Examining the relationship between commuting patterns, employment growth and long term unemployment in the Sydney Major Statistical Region

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ABSTRACT

The paper will develop a framework to understand how employment growth and commuting patterns (modelled using Journey to Work data) interact to determine the spatial distribution of unemployment in the Statistical Local Areas within the Sydney MSR. The paper is part of an on-going project aimed at understanding the relationship between regional employment growth and unemployment. We seek to explore how the benefits of employment growth are distributed across space. Employment change over time across urban areas is resolved by a combination of labour market responses summarised as: (a) changes in the local employment of residents, which can incorporate net in or out-migration; and (b) changes in the level of net in- or out-commuting. In areas of employment stagnation or decline, the capacity of some residents to avoid long term unemployment will be dependent on their ability to secure jobs elsewhere in the urban area and either out-commute or relocate.

The labour market accounts (LMA) framework is employed to decompose these labour market responses in the period 1996-2001 in the Sydney MSR. The LMA framework decomposes the movements in working age population (*WAP*) and labour force (*LF*) for a particular area to determine who fills the jobs arising from changing employment levels. We provide estimates for the following components: (a) labour force changes due to demographic processes, which are broken down into natural increase and net in-migration; (b) labour force changes due to changes in the labour force participation rate; (c) changes in unemployment, which are broken down into changes arising from demographic processes and changes arising from changes in the percentage of the labour force that are unemployed; and (d) changes in the local labour force due to changes in net in-commuting.

Regression models are estimated to consider the relative strength of the relationships between each of these labour market adjustment responses and percentage employment change. Separate models are estimated for males and females to test whether the adjustment processes of each are different. We also augment the regressions with a variable representing occupational structure to determine whether the initial occupational structure of an area impacts on the adjustment process.

The results highlight clear differences between males and females. The results show emphatically that employment growth between 1996 and 2001 has elicited substantial changes in commuting behaviour. Women, surprisingly, showing relatively greater in-commuting responsiveness to employment growth. Unemployment changes in local areas are swamped by commuting responses.

INTRODUCTION

The analysis of regional labour markets in Australia reveals persistent disparities in rates of labour utilisation (Mitchell and Carlson, 2005; Mitchell and Bill, 2005b). In particular, unemployment dispersion has not fallen despite the decline in the national unemployment rate since 1993. There is increasing evidence that regional labour market outcomes are not determined exclusively by the national business cycle, even if account is taken of industrial structure, so that reliance on indiscriminate Keynesian macroeconomic policy will not redress persistent inequality in labour utilisation rates (Mitchell and Carlson, 2005). In addition, regions differ in their composition of unemployment between short and long term, but notwithstanding the spatial persistence of unemployment, the evidence does not support the commonly held view that long term unemployment is irreversible (Mitchell and Bill, 2005a).

This dispersion of labour market outcomes persists even within urban areas in Australia, with, for example, the residents of Ku-Ring-Gai in Sydney experiencing a rate of unemployment of 4.9 per cent in August 2001, as compared to a rate of 19.8 for residents of Fairfield, another Sydney suburb (ABS, 2001). Individual and family poverty is directly related to unemployment. Also, since spatial population and employment increases tend to be uneven between the urban and regional areas, there tends to be congestion and infrastructure duplication in some areas, but under-utilised infrastructure in others (Denniss and Watts, 2001).

Moreover, when employment growth is spatially uneven as it has been over the 1990s, regionally localised growth (and stagnation) is likely to promote strong migratory and commuting responses, as relatively advantaged workers seek out employment opportunities. Contrary to neo-liberal arguments that have focused on barriers between sub-markets Gordon (2003: 56) argues that few barriers exist to adjustment at the small area level. While interactions between labour markets are strongest between proximate or neighbouring regions (Tobler, 1970; see Mitchell and Bill, 2004 and 2005a, 2005b for empirical application), adjustments to disequilibria travel across all sub-markets relatively quickly. In a geographic context such adjustments occur through commuting and migration; and the majority of migration is through small moves (neighbouring regions) inside larger regions which together account for the inter-regional picture of adjustment (Gordon, 2003: 59). The willingness to undertake such movements is heavily influenced by the macro-economy. Migration is likely to play a greater role in times of buoyant economic activity than recession (Gordon, 2003: 57), and it is the unevenness in the distribution of employment opportunities which is likely to be the key motivating factor, rather than differentials in the rewards and risks of the destination region (Gordon, 2003: 59). Thus it is relevant to examine whether commuting and migration have played a large part in the labour market adjustments occurring in one of the most buoyant regions in the Australian economy over the 1990s, the Greater Metropolitan Sydney region.

Commuting and migration are liable to directly impact the effectiveness of local job-creation strategies (Renkow, 2003). Commuting may frustrate the attempts of local policymakers to deliver opportunities to resident unemployed or to stimulate local business via increased resident purchasing power. However on the plus-side, to the extent that workers are able to adjust to job-losses by seeking employment in neighbouring regions, local job creation strategies may not be strictly necessary to revitalise flagging local economies. Alternatively policy-maker reliance on residential mobility to remedy regional downturns may see certain low-skilled workers who are less likely to undertake commutes or migration, heavily disadvantaged. Increased cross border commuting for jobs in periods of economic upturn raise a number of public finance issues (Renkow, 2003). Commuters enjoy employment opportunities, amenities and possibly transport provided by the destination region, but pay taxes that cover the local infrastructure costs in their origin region. Thus the ability to predict the nature of labour market adjustment across demographic groups,

particularly in areas of rapid labour market growth, may help predict who is best able to adjust to changing employment patterns and sharing the financial responsibilities for service provision.

