects (Broadberry, 1997):

$$\text{Log}\left(\frac{\text{PROD}_i}{\text{PROD}_s}\right) = \underbrace{\sum_j \text{Log}\left(\frac{\text{PROD}_{ij}}{\text{PROD}_{sj}}\right) * \left(\frac{\text{PROD}_j}{\text{PROD}}\right) * \bar{W}_j}_{\text{"Within sector"}} + \underbrace{\sum_j \text{Log}\left(\frac{W_{ij}}{W_{sj}}\right) * \left(\frac{\text{PROD}_j}{\text{PROD}}\right) * \bar{W}_j}_{\text{"Between sector"}} \quad (3)$$

where, i = region;

s = the state;

j = the sector, that is, agriculture, industry or services;

W = sectoral employment share.

The productivity and employment share differentials are doubly weighted. The first weighting factor is the average of the ratio of sector j 's productivity to total

productivity in region *i* and the state; and the second weighting factor is the average of the ratio of sector *j*'s employment share in region *i* and the state.⁵

The results of this decomposition are given in Table 8. The results show that the variation in sectoral employment shares is of minimal importance in accounting for inter-regional differences in productivity with the exception perhaps of the Mid-West region and to a lesser extent the West region.⁶ In other words, the variation in productivity across the regions cannot be wholly accounted for by the fact that some regions may have relatively high numbers engaged in agricultural activity.

Table 8: Decomposition of Regional Variation in GVA per Worker (Log(Region/State) x 100) into 'Within' and 'Between' Sector Effects 1991 and 1995

Region	"Within" sector effect	"Between" sector effect	Productivity
1991			
Border	-11.84	-0.94	-12.81
Dublin	19.23	-0.40	22.69
Mid-East	-37.38	1.64	-35.76
Midland	-20.50	-2.10	-22.51
Mid-West	-0.66	-4.49	-5.24
South-East	-6.49	-0.58	-7.15
South-West	4.64	0.27	4.92
West	-20.80	-7.16	-27.93
1995			
Border	-23.15	2.12	-21.04
Dublin	29.67	-4.41	23.65
Mid-East	-19.27	2.50	-16.47
Midland	-27.12	-1.82	-30.00
Mid-West	-11.05	2.58	-7.92
South-East	-10.87	-0.82	-11.26
South-West	10.81	0.39	9.20
West	-24.10	-7.77	-34.02

Source: CSO (1998) and Department of Finance (1998).

In Table 9 we provide a further decomposition of the total "within" sector variation by breaking out the contribution of the component sectors. These data suggest for the most part that the principal contributors to explaining inter-regional variation are the industry and services sectors. There are clearly substantial variations in productivity to be observed for these sectors. In 1991, relatively low agricultural productivity in the West and Mid-West did account for a significant proportion of the overall variation in productivity but for the 1995 data it is apparent that the overwhelming source of variation across the regions is the productivity performance of the non-agricultural sectors.

Table 9: Decomposition of Regional Variation in Total "Within" Sector Productivity (Log(Region/State) x 100) into Sectoral Components 1991 and 1995

Region	Agriculture	Industry	Services	Total
1991				
Border	-0.92	-4.29	-6.63	-11.84
Dublin	0.89	6.03	12.31	19.23
Mid-East	2.36	-15.86	-23.88	-37.38
Midland	-0.29	-15.68	-4.53	-20.50
Mid-West	-2.16	2.56	-1.05	-0.66
South-East	1.53	-1.75	-6.26	-6.49
South-West	3.08	6.51	-4.95	4.64
West	-4.81	-5.75	-10.24	-20.80
1995				
Border	1.19	-15.32	-9.02	-23.15
Dublin	2.00	9.03	18.65	29.67
Mid-East	-0.87	5.92	-24.32	-19.27
Midland	-0.66	-22.40	-4.06	-27.12
Mid-West	0.70	-8.28	-3.48	-11.05
South-East	0.69	-2.71	-8.86	-10.87
South-West	2.18	14.63	-6.00	10.81
West	-4.57	-11.39	-8.13	-24.10

Source: CSO (1998) and Department of Finance (1998).

In the industrial sector, where overall productivity levels are highest, the Southwest and East regions have significantly higher levels reflecting the very high concentration of high value-added manufacturing sectors around Dublin city and Cork city. By contrast, productivity levels in manufacturing in the West, Border and Midland regions are particularly low. As regards services there is a clear difference between the East and all other regions. The East has by far the highest regional concentration of services employment. Furthermore, between 1991 and 1996 almost all of the increase in GVA per worker came from industry and services activities that are generally located in urban areas.

5. THE URBAN FACTOR IN A STORY OF PRODUCTIVITY DIFFERENCES

Some Perspectives from the Endogenous Growth Literature

The preceding analysis has demonstrated that the bulk of the significant inter-regional variation in output *per capita* can be explained in terms of persistent productivity differences across the regions. Moreover, these productivity differences are primarily due to "within" sector effects and the inter-regional variation is

dominated by the industrial and services sectors. Thus there are characteristics of the regions that give rise to fundamental differences in the productivity of these sectors. To what factor or factors can these differences be attributed? Our view is that these significant productivity differences are closely related to the degree of urbanisation in the regions and in particular to the increasingly evident preference of multinational companies (MNCs) to locate in such centres (see O'Malley, 1994).⁷ O'Malley argues that part of the explanation for this trend is due to the fact that the MNCs are predominantly engaged in activities of an increasing returns nature which tend to flourish in large urban centres. Also the observation by NESF (1997) that “...almost 71 percent of the net increase in manufacturing and internationally traded services employment between 1986 and 1996 took place in the East region and the four counties containing the main urban centers...” provides *prima facie* evidence of the importance of the urban factor in explaining the concentration of employment. We will argue that there is strong theoretical support and some indicative empirical support for the urbanisation hypothesis.

