

HOUSING UNAFFORDABILITY AT THE STATISTICAL LOCAL AREA LEVEL: NEW ESTIMATES USING SPATIAL MICROSIMULATION¹

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ABSTRACT: This paper examines housing affordability estimates at the SLA level and assesses spatial patterns of households experiencing housing stress. The study covers all SLAs in New South Wales, Queensland, Victoria and the ACT, and there is a particular focus on the spatial distribution of housing unaffordability across the Brisbane, Canberra, Melbourne and Sydney Statistical Divisions. The housing affordability estimates are output from a project to develop and apply spatial microsimulation techniques to generate detailed synthetic small-area data for use as a decision support tool by state and territory governments. As well as reviewing the results and implications of the housing unaffordability estimates, this paper provides a general overview of the scope of the linkage project, and the methodological approaches taken in building the estimates.

1. INTRODUCTION

The three-year Australian Research Council (ARC) Linkage project "Regional Dimensions: New Models for Analysis of the Spatial Effects of Policy, Socio-Demographic and Economic Changes" (the 'regional linkages' project) began in June 2003. The project aims to develop and apply spatial microsimulation techniques to generate detailed synthetic small-area socio-economic data for use as a decision support tool by state and territory governments. A key identified policy area of interest for all partner states and

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territories (from the ACT, New South Wales, Queensland, and Victoria) is housing affordability and housing stress.

The objective of this paper is to present the small-area housing unaffordability estimates from the project, with some background to the methodology. An earlier paper on the regional linkages project (Day *et al.*, 2003) focused on the project methodology and provides a useful description of issues that are only summarised here. Also, the original version of this paper as presented to the 2004 ANZRSI Conference contains expanded sections – particularly the maps of results.

2. METHODOLOGY

2.1 Spatial Microsimulation

The regional linkages project uses spatial microsimulation to estimate the detailed characteristics of populations and households at a fine level of geographic detail, by creating small area socio-demographic data. Spatial microsimulation is the technique of re-weighting a generally national level sample so as to estimate the detailed socio-economic characteristics of population and households at a small area level. Useful summaries of spatial microsimulation can be found at Harding *et al.*, (2003), Williamson *et al.*, (1998), and Lloyd and Harding (2004).

The regional linkages project methodology re-weights the 1998-99 HES Confidentialised Unit Record File (CURF), to create a set of weights for each Statistical Local Area (SLA) in New South Wales, Queensland, Victoria and the ACT. These new weights are benchmarked against the Census Expanded Community Profile (XCP) data.

2.2 Convergence

The term 'convergence' is used to describe HES estimates that are close to – and ideally coincide with – the Census results used in the re-weighting process. Approximately 93% of SLAs had 'good' convergence (average absolute sums of residuals of less than 1) – more in New South Wales and Victoria, and less in Queensland and the ACT. Generally, SLAs with poor convergence produced unreliable results.

Poor convergence has tended to occur for SLAs with few households, a high percentage of people in Non Private Dwellings, and population characteristics that are unusual in the sense that there are relatively few HES records with the same characteristics, such as SLAs with military bases. In general, capital cities have a relatively good level of convergence and regional areas less so, suggesting a usefulness of focusing on urban areas. Coastal SLAs generally have better convergence than inland rural SLAs. The inner city SLAs of all capital cities tend to have poorer convergence: this may be due to the higher presence of unusual household types in these areas (such as high income apartment renters).

2.3 Validation

The synthetic estimates of housing unaffordability from the regional linkages project are subject to three broad types of validation. Validation processes apply only to those SLAs where convergence was 'good'.

The first type of validation is the comparison of sub-population counts, largely used in the re-weighting process. For each SLA, counts of households in each number of relevant sub-populations (tenure types, household types, and income groups) were estimated and compared with Census counts. Ideally, the estimate for each SLA's sub population would be the same as the Census count and hence, the average percentage difference across SLAs for a particular State or Territory should be close to zero. In most cases there was a linear relationship between our estimate and the Census, and low differences across all SLAs. There were better results for couples and couples with children sub-groups, and middle income sub-groups. The worse results (or greater differences) were for public housing and 'other' tenure sub groups, and sub-groups of very high and very low incomes.

The second form of validation was a comparison against ABS-held data that had not explicitly been incorporated in the re-weighting process. The ABS provided data on the estimated number of households in unaffordable housing in each SLA, for the purposes of validation. These data were derived from the 2001 Census and an ABS income survey using a different method to the regional linkages project - similar to that used in a recent study by NATSEM for the ACT Affordable Housing Taskforce (Percival *et al.*, 2002). That report suggested that this method of calculating unaffordability is sufficiently accurate to allow the analysis to be undertaken, but highlighted that the ABS data are also estimates rather than actual values, and tend to be less accurate at the lower end of the income scale. Overall, validation against these alternative ABS estimates is useful but should not necessarily be viewed as a comparison against a 'truth'.

Table 1 compares the estimated rates of unaffordable housing for each partner state and territory, as derived from the ABS validation data and the regional linkages project stage 1 output. The regional linkages project estimates of the percentage of households in unaffordable housing are higher than the ABS estimates for each of the states and territories² – however, the relative levels of unaffordability are very similar. Figure 1 shows, for New South Wales, the estimated number of households in unaffordable housing in each (convergent) SLA compared with the ABS validation data on housing unaffordability numbers. The two estimates track each other very closely and although the regional linkages estimates are consistently over the ABS estimates, the relativities are strong. It may be that the method of calculation of the ABS validation data contributes to a systematic bias for lower estimates. The strong relationship is very encouraging and indicates particularly that the relative spatial

² When calculated using the regional linkages estimates of total number of households.

