

Roskruge, Matthew James; Grimes, Arthur; McCann, Philip; Poot, Jacques

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Homeownership and Social Capital in New Zealand*

Matthew Roskrug[#], Arthur Grimes[†], Philip McCann[‡], Jacques Poot[£]

ABSTRACT

Does homeownership affect community social capital and thereby influence regional development? Following DiPasquale and Glaeser, a body of literature suggests that homeownership is positively related to social capital formation. Homeowners have an incentive to engage in the local community in order to preserve or enhance the value of their housing asset. Moreover, homeownership creates barriers to geographic mobility, which increases the present value of the expected stream of benefits from local community social capital. We test the homeownership hypothesis alongside other individual, household and locational determinants of social capital using unique data created by merging the 2006 and 2008 samples of the New Zealand Quality of Life survey. The measures of social capital used in our analysis include trust in others, participation in social networks, attitude towards local governance and sense of community. Since homeownership is not randomly assigned, we complement our regression models with propensity score matching to control for selection effects. The results confirm that homeownership exerts considerable positive impact, in the form of social capital, on New Zealand local communities.

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Keywords: social capital, homeownership, New Zealand, matching methods

JEL: H54, R11, Z13

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[#] Department of Economics, University of Waikato, Private Bag 3105, Hamilton, New Zealand 3240, Tel. + 64-7-838 4466 ext 6784, Fax +64-7-838-4621, E-mail mattr@students.waikato.ac.nz

[†] Motu Economic & Public Policy Trust, PO Box 24390, Wellington, New Zealand 6142, Tel. +64-27-2489389, E-mail arthur.grimes@motu.org.nz

[‡] Department of Economic Geography, Faculty of Spatial Sciences, University of Groningen, P.O. Box 800, 9700 AV Groningen, The Netherlands; E-mail p.mccann@rug.nl

[£] Population Studies Centre, University of Waikato, Private Bag 3105, Hamilton, New Zealand 3240, Tel. + 64-7-8384685, Fax +44-7-8384621, E-mail jpoot@waikato.ac.nz

1. Introduction

There is considerable debate regarding the costs and benefits of private homeownership in the academic literature and in public policy. This debate centers on externalities associated with homeownership and the extent to which policies can contribute to a socially optimal outcome. Studies have examined the impact of homeownership on both individuals and communities, particularly in the United States and Europe. These studies have linked homeownership to topics such as labor markets (e.g., Borjas, 1985; Oswald, 1996) and wellbeing (e.g., Cobb-Clark and Hildebrand, 2006). Homeownership has been found to have a significant impact in these and other areas. Such findings have been linked to the idea that when a home is purchased, the individual or household has a greater incentive to invest in the area in which they reside. Homeowners incur additional transactional costs in relocation which reduces their likelihood of moving and therefore increases the present value of the expected stream of local community benefits (DiPasquale & Glaeser, 1999). While homeownership and the associated lower geographical mobility may yield negative impacts such as greater rigidity in labor market adjustment (Oswald, 1996), there is mounting evidence that it also has positive impacts, particularly in terms of investment of households in the social capital of their local community.

The concept of social capital has become increasingly popular since it was introduced into economics by Putnam (1993) who related community interaction as well as civic engagement to local government performance in Italian regions. Putnam's arguments brought social capital – which before then had been primarily a theoretical concept used by sociologists in the fields of education (e.g., Bourdieu, 1986; Coleman, 1988, 1990) – into the mainstream and provided the impetus for a range of theoretical and statistical investigations. While there has been some criticism of the concept of social capital (e.g., Arrow, 1999; Solow, 1997, 1999), empirical findings have shown that measures of social capital are linked to improved individual, local and national outcomes.

In this paper we seek to investigate the role of homeownership on social capital by testing a model of local social capital using a range of dependent and explanatory measures obtained by merging two samples (2006 and 2008) of New Zealand's Quality of Life (QoL) survey. We combine this dataset with regional data from Statistics New Zealand.

This analysis aims to both complement and contribute to the existing body of literature on the micro foundations of social capital. We examine the role of homeownership using

micro-level regression analysis on a range of proxies for social capital. When trying to establish a causal link from homeownership to social capital, we must take account that, unlike in a randomized trial, there are certain selection mechanisms that draw households into homeownership, including the local level of social capital. Thus, we use propensity score matching (PSM) to quantify the ‘treatment effect’ (homeownership) on the “treated” (homeowners). This approach has been used to identify causal effects in other micro-econometric studies (e.g., Angrist and Pischke, 2009), but to our knowledge this paper is its first application to estimating the impact of homeownership on social capital.

The paper is arranged as follows. Section 2 provides a review of the existing literature on the subject. Section 3 discusses the general theoretical framework for the analysis of the determinants of social capital held by individuals and the methodology used for the analysis. Section 4 reviews our data and provides summary statistics while Section 5 reports the empirical results of both the regression and PSM analyses. The final section presents the conclusions and suggests avenues for further research.