Employment change over time across urban areas is resolved by a combination of labour market responses summarised as: (a) changes in the local employment of residents, which can incorporate net in or out-migration; and (b) changes in the level of net in- or out-commuting. In areas of employment stagnation or decline, the capacity of some residents to avoid long term unemployment will be dependent on their ability to secure jobs elsewhere in the urban area and either out-commute or relocate.

The labour market accounts (LMA) framework is employed to decompose these labour market responses in the period 1996-2001 in the Sydney MSR. The LMA framework decomposes the movements in working age population (*WAP*) and labour force (*LF*) for a particular area to determine who fills the jobs arising from changing employment levels. We provide estimates for the following components: (a) labour force changes due to demographic processes, which are broken down into natural increase and net in-migration; (b) labour force changes due to changes in the labour force participation rate; (c) changes in unemployment, which are broken down into changes arising from demographic processes and changes arising from changes in the percentage of the labour force that are unemployed; and (d) changes in net in-commuting.

Regression models are estimated to consider the relative strength of the relationships between each of these labour market adjustment responses and percentage employment change. Separate models are estimated for males and females to test whether the adjustment processes of each are different. We also augment the regressions for occupational structure to determine whether the initial occupational structure of an area impacts on the adjustment process.

The results highlight clear differences between males and females. The results show emphatically that employment growth between 1996 and 2001 has elicited substantial changes in commuting behaviour. Women, surprisingly, showing relatively greater in-commuting responsiveness to employment growth. Unemployment changes in local areas are swamped by commuting responses.

In Section 2, recent studies that have employed the LMA framework are reviewed followed in Section 3 by the presentation of the LMA framework in analytical terms. Section 4 provides a detailed description of the data. Section 5 then utilises the decomposed labour market responses in regression models to estimate the relation between employment change and labour market adjustment. Concluding comments are presented in the final section.

THE LABOUR MARKET ACCOUNTS APPROACH

A number of UK studies have analysed the ‘sectoral and spatial shifts for different sections of the labour force’ for cities (Bailey and Turok, 2000: 631) arising from the processes of de-industrialisation and de-urbanisation within the labour market accounts (LMA) framework. An equivalent approach to regional labour market analysis with extensions to analysing localised fiscal impacts of growth was developed separately in the US by researchers under the banner of the Community Policy Analysis Network (CPAN) (see Scott and Johnson, 2000; Renkow, 2003). The major differences between the two approaches relate to the analytical methods used and applications by the two groups (compare Bailey and Turok, 2000 and Renkow, 2003). In this paper, we use the UK approach to decomposition and regression analysis, whereas in a forthcoming paper we will employ systems estimation, common to the US literature, to determine the sensitive of labour market adjustment components to employment growth.

In the UK literature, the LMA framework has been used by Owen *et al*. (1984) and Green and Owen (1991) to explore local labour market areas for the periods, 1971-81, and 1981-84 and 1984-87 respectively. Clustering analysis was employed to identify similarities and differences between the local labour market areas in both studies. Owen *et al*. (1984) point to the influence of a range of spatial processes operating at different levels, both between broad labour market regions as well as along the urban-rural continuum, with non-spatial factors such as the industrial composition of employment also influencing labour market processes. Across a number of labour market change components, notably employment, participation rates, net migration and unemployment, there was evidence of a north-south dichotomy. This spatial distinction is least apparent for unemployment, due to the offsetting impact of regionally differentiated patterns of migration. Green and Owen's study spanned periods of depression and improved economic circumstances. They also found evidence of the north-south divide in economic performance, but a closer comparison of the two studies is not possible because they are based on different numbers of local labour market areas.

More recently, Turok and Edge (1999) looked at cities. Bailey and Turok (2000) looked at the impact of job loss on the labour market adjustment process across major cities in Britain over the period 1981-1991. They found high rates of adjustment occurred through migration and changes in commuting patterns, but some of these changes were an artifact of relocating out of the cities, but continuing to work in them (p.647). For some of the resident workforce, however, the adjustment took the form of higher levels of economic inactivity, which combined with the out-migration lead to unemployment falling despite lower employment. The authors identified major differences between men and women and across occupational groups in their capacity to respond to employment changes. Women had a higher incidence of becoming economically inactive in response to employment loss, while females in less skilled occupations had a much higher rate of inactivity than their more skilled counterparts.

Also cities with high shares of manual workers experienced less out-migration and greater increases in inactivity, in response to a given level of employment change. The authors attribute these results to a number of factors. First more qualified individuals have higher incomes and are able to commute greater distances. In addition, women tend to be more constrained than men due to their higher level of domestic responsibilities, and greater incidence of part-time work. Second, less qualified workers are alleged to experience greater barriers to migration than professional and managerial employees, which can be attributed to income levels, moving costs and barriers to migration arising from the social housing system. Bailey and Turok (2000: 648) suggest that there are likely to be few direct benefits for residents from creating professional and managerial employment, unless a greater percentage can be obtained for this group. First, there are few unemployed residents in these occupations. Second, the potential applicants for these jobs have wide commuting fields and hence significant choice about housing location. On the other hand, job creation for less qualified workers brings direct benefits. Over half of the jobs are obtained by residents previously unemployed or inactive; while more than a quarter go to in-migrants or those who would have migrated out. Few jobs are lost to commuters.

