MALE AND FEMALE UNEMPLOYMENT RATE DISPERSION IN A LARGE AUSTRALIAN CITY

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ABSTRACT: This paper examines the time series behaviour of the dispersion of male and females unemployment rates across the four Statistical Regions within Brisbane, the state capital of Queensland and the third largest city in Australia. The level of within-city dispersion is positively correlated with the city-wide unemployment rate. This is consistent with the hypothesis that the level of demand deficient unemployment varies differentially across regions over the course of the business cycle while differences in the natural rate of unemployment are relatively stable. This in turn suggests that successful macroeconomic stabilisation policies can have (indirect) welfare benefits by reducing regional inequality within cities, a not unimportant matter. An important finding is that there are significant gender differences in the level of unemployment rate dispersion, with dispersion being higher for females than for males.

1. INTRODUCTION

This paper examines the dispersion of unemployment rates for male and females across the four Statistical Regions within Brisbane, the state capital of Queensland and the third largest city in Australia with a population around 1.8 million. There are a number of reasons why this research may interest the reader. First, it contributes to the growing literature on the geography of labour market inequality. Second, there are obvious welfare and equity considerations which arise naturally from any study of labour markets – but especially from the study of the unequal distribution of unemployment. Third, as Crampton (1999, p 1500), Fernandez & Su (2004, p 553-6) and others have emphasised, when studying urban labour markets gender differences are likely to be important and, indeed, this is found to be the case.[2] It is this third aspect of the study which is the most interesting and the most important in terms of implications for further research.

The paper is structured as follows. The second section discusses the source of the data used and reports on the level of unemployment in the regions of Brisbane. The third section considers various measures of the dispersion of unemployment rates drawing heavily upon Martin (1997). Empirical evidence of dispersion for males and females in Brisbane is presented in the fourth section of the paper. It is found that that the level of within-city dispersion is positively correlated with the city-wide unemployment rate and that dispersion tends to be higher for females than for males. An attempt is made to explain these findings.

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[1] I am grateful to Nisvan Erkal and Christine Smith for very helpful comments.

[2] Tunny (2001) looked at the dispersion of unemployment rates in regions of Queensland outside Brisbane. This paper differs from his not only in the geographic areas under consideration but also in looking at dispersion separately for males and females, rather than just for the aggregate population.

The final section concludes.

2. UNEMPLOYMENT IN BRISBANE'S REGIONS

Information on the size of the labour force and the unemployment rate is available for both males and females (and thus, persons) for a (reasonably) consistent set of regions within Brisbane over the period September 1987 – December 2005.[3,4] The data is published by the Australian Bureau of Statistics and has its origin in a monthly survey of households (details of the survey and the definitions used are given in Australian Bureau of Statistics (2001)). The availability of this data allows us to study the behaviour of dispersion over time and (especially) its behaviour in relation to the state of the labour market as indicated by the city-wide unemployment rate. Also, since time series data for each region is available for males and females separately it is possible to also explore gender differences in dispersion.

Figure 1 sets out the unemployment rate for males (broken line) and females (solid line) in Brisbane over the period 1988 – 2005. The two rates are clearly highly correlated over the period. As was the case in the rest of Australia, unemployment rose dramatically in the early 1990s reaching peak values of 9.5 percent for females and 10.3 percent for males. It then fell slightly in fits and starts until 2001 when it began a steady and persistent decline to its current level of around 4.3 percent for females and 5.2 percent for males, the lowest levels achieved for more than two decades. This marked variation in the state of the labour market over the period provides an excellent opportunity to examine the relationship between unemployment level and dispersion. There are two (obvious) questions to be explored. The first is whether we have had low unemployment in recent years only at the expense of greater dispersion. The second is whether there are any systematic differences in the behaviour of male and female dispersion.

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[3] This paper is the first part of a planned study of unemployment rate dispersion in all of the state capitals. Preliminary work suggests that the key results (that female dispersion is greater than male dispersion and also that dispersion is positively related to the city-wide unemployment rate) also hold for other cities. An additional reason for researching Brisbane in some detail in its own right is that it would appear that the 'excess' of female dispersion over male dispersion is greater in Brisbane than in other cities.

