STATE DIFFERENCES IN THE EQUILIBRIUM EMPLOYMENT-POPULATION RATIO

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ABSTRACT: This paper looks at differences in the employment population ratio across Australian States taking a flows approach. One aim is to show that a flows approach can easily be applied to compare equilibrium values of various labour market variables or ratios and not just the unemployment rate. A second aim is to shed light on the reasons for the low employment-population ratio in SA and TAS. The flows data indicates that their situation is markedly different. For SA the entry rate is low but so also is the exit rate. In TAS the exit rate is high while the entry rate is low. Some possible reasons for the difference between the two are advanced and discussed. It is conjectured that State government policies aimed at lowering the rate at which jobs are destroyed may have played a role.

1. INTRODUCTION

There are a number of reasons to be interested in persistent differences between the States in the employment-population ratio. To begin with we have evidence that differences in this ratio are associated with marked differences in per capita income and other measures of welfare (Williamson (1965), Dixon (2003) and Louca (2003)). A second reason is that it has a rather obvious bearing on the capacity of State governments to fund their expenditure through State revenues. Also, if we are interested in the functioning of the labour market in the regions we have to accept that large numbers flow between being not in the labour force and employment (and vice-versa) and so the unemployment rate (or the ratio of employment to the labour force) is not a good measure of employment relative to potential. There are two reasons for exploring differences in the employment-population ratio using a flows approach. First, it may give us additional insight into the reasons for the differences we observe. Second, it is a way of demonstrating that a flows approach can easily be applied to compare equilibrium values of various labour market variables or ratios and not just the unemployment rate. It is common now-a-days to see models even in undergraduate text books of the equilibrium unemployment rate in terms of separation and finding rates (eg Barro (1997, Ch 10) and Mankiw (1997, Ch 5) and these ideas have found their way into the regional literature (see Martin and Sunley (1999) for an example) but in fact the technique can be adapted to look at other proportions, including the employment-population ratio. So far as I am aware, this has not been done before. The use of empirical data on the relevant flows is facilitated by the recent availability of gross flows data at the State level back to 1997 via an ABS Datacube.[1]

[1] ABS Datacube 6291.0.55.001 Table GM1 - labour force status and gross changes (flows) by sex, state, age. Unfortunately, the number of empty cells and/or low numbers

The paper is organised as follows. The next section sets out the elements of a flows approach to the (equilibrium) employment-population ratio. Section 3 describes the data set upon which this study is based. In sections 4 and 5 we look at the evidence on the relative levels of entry and exit rates and comment upon the findings. The final section concludes.

2. ENTRY AND EXIT RATES IN A FLOWS MODEL

At any moment in time all members of the population (*P*) will be in one or other of three labour market states. Specifically, they will either be employed (*E*), unemployed (*U*) or Not in the labour force (*N*). Over time the number in each of these labour market states will change as people flow from one state to another. In particular, people can enter employment from one or other of two states, some people might move from being not in the labour force into employment (*NTE*) while others might move from a state of being unemployed into employment (*UTE*). Likewise people might exit from employment to not in the labour force (*ETN*) or to unemployment (*ETU*).

Define the 'entry rate' into employment (*en*) as

$$en = \left(\frac{NTE + UTE}{N + U} \right) \tag{1}$$

and the 'exit rate' from employment (*ex*) as

$$ex = \left(\frac{ETN + ETU}{E} \right) \tag{2}$$

Let 'equilibrium' be a situation where the size of the inflow into employment is exactly matched by the size of the outflow, so that the total number employed is constant over time.[2] In this event,

$exE = en(N + U)$

Now, by definition, $N + U = P - E$, so we can write the above as:

$exE = enP - enE$,

Combining like terms together, yields:

$(ex + en)E = enP$

This can be rearranged to give an expression for the equilibrium employment-population ratio (this is the value of the ratio consistent with the inflow to and outflow from the pool of employed being equal):

$$(E/P)^{*} = \frac{en}{en + ex} = \frac{1}{1 + \left(1/\left(en/ex\right)\right)} \tag{3}$$

Which is to say two things: First, that the equilibrium employment-population ratio will be higher, the higher is the entry rate (cet par) and the lower

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in many of the tables for the ACT and the NT mean that analysis is best restricted to the six States.