2. Literature review

Homeownership has increasingly attracted the attention of social and economic researchers as interest in the impacts that such investment has on outcomes for nations, regions and individuals increases. Recent studies have attempted to measure whether there are non-conventional benefits to homeownership, such as outcomes for children (Mohantly & Raut, 2009; Haurin et al., 2002), for immigrants (Sinnings, 2010) and wellbeing (Cobb-Clark and Hildebrand, 2006). Many of these benefits relate to community interaction. The idea is that when someone purchases a home and becomes the owner-occupier, this financial investment also reduces geographical and labor mobility. This provides an increased incentive for an individual or family to invest in their community, through engagement in local decision making as well as through interactions with other members of the community (networks) and through participation in community activities.

There exist in the literature both arguments for and against homeownership. The arguments against high levels of home ownership stem primarily from papers by Oswald (1996, 1997a, 1997b, 1999) who argues that homeownership increases unemployment

through reduced geographic and labour mobility caused by increased transaction costs. In contrast, authors such as Boehm and Schlottmann (1999) focus on the benefits of that reduced mobility, arguing that this increases neighborhood quality and stability and that it also encourages socio-political activity in the local community. However, it is generally agreed by both proponents and critics of homeownership that homeowners have a greater incentive to invest in the local community than private or state landlords.

The hypothesis of a positive benefit of homeownership for social capital development has been supported by a body of econometric literature, starting with the seminal work of DiPasquale and Glaeser (1999) (see also Glaeser et al. (2002) and Earls et al. (1997)). Such studies have tended to find evidence that homeownership has a positive relationship with variables related to social capital.

3. Analytical framework and methodology

The underlying stock of social capital is intangible and unobservable. This has forced researchers to look for suitable alternative measures in order to estimate social capital stocks at various levels. The result has been the adoption of a wide range of proxy variables where a theoretical link exists between that variable and the underlying stock of social capital. In this paper, we utilize four proxies for social capital in developed democratic societies: trust, participation, sense of community and attitudes towards local government.

Both interpersonal trust and community participation are commonly used measures of the stock of social capital primarily due to their inclusion in the World Values Survey and the General Social Survey which are conducted throughout the world. Researchers such as Zak and Knack (2001) have provided robust theoretical links which validate their use. Measures of a sense of community and attitudes towards local government bodies are less commonly applied as proxies for social capital. The rationale for their inclusion stems from the work of Putnam (1993, 1995) which suggested that social capital is in part expressed in community interaction, which increases local social networks, and in attitudes towards local councils which reflects an individual's engagement with their local community.

Based on the literature, four distinct groupings of determinants of social capital have been identified for inclusion in an econometric model. They are: (i) demographic variables, (ii) geography and location-specific variables, (iii) variables relating to human capital, and (iv) a measure of homeownership.

Demography. Of an individual's demographic characteristics, a person's age and gender appear to be consistently associated with social capital (e.g. Glaeser et al., 2002; Putnam, 2000; van Emmerik, 2006). Additionally, ethnicity matters too. In New Zealand, the framework for analysis of social capital developed by Statistics New Zealand (Spellerberg, 2001), as well as the work of Williams and Robinson (2001), suggest that analysis of social capital in New Zealand needs to take account of differences between various ethnic groups, particularly Maori (New Zealand's indigenous people), as there are cultural differences in social beliefs and attitudes which may influence social capital formation.

Geography. Geography and location have also been identified as important issues. Several European studies have shown social capital formation in rural settings to be significantly different from that of urban social capital, with more 'bonding' rather than 'bridging' social capital in evidence. This effect can be examined using population density as a proxy for urbanization, with higher population densities reflecting more urbanized areas. There may also be unobserved differences between locations that can be controlled for using fixed effects estimations.

Human Capital. Human capital has been consistently found to be related to social capital (e.g. Huang et al., 2009; Glaeser et al., 2002; Helliwell and Putnam, 2007). As with much of the writing on social capital, the exact relationship is under some debate. Amongst others, Bowles and Gintis (2001) argue that social skills are a product of education, and as such, social capital could be considered a subcomponent of human capital. This is in contrast to the standard approach which is to view social capital as related to, but separate from, human capital. As the connection between social capital and human capital is one of the most robust and consistent findings in the social capital literature, inclusion of measures of individual human capital are included in our model.

Homeownership. As outlined above, homeownership has been shown inter alia by DiPasquale and Glaeser (1999) and Glaeser et al. (2001) to have a significantly positive effect on variables relating to social capital. However, homeownership is not randomly assigned. It is likely that those who own their homes are also likely to have higher incomes, higher educational attainment, be older and have a partner to share the mortgage with. These selection effects may cause bias in the estimates as those who own homes are likely also to be

those who possess other characteristics commonly associated with social capital; therefore the effect of owning the home on social capital may be overstated. Among those who do not own homes, there may be differences in contributions to social capital between those who live rent free in a home owned by family, those who rent from a private landlord, and those who rent from a public landlord.