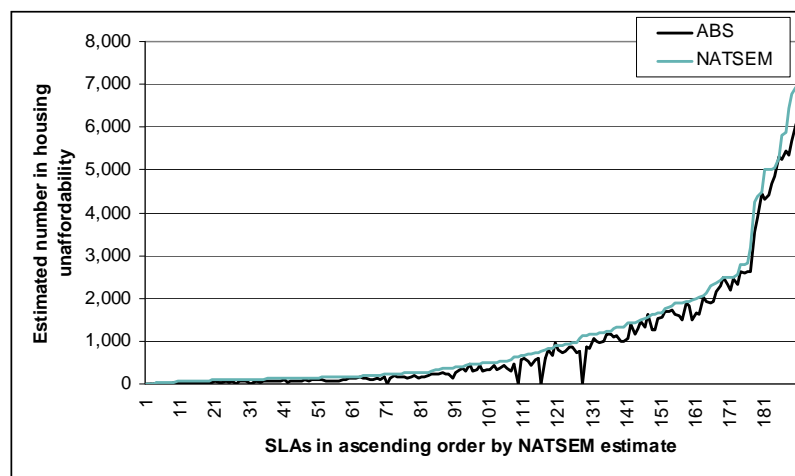
distribution of housing unaffordability numbers from the regional linkages estimates is likely to be a reliable representation.

The third form of validation is expert validation – wherein the state and territory partners provide assessments of how well the output accorded with their knowledge of the actual small-area picture. Some expert feedback has been provided to date and the stage two regional linkages output will take this validation into account.

Table 1. Comparison of percentage of households in unaffordable housing by State and Territory (ABS estimates against Linkage estimates).

	ACT	VICT	NSW	QLD
ABS unaffordability validation data	5.91%	8.09%	9.04%	10.56%
ARC Regional linkages project stage 1 estimate ^a	6.72%	9.76%	10.65%	12.33%
ARC Regional linkages project stage 1 estimate ^b	5.81%	7.55%	8.12%	9.65%

Notes: 1. OECD equivalence scale was used in calculation of unaffordable housing.
 2. Only convergent SLAs included in calculation.
^a estimate calculated using the ABS estimates of total number of households as the denominator.
^b estimate calculated using the ARC Regional linkages project stage 1 estimates of total number of households as the denominator.



Note: Only convergent SLAs are covered.

Figure 1. New South Wales: Validation Against ABS (estimated number in unaffordability).

3. HOUSING UNAFFORDABILITY

3.1 Background

Affordable housing is housing with costs that are less than an income-defined benchmark, or more broadly, with costs that are reasonable in relation to income - "leaving households with a sufficient income to meet other basic needs" (NHS, 1991). The term 'affordable housing' usually refers to housing for low to moderate income households that does not cost more than 30 percent of their income (after adjustment for the number of people in the household). The crude but popular '30 percent cut-off' measure of housing unaffordability was adopted initially in the National Housing Strategy (1991). Affordable housing can, in theory, be provided through both the private market (private rental and home ownership), and through the social (public) housing sector – although only the latter has housing costs that are specifically relative to income.

The availability of affordable housing has in recent years been established as a high-profile policy issue, featuring in state and Commonwealth initiatives as well as a major agenda item for research, welfare and housing industry groups³. The Affordable Housing National Research Consortium (2001) argues that although the existing government subsidies on housing are substantial, there is a serious shortage of affordable housing in Australia and the situation is likely to worsen. There have also been other qualitative housing affordability issues identified recently, including the choice, location and appropriateness of housing outcomes for lower income households in the current market. For example, Berry and Hall (2001) found extremely limited housing choices for low income households in terms of tenure, type, size and location.

Housing assistance in Australia is provided by the Commonwealth and the state or territory governments, and is provided both directly to households in social housing, and in the form of subsidies and exemptions to households in the private market. The purpose of Australia's various government housing assistance programs is to help overcome the problems that households face in obtaining or retaining suitable accommodation (Australia's Welfare, 2003). Thus governments, including the regional linkages partners, have a strong policy interest in housing unaffordability.

3.2 Definition Applied

The measure of housing unaffordability generated for the 960 SLAs in the four states and territories is calculated at the household level. The measure defines households as being in 'unaffordable housing' or as experiencing 'housing stress' if the household is in the bottom two quintiles (40 percent) of equalised (OECD) gross household income distribution; and the household has housing costs (rents and mortgages only, i.e. not rates or insurance) equal to or greater than 30 percent of their gross income. This measure effectively describes low

³ For example the Brotherhood of St Laurence (2004), Affordable Housing National Research Consortium (2001).

income households for whom housing costs represent an unreasonable proportion of income.

Three basic preceding data steps were required for the housing unaffordability classification: calculating percentage expenditure on housing, calculating equivalised income using the OECD scale (which adjusts household income in accordance with the number of adults and children), and determining income quintiles (using the HES Australia weights). The quintile thresholds used in calculating the outputs were \$186.55, \$285.89, \$447.23 and \$692.94.

3.3 Mapping the Results

The two unaffordability variables looked at are the number of households experiencing housing unaffordability, and this number expressed as a percentage of the total households in the SLA. Although the distribution of housing unaffordability by absolute number will be heavily influenced by the varying population sizes of SLAs, both variables are considered here given that better validation results were achieved with counts as compared to percentages.

The housing unaffordability variables have been mapped across the whole coverage of the ARC linkage project, and as individual capital city regions (Statistical Divisions). The 'bigger picture' maps cover the mainland eastern seaboard of Australia and are illustrative of broad spatial distribution patterns. Zooming in more closely on capital cities is valuable because the acceptability of the convergence measure (and hence, the likely reliability of results) tends to dissipate with distance from the capital cities. Also, capital city areas are intuitively, and have been identified by the partner states and territories as being, the places where housing unaffordability issues are the more acute.

Four different approaches to representing housing unaffordability distribution have been included. Each describes particular relationships, with different implications. Some, but not all the maps discussed are included in the Appendix of this paper, although they are available in the earlier (extended) version of this paper presented to the 2004 ANZRSI Conference. For both the count measure and the percentage measure of unaffordability the synthetic data have been mapped according to the following ranges:

- **Distribution within the quintiles of all regional linkages SLAs** (except non-convergent SLAs). This describes relativity to all SLAs in the entire linkage project area. The convergent SLAs are shown in quintiles (five equal count ranges). This illustrates whether the area or city experiences significant housing unaffordability as measured on a broader scale. Variation within cities is less apparent. Figures 2 and 3 illustrate this distribution.
- **Distribution within quintiles of SLAs in the capital city itself.** SLAs are limited to those within the capital city Statistical Division being looked at, with these convergent SLAs grouped into quintiles (five equal count ranges). These maps show the distribution of unaffordability relative only to other SLAs in the particular city. These maps show the relationships within cities, but there is no sense of relativity to other cities or regions. Detail can be highlighted within cities that have comparatively high or low housing

unaffordability as a whole. Some of these maps are shown in Figures 4 onwards.