[4] There have been changes in boundaries of Brisbane regions over the period although mostly they involved either small number of people or the movement of boundaries between regions with similar unemployment rates. There have been no changes of any significance since September 1997. All of the findings in the text (although they refer to the whole period) apply to the post 1997 period without any qualification. Data for the unemployment rates and labour force is taken from the ABS Labour Force Statistics module of the DX database. The regions which make up the Brisbane Major Statistical Region are: Brisbane City Inner Ring, Brisbane City Outer Ring, the South & East and the North & West. Details of the regional classification is given in the Appendix.

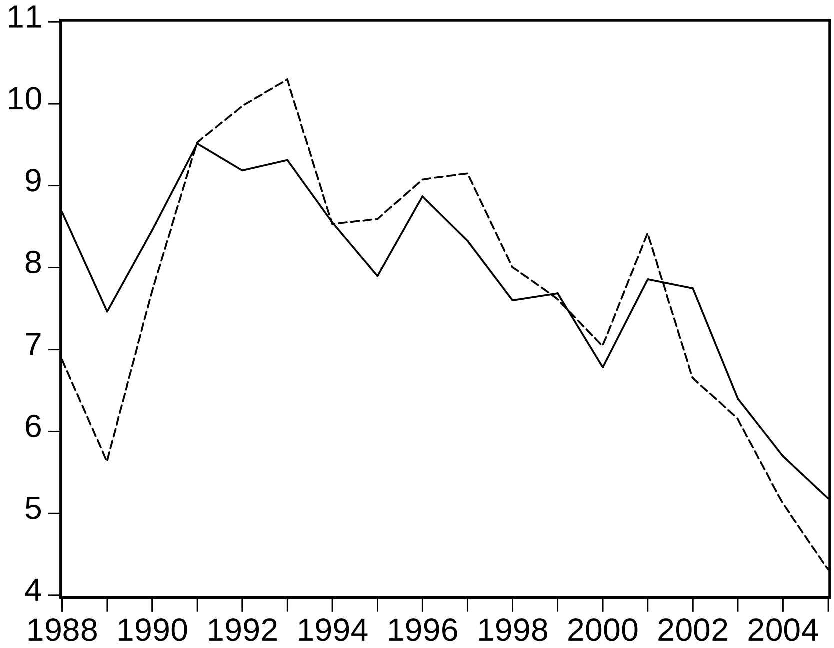

Figure 1. Annual Unemployment Rates for Males (broken line) and Females (solid line) in Brisbane, 1988-2005.

3. MEASURING UNEMPLOYMENT RATE DISPERSION

Two common measures of dispersion are the (weighted) standard deviation and Martin's measure of absolute dispersion (Martin, 1997).[5] The (weighted) standard deviation (*WSD*) of the unemployment rates in the different regions around their city-wide (ie. weighted) mean is:

$$WSD_t = \sqrt{\sum_r \frac{L_{rt}}{L_{ct}} \left(UR_{rt} - UR_{ct}\right)^2}$$

where: t is a time subscript; L_r is the size of the labour force in region r of the city; L_c is the size of the labour force in all regions taken together (eg the city-wide labour force); UR_r is the unemployment rate region r of the city, and; UR_c is the unemployment rate in all regions taken together (the city-wide unemployment rate). Martin's (1997, p 250) Absolute Dispersion (*AD*) measure

[5] Other measures include the (weighted) coefficient of variation and Martin's measure of relative dispersion. Data on the relative measures is available on request from the author. Results for these measures are not reported in this paper as they do not lead to any different conclusions to those reached using Martin's 'absolute' measure.

is:

$$AD_t = \sum_r \left(L_{rt} / L_{ct} \right) \left| UR_{rt} - UR_{ct} \right|$$

Martin's Absolute Dispersion measure has a very straightforward and intuitive interpretation. It measures the number of persons in all regions taken together who would have to change their labour market status in order for every region to have the (same) percentage unemployed as currently prevails in the city as a whole – where that number (the total number whose labour market status would have to change) is expressed as a proportion of the total labour force in the city. The easiest way to see this is to assume that there are only two regions (A, B) and that they are of equal size, so that L_r/L_c is equal to 1/2 for both regions. In this event our expression for Absolute Dispersion may be written as:

$$AD = \frac{1}{2}\left| UR_A - UR_c \right| + \frac{1}{2}\left| UR_B - UR_c \right| \qquad (2)$$

