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Assessing Poverty and Inequality at a Detailed Regional Level

New Advances in Spatial Microsimulation

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Abstract

During the past three years NATSEM has developed pathbreaking spatial microsimulation techniques, involving the creation of synthetic data about the socioeconomic characteristics of households at a detailed regional level. The data are potentially available at any level of geographic aggregation, down to the level of the Census Collection District (about 200 households). This paper describes the results of initial attempts to link the new database to NATSEM's existing STINMOD static microsimulation model of taxes and transfers in Australia, so that the spatial impact upon poverty and inequality of possible policy changes can be assessed. This paper outlines the new techniques used to create the synthetic household microdata and demonstrates how they can be used to analyse poverty rates, the spatial impact of possible policy change, and the characteristics of the poor by geographic area.

Keywords: poverty, inequality, measurement, Australia

JEL classification: I32, C81, D78

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General caveat

NATSEM research findings are generally based on estimated characteristics of the population. Such estimates are usually derived from the application of microsimulation modelling techniques to microdata based on sample surveys. These estimates may be different from the actual characteristics of the population because of sampling and nonsampling errors in the microdata and because of the assumptions underlying the modelling techniques. The microdata do not contain any information that enables identification of the individuals or families to which they refer.

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1 Introduction

It has in the past been difficult for Australian policymakers and researchers to assess the extent of poverty, wealth and income inequality at a small area level. The main purpose of this paper is to report on NATSEM's recent pathbreaking efforts to create synthetic small area sociodemographic data and to construct microsimulation models capable of predicting the regional impact of policy change on top of this synthetic base data—hereafter 'spatial microsimulation'. The first section of the paper describes the main sources of sociodemographic data currently available and the limitations of the data. The second section describes spatial microsimulation and introduces the major methods of creating synthetic microdata. The spatial microsimulation approach currently being developed by NATSEM, known as SYNAGI (SYNthetic Australian Geo-demographic Information) is then described. Section 3 describes the policy option modelled; examines estimated national poverty rates in Australia in 2001; and looks at the change made by the policy change simulated. As an illustrative example of the capacities of the new model, section 4 examines the likely regional distributional impact of this possible policy change. Section 5 concludes.

2 Spatial microsimulation methodology

2.1 Existing individual and household data

Regional policymakers and researchers—or national policymakers concerned with the regional impact of their decisions—rely on the availability of detailed and current small area data to inform their decisionmaking. The main source of small area sociodemographic data in Australia is the five yearly census of population and housing conducted by the Australian Bureau of Statistics (ABS). The census is a count of the population and dwellings in Australia with details of age, sex and a variety of other characteristics (ABS 1996). The smallest geographic area defined in the census is the census collection district (CCD), which is used for collection, processing and output of data. There are approximately 225 dwellings in each urban CCD, with fewer dwellings in rural areas. There were a total of 37,209 CCDs defined in the 2001 census.

In addition to the census, the ABS conducts surveys to collect detailed information on incomes, expenditures and other individual and household characteristics, such as the household expenditure survey (HES), the survey of income and housing costs (SIHC) and the national health survey (NHS).

Household and individual information is also collected by numerous public and private agencies in the conduct of their day-to-day activities. These administrative data can contain vast amounts of information on an individual's spending patterns, health history, travel habits and many other preferences, choices and characteristics. The results of market and attitudinal surveys are also a rich source of information that have the potential to contribute to corporate and public decisionmaking.

Microdata

Microdata are data that are available at the unit record level and generally consist of a list of unidentifiable individuals or households with associated characteristics obtained from a survey or census. Individual and household characteristics may include age, sex, marital status, household type, dwelling type and, possibly, a spatial indicator identifying the broad geographic location of the individual or household.

Microdata are available from the ABS from the census and many of its surveys in the form of confidentialized unit record files (CURFs). Census microdata are available as a 1 per cent household sample file of the census population, with some levels of detail collapsed for confidentiality. CURFs are also available from the HES and SIHC, again with measures taken by the ABS to ensure confidentiality. These CURFs contain unit records of all the respondents included within each survey. CURFs provide a valuable source of unit record data and provide a method for analysis at the individual or household level not available from tabular output. Usage of all CURFs is strictly governed by a licensing agreement with the ABS.

2.2 Limitations of existing data

Although the census provides a comprehensive coverage of Australian households for small geographic areas, it has several major limitations. These include the following:

- The amount of information collected from each household is relatively limited. For example, only gross household income is collected and then only in broad ranges of income, and there is also no information about social security receipt, income sources, wealth and expenditure;

- Unlike many other ABS collections, the full census results are not publicly available as a unit record file. Output for the whole census file is only available as a pre-defined series of tables for each CCD, or as customized tables that can be purchased from the ABS. This means, for example, that relationships between characteristics of interest cannot be easily or fully explored (such as age by income by educational qualifications). It also means that traditional microsimulation models[1]—that are widely used by policymakers to assess the likely impact of policy changes on certain groups in society—cannot be constructed on top of the pre-defined tables; and

- To protect the confidentiality of individuals, the ABS randomizes small numbers within the census. This makes analysis of multiple characteristics for individuals or households unreliable for many small geographic areas.

Other ABS data sources, such as the household expenditure survey, provide a very rich source of household information—but are not available for small geographic areas. Due

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1 Microsimulation models traditionally use microdata to estimate the likely overall impact of social or economic policy change on individuals or households by applying a set of rules to the individuals in the microdata. They are particularly useful for the analysis of the distribution of outcomes within the population rather than just aggregate outcomes.

to relatively small sample sizes, the need to protect the confidentiality of respondents and the limited spatial stratification of these surveys, very little information is available about the spatial variation of individual or household characteristics.

The major limitations of administrative and market survey data include their limited availability, often only partial coverage of the population, difficulty in use (most data are not collected for analytical purposes and therefore can be difficult to process, particularly geographically) and reliability.