4. HOUSING UNAFFORDABILITY RESULTS

4.1 Estimated Number in Unaffordable Housing

The estimated number of households in housing unaffordability in New South Wales, Queensland, Victoria and the ACT at the SLA level ranges from zero to 6,089 households (in Fairfield, Sydney). The total estimated number of households in unaffordable housing in the four partner states and territories is just under half a million households. This figure would potentially be higher, but that non-convergent SLAs have been excluded from the analysis. There are an average of 537 households in unaffordable housing per SLA, and a median of 223. Thirty seven (37) SLAs have less than 20 estimated households in housing unaffordability⁴.

Aggregating the SLAs to capital city Statistical Divisions, an estimated 105,700 (or 22 percent) of the households in housing unaffordability are in Sydney, and about 97,000 (20.2 percent) are in Melbourne. A smaller but significant number of households in unaffordable housing are in Brisbane: about 58,000 (12 percent). Sydney, Melbourne and Brisbane thus collectively account for 54 percent of the estimated total households in unaffordable housing for the four linkage states. A comparatively very small number of households – about 6,500 – are in housing unaffordability in Canberra. The much lower representation of low income households in Canberra is probably a big reason for this. Including Canberra, 56 percent of the estimated total households in unaffordable housing are within the four capital cities. Conversely, 44 percent of households in housing unaffordability are situated in SLAs outside of the four capital city statistical divisions.

The twenty SLAs with the greatest numbers of households in unaffordable housing are listed at Table 2. The SLA with the largest estimated number of households in unaffordable housing is Fairfield - part of the Fairfield-Liverpool Statistical Subdivision, in western Sydney. There are almost 7,000 households experiencing housing unaffordability in Fairfield, which is more than in all of Canberra.

The fourteen SLAs with the highest estimated housing unaffordability numbers (ranging from 3,176 to 6,928) are all located in New South Wales, with nine of these in Sydney - and eight of these Sydney SLAs being located in western and south western Sydney. The non-capital city SLAs with significant numbers in unaffordable housing are all coastal centres in New South Wales: Newcastle, Wollongong, Gosford and Wyong. The next six highest count SLAs are all in Victoria (and all of these are in Melbourne). The larger size of New South Wales and Victorian SLAs should be borne in mind.

⁴ In the results section, the 66 non-convergent SLAs are always excluded.

Table 2. Twenty SLAs with the Highest Estimated Number in Unaffordable Housing

SLA Name	SLA Code	Estimated number in housing unaffordability
Fairfield (C)	105252850	6,928
Wollongong (C)	115058450	6,763
Newcastle (C) - Remainder	110055902	6,434
Canterbury (C)	105201550	5,878
Lake Macquarie (C)	110054650	5,809
Wyong (A)	105708550	5,266
Gosford (C)	105703100	5,047
Liverpool (C)	105254900	5,008
Bankstown (C)	105200350	5,005
Parramatta (C)	105406250	5,000
Penrith (C)	105456350	4,465
Campbelltown (C)	105301500	4,381
Randwick (C)	105106550	4,262
Blacktown (C) - South-West	105530753	3,176
Port Phillip (C) - St Kilda	205055901	3,086
Glen Eira (C) - Caulfield	205652311	3,083
Frankston (C) - West	205852174	3,037
Maribyrnong (C)	205104330	2,990
Darebin (C) – Preston	205301892	2,860
Gr. Dandenong (C) Bal	205752674	2,832

Source: NATSEM simulation

The SLA estimates were aggregated to the Statistical Subdivision (SSD) level to give a broader sense of where most households in unaffordable housing are geographically located. The twenty SSDs with the greatest estimated number of households in housing unaffordability are shown at Table 3. Brisbane City SSD contains the most (30,610) households in unaffordable housing of any SSD in the study area. In part, this points to the unusually large area of the Brisbane City SSD. It also highlights that significant numbers of households experiencing unaffordability are (estimated to be) located in Brisbane – although at the SLA level this is harder to pick up on given the small size of Queensland's SLAs.

The other SSDs with the highest counts of unaffordability indicate that there are three main geographical areas where housing unaffordability is concentrated: western and south western Sydney, inner Melbourne, and coastal regions in New South Wales and Queensland. Significantly, the eight SSDs making up western Sydney (Outer Western Sydney, Inner Western Sydney, Fairfield-Liverpool, Canterbury-Bankstown, Central Western Sydney, St George-Sutherland, Outer Western Sydney, and Blacktown) collectively contain an estimated 68,713 households in housing unaffordability, or 14.3 percent of the total estimate.

New South Wales coastal centres – Newcastle, Wollongong, and Richmond-Tweed (including, for example, Byron Bay), and Gosford-Wyong in the far north of Sydney, also have considerable numbers of households in unaffordable

housing. Newcastle SSD has the second highest estimated total of all SSDs. In Queensland, coastal SSDs around Brisbane – Logan City, Gold Coast and Sunshine Coasts SSDs - have high counts of housing unaffordability (above 6,000 households). Western Melbourne, Southern Melbourne, Inner Melbourne and Northern Middle Melbourne SSDs all have over 7,000 estimated households in unaffordable housing.

Table 3. Aggregated to Statistical Subdivision (SSD): Twenty SSDs with the Highest Number in Unaffordable Housing

Statistical Subdivision	Estimated Number of Households in Unaffordable Housing
Brisbane City	30,610
Newcastle	18,531
Western Melbourne	13,326
Gold Coast City Part B	13,286
Fairfield-Liverpool	11,936
Canterbury-Bankstown	10,883
Southern Melbourne	10,542
Gosford-Wyong	10,313
Central Western Sydney	10,213
Sunshine Coast	9,448
St George-Sutherland	9,306
Inner Melbourne	9,201
Wollongong	9,001
Eastern Middle Melbourne	8,657
Outer Western Sydney	8,178
Richmond-Tweed SD Bal	7,500
Northern Middle Melbourne	7,436
Blacktown	7,303
Logan City	6,818
Lower Northern Sydney	6,310

Source: NATSEM simulation.

