

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

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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

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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 **b**-convergence. A statistically significant **b** (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 **b**. 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 **s**-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 **s**-convergence implies **b**-convergence, the absence of **s**-convergence does not imply the absence of **b**-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 **s**-convergence is constant yet it is clearly possible for **b**-convergence to be observed over time as the position of teams in the league changes through time. In other words **b**-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 **g**-convergence, be used in conjunction with the index of **s**-convergence in testing for **b**-convergence. The advantages of this index, apart from its simplicity, are twofold. First, it allows one to determine whether **b**-convergence exists in a situation where **s**-convergence is constant. Second, while **g**-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 **s**-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:

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

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.

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
s-convergence	21.14	21.49	22.47	22.79	22.04	22.12
g-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 **s**-convergence. The substantial inter-regional gaps in GVA *per capita* have persisted over time. There is some evidence of **g**-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 *s* or *g* 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.

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
<i>s</i> -convergence ^a	20.03	19.46	20.17
<i>g</i> -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.

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
<i>s</i> -convergence	20.48	19.44	13.84	16.67
<i>g</i> -convergence	1.00	0.86	0.73	0.90
Gross Income				
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
<i>s</i> -convergence	17.19	14.30	11.31	12.53
<i>g</i> -convergence	1.00	0.68	0.94	0.65
Disposable Income				
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
<i>s</i> -convergence	13.90	11.35	8.09	9.46
<i>g</i> -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).

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. 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 *s* and *g*-convergence up to the late 1980s, the exception is *g*-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 *g*-convergence so we only present *s*-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.

	<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
<i>s</i> -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.

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.

<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

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 NESC (1997) that inequality does not have a particular spatial manifestation.

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

Town Size	1987			1994		
	<i>Income Per Person</i>			<i>Income Per Person</i>		
	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 rate**
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):

$$\text{Log}\left(\frac{\text{PROD}_i}{\text{PROD}_s}\right) = \sum_j \text{Log}\left(\frac{\text{PROD}_{ij}}{\text{PROD}_{sj}}\right) * \left(\frac{\overline{\text{PROD}_j}}{\overline{\text{PROD}}}\right) * \overline{W}_j + \sum_j \text{Log}\left(\frac{W_{ij}}{W_{sj}}\right) * \left(\frac{\overline{\text{PROD}_j}}{\overline{\text{PROD}}}\right) * \overline{W}_j \quad (3)$$

"Within sector"
"Between sector"

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 1991,1995

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 NESO (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:

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

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

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

$$d\left(\text{Log}\left(\frac{Y}{L}\right)\right)_i = \mathbf{d}d(\text{Log}A)_i + \mathbf{a}d(\text{Log}K)_i - \mathbf{a}d(\text{Log}L)_i$$

(6)

(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

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

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 $\mathbf{d} > 0$ 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

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

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

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

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:

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

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

$$d(\text{Log}L)_i = \left(\frac{\mathbf{d}}{\mathbf{a} + \mathbf{f}}\right) d(\text{Log}A)_i + \left(\frac{\mathbf{a}}{\mathbf{a} + \mathbf{f}}\right) d(\text{Log}K)_i \tag{12}$$

and substituting either $\mathbf{b}L_i$, or, $\mathbf{b}(L/R)_i$ 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

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

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
Regional Authority, 1995		
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]
Census of Industrial Production, County Data, 1995		
Productivity-industry	-0.69 [0.33]	0.29 [0.24]**
Employment-industry	0.81 [...]	0.82 [0.73]**
Household Budget Survey, Size of Urban Centres, 1994-95		
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 NESI (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

$$\text{Log (Productivity variation)} = 119.6 - 67.91 \text{ Log (L)} + 98.58 \text{ Log (Density)}$$

$$(0.78) \quad (2.64) \quad (2.25)$$

$R^2 = 0.17; N=27$ (*t-statistics in parentheses*).

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

$$n = 0.0228 \quad \lambda = 0.7855$$

$$(0.1315) \quad (0.8471)$$

$R^2 = 0.06; N=3421$ (*t-statistics in parentheses*).

Employment change 1986-1996

$$n = 0.0779 \quad \lambda = 1.1531$$

$$(4.9819) \quad (43.786)$$

$R^2 = 0.31; N=3421$ (*t-statistics in parentheses*)

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 NESC (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:

