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WHEN THE POPULATION CLOCK STOPS TICKING: AN INDICATIVE STUDY OF POPULATION AGEING IN TASMANIA[1]

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ABSTRACT: Population ageing and its associated shift to natural decline are occurring unevenly across and within the various regions of the world. This regionality has particular implications for Australia, where the extent and speed of population ageing differs markedly across and within each State and Territory, but where essentially egalitarian federal policy holds sway over much that affects regional development. As Australia's fastest ageing state, Tasmania will be the first to deal with the major consequences of population ageing. But as the first 'cab off the rank', Tasmania will also in many ways have to define these consequences for the rest of Australia. This paper offers a conceptual and indicative look at just some of the associated issues.

1. INTRODUCTION

The salience of Australia's state and territory boundaries has often been appraised, especially with regard to federal migration and regional development policy (e.g. Poot, 1995; Forth, 1996; Howard, 2001). An emerging issue that has yet seen little mention in this literature is that of the regionality of population ageing and its associated shift to natural decline (cf. Hugo, 1999). This regionality, which is evident across and within the countries and major regions of the developed world, is especially notable within Australia, where the proportions aged 65 years and over currently vary from around 3.4 per cent in the Northern Territory, to 14.6 per cent in South Australia. The future momentum of ageing in each region will differ even more markedly, with Tasmania projected to overtake South Australia as Australia's oldest state in approximately 10 years, and the gap between the structurally youngest and oldest regions[2] opening up from its present 11.2 percentage points, to around 24.0 percentage points by 2051 (ABS Population Projections, 2000, Series II). Relatedly, Tasmania and South Australia will enter natural decline (where deaths exceed births) several decades ahead of most of the remaining states and territories. These disparate trends mean that ageing-related matters that Tasmania and South Australia will have to contend with in the 2020s will not have to be dealt with by the youngest states and territories until mid-century and beyond.

Such disparate trends can be expected to have significant implications for Australia's internal political jurisdictions. As indicated by the United Nations

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[2] Among other indices, a population is considered 'young' when less than 5 per cent is aged 65+ years, and 'old' when this proportion exceeds 10 per cent.

Expert Group on Population Ageing for the European Union (2000a; see also House of Lords, 2000), they can be expected to affect everything from internal labour supply and demand to migration flows, state and local government funding and political legitimacy. As regards funding and political legitimacy, for example, Australia's 727 local government bodies are currently compensated through their respective states via the Commonwealth Grants Commission (CGC), for a range of 'disability factors' (relative cost disadvantages) that affect their capacities to provide certain goods and services[3]. These factors extend across population indices such as dispersion, growth/decline, isolation, unemployment levels, and age profile. However, population ageing, as it will be outlined in this paper, is not currently one of these factors. Furthermore, as the gaps between the younger and older states and territories, and between younger and older local government areas within these regions, open up, some of the above disability factors are likely to become highly problematic, even auto-correlative[4]. They will almost certainly affect state and local government revenues, and, ultimately, the economic contribution *of* States. Yet, at this juncture, almost all 'impact studies' of population ageing in Australia have been undertaken at the national level (e.g., Clare and Tulpulé, 1994; Crowley and Cutbush, 2000; McDonald and Kippen, 2001; Healy, 2001; Kinnear, 2001; Quiggin, 2001; Guest and McDonald, 2002).

While the CGC and its funding arrangements are beyond the scope of this paper to consider in any more detail, the paper provides a related overview of the demography of Tasmania, which, as Australia's fastest ageing State, offers a useful case study. The paper begins by teasing out the structural and numerical dimensions of population ageing, arguing that for judicious policy-making to take place, these dimensions need to be better understood. Relatedly, it draws attention to the fact that in Tasmania, population ageing is occurring somewhat prematurely, the result of substantial net migration loss over the key reproductive ages, rather than low fertility *per se*. Projected trends for key age groups in Tasmania are then considered in terms of changes in demand for primary, secondary and tertiary education, in labour force entry:exit ratios (the ratio of those approaching or entering the labour force to those approaching retirement and leaving), and in what might be termed the retirement adjustment age (the retirement ages that would be needed to keep the current ratio of elderly to working age constant). These complex inter-relationships—which are by no means exhaustive—illustrate the importance of understanding that population ageing is a phenomenon affecting *all* age groups, and that during the forthcoming decades, regional differences in interactions between these groups will raise many new conundrums. But they will also raise many opportunities, if

[3] The main concern of this 'fiscal equalisation' policy is the *capacity* of states to provide goods and services, rather than the actual provision of equal goods and services, which are affected by state and local government policies. See http://www.cgc.gov.au for detail. NB. By 'states' is meant also the Northern Territory. The Australian Capital Territory is funded via different arrangements.

[4] These issues are the topic of another paper currently being written.

they can be but recognised and grasped amid the complexity. (In order to acknowledge the range of possible population outcomes afforded by the use of population projections, the paper uses both the Australian Bureau of Statistics' (ABS) 'high' and 'medium' variant projection Series I and II.)[5].

2. POPULATION AGEING: STRUCTURAL AND NUMERICAL DIMENSIONS

Although widely acknowledged as reflecting both low birth rates and increased life expectancy, most policy-related (and media) discussion on population ageing has, until recently, focused on the latter (Rottier, 2001). Rightly, the increasing numbers of elderly can be attributed to the declines in infant mortality that occurred during the early part of the 20th Century, and to the substantial increases in life expectancy at older ages that have occurred since the 1980s. To these numbers will soon be added the baby boomers from that aberrant period of increased fertility between 1945 and 1966. However, this increase in the *numbers* of elderly—which demographers term *numerical ageing*—is technically independent of the primary cause of population ageing that is the real concern of policy-makers. This concern is *structural ageing*—the increase in the *proportion* of the population that is elderly, caused by low and still-falling fertility since the 1960s, and the concomitant decline in the proportion that is young[6].

The reason for arguing that numerical ageing is not, in and of itself, 'the problem', is that the *numbers* of elderly have been increasing for millennia. What has changed fundamentally is that, because of structural ageing, the increasing numbers of elderly must in future be supported by a smaller *proportion* of the population—and, before long, by smaller numbers as well. It is, in fact, perfectly feasible for there to be an increase in the numbers of elderly, without there being a concomitant increase in their proportions: the latter is primarily dependent on trends in fertility.

This distinction between structural and numerical ageing is of major significance in a policy-making and, for the CGC, fiscal equalisation - context. On the one hand, it is numerical ageing that is driving up demand for age pensions, age-related health care, housing, transport and so on; on the other, it is

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[5] See ABS (2000) Population Projections, Catalogue 3222.0, Chapter 4, for the assumptions for each State/Territory. For Tasmania specifically, Series I assumes a continuation of fertility at 1.8 births per woman, an increase of 1 year in life expectancy at birth for each ten years projected, and an annual net migration loss of 313 across the 50 year projection period. Series II assumes a decline in the birth rate to 1.65 by 2008, then constant; an annual net migration loss of 1,870, and the same mortality assumptions. While Tasmania's current net migration is greater than –2,000, and has averaged –2,500 p.a. over the past decade, this loss has recently slowed. This situation, along with the proposed increase in Australia's net international migration gain to around 117,000 in the 2002-2003 year (from 100,000 in recent years), indicates that a scenario between Series I and II will prevail in Tasmania, at least in the short term.

[6] That is, contrary to many popular views, structural ageing is not caused by the baby boomers themselves, but by the falling fertility rates that have occurred since.

structural ageing that is the constraining factor. The decline in the proportion and then number of the population at the key working ages (15-64 years) that structural ageing will soon bring about will also generate a decline in the primary tax base. But, as is well known, it will also bring declines in the number of children and young people requiring health services, schooling and so on, thus offsetting at least some of the overall 'dependency burden' on the tax base. This shift-share effect, along with acknowledgment of the growing spending power of the elderly, is causing many commentators to argue that the net outcome of population ageing may well be positive (e.g., Crowley and Cutbush, 2000; Kinnear, 2001; Guest and McDonald, 2002; p. 39).

However, as yet less well explicated are the regional and institutional implications of the structural/numerical distinction; indeed these are extremely complex and require much more deliberation than can be afforded them here. But as an indication, Age Pensions are currently funded from federal taxation, while they are spent locally; thus the differential speed of structural and numerical ageing by state and territory could see a circuitous redistribution of funds from younger to older regions. Furthermore, the extent of this flow into any state or territory will be determined by its numbers of elderly, rather than its proportions.[7] And these two indices will at some point in time move in opposite directions, further complicating matters. In Tasmania, for example, numbers aged 65+ will peak and begin to decline around 2040, while the proportion aged 65+ will (at least under current assumptions regarding fertility) continue to grow.

Other regionally-disparate outcomes of population ageing will further confound this situation. As noted, also emerging is a related shift from natural increase to natural decline, which will surface in Australia's states and territories across a markedly different time-scale (see Figure 1). Where Tasmania and South Australia will enter natural decline around the second and third decades, this situation will not occur in Queensland, Western Australia and Northern Territory until the fifth and later decades. The shift, which is bought about by the changing ratio of old to young creating an excess of deaths over births, is now considered to be inevitable. It is already occurring in many European countries, and is projected to occur in all developed countries by mid century, even with sizeable net migration gains (United Nations, 2000b). That is, by mid century, all developed countries will be experiencing natural decline, and many, if not most, absolute decline as well, because the numbers required to offset low fertility are simply too great. In these regards, Tasmania will simply be Australia's first 'cab off the rank'. Importantly also, this *new* form of population decline does not occur evenly or even semi-evenly across a number of age groups, as with losses from migration and mortality, but rather, begins from the bottom of the age structure and moves upwards through it.

[7] That is, aside from other issues such as the proportion with private superannuation etc.

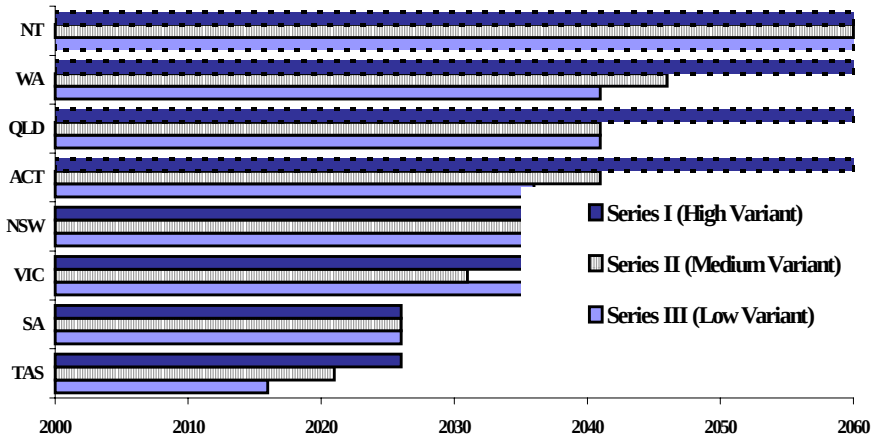

Figure 1. Natural Population Decline: Projected Year of Onset (on or before) by Australian State/Territory and ABS Projection Series.

3. POPULATION AGEING AND TASMANIA'S UNIQUE EXPERIENCE OF IT:

Australia's shift to natural decline will thus be highly differentiated regionally, with Tasmania becoming Australian's first state to experience this condition, several decades ahead of the youngest regions. Very important in Tasmania's case, however, is that its shift to natural decline is not being caused by the conventional harbinger, very low fertility, but rather, by a sizeable bite in the age structure over the key reproductive ages (Jackson and Kippen, 2001). Indeed, at around 1.8 births per woman, Tasmania's birth rate is the second highest in Australia. Offsetting this, Tasmania has, since 1990, experienced a net loss of over 21,000 people aged 18-38 years, a decline of 14.0 per cent of the 1990 cohort (see Figure 2). This loss has been almost exactly offset by natural increase, resulting in minimal overall decline to the total population. But, as indicated, this situation cannot continue for long. By contrast with total Australia (where birth numbers are declining only very slowly), the bite in Tasmania's age structure means that the numbers of births now entering its base each year are declining rapidly. At the same time, the numbers of deaths are slowly but inexorably increasing. Despite constant and considerable efforts on the part of Tasmania's Government to 'get the population growing again', migration is unlikely to resolve 'the problem' in either the short or long term. With the exception of three brief bursts of net migration gain (1918-19, 1947-53, and 1989-90), Tasmania has never been a strong attractor of migrants, while the numbers required to offset natural decline - around 1,400 net per annum from its

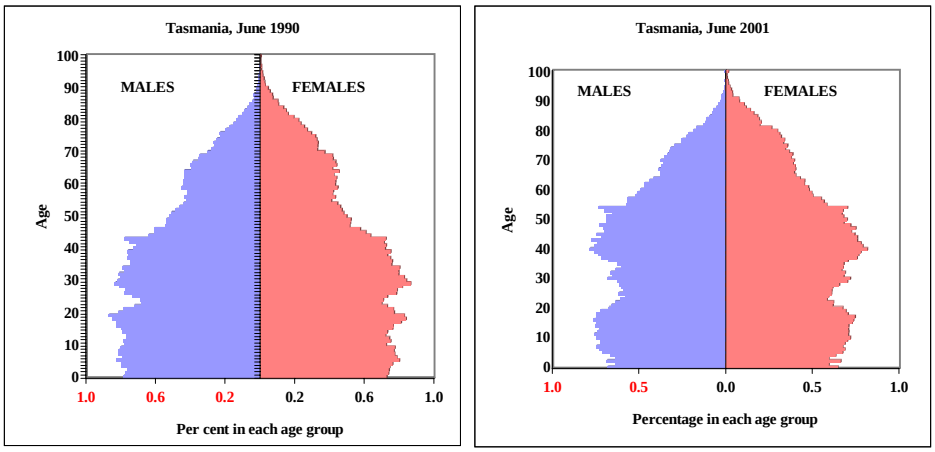

Figure 2. Age-Sex Structure of Tasmania, 1990 and 2001.

onset - will be substantially above most past experience[8].

Equally noteworthy, although impossible to do justice to in this paper, is the sub-regionality of these trends and patterns within Tasmania, and thus at the level of local government (see Felmingham, Jackson and Zhang, this volume). Occurring in all states and territories, sub-regional demographic differences are perhaps better acknowledged than those at state and territory level. However, where, in the past, the primary driver of these trends has been differential internal migration patterns and flows, from here on in they will also be differentially affected by the shift towards natural decline. Again these emerging dynamics indicate the complexity that will surround the forthcoming development of regionally appropriate population ageing related policies and principles.

4. THE CHANGING SIZE AND STRUCTURE OF TASMANIA'S AGE-GROUPS

The dynamics outlined above will manifest for the next several decades as dramatic changes in the size of all Tasmania's age groups, but most particularly at the youngest and oldest ages, and in the ratios between them. First, Figure 3 shows the relative effects of structural ageing (that is, falling fertility, compounded, in Tasmania's case, by the migration-driven loss of people in the key reproductive age groups) on age groups at the younger end of the age spectrum, for each state and territory. These groups, indexed to their respective numbers in 1999, represent the main primary, secondary, and key tertiary education ages: 6-11 years, 12-16 years, and 17-24 years. In all cases, Tasmania,

[8] Tasmania has experienced a net migration loss in 64 of the past 100 years, while net gains of 1,000 or more have been experienced only five times since 1960, the last time being 1991. Although the loss is now slowing, the past decade has seen an average net migration loss of 2,500 each year.

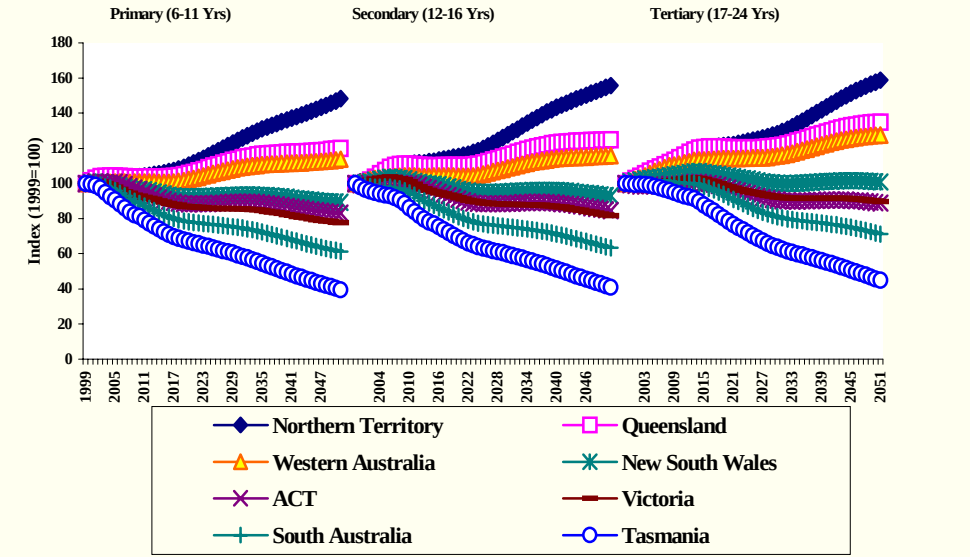

Figure 3. Projected Primary, Secondary, and Key Tertiary Education Ages (Indexed to 1999), By State/Territory (ABS Series II).

Source: Jackson and Thompson, 2002

and, to a lesser extent, South Australia and Victoria, experience substantial declines in numbers, while in the Northern Territory, Queensland, and Western Australia, these numbers soar. Note that these interstate comparisons are made on the basis of the ABS' medium variant Series II projections; the high variant (Series I) projections with their assumptions of high fertility rates continuing across the projection period are less appropriate for comparative purposes.

If these Series II assumptions eventuate, the Tasmanian primary school age population will decline by 2051 from its current 40,000 to around 16,000 (a decline of 59 per cent); the secondary school age population, from 34,000 to 14,000 (-57 per cent); and the main tertiary age population, from 50,000 to 22,000 (-55 per cent). Under Series I (the 'best case') the respective numbers and percentage declines by 2051 would be 26,000 (-36 per cent), 22,000 (-34 per cent), and 34,000 (-32 per cent). Because participation is somewhat less than universal at the older secondary school and tertiary education ages, actual numbers attending these institutions would be somewhat lower. For example, at current age-specific participation rates, the number of Tasmanian university students would fall from their current 13,108 to around 6,500 under Series II, or 9,500 under Series I (Jackson and Thompson, 2002). Declines of this magnitude will obviously have far-reaching implications, not only for the affected institutions, but also the many down-line industries and occupations they will impact upon. Permanently declining school age populations may well involve greater 'costs' than did their increases during earlier periods, and these costs will be broad ranging.

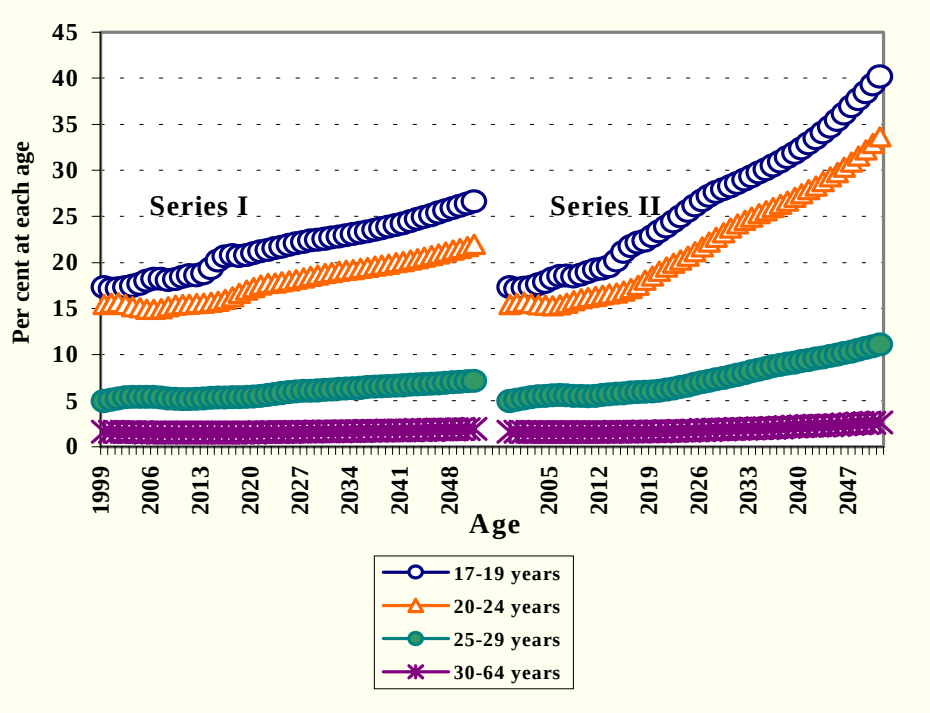

Figure 4. Tasmania: Age-Specific Participation Ratios* Required to Maintain Current University Numbers (13,108*), According to ABS Projection Series I and II.

Source: Compiled from DETYA, 2000 unpublished student data; ABS Population Projections, 2000, 3222. (NB * Data include overseas students).

Jackson and Thompson (2002) examine the trends for Tasmanian and South Australian public and private schools, matriculation colleges and universities in more detail. They show that declining cohort size in these states is so pronounced that within a few decades, total cohort sizes will be smaller than total enrolments today. Figure 4 illustrates the argument in terms of the increase in age-specific university participation ratios that would be required to maintain the Tasmanian university population *at or near its current size* (13,108, inclusive of overseas students). Under Series I, participation at 17-20 years would need to increase across the projection period by 53 per cent, and at 21-24 years, by 42 per cent. Under Series II, the proportions at these ages would have to more than double (132 and 117 per cent respectively).

It cannot be assumed, however, that such increases in university participation rates (should they be desired) will be readily forthcoming. The same structural ageing that is bringing about the declines in cohort size at the younger ages is also ushering in a significant change for the labour market: a substantial decline in the ratio of young people reaching the age of labour force entry, to those approaching retirement age and leaving. The emerging situation implies an

increase in competition for the participation of the young, between the labour market on the one hand, and tertiary education institutions on the other. This issue is examined further below. In the interim, it is worth making the point that recent increases in university participation rates - across most of the developed world - have been argued by many to reflect hidden unemployment. The emerging situation could thus see a reduction, rather than increase, in university participation, irrespective of the fact that the same dynamics will likely see an increase in the financial return for education. That said, counter arguments must also be acknowledged. If university participation rates have genuinely increased in response to, for example, increasing demand for higher skills, it will be labour market supply that will be the more affected. Such a scenario implies that it would be older rather than younger workers who would fill the void. Either way, the point needs to be made that because this scenario will differ so markedly across Australia's states and territories, it will have correspondingly complex implications.

Another important point also needs to be reiterated here. These changes reflect the internal momentum of decline set in place by the demographic transition and its continuing decline in fertility, and will occur, with a small time lag, even if Tasmania's current net migration loss was to become positive. For example, despite Victoria being a disproportionate receiver of Australia's international migrants (approximately 23 per cent of the net gain), structural ageing will soon see the same downward pressures on Victoria's school- and university-age populations as will occur in Tasmania and South Australia in the shorter term (Jackson and Thompson, 2002). The importance of understanding the inevitability of these shifts cannot be over-estimated: it is simply not possible to 'create' more five or ten or fifteen year olds. The 'lost' births are, indeed, lost forever.

Turning our attention to the age groups between the youngest and oldest, we find another trend of emerging importance - but also possible opportunity - for Tasmania. Whereas the proportion of the total Australian population that is at the key working ages (15-64 years) is projected to decline very slowly across the next fifty years (from 67 to 59 per cent), and numerically, to increase some 19 per cent, in Tasmania the numbers are already declining, while the proportion is projected to begin declining within the next few years (from 65 to 56 per cent, under the 'best case' Series I; and to 53 per cent, under Series II). Figure 5 illustrates these trends in terms of numbers (indexed to 1999) for each state and territory; the trend for New South Wales approximates that for total Australia.

Assuming a near-immediate shift to the lower net migration loss assumed in the Series I ('best case') projections, the Tasmanian working age population would experience a very slight increase until around 2010, then slowly decline, falling by over 50,000 across the projection period. Under these auspices, Figure 6 gives a breakdown for three main age groups that comprise the working age population, those aged 15-34, 35-49, and 50-64 years. Trends in each of these age groups clearly attribute the minor amount of intrinsic growth potentially remaining to those in the 50-64 year age group—the reason being that the baby boomers are currently shifting into this group (see also DHAC, 1999; Healy,

2001). The finding, which is evident nationally but again differs substantially by state and territory, has important implications for Tasmania in terms of its relatively high levels of early retirement. That is, as the only age group showing any sign of growth within the working age population, the contribution of 50-64 year olds to the Tasmanian economy over the next several years will be critical.

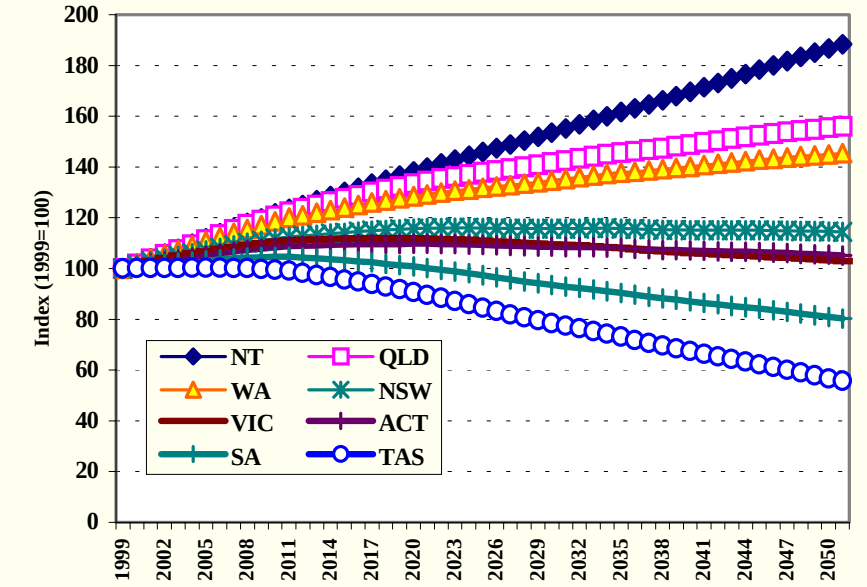

Figure 5. Projected Size of Working Age Population (Numbers Indexed to 1999) By State/Territory (ABS Series II).

Source: Jackson and Felmingham, 2002.

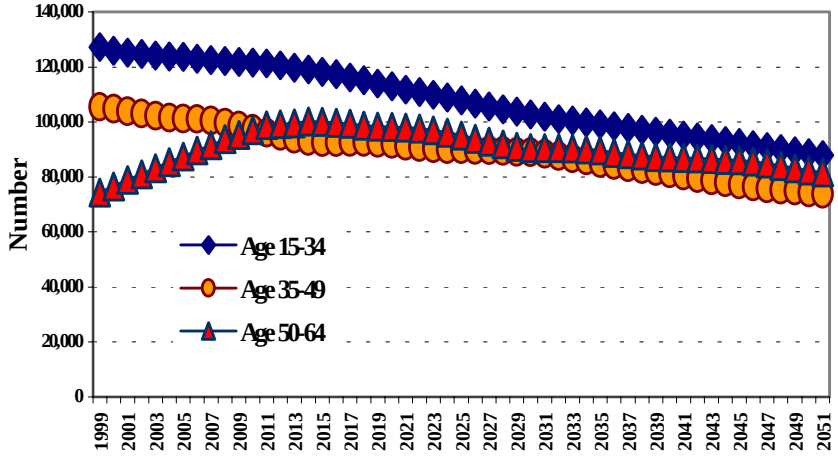

Figure 6. Tasmania: Projected Working Age Population, By Broad Age Group (ABS 2000, Series I).

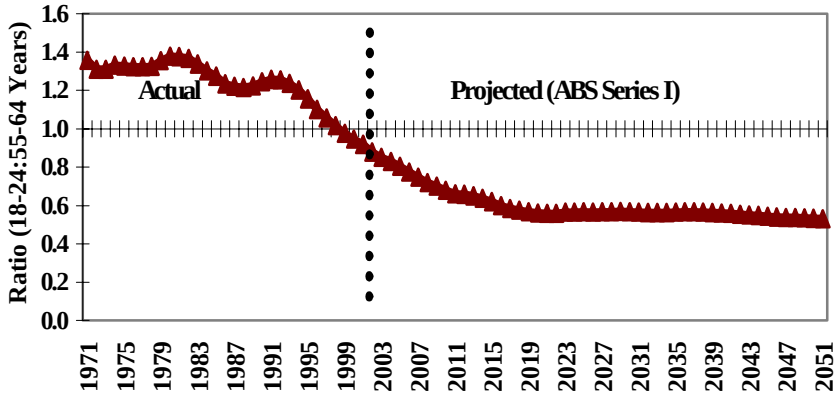

Figure 7. Tasmania: Estimated and Projected Labour Market Entry:Exit Ratios, 1971-2051.

McDonald and Kippen (2001) argue that regions faced with the above circumstances—that is, falling labour force supply exacerbated by negative, zero, or low net migration gains—have three other options for increasing the relative size of their labour forces. These are: a decrease in the age of entry to the labour force, an increase in the labour force participation rate, especially for women, and an increase in the age of retirement.

While the first of these options seems antithetical to current thinking, it could, as argued above, come about as a response to falling entry:exit ratios. Illustrated in Figure 7, this ratio counterpoises the number of people (here, males and females combined) aged 18-24 years and arriving at labour force entry age, with the number aged 55-64 years and nearing or entering retirement. For Tasmania this ratio has already fallen from 1.4 in the 1970s to less than 1.0 in 2001. By 2015, assuming current entrance and exit patterns, it will have fallen to around 0.6. That is, for every 6 young people endeavouring to enter the Tasmanian labour force around 2015, there will be 10 people approaching the age of retirement and/or leaving the labour force. Ratios like this, which have not been observed in Tasmania before (or indeed, Australia or the developed world), are likely to see a substantial increase in demand for the labour of young people.

As implied above, such a scenario has a number of implications. On the one hand, young people can anticipate an increase in competition for their labour, with attendant implications for improved wages and conditions. Such a situation could well see Tasmania become a net attractor of young people from other regions, reversing recent and current out-migration trends. The equivalent ratios in Western Australia, Queensland and the Northern Territory, for example, will in 2015 still be above 1.0. On the other hand, increased competition for labour implies cost implications for individual employers, which could see a reduction in some jobs. But again, at least at the macro-level, better employed, better paid young people imply an increase in consumption, and thus the potential to offset

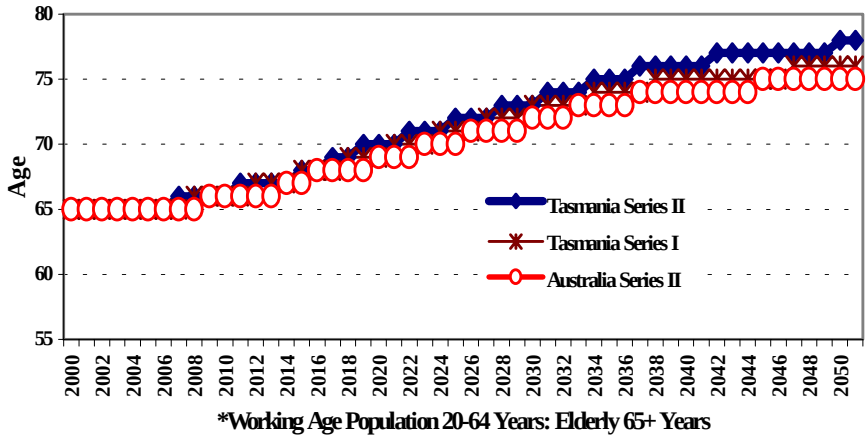

Figure 8. Retirement Adjustment Age Needed to Maintain Current Ratio of Working Age Population to Elderly (Working Age Population 20-64 Years: Elderly 65+ Years), Tasmania By ABS Projection Series I and II, and Australia Series II.

the reduced consumption that occurs with high levels of unemployment.

The second option, an increase in Tasmania's labour force participation rate, which is currently lower than that for all other states and territories, especially for women, is likely to be positively impacted upon by the previous factor: a decline in the supply of youth available for work is likely to see a concomitant increase in demand for the labour of older workers. Additionally it takes little imagination to link a numerically and proportionately shrinking labour force *vis-à-vis* increased numbers and proportions of elderly with a decline in unemployment, for both men and women. By contrast with the offshore manufacturing of clothing, electrical and other consumer goods, population ageing - as an emergent 'industry' - is likely to generate jobs that cannot be so readily exported offshore (McDonald and Kippen, 2001). If this is going to happen, it should happen in Tasmania first.

Relatedly, Figure 8 illustrates the third of the above options: an upward shift in the age of retirement. As an alternative to an increase in the employment rate of younger people, and thus a possible stabilising, or even reduction, in the proportion of younger people undertaking higher education, an increase in the proportion of older people in employment may be the more desirable option. Currently the ratio of Tasmania's working age population (defined here as 20-64 years) to the elderly (65+ years) stands at 4.3. To maintain this ratio across the projection period, the average retirement age would have to increase to around 75 years of age by 2038 and 76 years by 2048 (Series I). Should the assumptions in Series II (the medium case) prevail, the relatively greater loss of working age people to the elderly would result in a slightly higher average age of retirement being needed, and this margin would increase over time, reaching 78 years in 2051.