[2] In the data set we are going to use the population is held constant over the course of each month by virtue of the way the data set is constructed (we are using matched records data). If *E* is also constant then the ratio of *E* to *P* must be constant.

is the exit rate (cet par). Second, that a given percentage difference in the entry rate between States will have the same effect on the equilibrium employment-population ratio as a difference (in the opposite direction and by the same percentage) in the exit rate between States.[3]

The next section of the paper sets out a description of the data set upon which this study is based.

3. THE DATA

The empirical work in this paper is based on information obtained from persons in the Labour Force Survey whose responses (records) can be matched across successive months.[4] The Labour Force Survey (LFS) is a component of the Monthly Population Survey which is based on a multi-stage area sample of private dwellings (currently about 30,000 houses, flats, etc.) and a (much) smaller number of non-private dwellings (hotels, motels, etc.).[5] It covers approximately one-half of one percent of the population of Australia. Households selected for the LFS are interviewed each month of eight months, with one-eighth of the sample being replaced each month. In the interviews an attempt is made (inter alia) to establish whether each person is in or out of labour force and, if in, whether employed or unemployed. To derive labour force estimates for the 'population', expansion factors (weights) are applied to the sample responses. Weighting ensures that LFS estimates conform to the benchmark distribution of the population by age, gender and geographic area. Whilst the estimates for 'stocks' (such as the number unemployed, the number in the labour force etc) are adjusted for any under-enumeration and non-response, the Gross Flows estimates are not.

Data on gross flows between months is based on the matched sample - that is, persons surveyed in a given month whose responses in that month can be matched with responses in the previous month. The matched sample differs from the total sample for three reasons: the exclusion of respondents in non-private dwellings, sample rotation and 'non-response'.

For the LFS, private dwellings (such as houses and flats) and non-private dwellings (such as hotels and motels, boarding houses and short-term caravan parks, hospitals and homes, educational colleges and aboriginal settlements) are separately identified and sampled. The transient nature of many of the occupancies and the procedures used to select persons in non-private dwellings preclude the possibility of matching any of them who may be included in successive surveys. Indeed, no attempt is made to match these responses.

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[3] I think this is obvious, but just in case a proof is in the Appendix to this paper.

[4] Extensive discussion of the source of the data and the method used by the ABS to translate sample data into 'population equivalents' may be found in Dixon et al, (2002) and in the references cited therein. Much of what follows is taken from that article or from the ABS publication *Labour Statistics: Concepts, Sources and Methods*, ABS Catalogue Number 6102.0.55.001, Ch 19.

[5] Non-private dwellings make up about 3 percent of the total LFS sample.

However in relation to private dwellings, even though there is sample rotation,[6] a high proportion of the dwellings selected in one survey remains in the sample for the following survey and the response rate in the survey is quite high. This means that it is possible to match the characteristics of most of the persons in those dwellings from one month to the next, to record any changes that occur, and hence to produce estimates of flows between the different categories of the population and labour force.

Overall, those whose records can be matched represent about 80 percent of all people in the survey and these records represent around 93 percent of the population.[7] Although this is less than 100 percent, key indices such as the employment-population ratio, the unemployment rate and the participation rate calculated for the matched sample are highly correlated both over time and across States with the same indices for the whole survey/population. For example, the (mean) employment-population ratio computed from the matched records and the employment-population ratio computed from all persons in the survey (not just those whose records could be matched across successive months) are very highly correlated across States (r = 0.98) even though in every month the absolute number employed represented by the matched sample is smaller than the number for the whole population.[8]