2.3 Synthetic microdata

One solution to this lack of detailed small area data is to merge the information-rich survey data with the geographically disaggregated census data to create *synthetic microdata* for small areas. These new data may then help to fill the deficiency in the information available to policymakers by providing synthetic small area unit record data—effectively by creating 225 or so synthetic households for each CCD whose characteristics match as closely as possible the characteristics of the 225 households living in that CCD as shown in the census data.[2]

The benefits of creating synthetic microdata include:

- the creation of spatially disaggregated data from aggregated data such as national surveys;
- the ability to create tables of census variables that are not available in the standard census output, such as in the basic community profiles (BCPs);
- the ability to use the many simulated characteristics of each individual or household for multivariate analysis, thereby providing a method of identifying and analysing specific sociodemographic groups at the small area level; and
- the potential to use traditional microsimulation models to estimate the spatial impact of policy on particular groups within the population.

2.4 Spatial microsimulation

Spatial microsimulation is a term used to describe those techniques that create synthetic microdata for small geographic areas and allow assessment of the spatial impact of policy change (Melhuish, Blake and Day 2002). These techniques generally rely on creating synthetic individuals or households that match the sociodemographic characteristics of the small areas of interest.

Spatial microsimulation is a technique that combines individual or household microdata, currently available only for large spatial areas, with spatially disaggregate data to create synthetic microdata estimates for small areas. (This aspect of the

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2 It should be noted that to allay any privacy concerns NATSEM does not allow external access to the individual simulated household records.

modelling is sometimes termed 'synthetic estimation' in the international literature.) There are two possible methods by which this can be achieved: 'synthetic reconstruction' or 'reweighting' (Williamson, Birkin and Rees 1998).

The synthetic reconstruction approach requires the creation of a set of synthetic individuals or households whose characteristics match aggregate characteristics for the small area, such as those in the census BCP tables. The process usually involves imputing characteristics based on the distributions within the constraining tables, building the individual or household profiles in a sequential manner.

Reweighting is achieved by altering the weights for each individual or household in the survey. As national sample surveys are based on a sample of the population, each individual or household within the survey must be weighted to represent the estimated total number of that type of household within the population (sometimes also called 'grossing up'). In a similar manner, the same sample can be reweighted so that it represents the population within a small area. This can be achieved by selecting a representative set of individuals or households that, when viewed together, best fit the aggregate characteristics of the small area. One way of doing so is to select 225 or so households from the sample survey that best represent a particular CCD (this is an integer method of selection, in which all selected households have a weight of one). Alternatively, all households within the sample can be given a small fractional weight so that the sum of all weights equals the population in the selected CCD and the sum of the fractional individuals or households best matches the characteristic profile of the CCD.

2.5 The SYNAGI reweighting approach

The SYNAGI (SYNthetic Australian Geo-demographic Information) approach currently being developed by NATSEM uses the reweighting method to blend the census and ABS sample survey data together to create a synthetic unit record file for every CCD in Australia. To date, NATSEM's efforts have focussed upon the ABS Household Expenditure Survey, although efforts are currently underway to extend the methodology to enable the 'regionalization' of other sample survey data. The existing model first recodes the HES and census variables to be comparable, and then reweights the HES, utilizing detailed sociodemographic profiles from the census BCPs. Reweighting is undertaken using an optimization approach to generate iteratively a set of weights that 'best-fits' each CCD. That is, household weights are gradually changed until they produce a set of characteristics that match those of each CCD. Although a non-integer method of reweighting is used, the modelling can be seen as effectively creating 225 or so synthetic households for each CCD, with the characteristics of the synthetic households within each CCD closely matching the characteristics revealed in the census data for households in that particular CCD.

SYNAGI reweighting currently uses data from the 1996 census of population and housing BCP to create target variables for each of the 34,410 CCDs in Australia.[3] The

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3 CCDs are defined for each census of population and housing. Reference was made in section 2.1 to the 37,209 CCDs defined in the 2001 census. The number of CCDs defined for the 1996 census was 34,410.

variables from the census that are chosen as targets are those that are also contained within the 1998-99 HES. To make the variables from the HES compatible with the census, relevant HES variables are recoded so that they match the classifications and ranges that exist in the census. A total of 15 variables are currently used in the SYNAGI matching process (see Melhuish, Blake and Day 2002).

The matching process requires that the census and HES variables be based on the same year. This requires that the target variables from the 1996 census be updated to the year of interest. Monetary values must be inflated and the population adjusted for each CCD. The latter is done currently by using ABS demographic and building approvals data.[4] Similarly, HES income and other data are also inflated. There is no requirement to increase the population size of the HES as it is a sample and is reweighted in the SYNAGI process to match the population within each CCD.

The objective of the optimization process is to reweight the HES households in an iterative manner to create a match for the target variables in the census for each CCD. This results in a weight for each of the 6,892 household records for each of the 34,410 CCDs (although many of the weights for individual households in the HES sample for a particular CCD will be zero). The sum of these weights equals the number of households in the CCD, while applying the weights to the HES input values should create values that match the target values in the census table.

The actual optimization process consists of several linked algorithms that marginally change the values of household weights and subsequently evaluate the change in the HES variable values compared with the census targets. The evaluation measure is the sum of the absolute residuals between the reweighted HES values and the census targets. In general terms, if the change in household weights improves the fit to the census targets the weights are accepted, otherwise the change in weights is rejected. This process is undertaken many times until the reweighted HES values *converge* on the census targets. Initial evaluation of the approach suggests that it accurately reproduces the household characteristics targets for the majority of CCDs (Melhuish, Blake and Day 2002).

The current version of the SYNAGI model is based on the 1996 census and the 1998-99 HES, with both data sources updated for the purposes of the research presented in this paper to June 2001.[5]

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4 The method of updating census variables in the current approach is fairly crude. As SYNAGI develops, methods will be developed to improve the estimation of population change for small areas and to estimate the likely change in the characteristics of these small areas. Given the complexities of change at the small area level, even between censuses, this task is far from trivial and would rely on ancillary data, such as labour force estimates, to inform the updating process.

5 In this paper the postal area weights from Marketinfo2001 have been used. The 'postal area' is an ABS approximation of the postcodes used by Australia Post for mail delivery. Postal areas are aggregations of CCDs and 2379 postal areas were defined by the ABS for use with the 1996 census data.