<i>Employment</i>	<i>Growth Rate (%)</i>
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 accommodating 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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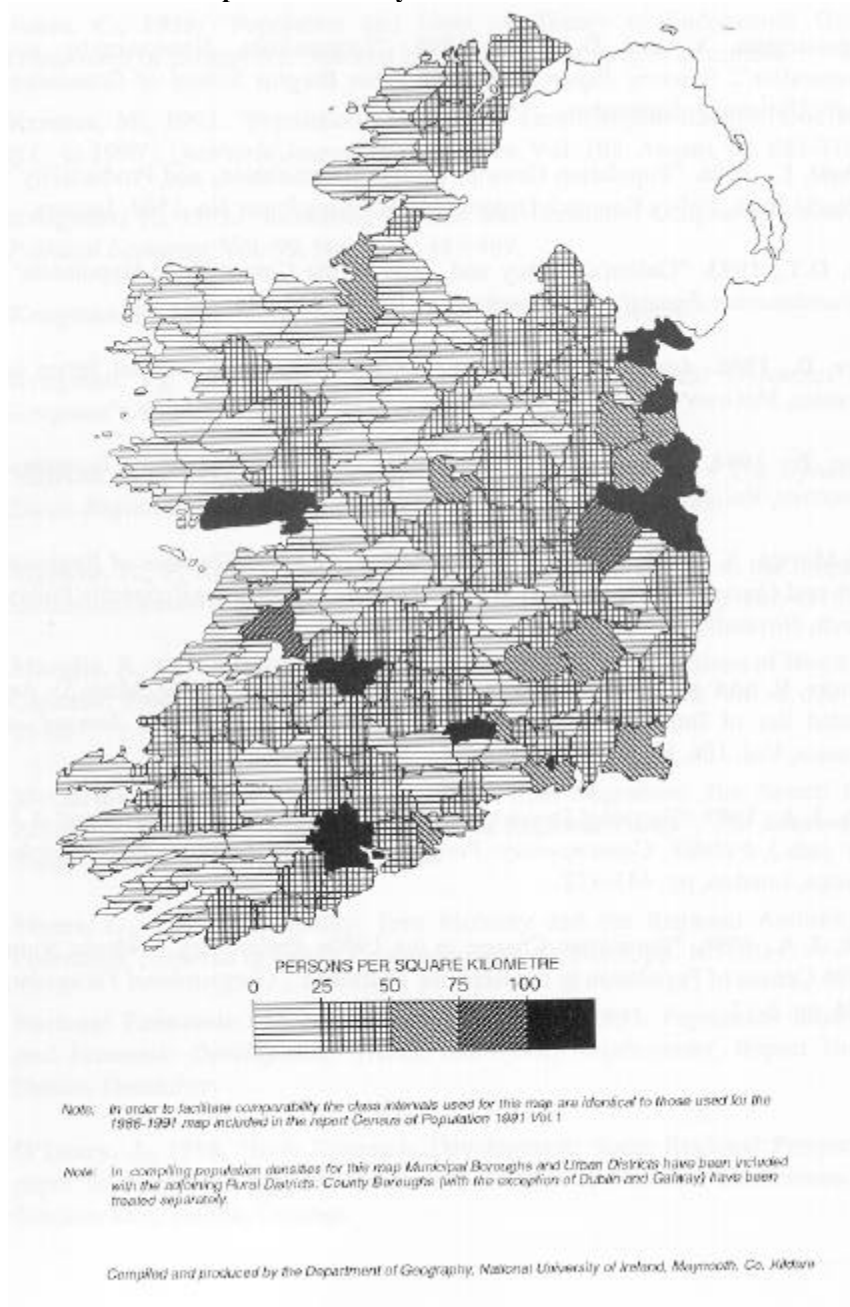
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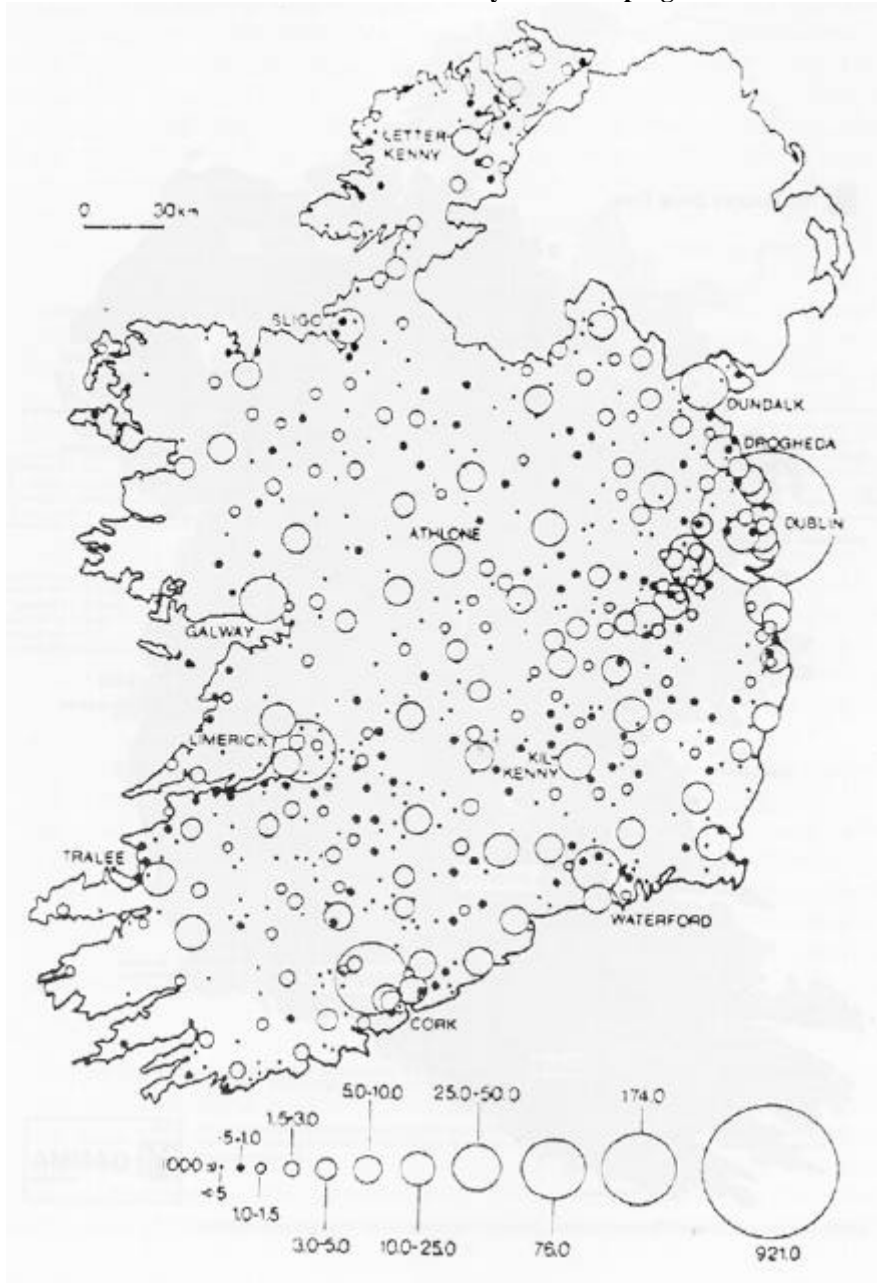
MAP 1