Suppose that both regions have a (constant) labour force of 100, giving a city-wide labour force of 200. Imagine that in region A there are 4 people unemployed and so the unemployment rate in region A is 4 percent. Suppose that there are 8 people unemployed in region B so that the unemployment rate in that region will be 8 percent. Given these figures the city-wide unemployment rate will be 12/200 which is 6 percent. If we calculate the value of *AD* for this data (using equation (2) above) we find that *AD* is 2 percent, that is, 2 percent of the city-wide labour force. Imagine now that the labour market status of some individuals in both region A and region B changes so as to make the unemployment rate in both regions the same (i.e. 6 percent) while the city-wide rate (obviously) remains at 6 percent. Since 6 percent of 100 is 6 it must be the case that, in order for the unemployment rate in both regions to be 6 percent, an *extra* 2 people must have become unemployed in region A and an *extra* 2 people must have become employed in region B. Notice that if we add together the number of people in both regions whose labour market status would have to change to equalise the unemployment rates at 6 percent we get the figure of 4 persons. If we divide this by the aggregate (city-wide) labour force we have 4/200 = .02 or 2 percent, which is identical in value to the figure for *AD* arrived at above. All of which is to say that the *AD* measure of the dispersion is equal to the number of people whose labour force status would have to change in order to even out unemployment rates between regions – where that number is expressed as a proportion of the total number currently in the labour force in all regions taken together.[6]

In the empirical work which follows the focus will be solely on Martin's *AD* measure. There are two reasons for this. To begin with, it turns out that for this data set the quantitative characteristics of the standard deviation measure and the *AD* measure are virtually identical and so it will suffice to describe only one of

[6] Martin (1997, p 240) describes it as: "the number of new jobs or labour force movements that would be needed to even out unemployment rates between regions".

them.[7] Also, as we have already seen, Martin's Absolute Dispersion measure has a neat intuitive interpretation, and since we are not going to lose any 'statistical' information by using it rather than the weighted standard deviation measure, it is preferable to use the *AD* measure.[8]

4. UNEMPLOYMENT RATE DISPERSION IN BRISBANE

Figure 2 shows a time series plot of the level of Absolute Dispersion (*AD*) for males (broken line) and females (solid line) using quarterly seasonally-adjusted data over the period 1987:4 -2005:4. To further aid in the interpretation Figure 3 reports annual averages, while Figure 4 shows the trends which result from applying a Hodrick-Prescott filter to the quarterly series - again, the series for males is shown as the broken line and that for females as the solid line. (EViews 5.1 is the package used.) Fortunately, the story being told in these different figures is fairly consistent, once we allow for the amount of noise being filtered out at each step.