Approximately twenty percent of SLAs have more than 748 households in housing unaffordability, and forty percent have more than 315. Figure 2 illustrates the overall spatial distribution of estimated housing unaffordability, by SLA, in these quintiles (five equal count) ranges. The darkest two shades thus indicate SLAs with the highest 40 percent of unaffordability numbers. The obvious pattern is that Sydney is, basically, comprised entirely of SLAs in the top 20 percent of unaffordability numbers. This means that all SLAs in Sydney

have a very high number of households in unaffordable housing, compared to other SLAs in the study area. Similarly, nearly all of Melbourne's SLAs are in the highest quintile of housing unaffordability. The exceptions in Melbourne are some outer areas such as the far south east, past Cranbourne, and the east past Lilydale. As would be intuitively expected Figure 2 mainly points to a greater presence of housing unaffordability in Sydney and Melbourne than elsewhere.

In the Canberra Statistical Division, by contrast, most SLAs have relatively low numbers in unaffordable housing: the majority are in the two lowest quintiles (thus having fewer than 158 households in unaffordability). Exceptions include the inner northern suburbs, and around Gungahlin. Again, the small size of ACT SLAs should be noted – however, looking at estimated numbers is important, as our validation has shown the estimated percentage results to be less reliable at this stage.

Brisbane Statistical Division includes significant areas of SLAs with high unaffordability counts, particularly in the southern suburbs (such as Inala, Browns Plains and Beenleigh), in the inner city, and outside of the Brisbane City LGA in Logan Shire, Ipswich and Caboolture. At the same time, the western suburbs of Brisbane (such as Brookfield, Anstead), and the bay suburbs in the south east (e.g. Belmont, Chandler – but not Cleveland) are concentrations of SLAs with very low housing unaffordability levels.

Outside of the capital cities, SLAs in the highest quintile of unaffordable housing are distributed along the New South Wales coast (consistently, from Bega in the South to Byron in the north), in selected Queensland coastal areas (the Gold Coast, Sunshine Coast, around Rockhampton and Cairns), and in some regional centres in Victoria and New South Wales. In Victoria, SLAs in Ballarat, Geelong, Bendigo, Shepparton and the La Trobe Valley all have high counts of unaffordable housing. In New South Wales, Wagga Wagga, Bathurst, Dubbo and Tamworth have relatively high estimated counts of unaffordability. Elsewhere in regional areas of the partner states and territories, estimated counts of housing unaffordability are scattered and generally very low.

The above trends are clearly in large part a product of overall population distribution. Nonetheless, distribution of estimated numbers in unaffordable housing does show where the bulk of households in unaffordability are actually located. Basically these areas are: Sydney (in its entirety), most of Melbourne, coastal New South Wales (in particular major centres such as Newcastle), parts of southern and outlying Brisbane, some coastal regions in Queensland, and major regional centres in New South Wales and Victoria.

4.2 Estimated Percentage in Unaffordable Housing

A measure of housing unaffordability normalised to population (i.e. expressed as a percentage, here as a percentage of total households), presents quite a different picture. It should be noted that in the Stage 1 regional linkages estimates of the total number of estimated households within an SLA frequently diverged from the number shown in the Census (because of the 'floating' classes where the total number to belong to that population sub-group was not constrained). As a result, our validation showed that the *percentage* of total

households in housing unaffordability did not match the ABS estimates as closely as did the *number* of households in housing unaffordability. As a result, the following estimates should be treated as preliminary, with more attention being given to relative levels of housing affordability than to absolute levels. In the forthcoming Stage 2 regional linkages output, NATSEM has corrected for this problem, with the estimated number of households within an SLA now being set to match the Census number.

The estimated percentages of total households in housing unaffordability by capital city Statistical Divisions show that, notably, relative to population, Brisbane has a far higher incidence of housing unaffordability (8.8 percent) than Sydney (7 percent) or Melbourne (7.2 percent). Canberra, however, again shows a low level of housing unaffordability – an estimated 5.8 percent of Canberra households experience housing unaffordability. And it is actually non-capital city SLAs that collectively have the highest proportion of households in housing unaffordability – 9.7 percent.

As a percentage of total households, housing unaffordability by Statistical Local Area ranges from 0 to 21 percent (in Inner City Brisbane). Across all SLAs, the estimated households in housing unaffordability account for 8.3 percent of all households. In assessing estimated percentages in unaffordability results, the much lower convergence results (as compared to estimated counts) should be considered – and cross reference to the distribution of lower convergence SLAs (including many in Brisbane) is probably an important qualification.

Table 4 shows the twenty Statistical Local Areas with the highest estimated percentages of housing unaffordability. These results are a significant departure from the equivalent table for estimated numbers in unaffordability. By percentage, nearly all the SLAs with the worst unaffordability outcomes are in Queensland, and the others are in coastal New South Wales. The high percentage unaffordability SLAs include inner city Brisbane, SLAs in the far south of Brisbane Statistical Division around Logan City, and SLAs around Caboolture and the Sunshine Coast to the north of Brisbane.

Figure 3 illustrates the spatial distribution of the estimated percentages in unaffordable housing, by SLA, in quintiles set relative to all SLAs in the linkage project. In Figure 3, Sydney and Melbourne are not obvious standout areas of high unaffordability. Instead, areas within each capital city are highlighted as concentrations of unaffordability: suggesting areas more 'characterised' by housing unaffordability (or generally lower socio-economic indicators), as opposed to those areas where the bulk of households in housing stress are situated.