2.6 The addition of microsimulation

At the conclusion of the above steps, a population of synthetic households has been created, with details of their household and family type, housing and labour force tenure, private income, education and so on. The next step is to impute the estimated social security and income tax liabilities of each of the synthetic households, using a microsimulation model. While information about the social security and income tax liabilities of the households is contained within the 1998-99 HES, such variables are discarded in our modelling to be replaced by new simulated receipts and tax payments. Part of the rationale for doing this is that the social security and tax systems changed very substantially between 1998-99 and 2001, so that the values on the original HES file are out of date.

In previous work NATSEM has created a version of its STINMOD static microsimulation model to run against the 1998-99 HES file. The STINMOD model replicates the rules of the social security and tax system (for more information see the STINMOD Technical Papers Numbers 1 to 7, available from the NATSEM website). For the estimates presented in this paper, a special version of STINMOD was created, replicating the rules of the tax and social security system as at June 2001. It must be emphasized that the results presented in this paper reproduce the characteristics of populations living within small areas as shown in the 1996 census data (with some minor updating to 2001). The 2001 census data have only recently been released by the ABS, and a new version of the SYNAGI model is currently being created based on the new 2001 data. Consequently, the results reported here are preliminary and primarily designed to illustrate the potential capacities of the new spatial microsimulation techniques.

3 Overall impact of the policy option

A hypothetical policy change concerning income support rates of payment is used to provide an illustration of the new microsimulation capacity. An important distinction in the Australian income support system is between pensions (paid, for example, to aged people and disabled adults) and allowances (paid, for example, to people who were unemployed or temporarily incapacitated for work due to sickness). Up until 1998, the base rate of assistance paid to married allowees was the same as that paid to married pensioners. However, since 1998 allowances have been indexed to movements in the consumer price index, while pensions have been indexed to movements in average male earnings. With earnings having increased more rapidly than prices, there is a growing gap between the rates of payment received by an allowee and by a pensioner. While the amount received by an allowee couple was the same as that received by a pensioner couple in 1997, by June 2001 the allowee couple received $25.40 per fortnight less (and the gap has since widened further). In June 2001, each partner within a pensioner couple received $335.50 a fortnight. In contrast, each partner within an allowee couple received only $322.80 a fortnight. A recent comprehensive review of poverty in Australia found a very high and rising rate of poverty amongst those who were unemployed, which suggested that those receiving unemployment allowances had fallen further behind average incomes within the community (Harding, Lloyd and Greenwell 2001: 12).

One possible interesting question is therefore the impact upon poverty outcomes of restoring the relativities prevailing in 1997 between allowee and pensioner couples—and that is the policy option simulated here. This could, of course, be accomplished in two ways—by reducing pensions, or by raising allowances. Given the concern with the level of unemployment allowances in relation to average community incomes, the second option is used as the illustration here. Such an option is expensive—about $300 million—and there is no suggestion here that this would be regarded as the most desirable policy option if the government were seeking to assist the unemployed. There is continuing concern within Australia about work incentives—and there are therefore questions about the extent to which the government can raise unemployment allowances without impacting upon the desirability of low paid work. Instead, the policy option chosen here is primarily designed to provide an illustration of the spatial capacities of the new model and of the new ability to examine the spatial impacts upon poverty of possible policy changes.

In undertaking the simulation, the poverty line was set at half average disposable income, with disposable income adjusted using the detailed Henderson equivalence scale (which is an equivalence scale with a long history of use in Australia).[6] In the pre-policy-change world, the poverty line was set at $460.92 a week, for a couple where the head is employed, the spouse is not in the labour force, and there are two children, a boy aged between 6 and 15 years and a girl under 6 years old. The poverty line is held constant at its pre-change level when assessing the impact of the illustrative policy option.[7]

There has recently been intensive debate in Australia about where the poverty line should be set. A poverty line set at half the median equivalent disposable income would be $403, so one set at 60 per cent of the median, following the Eurostat standard, would be $483.60. Thus, a poverty line set at 60 per cent of the median would be somewhat higher than the $461 that we have used in this study.

The income unit used is the household, which means that poverty rates are somewhat lower than found with a more restricted definition of the income unit (Greenwell, Lloyd and Harding 2001). The results, however, are for persons, with each person within a household being attributed the poverty status of that household.

In the world existing before the illustrative policy change, the estimated poverty rate for persons is 9.4 per cent in June 2001 (Table 1). The rate for children is somewhat higher, at 10.7 per cent, while that for adults is somewhat lower, at 8.9 per cent. After the increase in the payment rate for allowee couples, the overall poverty rate drops by 0.3 percentage points, to 9.1 per cent. The illustrative policy option particularly affects

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6 See Lloyd, Harding and Greenwell (2002) for more details on the equivalence scale. Disposable income equals gross income minus income tax. We have not attempted here to also simulate the impact of any increase in income tax to fund the increase in allowances, although this could easily be done as STINMOD also replicates the rules of the income tax system.

7 Since the poverty line is linked to average disposable incomes across the population, a more complete analysis might also incorporate the small increase in the poverty line which would stem from the increase in incomes received by allowees.

child poverty, with the poverty rate among children declining to 10.2 per cent. The estimated poverty rate for adults varies only marginally, falling to 8.7 per cent.

In the pre-policy change world, the estimated number of Australians living in poverty is 1.673 million while, after the policy change, this falls to 1.627 million—that is, by almost 50,000 people.[8] As Table 1 shows, the fall is evenly spread between adults and children. Because the estimated number of children in poverty in Australia is lower than the estimated number of adults in poverty, this fall produces a greater reduction in the child poverty *rate* than the adult poverty rate.

