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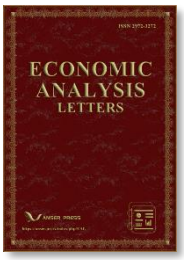

Testing the Oswald hypothesis with Australian census data 2001-2016

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ABSTRACT

The Oswald hypothesis is that home ownership reduces mobility and through that channel results in poorer labor market outcomes. There has been only limited previous evidence on the Australian case. Here we use data from the first four Australian censuses of the twenty-first century, aggregated at the smallest geographical areas for which statistics are released. We propose testing the Oswald hypothesis by estimating the effect of home ownership on the full-time employment rate. Modelling the unemployment rate, as is often done in testing the hypothesis, produces implausible results with respect to the control variables, most likely due to the limitations of the official definition of unemployment. We find that, in modelling the full-time employment rate, the control variables for educational and demographic factors have the theoretically plausible effects, while variables capturing rates for both outright home ownership and with mortgage home ownership are positively related to full-time employment rates, with the effect of the former stronger than the latter. Our findings strongly contradict the Oswald hypothesis.

KEYWORDS

Home ownership; employment; Oswald hypothesis; Australia; census data

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1. Introduction

The Oswald (1996) hypothesis is that a high rate of home ownership is associated with inferior labor market outcomes because of the relative immobility of homeowners compared to renters. Oswald suggests that in many western economies there was, over the period from the end of World War II to the 1970s, a rise in homeownership which led to a decline in the mobility of labor and hence to a rise in unemployment. In those countries, and in regions within countries, with higher rates of renting unemployment rates remained lower. The evidence on the Oswald hypothesis is mixed. It has been suggested that the reason behind contradictory results is whether one takes the perspective of an individual household or looks at some type of regional aggregate. Broulíková et al. (2020) cite numerous household-level studies that find that homeowners do better on the job market than renters, while aggregate studies find poorer labor market outcomes in areas of high home ownership rates. Our purpose is to examine the twenty-first century evidence for the Oswald hypothesis in the Australian context.

There has only been limited evidence on the Australian case. Flatau et al. (2002), using census data for the period 1986 to 2001, find no evidence to support the Oswald hypothesis but nor do they find evidence supporting the opposite conclusion that home ownership is associated with lower unemployment. Flatau et al. (2003), using a micro dataset over the years 1994-1997, find that the probability of unemployment falls as the probability of home ownership rises, consistent with the studies cited in Broulíková et al. (2020).

Here we propose bringing the Australian evidence up to date with data from the first four censuses on the current century. We do not use individual household level data since, apart from the fact that access to census micro level data is restricted, previous evidence from such data overwhelmingly rejects the Oswald hypothesis as noted above. Instead, we have compiled a data set covering four censuses, from 2001 to 2016, with aggregate data on observations on medium size statistical areas, called SA2s, roughly corresponding to suburbs in urban areas. In many cases, suburbs are characterized by relatively homogeneous socio-economic status, as reflected in real estate prices. Given previous evidence, such data, provides the best possibility of confirmation of the Oswald hypothesis. Apart from this data set we have another key point of difference from the previous literature in that we propose a test of the Oswald hypothesis relating to full-time employment rather than unemployment. It follows from the Oswald hypothesis that the employment rate should be negatively related to home ownership. The employment rate, and especially the full-time employment rate, is arguably a better proxy for the state of the labor market than the unemployment rate because the standard internationally comparable definition of unemployed excludes those who have market income related to employment for as little as one hour per week (those defined as underemployed), not to mention discouraged workers. Therefore, instead of modelling unemployment, we estimate models of the full-time employment rate with a model that has control variables that would be typically found in microeconomic analyses of the labor market.

2. Data and methods

2.1. Data

The source of data for this paper is the Australian Bureau of Statistics (ABS) Census of Population and Housing. We use four years (2001, 2006, 2011 and 2016) of data aggregated at the Statistical Area 2 (SA2) geography. An SA2 is a medium size area which is intended to represent a community that interacts socially and economically (ABS, 2016) and is the smallest area for which the ABS releases non-Census and Intercensal statistics. To achieve four years of census data we adapt the other census years to the 2016 Geography, giving a total of 2129 SA2 regions. A few SA2 regions had to be removed from the data because they were affected by boundary changes over the census periods. The variables extracted from the census data for each SA2 in each of the four years are listed and defined

in Table 1.

We calculated descriptive statistics for each of the variables in Table 1, broken down by State and Territory. These results are available on request. We note that there is considerable variability in every variable. There is a striking difference in average educational levels across the states and territories, with on average over 49% of people per SA2 having a degree in the Australian Capital Territory (ACT) compared to no more than 30% in any other state or territory. Both Tasmania and South Australia have around 52% with a Certificate or Diploma level qualification, while the ACT has 35%. The Northern Territory (NT), at over 22%, has by far the highest average indigenous population with no other state or territory at much more than 4%. Average full-time employment rates per SA2 also vary considerably across the country, from a low of 58.31% in Tasmania to a high of 65.71% in the NT. The proportion of dwellings owned outright shows the average rate of home ownership was lowest in the NT at 17.1%, well below the national average of 32.7%. Tasmania (36.9%) had the highest average rate of proportions of dwellings owned outright along with the highest average rate of dwelling with outright or with a mortgage 68.6%.