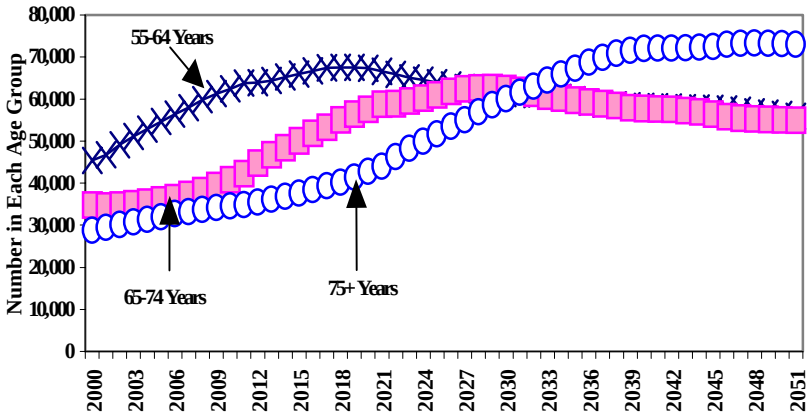

Figure 9. Tasmania: Projected Population Ageing by Broad Age Group (ABS, 2000 Series I).

The merit or otherwise of these findings is not considered here; they are included for illustrative purposes only. However, since it seems that, from both a social and economic perspective, Tasmania's main option for offsetting declining labour supply at the younger ages will be an increase in the proportion of middle-aged to older workers in employment, the exercise is far from academic (for international comparisons see Zoubanov, 2000; Caldwell, Caldwell and McDonald, 2002). Also of relevance to the situation is that while people are living longer than ever before, males at least have been spending a much shorter period in the formal workforce. Nationally, Ruzicka (1986: p. 22) estimated that the average male aged 15 years in 1933 would spend approximately 44 years or 83 per cent of his life in the labour force. Over the 1940s and 1950s this increased slightly to 84 per cent, but by 1981 that proportion had declined to 72 per cent (41 years), despite an increase in life expectancy of more than four years. These data do not appear to have been calculated regionally, but a comparison of age-specific participation rates for Tasmanian males in 1981 and 2001, against a further increase in life expectancy of five years over the same period, indicates substantial further compression. In 1981, around 69 per cent of Tasmanian males had entered the labour force by age 15–19, while 50 per cent remained in it at age 60-64. By 2001, only 57 per cent had entered the labour force by age 15-19, and only 41 per cent remained there at age 60–64 (ABS, 2001, Catalogue 6291.0). Again, if the trends at older ages are going to reverse as a result of population ageing (e.g., McDonald and Kippen, 2001), we might expect to see them in Tasmania first.

Finally, Figure 9 shows the effects of numerical ageing on Tasmania's 55-64, 65-74, and 75+ age groups, according to ABS Series I (best case) projections. Reflecting the earlier discussion, the fastest growing age group is currently that at 55-64 years of age, into which the first of the baby boomers are now moving. Present numbers can be expected to increase by 2019 by nearly 50 per cent, but thereafter they will begin to decline, falling back to around 23 per cent above

their current levels by 2051. Between 2011 and 2029, as the baby boomers shift into the 65-74 year age group, present numbers will increase by some 80 per cent, but then also fall back to around 57 per cent above current levels by 2051. Between 2021 and 2041, numbers aged 75+ years will increase 150 per cent over their present levels, and remain around this level throughout the rest of the projection period. Overall, the number of those aged 65+ years will double over the projection period, but they will peak around 2041, and begin to decline. This is a somewhat different perspective to that gained from the typical illustration of population ageing, wherein the proportion aged 65+ years continues to increase across the entire projection period, and more so for Tasmania than any other state/territory (Jackson and Felmingham, 2002: Figures 1 and 11).

There would seem to be great value in disaggregating both population ageing, and the 'elderly' population, in this manner. While the major impact of population ageing—in terms of the massive increase in the 65+ population—is projected to occur in Tasmania between 2010 and 2020, the real impact in terms of costs may not begin until around 2020, when the populations aged 75-84 and 85+ years really begin to grow. Whether or not these cohorts will contain proportionately more who are sick or sicker than previously (e.g., Fries, 1980, 1989; Hugo, 1986: p. 6; Mathers, 1999), they will certainly contain increased *numbers* requiring care and other age-related services, and these numbers will have fiscal implications for states. But to end on a more positive note, these increased numbers may well draw additional funds into the state, both via the federal payment of Age Pension, and as Superannuitants 'cash up' their investments and spend them locally. From the latter perspective, the onset of decline in these numbers in Tasmania from 2040 may well come to be looked on with some dismay.

5. COMING TO TERMS WITH THE REGIONALITY OF POPULATION AGEING

'If half of the people are overfed, and half are underfed, on the whole they have a fine diet.' This wonderful quote, the citation for which I have lost, sums up the message of this paper. Population ageing has many more implications than the generally well acknowledged increase in the numbers and proportions of elderly. Among these implications are its regionality and 'institutionality', the latter referring to the range of institutions that will bear its various negatives and positives. Analysing likely impacts of the phenomenon at the national level is important, but Australia's complex system of federal, state and local government demands that more attention be paid its regional and sub-regional manifestations.

In Tasmania, where the phenomenon of population ageing and its associated shift to natural decline are being accelerated by a substantial net migration loss at the key reproductive ages, these implications will rapidly become evident. Importantly for Tasmania, as Australia's first 'cab off the rank', their major impact will occur over a relatively brief time span, with extremely significant simultaneity across a number of key indicators. Within the space of a single decade, say 2010-2020, Tasmania's total and working age populations will enter natural decline, primary and secondary school populations will plummet, a

declining labour force entry:exit ratio will compete with the university and other tertiary education institutions for participants, mature and/or female workers will also be competed for, wage rates and employment conditions should improve, the population over the age of 65 will substantially outnumber children; and the number of 65-74 year olds will increase by around forty per cent. With the exception of South Australia, this demography will differ markedly to that in Australia's youngest states and territories, where both natural and absolute population growth will continue for some decades.

Such disparate trends indicate that an urgent rethink of many of Australia's federal level policies and the principles on which they are based is needed. Among these issues will be the current system of state and local government funding, an issue that could be only alluded to here. Others might be certain aspects of economic rationalism that currently work against those who would otherwise increase their number of employees: falling entry:exit ratios will not necessarily deliver lower unemployment in and of themselves. Fortunately, Tasmania and Australia will not be alone as they grapple with these concerns. But for Tasmania specifically, it is necessary to understand that the population clock has stopped ticking, and that it is in the vanguard position. Rather than trying to 'fix the problem' by seeking to return to population growth *per se*, a phenomenon that everywhere will soon belong in the past, it would be better to begin investigating more thoroughly just what positives the new demography might deliver, and work towards these ends.

REFERENCES

Access Economics (2001) *Population Ageing and The Economy.* Melbourne, Access Economics Pty. Ltd.

Australian Bureau of Statistics (1997) *Australian Demographic Trends.* Catalogue 3102.0.

Australian Bureau of Statistics (2000) *Population Projections.* Catalogue No. 3222.0.

Australian Bureau of Statistics (2001) *The Labour Force.* Catalogue 6291.0.40.001.

Caldwell, J.C., Caldwell, P., and McDonald, P. (2002) Policy responses to low fertility and its consequences: a global survey. *Journal of Population Research*, 19(1), pp. 1-24.

Clare, R. and Tulpulé, A. (1994) *Australia's Ageing Society*, Background paper No. 37, Economic and Planning Advisory Council, Canberra, Australian Government Printing Service.

Crowley, P. and Cutbush, G. (2000) *Ageing Gracefully. An Overview of the Economic Implications of Australia's Ageing Population Profile.* Commonwealth Department of Health and Aged Care, Canberra.

Felmingham, B., Jackson, N.O. and Zhang, Q. (this volume) Local government and population change: a case study of Tasmania. *Australasian Journal of Regional Studies,* 8(1).

Forth, G. (1996) Redrawing the map of Australia: the Commonwealth's regional development program. *Australasian Journal of Regional Studies*, 2(1), pp.75-86.

Fries, J. (1980) Ageing, natural death and the compression of morbidity. *New England Journal of Medicine*, 303, pp.130-136.

Fries, J. (1989) The compression of morbidity: near or far? *Milbank Quarterly*, 67, pp.208-232.

Guest, R.S. and McDonald, I.M. (2002) Would a decrease in fertility be a threat to living standards in Australia? *The Australian Economic Review*, 35(1), pp.29-34.

Healy, E. (2001) Australia's ageing labour force: how should government respond? *People and Place*, 9(1), pp.38-51.

House of Lords (2001) European Union - Thirteenth Report, Proceedings of the Committee, European Union Committee Publications (http://www.parliament.the-stationery-office.co.uk/pa/ld200001/ldselect/ldeu com /64/6401.htm) (accessed 23.02.02).

Howard, D. (2001) Isolating the consequences of government policy on regional development: comparative analysis of the state border regions of Australia. *Australasian Journal of Regional Studies*, 7(1), pp.83-96.

Hugo, G. (1998) Twelve major likely trends in Australia's future population. Paper prepared for CEDA Bulletin.

Hugo. G. (1999) Regional development through immigration? The reality behind the rhetoric. *Research Paper 9*. Commonwealth of Australia Parliamentary Library.

Jackson, N.O. (1999) 'Understanding population ageing: a background. *Australian Social Policy,* 1, pp.203–224.

Jackson, N.O. (2001) The Policy Maker's Guide to Population Ageing. Key Concepts and Issues. *Policy Research Series Discussion Paper 13*, Commonwealth Department of Family and Community Services: Canberra.

Jackson, N.O. and Felmingham, B. (2002) When the population clock stops ticking: indicative impacts on Australia's States and Territories. Unpublished Working Paper, University of Tasmania (www.taspop.tasbis.com), (accessed 25.06.02).

Jackson, N.O. and Kippen, R. (2001) Whither Tasmania? A note on Tasmania's population 'problem'. *People and Place*, 9(1), pp.27-37.

Jackson, N.O. and Thompson, B. (2002) The A-B-C of educational demand. A focus on Tasmania and South Australia. *People and Place*. 10(3), pp. 11-22.

Kinnear, P. (2001) *Population Ageng. Crisis or Transition?* Discussion Paper No.45, The Australia Institute.

Mathers, C. (1999) International trends in health expectancies: do they provide evidence for expansion or contraction of morbidity? *Compression of Morbidity: Workshop Papers*, Occasional Papers Series No. 4, Department of Health and Aged Care, Commonwealth of Australia, Canberra.

McDonald, P. (2000) Low fertility in Australia: evidence, causes and policy responses. *People and Place*, 8(2), pp. 6–20.

McDonald, P. and Kippen, R. (2001), Strategies for labour supply in sixteen developed countries, 2000–2050. *Population and Development Review*, 27(1), pp. 1-32.

Poot, J. (1995) Do borders matter? A model of interregional migration in Australasia. *Australasian Journal of Regional Studies*, 2(1), pp. 159-180.

Quiggin, J. (2001) Demography and the new economy. *Journal of Population Research*, 19(2):177-196.

Rottier, R. (2001) The Rhetoric of Population Ageing: Unraveling the 'Issues' and 'Troubles' of Ageing. Unpublished Honours Thesis, University of Tasmania.

Ruzicka, L. (1986) *The Length of Working Life of Australian Males, 1933–1981*, Monograph Series No.15, Bureau of Labour Market Research, Australian Government Publishing Service: Canberra.

State Grants Commission, Tasmanian. (2001-02) *Annual Report*. (www.treasury.tas.gov.au/sc) (accessed July 2002).

Thompson, B. (2001) Projecting Educational Demand in Tasmania. Unpublished Honours Thesis, University of Tasmania.

United Nations (2000a) Papers from the Expert Group Meeting on Policy Responses to Population Ageing and Decline, Population Division, Department of Economic and Social Affairs, United Nations Secretariat, New York 16th-18th October (http://www.un.org/esa/population/publications /popdecline) (accessed 10.03.02)

United Nations (2000b) 'R*eplacement Migration*, Population Division, Department of Economic and Social Affairs: United Nations Secretariat.

Zoubanov, A. (2000) Population ageing and population decline: government views and policies, Expert Group Meeting on Policy Repsonses to Population Ageing and Decline, Population Division, Department of Economic and Social Affairs, United Nations Secretariat, New York 16th-18th October (http://www.un.org/esa/population/publications/popdecline) (accessed 10.03.02).

STRUCTURAL CHANGES IN THE BRAZILIAN INTERREGIONAL ECONOMIC SYSTEM, 1985-1997: HOLISTIC MATRIX INTERPRETATION

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ABSTRACT: In this paper, we focus on the changes in the interregional trade flows in the Brazilian economy. Interregional trade matrices are constructed for two years, 1985 and 1997, and a Machlup-Goodwin-type model is applied following Haddad, *et al*., (1999). The model is used to explore changes in the trade structure among the 27 Brazilian states. Holistic matrix methods such as cluster and structural analyses are applied to the interregional system to explore the nature of the trade structure and the changes evident over the period 1985-1997.

1. INTRODUCTION

Changes in bilateral trade relations are one of the most important characteristics in modern economies. Globalization, trade agreements and the creation of free trade areas are some of the factors that can produce important changes in trade flows between countries. Similar influences may be demonstrated for changes in interregional trade flows within national economies, as factors and sectors react to changes in external trade regimes. One obvious method for studying bilateral trade is the gravity model, which offers a systematic way to measure what patterns of bilateral trade are normal around the world. Frenkel (1997) surveys and estimates a series of gravity models of bilateral trade among countries. His main goal is to examine data on bilateral trade in order to access the influence of geographical proximity versus preferential trading policies in creating regional concentration in trade.

The basic assumption in a gravity model of bilateral trade is that trade between countries depends positively on their size and inversely on distance. The

application of gravity-type models to interregional trade (between states in a country, for example) is straightforward, and became very popular in the literature (see Isard, 1998). These models can also be applied to study temporal changes in bilateral trade, usually using pooled time-series and cross-sectional data. In this framework, a simple time-dummy variable can be specified to test change in the overall mean of bilateral trade (e.g. Frenkel, 1997, p.82).

Although very useful to examine the role of size and distance in bilateral trade, the gravity type model seems inadequate when applied to explore temporal changes in interregional trade systems. First, the only temporal change examined in the model is the overall mean of bilateral trade[1]. Secondly, and maybe more importantly, pooled time series in this case implies a loss of information as the structure of trade is joined in a single variable.

In this paper, we evaluate other methodologies to study changes in the system of interregional trade applying holistic matrix methods. A Machlup-Goodwin-type model is employed following Haddad, *et al.,* (1999). This model is used to explore changes in the trade structure. Thereafter, cluster and structural analyses are applied to the input-output matrices in an exploratory fashion to determine more precisely the nature of the changes.

Two interregional matrices were constructed for 1985 and 1997, based on recently published data. The selected methodologies are used to examine changes in the exchange structure among the 27 Brazilian states. First, a gravity type model is estimated to access some broad changes and tendencies in the interregional system. Some shortcomings in the gravity model are discussed, and the proposed matrix methods are introduced in Section 3. These holistic matrix methods are then used to explore structural changes in the Brazilian interregional system. The following section interprets the results, compares the findings derived from the different methods and offers some perspectives on the exploratory analyses. The paper concludes with some reflections on the findings and their implications for more general modeling exercises.

2. THE MATRIX OF INTERSTATE TRADE FLOWS AND THE BRAZILIAN CASE

Two important changes in the Brazilian economy were the trade liberalization process, which took place since late 1980s, and the stabilization plan initiated in 1994. These two policy decisions, among others, have strongly affected the Brazilian economy in many ways; however, most analysis and interpretation of these recent economic changes have focused on macroeconomic impacts and national issues. Regional and spatial effects of these changes are important issues that have been relatively neglected. For example, the impact in the exchange trade structure among regions remains an undeveloped issue. Typically, analysts resort to the development of interregional computer general equilibrium (ICGE) models to address the spatial impacts of macro policies (see,

[1] Also a panel data estimation could be carried out, and dummy interactions specified, but these specifications do not change the problem of identifying structural change.

for example, Haddad, 1999). The present paper may be seen as an *exploratory* analysis of changes in the structure of interregional trade since there is no attempt to craft explanation from an ICGE. The questions posed are relatively simple, yet important ones. For example, over the period of analysis that macro trade liberalization took place, is it possible to detect any impact on the regional patterns of trade, in terms of origin-destination flows, the magnitude of the flows and the general pattern of exchange?

A further exploration concerns the concentration of economic activity. Fujita *et al*. (1999) explored theoretical models to study the effects of reducing an external trade barrier. Their interpretation "… suggests that external trade liberalization, although it brings a spatial deconcentration of industry as a whole, may also bring spatial clustering of particular industries, as locations come to specialise" (pp. 330). One would thus expect that spatial clustering of activities would be accompanied by a similar clustering of flows, although other factors, such as transportation costs in particular and transfer costs in general, would play an important role (see Magalhães *et al.*, 2001).

The link between these theoretical findings and the interregional exchange structure depends on the spatial distribution of the activities and how the trade liberalization process has affected each industry. Moreira (2000) has explored sectoral impacts of changes in the Brazilian economy. His analysis revealed that intra-industry specialization has occurred, and that in most of the sectors, the shares of imports and exports have increased. This change, among others, has probably affected the exchange structure between regions.

The data used to construct the matrices are interstate flows (CONFAZ, 1999 and IBGE, 1996), gross regional product (GRP) and total production, by state. Table 1 summarizes the data collected for 1985 and 1997, and displays the share in total population by state to provide a sense of the uneven spatial distribution. It is worth noting that the state shares in national GDP and total population have not changed very much, whereas regional trade balance (domestic exports less domestic imports as a share of GRP) in some states have displayed large changes.

The development of the **M**atrix of **I**nterstate **T**rade **F**lows (MIST) model follows Haddad, *et al*. (1999). However, while the latter paper deals with countries in a global economy, in the present context, attention will be directed to interactions between states within a national economy. Consider the following balance identity, which is applicable for each state *i* in the national economy:

$$X_i + C_i + I_i + G_i \equiv M_i + Y_i \tag{1}$$

where:

$$X_i + C_i + I_i + G_i = \text{total production of the state } i \tag{2}$$

$$M_i + Y_i = \text{total domestic demand in state } i = \text{total expense of the state } i \tag{3}$$

Table 1. Brazilian Interregional Data, Summary (1985, 1997).

State	% GRP in GDP		% Total Population		Interregional Trade Balance (% GRP)	
	1985	**1997**	**1985**	**1997**	**1985**	**1997**
Acre (AC)	0.13	0.15	0.27	0.31	-32.31	-15.80
Alagoas (AL)	0.86	0.66	1.69	1.67	-22.90	-26.85
Amapá (AP)	0.12	0.18	0.17	0.25	-34.25	-20.43
Amazonas (AM)	1.52	1.66	1.32	1.54	16.28	36.93
Bahia (BA)	5.35	4.25	8.01	7.96	-1.67	-8.87
Ceará (CE)	1.72	2.02	4.39	4.34	-19.42	-19.61
Distrito Federal (DF)	1.37	2.28	1.04	1.18	-37.90	-31.94
Espírito Santo (ES)	1.72	1.86	1.74	1.79	-14.59	21.17
Goiás (GO)	1.80	2.04	3.30	3.58	-23.60	-34.60
Maranhão (MA)	0.74	0.85	3.36	3.32	-42.43	-35.71
Mato Grosso (MS)	0.69	1.05	1.17	1.43	-43.98	-2.55
Mato Grosso do Sul (MT)	0.95	1.07	1.18	1.23	-14.29	-18.73
Minas Gerais (MG)	9.61	10.01	10.98	10.59	4.23	3.01
Pará (PA)	1.52	1.69	3.12	3.54	-24.58	-22.80
Paraíba (PB)	0.72	0.80	2.25	2.09	-28.22	-27.54
Paraná (PR)	5.92	6.07	6.08	5.73	4.25	0.29
Pernambuco (PE)	2.62	2.69	5.01	4.68	-9.47	-22.76
Piauí (PI)	0.39	0.49	1.78	1.69	-32.51	-38.45
Rio Grande do Norte (RN)	0.78	0.77	1.62	1.63	-12.19	-31.21
Rio Grande do Sul (RS)	7.88	7.95	6.38	6.12	-0.26	-2.07
Rio de Janeiro (RJ)	12.70	11.22	9.10	8.49	6.67	-13.52
Rondônia (RO)	0.48	0.48	0.59	0.79	-28.25	-25.70
Roraima (RR)	0.07	0.07	0.11	0.16	-87.35	-33.75
Santa Catarina (SC)	3.30	3.66	3.07	3.11	2.95	-5.62
São Paulo (SP)	36.12	35.48	21.28	21.77	5.99	15.38
Sergipe (SE)	0.92	0.56	0.99	1.04	-10.65	-22.46

and, *I, G, X and M* are private consumption, investment, government expenditures, exports and imports in state *i* respectively.

X and *M* are comprised of both domestic and external flows, that is, they incorporate interregional flows and foreign trade. The final demand components are consumption, *C*, investment, *I*, and government spending, *G*.

The trade flows *X* and *M* for each state can be decomposed in two parts, domestic and foreign:

$$X_i = \sum_{j=1}^{n} x_{ij} + \overline{X}_i \tag{4}$$

$$M_i = \sum_{j=1}^{n} m_{ij} + \overline{M}_i \tag{5}$$

The x_{ij} s are the sales of the state *i* to the state *j* and $\overline{X}_i$ are the foreign exports of the state *i*. In a similar way, the m_{ij} s are purchases (imports) of the state *i* from the state *j* and $\overline{M}_i$ are foreign imports by the state *i*. The interregional flows matrices [x_{ij}] and [m_{ij}] are the same. The diagonal elements are zero, as we are treating each state as an individual firm. Therefore, all intra-state intermediate consumption and final demand is in the 'final demand' vector.

Substituting (4) and (5) in (1):

$$\sum_{j=1}^{n} x_{ij} + \overline{X}_i + C_i + I_i + G_i = \sum_{j=1}^{n} m_{ij} + \overline{M}_i + Y_i = E_j \text{ for } i = 1,..., n. \tag{6}$$

where E_j is the total final demand in the state *i*.

The result will be an input-output-type table in which the rows describe the distribution of a state's domestic production throughout the national economy plus foreign exports ($\sum_{j=1}^{n} x_{ij} + \overline{X}_i + C_i + I_i + G_i$), while the columns reveal the composition of a state domestic expenditure plus foreign imports ($\sum_{j=1}^{n} m_{ij} + \overline{M}_i + Y_i$). Table 2 shows the layout of the MIST. The mathematical structure of the system consists of a set of *n* linear equations with *n* unknowns. In similar fashion to input-output systems, the solutions are straightforward mathematically, but there are differences in the economic interpretations of some of the results.

The system of *n* equations can be written in matrix notation as:

$$TZ + F = Z \tag{7}$$

where:

T is the interregional import coefficients matrix *(n* x *n)*, *Z* is the total final demand vector *(n* x 1*)* and *F* is the exogenous final demand vector *(n* x 1*)*.

Table 2: Matrix of Interstate Trade Flows.

		STATES								Final Demand (C+I+G+X)
		1	2	.	.	.	.	n-1	n	
	1		*E*	*X*	*P*	*O*	*R*	*T*	*S*	
S	2	*I*								
T	.	*M*								
A	.	*P*								
T	.	*O*								
E	.	*R*								
S	n-1	*T*								
	N	*S*								
Foreign Imports										
GRP										

Solving (7) yields:

$$Z = (I - T)^{-1} F \tag{8}$$

In the next section, some methodology that focuses on aggregate analysis of structure is reviewed and applied to the interregional systems for both years. The objective here is to probe for structural changes and similarities that gravity models and more casual inspection of the matrices might overlook.

3. EMPIRICAL ANALYSIS

First of all, a gravity type model is estimated using the information derived from the two interregional trade matrices introduced in the previous section. Cluster analysis and derivatives of bi-proportional adjustment mechanisms have proven to be popular, and valued, methods for uncovering changes in the structure of economic systems. These will be reviewed in turn and then applied to the Brazilian interregional system.

3.1 Gravity Type Model

A gravity model for interstate trade flows (1985 and 1997) is estimated using the data outlined in the previous section together with some geographic characteristics. The database for the estimation is constructed pooling the two cross sectional matrices. The dependent variable is the trade flow from state *i* to state *j*. The explanatory variables are the gross regional products of state *i* and *j*. These represent supply and demand effects; the expected result is that the larger the GRP the larger the trade flows between the states. Spatial characteristics are introduced through three variables. The simple distance between the states captures the overall effect of transport costs. Two dummies are introduced to indicate a common border between states and the location in the same macro region. A time dummy is introduced to identify the year (it equals 1 in 1997 and

0 in 1985). The effect of this dummy is the interaction with the constant term. If this dummy is not significant, then the mean bilateral trade in both years has not changed.

All the variables are used in (natural) logarithmic form. The proposed model is:

$$\log(TRADE_{ij}) = \alpha + \beta_1 \log(GRP_i) + \beta_2 \log(GRP_j) + \beta_3 \log(DIST_{ij}) + \beta_4 (ADJACENCY_{ij}) + \beta_5 (D97) + \beta_6 (DREG) + u_{ij} \quad (9)$$

where:

$TRADE_{ij}$ is the flow of trade from state *i* to state *j*

GRP_i is the GRP of state *i* (supply effect)

GRP_j is the GRP of state *j* (demand effect)

$DIST_{ij}$ is the distance between states *i* and *j*

$ADJACENCY_{ij}$ indicates when two states share a common land border

D97 is a time dummy (1997 = 1)

DREG indicates when two trading partners are located in the same macro region

Table 2a shows the gravity model results. The variables have the expected sign and are highly significant, except for the dummy variable. This result implies that there is no change in the overall mean of the bilateral trade flows between 1985 and 1997. It is worth noting that the estimated distance coefficient (-0.656) is in the usual range for these models (see Fujita *et.al*. 1999 p.98; and Frenkel, 1997, p.72).

The point to be made is that the gravity model is often used as a measure of structural change but it does not "tell us the story". In order to explore the structural changes in the inter-regional trade system, holistic matrix methods are explored in the next sections.

3.2 Cluster Analysis

Regional and industrial cluster identification has proven to be very popular in local and regional development research and practice.[2] This paper will apply some of these concepts in the study of the changes in the estimated Brazilian interstate trade matrix. The purpose will be to identify possible changes in the interregional linkages between states over this time period (1985-1997).

The first approach employs an interindustry linkage measure proposed by Czamanski and Ablas (1979). The following four coefficients based on input-output flows, i.e. the interregional trade matrix, describe the relative importance of the links, either for the supplying or for the purchasing state:

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[2] A survey of the concepts and applications of cluster analysis can be found in Bergman and Feser (1999).

Table 2a. Gravity Model.

Dependent Variable is $TRADE_{ij}$		
	Parameter	***t*-statistic**
Constant	-22.795	-22.542
GRP_i	1.375	51.519
GRP_j	0.964	36.155
$DIST_{ij}$	-0.656	-9.418
$ADJACENCY_{ij}$	0.835	6.744
D97	-0.126	-1.757*
DREG	0.349	2.841
Number of observations	1247	
R-squared	0.805	
Adjusted R-squared	0.804	
F-statistic	852.126	
Prob(F-statistic)	0.000	

*Not significant at 5% level
All variables taken in natural log terms

$$a_{ij} = \frac{x_{ij}}{\sum_j x_{ij}};\ a_{ji} = \frac{x_{ji}}{\sum_i x_{ji}};$$
$$b_{ij} = \frac{x_{ij}}{\sum_i x_{ij}};\ b_{ji} = \frac{x_{ji}}{\sum_j x_{ji}};\qquad (10)$$

where x_{ij} is the yearly flow in R$ millions of goods and services traded from state i to state j. Each coefficient is an indicator of dependence between states i and j, in terms of relative purchasing and sales linkages:

a_{ij}, a_{ji}: good purchases by j (i) from i (j) as a proportion of j's (i's) total good purchases. A large value for a_{ij} suggests that state j depends on state i as a source for a large proportion of its total purchases.

b_{ij}, b_{ji}: good sales from i (j) to j (i) as a proportion of i's (j's) total good sales.

A large value for b_{ij}, for example, suggests that state i depends on state j as a market for a large proportion of its total sales.

The largest of the four coefficients is selected for each pair of states. This yields a symmetric data matrix, L_U, that, when subjected to hierarchical cluster analysis, generates clusters that at least partially capture indirect linkages

between states.

This approach investigates the isolated functional linkage between pairs of states. Another criterion used for grouping industries (i.e. states) in a cluster was similarity between their total profiles of suppliers and buyers, including those outside the cluster (Czamanski and Ablas, 1979). This second approach indicates whether or not states have comparable purchase or selling patterns, since two states may be members of a cluster in the absence of direct linkages. It employs four correlations to describe the similarity between the exchange structure of two states, *k* and *l*:

$r(a_{ik}, a_{il})$: degree to which purchasing patterns are similar.

$r(b_{ki}, b_{li})$: degree to which output selling patterns are similar.

$r(a_{ik}, b_{li})$: degree to which the buying pattern of state *k* is similar to the selling pattern of state *l.*

$r(b_{ki}, a_{il})$: degree to which the buying pattern of state *l* is similar to the selling pattern of state *k.*

From these sets of correlations covering all possible pairs of states, an *n* x *n* intercorrelation matrix, L_V, was produced by selecting the highest of the four correlations for each pair of states.

A high $r(a_{ik}, a_{il})$ coefficient indicates that the two states, *k* and *l*, have similar purchase structures. A high $r(b_{ki}, b_{li})$ coefficient signifies that the two states, *k* and *l*, trade their products to a similar set of states. A high $r(a_{ik}, b_{li})$ coefficient implies that state *k* selling profile is related to state *l* purchase pattern. The reason for picking the highest of these four correlations is to identify the stronger linkages between each pair of states.[3]

Each column of this symmetric matrix describes the pattern of linkage between each state and all other states in the set. Hierarchical cluster analysis can be used to identify groups of related states. The matrices L_U and L_V will be calculated for the two years, 1985 and 1997. Hierarchical cluster analysis will be used to identify clusters in each case, and the results will be compared. The focus will be the change between the clusters identified in 1985 and 1997, for each matrix.

Hierarchical cluster methods are clustering algorithms that try to find reasonable clusters without having to look at all possible configurations. In the case of agglomerative hierarchical methods, they proceed by a series of successive mergers. Starting with the individual elements, the most similar are first grouped, and these initial groups are merged according to their similarities. *Linkage methods* are some of these agglomerative hierarchical methods. This

[3] We are not, at this time, trying to identify which linkages (selling or purchasing) are the most important. Other methodologies are necessary to make this analysis, they will be implemented in section 3.3 and 3.4.

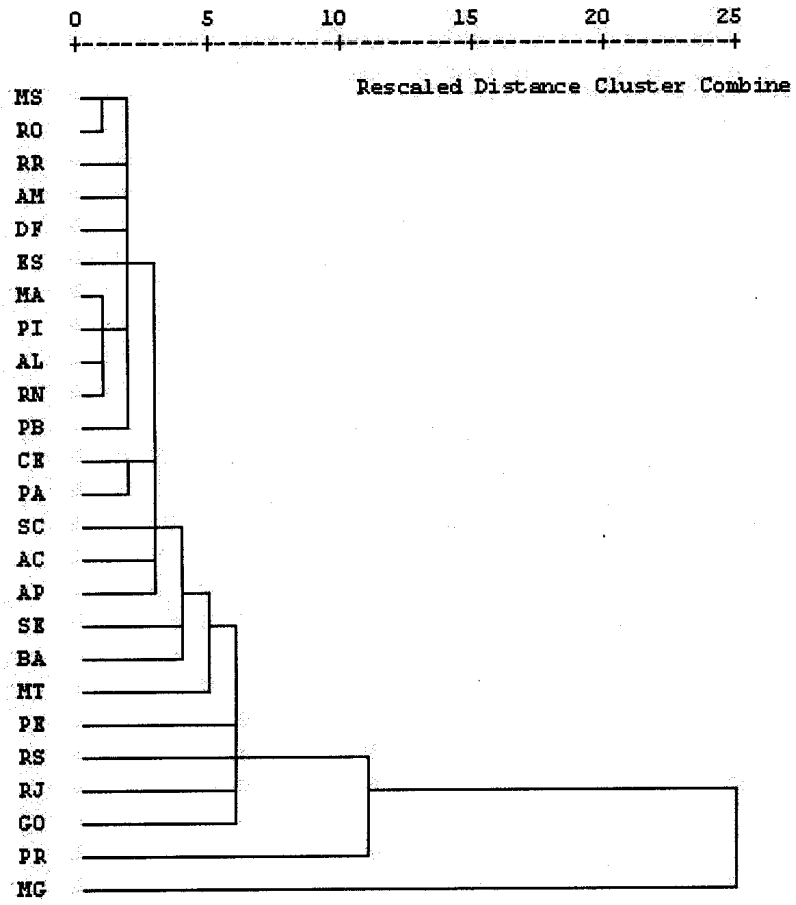

Figure 1a. Hierarchical Cluster Analysis – Matrices.
Dendrogram Using Single Linkage.
$\mathbf{L}_U$ Matrix 1985.

paper employs the *single linkage* procedure to identify the hierarchical clusters in the matrices L_U and L_V.[4]

In the single linkage procedure, groups are formed from the individual elements by merging nearest neighbors, where the term nearest neighbor connotes the smallest distance or large similarity. A description of this method

[4] This procedure and others for hierarchical cluster analysis are available in the release 10.1.0 of the SPSS package.