Australia is divided into eight states and territories, of which seven are shown in Table 1.[9] Both before and after the policy change, the highest poverty rates are found in South Australia and Tasmania, while the lowest are found in the ACT (which contains Australia's capital, Canberra). The other states all tend to have poverty rates that are

Table 1
Estimated number in poverty and the poverty rate,
before and after the policy change, 2001

	Before policy change						After policy change					
	No. in poverty			Poverty rate			No. in poverty			Poverty rate		
	People	Adults	Children	People	Adults	Children	People	Adults	Children	People	Adults	Children
	'000	'000	'000	%	%	%	'000	'000	'000	%	%	%
NSW	533	371	162	8.8	8.4	10.0	518	364	154	8.6	8.2	9.6
Victoria	399	278	121	9.1	8.6	10.5	387	272	115	8.8	8.4	10.0
Queensland	334	232	103	9.9	9.3	11.4	327	228	99	9.7	9.2	10.9
South Australia	156	112	44	11.1	10.6	12.6	151	109	42	10.8	10.4	12.0
Western Australia	160	111	49	9.1	8.7	10.2	156	109	47	8.9	8.5	9.8
Tasmania	56	39	16	12.7	12.2	14.1	54	39	16	12.4	12.0	13.4
ACT	19	13	5	6.5	6.4	6.7	18	13	5	6.4	6.3	6.6
Australia	1673	1166	507	9.4	8.9	10.7	1627	1143	484	9.1	8.7	10.2

8 Note that the results presented here for the illustrative application only cover part of the impact of the policy change on poverty. The poverty 'headcount' identifies where the increase in payment is enough to move someone from below to above the poverty line. It does not identify those cases where people's incomes have been increased, but where they remain either above or below the poverty line.

9 The Northern Territory has been excluded here because the HES sample from which these results are derived excludes remote areas, and an estimated one-quarter of the Northern Territory population are thus not captured in the survey. Many of those excluded are indigenous Australians, among whom poverty is often very pronounced, so we have excluded the results for the Northern Territory from this analysis.

relatively close to the Australian average. It should be noted here that these poverty rates should be treated with some caution, as they have been estimated using a *national* poverty line that takes no account of the differential costs of living in the different states and territories (which is particularly important for housing costs).

To this point, the aggregate or national results are no more informative than could be achieved with a national microsimulation model (one which also contains information about which state or territory respondents live in). However, we can now look in more detail at the spatial impact of the illustrative policy change, using the capacities of the new modelling techniques.

4 Spatial impact of the policy option

As noted earlier, results have been calculated in this simulation for ABS postal areas (hereafter called 'postcodes' for convenience).

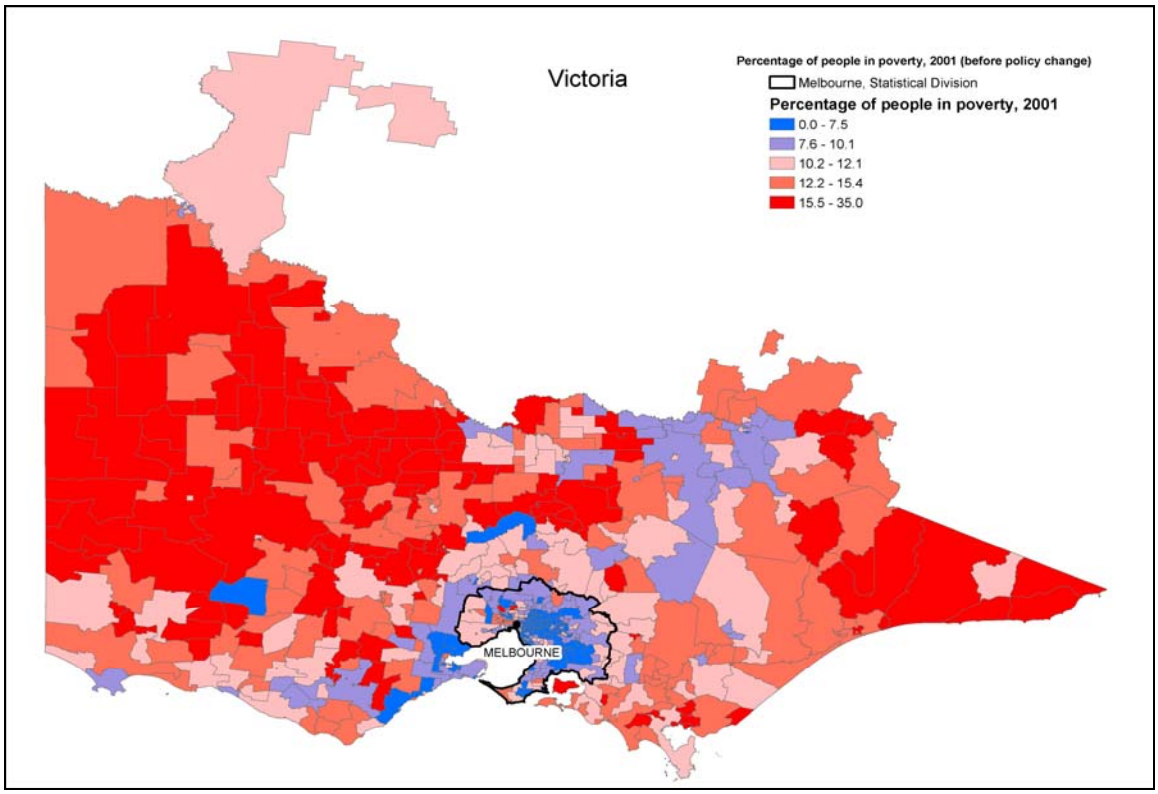
4.1 Mapping results

One possible use of the new microsimulation capacity is to map the postcode poverty rates, so as to get a visual impression of whether poverty is much higher in particular areas of a state or territory. This is done below for Victoria and Queensland (Figure 1). Although more detailed exploration is required, the initial impression given by the two maps is that the rate of poverty tends to be lower in the capital cities of the two states than in rural and regional areas.

A second possible use of the new modelling is to look at the *change* in the poverty rate within each postcode resulting from the policy initiative simulated. This is shown for Victoria and Queensland in Figure 2. This suggests that the greatest falls in poverty as a result of the new policy would be in regional and remote areas, rather than in the capital city.