The clearest spatial distribution of estimated unaffordability rates is the concentration of SLAs in the highest quintile of unaffordability (the 20 percent of SLAs with unaffordability rates above 10.4 percent), on the northern New South Wales coast (including Newcastle, Coffs Harbour, and Byron Bay), the far south New South Wales coast (around Bega), and on the Sunshine and Gold Coasts in Queensland. This distributive pattern suggests a high presence of lower income households, combined with high housing costs. Through these estimates,

housing unaffordability appears to be a defining characteristic of certain (mainly coastal) regional SLAs. In Victoria, high percentage unaffordability SLAs are also found outside Melbourne – Geelong, Ballarat and Bendigo.

Table 4. Twenty SLAs with the Highest Estimated Percentage of Households in Unaffordable Housing

SLA Name	State	SLA Code	Estimated % in Unaffordable Housing
City - Remainder (Brisbane)	QLD	305051146	20.9
Eagleby	QLD	305103466	19.2
Bilinga	QLD	310053512	19.1
St Lucia	QLD	305051506	18.4
Magnetic Island	QLD	345057031	17.2
Woodridge	QLD	305304656	16.7
Reid	QLD	805057209	16.6
Byron (A)	QLD	120101350	16.5
Beenleigh	QLD	305103461	16.4
Tanah Merah	QLD	305304645	16.3
Caboolture (S) – Central	QLD	305202008	16.2
Labrador	QLD	310053553	16.2
Newcastle (C) – Inner	NSW	110055901	16.1
West End	QLD	305051607	15.7
Biggera Waters	QLD	310053507	15.5
Waterford West	QLD	305304654	15.4
Lismore (C) - Pt A	NSW	120074851	15.4
South Brisbane	QLD	305051525	14.8
Tiaro (S)	QLD	315106850	14.7
Maroochy (S) – Coasta	QLD	310154905	14.7
Kolan (S)	QLD	315104400	14.6

Note: Total households are ‘floating’ variables and subject to revision.

Within the capital cities, Figure 3 is interesting in that it highlights that each city clearly contains regions with a much greater relative incidence of housing unaffordability. This differs from the distribution pattern of household numbers in that not all of Sydney and Melbourne appear ‘full of’ households in housing stress. The explanation is that there is presumably a simultaneous presence of the higher income groups in capital cities, alongside large numbers of poorer households in housing stress.

In Sydney, the west and south west are the regions with higher percentages of unaffordability. SLAs north of Sydney (Gosford-Wyong) are also in the top two quintiles of unaffordability rates. The rest of Sydney, presumably with the

greater representation of high income households, mostly has SLAs in the lower quintile ranges of housing unaffordability percentages. In Melbourne, SLAs in the western suburbs (Sunshine and Maribyrnong), the inner ring suburbs (such as Brunswick and St Kilda), the outer south east, and the outer east beyond Lilydale, are clearly separated from the rest of the city's SLAs in that they fall into the upper two quintiles of housing unaffordability rates. The inner eastern suburbs, as would be expected (the inner east is home to most higher income households), clearly appear as a region of very low housing unaffordability rates.

In Canberra, the inner north (Dickson, Downer, Braddon, etc.) has much higher percentages in unaffordable housing than the rest of the city. There are some scattered SLAs in the higher quintiles elsewhere in Canberra, however (such as Kambah). In Brisbane, the north west areas and the southern bay suburbs look to be wealthier areas, with low percentages in housing unaffordability. By contrast, the inner city, the south west (south of the Brisbane River through to Ipswich and Beenleigh), and north of the city around Caboolture, have many of the highest percentage unaffordability SLAs in the regional linkages study.

The percentage in unaffordability distribution highlights areas that probably have lower incomes generally. This bypasses areas where households in unaffordable housing live mixed in with higher income households: hence, expressed by percentages, the more obviously 'disadvantaged' areas stand out. This is in large part a product of the definition of housing unaffordability applied.

It should be considered whether Queensland has figured so notably in the percentage unaffordability results through having much smaller SLAs: the reverse effect of when viewed by overall counts of unaffordability. The distribution of convergence results, with many poorer results in Brisbane, and the overall better results for counts rather than percentages, should be kept in mind.

4.3 Sydney: Distribution of Housing Unaffordability

In Sydney, the west and south west are the regions with higher numbers and percentages of housing unaffordability. SLAs in the far north of Sydney (Gosford-Wyong) also have high unaffordability incidence. The rest of Sydney, presumably with the greater representation of high income households, mostly has SLAs in the lower quintiles, but Sydney as a whole – comparative to all other SLAs in the regional linkages project – does contain large populations in housing unaffordability.

Figure 2 shows that all Sydney SLAs have very high numbers in housing unaffordability: above 748 households in each SLA (thus in the highest 20 percent of the 893 convergent SLAs in the study). Sydney is populated by a very large estimated number of households in unaffordability – 105,700 in total. Figure 2 only illustrates that Sydney is wholly 'very unaffordable' when viewed in a wider context.

Figure 4 shows instead the number in unaffordable housing in quintile ranges set relative to Sydney SLAs only. In this map, SLAs in western and south western Sydney very obviously have higher numbers of households in

unaffordability (as does Gosford-Wyong in the north). The inner northern and southern suburbs, on the other hand, have relatively low numbers in unaffordability.

As observed earlier, nearly all SLAs in western and south western Sydney are in the highest twenty housing unaffordability counts of all SLAs in the study. Fairfield-Liverpool SSD has an estimated 11,936 households in unaffordability. The division of east/west, and north/south in Sydney is fairly apparent in Figure 4. The influence of income distribution in determining these estimate results is probably strong.

Unlike the distribution of gross housing unaffordability numbers, most of Sydney is not 'highly unaffordable' relative to the other SLAs in the linkage study, when housing unaffordability is expressed as a percentage of total households. Figure 3 shows that most of northern Sydney's SLAs have fewer than 7.4 percent of households in housing unaffordability – they are thus in the lower 40 percent of all SLAs in the study.

4.4 Melbourne: Distribution of Housing Unaffordability

Like Sydney, most of Melbourne's SLAs have high numbers in unaffordable housing. Overall, Melbourne has a very high number of households experiencing housing unaffordability: 96,827. As a percentage of total (estimated) households, this is higher than in Sydney (7.2 compared to 7 percent). In particular the outer south east (Frankston and Dandenong), the Yarra Ranges, the northern and western suburbs including Maribyrnong and Brunswick, Broadmeadows in the outer north west of the city, and St Kilda in the inner south east, have high incidences of unaffordability. The inner eastern suburbs, conversely, distinctly show as up as a region of very low housing unaffordability rates (the inner east is home to most higher income households).

