Motu

Social Capital and Regional Social Infrastructure Investment: Evidence from New Zealand

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Abstract

In this paper we link unique data on local social infrastructure expenditure with micro-level individual survey data of self-reported social capital measures of trust and participation in community activities. We use both probit and tobit models to estimate the impact of social infrastructure expenditure on social capital formation. Our results imply that the links between social capital, demographic characteristics, human capital, geography and public social infrastructure investment are rather more subtle and complex than much of the literature implies. While we find evidence in support of many of the hypothesized relationships discussed in the social capital literature, our results also suggest that the impact of public social infrastructure investment is affected by both selection effects and free rider processes.

JEL codes

Keywords

Contents

1. Introduction

There has been interest in the relationship between social capital and economic outcomes for several decades now but it remains a contentious and hotly debated topic. Glaeser and Redlick (2009) argue that expenditures on social infrastructure may be important for relatively distressed regions to discourage out-migration and thereby encourage residents to invest in social capital. Yet, although there have been many attempts to understand the economic determinants and the economic impacts of social capital, there remain many aspects of the concept which are still poorly understood. This lack of understanding stems primarily from the intangible nature of social capital, which means that measurement relies on observable proxy variables and investigator interpretation.

New Zealand provides a unique opportunity to examine the nature of social capital at a regional level. This opportunity stems from a combination of the characteristics of New Zealand, a small open society with clearly defined and universally applied regional regulations, coupled with a range of microeconomic datasets containing information on regional social capital. This paper therefore contributes to the understanding of the determinants of social capital. There have been few studies on the determinants of social capital in small, open, socially cohesive and institutionally homogenous countries. Despite the opportunities presented by the institutional framework, demography and availability of micro data on social capital, there has been no previous economic analysis on this topic in New Zealand.

In this paper, we estimate the determinants of social capital within New Zealand by means of the national results of two waves of the World Values Survey (WVS) combined with data from Statistics New Zealand and a specially constructed dataset containing detailed information on local government expenditure. The major innovation in this paper is that we combine micro survey data on self-reported indicators of social capital with local government data on the types of social infrastructure expenditure which the literature suggest are likely to enhance social capital. We then use both probit and tobit models to estimate the likelihood of participation in social capital-building activities, the range of activities people participate in and also the impacts of social infrastructure expenditure on this participation. As far as we are aware, this is the first time that such an empirical analysis has been undertaken of the relationship between individual social capital and regional social infrastructure investment.

The paper is organized as follows. Section 2 discusses briefly what is currently known about the links between social capital and economic growth and development and also highlights the gaps in our present understanding of these issues. Section 3 presents the theoretical

framework for analyzing the determinants of individual social capital. Proxies for social capital, interpersonal trust and community participation are outlined in detail, and these proxies for social capital are then related in a general framework to four areas that the literature suggests may determine individual social capital, namely: demographics, human capital, geography and local social infrastructure investment.

Section 4 describes and summarizes the individual datasets compiled from a variety of sources, as well as the final combined dataset used for this analysis. The combined dataset enables the testing of a specification of four econometric models based on the theoretical framework discussed in section 3. Section 5 presents the results of the probit and tobit models of the likelihood and range of social participation. The models are examined to see if the factors which influence the overall level of participation differ from those that influence the extent to which people participate in a range of social activities. Section 6 provides a detailed discussion and interpretation of the results and section 7 offers some conclusions.

2. Social Capital and Economic Development

Since Putnam's (1993) seminal analysis of the role of social capital in the performance of Italian regions, there has been rapidly growing interest from multiple academic disciplines in the role of social capital as a form of infrastructure (Castiglione et al. 2008), and its role in economic development (Francois 2002; Westlund 2006; Semitel Garcia 2006). Baum (2000) tracks the popularity of social capital, finding that before 1981, 20 articles listed social capital as a key word, rising to 109 between 1991 and 1995, and 1003 between 1996 and 1999. Using "social capital" as a key word in Google Scholar now suggests 133,000 articles or documents contain the phrase, of which 21,000 are linked to economics.

The term social capital has appeared in a range of disciplines and publications. It first appeared in academic literature in an article by Hanifan (1916) examining the role of rural schools on community wellbeing. It was not until the 1980s that the concept was largely rediscovered by sociologists Bourdieu (1986) and Coleman (1988, 1990). The theory began to cross disciplines with the popular publications of Robert Putnam (1993, 1995, 2000) who used a combined economic, political and sociological approach to apply social capital to the diversity of performance firstly in the Italian states and later in the United States. Putnam's work provided the first evidence that social capital was related to economic growth and other factors, and identified some precursors as well as outcomes of social capital.

'Social capital' has had varying meanings during the twentieth century, with the definition in earlier works remaining very fluid and different in meaning from its contemporary uses (Castiglione et al. 2008). Throughout its development as a concept, social capital has been consistently related to human capital in the literature. However, as has been stated several times, most notably by Robert Solow (1997, 1999), even in its modern usage the concept of social capital has been notoriously difficult to define, with no commonly agreed upon definition of social capital appearing in the literature (Claridge 2008). While the particular definition adopted by a study will often depend on the discipline and level of investigation (Robison et al. 2002; Adler and Kwon 2002), there has been a common theme amongst the usage, and that has been a focus on the productive benefits of social relations. Westlund (2006) states that 'social capital' has now come to refer to social networks, relationships, norms and values. These factors are all related to the social situation in which an actor is embedded. A problem with this definition is that it begins to fall short of what is commonly considered to be capital, which is a stock that provides a flow. Many economists have therefore changed their definition of social capital to include only interpersonal networks, which people can invest in, which can be held as a stock, provide a flow of returns and can depreciate, however with social capital depreciation occurring through underuse rather than use. Due to these factors, numerous definitions of social capital exist within the body of academic literature. They vary depending on whether their focus is primarily on (1) the relations an actor maintains with other actors, (2) the structure of relations among actors within a collectivity, or (3) both types of linkages (Adler and Kwon 2002).