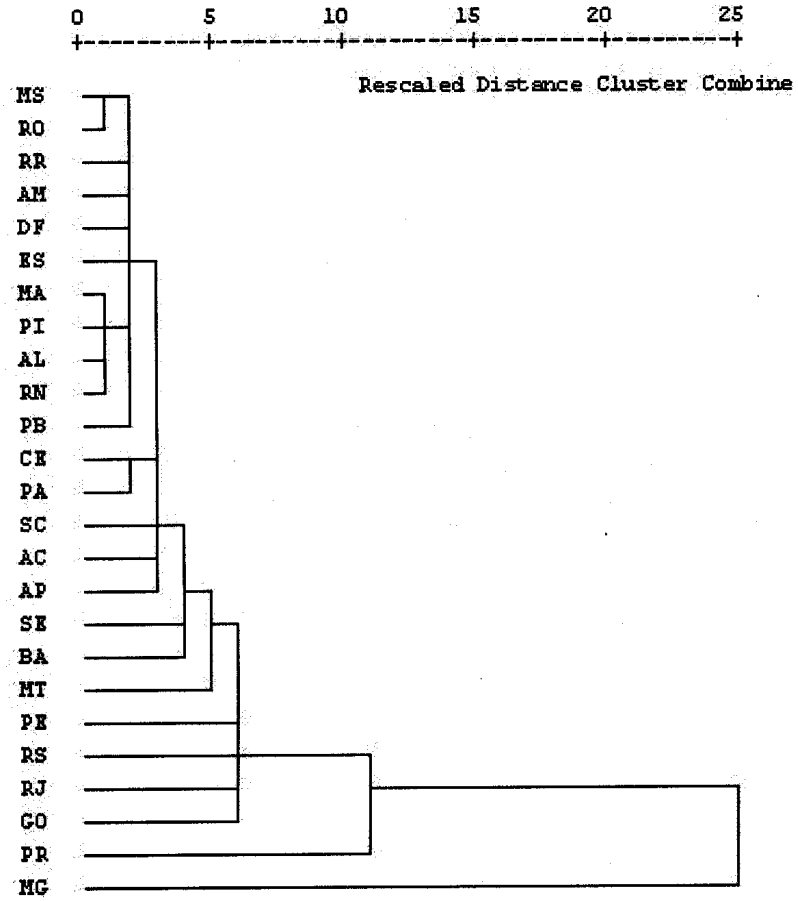

Figure 1b. Dendrogram using Single Linkage
$\mathbf{L}_U$ Matrix 1997.

can be found in Johnson and Wichern, 1998.[5] The results of the method can be displayed in the form of a two-dimensional diagram known as *dendrogram*, or tree diagram. The *dendrogram* illustrates the mergers that have been made at successive levels; each level (branch in the tree) implies a specific cluster and the distance between levels show the similarity between clusters (minimum distance means maximum similarity).

[5] Different methods applied to the L_U and L_V matrices (*complete linkage*, *average linkage*, *ward's hierarchical clustering method*, *between groups*) have generated similar results. The single linkage was adopted because it can delineate non elipsoidal clusters (Johnson and Winchern (1998), pp. 742-744).

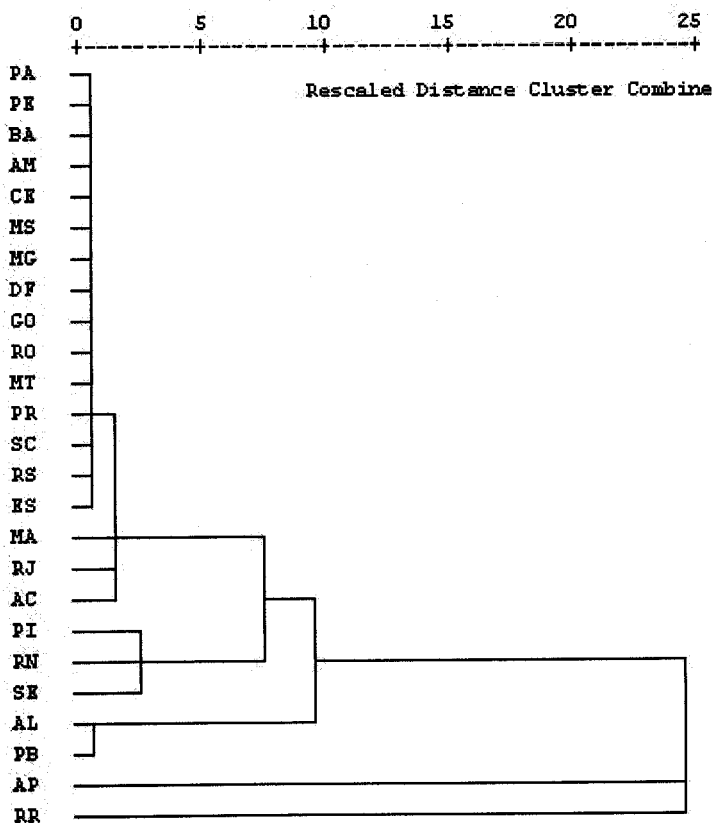

Figure.2a. Hierarchical Cluster Analysis - Matrices $\mathbf{L_V}$
Dendrogram using Single Linkage
$\mathbf{L_V}$ Matrix 1985.

The matrices subject to the hierarchical cluster method are symmetric distance matrices produced from the original data (matrix). In the case of the L_U and L_V matrices the distance matrix produced for the algorithm are simple transformations of the values (high correlation implies low distance).

Figure 1 reveals the *dendrograms* for the matrices L_U in 1985 and 1997. The state of São Paulo was dropped from the analysis because its very different (and dominant) pattern tended to hide the differences among other states. For 1985, various groups of states can be seen to cluster at intermediate levels. Recall that the L_U matrix captures the interdependence between states. Therefore the 1985 *dendrogram* indicates a highly different pattern in the interregional linkages. This characteristic is less evident if we observe the *dendrogram* for the L_U matrix in 1997. Here, a large group of states that cluster at lowers levels (great similarity) is observed. In the following levels, only two states come together,

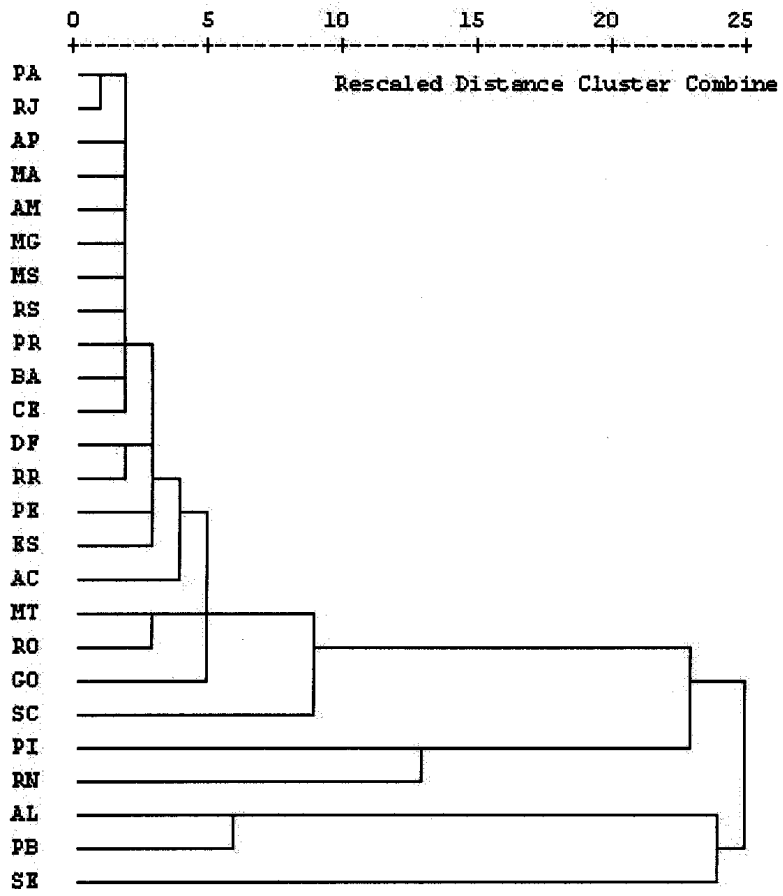

Figure 2b. Dendrogram using Single Linkage
$\mathbf{L_V}$ Matrix 1997.

Minas Gerais (MG) and Parana (PR). We should note that, in 1997, these two large states in the Brazilian economy and as well Rio Grande do Sul (RS) and Rio de Janeiro have clustered together. Sao Paulo (not shown) remains a dissimilar component in the interregional pattern of linkages.

The two *dendograms* in Figure 1 illustrate a homogeneity tendency at intermediate and lower levels. Some states that have dissimilar interregional linkage structures in 1985 become more similar in 1997. Only two states, Minas Gerais and Parana, become more dissimilar in this period.

In Figure 2, the *dendograms* for the L_V matrices show a pattern similar to those revealed in Figure 1. The movement in the hierarchical clusters maintains the same trend as in the L_U matrices, but seems to be stronger. Recall that the L_V matrix captures the similarity in the exchange structure between states. Some

clusters at higher levels have vanished; only Sao Paulo remains in its position as a very different structure in 1997.

3.3 Causative Matrix

Since the exploration focuses on modeling structural economic change, defined as changes in interactions among states, an input-output type model has been chosen since it provides a rich representation of economic structure. The causative matrix approach focuses on these inter-states interrelationships. The causative matrix method has been applied to input-output tables by Jackson, *et al*., (1990); this methodology will be implemented in the Machlup-Goodwin-type model established here.

The T matrix is observed in two periods, t and $t+k$. Hence, two Leontief inverses are calculated as in (8). Starting from the inverse matrix $B=(I-T)^{-1}$, two transition matrices are computed, B_M^t and B_M^{t+k}. These matrices are the normalized Leontief matrices in each period, t and $t+k$. The transition matrices are the Leontief inverse normalized by their respective column sums:

$$B_M^t = B^t (M^t)^{-1} \tag{11}$$

$$B_M^{t+k} = B^{t+k} (M^{t+k})^{-1} \tag{12}$$

where M^t and M^{t+k} are diagonal matrices whose elements m_{jj} equal the sums of the jth column of the respective B matrix.

Matrix B_M^{t+k} is assumed to be linked to the matrix B_M^t as follows:

$$B_M^{t+k} = CB_M^t \tag{13}$$

The C matrix maps the change between B_M^t and B_M^{t+k}. This *left causative matrix* is obtained by inverting B_M^t:

$$C = B_M^{t+k} (B_M^t)^{-1} \tag{14}$$

Jackson, *et al*. (1990) show that the causative matrix goes beyond examining direct changes in the elements of B_M by including the relative effects from other states. The resulting matrix C should be compared to the identity matrix. Elements of C different from those of an identity matrix indicate changing structure in the network of exchange interactions linking states.

The C matrix has n^2 elements that may be analyzed. Two sets of elements can be used to summarize this information. As pointed out by Jackson, *et al*. (1990), the row sums of the C matrix are also interpretable: off-diagonal row sums greater than 0 mean generally greater contributions to output multipliers, hence these states experience greater impacts when final demand in other states

changes. The diagonal elements show the relative endogenization in the states of their own final demand output impacts.[6]

A typology of the nature of structural changes for each of the 26 states is presented by combining these elements of the causative matrix. Given S_i, the off-diagonal row sum for state i, and d_i, the diagonal element for state i, the following classification is established, related to changes in each state own final demand and demand from other states[7]:

Type I: $d_i > 1, S_i > 0$

In this case, the state became relatively more dependent on its own final demand impacts and more dependent on other states demand.

Type II: $d_i < 1, S_i > 0$

State i became relatively less dependent on its own final demand impacts and more dependent on other states demand. Therefore, trade became relatively more important to stimulate production in state i.

Type III: $d_i < 1, S_i < 0$

As in type II, state i became relatively less dependent on its own final demand impacts, but less dependent on other states demand.

Type IV: $d_i > 1, S_i < 0$

In this case, state i became relatively more dependent on its own final demand impacts and less dependent on other states demand. Therefore, trade became relatively less important to stimulate output in state i.

Table 3 displays the results obtained with the causative matrix. None of the states has a type III classification, and most of them have a type IV typology. This type IV group clusters the bigger states in the Brazilian economy including Sao Paulo, Minas Gerais, Parana and Rio Grande do Sul. Therefore, an important feature in the changing structure points to greater endogenization in the states of own final demand impacts and decreased output impacts created from other states. In such a way, trade became relatively less important to these states.

The type I group shows states that became relatively more dependent on its own final demand impacts and more dependent on other states demand. The distinctive feature here is the increased output impacts created from other states. Therefore, trade became relatively more important to these states. This last movement in particularly significant in Amazonas and Rio de Janeiro, two important states in the North and Southeast regions, respectively.

3.4 Biproportional Filters

The left causative matrix model applied earlier is appropriate for the study of changes in backward linkages because attention has been directed to changes in column coefficients. As pointed out by Jackson *et al.* (1990), a right causative

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[6] Sonis, *et al*., (1996) employing an alternative decomposition have referred to this as self and non-self changes in demand.

[7] Jackson *et al.* (1990) applied the same typology for US industrial sectors .

Table 3. Structural Change in the Inter-state Exchange Relationships, Based on the Methodology of Left Causative Matrix.

State	Type	Off-diagonal Sum	Diagonal
Amazonas	I	0.3296	1.0025
Rio de Janeiro		0.1664	1.1676
Pernambuco		0.1484	1.0286
Piauí		0.0230	1.0096
Rio Grande do Norte		0.0210	1.0725
Rondônia		0.0096	1.0136
Para	II	0.1283	0.9940
Mato Grosso do Sul		0.0657	0.9766
Maranhão		0.0537	0.9471
Distrito Federal		0.0262	0.9885
Amapá		0.0023	0.9121
Roraima		0.0014	0.8699
Acre		0.0002	0.9914
São Paulo	IV	-0.7763	1.0748
Minas Gerais		-0.4130	1.1615
Paraná		-0.2198	1.0772
Mato Grosso		-0.1437	1.0130
Goiás		-0.1339	1.1271
Ceara		-0.0765	1.0425
Espírito Santo		-0.0635	1.0812
Bahia		-0.0454	1.0603
Paraíba		-0.0335	1.0320
Sergipe		-0.0254	1.1986
Santa Catarina		-0.0234	1.0321
Alagoas		-0.0164	1.0947
Rio Grande do Sul		-0.0135	1.0394

matrix model would be appropriately defined for sales (rows) coefficients, where interest is in the forward linkages. Conceptually, a left causative matrix is associated with demand-driven (Leontief) models, and right causative matrix with supply-driven (Ghosh) models[8].

The bi-proportional filter methods proposed by Mesnard (2000a) are appropriate tools to analyze structural change but avoiding reliance on one of these hypotheses. Although the results from the biproportional filters cannot be

[8] There is a large volume of literature about what model can be considered as the more attractive (for example Oosterhaven, 1988, Mesnard, 1997 and 2000b). In general the demand driven model is considered more plausible and much more used.

directly compared with those from the left causative matrix[9], they do provide additional information to analyze structural changes in input-output-type systems.

The idea is to generalize the comparison of technical and allocation coefficients. In this method, the two flow matrices are compared directly, without using technical coefficients or normalized Leontief matrices. Therefore, "…*ex ante* stability of technical and allocation coefficients will not be posed and their stability will be measured eventually *ex post*, that could help to dismiss one of the alternative hypothesis or both eventually." (Mesnard, 2000b, p. 6)

The basic principle in this method is to project an initial flow matrix T using the margins (columns and row sums) of a final matrix T^*. We should compute a matrix $\hat{T}$ as close as possible to T, with the margins of T^*. This is a similar undertaking to the normalization of both columns and rows. After that, the differences between $\hat{T}$ and T^* can be analyzed using an indicator of changes like the Frobenius norm of the columns and rows.

There are many methods to carry out the projection of a matrix from the margins of another, with the biproportional filter being just one of them. The result of a biproportion that gives to T the same margins of T^*, $\hat{T} = K(T,T^*)$, is given by $\hat{T} = PTQ$, where P and Q are diagonal matrices. These matrices respectively allow $\hat{T}$ to respect the margin (14) and closeness (15) conditions:

$$\sum_i \hat{t}_{ij} = \sum_i t^*_{ij} \text{ for all } i \tag{15}$$

$$\sum_j \hat{t}_{ij} = \sum_j t^*_{ij} \text{ for all } j \min \sum_i \sum_j \hat{t}_{ij} \log \frac{\hat{t}_{ij}}{t_{ij}} \tag{16}$$

The RAS algorithm is one of the biproportional filters that obey these two conditions. Moreover, the RAS has a unique solution, as demonstrated by Bacharach (1970), and all algorithms respecting these two conditions give the same results (Mesnard, 1994). All the projections calculated in this paper utilize the RAS algorithm.[10]

The *biproportional ordinary filter* (Mesnard, 1998) is the projection of matrix T in the margins of T^*: $\hat{T} = K(T,T^*)$. The resultant $\hat{T}$ matrix is compared to T^* through the difference matrix: $T^* - \hat{T}$. Then, relative variations for columns and rows are computed:

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[9] The results from the left causative method cannot be compared with those from the right causative matrix as well.

[10] The applied computation procedure for RAS utilized in this paper is included in the DAGG program, available at Monash University (www.monash.edu.au/policy/gpmark.htm).

$$\sigma_j^C = \frac{\sqrt{\sum_i [t_{ij}^* - K(T,T^*)_{ij}]^2}}{\sum_i t_{ij}^*}, \text{ for column } j \tag{17}$$

$$\sigma_i^R = \frac{\sqrt{\sum_j [t_{ij}^* - K(T,T^*)_{ij}]^2}}{\sum_j t_{ij}^*}, \text{ for row } i \tag{18}$$

The biproportional ordinary filter can also be computed in the reverse order. In this case, the projection of matrix T^* is in the margins of T: $T' = K(T^*,T)$. The resultant T' matrix is compared to T through the difference matrix. As in (16) and (17), relative variations for columns and rows can be computed:

$$\sigma_j^C = \frac{\sqrt{\sum_i [t_{ij} - K(T^*,T)_{ij}]^2}}{\sum_i t_{ij}}, \text{ for column } j \tag{19}$$

$$\sigma_i^R = \frac{\sqrt{\sum_j [t_{ij} - K(T^*,T)_{ij}]^2}}{\sum_j t_{ij}}, \text{ for row } i \tag{20}$$

Therefore, there are two possible sets of different results, the direct (17 and 18) and reverse (19 and 20) biproportional filters. There is no criterion to indicate which of them is better or more adequate.

To avoid the double projection, the biproportional mean filter (Mesnard, 1998) can be used. In this case, each matrix T and T^* is projected in the margins of the mean of these matrices. Then we have two projected matrices, $K(T, \overline{T})$ and $K(T^*, \overline{T})$, where $\overline{T} = 1/2\ (T+T^*)$. These two matrices are compared calculating relative variations for columns and sums:

$$\sigma_j^C = \frac{\sqrt{\sum_i [K(T^*,\overline{T})_{ij} - K(T,\overline{T})_{ij}]^2}}{\sum_i \bar{t}_{ij}}, \text{ for column } j \tag{21}$$

$$\sigma_i^R = \frac{\sqrt{\sum_j [K(T^*,\bar{T})_{ij} - K(T,\bar{T})_{ij}]^2}}{\sum_j \bar{t}_{ij}}, \text{ for row } i \tag{22}$$

In this case, only one set of calculations is made. This result removes the effects of the differential growth of states, but not the effect of differences in the size of states.

A third biproportional filter offers the option of eliminating the difference in the sizes of states. The idea is to normalize both columns and sums simultaneously in each matrix. This *biproportional bimarkovian filter* (Mesnard, 2000b) employs bimarkovian or binormalized matrices in which both margins (column and rows sums) are equal to 1. Then, the resulting projections are compared as in previous filters:

$$\sigma_j^C = \sqrt{\sum_i [K(T^*,1^M)_{ij} - K(T,1^M)_{ij}]^2}, \text{ for column } j \tag{23}$$

$$\sigma_i^R = \sqrt{\sum_j [K(T^*,1^M)_{ij} - K(T,1^M)_{ij}]^2}, \text{ for row } i \tag{24}$$

where 1^M represents column and row margins equal to 1.

Table 4 summarizes the results for row vectors. The first column shows the normalized allocation coefficients, the simple relative variation in row coefficients between the two matrices. The second and third columns are the results from the ordinary biproportional filter, direct (18) and reverse (20). The following columns display the results for the biproportional mean (22) and bimarkovian (24) filters.

The results for column vectors are in Table 5. The first column shows the normalized purchasing coefficients, the simple relative variation in column coefficients between the two matrices. The results from the ordinary biproportional filter, direct (17) and reverse (19) are in the second and third column. Results for the biproportional mean (21) and bimarkovian (23) filters are in the last two columns.

4. INTERPRETATION

The empirical analysis carried out has highlighted different aspects of structural changes in the Brazilian interregional system. Although the results cannot be directly compared, some findings were closely related.

The gravity model was able to identify the role and importance of larger states (in terms of GRP) in bilateral trade, as they have greater trade flows, as buyers and/or suppliers. It was also possible to assess the importance of spatial

Table 4. Structural Change in the Interstate Exchange Relationships Biproportional Filters, Brazil 1985-1997.

Row Vectors (%)

State	Norm. Alloc. Coeff.	Biprop. Direct	Biprop. Reverse	Biprop. Mean	Bimark.
Acre (AC)	25.49	55.09	44.82	52.12	45.37
Alagoas (AL)	17.54	8.72	9.87	9.44	14.52
Amapá (AP)	45.53	46.52	39.50	53.15	64.51
Amazonas (AM)	13.50	6.52	8.20	7.51	73.67
Bahia (BA)	5.63	17.23	17.76	17.40	15.36
Ceará (CE)	6.28	13.06	10.79	11.64	14.61
Distrito Federal (DF)	13.85	28.39	20.72	28.16	18.33
Espírito Santo (ES)	19.50	28.19	33.84	27.35	29.44
Goiás (GO)	15.27	19.90	20.23	20.27	21.67
Maranhão (MA)	11.53	19.86	23.17	18.59	35.50
Mato Grosso (MS)	20.72	34.29	35.26	33.82	31.30
Mato Grosso do Sul (MT)	9.31	16.97	16.12	17.94	47.93
Minas Gerais (MG)	19.82	7.76	6.37	7.12	16.49
Pará (PA)	8.97	12.29	12.44	12.30	58.05
Paraíba (PB)	9.94	19.98	13.95	17.12	19.52
Paraná (PR)	14.98	8.63	7.00	7.80	21.61
Pernambuco (PE)	6.55	12.31	16.11	10.86	12.74
Piauí (PI)	16.24	33.24	20.95	39.58	59.20
Rio Grande do Norte (RN)	11.42	21.67	18.89	24.97	15.78
Rio Grande do Sul (RS)	18.91	10.79	9.45	9.90	19.39
Rio de Janeiro (RJ)	35.08	14.79	16.83	15.83	16.52
Rondônia (RO)	15.58	27.06	21.59	26.64	46.29
Roraima (RR)	75.39	42.30	22.74	45.48	59.64
Santa Catarina (SC)	4.65	14.28	14.57	13.97	20.75
São Paulo (SP)	13.07	8.36	11.02	8.24	19.12
Sergipe (SE)	11.16	31.16	13.76	29.88	19.23

factors determining the trade flows. Neighboring states trade more, as happens with states in the same macro region. Distance was also a relevant variable explaining bilateral trade. However, the gravity model was not useful for interpreting or undercovering structural changes, as the time dummy failed to recognize the character of structural change. The holistic matrix methods revealed different aspects of the structural changes in the interregional trade. Cluster analysis showed that the larger states became more similar in their exchange pattern. Besides, the less developed states tended to group together and São Paulo exhibited a very distinctive pattern. The role of São Paulo as a central point in the exchange structure can explain its increased surplus in the interregional trade balance.

Table 5 Structural Change in the Interstate Exchange Relationships Biproportional Filters, Brazil 1985-1997.

Column Vectors (%)

State	Norm. Purch. Coeff.	Biprop. Direct	Biprop. Reverse	Biprop. Mean	Bimark.
Acre (AC)	55.59	20.86	14.75	22.01	42.40
Alagoas (AL)	55.41	16.75	20.80	15.40	16.79
Amapá (AP)	16.16	43.04	17.75	42.01	59.10
Amazonas (AM)	10.56	4.73	8.71	5.94	60.15
Bahia (BA)	12.20	11.50	14.02	11.41	21.14
Ceará (CE)	7.43	15.44	10.84	15.37	16.57
Distrito Federal (DF)	32.70	5.95	5.75	6.92	10.61
Espírito Santo (ES)	26.20	20.83	14.20	17.87	12.08
Goiás (GO)	16.13	18.84	10.29	15.70	16.74
Maranhão (MA)	21.05	9.25	17.57	9.92	51.91
Mato Grosso (MS)	32.35	22.62	7.23	21.94	51.10
Mato Grosso do Sul (MT)	21.98	11.71	24.37	11.06	22.46
Minas Gerais (MG)	9.72	8.77	31.71	9.26	27.87
Pará (PA)	16.73	12.02	13.69	11.35	62.06
Paraíba (PB)	14.89	13.48	21.78	11.87	13.99
Paraná (PR)	5.47	5.19	9.20	5.79	26.86
Pernambuco (PE)	7.13	14.98	15.72	15.42	23.20
Piauí (PI)	44.13	11.69	13.63	12.25	38.15
Rio Grande do Norte (RN)	32.84	16.28	12.66	14.28	7.80
Rio Grande do Sul (RS)	10.71	9.40	13.01	11.30	42.32
Rio de Janeiro (RJ)	20.73	27.15	29.22	28.30	31.28
Rondônia (RO)	23.11	17.71	14.80	15.98	39.98
Roraima (RR)	49.67	73.30	72.16	72.86	71.13
Santa Catarina (SC)	7.46	14.40	12.33	13.28	20.50
São Paulo (SP)	14.94	6.27	7.66	6.82	24.93
Sergipe (SE)	33.01	18.99	16.61	18.01	10.33

It is worth comparing the movement in the interregional trade balance between 1985 and 1997 (Table 1) and the empirical results. The left causative matrix results for type II are always related with states that have deficits in both years. Three big states (Sao Paulo, Minas Gerais and Paraná) have surplus in both years and the same type IV classification. We could say that for these big states the greater endogenization of their own final demand impacts offsets the decreasing impact from other states' final demand.

As pointed out earlier, the left causative matrix methodology is a demand-driven approach. The biproportional filter is an appropriate method to analyze the data without imposing this hypothesis. A general finding from tables 4 and 5 is that we cannot argue in support of either a demand (or supply) hypothesis. The row and column vectors have similar magnitudes (the means for each filter are

very similar), therefore demand and supply effects are both relevant in the analysis. This result is not surprising since row and column coefficients are roughly equal in view of the definitional relationship between input and output coefficients (e.g. Oosterhaven, 1988).

The bimarkovian filter seems to be the most appropriate because it takes into account the size of the states. As can be seen in table 1, the Brazilian states are very different, and this can generate misleading results. Probably this is the reason why the results from biproportional filters are, in some cases, very different. However, a more formal and theoretical comparison among the biproportional filters should be done to establish their differences.

From the bimarkovian filter, an interesting result is that states with higher changes in row vectors are the same ones that have higher changes in column vectors. The rankings of the first ten states with larger changes in row and column vectors contain almost the same states and, excluding Rio Grande do Sul, all the states are from the less developed regions, the North and Northeast.[11] These results indicate that among the less developed states, the structural change was in both allocation and supply coefficients. On the other hand, the more developed states (São Paulo, Rio de Janeiro, Minas Gerais and Paraná) have more important changes in their selling patterns.[12]

5. CONCLUSION

The motivation of this paper was to explore the changes in the structure of interregional trade in the Brazilian economy. Such exploratory analysis was carried out by means of a gravity type model and some additional matrix methods. The gravity model and the holistic methods may be seen as complementary approaches to the understanding of interregional trade patterns. The first approach helps to understand the various factors that may contribute to the spatial distribution of trade (e.g. neighboring states, large states, regional characteristics, etc.)

The holistic approaches using MIST helped to uncover structural changes in more detail. In the cluster analysis, it was possible to identify the changing pattern of trade relations. The causative matrix methods highlighted the changing composition of intraregional and interregional demand. The bi-proportional filter showed that supply and purchases state profiles have both changed, and these changes were more important in a specific group of states.

The analysis carried out in this paper presented a way of generalization about the type of trade involved in an interregional system and its changing composition over time. As the economy evolves, there are important implications for these structural differences in the articulation and implementation of development policies. Policies designed to reduce disparities across regions need

[11] These states are Amapá, Maranhão, Mato Grosso, Acre, Rio Grande do Sul, Rondônia, Piauí, Amazonas, Para e Roraima and Mato Grosso do Sul.

[12] These states are between the 11th and 14th position in the ranking for changes in the column coefficient (bimarkovian filter).

to be assessed in the context of the structure of both the targeted regional economies and the structure of their interaction with the rest of the country. Interregional trade can both enhance and undermine regional policies, in the former case by spreading the benefits from demand growth in other regions while, in the latter case, significant leakages may end up concentrating development benefits in a small number of regions (see Hulu *et al*., 1992). The tension between spread and backwash effects provides one of the major challenges for spatial development strategy and findings described in this paper speak to the important role that knowledge of interregional trade can play in contributing to a more complete understanding of the structure of a multiregional economy.

NOTE

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REFERENCES

Bacharach, M. (1970) *Biproportional Matrices and Input-Output Change*. Cambridge, Cambridge University Press.

Bergman, E.M. and Feser, E. J. (1999) *Industrial and Regional Clusters: Concepts and Comparative Applications*. Regional Science WebBook (www.rri.wvu.edu/WebBook).

CONFAZ. (1999) *Balança Comercial Interestadual 1997*. Brasília, Ministério da Fazenda.

Czamanski, S. and Ablas, L.A.Q. (1979) Identification of industrial clusters and complexes: a comparison of methods and findings. *Urban Studies,* 16, pp. 61-80.

Frenkel, J.A. (1997) *Regional Trading Blocks in the World Economic System*. Washington, Institute for International Economics.

Fujita, M., Krugman, P and Venables, A.J. (1999) *The Spatial Economy*. MIT Press: Cambridge, MA.

Goodwin, R.M. (1983) *Essays in Linear Economic Structures*. Macmillan Press: London.

Haddad, E. (1999) *Regional Inequality and Structural Changes: Lessons from the Brazilian Experience*. Ashgate: Aldershot.

Haddad, E.A., Hewings, G.J.D & Sonis, M. (1999) Trade and interdependence in the economic growth process: multiplier analysis for Latin America. *Economia Aplicada*, 3, pp. 205-237.

IBGE. (1996). *Contas Regionais do Brasil 1985-1997*. Rio de Janeiro, Fundação IBGE.

Hulu, E., Hewings, G.J.D. and Azis, I.J. (1992) Spatial implications of the export promotion strategy in Indonesia. In T.J. Kim. G. Knaap, I.J. Azis (eds), *Spatial Development in Indonesia: Review and Prospect.* Avebury: Aldershot.

Isard, W., Azis, I.J,. Drennan, M.P., Miller, R.E., Saltzman, S. and Thorbecke E. (1998) *Methods of Interregional and Regional Analysis*. Ashgate: Aldershot.

Jackson, R.W., Rogerson, P. Plane, D. and O'hUallachain, B. (1990) Causative matrix approach to interpreting structural change. *Economic Systems Research,* 2, pp. 259-269.

Johnson, R. A. and Wichern, D.W. (1998) *Applied Multivariate Statistical Analysis*. Prentice Hall: New Jersey.

Magalhães, A., Sonis, M. and Hewings, G.J.D. (2001) Regional competition and complementarity reflected in relative regional dynamics and growth of GSP: a comparative analysis of the Northeast of Brazil and the midwest states of the U.S. In J.J.M Guilhoto and G.J.D. Hewings (eds), *Structure and Structural Change in the Brazilian Economy*. Ashgate: Aldershot,

Mesnard, L. de. (1990) Biproportional method for analyzing interindustry dynamics: the case of France. *Economic Systems Research*, 2, pp. 271-293.

Mesnard, L. de. (1994) *Unicity of biproportion. SIAM Journal on Matrix Analysis and Applications,* 2(15), pp. 490-495.

Mesnard, L. de. (1997). A biproportional filter to compare technical and allocation coefficient variations. *Journal of Regional of Science,* 37, pp. 541-564.

Mesnard, L. de. (2000a). Methods to Analyze Structural Change over Time and Space: A Typological Survey. Paper presented at the *13th International Conference on Input-Output Techniques*, Macerata, Italy.

Mesnard, L. de. (2000b). Bicausative matrices to measure structural change: are they a good tool? *The Annals of Regional Science,* 34, pp. 421-449.

Moreira, M.M. (2000).A indústria brasileira nos anos 90. O que já se pode dizer?" São Paulo, IPE/USP, Programa de Seminários Acadêmicos, n. 10/2000.

Oosterhaven, J. (1988) On the plausibility of the supply-driven input-output model. *Journal of Regional Science* 28(2), pp. 203-217.

Sonis, M., Hewings, G.J.D. and Guo J. (1996) Sources of structural change in input-output systems: a field of influence approach. *Economic Systems Research*, 8, 15-32.