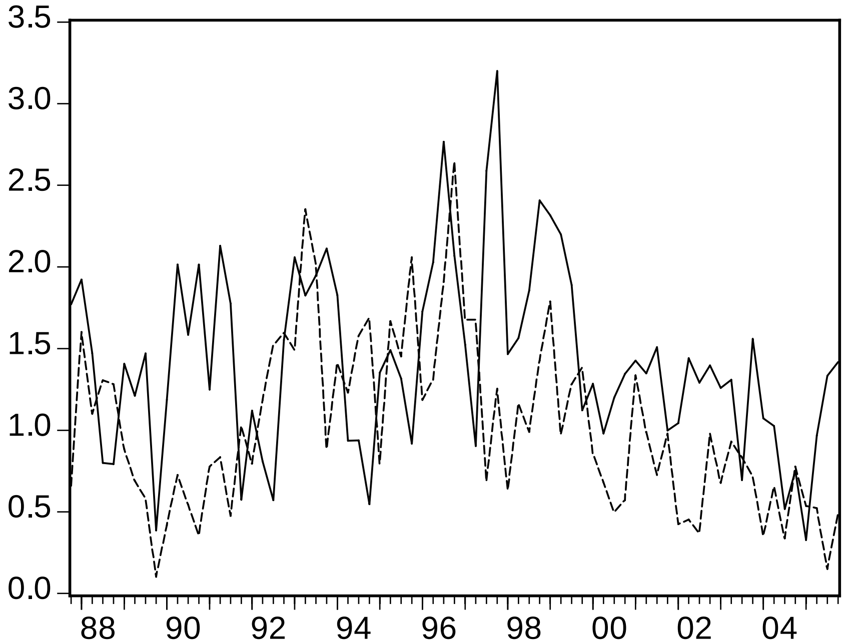

Figure 2. Quarterly Measures of Absolute Dispersion for Males (broken line) and females (solid line) in Brisbane 1987:4 – 2005-4.

[7] This is also true for Tunny's measures of dispersion in non-metropolitan regions of Queensland – see Tunny, 2001, p 6.

[8] Data on the weighted standard deviation measures is available on request from the author.

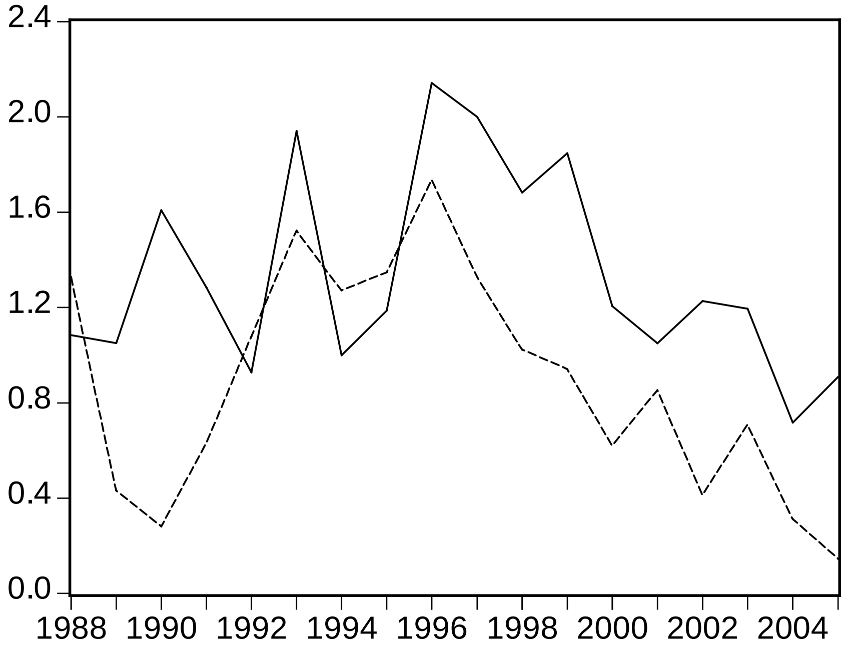

Figure 3. Annual Measures of Absolute Dispersion for Males (broken line) and Females (solid line) in Brisbane 1988 – 2005.

Two things are evident from the figures. First, dispersion tends to be higher for females than for males. The mean value over the whole of our sample period (1987:4 – 2005:4) of Absolute Dispersion for females is 1.4 and that for Absolute Dispersion for males is 1.0 while the mean values for the period 2001:4-2005:4 (the period over which the unemployment rate has been consistently trending downwards) are 1.1 for the Absolute Dispersion for females and 0.6 for the Absolute Dispersion for males. Indeed, in almost every period the level of Absolute Dispersion for females is above that of the Absolute Dispersion for males. Second, comparing Figures 1 and (say) 3 we see that there is a general tendency for both (absolute) dispersion and the unemployment rate to move together over time for both males and females. Looking at annual data (to reduce complications due to lags) the correlation coefficient between the level of Absolute Dispersion for females and the city-wide unemployment rate for females over the whole of our sample period is (+) 0.64 while for males the corresponding correlation coefficient is (+)0.89. We now turn to discussion of these findings commencing with a discussion of the finding that there is a 'pronounced' tendency for dispersion to be higher for females than for males, other things equal.