US researcher, Renkow (2003) also employs the labour market accounts framework to explore the determinants of the components of the labour market adjustment process across both urban and rural counties in the USA over a period 1980-90. His study of county-level data covers North Carolina and adjacent counties in Virginia, South Carolina, Georgia and Tennessee. The motivation for his study is both the question of who secures new jobs created in a particular county, but also the public finance considerations, since 44 per cent of local public expenditures in rural North Carolina are funded by residential property taxes, but equally the demand for public services might change too. If new jobs are secured by new residents (in-migrants) rather than residents, the increase in property taxes is accompanied by an increase in demand for public services. However, Renkow does not identify net in-migration by decomposing the change in the labour force.

Renkow (2003: 506) regresses the changes in in- and out-commuting, the change in the labour force and unemployment on a metro dummy, the local changes in employment and the labour force, and the changes in the labour force, the relative wage and relative housing costs within the each county's commuting zone. Renkow shows that changes in commuting patterns and the size of the labour force take up most of the labour market adjustment associated with employment change, as opposed to the unemployment rate, which is consistent with the work of Owen *et al.* (1984). Significant differences in the pattern of labour market adjustment are found between rural and metropolitan counties. The significant take up of new jobs via in-commuting suggests that the leakages associated with employment shocks may be substantial (Renkow, 2003: 510). The author concedes that the geographical unit chosen, namely counties, may influence the results with a larger unit leading to a smaller leakage.

THE LABOUR MARKET ACCOUNTS MODEL

The labour market accounts framework decompose the movements in working age population (*WAP*) and labour force (*LF*) for a particular area to determine who fills the jobs arising from changing employment levels. The approach is useful for analysing the amount that any particular community enjoys higher incomes as a result of employment growth (Barkley *et al*., 2002) as well as providing the basis for measuring the shortfall of jobs in a local area (Bailey and Turok, 2000).

Figure 1 presents a stylised version of the LMA framework to show the seven labour force sources (components) for workers in local employment. Following Barkley *et al*. (2002), local residents who are currently not in the labour force may choose to become economically active (A) by increasing their labour force participation. Local unemployment residents may gain local employment (B). Local residents who are in employment (locally or not) may take additional jobs (C), or they may quit and take new local jobs (D, E). Residents from outside the local area may also in-commute (F) or 'in-migrate' (move into) the local area (G) and take employment there.

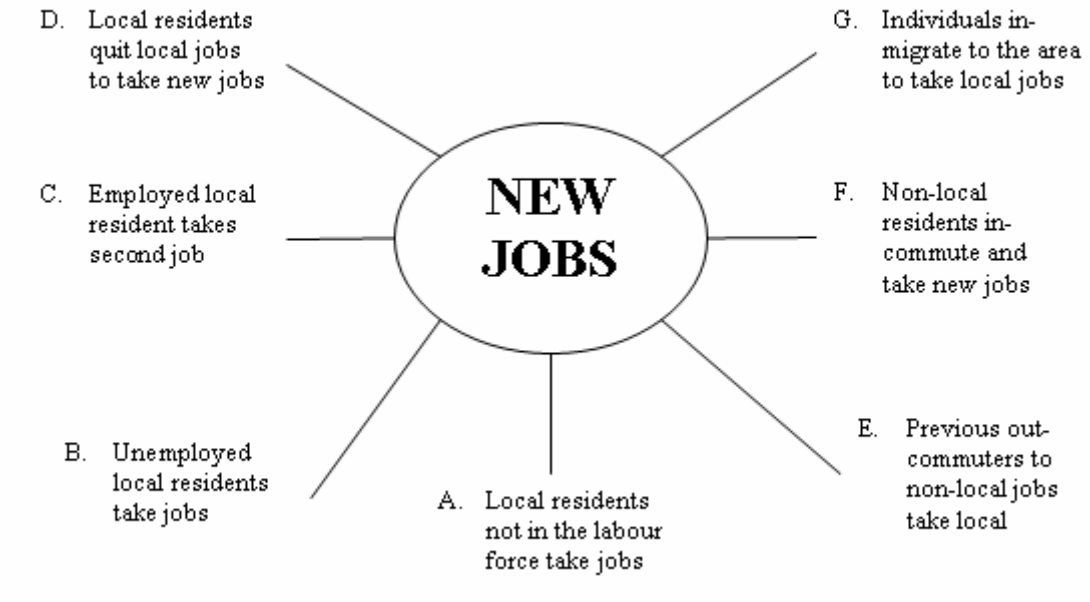

Figure 1 Allocation of new jobs among components of the labour force
Source: Barkley *et al*, 2002.

The system of labour market accounts used in this paper draws on the contemporary approach of Bailey and Turok (2000), which is compatible with the stylisation presented in Figure 1. Bailey and Turok (2000, p.637) note that employment change over time in an area gives rise to three interrelated changes, namely changes in the number of economically active residents, which

incorporates the level of net in-migration, changes in the number of these residents who are unemployed and changes in net commuting flows.
Then

$$\Delta E \equiv \Delta LF - \Delta U - \Delta C \quad (1)$$

where *E* denotes employment in the local area, *LF* is the local resident labour force (or the number of economically active local residents), *C* is the level of net out-commuting, *U* denotes the level of unemployment of local residents and the symbol Δ denotes the change in levels.