4. THE ENTRY AND EXIT RATES

Table 1 shows the mean values of the entry (*en*) and exit (*ex*) rates for the six States and for Australia as a whole over the period 1997:10 – 2005:08.[9] The last column shows the implied equilibrium employment-population ratio.[10] The reader should note that it is the convention when computing flow rates or transition probabilities (such as *en* and *ex*) to relate the size of the flow over any period (in our case, a month) to the size of the relevant stock measured at the

[6] As it is not reasonable to retain the same respondents in the survey for a long period of time, a proportion of the private dwellings in the sample are replaced each month. This procedure is known as sample rotation. Since the monthly LFS commenced in 1978, dwellings have been retained in the survey for eight consecutive months so that about one-eighth of the sample has been replaced each month. Thus the LFS sample can be thought of as consisting of eight sub-samples (or rotation groups), with a new rotation group being introduced into the sample each month to replace an outgoing rotation group.

[7] This is because the members of the 'missing' rotation group (1/8 of the total sample) will have characteristics pretty much identical to those who have remained in the survey across successive months. I f we expand the 80 percent to allow for this we have a figure of around 93 percent of the total sample. This is less than 100 percent due to non-response and the fraction of the population who are in non-private dwellings. See Dixon (2001) and Dixon et al. (2002) for further discussion.

[8] For each state the employment-population ratio computed from the whole of the Labour Force Survey and that computed from the matched records differ by less than 0.015.

[9] The entry and exit rates are computed from gross flows data over the period 1997:10 – 2005:08 obtained from the ABS in Datacube 6291.0.55.001 Table GM1 - labour force status and gross changes (flows) by sex, state, age. All figures refer to flows per *month*.

[10] The equilibrium values are very close to the observed means for each State over the period, differences between the two being 0.01 or less.

beginning of the period (month). Table 2 shows the same data except that all entries have been expressed relative to the value for AUS. In section 2 above we saw that a given deviation of *ex* or *en* by x% above or below 1.00 will (cet par) be associated with the same deviation in $(E/P)^*$ above or below 1.00. So one advantage of expressing all values relative to AUS is that it is easy to see the contribution of each variable to the difference between the equilibrium employment-population ratio in the State and that for Australia taken as a whole. A second advantage arises because we know that the matched sample represents only around 93 percent of the population and it is possible that the missing portion has quite different characteristics to the included portion.[11] However, although this might lead to some bias entering into the absolute values of each the variables for each of the States, it is less likely to lead to bias in the relative levels across states. For this reason it is best to look at all of the numbers in all of the tables in this paper as giving good information on the relative levels rather than the absolute levels of the variables.

Table 1. Mean values of *en* and *ex* and the implied equilibrium employment - population ratio: 1997:10 – 2005:08.

	en	*ex*	*(E/P)**
NSW	0.0586	0.0392	0.599
VIC	0.0599	0.0381	0.611
QLD	0.0635	0.0384	0.623
SA	0.0505	0.0358	0.585
WA	0.0683	0.0372	0.647
TAS	0.0477	0.0392	0.549
AUS	0.0601	0.0382	0.611
SD	0.0078	0.0013	0.0336
CV	0.1339	0.0344	0.0558

Table 2. Same data as for Table 1A but with all entries expressed relative to the AUS value

	en	*ex*	*(E/P)**
NSW	0.98	1.03	0.98
VIC	1.00	1.00	1.00
QLD	1.06	1.01	1.02
SA	0.84	0.94	0.96
WA	1.14	0.97	1.06
TAS	0.79	1.03	0.90
AUS	1.00	1.00	1.00

For ease of exposition in commenting on the tables I will focus on SA and TAS (the two States with a low employment-population ratio) and leave it to the reader to use the method described to develop information about the situation in

[11] See Dixon (2001) for further discussion of the characteristics of those whose records are not matched and so are not 'represented' in the flows data.

other States from the data provided here.