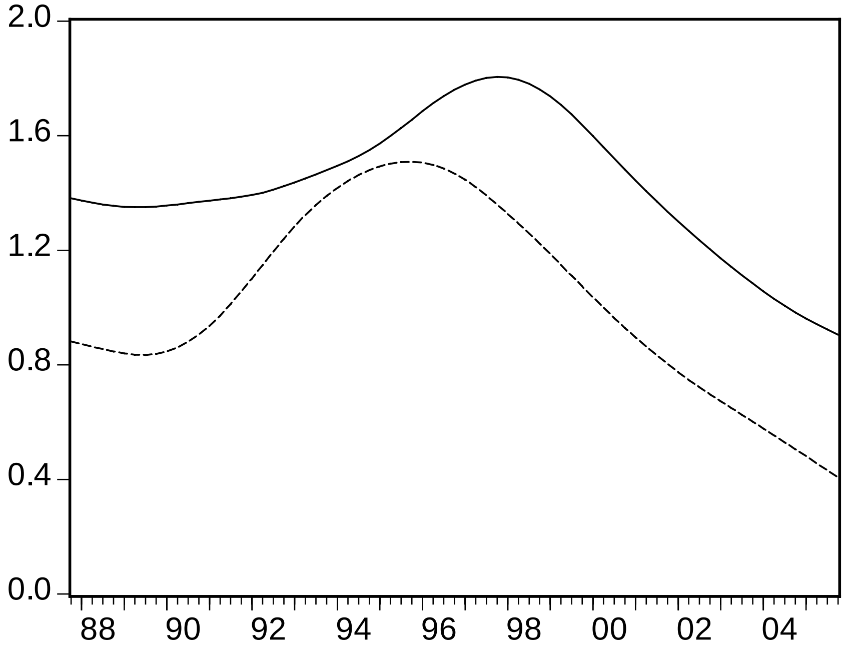

Figure 4. Hodrick-Prescott Filter Fitted to the Quarterly Series for Absolute Dispersion for Males (broken line) and Females (solid line).

One way to organise our thoughts about the difference in the degree of dispersion is to see it as partly due to the characteristics of 'people' and partly due to characteristics of 'place'.[9] We will deal with each in turn. We know that unemployment is concentrated disproportionately amongst particular groups in the society including sole parents and the less educated (inter alia).[10,11] Even putting to one side differences in the composition of industry located 'within' each area, greater spatial variations in the proportion of female residents who are in one or both of these categories (or in any other pre-disposing factor) than in the proportion of male residents who are in one or both of these categories will,

[9] Studies such as that by Karmel et al. (1993) show that over 70 per cent of the variation in unemployment rates across metropolitan statistical local areas (SLA's) in Australia can be 'explained' by the characteristics of the population who reside in the areas - acknowledging also that 'locality' characteristics, while not the dominant factor, are also important.

[10] Borland & Kennedy (1998) discuss those socio-demographic characteristics which seem to influence the probability that a particular individual will be unemployed in Australia. Armstrong & Taylor (2001, pp 192-4) cover similar ground for the UK, although in their case, in a spatial context.

[11] There are many other factors which are relevant to a person's risk of being unemployed – these two have been chosen as they may bear disproportionately on females.

cet par, result in there being greater variability in female unemployment rates than in male unemployment rates. However, the characteristics of the resident population are not the only thing that matters in determining the unemployment rate in the region. The characteristics of place, especially the location of industry, become important where commuting is costly or difficult and this (especially the latter) is more likely to be the case for females than for males (cet par) and it is more likely to be the case for females in outer suburbs than for females in inner suburbs.[12] Now, inspection of the raw data for unemployment rates in the regions of Brisbane suggests that the greater dispersion for females arises mainly because of the persistent and large difference in unemployment rates between the outer (South & East and the North & West) and inner (Brisbane City Inner and Outer Rings) statistical regions. The most likely explanation for this is to do with Brisbane's industrial structure.[13] In particular, Brisbane does not have the same 'traditional' job opportunities for females who live in outer suburban areas that the other cities have. For example, the textiles, clothing & footwear and the finance & insurance industries (both industries which employ large numbers of females relative to males) are far less prominent in Brisbane than in the other large cities, especially Sydney and Melbourne. In writing this I do not mean to imply that industrial structure (alone) is *the* explanation for the tendency for dispersion to be higher for females than for males. It is only part of an explanation that involves the other matters (including commuting difficulties) which have been mentioned in this paragraph. For that reason neither industry policy nor transport policy alone will be able to address the problem.