DOWNTOWN RETAIL SALES PERFORMANCE: EVIDENCE FROM CBDs OF LARGE CITIES IN THE UNITED STATES

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ABSTRACT: This paper examines diverse retail trade experiences in the central business districts (CBDs or "downtowns") of 70 large U.S. cities. Creating, maintaining and enhancing viable downtowns are goals pursued and promoted by many cities. The study analyses the stability, growth or decline of CBD retail sales as influenced by the interaction of demand and supply factors, including distinct CBD, city and metropolitan attributes. The demand and supply forces are incorporated into a model which is tested using multivariate analysis. Cross-sectional regressions are performed to explain absolute stability, growth or decline in downtown retail sales. Further analysis is directed to explain the change in the downtown share of citywide retail sales. The paper concludes with an evaluation of the relative role and impact of economic policy to promote CBDs, and the ongoing national and international debate regarding sustainable development.

1. INTRODUCTION

A number of studies over the past quarter century have examined retail activity in American urban areas. The geographic units in this research encompass central business districts (CBDs or downtowns), which historically were the core areas dominated by commerce, retail and government services. The CBDs in turn are located in central cities which comprise the largest jurisdictions (cities) in U.S. metropolitan statistical areas (MSAs). The MSAs, which are comprised of one or more counties, also include other cities and unincorporated county areas outside central cities which are usually identified as "suburbs" (see Appendix A for a glossary of geographic concepts).

Much of the previous comparative research across U.S. urban areas examines socio-economic trends in central cities versus suburbs of metropolitan areas (see, for example, Jensen and Leven, 1997; Gordon, Richardson and Yu, 1998). Generally, these studies have found significant declines, either absolutely or relatively, in the economic activity of many central cities, including retail establishments, sales and employment. Central city declines have been accompanied by suburban retail expansion in a variety of planned shopping centres at strategic locations and on major thoroughfares. The intra-metropolitan

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shifts have been attributed to a number of market-determined forces, including movement of employment and population, increasing automobile use in the journey to work and for shopping trips, and declines in the quality of the urban environment in central parts of cities.

In the above-mentioned studies, CBDs are usually combined with other central city areas in the analysis. Their historic positions representing high concentrations of retail and other economic activities are neglected or pushed to the background. Also, many studies represent the central city as sharing characteristics with the CBD or inner city areas, which may or may not apply, given specific circumstances.

Some have argued that the pervasive but not invariable declines in inner city retail, service and related activities are in part caused by perceived pejorative elements and/or cultural factors which influence market decisions by market participants (Stanley, 2000; International Council of Shopping Centres, 2001). Another contributing factor is the notion that governmental transfers and related programs have focused on low income residents of inner city areas in and around CBDs, but have neglected to support the considerable role of CBD and inner city businesses as engines of growth.

To sort out the conflicting propositions, one is advised to examine comparative experiences across many cities, suburbs and metropolitan areas. Previous efforts in studying CBDs often involve case studies of one or a few cities (e.g. Coffey and Shearmur, 1999). Alternatively, comparisons across a large number of cities and suburbs may use central cities as the surrogates for inner cities or CBDs (e.g. Jensen and Levin, 1997).

However, CBDs and their surrounding inner city areas are distinct from the central cities of which they are a part. The central cities are not only typically large geographic entities, but also exhibit diversified socioeconomic patterns among residents and businesses. However, approaches which use central cities as surrogates for CBDs and inner city areas come as no surprise because there are few economic data readily available for CBDs. Especially sparse are localized data on explanatory variables which reflect the forces that induce changes in inner city or CBD retail sales or other activities. These problems are among the reasons that comparative analyses of a large number of CBDs (or more broadly inner city areas) are uncommon and central city/suburb dichotomies are usually applied to evaluate the relative experiences of urban cores notwithstanding the limitations.

Given the above backdrop, our goals in this paper include the following. First, we analyse the comparative retail performance of downtowns or CBDs in a large number of major United States cities. In this context our in-depth studies cover the period 1982-1992. These comparisons may contribute to an understanding of the limitations of broad-brush central city/suburb comparisons and suggest whether the assumption that central cities reflect inner city experiences is seriously flawed.

Second, we attempt to identify and evaluate the influences of demand and supply factors that contribute to the agglomeration and dispersion of retail activities in urban areas. The analysis is undertaken in the context of concepts,

theories and models pertaining to central places, consumer behavior and the role of the public sector.

Thirdly, we hope to address real-world issues relating to CBD/downtown development, redevelopment, viability and competition, and to address some of the everyday concerns of elected officials, planners, community groups and activists. The following questions are examples.

- How important are public sector activities of assisted redevelopment in downtown viability, encompassing public safety, maintenance, revitalization and expansion of the retail sector?
- How important are concentrations of service jobs, including professional workers in high-density office developments, in generating retail demand downtown? Previous research has suggested that retail purchases by employees near places of work, including food in restaurants, represent a minor proportion of total retail expenditures.
- Are the expansions of households and household incomes in and around downtowns of key importance in supporting downtown retail activities?
- Does growth of tourism, conferences and other visitor activities significantly influence downtown retail activities?
- Do large facilities and services, including universities, state capitols or attractive waterfront areas within or adjacent to downtowns enhance viability in terms of retail sales growth?

The above questions and related issues are addressed in this paper. Questions concerning the role of other facilities and attractions, such as stadiums and sports arenas, the importance of leadership and downtown management, public transportation, and the role of corporate headquarters are deferred for later analysis.

The following section of this paper provides a discussion of conceptual and theoretical considerations pertaining to the issues of urban growth, the role of downtowns, and patterns of development in the United States. Next, a model specification is provided. The model is tested through multivariate regression analysis. The paper concludes with reference to the relative role and impact of economic policy to promote CBDs, and the ongoing debate regarding sustainable development.

2. CONCEPTUAL AND THEORETICAL CONSIDERATIONS

This study of secular changes in retail sales of CBDs continues a long tradition examining shifts in the internal structure of cities and metropolitan areas. CBDs play a strategic role in theories and models of urban areas. In early conceptualizations of American cities, downtowns were identified that included manufacturing, retail, service and public employment with workers residing in concentric circles or sectors around the centres (see Park and Burgess, 1925; Hoyt, 1939; Sullivan, 1990, pp. 6-10). These concepts were not static but assumed that downtowns would grow at the edges and that shifts in residential locations would expand the urban boundaries concentrically or by sectors, with considerable predictability.

Modifications to these concepts were introduced including the "multiple nuclei theory" of urban structure (Harris and Ullman, 1945) which incorporated the existence of industrial or warehouse districts, office clusters and retail centres in downtown as well as outlying areas. Although more realistic in its interpretations, this conceptualization provided a weak basis at best for predicting the pattern and direction of employment and residential location. However, reference was made to attraction and repulsion to explain why different employment and residential land uses would be in proximity to or distant from each other.

2.1 Urban Form and Urban Structure: Monocentric and Polycentric Cities

The concept of the monocentric city received a fillip with the introduction of formal theoretical models by Alonso (1964), Mills (1967) and Muth (1969) and antecedents relating to the negative exponential population density function in cities studied by Clark (1951). The monocentric theory introduced specifically the size of downtown or CBD employment, income of households, transportation systems and costs and preferences for land and housing consumption. Attention was also directed to the strategic location of CBDs near land and water interfaces, river tributaries or estuaries, transportation nodes (natural or man made), raw materials, transhipment points, industrial centres and others.

A central theme in the monocentric theory is that competition in a market economy induces the separation of land uses, economic activity and people. Industrial and commercial land uses outbid residents in their ability to pay higher rents for central locations. A rent/land value gradient emerges with the highest values in the CBD and decaying steadily at some rate as one moves outward toward the fringe of the city. An alternative formulation for retail market areas is in the form of models of spatial diffusion of individual consumer behavior (Allaway, *et al.,* 1994).

Changes in CBD land values and land value gradients were attributed in part to changes in income, population and transportation costs. One contentious point revolved around the reasons behind shifts of populations to lower density residences and a flattening of land value gradients in cities. Initially, this phenomenon was attributed to rising incomes leading to increased consumption of land and housing, and investments in transportation systems and growing automobile ownership (Alonso, 1964). Others, particularly in the United States and Great Britain, looked toward rising crime, racial tensions and the deterioration of central areas in cities as a major cause of decentralized patterns (Wheaton, 1977). In this discussion, considerable debate has revolved around the suburban location of employment and whether it led or responded to population shift.

The monocentric theory of city structure made allowances for deviations from a pure form and recognized the existence of outlying business nodes away from the CBD. A negative exponential land value gradient was postulated as the overarching pattern but it was by no means smooth. Minor peaks in land values along the gradients would be associated with the presence of small concentrations of outlying stores and businesses serving local residents as one

moved to the fringe of cities. The assumption was that outlying shopping areas and service establishments concentrated on convenience items, i.e., low value and daily needs goods and services, whereas major purchases, identified as shopping goods or high value services, involved large expenditures, comparison shopping and longer trips which would be to the advantage of CBDs. Some of these concepts relate to the tenets of central place theory (Sullivan, 1990, Chapter 5; Christaller, 1933).

We also note that the assumption of concentration of all or most employment in manufacturing, commerce and the public sector in CBDs was modified quite early. The shift of manufacturing toward central industrial districts or outlying areas was associated with changing production methods and products. The admixture of manufacturing and commerce in a central area was not unrealistic in olden days. It is sometimes forgotten that old industries often were concentrated in multi-storey buildings with machinery on several floors connected by belts to one large immobile steam engine on the ground floor. The arrival of portable electric motors, electric lighting, and the growing demand for consumer and other goods mass-produced on a horizontal production line at ground level were of major importance in shifting industrial locations away from central areas of cities.

The emergence of large shopping centres in the suburbs with off-street parking was experienced in the wake of World War II as single-family home and automobile ownership rose and reliance on public transport, substantially serving CBDs, was reduced. Eventually concerns about actual or perceived safety and security while shopping in central areas further undermined the viability of CBD retail activities unless steps were taken to revitalize them through private or publicly assisted urban renewal efforts.

The theory has been reshaped significantly in modelling urban environments. Various efforts have been directed to revise the concepts, theories and models of urban structure with modest success (Baumont and Le Gallo, 1999; Berry and Horton, 1970). Specific transformations regarding retailing and the downtown role have been addressed (Rowley, 1993). Although polycentric theory may reflect more accurately the growth and structure of cities today, generalizations and predictability relating to particular urban areas remain problematic and transferability of experiences across cities is weak. Central place theory was introduced in the process of these revisions, where a hierarchy of central places in metropolitan areas is found and such patterns will also be reflected in cities throughout a region or nation (Christaller, 1933). Under this conceptualisation, the largest central places include all higher order activities, serving the city, region and nation, with lower orders of activities in the smaller central places.

2.2 The Employment Sector as a Source of Demand for the Retail Sector

The relative growth of service and related employment housed in large office buildings and concentrated in CBDs was associated with the need for face-to-face contacts and the exchange of information. The presence of agglomeration economies was important in earlier years but with modern communication and information systems their role in CBDs has been challenged.

The office and services sectors in downtowns continue to contribute to retail demand near their locations. Eating and drinking places serve the office and services sectors, and employees shop in the CBD during lunch hours and after work, especially if they rely on public transport for their journey to work. Over time, increased reliance on automobile usage and concerns over crime and safety during shopping trips have discouraged demand from this source. In any event, the fraction of retail purchases made near workplaces is relatively small as a proportion of all household retail purchases–perhaps in the range of 5-10%.

2.3 The Current Role of Downtown

Which functions remain in the United States CBDs and how are they related to retail sales? Variations obviously exist across cities and urban areas. Recent surveys (International Downtown Association, 1999) indicate a relative decline in office and general retail activities in favour of new locations in other areas, but potential increases in leisure-related activities, including restaurants and entertainment. Populations that reside within or in close proximity to CBDs continue to comprise a market for remaining establishments. Certainly, office employees who work in downtown areas provide modest support for retail activities and especially eating and drinking places which are included in the retail sales definition. Where CBDs incorporate man made or natural amenities, local residents and visitors are attracted. Once again, however, the impact is selective; restaurants, bars, gift shops, boutiques, etc. are likely to benefit. Various incentives to foster theaters and sports centres in CBDs also have this type of selective impact (Newsome and Comer, 2000).

If CBDs are located along or close to well-maintained non-industrial waterfronts or other attractive scenery, middle or higher income residential developments, together with upscale retail/hotel complexes, are attracted. Such developments may be fostered by urban renewal efforts with the purpose of providing strong foundations for revenue generation in integrated shopping and tourist facilities that have a significant tax base. On some occasions these types of developments when combined with international facilities and services that also serve nearby ethnic populations, offer a major stimulus to revitalized CBDs. In contrast, singular efforts such as closings of major shopping streets to automobile traffic have been less successful.

The establishment of a safe and secure environment for visitors and residents must accompany physical improvements of CBDs and is vital. At all times, in today's environment, CBD retail establishments are not only in competition with outlying central city shopping areas but also with other cities nearby. Public agencies in suburban incorporated cities have shown extraordinary imagination in assisting and stimulating investments that will capture retail trade from neighbouring cities and in the process strengthen their tax base. Although "beggar thy neighbour" policies may produce inefficiencies in the aggregate they are pursued constantly unless curbed by actions of higher level governments.

3. THE MODEL

We incorporate the concepts on urban growth and structure discussed above into a model. Discussion of the model is followed by empirical tests applying multiple regression analyses. While theoretical models offer differing causative

factors and processes for explaining concentration and dispersion, little research has been done across cities throughout the U.S. at the micro-geographical scale of the CBD. Additionally, while models attempt to explain agglomeration and dispersion in terms of general factors, such as wages, rents or factors of production, there is significant variation in downtown concentration of retail activities across the large U.S. cities examined in this paper.

Therefore, while generalised models might have applicability in explaining agglomeration and dispersion within different economic sectors, the variations among different cities mean that there are many location and site-specific factors which also determine concentration and dispersion. Preliminary analysis shows that while concentrations of retail sales and jobs within the CBDs are generally declining substantially, significant variation among cities remains.

3.1 Geographic Scope

The analysis is based on data from central cities of MSAs in the United States with a population of 200,000 or more as of July 1, 1998. The sample does not include secondary central cities. Many MSAs in the United States include more than one central city. Even though their populations may exceed 200,000, these secondary central cities are providing retail, service and related activities of a "lower order" serving local residents rather than the metropolitan area as a whole.

After initial review of data, correlations and preliminary regression results, five cities in the original sample of 75 were deleted from the analysis. These cities constituted extreme outlying observations, and experienced severe and unexplained shifts in retail sales over the 1982-1992 period. The locations of the 70 cities analysed are shown in Figure 1 and Table 2. They illustrate the 1990 and 1998 populations of the 70 cities and their geographic size in 1990.

3.2 Summary of Retail Sales in CBDs, Central Cities and MSAs

The following summary (Table 1) pertains to the retail shares of CBDs as a percentage of central cities and of central cities as a percentage of MSAs over the period from 1982-1992.

Over the period from 1982 to 1992, the average CBD share of central city retail sales declined from 12.0% to 8.8%, a relative decline of over approximately 27%. In contrast to the data for CBD shares of central cities, the central cities do not show a sharp decline in shares of MSA retail sales. The average central city share of 43.9% of the MSA in 1982 actually showed a slight increase to 45.9% by 1987 and then a decline to 41.6% in 1992. The relative

Table 1. Retail Sales in CBDs , Central Cities and MSAs: 70 Large Central Cities in the United States.

	1982 (%)	**1987 (%)**	**1992 (%)**
Average CBD share of central city	12.0	10.2	8.8
Average central city share of MSA	43.9	45.9	41.6

Source: U.S. Census of Retail Trade

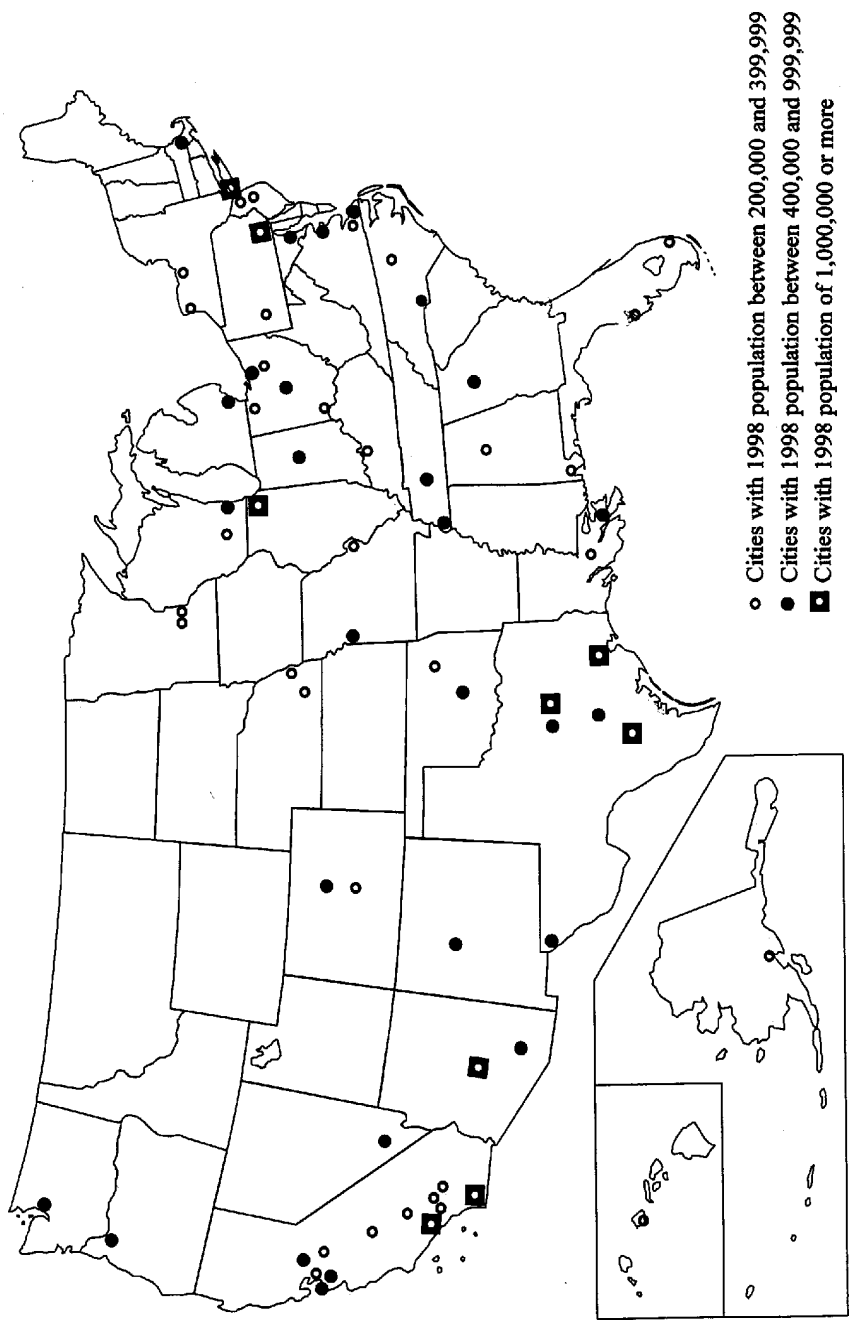

Figure 1. Location of Seventy Sample Cities, United States, 1998.

Table 2. Seventy Large Cities in the United States included in Analysis of CBD Retail Trade Ranked by Population in 1998.

PART 1 City	State	Estimated Population 1998	Census Population 1990	Change 1990 - 1998	Area in 1990 (Sq. Km.)
New York City	New York	7,420,166	7,322,564	1.3%	799.6
Los Angeles	California	3,597,556	3,485,557	3.2%	1,214.9
Chicago	Illinois	2,802,079	2,783,726	0.7%	588.1
Houston	Texas	1,786,691	1,654,348	8.0%	1,397.6
Philadelphia	Pennsylvania	1,436,287	1,585,577	-9.4%	349.7
San Diego	California	1,220,666	1,110,623	9.9%	838.7
Phoenix	Arizona	1,198,064	988,015	21.3%	1,087.0
San Antonio	Texas	1,114,130	976,514	14.1%	862.0
Dallas	Texas	1,075,894	1,007,618	6.8%	886.4
Detroit	Michigan	970,196	1,027,974	-5.6%	359.1
San Jose	California	861,284	782,224	10.1%	443.4
San Francisco	California	745,774	723,959	3.0%	120.9
Indianapolis	Indiana	741,304	731,278	1.4%	936.3
Columbus	Ohio	670,234	632,945	5.9%	494.2
Baltimore	Maryland	645,593	736,014	-12.3%	209.2
El Paso	Texas	615,032	515,342	19.3%	635.3
Memphis	Tennessee	603,507	618,652	-2.4%	662.7
Milwaukee	Wisconsin	578,364	628,088	-7.9%	248.8
Boston	Massachusetts	555,447	574,283	-3.3%	125.3
Austin	Texas	552,434	472,020	17.0%	563.8
Seattle	Washington	536,978	516,259	4.0%	217.2
Washington	DC	523,124	606,900	-13.8%	158.9
Nashville-Davidson	Tennessee	510,274	488,366	4.5%	1,225.2
Charlotte	North Carolina	504,637	419,558	20.3%	451.2
Portland	Oregon	503,891	485,975	3.7%	322.8
Denver	Colorado	499,055	467,610	6.7%	396.8
Cleveland	Ohio	495,817	505,616	-1.9%	199.3
Fort Worth	Texas	491,801	447,619	9.9%	727.7
Oklahoma City	Oklahoma	472,221	444,724	6.2%	1,574.4
New Orleans	Louisiana	465,538	496,938	-6.3%	467.5
Tucson	Arizona	460,466	415,444	10.8%	404.6
Kansas City	Missouri	441,574	434,829	1.6%	806.4
Virginia Beach	Virginia	432,380	393,089	10.0%	642.8
Albuquerque	New Mexico	419,311	384,915	8.9%	342.2
Las Vegas	Nevada	404,288	258,877	56.2%	215.6

Source: U.S. Census Bureau

Table 2 *(contd).* Seventy Large Cities in the United States included in Analysis of CBD Retail Trade Ranked by Population in 1998.

PART 2 City	State	Estimated Population 1998	Census Population 1990	Change 1990 - 1998	Area in 1990 (Sq. Km.)
Sacramento	California	404,168	369,365	9.4%	249.3
Atlanta	Georgia	403,819	393,929	2.5%	341.2
Fresno	California	398,133	354,091	12.4%	256.5
Honolulu	Hawaii	395,789	377,059	5.0%	214.3
Tulsa	Oklahoma	381,393	367,302	3.8%	475.0
Omaha	Nebraska	371,291	344,463	7.8%	260.4
Miami	Florida	368,624	358,648	2.8%	92.2
Oakland	California	365,874	372,242	-1.7%	145.2
Minneapolis	Minnesota	351,731	368,383	-4.5%	142.1
Colorado Springs	Colorado	344,987	280,430	23.0%	474.2
Pittsburgh	Pennsylvania	340,520	369,879	-7.9%	143.9
St. Louis	Missouri	339,316	396,685	-14.5%	160.2
Cincinnati	Ohio	336,400	364,114	-7.6%	199.8
Toledo	Ohio	312,174	332,943	-6.2%	208.6
Santa Ana	California	305,955	293,827	4.1%	70.2
Buffalo	New York	300,717	328,175	-8.4%	105.1
Anaheim	California	295,153	266,406	10.8%	114.7
Newark	New Jersey	267,823	275,221	-2.7%	61.6
Riverside	California	262,140	226,546	15.7%	201.1
Raleigh	North Carolina	259,423	218,859	18.5%	228.1
St. Paul	Minnesota	257,284	272,235	-5.5%	136.7
Louisville	Kentucky	255,045	269,555	-5.4%	160.8
Anchorage	Alaska	254,982	226,338	12.7%	1,805.9
Birmingham	Alabama	252,997	265,347	-4.7%	384.4
Stockton	California	240,143	210,943	13.8%	136.2
St. Petersburg	Florida	236,029	240,318	-1.8%	153.3
Jersey City	New Jersey	232,429	228,517	1.7%	38.6
Rochester	New York	216,887	230,356	-5.8%	92.7
Akron	Ohio	215,712	223,019	-3.3%	161.0
Norfolk	Virginia	215,215	261,250	-17.6%	139.3
Lincoln	Nebraska	213,088	191,972	11.0%	163.9
Baton Rouge	Louisiana	211,551	219,531	-3.6%	191.3
Bakersfield	California	210,284	176,264	19.3%	237.6
Madison	Wisconsin	209,306	190,766	9.7%	149.6
Mobile	Alabama	202,181	199,973	1.1%	305.5
Mean		665,437	645,557	4.1%	419.7
Standard Deviation		981,010	965,367	11.1%	377.2
Maximum		7,420,16	7,322,564	56.2%	1,805.9
Minimum		202,181	176,264	-17.6%	38.6

decline in central city share of MSA retail sales was approximately 5%, contrasted with a relative decline of 27% for the CBD share of central city retail sales. This brief excursion provides support for the assertion that CBD retail experiences are significantly different from those of central cities in which they are located. The experiences of the central cities, except for the CBD portions, are akin to those of the suburbs of the metropolitan areas.

3.3 Retail Sales Data

The primary source of retail sales data for the regression analysis are the Economic Censuses of the United States for 1982,1987 and 1992. In recent years data from the Economic Censuses have been made available by postal ZIP codes, enabling close approximations of the CBD .

The CBD definitions are derived from the Census of Retail Trade for 1982, which defined CBDs in terms of 1980 census tracts. This is the only time when the Census Bureau provided geographic specification of CBDs. The conceptual definition provided by the Census Bureau is, "an area of very high land valuation characterized by a high concentration of retail businesses, services businesses, offices, theaters and hotels, and by a very high traffic flow." The ZIP code geography corresponding most closely to the census tract CBD definitions in 1982 is used here in preparing the CBD retail sales data.

3.4 Model Specification

Retail sales in the CBD are estimated as a function of local demand, supply factors and distinct attributes of the downtown area:

$$\text{RETAIL} = f(\text{DEMAND}, \text{SUPPLY}, \text{ATTRIBUTES}) \quad (1)$$

where,

RETAIL = rates of change in CBD retail sales or CBD share of citywide retail sales

DEMAND = rates of change in a series of demand factors reflecting local and nearby resident purchasing power, and visitors and local employees

SUPPLY = rates of change in a series of supply factors, reflecting local government expenditures which may support development and retail patronage in CBDs

ATTRIBUTES = distinct and relatively stable attributes pertaining to the CBD, such as presence or absence of state capitols, major universities and attractive waterfront areas

The model is tested in reduced form, with the variables as defined below.

Dependent Variables

SALES *Definition*. Downtown retail sales in 1992 divided by downtown retail sales in 1982. Underlying sales data are in nominal dollars.

SALSHAR *Definition*. Downtown share of citywide retail sales in 1992 divided by downtown share of citywide retail sales in 1982. Underlying sales data are in nominal dollars.

Scaled Independent Variables

CITYRET *Definition.* Central city retail sales in 1992 divided by central city retail sales in 1982.

Direction of expected effect. This variable is used only in the regression for the downtown share of citywide sales. It is expected to be negatively related to growth in the downtown share. High citywide growth rates of retail sales provide competing opportunities and may reduce demand for downtown retail.

HHYCBD *Definition.* Aggregate downtown household income in 1990 divided by aggregate downtown household income in 1980. Underlying income data are in nominal dollars.

Direction of expected effect. Growth in household income within the downtown is expected to be positively related to increases in retail sales downtown.

HHYRING *Definition.* Aggregate downtown ring household income in 1990 divided by aggregate downtown ring household income in 1980. Underlying income data are in nominal dollars. The ring is defined as the sum of all ZIP codes adjacent to the CBD ZIP codes.

Direction of expected effect. Growth in household income in the downtown ring is expected to be positively correlated with increases in retail sales downtown. On the other hand, those in the downtown ring with relatively high incomes and automobile ownership may be drawn to suburban shopping centres. Therefore the expected direction is, *a priori*, indeterminate.

WHITE *Definition.* White population share of total population in the central city in 1990 divided by white population share of total population in the central city in 1980

Direction of expected effect. When white shares of population are declining, ethnic nonwhite population, such as Asians, may provide demand for specialized retailing within downtown. On the other hand, increasing shares of white population may induce further shifts in retail demand to outlying areas. Therefore the expected direction is, *a priori*, indeterminate.

SERVEMP *Definition.* Downtown service employment in 1992 divided by downtown service employment in 1987.

Direction of expected effect. Growth in service employment downtown is expected to be positively associated with increases in retail sales downtown.

ENPLANE *Definition.* Enplanements (i.e., passenger embarkations on scheduled commercial airline flights) at metropolitan-serving airports in 1996 divided by enplanements in 1989.

Direction of expected effect. Growth in enplanements is used as a proxy variable to represent business and other visitor travel to the area and downtown. Higher growth in enplanements is expected to be positively associated with increased retail sales downtown.

POLICE *Definition.* City police expenditures per capita in 1992 divided by city police expenditures per capita in 1982.
Direction of expected effect. Police expenditures may increase downtown retail sales by making downtown trips safer. Conversely, high police costs may represent high crime rates, which would reduce visits downtown. Therefore the expected direction is, *a priori*, indeterminate.

HCD *Definition.* City housing and community development expenditures per capita in 1992 divided by city housing and community development expenditures in 1982
Direction of expected effect. Growth in housing and community development expenditures are expected to be positively associated with increases in downtown retail sales by making CBDs more attractive for retailers and consumers.

LTD *Definition.* City long-term debt per capita in 1992 divided by city long term debt per capita in 1982.
Direction of expected effect. Growth in city long-term debt is expected to reflect increasing expenditures for infrastructure improvements, and be positively associated with increased downtown retail sales. However, if expenditures are primarily made in other locations, such growth may negatively impact retail sales in the downtown areas. Therefore, the expected direction is, *a priori*, indeterminate.

Distinct Attribute Independent Variables

These variables represent distinct attributes with a value of 1 if present, and the absence of such attributes with a value of 0.

CAPITOL *Definition.* Presence of state capitol downtown = 1.
Direction of expected effect. The presence of the state capitol is expected to increase local demand by staff, visitors and local residents (who may perceive the downtown as safer and more attractive due to the presence of state police and the state capitol) and be positively associated with increases in retail sales downtown.

UNIV *Definition.* Presence of major public or private university downtown = 1.
Direction of expected effect. The presence of a major university is expected to increase local demand from students, staff and businesses and be positively associated with increased retail sales downtown.

WATERF *Definition.* Presence of attractive waterfront downtown = 1.
Direction of expected effect. The presence of an attractive waterfront is expected to increase local and long-distance visitors to downtown and be positively associated with increases in retail sales downtown.

Table 3 provides a statistical summary of the values of the variables, showing means, standard deviations, maximum and minimum observations. A correlation matrix is provided in Table 4.

Table 3. Variable Names, Descriptions and Summary Values.

Variable Name	Description	Mean	Standard Deviation	Maximum	Minimum
SALES	Change factor for CBD retail sales 1982-1992	1.222	0.362	2.272	0.601
SHARCIT	CBD share of city retail sales in 1992 divided by CBD share of city in 1982	0.727	0.195	1.303	0.342
CITYRET	Change factor for central city retail sales 1982-1992	1.719	0.438	3.816	1.102
HHYCBD	Change factor for aggregate household income in CBD 1980-1990	1.916	0.587	3.365	0.671
HHYRING	Change factor for aggregate household income in CBD ring 1980-1990	1.902	0.367	2.887	1.327
WHITE	Central city white population proportion change factor	0.921	0.104	1.314	0.467
SERVEMP	Change factor for service employment in CBD 1987-1992	1.054	0.201	1.654	0.532
ENPLANE	Change factor for enplanements at regional and metropolitan airports: 1989-1996	1.374	0.451	3.926	0.727
POLICE	Change factor for central city police expenditures per capita: 1982-1992	1.890	0.355	3.468	1.299
HCD	Change factor for central city housing and community development expenditures per capita: 1982-1992	3.378	6.179	37.276	0.096
LTD	Change factor for central city long term debt per capita: 1982-1992	3.360	3.403	27.064	0.954
CAPITOL	Presence of state capitol in or adjacent to CBD = 1	n/a	n/a	n/a	n/a
UNIV	Presence of major university in or adjacent to CBD = 1	n/a	n/a	n/a	n/a
WATERF	Presence of attractive waterfront in or adjacent to CBD = 1	n/a	n/a	n/a	n/a

Note: All data for retail sales, household incomes and city expenditures are expressed in nominal dollars for the identified years.

Table 4. Correlation Matrix.