What Pritchett (1996) labels the “pro-natal” view stresses that population growth has pro-productivity effects of agglomeration and scale economies. Indeed, economists have noted that we cannot rationalise the existence of cities without recourse to some story about agglomeration economies nor indeed can we explain why relatively highly skilled labour will migrate from relatively poor regions into richer regions (see Bradley, O'Donnell, Sheridan and Whelan (1995)). Pritchett (1996) lists the potential agglomeration economies as being “... *reduced transport costs; increased specialisation; within industry spillovers of innovations; [and] financing the fixed costs of social overhead capital*”. Krugman (1999) argues that it is difficult to better the threefold rationale offered for the existence of these agglomeration effects by Alfred Marshall, namely, “... *the ability of producers to share specialised providers of inputs; the advantages to both employers and workers of a thick labour market; and localised spillovers of knowledge, especially through personal interaction*”.

Adam Smith first postulated the existence of a linear relationship between productivity and the level of employment (see Eltis, 1984). Higher levels of employment create the potential for technological change - the ‘division of labour’. In the recent work of Romer (1994), Jones (1998) and others on endogenous growth the accumulation of ‘knowledge capital’ or ‘ideas capital’ plays a central role. The non-rivalous nature of ideas provides an intellectually powerful argument for increasing returns. While an idea might be expensive to create, once created it can be applied relatively costlessly to the production process. Since constant returns can be motivated by the well-known argument of replication, given the non-rivalous nature of ‘ideas capital’, this implies that increasing returns in respect of *all* production resources (labour, physical capital and ‘ideas capital’) will prevail. The process of increasing returns therefore implies a feedback loop from population density through to higher productivity and back to density.

Jones presents a simple “Isaac Newton” model to demonstrate the relationship

between the growth in *per capita* output and the growth in population. The key relationship in this framework is the postulate that the time derivative of ideas is a linear function of the labour force set aside to create these ideas (the “Isaac Newtons”). And from first principles he can argue that increasing returns holds in respect of the accumulation of ideas. His model predicts that the growth in productivity will be proportional to the growth in population with the factor of proportionality related to the degree of increasing returns to scale. Jones is concerned primarily with rationalising global relationships between ideas accumulation and growth because as he noted the leakage of ideas across international boundaries implies that his results might not be supported by empirical studies which use cross-sections of countries as the unit of analysis.

We can adapt the Jones' model to the issue of inter-regional productivity differences as long as we presume that the source of the productivity differential to be explained is not the accumulation of ideas but is rather a factor related to economies of scale or agglomeration. In this case agglomeration or scale economies are tied to a particular geographical space and hence “leakage” as posited by Jones is not an issue.

A number of model versions are possible which result in different predictable hypotheses. Consider the following simple model:

$$\left(\frac{Y}{L}\right)_i = A_i^\delta K_i^\alpha L_i^{-\alpha} \quad (4)$$

$$d(A)_i = \delta \left(\frac{L}{R}\right)_i \quad (5)$$

where, Y = output; L = the labour input; A = productivity; K= the capital stock; and R = the land area.

In this model efficiency differences are a function of population density. Taking logs of (4) and totally differentiating across space we have

$$d\left(\text{Log}\left(\frac{Y}{L}\right)\right)_i \stackrel{(6)}{=} \delta d(\text{Log}A)_i + \alpha d(\text{Log}K)_i - \alpha d(\text{Log}L)_i \quad (6)$$

Dividing (5) by A and taking logs across space we obtain at the “steady state” that

$$d(\text{Log}A)_i = d\left(\text{Log}\left(\frac{L}{R}\right)\right)_i \quad (7)$$

Substituting (7) into (6) we get

$$d\left(\text{Log}\left(\frac{Y}{L}\right)\right)_i = \delta d\left(\text{Log}\left(\frac{L}{R}\right)\right)_i + \alpha d(\text{Log}K)_i - \alpha d(\text{Log}L)_i \quad (8)$$

In other words, this simple model predicts that the log difference of labour productivity across regions will be a positive function of the *log* of population density, if $\delta > 0$ which implies increasing returns; a positive function of the regional capital stock and a negative function of the regional labour force.

Some simple variants of this framework give equally interesting predictions. If we assumed that efficiency differences were a linear function of the level of employment we can easily show that

$$d\left(\text{Log}\left(\frac{Y}{L}\right)\right)_i = (\delta - \alpha)d(\text{Log}L)_i + \alpha d(\text{Log}K)_i \quad (9)$$

In other words, the log of labour productivity is a positive function of the *log* of employment, if $\delta > \alpha$ and the log of the capital stock. If, following Kremer (1993) we specified equation (5) as

$$d(\text{Log}A)_i = \delta \left(\frac{L}{R}\right)_i; \text{ or; } d(\text{Log}A)_i = \delta(L)_i \quad (10)$$

the inter-regional variation in productivity is *inter alia* a positive function of the *level* of population density or the *level* of employment.