Population Density of Rural Districts 1996



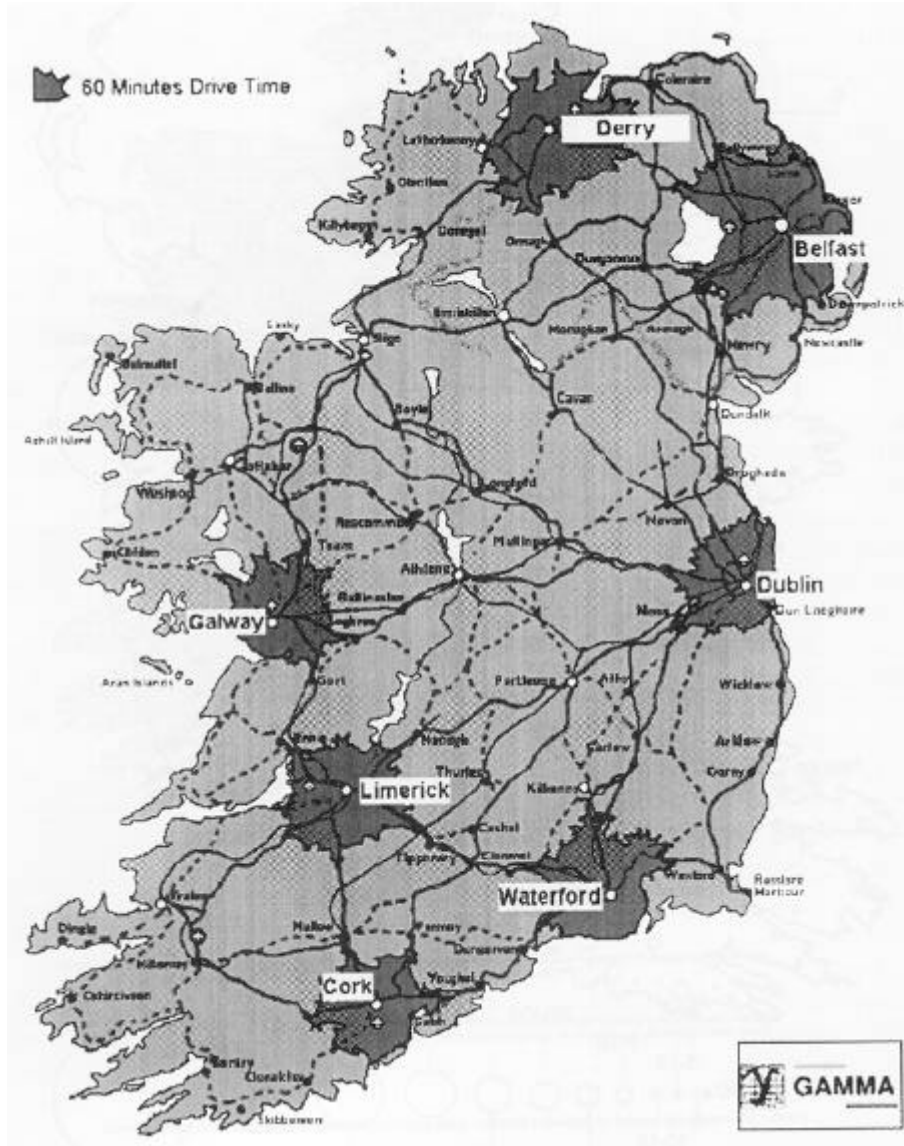
MAP 2

Distribution of Towns by Size Grouping



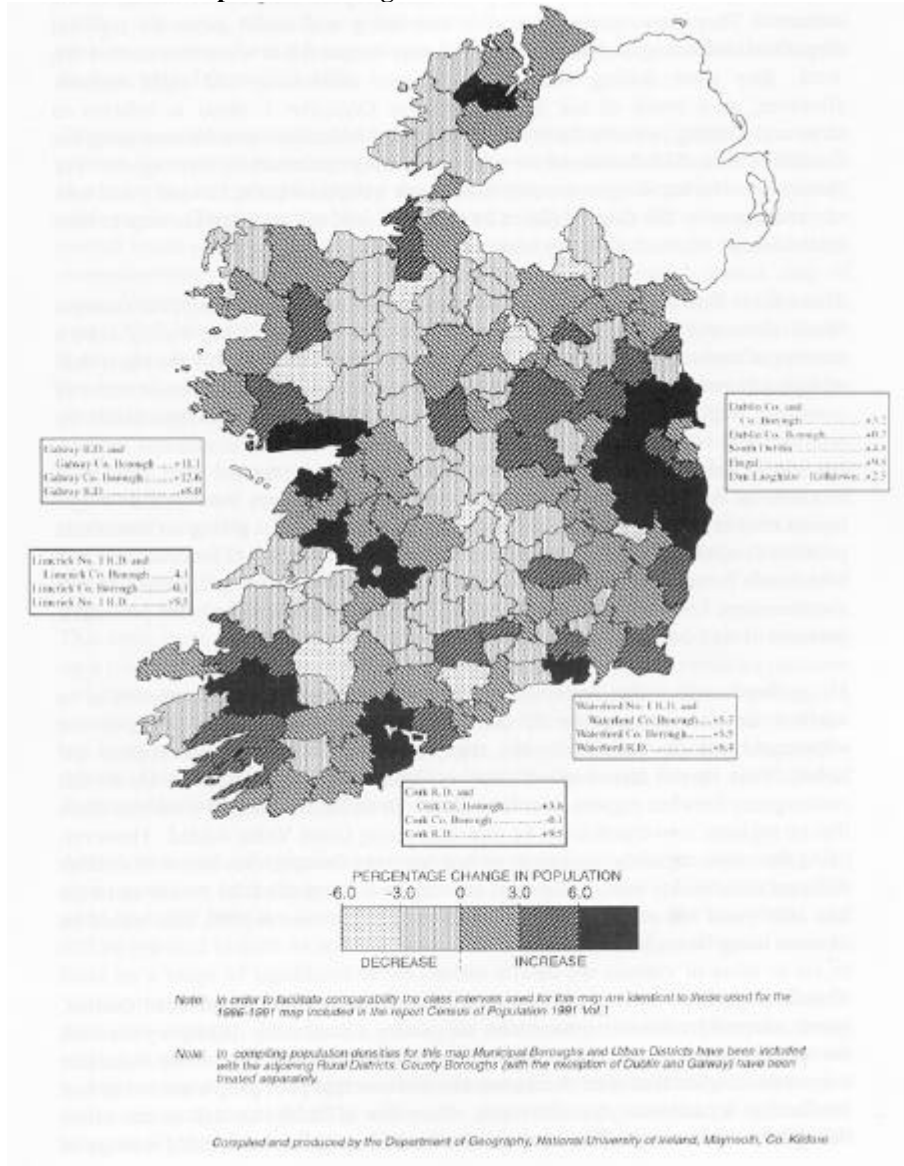
MAP 3

Travel to Work Drive Times for Selected Towns



MAP 4

Population Change of Rural Districts 1991-1996



DISCUSSION

Professor P.J. Drudy: I am very pleased to propose the vote of thanks to the authors. They have produced a very interesting and useful paper on regional disparities and I congratulate them on it. It may be noted that when they started this work, they were dealing with eight *Regional Authorities* and eight regions. However, as a result of our negotiations for *Objective 1* status in relation to structural funding, we now have only two regions officially - one incorporating the Border, West and Midlands and the other containing the remaining five regions. For those of us who are anxious to assemble data on a regional basis, I would plead with our colleagues in the *Central Statistics Office* to continue to assemble data at least on the former regional authority basis.

The authors first examine a number of indicators of regional disparity, for example Gross Value Added, Direct Income and Disposable Income. They rightly raise a number of concerns regarding the use of Gross Value Added (roughly the equivalent of Gross Domestic Product) and they conclude that it is “*a very deficient index of economic welfare*”. In particular, there is the difficulty of profit repatriation by multinational companies which results in an apparent increase in national income, but which does not of course accrue to the residents. At a regional level, the use of this concept is also problematic since those producing the Gross Value Added in one region may in fact be residing and spending in another, again giving an inaccurate picture of regional income. The authors also use the concepts of Direct Income and Disposable Income based on the *Household Budget Surveys*. Despite some obvious shortcomings, I would argue that the concept of Disposable Income is the preferable measure of well-being.

Using these various indicators, the authors examine the important question as to whether or not convergence is taking place between regions. Despite the widespread popular belief that poor regions remain poor while rich regions get richer, there is in fact a good deal of international evidence to show that convergence between regions does take place. In an Irish context, the authors show that no regional convergence can be identified using Gross Value Added. However, using the other, arguably more appropriate, income concepts, they arrive at a rather different conclusion, with evidence of convergence for most of the period up to the late 1980's and less evidence of marked disparities between regions than would be obvious using Gross Value Added.