	SALES	SHARCIT	CITYRET	HHYCBD	HHYRING	WHITE	SERVEMP	ENPLANE	POLICE	HCD	LTD	CAPITOL	UNIV	WATERF
SALES	1.000													
SHARCIT	0.660	1.000												
CITYRET	0.475	-0.322	1.000											
HHYCBD	0.296	0.326	0.040	1.000										
HHYRING	0.302	0.097	0.260	0.319	1.000									
WHITE	0.245	0.026	0.257	-0.039	-0.076	1.000								
SERVEMP	0.210	0.040	0.147	0.029	-0.019	0.292	1.000							
ENPLANE	0.166	0.065	0.153	0.013	0.088	-0.069	-0.107	1.000						
POLICE	0.101	0.207	-0.103	-0.018	-0.042	-0.031	0.072	0.038	1.000					
HCD	0.002	-0.035	0.050	0.032	0.076	0.041	0.006	-0.047	0.049	1.000				
LTD	0.020	-0.096	0.145	0.049	0.211	0.052	0.137	0.065	-0.039	-0.011	1.000			
CAPITOL	0.061	-0.135	0.220	-0.075	-0.018	-0.022	0.015	-0.146	-0.067	0.102	-0.108	1.000		
UNIV	0.390	0.147	0.326	0.054	0.074	0.046	0.165	0.016	-0.134	0.054	-0.061	0.319	1.000	
WATERF	0.006	0.198	-0.179	0.166	-0.035	-0.061	-0.034	-0.056	-0.044	0.113	-0.173	-0.147	-0.147	1.000

3.5 Dependent and Independent Variables Represent Change over Time

Both of the alternative dependent variables (SALES and SALSHAR) identify a change in CBD retail sales, in one case the overall rate (unadjusted for price level changes), and in the other case, the rate of growth relative to the larger central city of which it is a part. All of the independent variables, with the exception of attribute variables, have been structured to represent change over time. For example, the variables for household income in the CBD and CBD ring (HHYCBD and HHYRING) measure the rate of change of aggregate household income over the 1980-1990 period.

In many cases, due to data limitations, it is necessary to use data for the cities and MSAs as a substitute for the CBDs. For example, the data on police, housing and community development and long-term debt are for cities, and are not specific to downtowns. The enplanement data, which are a proxy for visitors, are for regional and metropolitan airports which serve the CBDs. The applicability of such data to a cross-section of downtown observations is dependent on the strong assumption (or postulate) that a bias exists for city expenditures to be in downtown areas, and the additional assumption that such biases will vary across major cities. In the case of visitors (as estimated by the proxy of enplanements), it is postulated that some propensity exists (either business or pleasure related) for such visitors to patronize downtown areas, and that such propensities will vary across major cities.

3.6 Attribute Variables

Three attribute variables have been developed, for the existence of amenities which are non-ubiquitous in large cities. They include major universities, state capitols and attractive waterfronts in or adjacent to downtown areas. Similar reasoning may be associated with these attribute variables as with the scaled variables discussed above. However, in the case of attribute variables for these non-ubiquitous high-amenity facilities, the presence of such facilities in the inner city will tend to attract demand for purchases. Also, universities and state capitols generally contribute to increasing retail purchasing power in and of themselves. Finally, the goods and services associated with high amenity waterfront areas are also likely to have income elasticities of demand greater than one.

4. MODEL TESTING

4.1 The Change in Downtown Retail Sales

Ordinary least squares regressions were performed to test the model. The first test is for the change in downtown retail sales. Table 5 presents the regression analysis. The adjusted R squared for the regression is 0.31. The F statistic is 3.94, suggesting the equation is significant. Two independent variables are significant at the 0.05 level or higher and one at the 0.06 level. The presence of a major university in or near the CBD and the relative growth of the white

Table 5. Regression of Change Factor of CBD Retail Sales (SALES): 1982-1992.

Regression Statistics	
Multiple R	0.646
R squared	0.418
Adjusted R squared	0.307
F statistic	3.780
Significance of *F*	0.00042
Standard Error	0.303
Observations	70

Variables	**Coefficients**	**Standard Error**	***t* Statistic**	***P*-value**
Intercept	-0.829	0.480	-1.728	0.089
HHYCBD	0.117	0.066	1.762	0.083
HHYRING	0.209	0.109	1.919	0.060
WHITE	0.890	0.367	2.425	0.018
SERVEMP	0.144	0.196	0.734	0.466
ENPLANE	0.126	0.083	1.529	0.132
POLICE	0.133	0.106	1.254	0.215
HCD	-0.004	0.006	-0.667	0.507
LTD	-0.006	0.011	-0.570	0.571
CAPITOL	-0.005	0.094	-0.055	0.956
UNIV	0.491	0.144	3.419	0.001
WATERF	0.156	0.100	1.559	0.124

Note: Change factor (SALES) expressed as 1992 CBD retail sales divided by 1982 CBD retail sales in nominal dollars.

population in the central city are positively related to growth in CBD retail sales. Growth in household income in the ring around the CBD also has a positive effect on CBD sales. Marginal significance might be attributed to CBD household income growth, the growth in visitors as weakly measured by enplanements at major airports and the presence of an attractive waterfront.

Growth in service employment in the CBD apparently does not add much strength to CBD retail sales, and the presence of a state capitol is quite insignificant. Importantly, the supply variables expressing the potential role of the public sector in influencing downtown retail sales growth perform poorly. Possibly these variables relating to police expenditures, housing and community development budgets and local public debt are weak proxies and may need refinement. Some logarithmic transformations were tested in the regression without noticeable improvement.

Table 6. Regression of Change in CBD Share of Central City Retail Sales (SALSHAR): 1982-1992[1].

Regression Statistics	
Multiple R	0.636
R squared	0.404
Adjusted R squared	0.279
F statistic	3.220
Significance of *F*	0.00142
Standard Error	0.166
Observations	70

Variables	**Coefficients**	**Standard Error**	***t* Statistic**	***P*-value**
Intercept	0.243	0.264	0.922	0.361
HHYCBD	-0.228	0.055	-4.154	0.000
HHYRING	0.090	0.036	2.462	0.017
WHITE	0.064	0.062	1.033	0.306
SERVEMP	0.347	0.211	1.647	0.105
ENPLANE	0.002	0.108	0.022	0.983
POLICE	0.051	0.046	1.098	0.277
HCD	0.098	0.058	1.690	0.096
LTD	-0.002	0.003	-0.616	0.540
CAPITOL	-0.004	0.006	-0.693	0.491
UNIV	-0.037	0.053	-0.712	0.479
WATERF	0.243	0.082	2.973	0.004

Note: Change factor (SALSHAR) is CBD share of central city retail sales in 1992 divided by CBD share of central city retail sales in 1982. Sales measured in nominal dollars.

4.2 The Change in the CBD Share of City Retail Sales

Table 6 presents the results of the regression for the change in the CBD share of city retail sales. The explanatory power of this equation is weaker than for the retail sales growth equation. Much of the variance in the equation is negatively related to retail sales growth in central cities. Essentially, rapid aggregate growth in central city retail sales is associated with shifts in retail sales to the fringes of the cities. The equation shows an adjusted R squared of 0.28 and the F statistic is 3.22. Growth of CBD household income also is significant and positive as anticipated. The growth of the share of the central city's white population and relative growth in police expenditures also appear to exert a benign but modest influence on the share of retail activity for CBDs. As in the equation on relative sales growth, the presence of a major university in or near downtown appears to significantly increase the retention of retail activities in central areas. Most of the other variables perform poorly, with the possible exception of an attractive

waterfront. As for the sales growth analysis, some logarithmic transformations were tested in the share regressions without noticeable improvement in the results.

5. INTERPRETATIONS

The analysis has produced modest but significant results in explaining the absolute growth in retail sales in 70 CBDs of large cities in the United States; and in secular shifts in the CBD share of central city retail sales covering the 1982-1992 period. Clearly, the analysis needs to be extended to more recent years and data available from the 1997 Economic Census will facilitate this.

While recognizing the preliminary nature of the results, the following interpretations of the regressions are advanced:

- Depending on how changes in CBD retail sales are defined, downtown household income or income in the adjacent ring is positively related to CBD retail growth, and changes in the CBD share of central city retail activity.
- The presence of a major university downtown has a positive effect on the CBD retail growth and the retention of retail activities in the CBD over time.
- Growth in the share of the central city white population is positively related to the rate of growth of CBD retail sales. The relationship is also positive but less significant when analyzing the changing share of retail sales in downtown areas.
- Rapid retail growth in central cities is negatively associated with the share of central city sales that remain in the CBD over time.
- No matter how CBD retail sales are defined, growth in downtown service employment does not have a significant effect on growth or retention of retail activity in downtown areas. CBD office workers in particular have shown a propensity for doing their major shopping near places of residence rather than places of work.

Although several variables included in this study showed marginally significant relationships to growth in CBD retail sales and the share of central city retail sales in downtown areas, they may play a more significant role when analysed more precisely. Attractive downtown waterfronts and rapid growth of visitors to central areas of cities may exert a stronger influence on CBD sales growth and retention of central city sales downtown if these variables can be defined in greater detail.

If forces on the supply side have contributed to the shift of retail activities away from or into central areas–due to, say, relative efficiency in the delivery of retail services–the impact of these forces in different metropolitan areas should be examined (Yeates and Montgomery, 1999). On the demand side, the increase in resident purchasing power has been found to be the most significant and substantial cause in stimulating downtown retail development.

6. POLICY ISSUES

Since this analysis represents a preliminary step, an extensive discussion of policy desiderata is not appropriate at this time. However, reference is made to

some policy issues, which may have increasing relevance as further analysis is undertaken.

First, implications may be present for local development policy. These apply particularly to programs to increase housing availability for all income levels in CBDs and adjacent areas, redevelopment policies downtown, and location of major public facilities and employment centres. Second the findings have implications in the current debate over sustainable development. Compact developments in downtowns and inner city areas can take advantage of existing infrastructure and presumably conserve resources and reduce negative externalities such as traffic congestion and pollution. Such developments may have greater market feasibility than previously believed, if concentrated purchasing power of inner city neighbourhoods can be identified more precisely by the public sector and the investment community.

Finally, analysis needs to be placed in the context of the experience of the 1990s, and whether, in fact, population and housing trends have shown a return to downtown and inner city areas, which has been inferred and discussed in both scholarly and popular forums in the United States.

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REFERENCES

Alonso W. (1964) *Location and Land Use.* Harvard University Press: Cambridge, Massachusetts.

Allaway A., Black W., Richard, M. and Mason J. (1994) Evolution of a retail market area: an event-history model of spatial diffusion. *Economic Geography*, 70(1), pp. 23-40.

Baumont, C. and Le Gallo, J. (1999) Empirical Foundations of Multicentric Urban Models. Paper presented at *46th North American Meetings of the Regional Science Association International,* Montreal, Quebec, November 11-14.

Berry, B.J.L and Horton F.E. (1970) *Geographic perspectives on urban systems*, Prentice-Hall: Englewood Cliffs, New Jersey.

Christaller W. (1933) *Central Places in Southern Germany.* Translated in 1966 by Barkin, C., Prentice Hall: Englewood Cliffs, New Jersey.

Clark, C. (1951) Urban population densities, *Journal of the Royal Statistical Society, Series A* 114 (4), pp. 490-496.

Coffey, W.J. and Shearmur, R.G. (1999) Intrametropolitan Employment Distribution in Montreal, 1981-1996. Paper presented at *46th North American Meetings of the Regional Science Association International*, Montreal, Quebec, November 11-14.

Gordon P., Richardson H.W and Yu G. (1998) Metropolitan and non-metropolitan employment trends in the US: recent evidence and implications. *Urban Studies* (35), pp. 1037-1057.

Harris C.D. and Ullman E.L. (1945) The nature of cities, *The Annals*, (242), pp. 7-17.

Hoyt H. (1939) *The Structure and Growth of Residential Neighbourhoods in American Cities.* Federal Housing Administration, Washington DC.

ICIC Initiative for a Competitive Inner City in Partnership with PriceWaterhouseCoopers (1999) Inner-city Business Development: Benchmarking Federal Spending and Guidelines for Action, Boston.

International Council of Shopping Centres (2001) Underserved markets–an untapped bonanza? *ICSC Research Quarterly,* 8(4), pp. 16-20.

International Downtown Association (2000) *The Downtown of the 21st Century*. Washington, D.C.

Jensen, M.J. and Leven, C.L. (1997) Quality of life in central cities and suburbs. *Annals of Regional Science* (31), pp. 431-449.

Mills, E.S. (1967) An agglomerative model of resource allocation in a metropolitan area. *American Economic Review* 57(2), pp. 197-210.

Morrill, R. (2000) Geographic variation in income inequality among U.S. states: 1970-1999. *Annals of Regional Science* (34) pp. 109-130.

Muth R.F. *Cities and Housing.* University of Chicago Press: Chicago.

Newsome T.H. and Comer J.C. (2000) Changing intra-urban locations of major league sports facilities. *Professional Geographer* 52(1), pp. 105-119.

Park R.E. and Burgess E.W. (eds) (1925) *The City.* University of Chicago Press: Chicago.

Rowley, G. (1993) Prospects for the central business district. In R. Bromley and C. Thomas (eds), *Retail Change: Contemporary Issues.* UCL Press: London.

Stanley F.D. (2000) *A Window of Opportunity: the Concentrated Buying Power in Inner Cities.* Federal Reserve Bank of Richmond, Richmond , Virginia.

Sullivan, A.M. (1990) *Urban Economics.* Irwin: Homewood, Illinois.

U.S. Bureau of Labor Statistics, (1995) *American Travel Survey*.

U.S. Census Bureau, *Census of Governments,* 1982, 1992.

U.S. Census Bureau, *Census of Population and Housing,* 1980, 1990.

U.S. Census Bureau, *Census of Retail Trade,* 1982, 1987, 1992.

U.S. Census Bureau, *Census of Service Industries,* 1987, 1992.

U.S. Census Bureau, *Geographic Area Reference Manual,* 1990.

Wheaton W. (1977) Income and urban residence: an analysis of consumer demand for location. *American Economic Review* (67), pp. 620-631.

Yeates M. and Montgomery D. (1999) The changing commercial structure of non-metropolitan urban centres and vacancy rates. *The Canadian Geographer* 43(4), pp. 382-399.

APPENDIX

Glossary of Geographic Concepts

Central Business District (CBD) or Downtown. The commercial area of a metropolitan area central city. An area of very high land valuation characterized by a high concentration of retail businesses, services businesses, offices, theaters and hotels, and by a very high traffic flow. These CBDs were geographically specified in terms of census tracts for the 1982 Census of Retail Trade, and these geographic definitions have not changed. The terms "CBD" and "downtown" are used interchangeably in this paper.

Central City. The largest city in a metropolitan statistical area (MSA), and the name used for the MSA. Additional cities that meet specific criteria are also identified as central cities (termed secondary central cities in this paper).

Inner City. The inner city is not formally defined by the Census Bureau. According to the Initiative for a Competitive Inner City (ICIC), the inner city is defined as those areas with poverty and unemployment rates at least 50% greater than the MSA, or with a poverty rate of 20%. This paper does not attempt to specify or analyse inner city areas.

Metropolitan Statistical Area. A geographic entity based on the concept of a core area with a large population nucleus, plus adjacent communities having a high degree of economic and social integration with that core. Qualification of an MSA requires the presence of a central city with 50,000 or more inhabitants. The county or counties containing the largest city, plus adjacent counties meeting specified criteria comprise the MSA.

REGIONAL SMALL BUSINESS PERCEPTIONS OF THE INTERNET: THE CASE OF WYONG SHIRE[1]

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ABSTRACT: This paper examines the use of the Internet by small and medium-sized businesses in the Wyong Shire, a rapidly growing region of the NSW Central Coast for which policy makers have considered use of the Internet as a business tool to encourage employment in the region. Survey data are used to focus on how businesses perceive the importance of the Internet for their future and the extent to which they appear strategically organised and able to take up the potential of the Internet. It finds that the average business does not consider the Internet to be important for its future, nor does it evidence much strategic organisation. There is some indication of the presence of very small, young start-ups ready to grow via the Internet platform. If regional development policy is to focus on the Internet as a development vehicle, it needs also to understand how and why the Internet is being used, not just whether it is being used by businesses.

1. INTRODUCTION

Whilst business transactions and information exchange have been enabled by information and communication technologies for many years, the advances in IT capability in combination with the worldwide web (WWW) on the Internet platform have generated a whole that is greater than the sum of its parts (Norris, West and Gaughan, 2000). There is now a greater infrastructure in place that connects the business world electronically. As a consequence we are seeing changing national economic profiles, patterns of industry and the way in which business is conducted (Dutta, Kwan and Segev, 1998; Frank, 1997; Ghosh, 1998). Commercialisation of the Internet has helped remove communication barriers with customers and employees by decreasing the importance of obstacles that are created by geography, time zones and location (Quelch and Klein, 1996). As well, where small and medium-sized businesses (SMEs) were previously unlikely to have resources sufficient to provide a viable IT facility, Internet

[1] The financial support of the NSW Department of Urban Affairs and Planning is gratefully acknowledged.

service providers (ISPs) offer them a tool to help compete with larger businesses. They may now be able to extend their geographic markets to the point of having a global presence (Hamill and Gregory, 1997; Poon, 1999). A two-person tourism business, for example, can now develop a global catchment area using a Web presence rather than relying only on a smaller catchment area generated by 'local' traffic, agency networks and limited advertising.

In this context it is not surprising that there has been a dramatic increase in the penetration of the Internet within Australian small and medium-sized businesses. Australian Bureau of Statistics survey data show that from June 1998 to June 2000 Internet access in very small firms increased by 108% (from 24% to 50%); for small firms Internet access increased by 103% (from 32% to 65%); and for medium-sized firms it increased by 48% (from 56% to 83%)[2] (NOIE, 2001; ABS, 2000). The official statistics also show that this penetration, regardless of business size, is not equal across all states, and is greater in capital cities than in other areas. Unfortunately the official statistics do not indicate the extent to which businesses outside capital cities have taken up the Internet. This paper provides insights into the uptake of the Internet and the perceived importance of the Internet in the Wyong Shire, a small, rapidly growing region in New South Wales and considers implications for regional development policy.

The Wyong Shire is part of NSWs Central Coast and is an example of a capital city dormitory suburb, sharing this characteristic with a number of other Australian regions, for example, Dandenong in Victoria. The Central Coast is one of the fastest growing regions in NSW (CCRF, 2000) and it suffers strained transport links to the employment centre of Sydney. NSW government policy sees business use of the Internet as a means to encourage business growth in the region, expand employment opportunities and also alleviate the transport bottlenecks. The number of SMEs in Australia is now almost one million, and they are recognised as making a significant contribution both to government revenue (NOIE 2002) and to employment growth (Leeves, 2000). This contribution applies as much for the SMEs on the Central Coast as it does for the nation and underlies government interest in increasing the rate at which SMEs go online and develop e-commerce practices (NOIE, 2002). It is of interest, therefore, to profile the uptake of the Internet by Wyong Shire SMEs as an indication of regional Internet activity and to complement national statistics.

Notwithstanding government expectations of why and how SMEs might start to use the Internet, it may be that their uptake is for other purposes. It is already known, for example, that the smaller the business, the more likely it is that its Internet activity is for email and information searches only (ABS, 2000), where this may be only an indication of non-business rather than emergent e-commerce use. This finding may or may not apply equivalently across regional and urban SMEs, just as infrastructure accessibility of the Internet varies between regional and urban businesses. For example, slow infrastructure roll-out is not a problem

[2] The Australia Bureau of Statistics (2000) defines very small businesses as 1-4 people, small businesses as 5-19 people, and medium-sized businesses as 20-99 people.

faced by capital cities but has caused some regions to install their own local carrier network (Lynch, 2000), and can mean less choice of ISP in a region together with fewer points of presence for ISPs to provide local call access. Given that bandwidth and ease of finding an ISP are recognised as inhibitors to use of the Internet (Hoffman, Novak and Chatterjee, 1997), we might expect variance in sophistication of Internet practices between regional and urban businesses even if only because knowledge acquisition in regional areas is more difficult due to relatively lower supply. Consistent with these kinds of factors, regional SMEs may also be less likely to appreciate the potential of the Internet or perceive it to be important for the future of their business.

The aim of this paper is to discuss perceptions of the importance of the Internet for the future of businesses in the Wyong Shire region in the context of an indication of their propensity to take advantage of the Internet's potential as a business vehicle. That indication is provided by measures of business activity that provide broad representation of how strategically organised a business is.

2. ON BEING STRATEGICALLY ORGANISED

A business strategy is an adjustment mechanism and provides a means of adaptation between an organisation and its environment (Chakravarthy, 1982). The process by which this occurs, conventionally, is via a sequence of planning, implementation and evaluation of the type(s) of strategy adopted by a business (Lorange, Scott-Morton and Ghoshal, 1986). Where there is some evidence of a process in place that assists the business in adapting to its environment, there is some evidence of it being strategically organised. Planning activity to provide direction to the business is one example. Monitoring competitor activity is another. Market sensing in the form of regular collection and use of market information and tracking market signals is another. The purpose of being strategically organised, of course, is to achieve a sustainable competitive advantage in the industry through cost and/or price advantages, or by offering a unique type of value to customers (Porter, 2001).

In the context of the Internet, Porter (2001) suggests that it is not a matter of whether a business should take up the opportunities available, but a matter of how the business does so if it is to stay competitive in today's environment. He says, 'Far from making strategy less important…the Internet actually makes strategy more important than ever.' (Porter, 2001, p.64). This argument is based on recognition that the process efficiencies that derive from use of the Internet lower barriers to market entry and intensify rivalry between competitors. In short, competitive pressures will gradually remove the present element of choice about uptake of the Internet on the part of businesses. Tapscott (2001) takes this still further by suggesting that the Internet is a qualitatively new infrastructure that is becoming ubiquitous, so much so that 'it will soon connect every business and business function and a majority of humans on the planet' (Tapscott, 2001, p.37). Irrespective of whether one agrees with Porter's (2001) approach that suggests the Internet is a difference in degree, or with Tapscott's (2001) approach that suggests it is a difference in kind, a business that is strategically organised is

likely to adapt more readily to the momentous changes intrinsic to the Internet.

The question then arises of how strategically organised regional SMEs might be and, consequently, how readily they might be able to adapt to the Internet juggernaut. We noted above that regional SMEs might not fully appreciate the potential of the Internet but, where SMEs are strategically organised, they may provide fertile ground for government policy that is attempting to facilitate their use of the Internet. Thus, this paper also addresses two aspects of being strategically organised in its investigation of the Internet profile of regional SMEs, namely, market sensing and business and financial planning.

Market sensing on the part of a business is directed outside the organisation to its environment with a view to forming some judgement as to threats and opportunities that present there. In this study, market sensing is represented by items that indicate whether a business compares its performance with that of competitors; whether the business is able to secure sufficient information to make marketing decisions; and how the business rates marketing its products or services beyond the Central Coast as important to its future.

Business and financial planning is an aspect of being strategically organised that is directed inside the organisation with a view to providing systematic management of internal processes to support directions that the business decides to take. Here, business and financial planning is represented by items that indicate whether the business rates having formal goals and objectives as important to its future; whether it has a written business plan and written financial budget for the ensuing financial year; whether it uses financial reports to assist in making business plans and decisions; and whether it uses an accountant to interpret financial reports on behalf of the business.

The following section details the method that was used to investigate the above two aspects of being strategically organised on the part of SMEs in the Wyong Shire region, as well as their perceptions of the importance of the Internet for the future of their business.

3. METHOD

A ‘mail-ready’ population of 1508 enterprises was purchased from a call centre bureau which processed the 1999 Yellow Pages Wyong Shire listing to confirm all organisations in terms of names, addresses, telephone numbers, contact personnel, but to exclude organisations identified by mobile telephone numbers. The ‘mail-ready’ population was culled further to retain 1097 businesses after excluding non-profit organisations and government agencies. A mail survey was sent to 1097 businesses and the 317 responses received make up the final sample. This is a 29% response rate, recognised as acceptable for mail surveys (Emory and Cooper, 1991). Reported data are part of a wider survey of small business in the Wyong Shire (Smith & Cunneen, 2000). A questionnaire was developed and piloted with SMEs. The final version comprises 32 questions predominantly requiring Yes/No answers or identification of a relevant category, and questions based on a five-point rating scale. Further details of the survey can be found in Flint and Herbert (2000).

Table 1. Summary Statistics for Variables Used in Study.

	All Businesses		**Micro**		**Small**	
	Mean	**St. Dev.**	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**
Dependent:						
Impin	1.74	1.07	1.71	1.15	1.78	0.96
Independent:						
Internet	0.54		0.41		0.72	
Employ. (not micro)	1.52	0.71			2.24	0.55
Turnover	2.46	1.12	1.92	0.82	3.21	1.05
***Market Sensing*:**						
Buscomp	0.74		0.68		0.82	
Minfo	0.76		0.74		0.79	
Impmark	0.36		0.34		0.39	
Business & Financial Planning:						
Impgoals	0.85		0.81		0.90	
Busplan	0.25		0.11		0.45	
Budget	0.36		0.20		0.59	
Finrep	0.70		0.62		0.83	
Acct	0.67		0.66		0.67	
Industry:						
Con	0.10		0.14		0.04	
Manufacturing	0.09		0.08		0.12	
Retail	0.25		0.24		0.26	
Service	0.44		0.46		0.40	
Tourism	0.05		0.03		0.08	
Other	0.06		0.04		0.09	
Observations:	288		167		121	

We define micro-businesses (hereafter micro) as those that have less than 5 employees and small to medium businesses (hereafter small) as those who have 5 to 99 employees.[3] Of the 317 businesses in the final sample, 58% are micro businesses and 42% are small businesses.

Data for this paper are drawn from demographic items in the questionnaire,[4] items relating to computer and Internet usage in the business, and items relating to how the business is strategically organised (see Section 2 above). The analysis here is based upon 288 businesses that provided data for each of the items used in the study.

[3] These definitions correspond with the ABS (2000) definitions noted above.

[4] A copy of the questionnaire is available from the authors on request.

4. DATA

In Table 1 we present summary statistics for the variables used in the analysis. The dependent variable is an ordered variable with values ranging between 0 and 4, which ranks the perceived importance of the Internet for the future of the business. A detailed description of this and all other variables can be found in the Appendix.

From the mean estimates it can be noted that the average business does not perceive the Internet to be very important for its future. It can be seen also that there is a slight difference between micro and small businesses in their perception of the Internet's importance. The mean figure is slightly higher and displays less variation in the case of small firms. There is greater disparity between micro and small firms in terms of connection to the Internet: small firms are much more likely to be connected to the Internet although, even with these firms, nearly 30% are still not connected to the Internet. Small businesses also have higher mean figures for employment and turnover but this is to be expected by definition.

The three market sensing variables show one noticeable difference between micro and small businesses: over 80% of small businesses are likely to compare their performance with competitors but less than 70% of micro businesses are. Around 75% of both micro and small businesses are able to secure sufficient information to make their marketing decisions and a similar percentage of both kinds of business rate markets outside the Central Coast as important to their future. It is interesting that this latter result indicates more than 60% of the businesses do not consider markets external to the Central Coast to be important to them, a result which seems consistent with their relatively low rating of the perceived importance of the Internet for the future of the business. Small businesses are of particular interest here as they are active in making comparisons with competitors but their lack of interest in non-Central Coast markets suggests they may not recognise their wider geographical environment as a source of either competitive threat or competitive potential. For both micro and small businesses, therefore, there is a sense of insularity given that today's business environment is one of emerging international markets and fewer institutional, product and geographical boundaries brought about by a dynamic mix of globalisation, consumerism and technology (Financial System Inquiry, 1997; Ohmae, 1989; Watt, 1998). This suggests a challenge for the policy-makers who want to encourage business and employment growth in the region.

Four of the five business and financial planning variables show a noticeable difference between micro and small businesses. Where they agree is on use of accountants to interpret financial reports on behalf of the business, with some two-thirds of the businesses following this practice. A high percentage of both kinds of business rate having formal goals and objectives as important for their future although it is 90% of small businesses to which this applies compared with just over 80% of micro businesses. This result does not sit comfortably with the percentage of businesses that have a written business plan or budget for the

Table 2. Ordered Probit – Dependent Variable "Perceived Importance of Internet".

	All Businesses		***Micro***		***Small***	
	Coeff.	**Std Err.**	**Coeff.**	**Std Err.**	**Coeff**	**Std Err.**
Independent:						
Constant	0.22	0.37	-0.02	0.45	0.27	0.96
Internet	0.61*	0.15	0.79*	0.20	0.30	0.28
Employ. (not micro)	-0.05	0.14			0.08	0.32
Turnover	-0.10	0.08	-0.21***	0.12	0.06	0.16
Market Sensing:						
Buscomp	0.05	0.15	0.09	0.19	-0.59***	0.35
Minfo	0.002	0.18	0.14	0.24	-0.36	0.34
Impmark	0.57*	0.15	0.63*	0.20	0.51**	0.26
Business & Financial Planning:						
Impgoals	0.47*	0.19	0.49**	0.25	0.73	0.59
Busplan	0.21	0.25	0.06	0.37	0.39	0.39
Budget	0.14	0.23	0.07	0.29	0.53	0.45
Finrep	0.05	0.17	0.14	0.21	-0.23	0.41
Acct	0.10	0.15	0.29	0.22	-0.17	0.27
Industry: †						
Con	0.59**	0.32	0.37	0.48	1.44**	0.60
Retail	0.42	0.29	0.36	0.45	0.67	0.45
Service	0.44***	0.27	0.31	0.41	0.85**	0.45
Tourism	0.45	0.45	0.22	0.78	1.18**	0.60
Other	0.01	0.39	0.23	0.60	0.31	0.67
Log likelihood	-385.4		-227.7		-142.7	
χ^2 (df)	68.4(16)		47.5(15)		42.8(16)	
Observations:	288		167		121	

*,**,*** = significant at the 1%, 5% and 10% respectively;

† omitted case is manufacturing.

ensuing financial year (using 'written' advisedly). Less than 50% of the small businesses have a written business plan and less than 60% have a written financial budget. These proportions reduce markedly for the micro businesses where only 11% have a written business plan and only 20% have a written financial budget. Whilst formal goals and objectives do not necessarily have to be contained in a written business plan/budget, this is their conventional vehicle. The absence of documentation that might formally contain such goals and objectives reduces the credibility of the high percentage response that suggests they are important. If the businesses are paying only 'lip-service' to the importance of formal goals and objectives, it suggests little inclination to becoming strategically organised. On a more positive note, a good proportion of

businesses use financial reports to assist them in making business plans/decisions although, again, it is 83% of small businesses that do so and a lower 62% of micro businesses.

The industrial structure of the sample indicates the dominance of service and retail industries in the region. The proportion of service businesses is slightly higher in the micro business sub-sample, as is the number of construction businesses.

5. RESULTS

Ordered probit regressions were run for all businesses and then for the sub-samples of micros and small businesses and the results are shown in Table 2.

From the results for All Businesses, we observe that connection to the Internet is statistically significantly associated with perceiving the Internet to be more important for the future of the business. This is also the result for the subset of Micro Businesses but there is not a similar significant result for Small Businesses. This means that although a much higher proportion of small businesses are connected to the Internet (72%) compared to micro businesses (41%), they do not perceive it to be as important for the future of their business as micro businesses. When this result is combined with that for turnover, which is not as significant for small businesses' perception of Internet importance but is inversely significant for micro businesses, it could suggest that positive micro businesses Internet perceptions are associated with young start-ups ready to use the Internet platform to their advantage. Alternatively, it may indicate that the small businesses find connection to the Internet to be less advantageous than expected as their larger size carries with it a more diverse corporate infrastructure that leaves the Internet with a less dominant role than that in some micro businesses.

Different aspects of being strategically organised provide statistically significant results. In the context of market sensing, those that rate marketing products/services outside the Central Coast (Impmark) as important for their future also perceive the Internet to be important for their future. This also applies for both Micro Businesses and Small Businesses. This suggests that, for the relatively small proportion of businesses that are alert to markets outside their locality (36% of all businesses), they seem also to be alert to the potential of the Internet as a vehicle for accessing those wider markets. However, this awareness of the potential of the Internet does not seem to carry through to the other two components of market sensing – comparing performance with competitors, and securing sufficient information for marketing decisions. Here, there is no significant result for All Businesses or Micro Businesses, while Small Businesses register an inverse significant result for one of the variables. The latter result suggests that those small businesses that compare their performance with competitors are less likely to perceive the Internet to be important for the future of the business. Interpretation of these results suggests that the businesses recognise the Internet as a vehicle to access new markets in the wider geographical environment but do not recognise its potential as a source of market

and competitor information. Further, the inverse significant result for Small Businesses reinforces the point made earlier that these firms may be relatively insular, focussing on local competitive markets without also recognising the competitive threat or potential from their wider geographical environment.

With regard to the business and financial planning aspect of being strategically organised, there is only one variable that provides significant results. Businesses that rate having formal goals and objectives as important to their future also perceive the Internet to be important for their future. This applies for All Businesses and Micro Businesses but the result is not significant for Small Businesses. The result may imply an orientation towards process efficiencies in businesses that recognise similar opportunities via the Internet. This is not supported, however, by the lack of significant results for other formal indications of being strategically organised, namely, written business plans and financial budgets, and use of financial reports to assist in business decisions. Another interpretation, therefore, may be that some businesses have already built the use of the Internet into their future directions and it is these businesses that also perceive the Internet to be important for their future. If this is the case, the results suggest it may only apply to the micro businesses and, if so, this may again suggest young start-ups ready to use the Internet platform.

Overall, in terms of being strategically organised, the results provide weak evidence of any systematic relationship between strategic organisation and perceptions of Internet importance for the regional SMEs in this study. At the same time, the variable for which there is a consistent significant result across all groups is the one that has a strategic future most embedded within it – markets beyond current geographic markets and recognising the potential of the Internet to help access those markets. This may indicate some recognition on the part of the businesses that uptake of the Internet is/will be a business necessity as Porter (2001) and Tapscott (2001) suggest. Even so, it seems that the Wyong SMEs still have a way to go before this recognition converts into systematic strategic action.