One problem with simply looking at the poverty rates of different areas is that an area with a very high poverty rate might contain almost no people, while an area with an average poverty rate might contain substantial numbers of people. Such an analysis might thus provide a misleading picture of where poverty is actually concentrated. In an initial attempt to address this, Figure 3 looks at the *number* of people in poverty by postcode within Victoria and Queensland. This gives a quite different impression to Figure 1, with poverty being more heavily concentrated in the capital cities and in the coastal belt—although with some inland areas showing a high number of people in poverty. A more complex but more accurate method of assessing this issue might be to look at the number of poor people per square kilometre, which we intend to do in future work.

Figure 1
Estimated poverty rates by postcode before the policy change
Victoria and Queensland, 2001



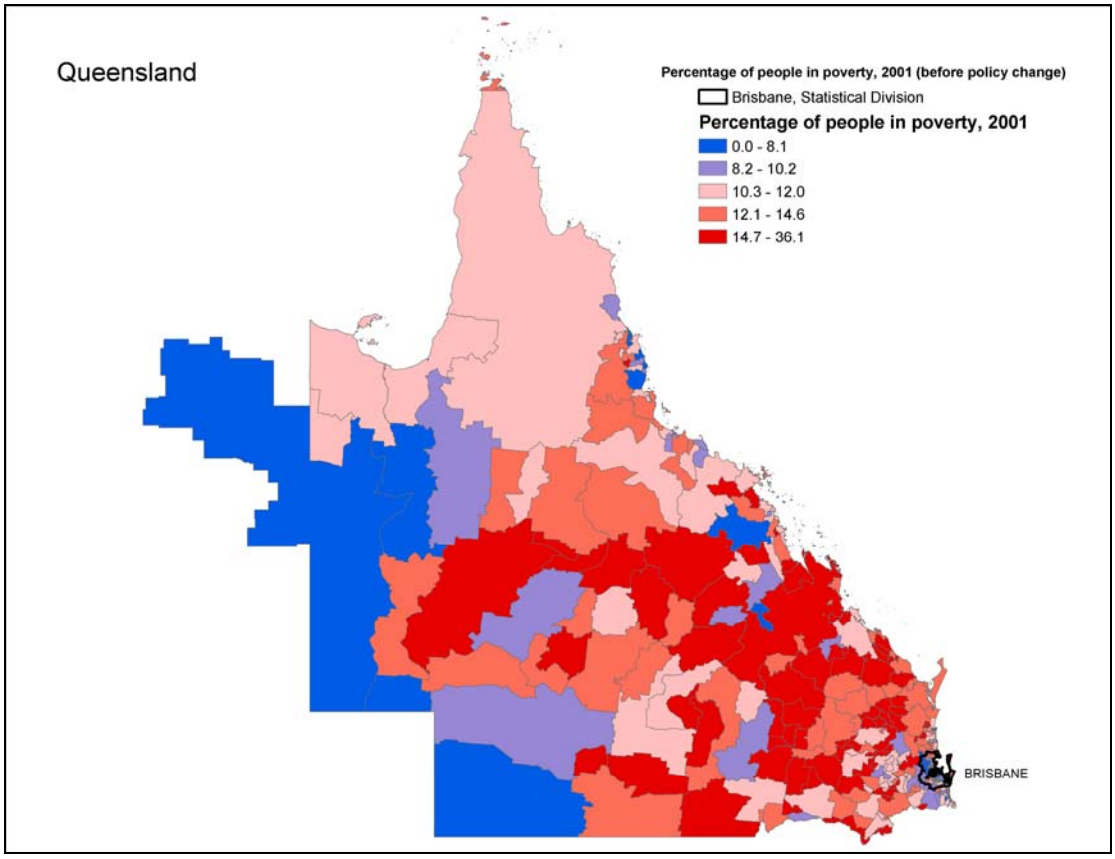
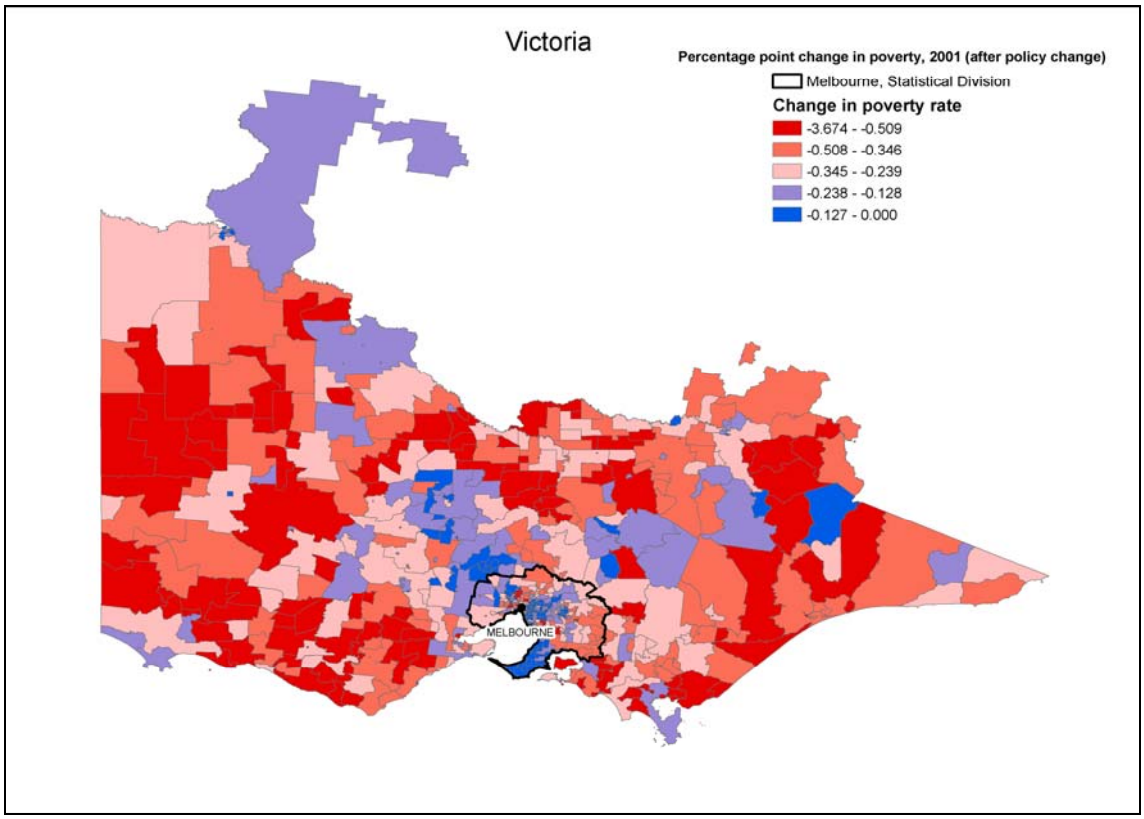