Kremer (1993) discusses a most interesting model where the log difference in productivity is a function of the level of employment/population. His model also contains a simple Malthusian population adjustment mechanism that ensures a constant standard of living. The surprising, and important, prediction of this model is that employment is a function of the level of population/employment. The intuitive basis of this model is that the gains from the accumulation of knowledge capital are principally to be found in increased population /employment rather than improvements in living standards. Kremer tests his model with global population data stretching back to 1 million B.C.! and finds strong statistical support for his theory. Romer (1996) notes that the relationship between population growth and population level is constant in the latter period of Kremer's sample and he speculates

that this may be due to the breakdown of the simple Malthusian assumption.

While this model was constructed to explain the endogenous growth potential of the accumulation of knowledge capital in an inter-country context it can be readily applied, like the Jones' model considered earlier, to the problem of explaining inter-regional differences in employment growth. There is of course not a perfect match. For one there will not be a perfect correlation between employment and population in the regions because of commuting and migration. Second, and most fundamentally, the Malthusian assumption is especially flawed at the regional level. We can modify Kremer's model by assuming for instance that population/employment does not adjust to equate living standards across regions but instead is a function of the level of population/employment.

Our re-worked version of Kremer's model is:

$$\begin{aligned}
 Y_i &= A^\delta K^\alpha L^{1-\alpha} \\
 \left(\frac{Y}{L}\right)_i &= \bar{y}L^\phi \tag{11} \\
 d(\text{Log}A)_i &= \beta L_i; \text{ or } ; d(\text{Log}A)_i = \beta \left(\frac{L}{R}\right)_i
 \end{aligned}$$

Solving this model for the inter-regional variation in employment, we get:

$$d(\text{Log}L)_i = \left(\frac{\delta}{\alpha + \phi}\right) d(\text{Log}A)_i + \left(\frac{\alpha}{\alpha + \phi}\right) d(\text{Log}K)_i \tag{12}$$

and substituting either βL_i , or, $\beta(L/R)_i$ for $d(\text{Log}A)_i$ the model predicts a positive relationship between the inter-regional variation (log difference) in employment and the regional *level* of employment or the *level* of population density. Our analysis of the Jones and Kremer models suggests that if the urbanisation, and hence agglomeration economies, are of consequence then either the inter-regional variation in labour productivity (log difference) or the regional variation in employment should be positive functions of the *level* of employment, or, the *level* of employment density.

The models we have discussed so far are consistent with an exogenous growth process. The distribution of employment across space and its concentration can according to the framework affect both productivity and employment differentials but what causes the distribution to be as it is? More particularly is the evolving distribution the outcome of an endogenous process? To address this question we must take stock of history.

Consider the following equation

$$L_{it} - L_{it-1} = nL_{t-1}^{\lambda} \quad (13)$$

where i refers to some spatial entity,

t is some time period

n is the rate of growth in L .

As ingeniously noted by Jones (1998) this simple equation or “law of motion” endogenises growth through the relationship postulated for the existence of agglomeration economies in (5) in a manner which is identical to the many other models of endogenous growth which are available. But more importantly it does so in a way that is not contrived or *ad hoc*. If we define L as the population in a spatial entity with low or nil inward or outward migration and assume that $\lambda = 1$, then (13) is no more than a statement that people, unlike machines, have the capacity to reproduce themselves. Jones interprets n as a net fertility parameter being equal to the difference between the birth rate and the death rate.

If we define L as employment, the linearity is not likely to be as robust a prediction at the regional level of analysis. Nonetheless there would appear to be a strong parallel. Vacancies will primarily emerge from existing employments and job deaths obviously will. New investment will locate where existing firms are congregated especially if the kind of agglomeration economies that we have postulated exist. Put simply large employment centers will grow ever larger.

What is attractive about this story is its simplicity. If there is any validity in this perspective then a cross-sectional regression (across the spatial entities) of the growth in employment or population should produce at least a positive constant (that is, $n > 0$). Should λ exceed unity it would of course imply that population, or employment was on an unsustainable path. It might be also reasonable to expect a different value for λ in respect of population and employment change. Given migration and commuting outside of a given spatial entity it seems reasonable to expect that λ might be less than unity for population relative to employment.

Urbanisation - Some Simple Empirical Tests

Primarily because of data limitations, both in terms of limited observations and the absence of certain variables, we do not claim that our empirical tests of the urbanisation hypothesis are definitive or complete. We are certainly not in a position to construct a full-scale model of regional production. Rather our intention is to establish whether there is tentative evidence for the urbanisation hypothesis. The greatest difficulty with any testing procedure in this context is to unravel the direction of causation. Accordingly we claim no more for our simple empirical tests than that they provide evidence of correlation. If such tentative evidence does not

exist it is unlikely to emerge from a more comprehensive set of model tests.