Figure 2 shows the number of households in housing unaffordability in Melbourne SLAs, in quintile ranges set relative to all SLAs in the linkage project. This map shows most Melbourne SLAs are in the highest 20 percent of housing unaffordability numbers – having more than 748 households in unaffordability. Outlying parts of the Melbourne Statistical Division have, comparatively, lower numbers in unaffordability. Figure 5 shows the distribution of housing unaffordability across Melbourne, this time in quintile ranges defined relative to Melbourne's SLAs. In this map, the regions with higher incidences of unaffordability are shown to be predominantly: the outer south east (Frankston and Dandenong), the Yarra Ranges, the northern and western suburbs including Maribyrnong and Brunswick, Broadmeadows in the outer north west of the city, and St Kilda in the inner south east. These suburbs are all well known as having relatively low socio economic indicators.

With housing unaffordability expressed as a percentage of total households, the Melbourne SLAs that have rates of over 10.4 percent and are thus in the highest 20 percent of SLAs in the linkage study, include Dandenong, Maribyrnong, Brunswick and Frankston. Figure 5 highlights the inner eastern suburbs of Melbourne: bound by the Yarra River to the north and Dandenong Road in the south - this region contain all the SLAs with the lowest percentages

of households experiencing unaffordability. The outer eastern suburbs then have relatively low percentages. Conversely, the outer south east, in inner suburbs (particularly the inner west and north), and the western suburbs of Melbourne have the higher estimated percentages of housing unaffordability. This largely comes down to the concentration of higher incomes in the inner eastern suburbs.

4.5 Canberra: Distribution of Housing Unaffordability

Canberra has a low number and percentage of households in unaffordability overall (a total estimate of 6,467 households, or 5.8 percent). Canberra's high income levels, rather than any difference in housing costs probably hold down this number. Unaffordability in Canberra is also much more dispersed than in other capitals, although the inner north (Dickson, Downer, Braddon, etc.) figures prominently.

Figure 2 shows that no Canberra SLAs contain estimated numbers of housing unaffordability that are high (in the top 40 percent) relative to other SLAs in the regional linkages study. In the context of all other regions in the partner states and territories, Canberra's SLAs have a consistently low number of households in housing unaffordability. Most SLAs are in the lower two quintiles (less than 158 households), although some SLAs in the inner north, and in Kambah, for example, have between 158 and 315 estimated households in housing unaffordability and are thus in the middle quintile.

Illustrating variation within Canberra itself, Figure 6 shows the distribution of estimated unaffordability counts by Canberra specific quintile ranges. Although the geographical distribution is quite mixed (consistent with intuitive knowledge of Canberra), the majority of households in unaffordability in Canberra appear to predominantly be in: the inner north (Lyneham, Dickson, Braddon), Gungahlin, parts of Belconnen, Lyons, Narrabundah, and parts of Tuggeranong such as Kambah. The Oaks Estate (toward Queanbeyan) is also in the highest quintile.

Figure 3 illustrates the relative percentage rate of housing unaffordability across Canberra's SLAs in the context of the whole linkage study region. Here, notably, Braddon, Turner, Lyneham, Charnwood, Lyons and Oaks Estate are all in the upper two quintiles of unaffordability rates by SLAs. These SLAs have over 10.4 percent of their total households in housing unaffordability. Most of Canberra's SLAs on the south side are in the lowest quintile range for percentage in unaffordable housing, with less than 5.8 percent rates of housing unaffordability. The inner north has the most apparent spatial concentration of housing unaffordability in Canberra. Outer Belconnen, areas around Narrabundah, and Tuggeranong around Kambah, again show up as having high relative unaffordability, as does Oaks Estate.

4.6 Brisbane: Distribution of Housing Unaffordability

A significant part of the total estimated households in unaffordable housing are in Brisbane Statistical Division: 57,819 (12 percent). The Brisbane City SSD also contains the most (30,610) households in unaffordable housing of any SSD in the study area. At the SLA level, however, these numbers are harder to pick up

on given the small (suburb based) size of Queensland's SLAs. Brisbane is also quite different from the other capitals cities reviewed in that similar geographical patterns are shown for each variable and in each quintile range: meaning that Brisbane's SLAs show a much larger variation in housing affordability measures than do SLAs in the other capitals cities.

Brisbane has many of the highest rates of housing unaffordability, relative to all SLAs in the linkage project, as well as many of the lowest. SLAs in Brisbane have estimated numbers in unaffordable housing ranging from 4 to 2,447, and percentages ranging from 2.5 to 20.9 percent. Relative to population, Brisbane has a far higher incidence of housing unaffordability (8.8 percent) than the other capital cities. As a percentage of total households, nearly all the highest 20 percent SLAs of the study are situated in Queensland and in Brisbane in particular. The south west of Brisbane is the standout areas for having clearly high incidences of unaffordability. The geographical barriers seem to be the Brisbane River and the South East Freeway.

Also, regions in the Brisbane Statistical Division outside of Brisbane City have strong concentrations of unaffordability: the north around Caboolture, and the south around Logan City, Ipswich and the Gold Coast. The north western suburbs and the southern bay area suburbs (except Cleveland) of Brisbane appear to be higher income areas, with have consistently low numbers and rates of housing unaffordability. This is very distinct from the inner city, the south west (south of the Brisbane River through to Ipswich and Beenleigh), and north of the city around Caboolture – where many SLAs have many of the highest percentage unaffordability SLAs in the regional linkages study.

In Brisbane there are clearly areas of high and low unaffordability. The city overall does not have a relatively high or low incidence of unaffordability. Hence the housing unaffordability estimates illustrated in the absolute count maps show very similar spatial patterns. (The spatial divisions by percentage in unaffordable housing are more distinct).