Table 2 also reports results for additional controls in terms of industry groupings and shows some distinct industry effects. In the case of All Businesses and Small Businesses, the construction and service industries are significantly more likely than manufacturing businesses to perceive the Internet to be important for the future of the business. Small Businesses in the tourism industry are also more likely to perceive the Internet as more important than manufacturing businesses. However, the low proportions of small businesses in the construction and tourism industry groupings may mean these results are not particularly robust. No significant industry effects are evident for Micro Businesses. It is interesting that it is amongst small businesses that industry effects are significant for perception of Internet importance for the future of their business when, overall, small businesses connected to the Internet do not evidence this perception. Specifically, service industry businesses, the dominant group, had a stronger perception of the Internet's importance than manufacturing

Table 3. Ordered Probit – Micro Businesses "Perceived Importance of Internet".

	Micro	
	Coefficient	**Standard Error**
Independent:		
Constant	0.04	0.47
Internet	1.10*	0.26
Employ (not micro)		
Turnover	-0.23***	0.13
Market Sensing:		
Buscomp	0.13	0.19
Minfo	0.13	0.24
Impmark	0.98*	0.28
Impmark*Internet	-0.79**	0.42
Business & Financial Planning:		
Impgoals	0.48*	0.24
Busplan	0.05	0.36
Budget	0.04	0.28
Finrep	0.14	0.20
Acct	0.26	0.22
Industry: †		
Con	0.38	0.49
Retail	0.35	0.47
Service	0.25	0.44
Tourism	0.16	0.86
Other	0.29	0.59
Log likelihood	-225.3	
χ^2 (df)	52.2 (16)	
Observations:	288	

businesses. It is intuitively appealing that the service and tourism industries would perceive the Internet to be more important for their businesses. For both these sectors, consumers are becoming increasingly skilled and demanding with regard to Internet access to information and customer service, whether to compare prices, make bookings, use 24/7 self-service or register complaints (Strauss and Frost, 2001).

As noted above, Table 2 indicates that only one variable "Impmark" from each of the 'strategically organised' groupings indicated a consistently significant result across all categories. To analyse this result further, ordered probit regressions were run with an additional interaction variable (Impmark*Internet), a binary variable that took the value of one for businesses that were 'connected to the Internet' *and* rated markets outside the Central Coast as important to their future business (Impmark) and zero otherwise. These regressions were run for All

Businesses, Small Businesses and Micro Businesses. Table 3 reports only the results for Micro Businesses, the category for which there was a significant effect from the interaction variable.

First we note that the results reported for micro businesses in Table 2 are robust to the introduction of the interaction variable as Table 3 indicates that the pattern of significance in the explanatory variables is not altered. Second, a significant inverse effect coefficient on the interaction variable indicates that micro businesses that are connected to the Internet and perceive the marketing of products/services beyond the Central Coast to be important for their future perceive the Internet to be less important for their business than would be expected based on the individual effects. One interpretation of this result is that the experience of these businesses with the Internet has led them to believe it is less likely to be a useful vehicle for geographic expansion. For micro businesses, this may arise as a result of recognising that limited human resources have only a finite capacity to deliver market expansion on both geographic and electronic levels simultaneously. Another interpretation is that the experience of these businesses with the Internet has already removed the 'hype' from the equation so that they see the Internet as only one of several vehicles that might be of relatively equal importance in assisting their geographic expansion. Thus, these micro businesses are merely reflecting their use of the Internet for non-business and/or basic communication purposes (ABS, 2000) with less intent to use it for geographic expansion but, nevertheless, with an increased appreciation of the potential of wider markets as a result of their Internet use than businesses that are not connected to the Internet and not thinking about marketing their products or services outside the Central Coast region. A variation on this theme is that the micro businesses connected to the Internet and thinking about geographic expansion may be sufficiently strategically organised to have already factored in the value of the Internet for their future.

6. DISCUSSION

Overall, results of the study reported here offer little encouragement for policy-makers who wish to emphasise the Internet as a vehicle for regional development. SMEs in the Wyong Shire on the NSW Central Coast evidence a profile that is reasonably comparable with the national profile in terms of the proportion of businesses connected to the Internet, but there is little to indicate that they are strategically organised or anticipate using the Internet as a vehicle for growth or development.

The SMEs, on average, do not perceive the Internet to be very important for the future of their business. As well, they do not present as being strategically organised, particularly with regard to being alert to opportunities and threats outside their immediate geographic locality or actually demonstrating systematic business and financial planning practice. As a general statement this applies both to small and micro business even though, in relative terms, the small businesses are much more likely to be connected to the Internet, to compare their performance with competitors, and to demonstrate systematic business and

financial planning practice. Despite this profile, it is not the small businesses that perceive the Internet to be important for the future of the business, if they are already connected to the Internet, rather it is the micro businesses. Similarly, while a higher proportion of small businesses consider having formal goals and objectives to be important for their future, it is only the micro businesses that perceive these goals as important that also perceive the Internet to be important for their future. When we take these results together with the inversely significant result for micro businesses with regard to turnover and perceptions of the importance of the Internet, we suggest they may indicate the presence of a group of young start-ups in the Wyong Shire, probably entrepreneurial, but ready to grow via the Internet platform. Another result consistent with this interpretation is that micro (and small) businesses that consider marketing activity outside the Central Coast region to be important for their future also perceive the Internet to be important for their future. However, the strength of this interpretation seems to lie more in the potential of the Internet than the practice. Micro businesses that consider marketing activity outside the Central Coast region to be important for their future and are already connected to the Internet, perceive the Internet to be *less* important for their future than the sum effects of the two variables would suggest.

In general, small businesses with experience of the Internet do not recognise it as any more beneficial to the future of their businesses than those that are not connected. If this is the case, it seems possible that small businesses are using the Internet for email and information searches as indicated in other studies (ABS, 2000). At the same time, there is some recognition of the potential of the Internet as a business tool even though this recognition falls well short of understanding its strategic potential. In this context, policy makers concerned to encourage regional growth and development via the Internet vehicle may need to revisit more holistic approaches that accommodate the Internet as only one small part. Clearly, further research is needed to help clarify the role and significance of the Internet in these approaches.

7. CONCLUSION

Irrespective of whether the infrastructure provided for business by a combination of the Internet and the World Wide Web is a difference in degree (Porter, 2001) or a difference in kind (Tapscott, 2001), business use of the Internet by SMEs in the Wyong Shire provides little encouragement to regional development policy-makers. It becomes clear from this study that it would be inappropriate for regional development policy-makers to make decisions on the basis of the incidence of Internet connection without pursuing also why businesses are using the Internet and why they are not. In this sense, incidence of Internet connection and/or its use in a business is merely an indication of business practice that is assumed to be happening or about to happen, eg. extending markets, improving process efficiencies. If the Internet is being used as a vehicle by which to grow the business – whether markets or profits – then government encouragement of its use in regional economies will be of benefit. If,

however, the Internet is being used as tool that is largely incidental to the longer-term direction of the business – for example, information searches on the Web, email communications within the business and/or externally to business and non-business contacts – then government facilitation of Internet use by business in regional economies may not be cost-effective.

REFERENCES

Australian Bureau of Statistics (2000) *Business Use of Information Technology 1999-2000*, Publication 8129.0, Commonwealth of Australia: Canberra.

Central Coast Research Foundation (2000) *Central Coast at a Glance*, Gosford.

Chakravarthy, B.S. (1982) Adaptation: A Promising Metaphor for Strategic Management, *Academy of Management Review*, 7(1), pp.35-44.

Dutta, S., Kwan, S. and Segev, A. (1998) Business Transformation in Electronic Commerce: A Study of Sectoral and Regional Trends, *European Management Journal*, 16(5), pp.540-551.

Emory, C.W. and Cooper, D.R. (1991) *Business Research Methods*, 4th edn, Boston: Irwin.

Financial System Enquiry (Australia) (1997), *Financial System Enquiry (Wallis Enquiry),* Australian Government Publishing Service: Canberra.

Flint, J.A. and Herbert, R.D. (2000) Marketing, The Internet and Regional Small Business, *Proceedings of the Australian and New Zealand Marketing Academy Conference: Visionary Marketing for the 21st Century: Facing the Challenge*, Griffith University: Gold Coast, pp.349-353.

Frank, M. (1997) The Realities of Web-based Electronic Commerce, *Planning Review*, 25(3), pp.30-37.

Ghosh, S. (1998) Making Business Sense of the Internet, *Harvard Business Review*, 77(2), pp.126-136.

Hamill, J. and Gregory, K. (1997) Internet Marketing in the Internationalisation of UK SMEs, *Journal of Marketing Management*, 13, pp.9-28.

Hoffman, D., Novak, T. and Chatterjee, P. (1997) Commercial Scenarios for the Web: Opportunities and Challenges, in Kalakota, R. and Whinston, A. (eds), *Readings in Electronic Commerce*, Addison-Wesley: Reading, Massachusetts, Chapter 2, pp.29-53.

Leeves, G.D. (2000) Job and Worker Reallocation in Small Firms: Evidence from Australia, paper presented at the 29th Annual Conference of Economists, Gold Coast.

Lorange, P., Scott-Morton, M.F. and Ghoshal, S. (1986) *Strategic Control Systems*, West Publishing: St Paul.

Lynch, A. (2000) Fibre Network on a High in Snowy, *The Australian IT*, September 5, p.3.

National Office for the Information Economy (2002) *E-Commerce for Small Business*, www.noie.gov.au/Projects/ecommerce/SME/index.htm, p.1, accessed January 2002.

National Office for the Information Economy (2001) *The Current State of Play June 2001*, Commonwealth of Australia: Canberra.

Norris, M., West, S. and Gaughan, K. (2000) *eBusiness Essentials. Technology and Network for the Electronic Marketplace*. John Wiley: New York.

Ohmae, K. (1989), Managing in a Borderless World, *Harvard Business Review*, 67(3), pp.152-162.

Poon, S. (1999) Small Business and Internet Commerce. What Are the Lessons Learned?, in Sudweeks, F. and Romm, C. (eds) *Doing Business on the Internet. Opportunities and Pitfalls*, Springer: London, Chapter 10, pp.113-124.

Porter, M.E. (2001) Strategy and the Internet, *Harvard Business Review*, 79(3), pp. 62-78.

Quelch, J.A. and Klein, L.R. (1996) The Internet and International Marketing, *Sloan Management Review*, 37(3), pp.60-75.

Smith, C.R. and Cunneen, D. (2000) *Training Needs of Wyong Shire Small Business*, School of Business, The University of Newcastle, Ourimbah.

Strauss, J. and Frost, R. (2001) *eMarketing*, Upper Saddle River, NJ: Prentice Hall.

Tapscott, D. (2001) Rethinking Strategy in a Networked World, *Strategy + Business*, 24, pp.34-41.

Watt, D. (1998) The Frontiers of Banking, *Telecommunication Journal of Australia*, 48(1), pp.37-39.

Table A1. Definition of Variables.

Variable Name	Description
Dependent:	
Impin	Ordered variable : 0 = Internet is not at all important to the future of business, 1 = Not very important, 2 = Important, 3= Very important, 4 = Of highest importance.
Independent:	
Internet	Binary variable; 1 = connected to Internet.
Employ. (Not micro)	Ordered variable : 1= < 5 employees, 2 = 5 < 20 employees, 3 = 20 < 50 employees, 4 = 50 < 100 employees, 5 = 100+ employees.
Turnover	Ordered variable : 0 = < $100,000, 1 = $100,000 < $500,000, 2 = $500,000 < $1 million, 3 = $1 million < $5 million, 4 = $5 million +.
Buscomp	Binary variable; 1 = business compares performance with competitors.
Minfo	Binary variable; 1 = business is able to secure sufficient information to make marketing decisions.
Impmark	Binary variable : 1 = business rates marketing products/services beyond Central Coast as important to the future of business.
Impgoals	Binary variable : 1 = business rates having formal goals and objectives as important to the future of business.
Busplan	Binary variable; 1 = business has written business plan for 1999-2000 financial year.
Budget	Binary variable; 1 = business has written financial budget for 1999-2000 financial year.
Finrep	Binary variable; 1 = business uses financial reports to assist in making business plans and decisions.
Acct	Binary variable; 1 = accountant interprets financial reports on behalf of business.
Industry	Omitted case is businesses in manufacturing industry.
Con	Binary Variable for businesses in the construction industry.
Retail	Binary Variable for businesses in the retail industry.
Service	Binary Variable for businesses in the service industry.
Tourism	Binary Variable for businesses in the tourism industry.
Other	Binary Variable for businesses in other industries.

TOURISM ADVERTISING EXPENDITURE IMPACTS ON THE BROKEN HILL ECONOMY

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ABSTRACT: The announcement of the closure of the Pasminco Broken Hill Mine in 2006 confirmed the need for more diverse employment opportunities in Broken Hill. Expanding the tourism industry is considered to be one possible way of achieving this goal. This paper combines elasticity of demand estimation and marginal income coefficients in an input-output model to determine the effect of increased promotion and advertising expenditure on tourism demand and the resulting employment generation. Promotion and advertising expenditure was not found to be a significant determinant of tourism demand in Broken Hill. Thus, the increase in employment estimated using economic impact analysis is not robust. Still, the combination of elasticity of demand estimation and input-output tables offers a pioneering way to estimate the impact of promotion and advertising expenditure on employment. Future applications of this method may identify a positive significant impact using more segmented data.

1. INTRODUCTION

Broken Hill is located on the Barrier Range in the Far West of NSW, 1,160km west of Sydney. For over 100 years Broken Hill has been inextricably linked with silver, lead and zinc mining so that it is also known as "The Silver City". However, the Pasminco mine will close in 2006 and this will have a significant impact on the region. The *Broken Hill Regional Skills Audit* used economic impact analysis to estimate that employment is expected to decline by 1,150 jobs or about 15% due to the closure of the Pasminco mine which is a very large economic impact for a city of about 20,500 people. The closure of the Pasminco mining operations will also exacerbate the already difficult labour market conditions in Broken Hill. As a result the closure of the Pasminco Broken Hill mine in 2006 confirms the need to look at other employment opportunities

so as to diversify the region's economy.

The *Broken Hill Regional Skills Audit* conducted by the Western Research Institute in 1999 identified the local tourism industry as the most likely industry that would match the labour market profile of Broken Hill. Indeed, Broken Hill is already an attractive tourist destination in outback NSW with some major attractions including: an early pioneering history; an Aboriginal cultural heritage; Australian artist icons (eg. Pro Hart); and an international sculpture symposium. Broken Hill is also seen as a complement to other destinations and activities such as being a stop off for trans-Australian train travel and accessibility to five major outback national parks and the Flinders Ranges.

Attracting tourists to any location requires the promotion of that site as a holiday destination where the consumer will enjoy a positive experience. An increase in tourism will also induce an increase in employment as more workers are needed to increase the region's production of tourism-related services (i.e. accommodation, cafes and restaurants). Therefore this study will estimate the effect of promotion expenditure on employment in Broken Hill. Note that advertising refers to a sub-set of promotion expenditure that only includes media and printing, while promotion expenditure refers to all the costs related to tourism promotion.

This paper uses a combination of two methods to estimate the total economic impact that tourism promotion can be expected to have on employment in Broken Hill. Econometric analysis was used to estimate the effect of each dollar increase in expenditure on promotion on the number of tourists visiting Broken Hill. The impact of the initial increase in tourism expenditure was then applied to an input-output table to estimate the secondary flow-on effects of increased tourism on total employment in Broken Hill. The combination of elasticity of demand estimation and input-output tables offers a pioneering way to estimate the impact of induced expenditure on a regional economy.

2. RELEVANT LITERATURE

No relevant literature was identified that examined the link between tourism promotion and advertising expenditure and regional employment. However, there are two separate lines of research that are relevant to this study. The first line of research uses econometric techniques to estimate the variables that affect tourism demand, while the other line of research examines the link between tourism expenditure and regional employment.

2.1 Econometric Tourism Demand Model

Demand estimation using econometrics is one of the main applied areas of research in economics. Econometric analysis uses time series or historical data and statistical regression to estimate the relationship between demand and its potential determinants.

There is a distinct lack of econometric work on the relationship between promotion and advertising expenditure and tourism in Australia compared to the rest of the world. Based on the international literature on tourism demand estimation, Witt and Witt (1992) developed a tourism demand model. The

relevant determinants of tourism demand in their model include: population, income, the price of travel and expenditure related to a tourist destination, the price of travel and expenditure related to substitute tourist destinations, promotion and advertising expenditure, underlying trends in consumer tastes and preferences and the behavioural habits of consumers. In many cases a variable may have a lagged impact on tourism. The model developed by Witt and Witt (1992) provides the theoretical basis for the independent variables used in this study.

A number of international studies have examined the specific relationship between promotion and advertising expenditure and tourism demand (Witt and Martin, 1987; Barry and O'Hagan, 1972; Uysal and Crompton, 1984; and Papadopoulos and Witt, 1985). The general result from these studies is that there is a relatively weak relationship between tourism demand and expenditure on promotion and advertising. The relationship was found to be statistically significant in less than one-third of the estimated demand models. Where the relationship between promotion and advertising expenditure and tourism demand was significant the resulting elasticity was small and less than unity.

Although there appear to be no econometric estimations of the relation between tourism demand and expenditure on promotion and advertising in Australia, Hamal (1996) has developed a significant tourism model. Hamal's (1996) model estimated two equations for holiday tourism for Australia, one for visitor nights and the other for visitor nights per capita of the destination. The latter equation was found to be superior as tourism nights alone causes multicollinearity problems. An error correction model was estimated for tourism demand and it produced the following long-run demand elasticities: 1.7 for income; -1.36 for the price of holiday travel and accommodation in Australia; and 2.96 for the price of holiday and travel accommodation overseas. Accordingly, this study used per capita tourism demand as the dependent variable.

2.2 Economic Impact of Tourism Demand

The common tool used for estimating the economic impact of tourism in a small regional context is an input-output table, which can be used to calculate the effect of a change in the level of economic activity (i.e. increased tourism expenditure) on regional employment.

The two main limitations with input-output tables identified in the literature are the assumption of linear coefficients and transfers in addition to expenditure switching. The assumption of a linear relationship between the input coefficients and output unrealistically implies that supply is infinitely elastic. This limitation generally leads to an overestimation of the multiplier effects generated by any initial change in expenditure. The overestimation of impacts can occur in the short run when a firm has excess capacity and in the long run if a firm is experiencing increasing returns to scale. In both cases an increase in output can occur that is more than proportional to the necessary increase in inputs and the linear coefficients assumption is violated.

There have been a small number of relevant studies that attempt to overcome the limitations of the traditional input-output model. Bryden (in West and Gamage, 1997) applied marginal coefficients to the hotel sector in place of average coefficients. The resulting multipliers for restaurants were lower and it is argued that this result was due to the spare capacity that usually exists in the industry. West (in West and Gamage, 1997) estimated the valued added multipliers for tourism expenditure using an integrated input-output model with a set of marginal econometric relationships. The marginal relationships were extended to all sectors and capacity constraints imposed. The estimated tourism expenditure multiplier obtained was 71.4% of the conventional input-output multiplier. This finding was consistent with a study by Mauritius and Wanhill (in West and Gamage, 1997) where capacity constraint multipliers were found to be approximately 30% lower than multipliers estimated using the traditional input-output model.

West and Gamage (1997) modelled the differential effects of tourism expenditure by different types of tourists in Victoria using a marginal income coefficient model. This model replaces the average income coefficients of households with marginal coefficients estimated from time series data at the sectoral level. West and Gamage (1997) maintained the linear coefficients assumption between other intermediate sectors of the input-output table as the non-linear relationships between the primary factor relationships produce relatively more accurate estimates of multiplier effects. Hence, a more accurate total economic impact can be estimated using the marginal incomecoefficients model.

Transfer and expenditure switching is the second major problem that arises when using input-output tables as economic impacts tend to be overstated. The Bureau of Industry Economics (1984: p3) argues expenditure transfers occur when expenditure on a particular good or service is transferred from one location to another. Expenditure switching, on the other hand, is when expenditure is switched from one good or service to another. When such transfers occur within the region under investigation then the economic impact can be overstated to the extent of that transfer. However, transfers and expenditure switching are not a significant issue for a small economy such as Broken Hill.

3. METHODOLOGY

3.1 Data

Data used in this study includes the Domestic Tourism Monitor produced by the Bureau of Tourism Research, Domestic Tourism Trends in NSW 1995/96-1996/97, Tourism NSW Domestic Tourism Expenditure Survey, *International Tourism Trends in NSW 1995/96*, Tourism NSW International Visitor Survey and the Australian Bureau of Statistics (ABS) *Statistical Regions 1996/97*. Additional data was obtained from both public and private tourism organisations in the Far West on promotion and advertising expenditure for the 1984/85 to 1996/97 period.

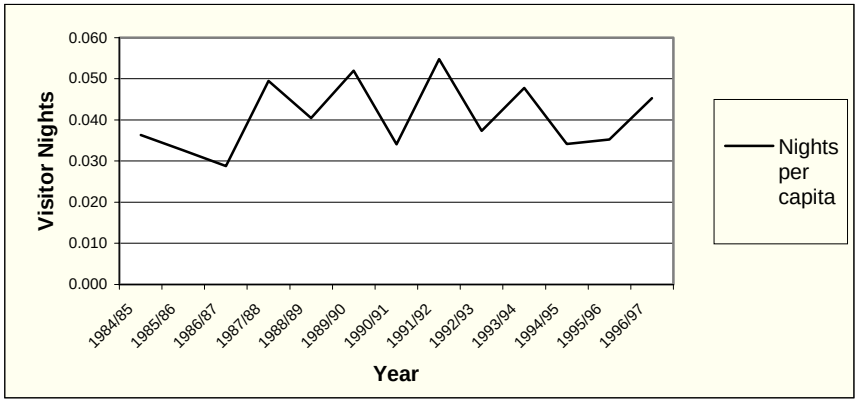

Figure 1. Far West Visitor Nights per Capita.

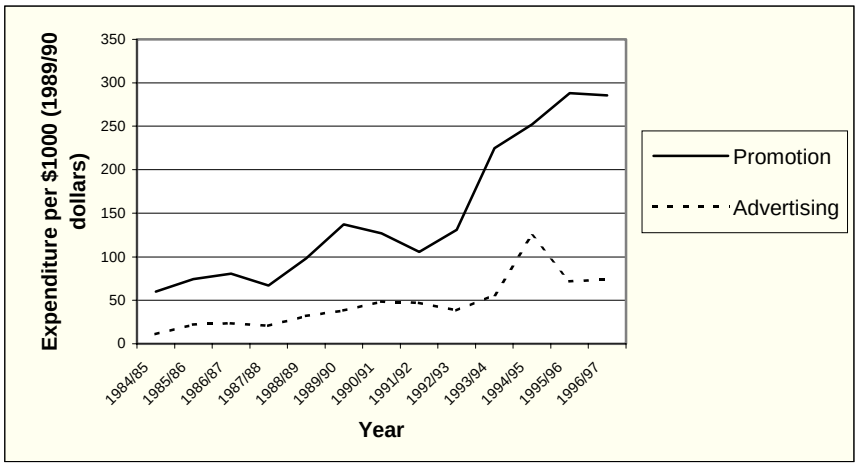

Figure 2. Far West Tourism Promotion and Advertising Expenditure.

3.2 Econometric Tourism Demand Model

Data on visitor nights per capita was the dependent variable for tourism in Broken Hill. Visitor nights refer to the number of nights spent in all forms of accommodation while on a journey away from home. The data series used was between 1984/85 and 1996/97. Tourism visitor nights by domestic residents are the focus of attention as 95% of visitors to Broken Hill in 1996/97 were domestic residents. A valid analysis of international tourists would require the estimation of demand equations for each country from which tourists originate. This option is too resource intensive in comparison to the expected benefits.

In this study tourism in the Far West is used to approximate tourism in Broken Hill. The origin of domestic visitors to the Far West in 1996/97 was: Sydney 13%, other NSW 24.2%, South Australia 37.5%, Victoria 14% and the

rest of Australia 11.3%. Nearly 80% of tourists travelled to the Far West using a private vehicle.

Figure 1 illustrates visitor nights per capita in the Far West between 1984/85 and 1996/97. The data is highly variable, but a two-year cycle is evident from 1986/87 to 1994/95. The volatility of the data makes it difficult to establish clear relationships using regression analysis.

Public and private organisations in the Far West provided data on per capita promotion and advertising expenditures in Australia (International promotion and advertising is excluded). Promotion expenditures include: media advertising, consultancy costs, brochures, conferences and seminars, display material, consumer shows, publication, print, related wage costs, vehicle and administration costs. Advertising expenditures, which are one part of promotion, only includes media and print advertising. The promotion data was segmented into advertising and non-advertising as the former could be expected to have a more direct impact on visitor nights. Accordingly this study attempted to estimate the different impacts of each on tourism demand in Broken Hill.

Figure 2 shows the per capita expenditure on promotion and advertising expenditure in constant 1989/90 prices. In both series a trend increase in expenditure is evident, especially since 1991/92.

A comparison between tourism and expenditure on promotion and advertising suggests no obvious correlation. The volatile two-year cycle of the tourism data set does not match the trend increase in promotion and advertising expenditures. The correlation of visitor nights with promotion expenditure was –0.05 and –0.10 with advertising expenditure. These correlations are low. Still, there may be a relationship once other demand factors are included in a tourism demand model.

One reason for the low correlation may be that promotion and advertising have a lagged effect on tourism demand as measured by visitor nights. This can occur, as holidays and travel are typically substantial commitments that require forward planning. Some promotion expenditures also have a long life (eg. brochures) and can therefore influence tourism in more than one year. The correlation of visitor nights with promotion expenditure lagged one year was –0.11 and –0.07 with advertising lagged one year. With a two-year lag for promotion and advertising expenditures the correlations with visitor nights were –0.17 and –0.26 respectively. Thus the *prima facie* evidence suggests that promotion and advertising expenditures have no significant pair wise correlation with demand even two years after that expenditure is made. Further, this correlation is the wrong sign, which would suggest that expenditure on promotion and advertising would cause a reduction in visitor nights.

Aside from promotion and advertising expenditure the other independent variables used to predict tourism demand were: price, income, one off events, break in the series and competing promotion expenditure. Following Hamal (1996) the proxy for price was the CPI component of the cost of holiday travel and accommodation for Australia as a whole. This should be a fair indicator of changes in costs over time in the Far West. As data on substitute tourist locations to Broken Hill was not available it was assumed that overseas travel by domestic

residents would be a fair proxy. The CPI component of the cost of holiday travel and accommodation for overseas destinations was therefore used to estimate substitution effects. To increase the degrees of freedom in the tourism demand model the relative price of domestic versus international travel was used as an independent variable rather than including two separate variables.

As domestic tourists to the Far West originate from all over Australia the average income of all households in Australia was used as the income variable. Dummy variables for an "Ag Fair" and the lack of train services to Broken Hill were used to determine the impact of special events. None of these dummy variables improved the overall goodness of fit of the tourism demand model.

The use of econometric analysis to estimate demand is an inexact process. At present there is no general consensus as to which methods to use to estimate the "best" model, however this is defined. The approach used in this study was to examine the performance of a regression on the basis of the statistical significance of parameters and how the estimated parameters compare with economic theory. The usual goodness of fit and diagnostic statistics were also used to determine the adequateness of the overall model. In most cases only strong and robust models will pass these tests.

The regression model that best predicts visitor nights in the Far West contained the following independent variables: relative price of holiday travel and accommodation, real household disposable income and real promotion or advertising expenditure per capita lagged two years.

The estimated model was linear in preference over other functional forms such as a log-linear, which implies diminishing returns to promotion and advertising expenditure. As with the tourism demand models estimated by Hamal (1996) variables specified in absolute and not per capita terms proved to be unsuccessful predictors of visitor nights due to the high multicollinearity between population and income. Finally, it may be argued that because promotion and advertising expenditure possess public good characteristics (i.e. consumption of promotion and more particularly advertising may be non-rivalrous and non-exclusive) that consideration should be given to specifying these variables in absolute terms. However intuitively attractive this explanation may be the modification was found to make only a small difference to the final results.

3.3 Economic Impact of Tourism Demand

The procedure outlined by Jensen and West (1986) was used to estimate the economic impact of tourism demand on Broken Hill. In this case the level of tourism expenditure estimated using econometric analysis (see above) is distributed to various sectors in the input-output table. The table is then inverted to determine the multiplier effects of the initial tourism expenditure. The multiplier effect refers to the phenomenon where every dollar spent will have a corresponding stimulus to related industries, which will then flow-on to other related industries and so on.

Table 1. Regression Estimates for Visitor Nights Per Capita.

Variable	Coefficient*	*t*-ratio	*p*-value
Promotion Model			
Price	-0.124	-0.87	0.416
Income	0.020	1.53	0.177
Promotion (2 year lag)	0.256	0.13	0.901
Break in Series (dummy)	-0.018	-1.46	0.196
Constant	-0.132	-0.97	0.370
Advertising Model			
Price	-0.130	-1.04	0.341
Income	0.017	1.34	0.229
Advertising (2 year lag)	1.664	0.55	0.600
Break in Series (dummy)	-0.017	-1.62	0.157
Constant	-0.090	-0.58	0.583

The input-output table used in this study is the 1996 Far West statistical division input-output table which includes Broken Hill, the Unincorporated Area, Central Darling and Wentworth. The Far West input-output table was prepared by Dr Roy Powell and Linden Chalmers of the Centre for Agricultural and Regional Economics (CARE) using the Generation of Regional Input-Output Tables (GRIT) technique. The GRIT technique is a hybrid method of deriving regional input-output tables from the National input-output table while at the same time allowing for the insertion of superior data at various stages in the construction of the tables. The National input-output table was constructed by the ABS.

The marginal income coefficients model used by West and Gamage (1997) was also used in this study. Thus, the average income coefficients in the household row were replaced by marginal coefficients estimated from time series data at the sectoral level.

4. RESULTS

4.1 Econometric Tourism Demand Model

The estimated regression model used to predict visitor nights was applied to calculate the elasticity of tourism and expenditures on promotion and advertising. This elasticity allows an estimate of the marginal increase in visitor nights to Broken Hill that would result from a $1 increase in promotion and advertising expenditure.

Table 1 shows the regression demand estimates for visitor nights per capita and expenditure on promotion and advertising. The two models were estimated based on a 1986/87 to 1996/97 data sample of 11 observations. The promotion model explains 39% of the total variation in visitor nights, while the advertising

Table 2. Estimated Elasticity of Visitor Nights.

Variable	Average Elasticity	1996/97 Elasticity
Promotion Model		
Price	-2.97	-2.91
Income	7.21	7.16
Promotion (2 year lag)	0.05	0.07
Advertising Model		
Price	-3.12	-3.05
Income	6.28	6.11
Advertising (2 year lag)	0.10	0.22

Table 3. Promotion and Advertising Marginal Impacts in Current Dollars.

Variable	Mean	Lower Estimate	Upper Estimate
Promotion (2 year lag)	+0.21	-3.75	+4.17
Advertising (2 year lag)	+1.36	-4.66	+7.39

model explains approximately 41% of the variation in visitor nights. The coefficients from both models were insignificant at the 5% level. In combination it appears that there is not a strong relationship between visitor nights and expenditure on advertising and promotion.

The small sample size and the high variance of the data on visitor nights reduce the power of regression analysis to reveal small effects. Despite the poor performance of this model on statistical grounds the coefficients in each model are consistent with theoretical expectations. The price variable has a negative impact, income has a positive impact and expenditure on promotion and advertising have positive impacts.

Table 2 shows the elasticities implied by the regression results in Table I. Given the use of a linear functional form the elasticities change from year to year. As a consequence elasticities are presented for both the average of the sample data (i.e. the average of 1986/87 to 1996/97) and for the most recent year only (i.e. 1996/97).

The price and income elasticities are both highly elastic. The promotion and advertising elasticities are positive but small, with the advertising elasticity generally larger than the promotion elasticity.

The elasticities in Table 2 were estimated in constant 1989/90 dollars. Table 3 shows the estimated marginal impacts of promotion and advertising expenditure on visitor nights in current (1998/99) dollars and the 95% confidence intervals for these estimates. These estimates suggest that a $1 increase in promotion or advertising expenditure can be expected to increase visitor nights per capita by 0.21 and 1.36 respectively. Given that none of the coefficients from either tourism demand models were statistically significant

Table 4. Marginal Impacts per Dollar of Promotion and Advertising of the Far West.

	Mean	Lower Estimate	Upper Estimate
Promotion Model			
Visitor Nights	0.21	-3.75	4.17
Gross Regional Product	$7.68	-$137.14	$152.50
Employment	0.0002	-0.0036	0.0040
Household Income	$4.88	-$87.14	$96.90
Advertising Model			
Visitor Nights	1.36	-4.66	7.39
Gross Regional Product	$49.8	-$170.64	$270.60
Employment	0.0013	-0.0045	0.0071
Household Income	$31.56	-$108.14	$171.49

these elasticities should be considered imprecise. Still, the probability that increased promotion and advertising expenditure will have a positive impact on visitor nights is 55% and 70% respectively.

4.2 Economic Impact of Tourism Demand

The preceding analysis shows a greater than 50% probability that increased expenditure on promotion and advertising in the Far West will lead to increased visitor nights and tourist expenditure. This initial increase in tourist expenditure will have a multiplied effect on employment in the Far West. The average marginal economic impact of expenditure of $1 on promotion or advertising was estimated using the marginal coefficients model.