Table 1. Variable definitions.

Variable	Definition
PCUNEMP	Proportion of workforce unemployed
PCFTEMP	Proportion of workforce in full-time employment
ED1	Proportion of population with bachelor's degree or higher
ED2	Proportion of population with a certificate or diploma level qualification
PC15TO24	Proportion of population aged 15 to 24
PC55TO64	Proportion of population aged 55 to 64
PCINDIG	Proportion of population identifying as indigenous
PCMALE15UP	Proportion of population over 15 who are male
POPDEN	Population density
PCOR	Proportion of homes owned outright
PCMORT	Proportion of homes owned with a mortgage

2.2. Methods

The dependent variable is the full-time employment rate (PCFTEMP). As noted earlier, if the Oswald hypothesis holds, we expect home ownership to be negatively related to PCFTEMP.

The explanatory variables of interest to test the Oswald hypothesis are the housing tenure variables PCOR and PCMORT, which are, respectively, the proportion of homes owned outright, and the proportion of homes owned with a mortgage.

The control variables are the proportion of the population with bachelor's degree or higher (ED1), the proportion of the population with a certificate or diploma level qualification (ED2), qualifications generally considered below degree level, the proportion of the population in the age ranges of 15 to 24 and 55 to 64 (PC15TO64 and PC55 TO 64, respectively), the proportion of the population who identify as indigenous (PCINDIG), the proportion of the population over 15 who are male (PCMALE15UP), and population density (POPDEN) and its square.

The equation to be estimated is equation (1), where i indexes the SA2s and t indexes the census years.

$$PCFTEMP_{it} = a_0 + a_1 ED1_{it} + a_2 ED2_{it} + a_3 PC15TO24_{it} + a_4 PC55TO64_{it} + a_5 PCINDIG_{it} + a_6 PCMALE15UP_{it} + a_7 POPDEN_{it} + a_8 POPDENSQ_{it} + a_9 PCOR\, u_i + a_{10} PCMORT_{it} + e_{it} \quad (1)$$

Our expectations are that the educational variables will be positively related to the full-time employment rate. The demographic variables are included to age, gender, and ethic differences in labor market outcomes. Full-time employment may also be linked to population density in that work opportunities may be limited in very remote

areas.

3. Results

We first run a fixed effects panel regression. The results of this estimation are shown in Table 2. We also run a random effects model and use the Hausman test to choose between models. The RE model results are in Table 3. The Hausman test in Table 4 indicates that the FE model is preferred. Table 5 displays the standardized coefficients and elasticities at means from the FE model.

Table 2. FE model – Dependent variable PCFTEMP.

Variable	Coefficient	t-Statistic	p
C	-7.59	-4.63	0.00
ED1	0.15	14.82	0.00
ED2	0.26	22.50	0.00
PC15TO24	0.45	17.55	0.00
PC55TO64	-0.09	-3.97	0.00
PCINDIG	-0.41	-9.51	0.00
PCMALE15UP	0.38	12.03	0.00
POPDEN	0.00084	3.12	0.00
POPDENSQ	-9.24×10^{-8}	-6.58	0.00
PCOR	0.51	49.48	0.00
PCMORT	0.42	36.94	0.00
F-statistic		43.40	

Every control variable is statistically significant at much better than the 1% level. Both the education variables have the expected positive sign. A higher percentage of population in the 55 to 64 age group is associated with a lower full-time employment rate, which may be related to older workers reducing their hours or retiring early. A higher percentage of population aged 15 to 24 is associated with a higher full-time employment rate, which may seem surprising, but is likely a combination of parents with older children being more likely to be in employment and the older end of this age range having left formal education. A higher proportion of indigenous people is associated with lower full-time employment, consistent with indigenous disadvantage in the labor market. Population density shows an inverted U-shaped relationship with full-time employment, which is suggestive of greater employment opportunities in more populated areas, although the relationship tapers off at very high densities.

The fact that the model makes sense with respect to all the control variables gives us confidence in proceeding to interpret the coefficients of the variables of interest, which measure housing tenure. Both the percentage of dwellings owned outright, and the percentage of dwellings owned with a mortgage are positively related to the full-time employment rate, contrary to the Oswald hypothesis. This finding is in line with household level studies that typically find homeowners have better labor market outcomes than renters but in contrast to many aggregate level studies which find the opposite (Broulíková et al. 2020). Our findings, which are based on data at the SA2 level of aggregation, indicate, at least in present century in the Australian context, that, even if home ownership may act to reduce mobility, full-time employment is an important driver of home ownership.