The findings raise serious concerns regarding the traditional, and even current, stance adopted by some commentators suggesting a continuing dichotomy between the ‘prosperous’ East of the country and the ‘poorer’ West. I also would argue that it is more complex than that. Recent research shows that poor people are not in fact confined to a particular part of Ireland. They live in Dublin as well as elsewhere throughout the country. This contention is backed up by research using a range of indicators such as migration, employment growth and unemployment. Let us look

briefly at these indicators. For example, the Dublin region has long been perceived as a region which recorded net immigration. This was indeed true up to the mid 1970s. However, since then it has recorded net out-migration in all intercensal periods. Its rate of net out-migration was second highest, after the Midlands, over the long period from 1971-1996.

Turning to employment, the Dublin region recorded a net loss of 29,200 jobs, or 24 percent, in industry including manufacturing over the period 1971-1997. While it showed a modest net gain during the 1990s, this was significantly less than any other region. The adjoining Mid East showed solid gains but did not counteract the overall losses in the east of the country. The same conclusion can be reached using unemployment. In 1971, the Dublin region had the second lowest rate of unemployment in the country. By 1997, it had the second highest rate. In the same year, Dublin also had the highest rate of long-term male unemployment in the State. It was closely followed by the Mid East. These pieces of evidence lend support to the overall conclusions reached by the authors that "*inequality does not have a particular spatial manifestation*".

The paper goes on to analyse the reasons for variations in Gross Value Added at a regional level and provides convincing evidence that 'productivity' is a crucial explanatory variable. This seems to arise from differences in the various sectors of employment and in the sectoral distribution of employment, especially in industry and services. The authors show that the main improvement in Gross Value Added over time resulted from high value-added employment in the main urban centres. This leads them to investigate the relevance of agglomeration economies. Drawing on a range of authors from Marshall to Krugman, they provide a reasoned rationale and some evidence to support a policy of concentration rather than dispersal. In contrast, they cast doubt on the broad-based dispersal-type regional policy which has been pursued in Ireland for many years. In effect, they are returning to the debate which raged in the late 1960s when the Buchanan Report on *Regional Studies in Ireland* called for a 'growth centre' policy.

At that time such an approach was rejected by the government because it received such opposition from the general public and from politicians whose constituencies were excluded from the favoured 'growth centre' status. There are many who will still be opposed to such an approach, but it does make economic and social sense to build up a range of significant urban centres around the country in order to act as 'countermagnets' to Dublin as well as to serve as focal points for development in their own regions. This would reduce the inflationary and other pressures being created in cities such as Dublin, while making better use of under-utilised resources in other regions. Such an approach should not of course preclude the need to give active encouragement to fully utilise the resources and potential of agricultural areas, small towns and villages. The authors are to be complimented for raising this fundamental issue again. I would like to thank the authors for a thoughtful, well-argued and timely paper.

Dr. Eoin O’Leary: It is my privilege to be invited by the Statistical and Social Inquiry Society to second the vote of thanks on this thought provoking paper from Gerry, Tom and Jim. The growth performance of different regions in Ireland has recently attracted much interested. It is not only appropriate for the Society to have a paper in this area, but it is especially welcome that the authors are drawn from the disciplines of economics and geography, which is an interesting and worthwhile mix in the context of the burgeoning interest in economic geography.

My comments on the paper are in five sections. I begin with some general comments and continue with more detailed comments on the measurement of regional income using the regional accounts, the use of regional income measures from the *Household Budget Survey* (HBS), and on the analysis presented on the degree of convergence among Irish regions. This is followed by some concluding remarks.

General Comments

The authors begin by asserting that policies of re-distribution that have an explicit regional emphasis are unlikely to be justified in Ireland’s unitary State. They proceed to explore the extent of regional income convergence among Irish regions using *Gross Value Added* (GVA) estimates from the *Regional Accounts* and income measures from the HBS. They propose that urbanisation and, in particular, agglomeration economies are the key factors in explaining the inter-regional productivity differences they observe. Overall, by raising these important and interesting issues they have offered a worthwhile paper. However, the argument presented is severely constrained by measurement difficulties, to which I now turn.

Measurement of Regional Income using the Regional Accounts

In order to measure regional income, the authors use GVA from the Regional Accounts. This source, which has been published by the CSO since 1991, is the definitive source of regional output data since it is based on the national accounting framework. The authors state that GVA, which is similar to GDP, is a misleading measure of regional income mainly due to the presence of significant profit outflows attributable to foreign multi-nationals. These outflows have represented 15 percent of GNP in recent years, resulting in a gap between GDP and GNP which is unprecedented by international standards. For example, the average gap for EU-15 countries in 1995 was 0.8 percent, with Sweden (4.2 percent) and Finland (3.5 percent) being the nearest to Ireland, and at the other extreme, Belgium, Luxembourg and the Netherlands having GNP levels in excess of GDP (Eurostat, 1998). In common with many other studies (O’Connor, 1999; O’Leary, 1998), the authors are content to refer to this drawback as on page 160. However, by not making any adjustment to account for these outflows they are implicitly assuming that profit outflows are regionally distributed in proportion to regional GVA. This assumption is not warranted since it is well known that multi-national activity is concentrated in the Dublin/Mid-East, Border and South-West regions.