In summary, assuming that individual i 's social capital (K_{Si}) is determined by that individual's personal characteristics (P_i), the geographic variables of the individual's region, r , (G_{ir}), human capital (K_{Hi}) and Homeownership status (HO_i) we can specify a framework for the regression model as follows:

$$K_{Si} = K(P_i, K_{Hi}, G_{ir}, HO_i) \quad (1)$$

This framework can be used to aid the selection of variables from available micro datasets. The exact form of the model will depend on both availability of data and the form in which the data is available.

When participants in a study are not randomly assigned into control and treatment groups, we do not have an experimental setting to separate the causal effects of a treatment (in this case homeownership) from the selection effects which may arise. Two options can be considered to estimate the effect of an intervention on a dependent variable. One approach is simply to ignore the selection bias and use a standard non-experimental estimator such as OLS regression. A second method is to use a matching methodology in order to control for potential selection bias. The latter method is preferred given that homeownership is not randomly assigned.

Regression analysis

We report the results of OLS regression of the association between homeownership and the four proxies for social capital. We include controls for demography (age, gender, ethnicity, household size and composition), human capital (years of schooling, employment status and income) and geography (years resident in the region, population density). Our equation also includes both spatial and time fixed effects (but not individual fixed effects since we do not have longitudinal data on individuals). The resulting estimation can be shown as:

$$K_{Sirt} = \alpha + \beta_0 HO_{irt} + \mathbf{X}_{irt} \boldsymbol{\beta} + \mathbf{R}_t + \mathbf{D}_t + \varepsilon_{irt} \quad (2)$$

where K_{Sirt} is the outcome of interest, in this case the proxy for social capital, of individual i in region r at time t , HO_{irt} is a dummy representing the treatment, in this case whether the individual is a homeowner or not, \mathbf{X}_{irt} are the observations for individual i in region r at time t on a set of explanatory and control variables pertaining to geography, demography and human capital while R_r and D_t are the coefficients for the spatial and time fixed effects respectively.

We run the regression model in equation (2) for each of the four social capital proxies: Trust, Participation, Community and Council. As Trust is a binary variable, we used a logit model in this case. Due to the truncation, the Participation index was analyzed using a tobit regression. As Community is an ordinal Likert-scale type of variable (with a higher score representing a ‘better’ outcome), an ordered logit regression is appropriate. The Council variable was created by taking the first principal component of three binary variables relating to an individual’s attitude towards local government. As a first principal component has a zero mean and a normal distribution, Ordinary least squares regression is appropriate (ignoring selection issues).

PSM methods

An alternative to regression estimation is to use a quasi-experimental method in the form of propensity score matching in order to compare individuals who are observationally similar except with respect to the treatment. In a randomized experiment, the randomization procedure itself would ensure that a sufficiently large control and treatment group would be on average observationally similar, as well as having on average the same unobserved attributes (Bryson et al, 2002). A quasi-experimental design differs from an experimental design because in the former the data have not been generated by a random assignment of individuals into the treatment or control group. The estimation process for the treatment effect needs to take into account that there may be underlying reasons why individuals are likely to fall into the treatment or control group. Several quasi-experimental methods have been developed (see Greenstone and Gayer, 2009). Most require longitudinal data on an individual to measure before and after treatment outcomes while taking into account heterogeneity in the population in terms of unobserved personal attributes. Given the data available for this study, we can only account for selection on observables and matching methods are then the best option for controlling for selection bias.

Matching methods involve the process of matching observations in a treatment and control group based on observed characteristics such that we compare two or more individuals who are observationally similar but happen to belong to either one or the other group. The result is that we gain an estimate of the effect of the treatment while removing the underlying bias that self selection into the treatment group may have caused. Propensity score matching (PSM) was first introduced by Rosenbaum and Rubin (1983) who proposed that matching individuals on a set of observable characteristics would reduce the bias present in observational studies which lacked randomization.¹ PSM takes a set of characteristics shared by both treatment and control groups, and creates a single-index variable rather than having a large matrix which would be difficult to match on. The propensity score can then be used to match observations such that those with a similar propensity score possess similar characteristics. While this may not completely remove the selection bias, it provides improved estimations through the reduction in bias resulting from having matched individuals. Propensity score matching requires individuals who have the same propensity score to have the same likelihood of being selected for the treatment group.

To our knowledge, the present paper is the first propensity score matching evaluation of the effects of homeownership on individual social capital. However, other applications of the methodology are widespread. Dehejia and Wahba (2002) suggest that for propensity score matching to successfully reduce selection bias, observations for both treatment and control groups must be at the same location (and date) and have used the same questionnaire. The dataset must contain a rich set of variables which are relevant to both the intervention (homeownership) and the outcome (social capital). The PSM is calculated by taking a researcher-specified list of variables which reflect the characteristics of observations within a sample and must relate not only to the treatment but also to the dependent variable. Using these variables, the method generates an index score which represents the characteristics of the individual. The PSM requires scores to be balanced between treatment and control groups in terms of their representation within propensity score blocks. The balancing refers to the idea that exposure to the treatment effect is random for any given propensity score. Therefore, treated and controlled observations should be on average observationally identical (Becker and Ichino, 2002). The balancing property is satisfied by dividing the propensity scores into ‘blocks’ and testing to see whether the control and treatment groups within each block are on average identical.