The finding that (absolute) dispersion is positively related to the level of the unemployment rate implies that relative unemployment rate differences rise in recessions and fall with recoveries. Now, imagine that the observed unemployment rate in each region is the sum of a 'structural' or 'natural' component and a demand-deficient component. Imagine also that, unlike the demand deficient component, the 'natural' component does not vary with the state of the labour market. In that case to find the level of absolute dispersion varies with the state of the labour market implies that the level of demand deficient unemployment varies differentially across regions over the course of the business cycle. This is hardly surprising, given the uneven distribution of industries and occupations across suburbs. So the finding that absolute dispersion is positively related to the level of the unemployment rate implies that differences between regions in the 'natural' rate of unemployment are less than are the differences between regions in the level of '(natural plus) demand

[12] Lillydahl and Singell (1985) in their study of male and female labour market experience in five US cities found a tendency for female (and teenage) unemployment rates to rise with distance from the CBD which they attributed to self-imposed job location and work hour limitations. Vipond (1984) and Vipond & Beed (1986) look at the intra-urban unemployment gradient for Melbourne and Sydney.

[13] The author is grateful to Christine Smith for suggesting this explanation.

deficient' unemployment.[14] This in turn suggests that successful monetary and other macroeconomic stabilisation policies can have (indirect) welfare benefits by reducing regional inequality within cities, a not unimportant matter. To put the point slightly differently, policy makers should be aware that the costs of using unemployment to fight inflation are not confined solely to the social and economic losses which result from higher unemployment per se but in addition there are the social (and possibly political) costs of a more uneven distribution of joblessness within our cities.

5. CONCLUSION

This paper examined the dispersion of unemployment rates across regions within Brisbane. One aim of the paper was to see if gender differences were present and important and, indeed, this is found to be the case as dispersion appears to be significantly higher for females than for males. It was argued that this reflects characteristics of place as well as people, with industry structure playing a role. It also appears to be the case that the level of within-city dispersion is positively correlated with the city-wide unemployment rate. This likely indicates that the level of demand deficient unemployment varies differentially across regions over the course of the business cycle while differences in the natural rate of unemployment are relatively stable. This in turn suggests that successful macroeconomic stabilisation policies can have (indirect) welfare benefits by reducing regional inequality within cities.

[14] This may be compared with the explanation for inter-state unemployment rate dispersion given in Dixon, et al. (2001).

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APPENDIX: STATISTICAL REGIONS OF BRISBANE

The ABS divides the Brisbane Major Statistical Region into four Statistical Regions. They are the Brisbane City Inner Ring Statistical Region, the Brisbane City Outer Ring Statistical Region, the South and East Brisbane City Statistical Region and the North and West Brisbane City Statistical Region. These Regions are each made up of a small number of Statistical Subdivisions, which in turn are made up of a number of Statistical Local Areas. The Regions and their Statistical Subdivisions (SSD) and Statistical Local Areas (SLAs) are set out below. The source of the information is ABS (2006).

Brisbane City Inner Ring Statistical Region

Inner Brisbane SSD which is made up of the Bowen Hills, Brisbane City, Dutton Park, Fortitude Valley, Herston, Highgate Hill, Kangaroo Point, Kelvin Grove, Milton, New Farm, Newstead, Paddington, Red Hill, South Brisbane, Spring Hill, West End and Woolloongabba SLAs.

Northwest Inner Brisbane SSD which is made up of the Albion, Alderley, Ascot, Ashgrove, Bardon, Chelmer, Clayfield, Corinda, Enoggera, Graceville, Grange, Hamilton, Hendra, Indooroopilly, Kedron, Lutwyche, Newmarket, Nundah, St Lucia, Sherwood, Stafford, Stafford Heights, Taringa, Toowong, Wilston, Windsor, Wooloowin SLAs.