Some estimates I have recently made (O'Leary, 1999) show that when profit outflows are distributed using each regions share of the remainder of net manufacturing output accounted for by foreign owned firms, the levels and rankings of estimated regional income (which is equivalent to regional 'GNP') are changed significantly. It should be noted that my methodology does not, in common with the authors, allow for inter-regional price differences due to data unavailability. Table 1 shows the effect of this adjustment for 1995. Two of the three regions with a concentration of multi-nationals are severely effected. The South-West decreases by 10 percentage points, while the Border decreases by 6.5 points due to the relative importance of multi-nationals in these regions. The Dublin/Mid-East region increases slightly relative to the average because, although 39 percent of foreign owned profit is estimated to flow from there, this region accounts of 47 percent of GVA. It is noticeable that the ranking of the Border region drops from 5th to 7th on the income basis, with the Midlands and West each gaining a place.

Table 1: GVA and Regional Income per capita in 1995 (State = 100)

Region	GVA per Capita	Regional Income per Capita
Border	77.2	70.7
Dublin/Mid-East	121.0	124.6
Midlands	71.8	80.7
Mid-West	94.6	95.5
South-East	86.4	87.5
South-West	106.2	96.2
West	70.0	71.7
State	100.0	100.0

Source: O'Leary (1999).

It is difficult to adjust for the problem of workers commuting between regions which distorts GVA as a measure of income. The best course of action is to treat Dublin and the Mid-East as one region since the problem is most severe there. Although the authors are aware of this problem they do not take this step. However, it should be noted that other regions are undoubtedly also affected by this problem.

Regional Income Measures from the Household Budget Survey

The authors suggest on page 161 that income measures from the HBS are a more comprehensive estimate of personal incomes than the GVA measure. I have to take issue with this assertion for three reasons.

First, all data in the HBS are self reported which leads in the case of income, and certain items of expenditure like alcoholic drink, to under-reporting. This source of non-sampling error is clearly highlighted by the CSO, who warn, for example, that the gap between disposable income and total expenditure is more that could be attributed to definitional and time reference details (CSO, 1997). In order to achieve

an appreciation of the extent of the under-reporting, we can compare the HBS to the national accounts. We find that in 1995, for example, direct income and disposable income from the HBS are approximately 53 percent of personal income from the national accounts. Because of definitional and time frame differences these percentages are only indicative of the level of under-reporting in the HBS, which does seem to be quite significant. Furthermore, we cannot adopt the assumption that the extent of this non-sampling error is distributed uniformly across regions. Once again the CSO warn us that income understatement varies by type and source of income (CSO, 1997). Thus, for example, if we are to assume that the self-employed persons are more likely to under-report than the PAYE sector, then regions with a preponderance of self employed farmers would have more unreliable estimates of income than other regions.

Second, the HBS is a sample survey where the responding sample is approximately 8,000 households covering 26,000 persons which is equivalent to roughly 0.75 percent of the population. The sample sizes for the some of the regions are quite small. For example, the numbers sampled in the Mid-West, which has a population of 317,000, is approximately 2,000 persons or 0.6 percent. The CSO present the standard errors of estimates for the population as a whole. For the income measures used by the authors the standards errors vary between 2-3 percent of the average (CSO, 1997). However, the CSO warn that the magnitude of the standards errors increase as smaller sub-samples are taken (CSO, 1997). Thus, for example, the standard errors for the income estimates for the Mid-West are likely to be much greater than 2-3 percent. This implies that we must be conscious, in making comparisons between regions over time, of the danger of reaching conclusions that are statistically insignificant.

Third, it is hard to justify the statement the authors make on page 166, that direct income from the HBS reflects underlying productivity relationships. The HBS provides income and not output data, which is necessary for productivity measurement. Indeed, later in the paper the authors implicitly accept this point as they use GVA and not income in their decompositions in section 4.

In conclusion, it is clear that regional income estimates from the HBS should be used with great care due to the extent of both non-sampling and sampling error in them. In no way can they be regarded as superior to the GVA estimates.

Analysis of Convergence Among Irish Regions

The authors proceed to measure the extent of regional convergence in Ireland in the context of the literature on economic growth and convergence. The convergence process is not in any way automatic. Where it occurs, it involves relatively poor regions catching-up on relatively rich regions over long time periods. In effect, poorer regions converge by offering higher marginal returns on capital and by possessing an enhanced ability to transfer technologies from other regions, whether at home or abroad. It is important to note that in order to benefit from technological transfer, regions must host traded industries. When productivity convergence occurs in this way then living standards convergence should follow, in principle.

In analysing the results presented by the authors on the degree of convergence between Irish regions, I have five comments to make. These comments follow Sections 3 through 7 in sequence.

First, the measure of γ convergence used by the authors, in combination with the widely used σ convergence measure, has been proposed by Gerry and Tom elsewhere (Boyle and Mc Carthy, 1997 and 1999). This is a useful contribution to the literature as it provides a simple summary measure of convergence.

Second, the convergence process takes place over the long run, which in practical terms means at least two or three decades. It is not very meaningful to estimate the degree of convergence over six consecutive years as is done for the GVA data. This is especially so during the 1990s in Ireland, which has been a period of unprecedented prosperity, which has been significantly affected by cyclical factors. The average annual growth rate of Irish GDP was 4.9 percent between 1991 and 1996, which compares to an average of 3.2 percent per annum between 1945 and 1996.