5. IMPLICATIONS AND FUTURE DIRECTIONS

The stage one regional linkages estimates of housing unaffordability have indicated a great deal of promise. The methodology appears to produce reliable small area estimates of housing unaffordability. Comparison of the regional linkage estimates against separate ABS estimates shows very similar relativities between SLAs - suggesting that the spatial distribution of households in housing unaffordability can be reliably estimated and interpreted using this method.

The type and level of analysis of housing issues provided in this paper is not possible with the currently available small area housing data. This is demonstrative of the value of spatial microsimulation and its capacity to provide insight into issues of relevance to policy makers.

Nonetheless, areas for improvement have been identified through the examination of the Stage 1 estimate data and through expert validation from the industry partners. In particular, the issue of the total number of households diverging (thus undermining reliability of the percentage results) has recently been resolved for and will be reflected in the improved Stage 2 output. Later

stages of the project will involve the addition of taxation, income support and wealth characteristics with the capacity to model policy change, as well as work on projections. As the regional linkages project develops, given the existing patterns of housing unaffordability revealed by the data, policy makers might wish to explore impact of changes in housing assistance programs.

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APPENDIX: SPATIAL MAPPING OF HOUSING UNAFFORDABILITY

Figure 2. Estimated Number in Unaffordable Housing: All Linkage States (Data Source: NATSEM simulation)

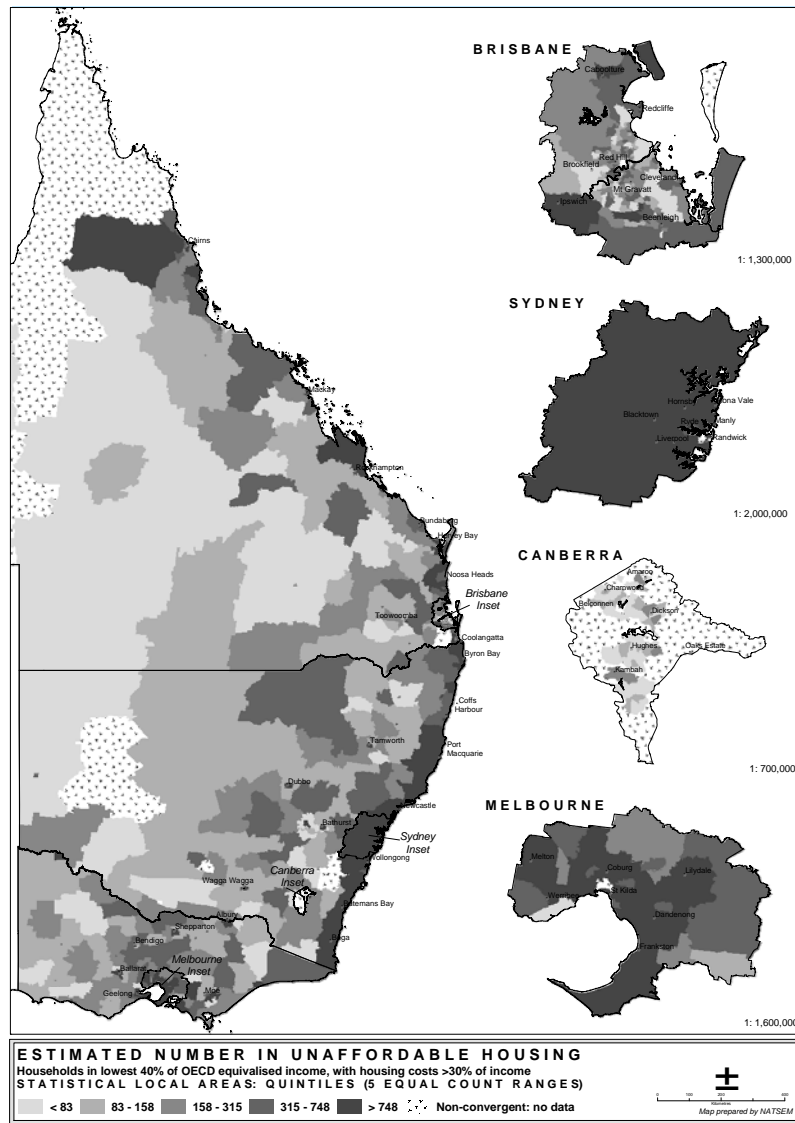


Figure 3. Estimated Percentages in Unaffordable Housing: All Linkage States
(Data Source: NATSEM Simulation)