The key pieces of information in Tables 1 and 2 are: (a) the entry rate is (far) more variable across States than is the exit rate,[12] (b) the entry rate is below average in both TAS and SA, and (c) the exit rate is above average in TAS but not in SA.

It is possible to explore the entry rate in a little more detail and, by doing so, to link both entry and exit flows with job or, more correctly, employment creation and destruction.

The entry rate was defined above as the (gross) flow into employment relative to the total number not employed. This will depend upon two things, first, the size of the inflow into employment relative to the number employed (ie ((*NTE + UTE)/E*) - I will refer to this rather loosely as 'the rate of employment creation' - and, second, the ratio of the number employed to the number not employed (ie *E/(N + U)*). In other words

$$en = \frac{NTE + UTE}{N + U} = \frac{NTE + UTE}{E} \times \frac{E}{N + U} \qquad (4)$$

Table 3 shows the (mean) values of *en* and its components, as given by equation (4), for each of the States over the period 1997:10 – 2005:08. Earlier we noted that the entry rate is below average in both TAS and SA. Table 3 shows that there are quite different reasons for the low entry rate in the two States. For SA 'the rate of employment creation' is below average and it is this, together with the fact that its ratio of employment to non-employment is also below average that explains its low entry rate. [13] On the other hand the entry rate in TAS is below average not because the rate of employment creation is below average, but rather because the proportion in employment is so low that, even with an above average rate of flow into employment, relatively little impact is being made on the number not employed (and we saw in Table 1 that there is also an above average exit rate in TAS).

Table 3. Mean values of *en* and its components as given by equation (4): 1997:10 – 2005:08.

	en	*(NTE+UTE) / E*	*E / (N+U)*
NSW	0.0586	0.0396	1.48
VIC	0.0599	0.0391	1.53
QLD	0.0635	0.0394	1.61
SA	0.0505	0.0371	1.36
WA	0.0683	0.0389	1.76
TAS	0.0477	0.0396	1.20
AUS	0.0601	0.0391	1.54

In the next section of the paper we look at the rate of employment creation

[12] Interestingly, the two variables *en* and *ex* are essentially uncorrelated across States, with r = -0.019.

[13] The two variables *(NTE + UTE)/E* and *E/N + U)* are essentially uncorrelated across States, r = 0.099.

and its counterpart, 'the rate of employment destruction', in more detail.

5. FLOWS INTO AND OUT OF EMPLOYMENT RELATIVE TO THE NUMBER EMPLOYED

If we think about the determination of the equilibrium employment-population ratio as revealed in Tables 1 and 3, we now have three variables involved in the analysis: (i) the flow out of employment relative to the number employed (this is *ex* in Table 1), (ii) the flow into employment relative to the number employed (this is given in Table 3) and (iii) the ratio of the number employed to the number not employed (this is also given in Table 3). Now although for computational purposes this third variable (the ratio *(E/(N + U))*), is exogenous (as it is based on beginning of month values) in terms of the evolution of the variables – and especially the employment-population ratio – over time it has to be regarded as endogenous. This means that ultimately it is the other two variables (the two flows, ((*NTE + UTE)/E*) and ((*ETN + ETU)/E*)) which are the 'exogenous' driving forces.

If the size of the inflow into employment relative to the number employed (ie ((*NTE + UTE)/E*) can be described as 'the rate of employment creation' then the outflow from employment relative to the number employed (ie *ex* = ((*ETN + ETU)/E*) can be described as 'the rate of employment destruction'. Information about each of these measures is given in the Tables 1 and 3 above. Table 4 brings this information together in the one table.

The reader familiar with the literature in labour economics will be aware that, although the data we have is for employment and not job flows, I have borrowed terminology from the literature on job creation and destruction.[14] In that light, a natural extension of the concepts of employment creation and destruction is that of 'employment reallocation'. This will be the sum of the rates of employment creation and destruction. This is given as the last column of Table 4.