The authors may point to the absence of regional GVA estimates before 1991. However, O'Connor (1999) uses a number of sources, including Henry (1997), which contain regional GVA estimates for 1979. The authors present convergence results for the period 1973 to 1993 using the HBS data. although based on my earlier comments, these results should be treated with caution. Furthermore, the availability of GVA estimates for 1979 and the 1990s, implies that an alternative data source exists which has more comprehensive coverage and is more reliable.

Third, the authors also present convergence results within urban and rural areas. However, it is not clear why this classification is being analysed. For example, will the convergence mechanism operate within rural areas where by definition, agriculture will predominate. I think that in studying regional convergence we should be careful in selecting regions that contain a mix of industry and services as well as agriculture.

Fourth, the authors find some evidence of living standards convergence before 1987 when the economy was in a slump and divergence afterwards when the economy was booming. I should note that these findings are similar to those by Chatterji and Dewhurst (1996) for English, Welsh and Scottish regions. Using a number of decomposition's the authors then find that the proximate cause of the divergence observed between 1991 and 1996 is growing labour productivity differences. In their second decomposition of inter-regional productivity into 'within' and 'between' sector effects, the authors find that 'within' sector effects are more important. This result is not surprising, given that sectoral employment shares are not likely to change much over six consecutive years. However, 'between' sector effects have been found to be quite important over longer time periods. For example, we have estimated that, between 1970 and 1990, the intersectoral component of productivity growth explains approximately 50 percent of aggregate productivity convergence among EU countries (Doyle and O'Leary, 1999).

On page 175 the authors attribute these differences to "*the degree of urbanisation in the regions and in particular to the increasingly evident preference of multinational companies to locate in such centres*". Although the authors do present evidence in section 6 of the absolute increase in urbanisation in the 1990s, there are no comparisons made with earlier periods. Has the pace of urbanisation changed, and if so what is the connection between the degree of urbanisation, as measured by the authors, and the extent of convergence/divergence?.

Moreover, I am not sure that productivity differences across regions in the 1990s are solely or even largely attributable to multi-nationals availing of agglomeration economies. It has been shown elsewhere that the presence of transfer pricing by multi-nationals, which accounts for part, but not all, of profit outflows, requires adjustment of Irish productivity levels (O'Leary, 1997; Birnie and Hitchens, 1998). In particular, productivity levels in regions with a concentration of multi-nationals will, compared to other regions, be distorted due to transfer pricing. Leaving these adjustments aside, it is still likely that productivity levels for regions with a preponderance of multi-nationals will be relatively high, as they are internationally competitive. The direction of causation between these efficiencies and urbanisation are unclear, as the authors themselves later recognize. Multi-nationals may locate in an area due to IDA inducements and the availability of a skilled labour pool. However, it is equally plausible to argue that skilled labour is drawn to an area due to the presence or prospective presence of multi-nationals.

Finally, in their correlation tests for their agglomeration models presented in Table 10, the authors do not adequately explain why, in the correlation of industry productivity against employment levels in 1995, they get a positive sign for regional authority data but a negative sign for *Census of Industrial Production* county data. Does this mean that from equation (9), $\delta > \alpha$ for regional authorities but $\delta < \alpha$ for counties? If so, what is the rationale for this surprising result?.

Concluding Remarks

Overall, analysis of the growth performance of different Irish regions is an important and relatively new area of inquiry. Achieving a better understanding of why regions have grown at different rates over the past twenty or thirty years is necessary in order to inform the emerging regional policy debate. In suggesting, urbanisation, and in particular agglomeration economies as possible causes for the different growth experiences of regions, the authors have made a worthwhile contribution to the debate. However, due to the measurement difficulties already outlined, their paper has not adequately tested this hypothesis.

My remarks have benefited from useful comments by Connell Fanning and Ber Power, whom I wish to acknowledge. Finally I would like to commend this interesting paper to you and second the vote of thanks to Gerry, Tom and Jim.

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Mr. Michael McGinley: There is an interesting historical setting for the data presented which the authors might like to address, valuable sources for this include Wakefield (1814), the Royal Commission on Labour (1894), Bowley (1900) and the work of Micheál Ross in the 1960s. The earlier researchers were particularly interested in the shrinking differentials between labourers and artisans. The marked change in the composition of the Irish labour force in the last twenty years, with over a quarter of a million mainly low paid married women accounting for almost the entire growth of those in work, is also very relevant to this discussion. Explanations of different growth experiences such as Weber's religion-values explanation could be explored in the different regions of Ireland. The significance of random events, particularly in location decisions, must not be overlooked either. It was not entirely clear if the authors identification of urbanisation and high productivity was an explanation of the Irish growth experience or merely a description of it.

REPLY TO DISCUSSION

We would like to thank all those who contributed to a lively discussion and especially those that took the trouble to provide written comments. We will comment on the points raised by each of the contributors in turn.

Professor Drudy is to be complimented in the first instance for the graciousness with which he has accepted two carpet baggers into his area of specialisation. His remarks clearly bare the mark of long-term research and we are grateful for his insights and wisdom on the topic. We are particularly grateful for him pointing out the complexity of comparing welfare measures across regions and hence the need to use a more comprehensive set of indicators than *per capita* income. Regions don't take decisions and are not impacted by decisions. Individuals and households do. As Professor Drudy emphasises quite strongly poverty and inequality occur in equal force in all regions. The implication for policy of this stylised fact is clear: taxation and transfer programmes are rightly based on the individual and there are few, if any, good reasons on redistributive grounds for imposing a regional tag on our current

system.