Our simple models suggest that the inter-regional variation⁸ in either labour productivity or employment should be positively related to either the level of employment or an index of density. We can exploit three sources of data to shed light on these relationships, namely, the *Regional Authority (RA)* level data, the *Household Budget Surveys (HBS)*⁹ which provide a limited amount of spatial data and the *Census of Industrial Production (CIP)* which furnishes county-level observations on industrial productivity and employment. We present the relevant correlation coefficients in Table 10.

Table 10: Correlation Coefficients for Tests of Simple Agglomeration Models

Variation in:	Level of Employment	Density
<i>Regional Authority, 1995</i>		
Productivity-industry	0.69 [0.77]	0.28 [0.26]*
Productivity-services	0.66 [0.54]	0.36 [0.30]*
Employment-industry	0.97 [...]	0.54 [0.48]
Employment-services	0.96 [...]	0.59 [0.50]
<i>Census of Industrial Production, County Data, 1995</i>		
Productivity-industry	-0.69 [0.33]	0.29 [0.24]**
Employment-industry	0.81 [...]	0.82 [0.73]**
<i>Household Budget Survey, Size of Urban Centres, 1994-95</i>		
Direct Income <i>per capita</i>		0.64***

Note: The numbers in parentheses are the correlation coefficients for the log values.

* Population per square kilometer (excluding Dublin).

** Urbanisation index provided by NESC (1997) which is defined as the percentage of the population in settlements of 1,500 or greater.

*** This correlation coefficient refers to the relationship between *per capita* direct income and town size for the urban centres given in Table 6.

The coefficient values provide tentative support for the hypothesis of agglomeration economies associated with urbanisation. There is one exception that we shall come to later. The results are especially strong when we use the level of employment as our index of urbanisation. Also the suggestive evidence of an urbanisation effect is stronger for employment variation rather than productivity.

The finding of a negative sign for the county productivity variation in the CIP data is consistent with the prediction in equations (8) and (9). In the absence of county-based capital stock estimates we cannot test the model's predictions fully but it is useful to consider the following regression which involves regressing the variation in productivity on the level of employment and a density index and which generates significant coefficient values with the anticipated signs for both variables:

Productivity Regression

$$\begin{aligned} \text{Log (Productivity variation)} &= 119.6 - 67.91 \text{ Log (L)} + 98.58 \text{ Log (Density)} \\ &\quad (0.78) \quad (2.64) \quad (2.25) \\ R^2 &= 0.17; N=27 \text{ (t-statistics in parentheses).} \end{aligned}$$

Population and Employment Dynamics

We have tested our simple “law of motion” equation (13) on the lowest spatial unit which is feasible, namely, the *District Electoral Division (DED)* level, for the change in population and employment over the period 1986 to 1996. The following results were obtained:

Population change 1986-1996

$$\begin{aligned} n &= 0.0228 & \lambda &= 0.7855 \\ &\quad (0.1315) & &\quad (0.8471) \\ R^2 &= 0.06; N=3421 \text{ (t-statistics in parentheses).} \end{aligned}$$

Employment change 1986-1996

$$\begin{aligned} n &= 0.0779 & \lambda &= 1.1531 \\ &\quad (4.9819) & &\quad (43.786) \\ R^2 &= 0.31; N=3421 \text{ (t-statistics in parentheses)} \end{aligned}$$

It is clear that at the level of the DED there is substantial noise to the extent that as far as population change is concerned both the value of n and λ are not significantly different from zero.¹⁰ The magnitudes of these coefficients, especially λ are nonetheless interesting. Given that λ is less than unity, the implication is that the growth in population across spatial units will fall to zero asymptotically. In other words the prediction is that the growth rate in larger centres of population is much less than in smaller centres. This point is noted using a different perspective to ours in NESG (1997).

The results for employment change are the exact opposite to population and the coefficients are also statistically significant at the DED level. The linearity of equation (13) is confirmed for employment. This confirms the self-perpetuating nature of employment generation at the spatial level. However, the coefficient is not exactly equal to unity and while it is numerically only marginally in excess of unity it is nonetheless significantly different. The practical significance of this result is that the growth of employment is increasingly positive in the level of employment. For

example, our results imply the following growth rates in employment by level of employment:

<u>Employment</u>	<u>Growth Rate (%)</u>
100,000	4.54
200,000	5.05
250,000	5.22
300,000	5.37
500,000	5.81

6. CONSTRAINTS IMPOSED BY THE EXISTING URBAN HIERARCHY

The preceding section stresses the importance of initial conditions in determining outcomes and especially the concentration of industrial and service activity in areas of high population density. Policy can only start to make a difference by recognising the constraints imposed by history. There are thus a number of aspects of population and settlement that are relevant to regional development. These include key variables related to functional specialisation, size, the location and position of urban centres within regional, country and international urban hierarchies (see Boeckout, Groenewegen and Romkema, 1995 and EU Commission , 1997).

The overall density of population in Ireland is very low which has cost implications for the supply and maintenance of physical infrastructure and a variety of essential public and private services. Throughout most rural areas the average densities are less than 25 persons per sq. km.. This low overall density can be seen clearly in Map 1 of population densities contained in the Appendix (Walsh,1996).