In turn, the change in the economically active local population (*LF*) can be separated into the component arising from the change in the working age population (*WAP*) arising from demographic processes (ΔLF_d) and the change associated with the change in the labour force participation rate ($\Delta LFPR$)

$$\Delta LF \equiv \Delta LF_d + \Delta LFPR \quad (2)$$

The first term can be broken down into the component associated with natural increase in the *WAP* increase (ΔNI) and that associated with net out-migration (ΔNM).

$$\Delta LF_d \equiv \Delta NI - \Delta NM \quad (3)$$

Similarly Bailey and Turok (2000: 638) note that changes in unemployment can also be broken down into the component associated with the change in the demographic process and that arising from the change in the unemployment rate, so that

$$\Delta U \equiv \Delta U_d + \Delta U_r \quad (4)$$

The final component of the accounts arises from the change in the net in-commuting associated with the local area (ΔC), which, subject to data availability, can be broken in into gross changes in in-commuting minus gross changes in out-commuting. More simply it can be written as:

$$\Delta C \equiv \Delta E_r - \Delta E_l$$

where ΔE_l denotes the change in local (SLA) employment and ΔE_r denotes the change in the level of employment of residents, some of which is local. Then successive substitution of (2), (3) and (4) into (1) yields the following identity:

$$\Delta E \equiv \Delta NI - \Delta NM + \Delta LF_r - \Delta C - \Delta U_d - \Delta UR \quad (5)$$

DATA SOURCES AND DESCRIPTIONS

Statistical Local Area (SLA) data for this paper are drawn from a number of sources. Census data for a range of demographic characteristics (age, sex and occupation, as well as the SLA based economic and socio-demographic characteristics are taken from the Basic Community Profile (BCP), the Time Series Profile (TSP) and the Working Population Profile (WPP). These data were collected on the 7 August 2001 and persons are counted on an enumeration, rather than usual residence basis. While the Greater Metropolitan Sydney study area, officially comprises 70 SLAs, only 55 SLAs were recorded in the customized data table supplied by the ABS (involving the aggregation of Sydney, Newcastle, Blacktown, Sutherland Shire and and the removal of SLAs in the upper and northern Hunter). These 55 SLAs became the new basis for our study using Census data for 1996 and 2001. The SLA based Basic Community Profiles (BCPs) for the two years yield the resident populations of the SLAs by age (and sex) and hence the *WAP*, that is workers 15 and over, the labour force participation rate and the levels of employment by industry and occupation and unemployment.

A simple comparison of the *WAP*s over the five years yields the natural increase in the *WAP* from individuals getting older minus any deaths in that age group plus the level of net in-migration. The natural change in the *WAP* can be obtaining from age adjusting the 1996 *WAP*. In order to calculate

the rate of natural labour force change SLA level death rates were devised using SLA *Demography NSW*, 3311.1, 2001 and *Deaths, Australia* 3302.0, 2001. An estimate of deaths across the age distribution for men and women in each SLA over the 5 year period is obtained by calculating the implied deaths across the age distribution from the age and sex specific NSW death rates and reconciling through pro-rata adjustment the implied total number of deaths in each SLA with the total official recorded annual deaths in each SLA. The estimate of total deaths across the age distribution for both males and females enables the computation of net in-migration by sex.

The Working Population Profiles (*WPP*) for each census year yield the local (SLA) levels of employment by sex, which contribute to the computation of the change in net in-commuting over the 5 year period. Data does not permit complete disaggregation of labour market accounts by occupation. Complete analysis would require unemployment by occupation and gender for each spatial area.

For SLAs within the NSW Greater Metropolitan Region, a customised table of employees broken down by occupation minor group (3 digit) by sex was also obtained from the ABS for the purposes of calculating changes in commuting patterns. A further table of Journey to Work (JTW) data was supplied by the NSW Department of Planning, providing a matrix of commutes on the night of the 1996 and 2001 Census. It counts employees travelling from their home SLA to their work SLA, broken down by occupation and sex within the Greater Metropolitan Sydney Area.

MODELLING LABOUR MARKET RESPONSES TO EMPLOYMENT GROWTH

Overview of labour market responses

Table 1 presents the summary statistics of the labour market responses to employment change between 1996 and 2001 for males and females. The areas gained on average 8.6 per cent of their male labour force and 8.8 of their female labour forces over this period due to demographic changes with Net in-migration dominating (4.7 per cent for males and 5.3 per cent for females). In this

Table 1 Summary statistics of labour market responses to employment change, 1996-2001

	Mean	Std. Dev.	Maximum	Minimum
Males				
LF changes due to demography	8.59	14.83	105.04	-3.64
Natural increase in LF	3.92	2.88	11.73	-1.70
Net in-migration to LF	4.67	15.10	105.18	-6.09
LF changes due to DLFPR	-2.12	4.00	4.55	-24.89
Change in UN due to demography	0.49	0.95	5.97	-0.64
Change in UN due to DUR	-1.59	1.10	0.41	-4.39
Change in net in-commuting	1.69	29.19	206.13	-29.32
Females	Mean	Std. Dev.	Maximum	Minimum
LF changes due to demography	8.76	16.54	118.76	-3.39
Natural increase in LF	3.45	2.99	10.53	-3.12
Net in-migration to LF	5.31	16.58	117.84	-5.44
LF changes due to DLFPR	1.65	3.56	8.28	-17.30
Change in UN due to demography	0.76	1.19	7.97	-0.39
Change in UN due to DUR	-1.44	1.17	0.19	-4.56
Change in net in-commuting	6.78	60.08	441.90	-18.06

Note: components are expressed as a percentage of 1996 labour force, for males and females, respectively.

growth period, male labour force participation changes reduced the available labour force on average across the areas whereas female labour force participation increased. It is clear that on average, the employment growth has only had a muted impact on the unemployment of residents. While changes in net in-commuting were a positive addition to the labour forces for the study areas for males (1.7 per cent on average), they represent a dominant labour market response for females (6.8 per cent on average). This is the notable result from our study and bears further analysis.