Table 4. Mean values of 'the rate of employment creation' (first data column) and the 'the rate of employment destruction' (second data column) and the employment re-allocation rate (last data column): 1997:10 – 2005:08.

	(NTE+UTE) / E	*(ETN + ETU) / E*	*Re-allocation*
NSW	0.0396	0.0392	0.0788
VIC	0.0391	0.0381	0.0772
QLD	0.0394	0.0384	0.0778
SA	0.0371	0.0358	0.0729
WA	0.0389	0.0372	0.0761
TAS	0.0396	0.0392	0.0788
AUS	0.0391	0.0382	0.0773
SD	0.0009	0.0013	
CV	0.0243	0.0344	

[14] See especially Eberts & Montgomery (1994), Davis, Haltiwanger & Schuh (1996), Roberts (1996), Baldwin, Dunne & Haltiwanger (1998) and Bockerman (1999).

Before attempting to interpret the information given in Table 4 it is important that the reader recall that the matched sample represents only around 93 percent of the population and it is possible that the missing portion has quite different characteristics to the included portion. For this reason it is best to look at all of the numbers in the Table as giving good information on the relative levels rather than the absolute levels of the variables.

The key pieces of information in Table 4 are that: (a) the employment destruction rate is more variable across States than is the employment creation rate,[15] (b) the employment creation rate is below average in SA but above average in TAS, (c) the employment destruction rate is below average in SA but above average in TAS, and (d) the employment reallocation rate is below average in SA and above average in TAS.

In attempting to interpret these figures one envisages that to some extent employment creation and destruction is related to job creation and destruction but, at the same time, there might be flows of different individuals into and out of a given set of jobs. In what follows I will assume that this latter component does not vary markedly (as a proportion of total employment) across States and so to explain differences between the States in the levels of employment inflow and outflow we need to explain differences between the States in the rates of job creation and job destruction. Three things come to mind. Firstly, some industries by the nature of the products they produce or the technologies they use tend to have high (or low) rates of both creation and destruction (inflow and outflow). For example some industries have a have a high 'seasonal' component (agriculture, tourism, building etc) and to the extent that these industries make up a greater share of employment in one State than another one would expect both creation and destruction (inflow and outflow) to be higher on that account. Likewise, there is a good deal of evidence that the flows which accompany job creation and destruction are often associated with the birth and death of firms/plants within industries and sectors and that the pace of this change depends very much upon the age and scale of plant and the level of (human and physical) capital intensity, amongst other things. Again, to the extent that this varies across States one would expect both creation and destruction (inflow and outflow) to be higher on that account. Secondly, government policy, including State government policy may play a role. For example policies are often designed to influence the rate of job destruction by providing subsidies to ailing firms whilst doing very little to encourage job creation. Thirdly, the state of the aggregate economy may play an important role. Areas in decline are likely to have a high rate of job destruction relative to job creation, other things equal. The first factor mentioned above will lead to higher or lower levels of both inflow and outflow whereas the second is likely to result in lower outflow relative to inflow while the third factor will result in higher levels of outflow relative to inflow.

Which of these factors separately or in combination account for the relative levels of inflow and outflow we observe, and especially in TAS and SA? At this

[15] The two rates are also highly and positively correlated across States, with r = 0.947.

point all one can do is conjecture. My conjectures are: (a) That, other things equal, aggregate growth rates in both states are such that (cet par) the rate of job destruction would be relatively high and the rate of job creation relatively low. (b) That the industry structure and production technology in use in both States, but in TAS especially, would tend to make both job creation and job destruction higher than would otherwise be the case. (c) That the changing nature of employment and the growth of casual and part-time work would also be making both job creation and job destruction higher than would otherwise be the case (however it is not clear that this is something that would effect SA and TAS more so than the other States). Now, collectively items (a) – (c) could account for most of what we observe except for one thing and that is the observed relatively low rate of employment destruction (and thus a low exit rate from employment) in SA. To account for this I also conjecture: (d) that in SA government policy has acted to reduce the rate of job destruction below what it would otherwise be (whilst probably not, at the same time, raising the rate of job creation above what it would otherwise be).