Turning to the interpretation of the standardized coefficients in Table 5, we see that vocational-type qualifications, represented by ED2, are more important drivers of full-time employment than university qualifications. A higher proportion of the population identifying as indigenous is an important factor in lowering home ownership rates, while a higher proportion of younger people is an important factor in increasing home ownership rates. The effect of outright ownership on employment is somewhat stronger than that of ownership

with a mortgage. The elasticities at means of PCFTEMP with respect to PCOR and PCMORT are about 0.3 and 0.2, respectively. Overall, then, we find that a 1% increase in the home ownership rate is associated with about a 0.5% increase in the full-time employment rate ceteris paribus. Of course, all other things are not equal, and over time on a national level, employment and unemployment are driven by a range of macroeconomic and demographic factors. Nevertheless, our findings indicate that Oswald's hypothesis that the immobility of homeowners relative to renters negatively affects the labor market outcomes of the former is not borne out by the evidence in the context of Australia in the twenty-first century.

Table 3. RE model - Dependent variable PCFTEMP.

Variable	Coefficient	t-Statistic	p
C	-24.85	-18.85	0.00
ED1	0.19	26.11	0.00
ED2	0.35	39.31	0.00
PC15TO24	0.62	31.86	0.00
PC55TO64	-0.20	-9.98	0.00
PCINDIG	0.16	10.68	0.00
PCMALE15UP	0.76	30.45	0.00
POPDEN	0.0027	21.07	0.00
POPDENSQ	-1.45×10^{-7}	-14.84	0.00
PCOR	0.35	45.85	0.00
PCMORT	0.22	24.60	0.00
F-statistic		1362.77	

Table 4. Hausman test.

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	p
Cross-section random	2624.94	10	0.00

Notes: Correlated Random Effects - Hausman Test. Null hypothesis: RE model is appropriate.

Table 5. FE model - Scaled coefficients.

Variable	Coefficient	Standardized Coefficient	Elasticity at Means
ED1	0.15	0.23	0.070
ED2	0.26	0.34	0.20
PC15TO24	0.45	0.18	0.094
PC55TO64	-0.091	-0.031	-0.017
PCINDIG	-0.41	-0.34	-0.022
PCMALE15UP	0.38	0.12	0.31
POPDEN	0.00084	0.12	0.016
POPDENSQ	-9.24×10^{-8}	-0.11	-0.0050
PCOR	0.51	0.61	0.27
PCMORT	0.42	0.51	0.21

We also ran the model specified by equation (1) but with the unemployment rate as the dependent variable, repeating the process of running FE and RE models and applying the Hausman test. The FE version was again preferred. However, the results raised some difficulties, reinforcing our concerns around the use of the official definition of unemployment. First, both education variables were highly statistically significant but had the wrong signs in that they were positively associated with unemployment. Of the demographic variables only the proportion of males and the proportion of the population aged 55 to 64 remained statistically significant, with the former positively associated with unemployment, contrary to expectations, and the latter negatively associated with unemployment, also contrary to expectations. Although the home ownership variables were both statistically

significant, with outright ownership positively and mortgaged ownership negatively associated with unemployment, given the unreasonable results concerning the control variables, we are reluctant to draw any conclusions from these findings.

4. Conclusion

Since, in most cases, households need to borrow to purchase a home, and lenders require, above all else, the ability of a borrower to service a loan, it is perhaps surprising that any evidence has been found in favor of the Oswald hypothesis. Certainly, it is not surprising that evidence is likely to be highly dependent on specific institutional circumstances in different countries. We argue that modelling full-time employment provides a fairer test of the Oswald hypothesis than using unemployment as the dependent variable. Our findings, using data from the first four censuses this century in Australia, run strongly counter to the Oswald hypothesis. Controlling for the usual factors affecting employment we find that home ownership is positively associated with the full-time employment rate.

The main limitation of our analysis relates to the level of aggregation of the data. Census data is collected at the household level and then aggregated at various levels from the smallest geographic areas (mesh blocks) to SA1s (Statistical Area Level 1), which are the smallest geographic unit used by the Australian Bureau of Statistics (ABS 2021a) to release census data, through SA2s, SA3s to SA4s (the largest sub-state regions, useful for examining a range of regional data). We have discussed above why we do not use household level (micro) data. Across different censuses, given population growth and land use changes, these geographical definitions of statistical areas are subject to change. Our choice of SA2s is driven by "their purpose to represent a community that interacts together social and economically" (ABS 2021b) and by the fact that it is the lowest level of aggregation for which we have been able to maintain concordance of SA2s across four censuses with very little loss of observations. Future research could test the robustness of our findings with respect to data at differing levels of aggregation. It would also be useful to extend our study to the post-Covid period, although that is probably best left until after the 2026 census when it will be possible not only to incorporate data from the 2021 census (taken at the height of the Covid crisis in Australia) but also to determine whether data from the Covid period is affected by impacts on the labor market of the exceptional conditions of lockdowns in some states and the effective closure of the international border. Certainly, that period witnessed an extraordinary boom in the property market.

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Conflict of interest

All the authors claim that the manuscript is completely original. The authors also declare no conflict of interest.

Author contributions

Conceptualization: Megha Raut, W. Robert J. Alexander; Investigation: Megha Raut, W. Robert J. Alexander Methodology: W. Robert J. Alexander; Formal analysis: Megha Raut, W. Robert J. Alexander; Writing – original draft: W. Robert J. Alexander; Writing – review & editing: Megha Raut, W. Robert J. Alexander.

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