The settlement pattern is particularly weak as Map 2 indicates. Dublin metropolitan area is over five times the size of Cork. There are only three other centres with more than 40,000 inhabitants. All are located on the coast, thus significant portions of their potential hinterlands are absent. Beyond the commuter hinterlands of the largest centres there are only another five centres with populations between approximately 18,000 and 30,000 - Dundalk, Drogheda, Kilkenny, Sligo and Tralee (only Kilkenny is inland). The settlement hierarchy is especially weak throughout most of the Border and West regions and in remote coastal parts of the Mid-West and South-West.

The location, as well as the scale, of urban centers is clearly an important concern in the quest for strategies to effect a more balanced regional development. We present in Map 3 an impression of the catchment areas of the principal urban centres by using estimates of *Travel to Work* areas that are defined as 60 minutes or less commuting time from the centre of the designated urban area. There are clearly large areas of the country that are remote from these larger centres. There are some

regions where the urban system is particularly weak and there are long distances between places. This is particularly the case in the North-West and the eastern half of the West region and in parts of the Mid-West, South-West and Border regions.

The pattern of recent population change is summarised in Map 4. In the most recent inter censal period, Galway was the most rapidly growing city, while Tralee had the highest growth rate among the next tier of towns. There are risks of a cleavage emerging within the Midlands and parts of the South-East as the more accessible towns fall more under the influence of Dublin. The total levels of population growth between 1981-86 and 1991-96 were broadly similar, 97,238 and 100,368 respectively. However, the regional distribution of this population increase differed very much between the two periods. In the early 1980s, 46 percent of the increase occurred in the East and 26 percent in the Border, Midlands and Southeast. By the early 1990s the proportions were 55 percent and 15 percent respectively. Apart from the doubling of the level of population growth in Dublin city and county, the next highest level of population increase was in the West, mostly around Galway city.

Detailed micro level analysis of the pattern of population change reveals the extent to which growth has been concentrated in and around the largest urban centres, followed by the county towns and their contiguous rural areas (Walsh, 1996). Corridors of growth can be detected in the rural areas adjacent to major sections of the national roads. Finally, some growth is occurring in coastal areas and in some scenically attractive inland areas. By contrast extensive areas of decline are evident throughout the North-West and West and in parts of the Midlands and central Munster. The extent of decline is greatest in the relatively more rural tracts away from the national roads.

7. THE BASIS OF REGIONAL POLICY

To this point we have established that there exists core-periphery income dispersion in Ireland, that the tax-transfer system already corrects much of this dispersion, that output *per capita* dispersion is explained in large part by productivity differences, that productivity dispersion cannot be explained in terms of sectoral composition of employment and that some form of agglomeration/urbanisation story is important in explaining regional productivity differences.

The idea that a country may develop a core-periphery regional structure is not new. What is new is (i) the understanding of the forces that give rise to this outcome and (ii) the identification of a link between growth performance and agglomeration. Insights into the evolution of regional differentiation has been provided by economists and geographers alike (see for example Krugman, 1991 and Malecki 1997).¹¹

Our discussion in Section 5 has developed the analysis of the link between agglomeration and the inter-regional variation in productivity and employment

generation. The key empirical finding is that regional divergence appears to be an equilibrium phenomenon. In this respect regional policy that seeks to eliminate this divergence must be seen as an attempt to alter this market outcome. Justification for this policy must in turn be based on efficiency and/or equity grounds. In this section we investigate whether a case for regional policy can be made on these grounds. We sketch an analytical basis for regional and urban policy in Ireland and in so doing outline a policy direction that combines targets with respect to regional income differentials, growth and urban development.

The central question concerns the implications of agglomeration effects for the design of regional policy. To date the welfare theoretic basis of regional policy in such an environment has not been developed in a unified way. There exists a literature on the efficiency basis of regional policy emanating, on the one hand, from the development literature and on the other from the analysis of fiscal federalism. Agglomeration effects have not been an important concern in the latter literature. Instead the concern has been with the optimality of the (labour) migration equilibrium and its dependence on the nature of the labour market and on federal to sub-federal fiscal relations.¹² Agglomeration effects feature importantly in the urban economics literature. Here the concern is with the optimal size of cities and whether market forces serve to create cities that are too large or too small.

Regional and urban policy in Ireland has not to date been informed by the literature on fiscal federalism.¹³ Viewpoints have developed on targeted regional spending and urban planning that owe more to historical practice and the need to confront immediate constraints than any consistent analytical assessment. Given the message in the earlier sections of this paper - that agglomeration is important for growth - *ad hoc* regional and urban policy is potentially costly.

The basic question – “is it necessary to have policy conditioned by spatial variables?” – is usually not asked. More often than not it is assumed that government should have a regional policy. However, this is by no means axiomatic and especially in a *very small very open* economy. In Ireland no potential Pareto improvements may arise as a consequence of adding a spatial category to the available set of policy instruments.¹⁴ We believe the potential regional policy interventions which require consideration are policies of redistribution and policies related to urbanisation.

Policies of Redistribution

Governments use a combination of a progressive income tax and a targeted transfer system to effect a transfer of resources from the better off to the poorer members of society. It is reasonable to suppose that governments are concerned to affect this redistribution in the most efficient way.¹⁵

We have demonstrated that income differentials exist across regions in Ireland.

Setting aside the issue of the intra-region income distribution - which is tackled in a similar way across regions - we can ask whether regional differences in average income suggest that a spatial category would be a useful instrument of targeted transfer policy? If the answer is in the affirmative we have a basis for a regional policy which might involve transfers from richer to poorer areas.