To shed more light on these results, we examine the LMA decompositions for variation among the areas within the study region outlined in Section 4. Figure 2 shows the individual LMA components of the change in employment between 1996 and 2001 for males while Figure 3 shows the LMA components for females. It is clear that the Sydney SLA dominates the other SLAs in both cases. The variation of values across areas is greater for males. There is also clearly more variation in labour market adjustment displayed for both males and females in the components that involve people moving either their residence or travelling to work via commuting. The muted response of unemployment revealed in Table 1 also translates in a lack of variation in the unemployment responses across the SLAs, the Sydney SLA included. It is clear that the employment growth experienced over this period (1996-2001) was not particularly beneficial in terms of reducing unemployment.

In terms of the net in-commuting, there is much greater variation for males between the areas that experienced net out-commuting and those that gained from this behaviour in the form of net in-commuting. Table 2 ranks the SLAs in descending order for the net in-commuting component and provides some indication of which SLAs gained workers from this source and which lost workers. There is very little correlation across males and females of the sorted lists of SLAs.

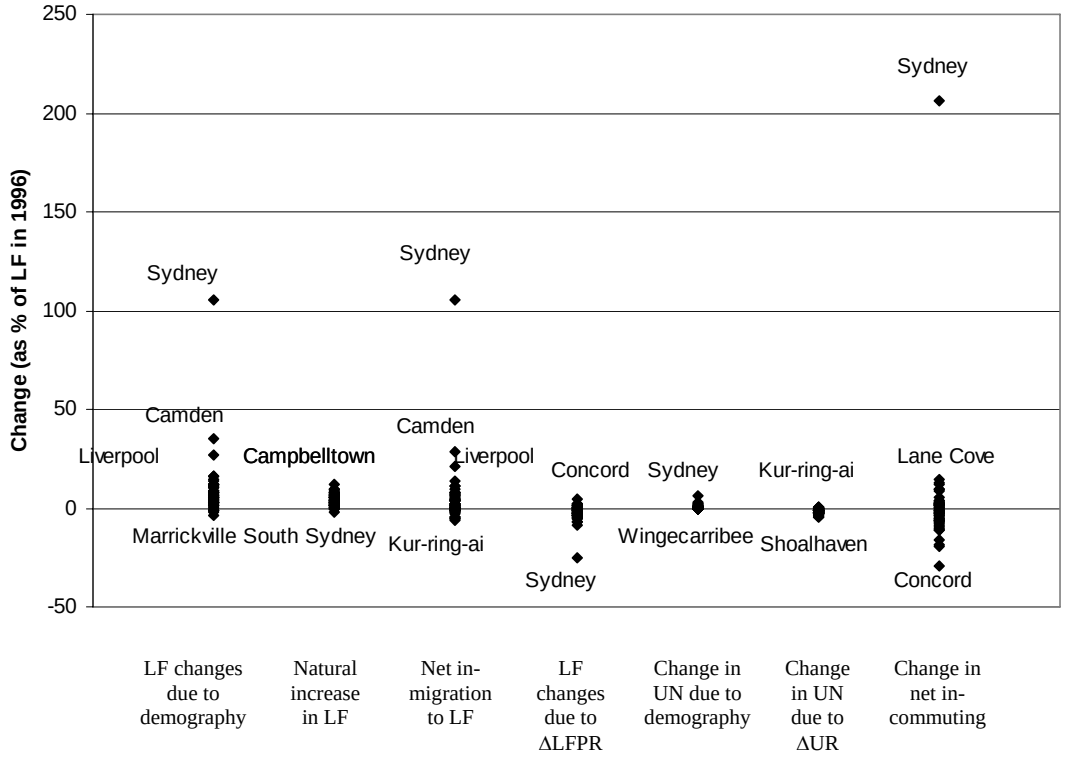

Figure 2 Change in employment by SLA, 1996-2001, Male residents
Source: Authors' own calculations from Equation (5).