Figure 2
Estimated change in poverty rates by postcode as a result of the policy change,
Victoria and Queensland



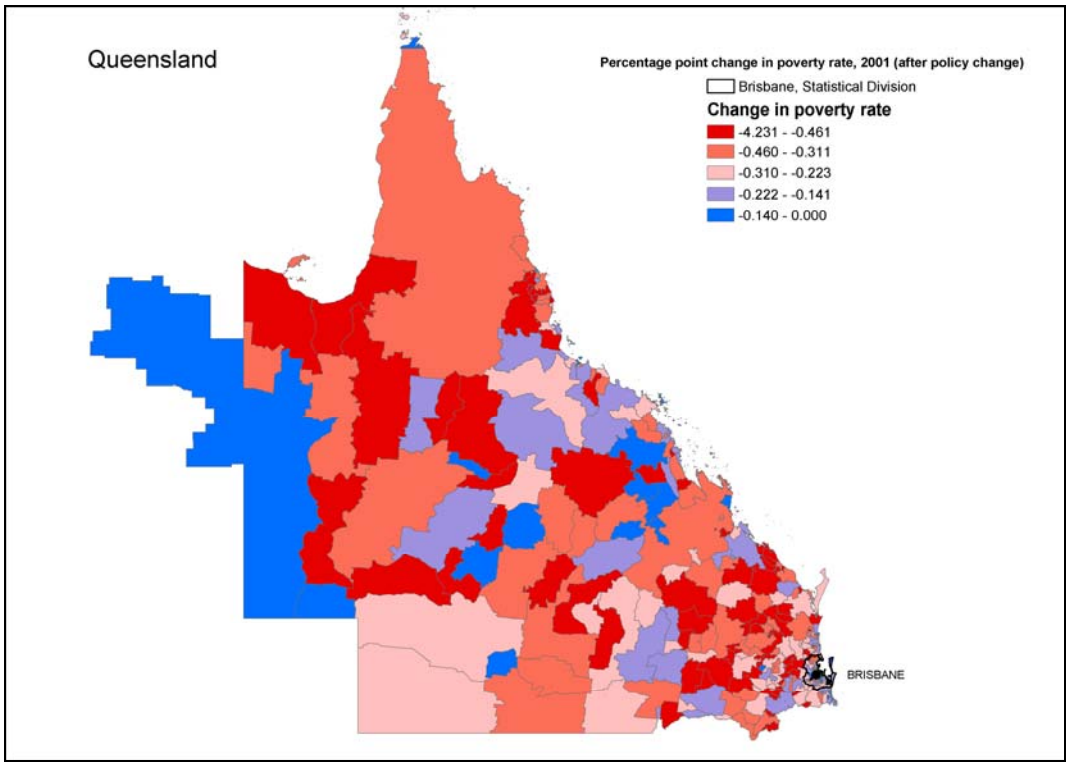
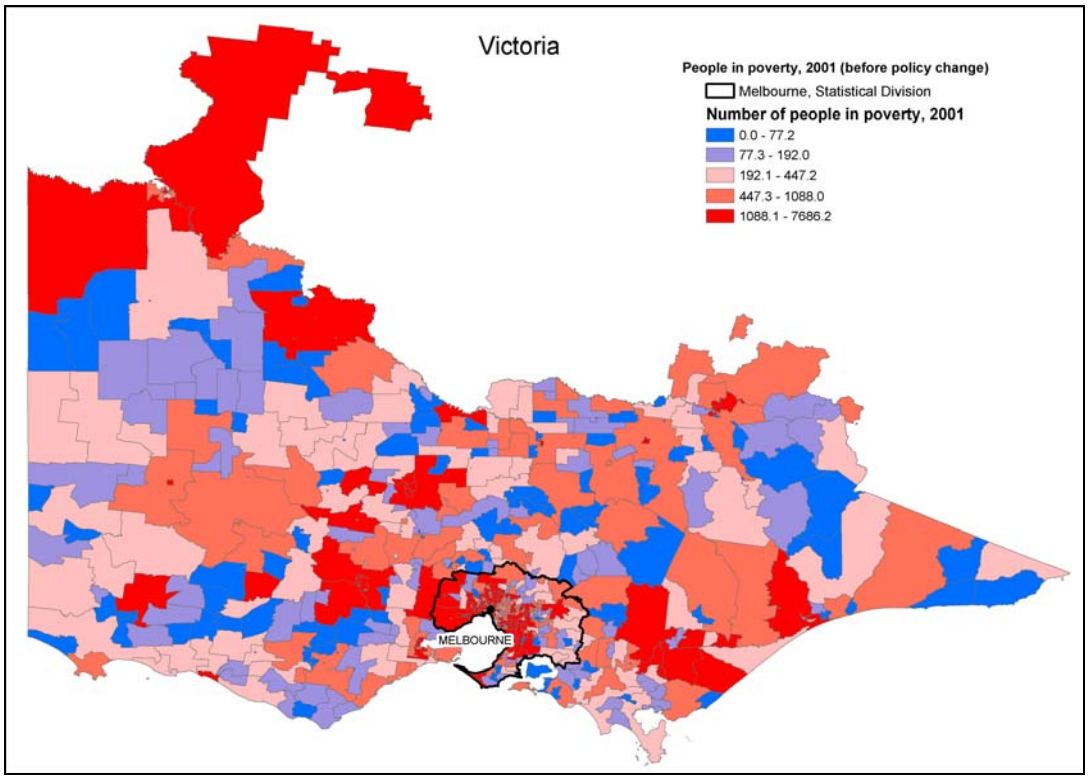
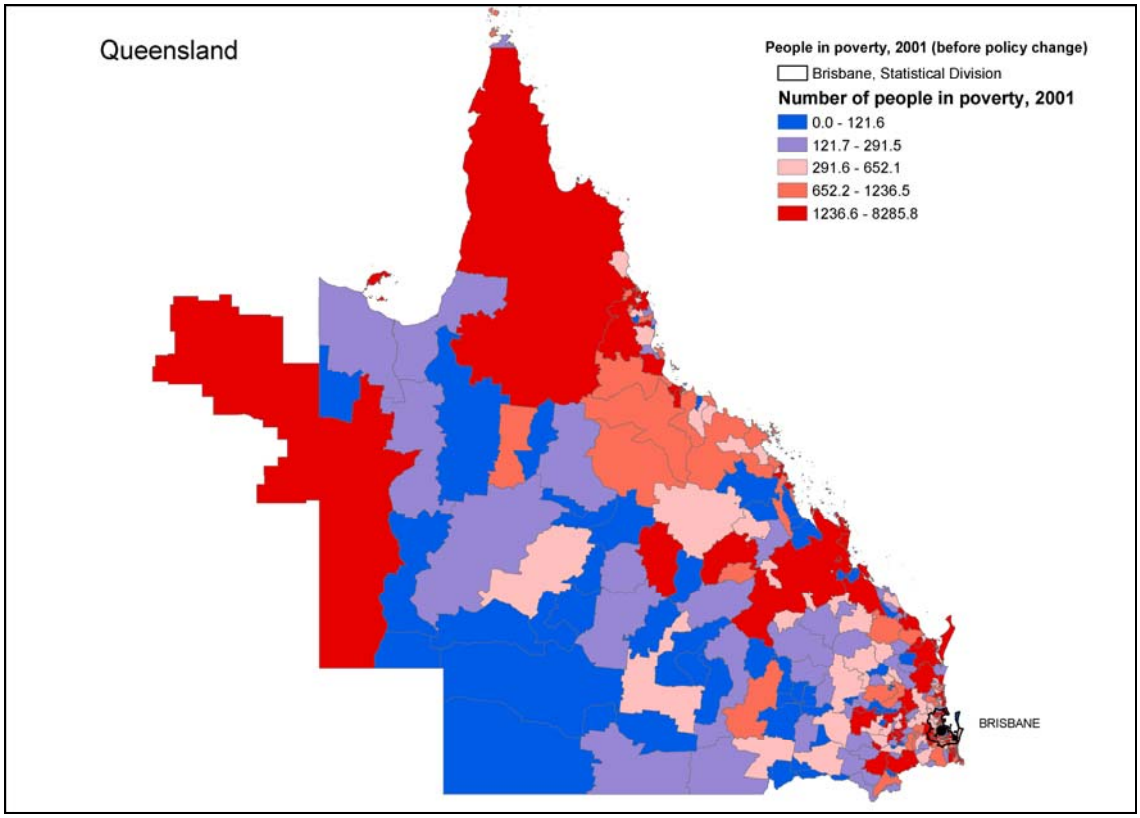