For simplicity, imagine a situation where we have a two-region country where one region is designated as rich and the other as poor. The basis for income differences derives from differences in labour productivity. Welfare is linearly related to income if working and to the value of leisure if unemployed. In this situation we ask whether it is efficient to subsidise employment in the poorer region via a wage subsidy or the creation of a job. The question is answered by comparing the shadow wage to the market wage.¹⁶

The optimality of the regional employment policy depends on the way it affects the labour migration equilibrium between the rich and the poor region. Boadway and Flatters (1981) find that a general presumption in favour of this policy depends on the absence of a transfer programme such as unemployment insurance. We call this the *no government* case in that the general basis for regional policy depends on the absence of a standard instrument of government policy. The message here is that, in general, regional categorisation cannot be presumed to improve on policy implementation that can categorise by employment status.¹⁷

Let us continue to work in terms of a two-region country. Now, however, we impose a federal system of government. Each region has a government and in addition there exists a common upper level of government. Given the previous result one might imagine that more government would further undermine the case for regional policy. This will not be the case. The reason for this relates to the existence of common property and the ability of regional government to exploit property specific to its region.

There is an extensive literature dealing with this case which dates from Buchanan (1950). It involves taking account of the dependence of welfare on (local) public goods in addition to private goods. By local we mean that the consumption of the public good requires residence in the region of provision. Once welfare is modeled in this way we see that regional post-tax income differentials (measuring as they do private good consumption) are perfectly consistent with migration equilibrium.

Migration interacts with the provision of public goods in that migrants give rise to congestion in usage of public goods but also contribute to the cost of provision. The difference between the tax payment and the congestion cost is called a fiscal externality. The migration equilibrium will be inefficient to the extent that the fiscal externalities are not equal across regions. This problem will be exacerbated to the extent that there is rent generating regional specific common property.

Boadway and Flatters (1982) conclude that this framework generates the following policy conclusions: (i) one cannot expect in general that migration decisions in a decentralised federal economy will lead to an efficient allocation of labour over regions, (ii) self-interested regional governments acting on behalf of their residents have an incentive to take budgetary actions that, from a federal point of view, lead to inefficiencies, (iii) the federal government faced with these inefficiencies and inequities will be justified in using a system of inter-region transfers as part of its set of policy instruments in seeking national objectives.

This is a strong case for a regional policy. It involves taking from richer regions and giving to poorer. The form of this transfer, as analysed by Boadway and Flatters (1982), involves untied transfers which are budget balancing at national level. It is not a regional policy as defined in the previous case. However, as Myers (1990) demonstrates, the case for federal intervention depends on the regions not being able to make payments to each other. This then raises the question of the form of government itself. We now turn to this question.

The case for regional policy can be made when regional governments co-exist with a federal level of authority. The strength of the case depends on the set of transfer instruments assigned to regions. The question of the efficacy of regional policy then seems to turn on the existence of a federal or a unitary state. In turn this leads us to ask whether it is possible to make a case for a federal as opposed to a unitary form of government?

Practitioners of political science frequently address this type of question. A view on this issue is crucial to resolving differences over design of future institutional structures in the European Union. The economics of fiscal federalism attempts to address this question by identifying those aspects of public intervention appropriate for action by different levels of government. This work is often used as the basis for a policy of subsidiarity – assign a policy to the lowest level of government consistent with efficient implementation. This literature would suggest that redistribution is best assigned to the highest level of government.

Dixit and Londregan (1998) note that in practice, lower levels of government have access to many policy instruments which have a redistributive dimension. They analyse the politics of redistribution in a federal and unitary states, noting the importance of analysing strategic interaction between the federal and regional level in the former. The critical point emerging from the Dixit and Londregan analysis is to recognise the importance of history. National regional policy, given a concern for redistribution, will differ as between a federal and unitary state. Once the constitutional decision is made the idea is to implement policy appropriate for that structure and not the other. However, it also means that the winners and losers from redistribution are to some extent pre-selected as a consequence of constitutional decision.

All of this discussion has weaved through a set of models. The simple conclusion is that there is no general presumption in favour of regionally-based transfer policy as a supplementary category for targeted taxation and welfare transfers. What is optimal depends on the form of government and in particular the interaction between central and regional redistributive politics. For as long as Ireland remains a unitary state we argue that there is no basis for a regionally-based transfer policy at all. To the extent that there may be a defensible spatial dimension to government redistributive policy it ought to be related to the exploitation of economies that may arise from agglomeration. It is to this issue we now turn.

Policies Relating to Urbanisation

There exists an extensive economics and geography literature on optimal city size distribution. One aspect of this literature relates to the pricing of infrastructure and the relationship between congestion and under-pricing. It is this aspect that has seen its way into the Irish policy debate on urbanisation - without, it must be said, having any effect on policy. This has had the effect of generating an unbalanced set of recommendations. It also has generated an uneasy alliance between those who think that Irish cities - principally Dublin - are too big and those who are disposed to see the problem as merely one of under pricing. We will demonstrate in this section that it is important to distinguish between two location decisions - the location of employment and the residence of people - in framing an urbanisation policy.