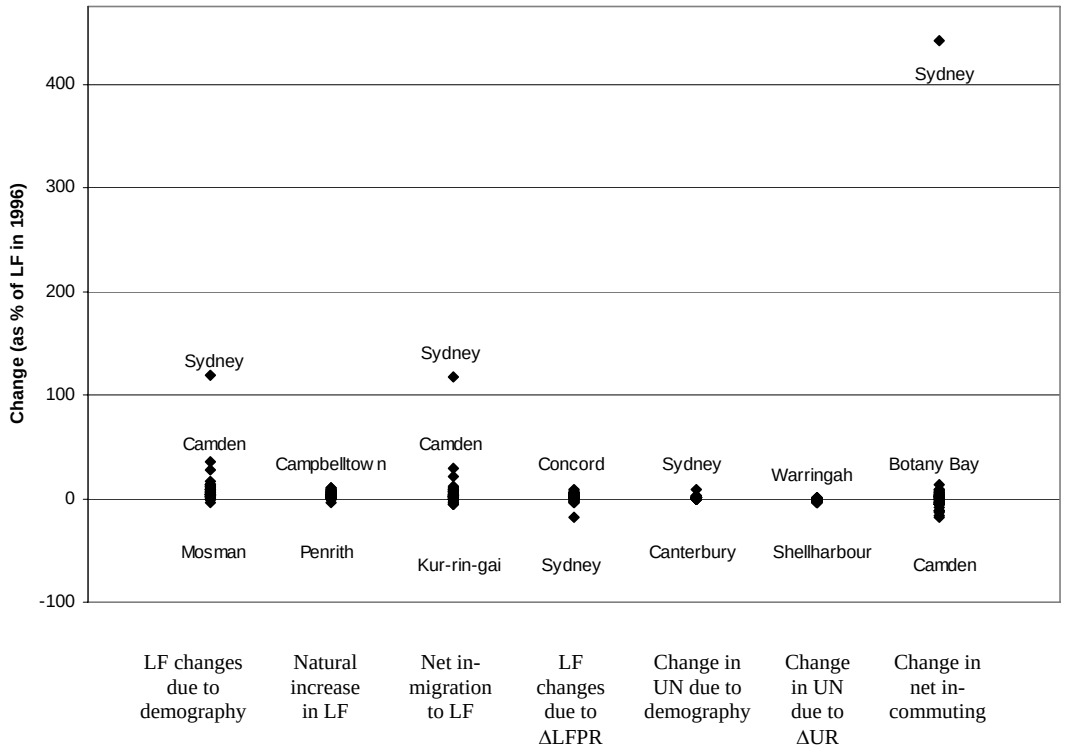

Figure 3 Change in employment by SLA, 1996-2001, Female residents
Source: Authors' own calculations from Equation (5).

Regression analysis of labour market responses

Bailey and Turok (2000: 639) use regression models "to examine the relative strength of the relationships between employment change and each of the labour market adjustment variables." Several models were explored. The first equations estimated separately for males and females involve regressing each of the labour market adjustment components outlined in Section 3 expressed as a percentage of the 1996 labour force on the employment change between 1996 and 2001 (for males and females, respectively) expressed as a percentage of the respective 1996 labour forces.

The slope coefficient measures the response of that particular labour market adjustment mechanism to employment change. The constant term may be interpreted as measuring the labour market adjustments that are not attributable to employment change although their robustness in this context is debatable. We also seek to determine whether the initial occupational structure of an area impacts on adjustment? It is expected that areas with higher proportions of manual workers would experience lower levels of adjustment. This leads to the further expectation that the adjustment processes of men and women are different. While this arises partly as a result of occupational differences, women are more likely instrumentally attached to the labour force.

Male results

The male results for the labour market adjustment responses to employment change are shown in Table 3. As outlined in the introduction, the sample period (1996 to 2001) was a period of consolidated growth (following the 1991 recession).

The results show that there is considerable adjustment to employment change in the form of net in-migration and net in-commuting with the latter dominating. The results confirm those of Bailey and Turok (2000) who found similarly for the UK. By way of interpretation, for every 1000 male jobs created in an area, net in-commuting by men rose by 744 and 364 economically-active men

Table 2 Change in in-commuting component, 1996-2001, males and females

Males		Females	
Sydney	206.1	Sydney	441.9
Lane Cove	14.2	Botany Bay	12.7
Ryde	12.9	Cessnock	8.5
North Sydney	12.2	Lane Cove	8.3
Cessnock	9.6	Ryde	7.4
Botany Bay	9.4	Mosman	6.7
Port Stephens	9.1	Port Stephens	5.9
Willoughby	5.5	Manly	4.9
Campbelltown	3.8	Ku-ring-gai	4.8
Woollahra	3.6	Woollahra	4.2
Fairfield	3.1	Hunter's Hill	4.1
Maitland	2.7	Pittwater	3.8
Pittwater	2.5	Kogarah	2.9
Hawkesbury	2.3	Burwood	2.8
Randwick	2.1	Hawkesbury	2.7
Manly	2.0	Randwick	2.6
Shoalhaven	2.0	Baulkham Hills	2.5
Waverley	1.8	Campbelltown	2.4
Lake Macquarie	1.6	Parramatta	1.9
Mosman	1.2	Shoalhaven	1.8
Blacktown	1.0	Waverley	1.7
Ku-ring-gai	0.9	Maitland	1.5
Kogarah	0.5	Newcastle	0.8
Canterbury	0.2	Warringah	0.8
Warringah	-0.3	Canterbury	0.2
Kiama	-0.7	Wingecarribee	0.2
Sutherland	-1.3	Gosford	-0.2
Hunter's Hill	-1.4	North Sydney	-0.5
Blue Mountains	-1.6	Sutherland	-0.9
Gosford	-1.8	Penrith	-1.0
Penrith	-2.3	Fairfield	-1.1
Wingecarribee	-2.4	Lake Macquarie	-1.2
Hornsby	-2.5	Willoughby	-1.7
Shellharbour	-2.5	Holroyd	-2.4
Ashfield	-2.9	Wollongong	-2.6
Parramatta	-3.4	Bankstown	-3.2
Baulkham Hills	-3.4	Blue Mountains	-3.7
Rockdale	-4.5	Rockdale	-3.7
Leichhardt	-5.6	Shellharbour	-4.2
Auburn	-5.8	Kiama	-4.8
Holroyd	-6.0	Auburn	-4.8
Wollongong	-6.4	Strathfield	-4.8

Burwood	-6.6	Blacktown	-5.0
Bankstown	-6.8	Wyong	-5.1
Hurstville	-7.1	Ashfield	-5.4
Marrickville	-7.8	Drummoyne	-5.4
Wyong	-8.9	Hornsby	-6.1
Newcastle	-9.2	Hurstville	-6.2
Drummoyne	-10.6	Leichhardt	-9.0
Strathfield	-10.8	Wollondilly	-11.3
South Sydney	-10.8	Concord	-11.6
Camden	-16.4	South Sydney	-11.9
Wollondilly	-18.4	Marrickville	-12.8
Liverpool	-19.6	Liverpool	-16.9
Concord	-29.3	Camden	-18.1

migrated into the same area. The goodness of fit measures (adjusted R^2) indicate that the relationships are strong (0.95 and 0.85, respectively for in-commuting and in-migration). So both out-migration and out-commuting occur in areas where employment losses arise.