Figure 3
Estimated number of people in poverty by postcode before the policy change,
Victoria and Queensland, 2001





4.2 Results for individual postcodes

It is also possible to look at the profile of poverty in individual postcodes, either before or after the policy change. As a case study here we have examined a NSW postcode, which is located in metropolitan Sydney. An estimated 3,980 people living in this postcode are in poverty before the policy change, with about an estimated 1,520 of these being children and the remainder adults. The postcode is a relatively large postcode, with well over 25,000 people contained within it. The estimated poverty rate before the policy change is 14.8 per cent.

After the simulated policy change, about an estimated 210 people are lifted above the poverty line, reducing the poverty rate to 14.1 per cent.

This selected postcode is interesting, because it has a very different poverty profile to the average picture for Australia. As previous research has shown us (Harding, Lloyd and Greenwell 2001), and as demonstrated again in the second column in Table 2, poverty in Australia is typically associated with such factors as not being in paid work, being dependent on government cash benefits, and being a sole parent or having a large family.

The majority of those in poverty in the selected postcode live in a household where the head is of working age—between 25 and 54 years. This postcode has relatively fewer households in poverty that are headed by either a young Australian aged less than 25 years or an older Australian 65 or more years than the average. For example, while an estimated 10.5 per cent of all Australians in poverty live in a household headed by a 65 plus year old, in the selected postcode the proportion is only 2.0 per cent.

A poor person living in a household in the selected postcode is three times as likely to be headed by a person employed full time, compared with the national average for poor households. Thus, almost one in every seven poor people in the selected postcode live in a household headed by someone working full time—suggestive of a significant 'working poor' representation. Conversely, a poor person living in the selected postcode is less likely than a poor person nationally to be living in a household headed by an unemployed or self-employed person.

The country of birth of the household head is also strikingly different for poor households in the selected postcode than poor households nationally. Nationally about two-thirds of all poor Australians live in a household with an Australian-born head while, in the selected postcode, the comparative proportion is about one-fifth. Instead, poor households in the selected postcode are much more likely to be headed by a migrant, and particularly one born in Asia.