Consider first a caricature of conventional wisdom on urbanisation. The belief is that economic growth has, through employment growth, generated more car usage. City roads are unpriced and the policy of major expansion of inner city roads has ceased. Hence congestion develops. The solution, it is argued involves a combination of road pricing and increased public transportation, principally in the form of buses.

It is our view that this policy is not only unworkable but also undesirable as stated. In order to see this the first thing to note about commuting is that it is time and not distance that matters. Once this is understood one can begin to approach the urbanisation question in a balanced way.

An urbanisation policy can be framed in terms of a simple model of optimal city size. Assume that a person is equally likely to obtain planning permission to build, be it a house or a business, in any part of the country. In this circumstance would we expect individual self-interested actions to lead to a pattern of agglomeration different to that which could be judged to be in the public interest? The answer depends on the presence or absence of external scale economies.

According to Papageorgiou and Pines (1998) an external scale economy is said to exist when the marginal social surplus (that arises from accomodating an individual in the city at the equilibrium utility level) exceeds the marginal private surplus

(associated with the individual living and working in the city). An external diseconomy can be defined in an analogous fashion. It is not possible, however, to link excessive agglomeration, or dispersion, in a linear fashion with the existence of a diseconomy or an economy at the margin. The reason for this is that the externality as defined is in fact the sum of two externalities. This, as Papageorgiou and Pines (1998) note, has given rise to some confusion in the urban economics literature. Depending on which of the externality generators is emphasised the conclusion regarding the effect of agglomeration can differ.¹⁸

Here we give an intuitive interpretation of the sources of externality. It links with our analysis of the relationship between agglomeration and productivity in Section 5 and provides a framework for policy formulation. The marginal social surplus is the difference between marginal social product and the cost of providing the individual with the consumption bundle consistent with the equilibrium utility level. This is a more general variant of the fiscal externality we discussed earlier in relation to fiscal federalism. Here the driving element is the idea of agglomeration across all (private good) producers in the city – the marginal product depends on the number of other producers. There it arose from scale economies in the production of the public good alone. In the formal modeling we can allow for local public goods but this is not a necessary requirement.

The marginal private surplus depends on the difference between the wage and the market cost of acquiring the consumption bundle consistent with the equilibrium utility. The issue of optimal city size distribution in a state now reduces to the equalisation of external scale economies across cities. There is no reason to expect that the market will generate such equalisation. Hence, in the same way that we could argue for regional policy in a federal state, we can argue for urban policy in a unitary state. In this case the generators of the case for policy intervention are externalities that arise from employment location and settlement patterns for any given public infrastructure (or set of local public goods).

This characterisation of the optimal city depends on the assumption that the location of employment and population settlement constitute the outcomes of the one decision. If this assumption is dropped we can characterise optimal employment location and optimal settlement separately. In order to clarify these issues we can rearrange the social and private surplus concepts. First, define the employment surplus as the difference between marginal social product and the wage. Second, define the settlement surplus as the difference between the market and social cost of the equilibrium utility consumption bundle. We now define an optimal allocation as a pair (employment distribution, settlement distribution) such that conditions one and two are equalised across cities.

If people must live where they work - a traditional industrial revolution view - the dichotomy suggested above does not hold. This view was in fact industrial policy following the industrial revolution. Witness the construction of workers housing. In

fact we could argue, following Marglin (1974), that the very success of the factory system depended on gathering together workers in the same place. This was in contrast to the putting-out system where the entrepreneur concentrated production via his mobility rather than that of the workers. A twentieth century view of urban planning - and here we are not imagining information age cities - should be built on the idea that employment location and settlement are distinct decisions. The policy intervention is to facilitate the dichotomy *via* transport networks based on the minimisation of commuting time subject to a variety of constraints related to cost of provision and equalisation of land rents along with the optimal employment and settlement location conditions.

A specific solution to this policy problem for a country would be a challenging exercise. However, the framing of the problem can itself yield a guide to policy design. Consider, for instance, the case for the pricing of city roads. For given infrastructure this will frustrate an attempt by individuals to dichotomise the employment and settlement decisions. With given wage levels it reduces private surplus thereby reducing welfare for non-city dwellers. This can in turn lead to upward wage pressure that serves to undermine the exploitation of agglomeration economies. This is not to argue against pricing in any circumstance. Rather it has a place at the margin in allocating the use of facilities, given the optimal size of the city (as determined by employment concentration) and the optimal settlement pattern (as determined by commuting time, all other things being equal).

8. CONCLUSIONS

If there is a role for policy in promoting a more balanced regional development which is driven by productivity fundamentals the preceding section suggests that recognition of the role of key urban centres in developing their hinterlands has to be a critical feature of such a policy. If regional spaces are to have any functional meaning in this paradigm, other than mere lines on a map, they must be organised around strong urban centres. This paradigm has clear implications for the planning of settlement patterns and transport systems. If policy determines that balanced development can be achieved through a permanent flow of transfers then there is no requirement for regions to have a functional orientation, that is they can function merely as tags. In this paper we have established that there is no basis for an Irish regional policy of the latter type. Introducing a regional tag will not improve upon existing categorical data used in the tax and transfer system.