The employment growth had only a small impact on the change in unemployment however (1000 extra jobs reducing unemployment by 5 via reductions in the unemployment rate but increasing it by 20 as a result of demographic processes (among them the hidden unemployed). Notably, 81 workers dropped the out of the labour force via participation rate changes for every 1000 jobs created. Given the surprising nature of this result, we are exploring the sensitivity of different age cohorts. It should be emphasised that the adjustments are over a 5 year period and they indicate that at least for some males (particularly those unemployed in 1996) the response to employment growth has been extremely muted.

The constant terms in each equation, inasmuch as we can interpret them as indicating the extent of adjustment that is not explained by the percentage change in employment, tell us that the labour force grew by 4.0 (on average) as a result of natural increase; by 1.3 per cent (on average) as a result of net in-migration; shrunk on average by 1.4 per cent due to declining labour force participation rates.

Bailey and Turok (2000: 642) suggest that “part of the explanation for these changes must lie in the changes for different occupational groups. With a rising proportion of jobs in the professional and other skilled occupations, it would be expected that a larger proportion of the employment opportunities would be taken by in-commuters. This reflects the fact that the more advantaged population cohorts have greater choice of housing and transport and as a result tend to commute longer distances than the more disadvantaged segments of the population. Equally, the declining participation rate for the resident populations is consistent with a smaller proportion of less skilled job opportunities.

The regression models can be extended by adding more control variables to the right hand side. As a first step, we included a metropolitan dummy which took the value of 1 for a metro region and 0 otherwise (based on the Sydney MSR geography). Following Bailey and Turok (2000: 642), we also controlled for occupational structure as a “means for assessing the extent to which different occupational groups were able to adjust to employment change.” In this regard, the percentage of manual male workers in total male employment for each area was also included. The relationship between occupational structure (as measured here) and employment change is predicted to be strongly positive in a growth phase.

Table 3 Labour market adjustment responses to employment change for males

Labour market adjustment component	Constant (%)	Coefficient for % Change Employment	*t*-statistic for Change Employment	Adjusted R^2
Change in residents Labour Force				
Due to demographic processes	5.333	0.352	15.758	0.821
natural increase	4.029	-0.012	-1.155	0.006
net in-migration	1.304	0.364	17.301	0.847
Due to change in LFPR rate	-1.375	-0.081	-8.953	0.594
Increase in net in-commuting	-5.198	0.744	32.468	0.951
Change in unemployment				
Due to demographic processes	0.301	0.020	9.862	0.641
Due to change in unemployment rate	-1.542	-0.005	-1.288	0.012

Note: LFPR is labour force participation rate.

The results of the augmented regressions are shown in Table 4. The metropolitan dummy only impacts significantly on labour force participation with the metropolitan regions having higher levels of labour force activity than the non-metropolitan regions.

The inclusion of the occupational structure does not significantly alter the estimated labour market responses to employment change which are shown in Table 3, although the goodness of fit of the regressions improves in some cases. The statistically significant negative coefficients (on the labour force participation and change in the unemployment rate components) suggest that areas which had higher percentage of manual employment have lower labour force participation rates and less reduction in unemployment as a result of employment change. The natural increase component is marginally significant (*t*-stat = 1.85) and positive. Bailey and Turok (2000: 642) also note a similar result for the UK and drawing on the work of Armitage (1997) suggest that "this is likely to reflect the higher fertility rates which occur in areas with higher concentrations of manufacturing industry".

Female results

The female results for the labour market adjustment responses to employment change are shown in Table 5. The results are in contrast to those for males (Table 3). Overall, the labour force responses due to demographic processes are smaller for women than they are for men. Further, the prior expectation was that women would be less likely to respond to employment change through migration or commuting by comparison to their male counterparts. However, while the net in-migration response is lower for females (219 jobs per 1,000 extra jobs compared to 364 for males), the in-commuting coefficient (highly statistically significant) tells a different story and indicates that for every 1,000 jobs generated there are (on average) 832 extra female in-commuters to the area (compared to 744 for males). Indeed, in-commuting is the main female response to employment change. Bailey and Turok (2000) found that the main response for women was in changing labour force participation rates. Given that our data is for a period of consolidated employment growth (in contrast to Bailey and Turok, who studied a period of employment loss) we would expect the cyclical labour force responses to be muted. The results confirm this expectation. For every 1000 jobs created 35 women leave the labour force.

The main picture to emerge from the results is that women rely more heavily on commuting across regions relative to men to gain income-earning opportunities in response to employment growth.