¹ Our application of PSM is estimated using PSCORE for Stata (Becker and Ichino, 2002).

In order for the propensity score matching to be successful, the scores should be reflective on average of observationally identical treatment and controls, such that on the whole individuals who attain a given propensity score have a random chance of falling into the treatment or control group. This does not require control and treatment groups to be equal, but rather identical on average given the variables they are matched on. Further discussion and formal proofs can be found in Rosenbaum and Rubin (1993), Imbens (2000) or Becker and Ichino (2002).

Once propensity scores are obtained, there are several different methods for obtaining treatment effects. They include stratification, nearest neighbor, radius and kernel matching. Each method matches treatment and control groups based on their propensity score, using slightly different matching criteria.

The stratification method divides the propensity scores into ranges such that within each range, treatment and control groups have the same PSM score on average, essentially the same as the blocks used for balancing the PSM scores. The average treatment effect is then calculated by taking the average effect from each block and weighting it by the number of treated observations.

The nearest neighbor matching compares treated observations with observations that have not been treated but that are observationally the nearest. The pair-wise difference between the outcomes of the treated and their non-treated neighbors is then calculated and the average difference reported. However, it is possible that with nearest neighbor and stratified methods observations in the treated group or the control group will be compared with very different observations from the opposite group in terms of propensity scores.

To overcome this problem, both radius and kernel matching methods can be implemented. Radius matching is similar to nearest neighbor matching, but matched observations are constrained to be within a given proximity to each other. Kernel matching compares the treated with weighted averages of all those in the control group, whereby the weights are inversely proportional to the distance between the propensity scores of the treated and the controls.

For the purposes of our analysis, both nearest neighbor and kernel matching algorithms were used. Our treatment is whether or not an individual owns the home they live in; the dependent variables are the four proxies for social capital specified earlier. Balanced blocks for homeownership have been obtained using variables relating to age, gender, years of schooling, part-time employment, domestic relationship status and regional population density.

4. Data overview and descriptive statistics

We use pooled cross-sectional micro data obtained by merging the 2006 and 2008 samples of the New Zealand Quality of Life (QoL) survey. The QoL survey is unique to New Zealand and is a national survey sponsored by local government, with data available on request from the Quality of Life Research Team after approval of a formal proposal.² The survey is designed with the aim of measuring aspects relating to an individual's quality of life, living situation, community interactions and aspects of health and wellbeing in order to assist local government decision making and provide insight into regional issues, particularly for people living in urban areas.

Four QoL surveys have been completed to date (in 2003 and then biennially from 2004). However, due to changes in the questionnaire and coding only the 2006 and 2008 surveys were selected for our analysis. The merged dataset has a sample size of 15,700, with 7,545 participants in the 2006 survey and 8,155 in the 2008 survey. Surveying was conducted using computer assisted telephone interviewing (CATI) and the sample was drawn from New Zealand residents aged 15 and over, with quotas for age, gender and ethnicity. Participants were drawn at random from the electoral role and were notified by mail prior to the phone interviewing. The final response rates were 22% in 2006 and 37% in 2008. Because actual levels of social capital are not directly observable, we require suitable proxy variables which represent individual social capital. As noted earlier, we were able to construct four proxy measures of social capital, namely: trust in others, participation in social networks, sense of community and attitude towards local governance.

In addition to the data available through the quality of life survey, data regarding the regional demographics for New Zealand were obtained from the Statistics New Zealand 2006 Census of Populations and Dwellings.

Table 1 about here

Table 1 shows the descriptive statistics of the final variables reported in the regression equations, from which a subset used in the propensity score estimations. The combined and cleaned dataset was largely representative of the underlying general New Zealand population.

² See <http://www.bigcities.govt.nz/contacts.htm>

Regarding gender, Males were slightly underrepresented, with 48% of the New Zealand population over 18 are male compared to 44% in the sample. The age distribution was fairly consistent with the New Zealand distribution; however there was an under sample of those aged 20 to 29 and 75 to 84, particularly amongst women. Those aged 45 to 49 were the only group largely overrepresented in the sample, however women aged 50 to 64 were also slightly oversampled. Dealing with ethnicity is problematic in New Zealand following the introduction within many surveys of a new ethnic category, 'New Zealander', in addition to the traditional European and Maori and other ethnic groups. Our prior is that this group should be combined with 'European' and 'Pakeha³', and when we compare the ethnic distribution we use this assumption. We find the quality of life survey to be almost perfectly representative of the underlying ethnic distribution of New Zealand, primarily due to the survey methods of the QoL survey. The sample is however not particularly representative of the underlying geographical distribution between New Zealand's regions. Rural regions are consistently undersampled, and while New Zealand's major city, Auckland, appears to be accurately represented there is a strong oversample in the urban and peri-urban regions around Wellington, the capital city, with 21% of the sample coming from Wellington and the surrounding regions compared to 9% of the population. The regions of the South Island are also under-represented, with 18% of the sample residing in the South Island compared to 25.5% of the actual population. However, the regressions reported in section 5 are based on unweighted data, as appropriate weighting remains somewhat arbitrary and regressions weighted by age and location census frequencies yield very similar results.