We naturally support Professor Drudy's request that the CSO continue to publish their excellent series on GVA on the now old Regional Authority basis. The creation of the two new "super" regions in recent months underlines the need for regional policy to be based on functionally sensible definitions of regional spaces and not on arbitrarily drawn administrative regions. It is the central contention of our paper that a regional strategy that is based on the promotion of key urban centres will satisfy this requirement.

In the empirical part of our paper we think that there are three findings of importance:

1. The absence of inter-regional convergence in living standards whether measured using GVA or HBS data.
2. That persistence of inter-regional output/income gaps is principally explained by productivity differences across the regions.
3. There is tentative empirical support for the agglomeration hypothesis.

Having considered Dr O'Leary's comments we see no reason to alter these conclusions.

First, let us take Eóin's comments on point (1). He has reservations about the CSO GVA data and we presume that his table was constructed in order to get a better measure of living standards in each region. This is no doubt an interesting issue but as we explicitly state on page 161 it is not at all the concern of our paper. Our interest is in convergence over time and in this key respect Eóin's data supports our finding. Of course as far as regional productivity measures are concerned Eóin's adjustments are inappropriate. Profit repatriations, no matter how extensive, do not distort productivity estimates whereas transfer pricing does. This is precisely why we look both at inter-regional productivity and employment in our tentative empirical investigation of the agglomeration hypothesis.

Eóin also has reservations about the CSO HBS data. We never say in our paper that the HBS is "superior" to the GVA data as a measure of living standards. We simply point out that it is an alternative indicator that has certain advantages over the GVA estimates. It has of course the obvious disadvantages of all survey-based estimates. But the important point to note about the HBS and GVA data is that both sources point to the absence of convergence in living standards over roughly similar periods. Moreover, the HBS data also clearly show that the spread in living standards adjusted for income taxes and welfare payments is much narrower than the raw GVA measures. This point also coincides with Eóin's own data.

Eóin also queries our comment that the HBS estimates of direct household income reflect underlying productivity differences. This puzzles us. If we had used the

phrase “exactly reflects” or “is equivalent to” then we might have understood his concern but is Eóin suggesting that wages are not remotely influenced by productivity?

Eóin also remarks that the absence of convergence should not be surprising and he asserts that it takes three decades for convergence to emerge. We never express “surprise” at not finding convergence. The really interesting result, we have argued, is its absence, which is, confirmed both by the GVA and HBS data and, as we have noted, by Eóin's own re-working of the GVA data. This result is what we refer to on p. 182 as an “equilibrium phenomenon”. But leaving this, perhaps subtle, point aside, Eóin's opinion, that convergence takes three decades to emerge, is in contradiction of the facts. The *Oxford Bulletin* paper by Boyle and McCarthy (1997), for instance, clearly shows that convergence takes place each year in OECD countries up to the early 1970s. One has to be careful not to infer from the evidence that because the rate of convergence is slow that it does not occur.

Now let us consider Eóin's remarks on point (2). Our second important empirical conclusion is that the aggregate productivity differences across regions are primarily due to “within” sector rather than “between” sector factors. Eóin thinks that this conclusion is based on the short time period analysed and puts forward as evidence his own findings that over a much longer period “between” sector effects actually dominate. Aside from the doubtful relevance of evidence from an unrelated dataset and analysis there seems to be misunderstanding of what we attempted in our paper. Our analysis focused on the cross-sectional variation in productivity *not* on the intertemporal variation. What our results show is that the variation in productivity *at a point in time*, we do this for 1991 and 1995, between any given region and the state as a whole is not due to compositional differences in employment but to sectoral variations in productivity. Eóin's opinion appears to be based on an analysis which concerned the *intertemporal* variation in productivity which is a totally different focus and not of concern to us.

Now we come to our tentative testing of the agglomeration hypothesis. Naturally we accept Eóin's reiteration of our point that causality could run either way. But we would be very naïve to build our policy advice solely on foot of what we admit is tentative empirical analysis. The theoretical case is strong we believe as Professor Drudy recognises. Now if our simple exploratory tests had not supported the theory we would have been concerned. Incidentally we were careful not to base our simple tests on just the HBS and GVA data. We also employed county-based CIP data and examined both inter-regional productivity and employment variations.

Michael McGinley makes a number of perceptive observations and each of them could give rise to a paper in its own right. Do random effects matters in regional income performance? Yes absolutely. We emphasise at several points in the paper that initial conditions, or in other words, history, matters. In the current context it is the set of conditions that might be referred to as “historical accidents” that gave rise

to the pattern and location of large urban areas in Ireland.

Michael also raises the point concerning the direction of causality. We accept, and hopefully have made it abundantly clear in the text of our paper, that our empirical tests cannot determine the direction of causality. They merely suggest an association between urbanisation and productivity. But we believe that there are strong theoretical arguments in support of the view that agglomeration economies precede the location of high-productivity firms.

The valid scepticism over the extent of empirical support for the agglomeration and hence urbanisation hypothesis provides we believe a very rich agenda for future empirical work. Specifically, we think that it would be most helpful to determine if urban centres require to attain a particular critical mass before agglomeration economies can be established.