Irish regional policy must thus be based on productivity fundamentals. Our analysis suggests that the only feasible way to do this involves a policy of planned urbanisation. To frame such a policy we must begin by asking whether we have the optimal settlement pattern? For this consideration we might turn again to Map 3 that has been discussed in Section 6. Casual empiricism suggests that the commuting area is very small to our large cities. This would be expected to cause excessive inner city area rents combined with excessive usage of public facilities at the same

time as we observe under-utilised facilities and low rents elsewhere. It is time to commute and not distance that determines the spatial dispersion with respect to employment and settlement. Dedicated lines of transport are the only way to increase speeds and maintain safety. The only way to achieve this is through a network of train services (extending, for instance, in the Dublin area for up to 80 kilometres).

As noted in Section 6 there exist only a handful of urban centres in Ireland with the appropriate range of facilities and more importantly with the potential for the generation of agglomeration economies. It may be thus justified to target public investment in the transport, social infrastructure and human capital areas to these centres to enable them to become internationally competitive and realistic alternatives to Dublin. We are loath, however, to suggest that such resources should be transferred at the expense of Dublin since the latter continues to enjoy substantial advantages as a centre of high employment and agglomeration economies. There is clearly scope for imaginative solutions to the financing the infrastructural requirements in Dublin and other centres that involve state and private partnerships (see Farrell, Grant, Sparks, 1998).

The most appropriate choice for regional centres would appear to be Cork, Limerick (including Ennis and Shannon), Galway and Waterford. In the Northwest Derry - Letterkenny presents itself as an almost natural regional centre. Here the cross-border link is particularly important since Letterkenny on its own is not sufficiently large to develop into a major centre. Derry which has been identified as an important cross-border gateway and centre with a high growth potential (Department of the Environment for Northern Ireland, 1997) would benefit significantly from an enlargement of its hinterland into Donegal.

The recent ESRI report on national investment priorities (FitzGerald *et al*, 1999) has strongly recommended that a national spatial development strategy should be formulated that would examine, among other issues, the best options and strategies for achieving the goal of balanced regional development. The two reports prepared by Fitzpatrick and Associates (1999a, 1999b) for the two new "super" Regional Authorities set out a preliminary framework that links proposals for investment in infrastructure to a hierarchy of regional and local centres. This framework is designed to take into account both the inter-urban functional linkages and the relationships between urban centres and their rural hinterlands. These studies provide a foundation for a more comprehensive strategy for sustainable regional development as we come to the turn of this century.

Endnotes

1. Where variable y and x have a bivariate normal distribution, as is likely in the case of Barro regressions, a regression of y on x will tend to produce a slope less than unity.
2. Quah's (1993) methodology permits us, for instance, to test for the existence of "growth clubs" or multiple nodes in the evolving cross-country income distribution.
3. The data are not adjusted for inflation because as noted earlier we have no basis for determining region-specific deflators.
4. Specific interventions might be related to the dispersal of productive factors and public goods.
5. The decomposition in (3) is a linear approximation and hence the "within" and "between" sector effects will not always add up to the total inter-regional variation in productivity. The accuracy of the approximation depends on the inter-regional variation in the weights and this is why we have based the weights on the average of the regional and state values.
6. A *caveat* must be entered to this comment. Broadberry (1997) points out that it is unreasonable to assume that a sector's productivity would be unaffected by a significant labour outflow. In the case of the agricultural sector, for instance, the international evidence presented by Broadberry suggests that over time the apparently high productivity of the agricultural sectors observed for most countries is explained by the substantial labour outflows that have occurred from the sector. When he adjusts for this factor he finds that much more of the inter-temporal variation in productivity is attributable to the "between" sector or employment share effect than would be indicated by the direct application of (3). It is not clear, however, that this concern applies with equal force to the cross-sectional case.
7. It is well known that the level of labour productivity is exaggerated for a handful of multinational sectors relative to both indigenous sectors and to EU norms and that this is probably due to transfer pricing (see Honohan, Maitre and Conroy, 1998).
8. The inter-regional variation is expressed as the $\log(\text{region/all regions}) \times 100$.
9. It should be noted that the HBS data provide an estimate of *per capita* household income so this data cannot provide a strict test of our agglomeration models.
10. In fact when we ran the regression using county level data we obtained virtually identical results but given the relative absence of noise at the higher level of aggregation the coefficients were now found to be statistically significant.
11. A particular appeal of the economic geography literature associated with Krugman is the characterisation of this process as an equilibrium phenomenon.
12. Similar tools of analysis can be used to examine capital location.
13. McCarthy and McCarthy (1989) drew on this literature in their examination of the of inter-country transfer policy in the European Union.
14. A Pareto improvement implies that one party can be made better off in welfare terms without making any other party worse off.

15. Efficiency is defined here in terms of the Pareto criterion as in previous footnote.
16. See Boadway and Flatters (1981) for the full exposition of this model. This type of regional policy is an example of the regional investment strategy that we discussed in earlier sections. The Boadway and Flatters analysis, however, does not model the agglomeration-type effects that we considered in Section 5.
17. Again note that our views on what might constitute an appropriate regional investment strategy are based on an agglomeration story.
18. It should be emphasised that this literature, as is true also in the economic geography literature, relies on specific functional forms in deriving results. In addition results then are not unambiguous. Their benefit, however, is to facilitate logical discussion of complex phenomena.

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