Participants who indicated they were foreign born comprised 24.4% of the sample. This is close to the proportion of foreign born aged 15 and over in the New Zealand 2006 census which was approximately 26%. In comparing the proxy variables for social capital for foreign and New Zealand born participants, Foreign Born participants were almost identical to New Zealand born participants in all measures with the exception of the attitudes towards local government. The index here was derived as the first principal component of three variables. Foreign Born participants scored a mean first component value of 0.038 compared to -0.012 for New Zealand born participants. While this result was also confirmed by the regressions, it did not affect the other results noticeably.

5. Results

³ Maori term for people of European decent.

To examine the impact of homeownership on social capital, we first use standard regression techniques to estimate the model specified earlier using the four separate dependent variables. We then use PSM analysis to estimate the impact of homeownership on social capital.

5.1 Regression results

The determinants of each of the four separate dependent variables are estimated by means of regression methods that are appropriate to the type of dependent variable. We used a standardized model with a fixed set of explanatory variables chosen using the theoretical framework developed in section 3, with consideration of the available data introduced in section 4. The variables are described in table 1, and are all related to one of the four categories specified in the framework: either geographical, demographic, human capital or home ownership.

The binary trust variable is examined using a logit regression, while the participation index is examined using tobit regression due to the truncation of the index. Sense of community was examined using ordered logit regression while the first principal component of the council variables is examined using ordinary least squares. In each regression, we control for both spatial and time fixed effects. The results of these regressions are presented in table 2.

Table 2 about here.

Impact on Trust

The results for the logit regression of trust can be seen in column (1) of table 2. Of the demographic variables, the statistically significant findings are people of Asian ethnicity reporting relatively lower levels of trust and a marginally positive effect of older people being more trusting. Higher income and/or education also increase trust. These results are fully consistent with earlier research on the determinants of trust, using a completely different dataset, the World Values Survey (see Roskruege et al. 2010).

Interestingly, not being in the labor force or being employed part time also yielded statistically significant positive impacts on trust. These two variables also have positive impacts, where significant, on the other social capital variables of participation, sense of community and attitudes towards local government. It is possible that these two variables pick up that lower, or zero, hours of work reflect a high reservation wage and greater

productivity in the non-market sector. Non-participation and part-time paid work are associated with higher rates of voluntary work (for New Zealand, see e.g., Clark and Kim, 2009).

Trust is positively associated with household size and with living with a partner. Regional population density is not significant, but urbanization effects may be captured by the spatial fixed effects. The two measures of an individual's duration of residence in the region are also not significant.

Finally, the focus of our analysis is homeownership. We distinguish four categories: owner-occupier, renting from a family member (or provided rent free), renting from a private landlord and renting from the State. The default category is owner-occupier. We find that those renting from a private landlord or from the state are significantly less trusting than homeowners (or those renting from a family member). These findings are consistent with international findings such as those of Helliwell and Putnam (2007) and in the meta-analysis of Huang, van den Brink and Groot (2009).

Impact on Participation

Column (2) in table 2 reports the results for the determinants of the participation index using a tobit regression. The participation index ranged from 0 to 8, where zero had the participant engaged in no activities and 8 where the participant engaged in all activities surveyed in the QoL questionnaire. In this case, gender and age are both significant at the 1% level. Males participate less in social activities. The effect of age is clearly non-linear with minimum participation in social activities at around age 50. Again, this reflects the opportunity cost of time devoted to such activities. The typical concave age earnings profile suggests that this cost is indeed the highest around age 50.

Maori or Pacific Islanders reported higher levels of participation in social activities, consistent with those groups having on average lower hourly labor market earnings. However, those with Asian ethnicity participate less, possibly because many are recent immigrants who are likely to still be less integrated in New Zealand society.⁴ The coefficients on the years of schooling and household income are both significant and positive at the 1% level; thus the income effect outweighs the substitution effect for those working fulltime. As noted earlier, working part-time is also associated with participation in a larger range of social activities. Variables referring to geographical determinants are largely insignificant

⁴ The results are consistent with those of Clark and Kim (2009).

while there is some weak evidence that residing in a region longer than 10 years is associated with increased participation. Plausibly, larger households participate more in social activities.

The homeownership hypothesis is once again confirmed by regression (2). Both renting from a private landlord and living in a state owned house yield a negative impact on social participation significant at the 5% level relative to people who are homeowners (or renting from a family member).