Poor households in the selected postcode are somewhat less likely than poor households nationally to own their own home outright, while they are also somewhat less likely to live in public housing. Further reinforcing the profile of difference, more than two-thirds of all those in poverty in the selected postcode live in 'couple with children' households, a proportion more than 20 per cent higher than the national average for poor households. The proportion living in multiple family households is

Table 2
Characteristics of residents of poor households in selected postcode in NSW, compared with national profile of poor and non-poor Australians (before policy change)

	Composition of those in poverty in:		Composition of those not in poverty in Australia
	selected NSW postcode	Australia	
Age of the household reference person			
< 25 years	1.7	4.1	4.3
25-34 years	27.4	20.3	20.0
35-44 years	38.3	35.1	28.8
45-54 years	15.7	17.7	23.4
55-64 years	14.9	12.3	11.1
65+ years	2.0	10.5	12.3
Sex of reference person			
Male	49.4	37.0	65.2
Female	50.6	63.0	34.8
Occupation of reference person			
NA	62.5	64.1	28.5
Managers and professionals	20.2	12.6	34.3
Tradespersons	2.1	3.5	10.8
Clerical, sales and service	1.6	10.1	13.5
Labourers, production and transport workers	13.6	9.7	12.9
Labour force status of reference person			
Employee – FT	15.3	4.9	54.2
Employee – PT	13.2	15.9	10.1
Self-employed	9.1	15.0	7.2
Unemployed	8.2	13.2	1.2
NILF	54.3	50.9	27.4
Country of birth of reference person			
Australia	21.1	67.3	69.5
Other	24.3	8.7	7.2
Europe/former USSR	12.0	14.7	16.3
Asia	42.7	9.3	7.0
Principal source of income for the household			
Wage and salary	26.6	14.6	66.0
Self-employed	8.0	7.9	7.0
Other	3.8	6.7	6.2
Govt cash benefits	59.1	65.2	20.7
NA	2.4	5.5	
Tenure type			
Owner	27.5	33.5	37.2
Purchaser	28.2	26.7	34.5
Public housing	9.0	10.7	4.4
Private renter	27.7	24.2	22.0
Other, rent-free	7.6	4.8	1.9
Martial status of reference person			
Never married	3.4	11.8	10.2
Sep/div/widowed	7.1	19.7	16.1
Married	89.5	68.5	73.7
Household type			
Single person	7.0	16.6	8.9
Couple only	4.8	15.8	20.1
Couple with children	68.9	46.8	45.3
Sole parent	3.6	10.6	11.6
Multiple families	15.7	10.2	14.1

Table continues

Table 2 (con't)

	Composition of those in poverty in:		Composition of those not in poverty in Australia
	selected NSW postcode	Australia	
Number of dependants in the household			
None	19.8	42.1	45.6
One	12.6	12.6	16.9
Two	43.1	18.7	22.0
Three	19.9	16.1	11.5
Four	3.9	7.3	3.1
Five or more	0.7	3.2	0.9

also high, while poor sole parents, single people and couples without children households are under-represented compared to the national average for poor households.

The final column in Table 2 shows the profile nationally for those Australians who do not live in poor households. The table underlines earlier research that suggests that having a job is one of the best routes out of poverty.

Overall, therefore, the selected postcode provides a good illustration of the capacities of the new spatial microsimulation to shed light on the reasons for poverty in different regions of Australia. Its poverty profile is very different to that of poverty within Australia generally, consisting disproportionately of migrants who are working in lowly paid jobs, are married and have children. While there are still poor people living in the selected postcode who are dependent on unemployment or sickness allowances—and who would thus be affected by the policy option that we have modelled—the majority of poor residents in this area would not be assisted by such a policy option. This illustrates how the new spatial microsimulation can be used to inform decisions by policymakers about the most appropriate policy responses to poverty.

Conclusions

In recent years NATSEM has developed spatial microsimulation models, which attempt to create geographically-detailed unit record files of synthetic households. During the past decade NATSEM has created many microsimulation models, which have allowed policymakers to assess the immediate distributional and revenue impact of possible policy changes at the *national* level. However, in the past, suitable microdata have not been available in Australia to assess the impact of existing policy or possible policy changes at a more detailed spatial level. The new techniques developed at NATSEM attempt to redress this deficiency.

This paper has described NATSEM's first attempt to simulate the spatial impact of a possible policy change—namely, increasing the rate of social security payment paid to

allowee couples to the same level as that paid to pensioner couples.[10] While these two rates used to move in tandem, in recent years there has been a widening gap between them.

It must be emphasized that the results presented here are intended to illustrate the potential capacities of the new models being developed, rather than to be treated as firm estimates of the extent of poverty in Australia today. There has been intense public debate in Australia for the past 18 months about the most appropriate way to measure poverty and about the accuracy of the national sample survey data that underlies most poverty estimates in Australia. In addition, and even more importantly, the results presented here are the result of blending the 1998-99 ABS household expenditure survey unit record data with the 1996 census basic community profiles (with some minor updating of both data sources to better reflect the 2001 world). The 2001 census data have recently been released by the ABS, and NATSEM is in the process of blending the 1998-99 HES data with the new 2001 census data. This will provide a much more up-to-date picture of the extent of relative disadvantage in Australia today. Finally, the results presented here have arisen from NATSEM's first attempt to simulate the spatial impact of a policy change by linking its STINMOD microsimulation model of the tax and transfer system with the synthetic household microdata. Much research remains to be done to confirm the extent to which the synthetic results match other available benchmark data (such as Centrelink administrative data on the number of social security recipients by postcode). Thus, the extent to which results from the HES and other ABS sample surveys accord with existing national administrative data on the number of social security recipients and the amount of social security payments received *at the national level* is already the subject of investigation by the ABS and the Social Policy Research Centre at the University of NSW. We have not yet undertaken the further research required to validate the accuracy of the social security payments simulated within STINMOD *at the regional level*.

With these caveats firmly in mind, the simulation suggested that restoring the social security rate paid to allowee couples to the same level as paid to pensioner couples would reduce overall poverty within Australia by 0.3 per cent and child poverty by 0.5 per cent.

Our mapping of estimated poverty rates by postcode suggested that poverty is not uniformly spread across the different geographic regions of Australia but shows great variation. In addition, the policy change modelled would also have disparate spatial impacts, benefiting some postcodes much more than others.

Examination of the profile of poverty before the policy change in one postcode in NSW showed that the new spatial microsimulation model would potentially be very useful in assisting policymakers to understand the different characteristics of those in poverty in particular geographic areas. It would also help in exploring exactly which policy changes would be most likely to assist those geographic regions of particular concern to policymakers.

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[10] Allowances are paid for a range of circumstances, including unemployment and sickness. Pensions are in theory designed for longer-term cases of need, such as where recipients are older and retired or are disabled and unlikely to be able to work for at least the next two years as a result of impairment.

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