Table 4 shows the marginal economic impacts of each dollar of expenditure on promotion and advertising in the Far West. The lower and upper estimates are based on the assumption of a linear impact but it would be preferable to estimate each using the marginal coefficients model. The wide confidence intervals for the economic impacts arise due to the magnitude of the confidence intervals for visitor nights estimated using regression analysis.

On average each dollar of promotion expenditure increases visitor nights by 0.21. For every $5,000 spent on promotion the resulting visitor expenditure is estimated to create 1 additional job. In contrast, each dollar of advertising expenditure increases visitor nights by 1.36. For every $770 spent on advertising in the Far West the resulting increase in visitor nights is estimated to create 1 additional job. The economic impact of expenditure on advertising is relatively greater than expenditure on promotion as the former created more visitor nights and hence a greater magnitude of tourist expenditure.

5. CONCLUSION

This study did not identify a statistically significant impact of promotion and advertising expenditure on employment in the Far West of NSW. This is due to the insignificant relationship between promotion and advertising expenditure and tourism demand, a finding that is consistent with the existing econometric literature on tourism demand.

When promotion expenditures were separated into advertising expenditure and non-advertising expenditure the results improved (but were still not significant). This suggests better results and possibly statistically significant results may be obtained by further segmentation of the data. For example the categories of location, publication, media and target audience could be used to segment advertising expenditure data. Unfortunately data at this level of separation was not available for Broken Hill.

A more powerful study is needed to re-test the hypothesis that advertising and to a lesser extent promotion expenditure have a positive effect on tourism demand and the extent of these impacts in different market segments. If a future study were to find that promotion and advertising which targeted different market segments has a positive effect on employment the result could be used to determine the appropriate allocation of these expenditures to increase tourism demand and hence generate employment.

In conclusion, the main strength of this paper is the combination of two methodologies (i.e. elasticity of demand estimation and economic impact analysis) to examine the effect of promotion and advertising expenditure on employment, which cannot be estimated using any other method alone. This is accomplished by examining separately the link between dollars spent on tourism promotion and subsequent visitor nights and the employment generated by increased tourism expenditure. The combination of elasticity estimation and input-output tables therefore offers a pioneering way to estimate the economic impact of promotion and advertising expenditure on regional employment. More generally, the combined method provides a way for estimating the effect of induced expenditures (e.g. many government policies) on a regional economy.

REFERENCES

Australian Bureau of Statistics. (1998) *Statistical Regions 1996/97*.

Barry, K. and O'Hagen, J. (1972) An Econometric study of British tourist expenditure in Ireland. *Economic and Social Review*, 3, pp. 143-161.

Bureau of Industry Economics (1984) *Tourist Expenditure in Australia*. Research Report 16: AGPS.

Bureau of Tourism Research. (1998) *Domestic Tourism Monitor*. Various Issues.

Hamal, K. (1996) *Modelling Domestic Holiday Tourism Demand in Australia: Problems and Solutions*. Bureau of Tourism Research Conference Paper 96.11.

Jensen, R. and West, G. (1986). *Input-output for Practitioners: Theory and Applications*. Australian Regional Developments, Department of Local Government and Administrative Services, AGPS.

Papadopoulos, S. and Witt, S. (1985) A Marketing Analysis of Foreign Tourism in Greece. In S. Shaw, L. Sparks & E. Kaynak (eds). *Proceedings of Second World Marketing Congress*, University of Stirling.

Tourism NSW. (1998) *Domestic Tourism Trends in NSW 1995/96 – 1996/97*.

Tourism NSW. (1998) *International Tourism Trends in NSW 1995/96 – 1996/97*.

Uysal, M. and Crompton, J. (1984) Determinants of demand for international tourist flows to Turkey. *Tourism Management,* 5, pp. 288-297.

West, G. and Gamage, A. (1997) Differential multipliers for tourism in Victoria. *Tourism Economics*, 3 (1), pp. 57-68.

Western Research Institute (1999) *Tourism Promotion Expenditure and Tourism Demand in the Far West*. Western Research Institute: Bathurst, Australia.

Western Research Institute (1999) *Broken Hill Regional Skills Audit Report.* Western Research Institute: Bathurst, Australia.

Witt, S. & Witt, C. (1992) *Modelling and Forecasting Demand in Tourism*. Academic Press: London.

INDICATIVE IMPACTS OF POPULATION DECLINE ON THE OPERATIONS OF LOCAL GOVERNMENT IN TASMANIA[1]

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ABSTRACT The objective is to assess the effects of population ageing and decline over the period (2000-2017) on the capacity and efficiency of local government operations in Tasmania. Tasmania's population has fallen from 474,000 in 1996 to 470,000 in 2001. Further declines are projected. A demographic analysis of local government areas (LGAs) finds that some will experience comparatively large depopulation, while others will make population gains. Tasmania's LGAs will experience a 5 percent loss total income loss which will have a modest impact on Tasmania wide employment, Output, Gross State Product and Wage income. Efficient population sizes for urban (76,274 persons) and rural (18,676 persons) LGAs are derived and the analysis of LGA population changes reveals that scale efficiency losses will increase substantially, strengthening the case for a further boundary review. Further related policy issues are discussed.

1. INTRODUCTION

The purpose of this study is to determine the effects of depopulation on the capacity of Tasmanian local government to meet the demand for its services and on the efficiency of local government operations in a small, self contained region, one which is already experiencing the effects of a declining population. At the 1996 census Tasmania"s population was 474,000 but had fallen to 470,000 by December 2001.

The study is motivated by the lessons which may be gleaned from Tasmania's comparatively early experience of population ageing-oriented decline for Tasmanian policy makers and for other regions of Australia.

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Tasmania is not alone in relation to its current population trends. The most recent United Nations survey[2] of population trends suggests that the twenty first century will not be that far advanced before what remains of current population growth slows and most of the developed world shifts from natural population increase (the difference between births and deaths) to natural decline. This is attributed to a forthcoming excess of deaths over births, the result of hyper population ageing associated with the ending of the demographic transition. Similar trends will soon be evident in all of Australia's States and Territories, although more so in some than others. The population of South Australia has recently ceased to grow, while the Tasmanian population is presently falling and is projected to fall further. However, the *immediate* cause of population decline in these two States is not the extremely low levels of fertility or birth rates that are evident in many counterpart countries, but rather, net outmigration to other Australian regions that, particularly in Tasmania, is ushering in a *premature* shift to natural decline. According to Jackson and Kippen (2001), the outmigration is concentrated in the 18 to 38 year age groups, exacerbating the effects of the moderately low and still falling fertility. If current trends continue, both SA and Tasmania will find that their respective rates of natural population increase will turn negative in the next two decades, an outcome that will not arise in most other Australian regions until nearer the middle of the century or even later.

The projected year of onset of natural decline for each State and Territory, according to the ABS' three main projection series (the high, medium and low variants, referred to below as Series I, II and III respectively (see Jackson, this edition, Figure 1)[3]. Note that these trends therefore *include* migration at the levels assumed for each Series). Tasmania is projected to have begun natural decline by 2016 (according to Series I), and no later than 2026 (Series III). South Australia will follow around 2026 (all three projection series). Then, natural decline will occur in the remaining states and territories in the following sequence: Victoria, NSW, ACT, Queensland and WA. The NT will not, however, experience natural decline within the 2000-2051 period on any set of projections, while the Series III projection data indicate that this may also be the case for NSW and the ACT, Queensland, and Western Australia.

The policy implications of the different timing of the shift to natural decline will be profound, particularly for regional Australia and its respective local government organisations, the tier of government immediately affected by changing population characteristics. They will be especially profound because it is unlikely that "replacement migration" will ultimately be sufficient *in any country or region* to offset natural decline (United Nations 2000). Not only are the numbers required far in excess of anything experienced by any country in the past, but in Australia there is as yet no acknowledgment of the migration-related implications of the regional temporality of natural decline (see for example Ruddock 2000). Hugo (1999) explains why an early shift to natural decline in South Australia and Tasmania will experience this outcome, *a priori,* a reflection

[2] UN Population Division (2000), *Replacement-Migration*, UN, New York.
[3] ABS Population Projections 1997-2051, No. 3220.0.

of net migration loss and is a significant problem in itself.

Local government is the tier of government preferred for this study of population effects because population movements prove to be unevenly spread. Some local government areas (LGAs) will experience quite severe projected population losses while others gain in spite of the fact that the regional population is projected to decline. The uneven distribution of population change across LGAs has profound implications for individual Councils in Tasmania.

The structure of the remainder of this paper is as follows: the methodology and data are detailed in Section 2. The major results of the analysis are discussed in Section 3, and a summary of the issues emerging from the analysis are outlined in the concluding Section 4.

2. METHODOLOGY AND DATA

Four interrelated approaches constitute the methodology of this study. The first is a *Projection of the 29 Tasmanian LGA Populations* for the medium term (2001 to 2017). These form the basis of the estimation of individual LGA gains and losses of *financial capacity* to meet the demand for local government services in Tasmania. These increases and decreases in financial capacity are then translated into changes in the final demand for the output of local government services, and the *Tasmanian wide impacts* are then evaluated. Finally, the *effects on efficiency* of individual LGA population losses and gains are evaluated by assessing population losses and gains against an *optimal LGA population criterion* developed specifically for this purpose. These four steps are discussed in sequence.

2.1 Population Projections for Tasmania's LGAs (2001 to 2017)

The population projections published by the ABS[4] were not available for statistical local areas (SLAs) and LGAs when this study was conducted, so population projections for SLAs and Tasmania's 29 LGAs were commissioned by the authors from the ABS for the reference period 2001 to 2017. The assumptions underpinning these medium term projections are summarised briefly. Fertility rates are based on the average of age specific fertility rates observed in each LGA between 1991 and 1997 and change in accord with the ABS projections. Mortality assumptions are the prevailing State/Territory mortality rates. Migration is assumed to follow historical trends evident in individual LGAs and expected levels of interstate and overseas immigration. The age and sex distributions underlying the migration patterns are based on 1996 census data.

This study of demographic effects was confined to the medium term period 1999 to 2017 in preference to the usual ABS projection period, which extends to 2051. The medium term, as defined, is long enough to warrant some long term forward planning, particularly among the declining regions, but short enough to be relevant to the current generation of policy makers. The ABS projection outcome for each LGA appears later in this paper, in column (2) of Table 1, next

[4] See Figure 1 for reference.

to the estimated resident population of each LGA at the 30th June 2000. The percentage change in the population over the period 2000-2017 appears in column (3) of Table 1.

2.2 Financial Constraints on Local Government

Population ageing and decline will have two main effects on the *financial capacity of local government* to meet demand. The first will come through the impact on Commonwealth Government Financial Assistance Grants (FAGs) to States and Territories, so that declining population shares may mean less absolute funding from the Commonwealth[5]. To determine this financial effect, it is assumed that the Commonwealth's base grant to local government is constant in real terms over the period, and that the base grant is adjusted for Tasmania's declining share of the national population. Presently (2001), 2.50 percent of the national population reside in Tasmania, but according to the ABS, this proportion will fall to 2.02 percent by 2017. The ratio of these population shares is applied to the current Base Grant to Tasmanian local government, and provides the projected base grant allocation in 2017:

$$\text{Base Grant}^{6}_{2000-2001} \times \frac{\text{Population Share 2017}}{\text{Population Share 2001}} = \text{Projected Grant 2017}$$

$$\$22,531,691 \times \frac{0.0202}{0.0250} = \$18,205,606$$

If the Commonwealth government were to maintain the current base grant funding over the medium term 2001-2017 in real terms, Tasmania's declining population share implies a fall in the real value of the base grant to Tasmanian local government of $4.33 million on the basis of current policy. The reasonableness of this argument can be debated, but the point of this analysis is to show how LGAs are affected by depopulation when policy is per capita based.

The projected Commonwealth FAGs in 2017 are distributed across all 29 Tasmanian LGAs in proportions applied by the State Grants Commission (States Grant Commission, *Annual Report 2000-01*, Table 4, p. 23 - Base Component). Our use of the current distribution assumes a most unlikely outcome, namely that Tasmanian State Grants Commission relativities will not change over the next seventeen years. However, the value of using the current distribution is that it reveals the grant outcomes applying if nothing is done by way of policy intervention. The Base Grant loss calculated in this way appears in column (6) of Table 1.

The second cause of a demographically induced financial loss is to be found in the erosion of individual Councils rateable income bases, and the subsequent loss of rates income. As is evident from column (7) of Table 1, there will be population winners and losers among Tasmanian LGAs. For the losers and winners, the loss/gains of rates income may be calculated on a per capita basis:

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[5] This outcome is not certain, but the authors believe that the effect of maintaining current Federal policies should be emphasised in research of this type.

[6] Tasmanian State Government Grants Commission: Annual Reports – various years.

Table 1. Population Change and Financial Impacts on Local Government.

LGA	Population 2000	Population 2017	Population Change (2000-2017)	% Change (2000-2017)	Grant Loss $	Rates Change $	Financial Effect $
	1	2	3	4	5	6	7
Break O'Day	5805	6263	458	7.89	-110664	220336	109673
Brighton	12974	13818	844	6.51	-105486	270896	165410
Burnie	19496	17085	-2411	-12.37	-173908	-1423903	-1597811
Central Coast	20992	19157	-1835	-8.74	-195983	-768926	-964909
Central Highlands	2461	2119	-342	-13.90	-95491	-155591	-251082
Circular Head	8515	8265	-250	-2.94	-134949	-124911	-259860
Clarence	48756	41945	-6811	-13.97	-209723	-3182455	-3392178
Derwent Valley	9794	9084	-710	-7.25	-85534	-315115	-400649
Devonport	24508	21269	-3239	-13.22	-135117	-2012482	-2147599
Dorset	7415	7297	-118	-1.60	-129650	-40845	-170495
Flinders	913	877	-36	-3.94	-57059	-15766	-72825
Geroge Town	6773	6132	-641	-9.46	-80969	-335593	-416561
Glamorgan/Spring Bay	4197	4352	155	-3.70	-56769	87828	31059
Glenorchy	43885	39493	-4392	-10.00	-137551	-2361228	-2498779
Hobart	46063	41827	-4236	-9.20	-108616	-3259075	-3367691
Huon Valley	13515	12997	-518	-3.83	-151219	-220362	-371581
Kentish	5474	5737	263	4.80	-97664	60416	-37248
King Island	1791	1666	-125	-7.00	-56490	-68459	-124949
Kingborough	28386	29229	843	2.97	-164045	378888	214842
Latrobe	8101	8960	859	10.60	-58042	425791	367749
Launceston	62610	55787	-6823	-10.90	-236309	-4211201	-4447510
Meander Valley	17422	18519	1097	6.30	-162618	381731	219112
North Midlands	11805	11962	157	1.33	-174050	61973	-112077
Sorell	11056	13020	1964	17.76	-86951	777773	690822
South Midlands	5659	6411	752	13.29	-109716	265119	155402
Tasman	2273	2589	316	13.90	-37939	106895	68956
Waratah/Wynyard	13879	12594	-1285	-9.26	-161644	-557645	-719289
West Coast	5748	4068	-1680	-29.23	-139330	-712362	-851691
West Tamar	19990	20433	443	2.22	-169691	108251	-61441
Total	***470256***	***442955***	***-27301***	***-5.81***	***-3623175***	***-16620024***	***-20243199***

Rates income per capita is the total rate revenue received by Tasmanian LGAs as a ratio of the estimated resident population of each LGA at 30th June 2000[7]. This is simply an average measure of the change in rates income per capita and does not capture the differing impacts of an industry or particular types of households withdrawing from a particular LGA. The regional social impact of industry withdrawal is a subject worthy of further analysis demanding a survey of the effects of such change. However, this is beyond the scope of the present analysis.

When rates income per capita is applied to the population change projected by the ABS, the change in rates income becomes evident. The total income loss shown on column (8) of Table 1 as the "financial effect" is the sum of the grant income loss plus the change in rates income appearing in columns (6) and (7) of Table 1 respectively.

2.3 Statewide Impacts

This income loss will restrict the capacity of local government in Tasmania to meet the demand for local services, and may lead to a loss of local government's current contribution to Tasmania's economy. To assess the statewide impact of the financial incapacity of local government, this income/expenditure capacity loss is interpreted as a reduction in the final demand for local government services, and an appropriate Input/Output (I/O) model is applied to determine Tasmanian Output, Gross State Product (GSP), Employment, and Wage income impacts, of this reduction in local government activity.

The model applied for this purpose is *EconSearch 1,* a 12 industry I/O model[8] developed within the School of Economics at the University of Tasmania, in 1990 to reflect the natural resource, rural and tourism bases of the Tasmanian economy. The 12 industries included in this model are not standard ANZIC industry classifications. The transactions table for *EconSearch 1* was fully revised in 1994-95 with funding from the Tasmanian Farmers and Graziers Association (TFGA), and has since been maintained by postgraduate students and staff of the School of Economics.

2.4 Population Scale Efficiency Effects

One of the issues associated with LGA population decline is that smaller populations may force the diminished LGAs to operate at suboptimal levels, namely at unit expenditures that are not at a minimum to achieve current service levels. The purpose here is to assess the efficiency loss associated with

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[7] Sourced from the States Grant Commission, *Tasmania Annual Report 2000-01*, Appendix 5 (p. 29) and Appendix 8 (p. 32).

[8] The 12 industries included are Agriculture, Forestry, Fishing, Mining, Food and Beverage, Mineral, Timber Processors, Other Manufacturing, Construction and utilities, Public Services, Private Tertiary and Tourism.

declining LGA populations in Tasmania. In order to proceed in this direction, some benchmark indicator of the minimum population size is required. The lack of these population benchmarks has bedevilled the policy debate about local government modernisation in the past. The population benchmark $\left(P_i^*\right)$ referred to is the minimum population size consistent with the point at which the local government per capita expenditure function enters the horizontal stretch shown in Figure 1. This is formalised in the general form of a per capita expenditure function dependent upon population size:

$$y_i = \left(\frac{E}{P}\right)_i = f\left(P_i\right) \tag{1}$$

y_i = expenditure per capita.

The above expression suggests that expenditure is influenced by population size and is a general representation of the relationship between these variables. It is not a particular form of the relationship between population and expenditure per capita at a given point in time.

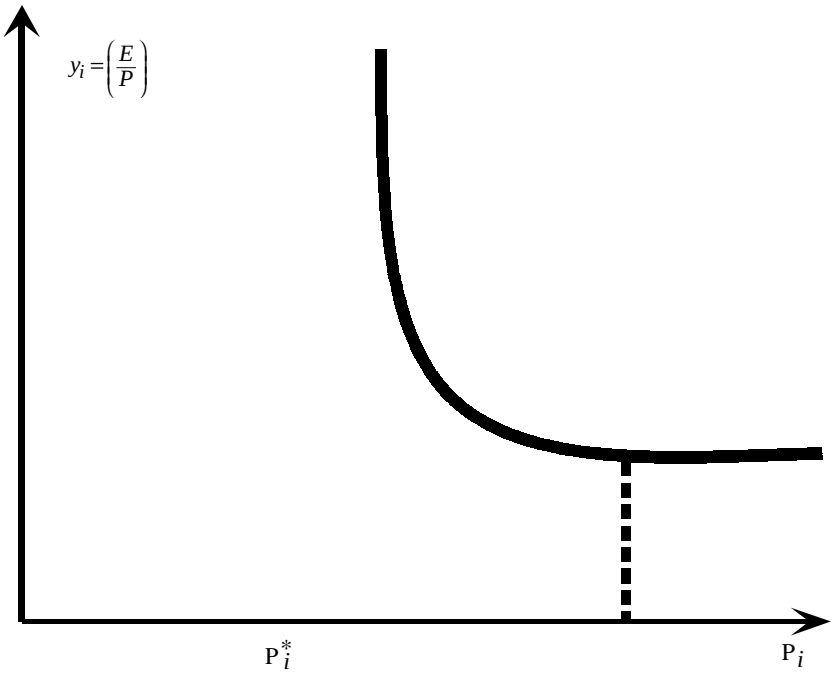


Figure 1. Population Benchmark.

The problems involved in finding particular forms of general functions such as (1) are well known in the economics literature about production/cost and utility/demand. In particular, several interpretations (e.g. the Cobb-Douglas) are confined to narrowly restricted axiomatic bases, for example, that elasticities of factor substitution be equal to unity. These limitations are in evidence here also. To overcome these, the following flexible functional form is estimated:

$$\ln\ y_i = \alpha_0 + \alpha_1 \ln\ P_i + \alpha_2 \ln\ t\ + \alpha_3 \ln P_i\ \ln\ t\ + \varepsilon \tag{2}$$

To provide greater flexibility, a multiplicative trend is included, and is represented by the term $\alpha_2 \ln t$ in equation (2). The reference to greater flexibility concerns the fact that an additional variable, namely, "time" appears as a generator of changes in per capita expenditure.

Population change is not a variable entirely under the control of LGAs. In fact local government is likely to have little if any influence over population trends, which are driven by a combination of demographic factors, long term economic developments and policies adopted by State and Federal Governments. This characteristic of population means that alternative techniques such as Data Envelopment Analysis (DEA) and Stochastic Frontier Methods (SFM) are inappropriate. DEA analysis, which treats population as an uncontrollable variable is used to modify raw DEA efficiency scores based on the managerial performance of decision making units. However, the raw scores are determined by factors controlled by the decision maker. The SFM technique requires some specific functional form and is less general than (2), in any case, there are too few time series observations to inferences drawn from reliable SFM.

The translog per capita expenditure function (2) is estimated over both urban and rural panels using the *Restricted Least Squares (RLS)* technique. The restriction involves setting the parameter on the population variable in (2) at $\hat{\alpha}_1 = 1$. This restriction is consistent with a specific interpretation of (2) in which the per capita expenditure elasticity with respect to population is unity. An approximation to the minimum required urban and rural populations is obtained for the first year of the time series (1994-95). In this period the variable time (*t*) assumes the value *t* = 1 and as a consequence ln (t) is zero eliminating the third and fourth terms of (2). Following this modification, the revised translog function takes a simplified form for that particular point in time:

$$\ln\ y_i = \hat{\alpha}_0 + \ln\ P_i \tag{3}$$

where e is the exponential base e = 2.7182.

This expression (3) may be transposed and expressed in levels to yield the following approximation to P_i^*:

$$P_i^* = y_i e^{-\hat{\alpha}_0} \tag{4}$$

To obtain an estimate of P_i^*, the average urban and rural LGA per capita expenditure at *t* = 1 (1994-95) is used to represent y_i in (4) while $e^{-\hat{\alpha}_0}$ is

calculated from the restricted least squares estimate of $\hat{\alpha}_0$ in (4).

2.5 Data

The flexible functional form (2) is fitted to data drawn from the Tasmanian State Grants Commission (TSGC) annual reports for the years 1994-95, 1995-96, 1996-97, 1997-98 and 1998-99. The individual LGA populations reported in these annual reports are intercensal population estimates[9]. Per capita expenditure (y_i) is the ratio of all LGA expenditure except road expenditures to estimated population in each year. Expenditures on roads are distributed under a different criteria.

The expression (2) is fitted to two data panels: the first is comprised of the six officially recognised Tasmanian local governments area cities, namely, Hobart, Launceston, Burnie, Devonport, Glenorchy and Clarence. The six cities' population and expenditures are observed in each of five years. These constitute a data panel consisting of 30 observations. This data set is labelled the *urban* panel. The second panel is comprised of the 23 rural municipalities observed in each of 5 years and taken together this *rural* data panel has 115 observations. The use of data panels obviates some of the limitations associated with small sample sizes. Further a pragmatic argument can be advanced to support this particular data disaggregation. Urban and rural communities have fundamentally distinct characteristics. Urban areas are more densely populated, are afflicted to a lesser extent by the tyranny of distance and remoteness from Council locations and the residents of urban and rural municipalities may have different levels of disposable income and of wealth. These differences are sufficient to warrant a separate study of urban and rural LGAs. In practice, the distinction between urban and rural LGAs is common. For example, the latest review of the structure of Tasmanian local government supports the preservation of this distinction in the allocation of local government FAGs.

> *"… the Board favours the more direct and transparent approach to the distribution of financial assistance grants that would result from a system of local government which substantially retains councils with either a strong urban or rural focus".*
>
> Tasmanian Local Government Review Final Report (1998, p.29)

The distinction between urban and rural councils is retained.

3. RESULTS

3.1 Population Trends and Characteristics

The forecast total population of Tasmania's LGAs is indicated in column (2) of Table 1, and the projected percentage change in Tasmanian LGA populations from the base period (2000) is disclosed in column (3). Twenty of Tasmania's 29 LGAs will experience a population loss. Among the rural LGAs worst affected by such population movements are the mining municipalities on Tasmania's

[9] State Grants Commission – Annual Report.

West Coast (-29.23%), and the Central Highlands (-13.90%). However, some rural communities can look forward to substantial population gains, including the Tasman municipality (+13.90%), South Midlands (+13.29%) and Sorell (+17.76%) communities.

A second interesting characteristic of these intra municipality population movements is evidence of a continuing urban population drift to neighbouring mixed urban/rural LGAs. Hobart's population is projected to fall (-9.20%), but this is partly offset by population increases in neighbouring Kingborough (+2.97%). Clarence City's population also declines by -13.97%, but this loss must be offset against the increase of neighbouring Sorell's population (+17.76%). Launceston's loss (-10.9%) will also be absorbed by increases in the West Tamar and Meander Valley population increase.

Change in the North West Tasmanian population are less well explained by urban drift. Neighbouring municipalities at the Western end of the North West Coast face declining trends. Burnie (-12.4%), Central Coast (-8.7%), Waratah/Wynyard (-9.3%), and Circular Head (-2.9%). So the North West region seems likely to lose population, although there is evidence of growth at Latrobe (+10.6%) offsetting to some extent a projected decline in the population of Devonport (-13.2%). In summary, eighteen of the twenty-nine Tasmanian LGAs face a projected population decline in the medium term, while eleven may gain population.

Although interregional population movements vary in their outcomes, the ageing process is uniform for all LGAs. This is evident on columns (4) and (5) of Table 1. Tasmanian LGAs will experience the same ageing process evident in many Australian communities. From columns (4) and (5) of Table 1, the percentage of the population older than 50 years rises from 29.7% in 2000 to 41.1% in 2017. This represents a 38% increase in the size of the 50 plus population. The ageing of the population will affect the nature of the demand for local government services, an issue taken up in later research.

3.2 Financial Impacts and Statewide Effects

Columns (6), (7) and (8) of Table 1 outline the financial impacts of the population movements outlined above. The loss of grant income is negative for each Council, based on the logic argued in Section 2: if the Commonwealth's Grant to Australian local government remains at the same real level, then Tasmania's declining share of the national population will result in a smaller Commonwealth Grant to each Tasmanian local government.

The change in rates income is based on population movements for each LGA, so those Councils experiencing growth will also gain from an increase in rates income, which invariably offsets the loss of grant support. So in those eleven cases where a population increase occurs, the net financial outcome is positive in eight cases in column (8) of Table 1. In total, across all 29 Councils, the loss of grant income amounts to $4.328 million, while the loss of rates income is

Table 2. Statewide Effects of the Change in Final Demand for Local Government Services.

Tasmanian Output	
$ million	-33.911
Tasmanian GSP	
$ million	-25.628
Tasmanian Wages Income	
$ million	-9.528
Employment	
No. of FTE Jobs	-618

$16.621 million. The net financial loss from the demographic change is $20.948 million[10]. These losses must be met through increases in rates charged by LGAs or by revision of the Grants formulated to assist Councils affected by depopulation.

Income losses will force Councils to reduce annual expenditures by a similar amount, and in general this will produce a contraction in the final demand for local government services in Tasmania of $20.948 million annually. How will this contraction of final demand impact on Tasmanian wide employment, output, wages income, and Gross State Product (GSP)? The application of the *EconSearch 1* I/O multiplier model to this $20.948 million change in the final demand for Tasmanian local government services has the impacts indicated on Table 2.

Table 2 indicates that population decline over the 2001-2017 period, which leads to a loss of financial capacity and a commensurate loss of final demand for local government services in Tasmania, will reduce the value of production in Tasmania by $33.911 million per annum, while GSP falls by $25.63 million per annum. Wages income will fall by $9.53 million, and 618 jobs will be lost across all Tasmanian industries. The Statewide impacts of reduced local government activity are of small order: GSP, for example, reduces by less than 2 percent, an outcome which could be offset by quiet, modest, public sector productivity increases.

3.3 Scale Efficiency Effects

Those LGAs experiencing population losses over the medium term will be forced to operate at population sizes that do not minimise expenditure per capita. The assessment of these scale effects is based on the restricted least squares (RLS) estimate of the translog expenditure function (2). The results of these RLS estimates of (2) are shown on Table 3, which also includes estimates of the

[10] This change in final demand for local government services is apportioned to two industry groupings: Public Administration and Private Tertiary services.

Table 3. RLS Estimates of (2).

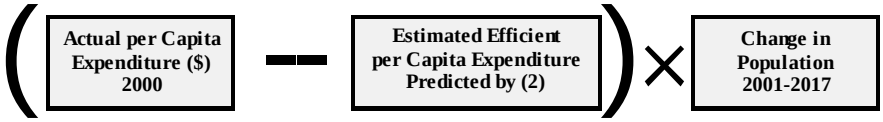
	Coefficient	Urban		Rural	
		Estimate	**t-ratio**	**Estimate**	***t*-ratio**
1	α_0	-4.68*	-12.54	-2.76*	-15.86
2	α_1[1]	1	n.a.	1	n.a.
3	α_2	0.387	0.12	3.26*	8.18
4	α_3	0.11	0.97	0.68*	4.73
5	$\overline{R}^2$	0.55		0.58	
	Optimal Populations 30 June 1995				
6	Urban	76,274*			
7	Rural	18, 676			
	Efficiency Loss				

	Sample	2000		2017		2000-2017
		$ million	**% Exp.**	**$ million**	**% Exp.**	**$ million**
8	Urban	54.18	22	64.14	26	9.96
9	Rural	20.43	11	20.38	11	-0.05

[1] α_1 restricted to the value $\hat{\alpha}_1 = 1$.

* Refers to significant at 5% level.

minimum optimal population required for scale efficiency $\left(P_i^*\right)$, and the total efficiency losses associated with population decline. These are calculated by taking the value of per capita expenditure projected from expression (3), using P_i^* for each Council predicted by the estimate of (2). This product will represent the scale efficient per capita expenditure. The efficiency loss per capita is then found in the efficient level of expenditure per capita, minus the current (2000) actual per capita expenditure for each LGA. This difference between actual and predicted (efficient) per capita expenditures is applied to the LGAs estimated population in 2001 and projected population in 2017 to assess the value of total scale inefficiencies in dollars for Tasmania's 6 urban and 23 rural LGAs. In summary, scale inefficiency for each Tasmanian LGA is calculated as follows:



This calculation provides the estimated loss included in rows (8) and (9) and column (6) of Table 3.

Rows (1) to (5) of Table 3 contain the results of the RLS estimates of (2) for both urban and rural samples. The restriction $\alpha_1 = 1$ is evident in row (2), while the constant in row 1 is significantly different from zero, which is not the case for $\hat{\alpha}_2$ and $\hat{\alpha}_3$ for the urban panel, while these estimates are significantly different from zero in the rural sample. These estimates explain 55 and 58 percent of the urban and rural per capita expenditure respectively.

The minimum required populations in the urban and rural cases are 18,676 and 76,274 persons respectively. Tasmania's LGAs tend to have populations smaller than required for expenditure efficiency. There are only four municipalities which satisfy minimum population requirements, and so there are scale inefficiencies totalling $54.18 million (2000), rising to $64.14 million (2017) for urban Councils. Scale inefficiencies are 22 and 26 percent of total expenditures in 2000 and 2017 respectively in the rural sector of local government. Rural or non urban scale inefficiencies represent a smaller proportion of total expenditures (11 percent) in both years, however, scale inefficiencies do not increase among rural Councils in the medium term.

4. CONCLUDING COMMENTS

The disparate population trends in forth coming decades by Australian States and Territories was evident in Jackson, this edition (Figure 1). Some regions, most notably, the Northern Territory, seem unlikely to experience natural population decline before 2051, while South Australia and Tasmania may confront it as soon as the next decade. Moreover in Tasmania, sub regional population churning will result in substantial declines in many LGAs well before the projected onset of natural decline at the regional level. These disparate trends require leadership at Federal level in relation to policy development, because individual regional interests are vested, and less likely to reach a consensus. Two aspects of current Federal policy require some review of the per capita basis on which local government FAGs are distributed. The impacts of population movements involve significant adjustment costs for local government and these are not afforded sufficient recognition in the current policy approach to local government. The Commonwealth's current distribution formula for local government FAGs is ripe for further review.

The basis for Federal/State cooperation on population strategies is evident in current financial arrangements. When bank branches, industries, and national retail chains withdraw from regional towns, the costs in terms of jobs, value added and rateable income losses are borne by local communities. There are some potential financial benefits accruing to the Federal and State governments, for example, capital gains tax and stamp duties on the transfer of property. These financial rewards could be earmarked and returned to the regions bearing the costs of adjusting to a smaller population.