Impact on sense of community

Column (3) in table 2 shows the impact of homeownership and other factors on an individual's sense of community. Being male is associated with a lower sense of community. Growing older raises the sense of community but the relationship is concave and reaches a maximum at the top end of the age range of the survey respondents. Of the ethnicities, all ethnic minorities have positive coefficients that are significant at the 1% level. These reflect the strong networks that operate within such communities, as compared with the general population. Those living with a partner, those who are retired, those in part time employment, those not actively engaged in paid work (but not retired) and those who are in larger households also report a greater sense of community. Moreover, as we might expect, there is an increase in the sense of community for each additional year of living in a region.

Finally, the homeownership hypothesis is once again confirmed, with renting from a private landlord associated with a lower sense of community at the 1% level. There is no statistically significant difference between homeowners and people living in state owned housing, many of whom will have long-term relationships with their community.

Impact on attitudes towards local government

Column (4) presents the results of the ordinary least squares regression model which tests for factors influencing attitudes of residents towards the activities of their local government. There is no evidence of a gender effect. However, both age and age squared are significant, with the coefficients suggesting that the attitude towards council activities over the life cycle initially declines with age and then increases after people have reached midlife. There is weak evidence that having a child at home is related to a decline in attitudes. Both the dummy variables representing the Pacific and Asian ethnic groups are significant and positive at the 1% level. Consistent with other literature, more educated people have a more positive attitude towards local government. However, there is no effect from household income or employment status. Interestingly, the attitude towards council significantly

declines with increasing duration of residence. A longer stay in a region appears to make residents less satisfied with the performance of their local council. On the other hand, the attitude is more positive in regions with greater population density (i.e., more urbanized regions).

Finally, the three housing measures (private renting, state renting and living with family) are significant and positive at the 1% level when compared to home owners. We conclude that homeownership, which in New Zealand brings with it the obligation to pay local taxes, is negatively associated with the attitude towards local government.

Comparison across models

Comparing the four models, there is evidence that being female increases the likelihood of both participation and the sense of community an individual feels. Trust and sense of community are both positively related with age. However, participation and attitude towards council have a convex relationship with age, with the lowest participation in community activities and support for council occurring at midlife. Compared to the dominant European ethnic group, individuals who identified with Maori or Pacific Island ethnic groups had significantly higher participation and sense of community and the Pacific Island ethnic group also had more positive attitudes towards local government. In contrast, those identifying with an Asian ethnic group had a lower likelihood of trusting others and participation, but were more likely to feel a sense of community and approve of the councils activities. The “other” ethnic group was not statistically dissimilar from the majority European ethnic group in any of the models.

There was some evidence that living with a partner increased trust and sense of community, while having children residing in the household was associated with a poorer view of local governance. Years of schooling was significant and positive in all models other than when modeling sense of community, and household income is significant and positive for both trust and participation. Those who were employed part time or unemployed were more likely to both trust others and feel a higher sense of community compared to those who were employed fulltime. The first 10 years of living in a region appear to have the greatest impact on contributions to social capital, with increasing sense of community and declining attitudes towards local government when duration of residence increases. Population density is insignificant for all proxies other than attitudes to local government, where it is both significant and positive. Compared to home owners, those who rented from either a private or state landlord were significantly less likely to trust others or participate in social activities,

and private renters were also less likely to feel a sense of community. However, when considering attitudes towards local government, those living in family, private rental and state rental housing all were significantly more likely to have a positive attitude towards local government when compared to those who own their own homes. It is likely that this is due to the fact that local government rates and levies are paid for explicitly by home owners, while those who are renting have these costs incorporated into their rent, and therefore are not faced with the local government costs directly. This means that as homeowners are faced with a bill for local government services, they have a stronger incentive to hold local government to account and are therefore more critical of council actions. The positive coefficients for the three types of people who are not owner-occupiers suggest that those groups are less actively involved in holding local authorities to account.

In summary, the regression estimates show that homeownership has a significant positive effect on most proxies for social capital, with the exception of attitudes to local government in which case the results suggest that homeownership is associated with less positive attitudes.

5.2 PSM estimates

In this section we discuss the results of the PSM model of homeownership on the four proxies for social capital. We employ both kernel and nearest neighbor matching to estimate the effects with bootstrapped standard errors obtained with 200 repetitions. The results of both methods for the four proxies are presented in table 3. Due to balancing issues we had to consider a much smaller model than that used in the regression estimations. The most satisfactory matching model was based on age, gender, whether the individual is in part-time employment, whether they are living in a residence with a partner, years of schooling and the population density of the territorial area they reside in.

Figure 1 presents the kernel densities of the propensity scores for both homeowners and non-homeowners using the control variables specified above. The figure suggests that while there is considerable overlap in the distributions, the kernel density for homeowners has considerable density for high propensity scores, with a strongly negative skew. The distribution for non-owners has one overlapping mode in the same range (between 0.8 and 0.95) but another mode between propensity scores of 0 and 0.2. This is reflected in the very different means between the groups, with the mean propensity score for homeowners being .62 and .46 for non home owners.