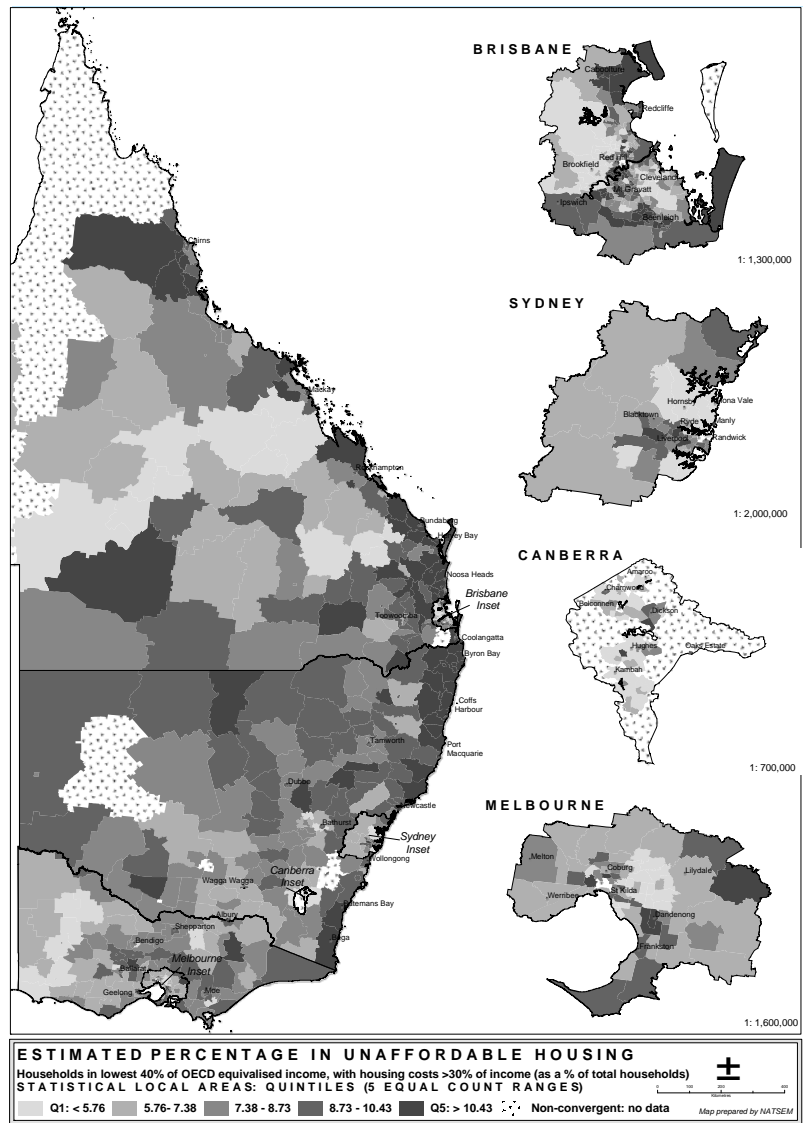


Figure 4. Estimated number in Unaffordable Housing: Sydney (Quintiles). Data Source: NATSEM simulation.

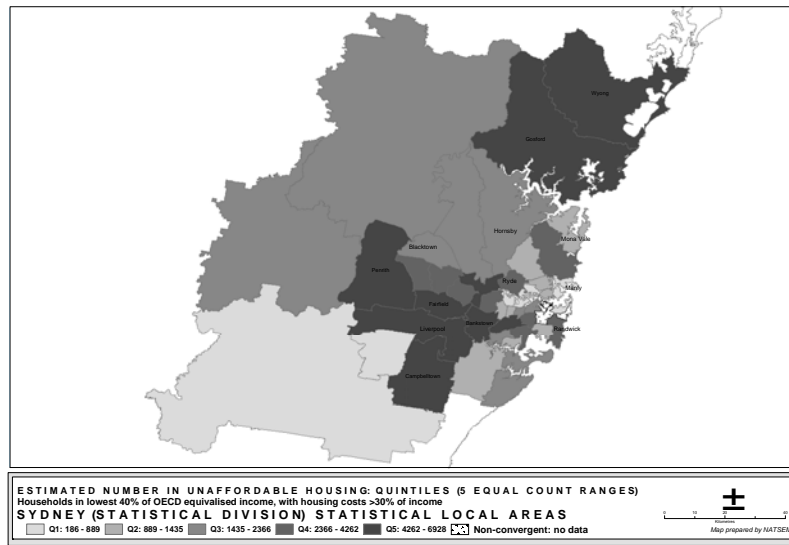


Figure 5. Estimated Percentage in Unaffordable Housing: Melbourne (quintiles) Data Source: NATSEM simulation.

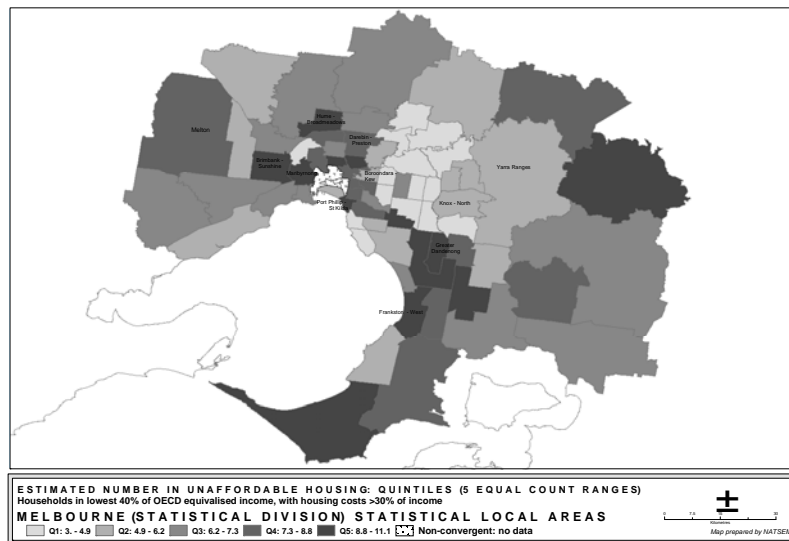


Figure 6. Estimated Number in Unaffordable Housing: Canberra (quintiles).
Data Source: NATSEM simulation

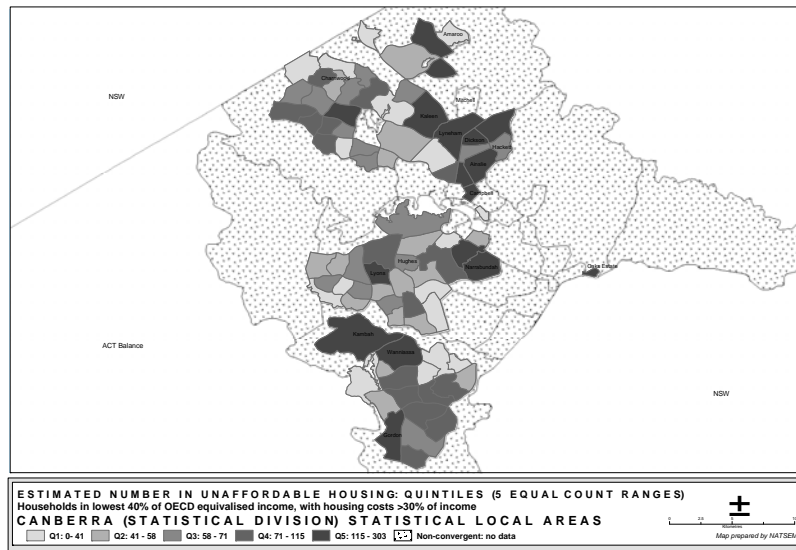


Figure 7. Estimated Percentages in Unaffordable Housing: Brisbane (quintiles)
Data Source: NATSEM simulation