6. CONCLUSION

This paper has looked at differences in the employment population ratio across states taking a flows approach. One aim has been to show that a flows approach can easily be applied to compare equilibrium values of various labour market variables or ratios and not just the unemployment rate. A second aim has been to shed light on the reasons for the low employment-population ratio in SA and TAS. We have seen that their situation is markedly different and it would seem that quite different pathways would have to be followed in each of these States if their employment-population ratio is to rise. For SA the entry rate is low but so also is the exit rate. In TAS the exit rate is high while the entry rate is low. We have also seen that the sizeable flow into employment in TAS is matched by a large outflow from employment and as result, the high inflow does not translate in to fast (net) employment growth. Indeed, from the point of view of welfare and labour market policy it would seem that TAS can be described as having a low employment-population ratio, high reallocation rates (this may or may not be associated with 'churning' of individuals[16]) and all this alongside a high unemployment rate and an especially high rate of long-term unemployment![17]

For the employment-population ratio to rise in TAS and SA either the 'the rate of employment creation' has to rise or the 'the rate of employment destruction' has to fall (or, at least, for the former to rise relative to the latter). Since 'the rate of employment creation' is already well above average in TAS it may be that it is to fall in 'the rate of employment destruction' that we must look

[16] Churning is "where people cycle in and out of work without finding a long-tem secure job" (Watson and Buchanan, 2001, p 204). See EPAC (1996) and also Le and Miller (1999) for a discussion of the social and economic consequences of churning.

[17] For evidence on long-term unemployment by States see Ramakrishnan and Cerisola (2004, p 19). The rate in Tasmania is double that for Australia as a whole.

for an improvement in the employment-population ratio in that State. On the other hand, since 'the rate of employment destruction' is already well below average in SA it may be that it is to rise in 'the rate of employment creation' that we must look for an improvement in the employment-population ratio in that State. Unfortunately, to the extent that employment creation and destruction is related to job creation and destruction, the evidence appears to be that "idiosyncratic factors dominate" (Davis et al, 1996, p 153). This finding is usually taken to indicate that policy focussed on individual industries is not likely to be very effective in the long run.

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APPENDIX: THE ELASTICITY OF $(E/P)^*$ WITH RESPECT TO *EN* AND *EX*

Inspection of (3) shows that the derivatives of $(E/P)^*$ with respect to the entry and exit rates are: $\left(\partial\left(E/P\right)^*/\partial en\right)=\left(E/P\right)^{*2}\left(ex/en\right)\left(1/en\right)$ and $\left(\partial\left(E/P\right)^*/\partial ex\right)=-\left(E/P\right)^{*2}\left(1/en\right)$ and so, not unexpectedly, a rise in *en* increases $(E/P)^*$ while a rise in *ex* reduces $(E/P)^*$. Interestingly, the elasticity of the equilibrium employment-population ratio with respect to the entry rate is $\left(\partial\left(E/P\right)^*/\partial en\right)\left(en/\left(E/P\right)^*\right)=\left(ex/en\right)\left(E/P\right)^*$ while the elasticity of the equilibrium employment-population ratio with respect to the exit rate is $\left(\partial\left(E/P\right)^*/\partial ex\right)\left(ex/\left(E/P\right)^*\right)=-\left(ex/en\right)\left(E/P\right)^*$. In other words the two elasticities are equal in value but of opposite sign. Notice that $\left(ex/en\right)\left(E/P\right)^*=\left(ex/\left(en+ex\right)\right)$. Evaluated at the means for AUS this is 0. 4. In other words as a very rough first approximation we can say that the long-run elasticities of $(E/P)^*$ with respect to *en* and *ex* are 0.4 and –0.4 respectively.