The estimates of the average treatment effect of home ownership on the treated (ATT) are reported in Table 3 for the four proxies of social capital, and the nearest neighbor method of matching (ATTNN) and the kernel density method (ATTKD). The effect of homeownership on trust and participation is positive and statistically significant at the 5% level or better with both methods. However, there is only weak evidence for homeownership impacting on the sense of community, with it being significant at the 10% level using kernel density matching and insignificant using nearest neighbor matching. Both methods provide clear evidence that homeowners have less positive attitudes towards local governments.

Using the average treatment effects along with the confidence intervals, we gain some understanding of the likely effect that owning a home has on trust, participation, sense of community and attitudes towards local government. The findings for trust suggest an increase in the probability of reporting positive trust of around 3 to 5 percentage points on average, but with confidence intervals spanning a range of 1 to 9 percent. For participation, the interpretation is that the average number of social activities is about 0.1 higher for homeowners than for non-owners, but with a confidence interval between 0 and 0.2. The community variable itself has a range from 1 to 5, and homeownership increases the response very weakly or not at all. The findings for attitudes towards local government however were strongly significant and negative. The 95% confidence interval ranged from -0.341 to -0.166 across the matching methods, with means of -0.226 for kernel and -0.244 for nearest neighbor matching. This result suggests that there is a significant and large decrease in an individual's attitude towards local council decision making resulting from owning a house.

Across the matching results, there appears to be significant evidence for the impact of homeownership on proxies of social capital, however the impacts tend to be quantitatively modest at best. Both trust and participation appear to be positively impacted by homeownership while attitude towards local governance is strongly negatively affected by homeownership.

6. Conclusions

By applying both regression and matching techniques to survey data collected in New Zealand, we estimated the impacts of homeownership alongside other micro-determinants on individual social capital.

Using regression methods, and controlling for a wide range of other individual, local and time characteristics, we find that when an individual does not own the home they live in, they report significantly lower levels of social capital than those who do own the home they

live in. The exception to this result is with regard to attitudes towards local government, on which homeownership has a negative impact. Even here, this outcome likely reflects a stronger involvement in the governance of their community by homeowners, but this involvement makes them less satisfied with the performance of their local representatives.

The PSM estimates of the average treatment effect of homeownership were obtained by using nearest neighbor and kernel matching. Homeowners are found to be more trusting and participate in more social activities than non-homeowners. However, there is only weak evidence that homeownership increases the sense of community an individual feels. Again, and there is strong evidence that homeownership decreases an individual's attitude towards local government.

Both sets of results support the hypothesis that homeownership encourages personal investment in the local community. These results may have implications for policy, particularly for those areas where there are low levels of owner-occupied dwellings. In such areas, high levels of crime and other social 'bads' may arise from the lower levels of social capital associated with the lack of homeownership. The PSM results (on which we place most reliance) imply that increasing levels of homeownership may improve personal trust and participation, but not engender a material increase in the sense of community. Thus whether or not homeownership should be encouraged depends on the outcome that is being sought. If a greater sense of community is desired, a policy favoring homeownership may have little or no effect. If policy-makers wish to increase participation in local activities and/or increase trust in others, they may wish to consider policies that enhance homeownership. In addition, if central government wished to raise the incentives on local residents to hold local government to account, a policy that raises homeownership levels may be an effective means of engendering extra scrutiny of local government performance.

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Table 1. Descriptive statistics

	variable	description	Obs	Mean	Std. Dev.	Min	Max
Dependant variables	Council	index of attitudes towards council	14439	0	1.25	-1.69	1.82
	Community	Reported sense of community	14952	3.62	1.03	1.00	5.00
	Trust	0= 'cannot be too careful' 1= 'most people can be trusted'	14927	0.77	0.42	0	1.00
	Participation	Index of activities individuals are an active participant in	15056	2.87	1.48	0	8.00
Demographics	euro*	Identified as ethnic european	15056	0.76	0.43	0	1.00
	maori	Identified as ethnic Maori	15056	0.13	0.33	0	1.00
	pacific	Identified as ethnic Pacific Islander	15056	0.05	0.23	0	1.00
	asian	Identified as ethnic Asian	15056	0.08	0.27	0	1.00
	other	Identified as belonging to another ethnic group	15056	0.04	0.21	0	1.00
	male	0= female, 1=male	15056	0.44	0.50	0	1.00
	age	age in years	15056	46.25	16.22	18.00	100.09
	hh_size	size of household, truncated at 6.	15056	3.12	1.40	1.00	6.00
	child	child under 15 currently living in same residence	15056	0.52	0.50	0	1.00
	partner	partner currently living in same residence	15056	0.76	0.43	0	1.00
Home ownership	ho_owner*	Owner of household	15056	0.72	0.45	0	1.00
	ho_fam	Living in home owned by family	15056	0.13	0.33	0	1.00
	ho_renter	Living in rented accomodation	15056	0.12	0.32	0	1.00
	ho_state	Living in a state owned home	15056	0.04	0.18	0	1.00
Human capital	ed	years of formal schooling	15056	13.46	2.33	10.00	18.00
	hhinc	household income	15056	76,001	48,711	0	216250.00
	fulltime*	1= currently in full time employment	15056	0.53	0.50	0	1.00
	parttime	1= currently in part time employment	15056	0.21	0.40	0	1.00
	unemp	1= currently not in labour force	15056	0.15	0.36	0	1.00
	retired	1= currently retired	15056	0.11	0.31	0	1.00
geographic	reg_cont	number of years living in region, up to 10	15056	8.51	2.70	0.50	10.00
	reg10plus	0= less than 10yrs, 1= 10yrs+	15056	0.71	0.45	0	1.00
	popdens	population per km ² in territory individual resides in	15056	466.20	477.69	0.52	1718.48