There are several policy implications for local government in Tasmania. The first concerns the current approach to the distribution of Commonwealth FAGs to individual LGAs in Tasmania. Current distribution procedures follow national guidelines in general, but take into account specific regional disability factors. One of these is the inclusion of adjustments for population growth/decline. The additional costs to LGAs explained by population movements are incorporated in the current disability weighting formula, provided a threshold population change (2 percent) is met. However, essentially permanent *natural* population decline occuring as the result of population ageing as opposed to essentially permanent *natural* population growth is a compelling argument for some research of the relative adjustment costs involved in distinguishing growing from declining

regions *per se*. Those LGAs worst affected by significant depopulation may experience different kinds of adjustment costs compared to those applying in growing regions and the current distribution formulae may not capture the differing nature of these. A review of the population change disability adjustment may reveal a need for recalibration of the formula based on different weights for different kinds of population adjustment costs.

The ABS population projections for each Tasmanian LGA reveal a surprising number of inter LGA population movements, suggesting that some LGAs will experience quite substantial population decline. The pressure for further local government modernisation will increase throughout the forecast interval 2000 to 2017. Population decline in the officially designated cities are partially offset by population gains in adjacent non-urban municipalities. These are all expressive of an urban to suburban drift: Clarence's population decline is partly offset by Sorell's spectacular increase; Glenorchy's by Brighton's gains; Launceston by West Tamar's smaller gain; Hobart by Kingborough; Devonport by Latrobe. The much needed exploitation of scale effects in Tasmanian local government may be achieved through the cooperation of urban/neighbouring suburban municipalities or through amalgamation or an appropriate mix of these.

The size of the present urban municipalities in general is less than the population size required for scale efficiency. The cost to ratepayers is large and will increase as population declines in 20 municipalities. However, the population shortfall is not as large as previously imagined: 76,000 and 18,000 are the respective population sizes required for the cost effectiveness of urban and rural municipalities respectively. That said, the criteria that specify urban or city status may also require review.

REFERENCES

Australian Bureau of Statistics (ABS) *Population Projections 1997-2051*, No. 3220.0.

Coale, A. (1972) *The Growth and Structure of Human Populations*, Princeton University Press: Princeton, N.J.

Hugo, G. (1999) Regional Development Through Immigration? The Reality Behind the Rhetoric. *Research Paper 9*, Canberra: Commonwealth of Australia Parliamentary Library.

Jackson, N.O. and Kippen, R. (2001) Whither Tasmania? A note on Tasmania's population "problem". *People and Place*, 9(1), pp.27-37.

Lutz, W., Sanderson, W., and Sherbov, S. (2001) The end of world population growth. *Nature*, 412, pp. 543-545.

McDonald, P. and Kippen, R. (2000) Strategies for Labour Supply in Sixteen Developed Countries, 2000-2005. Paper presented to the *2000 Annual Meeting of the Population Association of America*, Los Angeles, California, 23-25 March.

Ruddock, P. (2000) Minister's Article for the Business and Higher Education Round Table on the Theme "*Populate or Stagnate: Australia 2050*", Economic and Environment Section, Department of Immigration and Multicultural Affairs, October.

Tasmanian Local Government Review (1999) *Final Report* (Jan). Tasmanian Government Printer: Hobart, p.146.

Tasmanian State Grants Commission *Annual Reports.* 1994/95, 1995/96, 1996/97, 1997/98, 1998/99, 1999/2000 and 2000/2001.

UN Population Division (2000) *Replacement Migration*, New York.

Worthington, A.C. and Dollery, B.E. (2000) Productive efficiency and the Australian local government grants process: An empirical analysis of NSW local government. *Australasian Journal of Regional Studies*, 6(1), pp. 96-121.

BOOK REVIEWS

PLANNING FOR A BETTER URBAN LIVING ENVIRONMENT IN ASIA

Gar-On Yeh and Mee Kam Ng (Eds), January, 2001, Ashgate Publishing Ltd,
ISBN 1 85972 223 7, RRP £47.50 - Hardback - 400 pp.

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This book is an interesting addition to the literature that deals with rapid urbanization of Asia's cities and the problems and challenges that lie ahead in creating a suitable environment for humans to live in. The book is timely since Asia not only has the majority of the world's population, but is also undergoing rapid economic change. Despite such development, many Asian countries have dual economies – i.e. slums and empty lots exist next to modern buildings and historical sites and automobiles travel next to carts drawn by cattle. Pollution, especially of air, is of great concern. These issues need urgent attention if economic growth is to be sustained and improve the well being of people. The book has brought together a collection of articles that highlight the paradoxes of larger urban areas and discusses ways and means of minimizing some of their negative aspects. The book clearly demonstrates that good urban planning and management measures are of utmost important in these cities which have a great deal of cultural, ethnic, economic, political, historical and architectural diversity.

The book investigates in a lucid manner the urban development issues and various responses to plan for a better urban living environment in Asia. The book contains 19 chapters and is grouped together according to five main themes: urban and regional planning, environment, housing, redevelopment and conservation, and planning education.

The first chapter introduces the issue of planning for a better living environment in Asia and the second chapter provides an overview of the challenges and prospects of large cities in Asia arguing that increasing industrialization and urbanization have lead to many interrelated sectoral and spatial problems which can only be remedied by innovative planning and implementation mechanisms. The origins and effects of the existence of a large informal sector in Asian cities are discussed in Chapter 3. It is pointed out that in order to better manage the urban economy and environment it is better for the urban planning system to accommodate the informal sector. Chapter 4 presents the results of a case study of urban development and planning practice in Malaysia substantiating the problems discussed in the previous chapter. Chapter 5, too, highlights the lack of coordination between physical and infrastructure planning and a bias towards the interests of the local bureaucrats and private sectors in the development process. Chapter 6 examines through simulation modeling how pedestrian movements can be facilitated by manipulating the built

environment while Chapter 7 discusses how urban planning and management measures can help create an interesting and pleasant high density environment. A case study from Hong Kong is discussed.

Chapter 8 suggests the adoption of an ecological plan that focuses on the management of the urban living environment according to ecological principles. The case study is from China. Chapter 9 discusses the environmental problems in densely populated areas such as Bangladesh and argues that better planning could minimize such problems.

Housing issues in rapidly growing urban Asia are discussed in Chapter 10 evaluating a five-year two million housing unit construction plan in South Korea and Chapter 11 shows that it is possible to make available affordable housing to low-middle income households. The case study for this purpose has been drawn from Bangladesh. Chapter 12 shows the importance of architecture in highlighting the historical diversity of various races and cultures in Asia. The importance and usefulness of culture in utilizing and organizing internal space of a house are highlighted with an example of Javanese culture.

Two case studies from Japan and Taiwan are used to discuss the land pooling/readjustment technique (LP/R) in urban redevelopment with landholder participation. This is discussed in Chapter 14. Another study conducted in Japan examining Japan's urban renewal, which refer generally to rebuilding houses with fire-proof material is discussed in Chapter 15. Chapter 16 discusses how a noble's residence in Indonesia has been transformed from a house of an aristocratic family to a residential community meeting much desired social needs of a rapidly changing economy while preserving the 'great traditional Javanese architecture'.

Chapter 16 shifts attention to planning education in Asia where it is pointed out that such education should meet the new challenges imposed by the changing urban situation. Examples are taken from India. The experiences of promoting Philippines' planning environment and training professional planners for the government and private sectors are discussed. Finally, Chapter 19 examines the future demands of Asian planning educators and looks at whether such challenges could be met by the current planning education.

It would have been interesting if more emphasis had been placed on the role of green spaces in urban cities in Asia in terms of opportunities for wildlife, recreation and air pollution mitigation. The discussion on this theme is limited. Evidently, this was deemed to be outside the scope of this volume. The book has not only theoretical discussions, but also cite examples from case studies conducted in nine Asian countries ranging from highly developed to least developed. This volume of work gives policy decision-makers and planners' guidance and new ideas in their endeavors to bring about better living conditions for its urban denizens. Although this book is a collection of papers dealing with Asian urban living, the concepts and the evidence from case studies produced are useful to Africa, the Middle East and Latin America where similar problems are encountered.

PLANNING AND THE INTELLIGENCE OF INSTITUTIONS: INTERACTIVE APPROACHES TO TERRITORIAL POLICY-MAKING BETWEEN INSTITUTIONAL DESIGN AND INSTITUTION-BUILDING

Enrico Gualini, Ashgate Publishing Ltd., May 2001, Hardcover 356 p.,
ISBN 0 7546 1381 X, RRP £45.00.

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This book has been published in the series Urban and Regional Planning and Development. It is primarily concerned with institution-building and the evolution of institutions in a territorial or regional context. But a region is not defined in a geographical manner but as a social construct. In the words of Gualini (p.18):*"According to this conception, what identifies regions becomes the flexible, emerging form in which human conducts are ordered, defined by their respective patterns of relations and activities. Regions and locales are thus seen as both mediums and outcomes of social interaction, no more as entities defined by precast identities, but as constructs, 'shared spaces' or 'theatres of interaction' defined by intersections and articulations of relationships in the framework of actual social interactions: not as aggregates of spatial localizations, but as forms of a subdivision of time-space defined through the forms taken by concrete social practices."*

Gualini (p.17) explains that there has been a change in emphasis in neo-Schumpetarian notions of innovation and development from an economic to a sociological-culturalist perspective. This stresses "the mutual relationships between innovation, entrepreneurial and economic structures and socio-political and institutional forces as the conditions for the development of growth dynamics and diffusion processes, and redefining the role of institutional forms of support and organizations based on the involvement of social actors at a regional level" (p.17). It is, of course, true that Schumpeter emphasized the importance of the social cultural context as an important influence on entrepreneurship and innovation but economics is also important in his theory.

This book is divided into three parts. Part I is entitled "An Institutional Turn in Planning Theory". Part II outlines and interprets a case study, namely experiences in New Jersey, USA, in institutional innovation involving the cross-acceptance process. As a result of an action brought by Mount Laurel Township, the Supreme Court of New Jersey required the State of New Jersey to engage in state planning of land use, and this led to the development of cross-acceptance plans and procedures for interaction between the different actions and levels of government in New Jersey. These procedures are designed to achieve consensus but also evolve with experience so that organizational innovation occurs. Part III is entitled "Rethinking the Dimension of Institutionalisation in Planning

Practice" and is concerned with general principles of social organization.

The coverage of the book is mostly sociological in nature with main emphasis being on procedures for obtaining consensus in regional planning in public decision-making.

Now the issue of consensus or, more generally, social conflict resolution is an important matter. It is one that seems to have been more thoroughly addressed by lawyers than economists. While game theory has been applied to social conflict resolution, new welfare economics (e.g. the Kaldor-Hicks criterion) does not address this social issue. Therefore, welfare economics is limited in its policy applications.

However, game theory is also limited in its social policy applications because it focuses on defined and constant ends. Thus, it may not result in effective conciliation. As suggested by Gualini (pp.299-300): "*Negotiating practices … should evade a primary focus on defined ends and outcomes and thus [avoid]… the paradoxical consequences of an implicit assumption of the constancy of interests involved which threatens to reduce the integrative redefinition of issues at stake to a mere strategic device [as in game theory] … and rather become a means for favouring the emergence of social preferences …".*

Institutions both constrain and allow some possibilities for innovation and change. Thus dual aspects need to be considered in institutional design in all contexts.

While the author makes some reference to the work of economists such as Mancur Olson, Herbert Simon and Cyert and March, he makes little or no use of any economic theories. From this point of view, the work is not holistic. It is necessary to consider the transaction costs involved in creating consensus. Is there a point at which the extra cost of building consensus exceeds the extra cost? Should not the cost of institutional mechanisms be considered in relation to their effectiveness in building consensus? Such questions are not tackled by Gaulini.

I found that the English style of writing by Gualini was 'heavy going'. Sentences are often quite long and packed with abstract words and adjectives that sometimes seem superfluous, or imprecise in meaning. This may deter some potential readers. Nevertheless, this book should be of interest to those working in planning, and especially those involved in sociology, public administration and political science. However, most economists would probably only find about 20 percent of this book relevant if they have an interest in the economics of organization and wish to explore the interface between economics and sociology in this context.

GLOBALIZATION AND MARGINALITY IN GEOGRAPHICAL SPACE: POLITICAL, ECONOMIC AND SOCIAL ISSUES OF DEVELOPMENT IN THE NEW MILLENIUM

Heikki Jussila, Roser Majoral and Fernanda Delgado-Cravidão (eds) Ashgate Publishers, June 2001 ISBN 0-7546-1476-X, Hardcover pp. 304, RRP £45.00.

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Globalisation and Marginality in Geographical Space is the fourth book in the *Spatial Aspects of Marginality* series by the International Geographical Union (IGU) Commission on Dynamics of Marginal and Critical Regions. It is based on a varied selection of papers from the Commission's 1998 conference in Coimbra, Portugal. The purpose of the series is to illustrate the contribution of geographical research to the understanding of the effects of globalisation on marginal areas. The aim of this book is to analyse and discuss the issue of marginalisation and the effects of globalisation in relation to the politics, policies and social issues pertaining to marginal areas.

The approach is to use practical examples of how globalisation and deregulation affect marginal areas and communities in such diverse countries as Argentina, Australia, Finland, Iceland, Italy, Norway, Portugal, Spain, Sweden, United States of America and Zimbabwe. The expansion of the European Union has added another dimension to globalisation in Europe, which is well documented here. Another underlying theme is the overlay of recent marginalisation on communities still suffering the effects of 'first wave' globalisation and marginalisation by colonisation.

The aims of the book are generally met, with the first section after the introductory chapter containing five articles on the effects of globalisation, the second section on policies and politics of change having seven articles and the third section on social issues containing eight articles. The final section is a summary and conclusions by the editors. The geographer's perspective is understandably predominant, with an emphasis on descriptive analysis of marginal areas and policies and less in the way of political analysis. Given that globalisation can be understood on one level as a consequence of economic restructuring and the rise of transnational firms in a technologically advancing world, or on another level as a neo-liberal political ideology that favours deregulation and free trade over other forms of economic and social organization, the emphasis here is on the former. However, in the first section on the effects of globalisation, the articles are more theoretical and do tackle the deconstruction of the concept of globalisation.

Walter Leimgruber (Chapter 2) warns that by 'privileging the global scale, the importance of all other scales is ignored…There are many local and regional problems which have little impact on the global system and a global problem

may not be felt at the local level.' In addition, he argues that geographers are accustomed to variations in scale and that thinking 'globally' is not a new phenomenon. Liemgruber suggests that deregulation is more in the political domain and 'stands for the current tendency of the State to back out of certain tasks or services, which it used to provide.' His statement that 'Central to the current debate on deregulation is the definition of the State's primary tasks' is pertinent. Leimgruber describes a marginal region as one that is not isolated from the rest of the world but one that receives fewer benefits from it than other regions. Marginality is not an objective phenomenon but is tied to the spatial and temporal scale of observation and Leimgruber presents a number of case studies to illustrate this point.

Lawrence Sommers, Assefa Mehretu and Bruce Pigozzi (Chapter 3) discuss vulnerability to economic marginality in the new international division of labour. They argue that there have been significant shifts, economically and spatially, from previous patterns based on centre-periphery models because of the shift in the locus of power from nation states to transnational corporations. It is this power shift that is at the heart of anti-globalisation protests and the rise of economic marginalities within core areas even though overall prosperity of a nation may be rising. Sommers *et al*. provide useful definitions of the key concepts of the book's themes. They define marginality as a condition of poverty and deprivation found in a community or territory that has experienced the adverse effects of uneven development either due to non-competitive conditions in free markets (contingent marginality) or hegemonic biases in regulated or controlled markets (systemic marginality). Globalisation is defined as a complex form of internationalisation of economic activity that implies a degree of functional integration between internationally dispersed economic activities.

J. Clark Archer and Richard Lonsdale (Chapter 4) discuss the impact of globalisation and deregulation on the Great Plains region of the United States of America. They suggest that this region has common features with parts of Australia, Argentina, Canada and Russia and that the trend to government deregulation and the increased control of commodity markets by large transnational companies add to the uncertainty and change being experienced in the Great Plains and these similar regions. If the Great Plains can be regarded as marginal, consider the plight of Southern Patagonia in Argentina (Maria Cepparo de Grosso, Chapter 5). This region is remote, arid and sparsely populated, with its economy almost entirely reliant on wool and few prospects for regional diversification. In Chapter 6, Henri Goverde discusses the difficulties and potential for marginalisation posed by the EU enlargement to incorporate the ten Central and Eastern Europe countries (CEEC-10). Whilst quite a comprehensive analysis, this chapter suffers from poor translation into English and lack of subsequent editing, making it very difficult to read.

The second section on politics and policies of change contains an article by Toivo Muilu (Chapter 7) on the European Union's fledgling Northern Dimension initiative, proposed by Finland, which joined the EU in 1995. The Northern Dimension aims to promote ecologically sustainable utilisation of natural resources, peaceful and stable development and a role for the EU in the North

Calotte, Barents Euro-Arctic Region, the Komi Republic in Russia and the sea areas surrounding Scandinavia and Northern Russia. Matti Häkkilä (Chapter 8) continues the northern theme, discussing the prospects for rural northern Finland since joining the EU. One avenue for expansion is the growth of organic agriculture or 'natural production', similar to the call to capitalise on a 'clean, green' image in Australia. It becomes clear here the advantages to the marginal regions of countries of EU membership. Depending on the categorisation of regions under the EU Objectives, large sums of money are available under certain EU schemes to assist marginal regions.

Maria Andreoli, Francesco Di Iacovo. Heikki Jussila and Vittorio Tellarini (Chapter 9) present the case of the Tuscany Rural Observatory, a collaborative project aimed at capturing all the available resources for research and rural development at the local level in Tuscany. In this chapter, the following chapter by Luis Moreno on the problems of regional development in the Algarve region of Portugal and in Chapter 13 on the impact of deregulation on tourism by Francisco López-Palomeque, the arguments were difficult to follow because of poor translation.

Paul Olav Berg (Chapter 11) looks at the consequences for peripheral areas of the corporatisation of government administrative bodies in Norway, using the example of telephony services in Norway. Olav concludes that more research is required for definitive answers but that the tendency for commercial effort to be concentrated in market segments and geographical parts of the market means lower prices in these competitive markets, and the maintenance of high prices in peripheral regions where there is less competition, is not surprising. Steven Kale (Chapter 12) reviews the consequences of regulation and deregulation in such sectors as transport, agriculture and the environment which present both barriers and opportunities for development in the US Pacific North West, not dissimilar to the Australian situation. He raises the issue of 'lone eagles' (telecommuters), and the potential for this trend to running home-based businesses to continue if supported by adequate infrastructure.

The fourth section - From economic to social issues - covers a broad range of topics in varying depths, which include: socio-economic mapping of Tuscany (Chapter 14, Maria Andreoli, Vincenzina Colosimo and Heikki Jussila); analysis of inequality in Portugal (Chapter 15, Sandra Marques and Fernanda Delgado-Cravidão); a fascinating glimpse of a form of economic organization that was so insular as to be extremely vulnerable to globalisation and restructuring in the textile industry – a mill town in South Carolina (Chapter 16, William Stanley); the consequence of demographic shifts for regional development in Spain (Chapter 17, Dolores Sánchez-Aguilera and Roser Majoral); and comparison of spatial distribution in Finland and Sweden using GIS mapping to inform regional mapping (Chapter 18, Jarmo Rusnanen, Toivo Muilu, Alfred Colpaert and Arvo Naukkarinen).

The sole Australian contribution to the volume is contained in this section and is a detailed description and analysis of indigenous disadvantage in Tasmania by Peter Scott (Chapter 19). Scott analyses the circumstances of arguably the most marginalised group in Australian society in the most

marginalised state in Australia and the process of secular disenfranchisement since early colonisation. Lucilla Caetano (Chapter 20) discusses the complex issue of child labour as a manifestation of marginalisation, using Portugal as a case study. Increased urbanisation has meant a growth in child labour in the cities, but it remains most common in agriculturally based regions in developing countries.

The situation of women in rural Zimbabwe and the contingent and systematic marginality they face is analysed by Assefa Mehretu, Chris Mutambirwa and Jane Mutambirwa (Chapter 21). Contingent marginality is defined as an anomalous condition of social and regional inequality within the context of what is a fair and equitable system, whereas systemic marginality is polarised development caused by a system of inequitable social relations in a society where a hegemonic order uses formal and informal institutions to maintain power. Mehretu *et al*, argue convincingly that the source of much of the systemic marginality of women is the colonial and post-colonial methods of territorial administration, whilst the source of contingent marginalisation, namely the unequal division of labour in the household, is a more universal phenomenon. The strengthening of the discussion in this article by the provision of policy options for combating marginalisation would have been welcome in many of the previous chapters also.

The overall message from this volume is summed up well by Leimgruber, who concludes that 'despite considerable efforts at all levels (international development aid, regional policy, deregulation etc), very little has changed: regional disparities have not disappeared and inequality is still a major problem.' Some would argue that this means we could abandon all three of these and be no worse off. However, the view from the arguments and case studies offered in this book would suggest the opposite: that research into the effects of globalisation on development in marginalised areas need continued and enhanced effort.

GROWTH AND CONVERGENCE IN METROPOLITAN AMERICA

Janet R. Pack, *Brookings Institution Press, Washington D.C.,* 2002, ISBN Paperback 0-8157-0247-7.

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It is not very often that an author produces a concise and straightforward text that simplifies the complex nature of urban resource economics - noteably this happens to be one of those rare occassions. Park highlights and analyses regional differences between 1960 and 1990 for 277 metropolitan regions spread evenly across the USA. In addition comparisons are drawn between the changing

dynamics and fortunes of four broader regions in the USA, namely the north-east, south, mid-west and the west. The emphasis is placed on socio-economic factors and population characteristics and permits an invaluable insight into the varying levels of decline or prosperity in the USA over this time frame. It was argued that population growth factors can not be easily replicated or predicted, and with the benefit of hindsight there has clearly been poor anticipation of future changes. Apparently much can be attributed to fate and historical events with little credit forthcoming to planners. As a result, policy-makers must understand that variables outside the control of these regions will ultimately have the final say on the progress or lack thereof, regardless of the resources committed towards future anticipation of change.

Pack addresses and surmounts some difficult issues that have challenged other authors in this field, including the implications of broader government policy, changes in the taxation system, and variations in unemployment rates and poverty levels. The attention is also focussed on variations in regional growth and possible catalysts for these changes, although at the same time retaining a simplistic approach with clarity of explanation. Reasons for sustained population decreases in certain areas are canvassed and then accompanied with insights and carefully produced suggestions for improvement.

There are a total of six chapters only accompanied by three appendices, author index and index. The first chapter considers 'major shifts in population and economic activity', followed by the next chapter looking at 'interregional differences: characteristics and explanations'. The third chapter is titled 'socioeconomic characteristics and growth' whilst the next looks at 'estimating growth'. Chapter five follows on and considers 'behind the growth equations' with the final chapter titled 'regional policy'.

A substantial amount of the text was devoted to interpreting why the spatial differences occurred and how the regions were associated with each other. This process was well supported by a variety of colour GIS maps and graphs, not often included in an affordable and concise text of this nature. It was demonstrated that regions with high population growth are not necessarily associated with high per capita income, and at times the inverse occurs. The location of other influences, such as a high level University were commonly linked to higher per capita income as opposed to than population-related variables. Regions that were traditionally reliant upon traditional industries were shown to be struggling in contrast to the new technology areas.

Pack addressed a range of complex regional issues and presented the findings in a user-friendly text. The author's intricate knowledge of the historical events that occurred during the 1960-1990 era both supported and complemented the discussion, shedding light on numerous regional trends that otherwise may not be fully appreciated by the reader. However as the analysis and discussion is so specific to the USA, a transformation of the results to Australia or New Zealand would be extremely challenging, primarily due to the circumstances surrounding the USA including the adjoining countries and sheer population size.

In summary, Pack has produced an entry level and quite readable text aimed at readers with a direct or indirect interest in urban research. It is aptly suited as

an entry level text for students undertaking studies in geographical sciences, and then provides a springboard for higher level research into this area. Whilst Pack has not claimed to produce a fully comprehensive guide addressing every issue in regional economics, the text does provide more answers than questions in this constantly evolving area. As such it is a recommended read for those interested in urban research, especially those requiring a level of high detail focussing on the USA.

THE DYNAMICS OF NEW FIRM FORMATION

Vinod Sutaria, Ashgate Publishing, April 2001, Hardcover 108 p., ISBN 0 7546 1308 8, RRP £37.50.

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What an ambitious question Sutaria states at the start of his introduction! Clearly if he were to answer the question of what force drove the growth and development of economies then the halls of economic departments around the world would be much quieter indeed.

Sutaria's primary aim perhaps reveals the nature of his book in general. His mission of revealing *dynamic disequilibrium* as the major driving force in a capitalist economy (Sutaria 2001) (p.5) (and providing a counterpoint to neoclassical models) seems rather ambitious indeed. The notion of dynamic disequilibrium is not new of course. It has been suggested that this places a correct interpretation on Marxist theory (Freeman and Guglielmo 1996) and that Marx's own writing support this. Whilst this may seem perhaps extremist language (after all how many economists would be comfortable being associated with his economic ideas?), it does none the less illustrate, as it seems to me, some common anti-liberalist ideas (such as government intervention to stabilize the economic conditions in a region (Sutaria 2001) (p. 83)). If I were to classify the philosophical view of the author it would be of a Schumpeterian and Keynesian nature.

In the first half of the book Sutaria sets up his research and explains the ideas behind his research. As seems standard in research he provides an introduction, theoretical background and empirical evidence (as he says) and a research design and methodology. Following on from this he delves into the determinants of New Firm Formation (where he does all his tests) and finally a summary and review of policy implications.

For a large portion of his book he seems to rely heavily on statistical tests he employs for his analytical work. However there seems to be a lack of awareness of the various criticisms of such techniques. Is it really possible to measure human behaviour using mathematical and statistical techniques? As Stostask

points out the very problem with such techniques is that they are typically designed along Keynesian lines of economic thought (Stostak 2002). If this is true then it seems a bit funny how the tests he employs follow on from his philosophical point of view. And if so, why doesn't it surprise me that the results he obtains actually support much of this philosophical point of view!

Past work on New Firm formation and particularly the role of Entrepreneurship is hardly barren ground. Some common themes which appear in much of the previous research seem to include: the fact that entrepreneur is vital to an economic system, criticism of "traditional" neoclassical economic thought and information asymmetries. Strange indeed that these very same themes appear within Sutaria's book as well, but what seems very applicable in this case is a quote from Hindley "There does seem to have been a lot of repetition over the past two centuries"(Hindley August 1984) . One improvement that perhaps has been made on previous books on entrepreneurship is that he has added much more cross reference with his data (as opposed to Hindley's criticism of Casson's book (Hindley August 1984)). But as discussed above, this may not really mean much at the end of the day.

Some implications that he draws from his empirical results include a correlation between new firm formation and the change in the unemployment rate (negative), education, firm size structure, previous year entry and exit rates of firms, availability of local financial capital, human capital assets among others. If we assume that these are correct and that such statistical analysis can indeed be applied to this human behaviour there are still many other issues regarding these results. Primary among these is perhaps the disagreement on their relevance among various scholars. Sutaria even illustrates this when he points out that the relationship between education and the rate of new form formation is far from certain (Sutaria 2001) (p. 74). So it seems to me that either Sutaria's analysis of new firm formation in the Texas metro regions is special (compared to other studies by Guisnier (Guesnier 1994) and Reynolds (Reynolds 1994) for other reference areas), or alternatively that his implications about the significance of education need to be treated with much greater care. This is perhaps one example which I assume could be extended to the other variables he says correlate with new firm formation as well (I won't even get into the issue of unemployment affecting the rate new firm formation).

Sutaria has put much work into this research, which certainly I would congratulate him for. However I find myself scratching my head wondering what he has actually achieved. Basically at the start of the book he states that he believes entrepreneurship is an important factor in new firm formation and, surprise surprise, that's pretty much his conclusion too. All in all it looks like a book tailored to those interested solely in New Firm Formation.

REFERENCES:

Freeman, A. and C. Guglielmo, Eds. (1996). Marx and Non-Equilibrium Economics. Cheltenham, UK and Brookfield, VT, Edward Elgar.

Guesnier, B. (1994). "Regional Variation in New Firm Formation." Regional Studies **28**(4): 347-358.

Hindley, B. (August 1984). "The Entrepreneur: An Economic Theory.; Entrepreneurship and the New Firm.; The Entrepreneur." *Economica, New Series* **51**(203): 370-371.

Reynolds, P. (1994). "Autonomous Firm Dynamics and Economic Growth in the United States, 1986-1990." *Regional Studies* **28**(4): 429-442.

Stostak, F. (2002). What is wrong with econometrics? Ludwig Von Mises Institute. http://www.mises.org/fullstory.asp?control=940

Sutaria, V. (2001). The Dynamics of New Firm Formation. Aldershot, UK., Ashgate Publishing Ltd.

KOREAN ECONOMIC REFORM: BEFORE AND SINCE THE 1997 CRISIS

Robert F. Emery. Sydney: Ashgate Publishing, August 2001, Hardcover 234 p.,
ISBN 0 7546 1781 5, RRP £45.00.

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The Korean experience has been of interest to many observers including policymakers and economists. In particular, the rapid transition of South Korean from a poor country in the 1960s to a member of the OECD in 1990s has been referred to as a growth miracle. To some, the 1997 crisis hitting its economy, especially its financial and business sectors, came as a surprise. Many interesting questions arise. What are the causes of the crisis? What are the on-going problems in that economy? How persistent the problems will be? What kind of reform has been made in dealing with these problems?

This book investigates South Korean's economic reform for the period from 1970s to late 2000, before and since the 1997 crisis. It focuses on the financial sector, the corporate sector, and the role of the government.

The first four chapters provide detailed descriptions of the Korean financial structure and early financial reform prior to the crisis. They touch various types of financial institute, banking or non-banking, as well as the status of the central bank and supervisory institutions. Problems of the economy are identified in the financial and corporate sectors, largely as consequences of the growth-oriented policy of the government and the lack of transparency in business performance. Among many forms of government interventions, policy loans were channelled through commercial banks to favoured sectors, and interest rates were capped below their market value, leading to over-investment, over-borrowing, and over-leveraging by the large businesses (the *chaebols*). Non-performing loans and high debt/equity ratios became serious problems as a result, and eventually contributed to the 1997 crisis among other factors such as declining foreign reserves and increased short-term foreign debt. The early financial reform attempts were mostly ineffective, as they did not remove the government

controls over the financial sector.

Chapter 5 takes a close look at the 1997 crisis and the subsequent economic reform program. Some immediate causes of the crisis were discussed that worsened the financial situation of the economy. Owing to excessive production capacity and over-borrowing, a sequence of business failure (especially the collapse of Kia, the eighth largest *chaebol*) occurred in 1997, generating shock waves throughout the economy that for decades had been unfamiliar with bankruptcy of large businesses. Banks began to call back loans and refuse to extend new credits, and foreign investors and creditors began to pull their funds out of Korea. As foreign reserves were quickly depleted, South Korea found itself unable to service short-term foreign debt and requested the IMF assistance under conditions of sound reform. The reform program called for greater independence of the Bank of Korea (the central bank), improvement in accounting standards, increases in minimum capital adequacy, speedy disposal of non-performing loans, and restructure of troubled financial institutions via merger and acquisition. There were also calls for the corporate sector to enhance transparency of profit and loss statements, disclosure of operations, regular audit of companies, and eventual elimination of the system of mutual guarantees within conglomerates. When the reform was under way, GDP declined by 6.7% and unemployment rose substantially to 6.8% in 1998, after many years of rapid growth and low unemployment.

More detailed investigations into the reform and restructure of the financial sector were conducted in Chapter 6. It covers the reform in many dimensions of the financial sector, including the banking sector, non-banking financial institutions (merchant banks, investment trust companies, insurance companies, security companies, and leasing companies), and the capital and money market (the stock exchange, the bond market, mutual funds, and futures exchange). Likewise, Chapter 7 offers more details of the reform and restructure in the corporate sector, e.g., the predominance of the *chaebols* and their problems, the "big deals" between the largest *chaebols* and the government, and the near bankruptcy of Daewoo (the second largest *chaebol*).

The last chapter concludes with an overall assessment of the reform and restructure in both the financial and corporate sectors, and the reform in the labour market and the government sector. The reform has not been finished and many problems remain unresolved, despite that GDP growth regained its high pace after 1998. Near the end of year 2000, Korean banks were still suffering high proportions of non-performing loans, and the whole financial sector was still making a net loss. In the corporate sector in the meanwhile, excessive capacity of production was not eliminated, making it hard for many companies to turn losses to profits.

Lessons from the Korean experience may well be helpful to developing countries. Starting with the lack of modern market system and thriving to combat poverty, these countries often face a similar trade-off in policy making: rapid growth and sound efficiency. On the one hand, growth-promoting policy coordinates efforts to help vulnerable businesses in these countries with much needed resources, such as technology and financial funds, and external markets.

On the other hand, by distorting market forces, these government interventions create imbalances across sectors, poor profitability, and consequently non-performing financial investments. In this regard, the book has offered valuable insights from this case study.

Outside the scope of this book, however, it is also interesting to see clear comparisons between the Korean experience and those of other Asian countries that also struggled through the 1997 financial crisis in the region. In particular, comparisons among the Asian Tigers (Singapore, Taiwan, and Hong Kong, in addition to South Korea) could allow one to draw more clear conclusions concerning the roles of government policy, the size of business, and financial institutions in achieving sustainable growth. Such comparisons await future research.

AUSTRALASIAN JOURNAL OF REGIONAL STUDIES

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