Southeast Inner Brisbane SSD which is made up of the Annerley, Balmoral, Bulimba, Camp Hill, Cannon Hill, Carindale, Carina & Carina Heights, Coorparoo, East Brisbane, Fairfield, Greenslopes, Hawthorne, Holland Park, Holland Park West, Moorooka, Morningside, Norman Park, Tarragindi, Yeerongpilly and Yeronga SLAs.

Brisbane City Outer Ring Statistical Region

Northwest Outer Brisbane SSD which is made up of the Anstead, Aspley, Bald Hills, Banyo, Bellbowrie, Boondall, Bracken Ridge, Bridgeman Downs, Brighton, Brookfield (including Brisbane Forest Park), Carseldine, Chapel Hill, Chermside & Chermside West, Darra-Sumner, Deagon, Doolandella-Forest Lake, Durack, Ellen Grove, Everton Park, Ferny Grove, Fig Tree Pocket, Geebung, Inala, Jamboree Heights, Jindalee, Karana, Downs-Lake Manchester, Kenmore & Kenmore Hills, Keperra, McDowall, Middle Park, Mitchelton, Moggill, Mount Ommaney, Northgate, Nudgee, Oxley, Pinjarra Hills, Pinkenba-Eagle Farm, Pullenvale, Richlands, Riverhills, Sandgate, Seventeen Mile, Rocks, Taigum-Fitzgibbon, The Gap, Upper Kedron, Virginia, Wacol, Wavell, Heights, Westlake and Zillmere SLAs.

Southeast Outer Brisbane SSD which is made up of the Acacia Ridge, Algester, Archerfield, Belmont-Mackenzie, Burbank, Calamvale, Chandler-Capalaba

West, Coopers Plains, Eight Mile Plains, Gumdale-Ransome, Hemmant-Lytton, Kuraby, Lota, MacGregor, Manly & Manly West, Mansfield, Moreton Island, Mount Gravatt & Mount Gravatt East, Murarrie, Nathan, Pallara-Heathwood-Larapinta, Parkinson-Drewvale, Robertson, Rochedale, Rocklea, Runcorn, Salisbury, Stretton-Karawatha, Sunnybank & Sunnybank Hills, Tingalpa, Upper Mount Gravatt, Wakerley, Willawong, Wishart, Wynnum and Wynnum West SLAs.

South and East Brisbane City Statistical Region

Beaudesert Shire Part A SSD which is made up of the Beaudesert Shire Part A SLA.

Logan City SSD which is made up of the Browns Plains, Carbrook-Cornubia, Daisy Hill-Priestdale, Greenbank-Boronia Heights, Kingston, Logan City Balance, Loganholme, Loganlea, Marsden, Rochedale South, Shailer Park, Slacks Creek, Springwood, Tanah Merah, Underwood, Waterford West and Woodridge SLAs.

Redland Shire SSD which is made up of the Alexandra Hills, Birkdale, Capalaba, Cleveland, North Stradbroke Island, Ormiston, Redland Bay, Sheldon-Mt Cotton, Thorneside, Thornlands, Victoria Point and Wellington Point SLAs.

North and West Brisbane City Statistical Region

Caboolture Shire SSD which is made up of the Bribie Island, Burpengary-Narangba, Caboolture Shire (Central, East, Hinterland & Midwest), Deception Bay and Morayfield SLAs.

Redcliffe City SSD which is made up of the Clontarf, Margate-Woody Point, Redcliffe-Scarborough and Rothwell-Kippa-Ring SLAs.

Pine Rivers Shire SSD which is made up of the Albany Creek, Bray Park, Central Pine West, Dakabin-Kallangur-Murrumba Downs, Griffin-Mango Hill, Hills District, Lawnton, Petrie, Strathpine-Brendale and Pine Rivers Shire Balance SLAs.

Ipswich City SSD which is made up of the Ipswich City Central, East, North, South-West and West SLAs.