*Indicates baseline variables

Table 2. Regression results

VARIABLES	(1) Trust Logit	(2) Partindex [†] tobit	(3) Community ologit	(4) Council OLS
male	0.060 (0.043)	-0.145*** (0.026)	-0.101*** (0.032)	0.034 (0.022)
age	0.017* (0.009)	-0.019*** (0.006)	0.039*** (0.007)	-0.011** (0.005)
age2x100	-0.009 (0.010)	0.020*** (0.006)	-0.022*** (0.008)	0.016*** (0.005)
maori	0.025 (0.062)	0.331*** (0.038)	0.325*** (0.048)	0.023 (0.032)
pacific	-0.121 (0.089)	0.499*** (0.058)	0.542*** (0.073)	0.299*** (0.049)
asian	-0.402*** (0.075)	-0.186*** (0.049)	0.349*** (0.060)	0.280*** (0.042)
other	-0.018 (0.101)	-0.027 (0.061)	0.117 (0.075)	0.066 (0.051)
lned	1.288*** (0.127)	1.528*** (0.075)	0.074 (0.094)	0.380*** (0.064)
lnhhinc	0.175*** (0.036)	0.158*** (0.022)	-0.040 (0.027)	0.018 (0.018)
partime	0.275*** (0.057)	0.252*** (0.034)	0.232*** (0.042)	0.028 (0.028)
unemp	0.237*** (0.063)	0.050 (0.039)	0.254*** (0.048)	0.048 (0.033)
retired	0.152 (0.111)	0.087 (0.066)	0.330*** (0.082)	-0.016 (0.056)
ho_fam	-0.073 (0.082)	-0.015 (0.052)	-0.082 (0.064)	0.137*** (0.044)
ho_renter	-0.144** (0.068)	-0.086** (0.042)	-0.226*** (0.053)	0.113*** (0.036)
ho_state	-0.236** (0.106)	-0.164** (0.070)	0.040 (0.087)	0.368*** (0.059)
hh_size	0.038** (0.019)	0.089*** (0.012)	0.093*** (0.014)	0.031*** (0.010)
child	-0.023 (0.050)	-0.050 (0.031)	-0.020 (0.038)	-0.046* (0.026)
partner	0.102* (0.056)	0.038 (0.035)	0.139*** (0.043)	-0.046 (0.029)
reg_cont	-0.023 (0.015)	0.011 (0.009)	0.035*** (0.011)	-0.015* (0.008)
reg10plus	0.088 (0.087)	0.097* (0.053)	-0.079 (0.066)	0.009 (0.045)
lnpopdens	0.866 (2.774)	-0.154 (1.688)	3.042 (2.097)	4.998*** (1.418)
Constant	-6.946 (5.721)	-2.645 (3.482)	3.792 (4.327)	-11.589*** (2.927)
Observations	14,866	14,999	14,896	14,386
Pseudo R squared	0.033	0.026	0.030	0.060 ^{††}
Log likelihood	-7688	-26774	-20174	-23203
Chi squared	519.8	1447	1251	924.5

Notes: Time period and spatial fixed effects included; standard errors in parentheses; Significant at: *** p<0.01, ** p<0.05, * p<0.1; [†] Sigma is 1.476*** and is equivalent to the standard error of estimate in OLS regression; ^{††} Standard R-squared.

Table 3. Average treatment effect on proxies for social capital using matching estimators

Dependent variable	ATTNN	95% CI	ATTKD	95% CI
Trust	0.048*** (0.017)	0.027, 0.091	0.034*** (0.012)	0.012, 0.06
Participation	0.112** (0.056)	0.02, 0.195	0.145*** (0.042)	0.056, 0.214
Community	0.029 (0.038)	-0.05, 0.1	0.048* (0.025)	0.004, 0.199
Council	-0.244*** (0.047)	-0.341, -0.166	-0.226*** (0.032)	-0.286, -0.163

Notes: Bootstrapped standard errors in parentheses with 200 replications; Significant at: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; Matched on: age, age², gender, education, education², regional population density, employment status & relationship housing status.

Figure 1: Kernel density estimate for homeowners and non-homeowners