Table 4 Labour market adjustment responses to employment change for males with occupational structure

Labour market adjustment component	Constant (%)	Coefficient for % Change Employment	*t*-statistic for Change Employment	Coefficient Manual % Total Employment	*t*-statistic for Manual % Total Employment	Coefficient Metro Dummy	*t*-statistic for Metro Dummy	Adj R^2
Change in residents Labour Force								
Due to demographic processes	1.614	0.358	15.801	0.459	1.434	0.127	0.056	0.822
natural increase	2.009	-0.008	-0.775	0.266	1.851	-0.097	-0.096	0.044
net in-migration	-0.395	0.366	16.850	0.193	0.629	0.225	0.104	0.842
Due to change in LFPR rate	0.082	-0.088	-11.925	-0.385	-3.705	1.982	2.701	0.742
Increase in net in-commuting	-1.686	0.742	31.428	-0.262	-0.785	-1.826	-0.775	0.950
Change in unemployment								
Due to demographic processes	0.031	0.020	9.796	0.030	1.027	0.040	0.191	0.634
Due to change in unemployment rate	-0.022	-0.008	-2.592	-0.218	-4.829	0.244	0.767	0.357

Note: Adj R^2 is the adjusted R^2.

Similar to the male results, employment growth had only a small impact on the change in female unemployment however (1000 extra jobs reducing unemployment by 2 via reductions in the unemployment rate but increasing it by 14 as a result of demographic processes. Given the adjustments are over a 5 year period the response of unemployed females (in 1996) to employment growth has been extremely muted.

The notable difference in the constant terms for women is in the participation rate response. The constant terms indicate the extent of adjustment that is not explained by the percentage change in employment. For females, this component suggests a 2.3 per cent (on average) labour force increase as a result of labour force participation responses compared to the shrinking male response.

Table 6 reports the results of the extended regressions along the same lines as those reported in Table 4 for males. The metropolitan dummy impacts significantly only on the change in unemployment due to demographic processes response for females. The results suggest that females in metropolitan regions enjoy greater reductions in unemployment relative to their non-metropolitan counterparts when employment is growing. There are no other statistically significant differences in the labour market responses for females between the metropolitan and non-metropolitan areas.

As in the male case, the inclusion of the occupational structure variable in the female regression does not significantly alter the estimated labour market responses to employment change which are shown in Table 5, although the goodness of fit of the regressions improves in some cases. The natural increase component is strongly significant and positive and dominates the employment change response. It is also consistent with the male result discussed earlier. The other responses are not sensitive to the inclusion of this measure.

Table 5 Labour market adjustment responses to employment change for females

Labour market adjustment component	Constant (%)	Coefficient for % Change Employment	*t*-statistic for Change Employment	Adjusted R^2
Change in residents Labour Force				
Due to demographic processes	4.919	0.215	18.799	0.867
natural increase	3.514	-0.003	-0.602	-0.012
net in-migration	1.404	0.219	21.106	0.892
Due to change in LFPR rate	2.278	-0.035	-7.349	0.495
Increase in net in-commuting	-8.082	0.832	60.471	0.985
Change in unemployment				
Due to demographic processes	0.510	0.014	12.148	0.731
Due to change in unemployment rate	-1.395	-0.002	-1.016	0.001

Note: LFPR is labour force participation rate.

Table 6 Labour market adjustment responses to employment change for females with occupational structure

Labour market adjustment component	Constant (%)	Coefficient for % Change Employment	*t*-statistic for Change Employment	Coefficient Manual % Total Employment	*t*-statistic for Manual % Total Employment	Coefficient Metro Dummy	*t*-statistic for Metro Dummy	Adj R^2
Change in residents Labour Force								
Due to demographic processes	3.484	0.217	18.829	0.320	1.185	-0.779	-0.362	0.867
natural increase	0.706	-0.001	-0.154	0.467	3.958	-0.231	-0.247	0.226
net in-migration	2.778	0.218	20.547	-0.146	-0.588	-0.547	-0.277	0.888
Due to change in LFPR rate	3.566	-0.035	-7.286	-0.050	-0.443	-1.212	-1.339	0.493
Increase in net in-commuting	-6.799	0.829	60.756	-0.450	-1.406	2.011	0.790	0.986
Change in unemployment								
Due to demographic processes	0.618	0.015	13.830	0.047	1.899	-0.514	-2.612	0.785
Due to change in unemployment rate	-0.367	-0.004	-2.269	-0.227	-6.042	0.534	1.789	0.488

Note: Adj R^2 is the adjusted R^2.

CONCLUSION

This paper is the first to apply the Labour Market Accounts framework to Australian data. At this stage the results must be considered to be tentative. The heavy reliance of both women and men on changes in commuting patterns is in part a consequence of the choice of SLAs as the basic spatial units of analysis. By contrast, Bailey and Turok (2000) examined 28 urban areas, so that intra-urban changes in the spatial pattern of commuting would be suppressed in their work. The net in-commuting variable is constructed via employment figures from the WPP and BCP. These data warrant further exploration.

The main picture to emerge from the results is that women rely more heavily on commuting across local areas relative to men to gain income-earning opportunities in response to employment growth. The employment growth had only a small impact on the change in unemployment for both males and females. The metropolitan dummy only impacts significantly on labour force participation with the metropolitan regions having higher levels of labour force activity than the non-metropolitan regions. Within this single equation framework the commuting results are separate from those relating to participation.

The inclusion of the occupational structure does not significantly alter the estimated labour market responses to employment change which are shown in Table 3, although the goodness of fit of the regressions improves in some cases. The statistically significant negative coefficients (on the labour force participation and change in the unemployment rate components) suggest that areas which had higher percentage of manual employment have lower labour force participation rates and less reduction in unemployment as a result of employment change. The natural increase component is marginally significant and positive.

The next phase of this research is to focus more closely on the dominance of net in-commuting in the male and female regression results. Increasing net in-commuting can arise if in-commuting increases and/or out-commuting declines. Disentangling these sub-components is important because the two flows have significantly different implications for the local area labour forces.

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