Once introduced to the mainstream, the links between social capital and economic growth began to be investigated by several authors, such as La Porta et al (1997), Knack and Keefer (1997), Zak and Knack (2001). Yet, the current popularity of the concept has not been without controversy, as the intangible nature of the subject makes quantification, validation and even defining social capital a potentially problematic exercise. This subjectivity of interpretation has drawn criticism from authors such as Robert Solow (1997, 1999) and Kenneth Arrow (1999), whose arguments are particularly critical of including social capital as a form of true capital, similar to human or physical capital. However, over time this debate has given way to a general acceptance of the theory. The role played by social capital in regional (Westlund 2006) and national (Castiglione et al. 2008; Tinggaard Svendsen and Haase Svendsen 2009) economic growth has now become largely accepted and widely used in the economics literature. Social capital can be examined at several levels, including political, community and individual levels, and there is now a wide literature regarding the applications, validity and methodological considerations associated with using the concept of social capital in economic research. Even so,

it is still the case that the exact mechanisms by which social capital contributes to growth and development remain the topic of much debate and investigation, and this also relates to the use of data. Without any overall consensus as yet on how to define or operationalise social capital, researchers often utilize a wide array of datasets such as the World Values Survey and General Social Survey datasets in order to develop proxies for social capital from survey items that were not originally intended for such an analytical approach (Miller and Buys, 2008; Baum and Ziersch, 2003; Zack and Knack 2001; Kawachi et al. 1997).

New Zealand provides an ideal context for examining social capital for several reasons. Firstly, New Zealand consistently ranks as one of the world's most open, cohesive and institutionally sound societies (McCann 2009); secondly, very detailed individual level data are available for New Zealand; and thirdly, given its geographical isolation, New Zealand may be thought of as a self-contained societal case study. Given the data at our disposal, this paper will focus on examining the levels of social capital held by an individual. At this individual level, there are two generally accepted dimensions of social capital which can be used to gauge personal stocks of social capital. These are, firstly, trust in people and secondly, personal involvement in other people's activities (Huang et al. 2009). These measures have been adopted by both the World Values Survey and the General Social Survey, and as such have appeared frequently in social capital analyses making use of these data sources.

In the particular case of New Zealand, while concepts such as social infrastructure, participation and community development were discussed prior to the 1990's, the social capital concept itself had not been applied to New Zealand until relatively recently. In 1997, stimulated by both an interest from policy analysts and by a trip to New Zealand by Robert Putnam, the Victoria University Institute of Policy Studies (IPS) began applying social capital concepts to New Zealand. This research, while largely social in nature, did provide insights into the economic relationships between social capital and development. More importantly, this research provided a framework and issues for the measurement and analysis of social capital in the New Zealand context. The results of the IPS study into social capital were published in three books (Robinson, 1997; 1999; 2002), and also led to several other important publications, most notably Statistics New Zealand's "Framework for the Measurement of Social Capital in New Zealand" (Spellerberg, 2001). In addition, New Zealand has also been included in two cross-country studies of the levels of trust, as reported in the World Values Survey (WVS), and the relationships between trust and economic growth. The studies by Zak and Knack (2001) and González (2001) were extensions on the original seminal work by Knack and Keefer (1997), in which trust (using WVS data) was found to be correlated with GDP growth across several

countries. The results showed that New Zealand had a level of GDP growth that was consistent with what would be expected given the level of trust reported.

3. The Determinants of Social Capital

As discussed above, the underlying stock of social capital is intangible and unobservable, and 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 analysis, we have settled on two commonly used proxies for social capital in developed democratic societies, namely interpersonal trust and community participation. Both interpersonal trust and community participation have become generally accepted in the international literature as valid indicators of the underlying stock of social capital. While their widespread adoption was initially due to their inclusion in the World Values Survey and the General Social Survey, researchers such as Zak and Knack (2001) have provided robust theoretical links which validate their use.

Based on the literature, four significant groupings of determinants of social capital have been identified for inclusion in the theoretical model. They are: demographic variables, geography and location-specific variables, variables relating to human capital and measures of social infrastructure investment. Because this analysis considers social capital at an individual level, demographic aspects of the individuals should be controlled for as these are consistently shown to be related to social capital, specifically age, gender and ethnicity (Glaeser et al. 2002; Putnam 2000, van Emmerik 2006). With respect to ethnicity, there is currently no existing economic study on social capital in New Zealand which incorporates ethnicity as a factor. However, there are strong grounds for believing that the ethnic composition of New Zealand's population and in particular the cultural differences between the indigenous Maori, the population of European origin, the population of various Asian origins, as well as the Pacific Island communities, may lead to ethnic distinctions in social beliefs and attitudes which could influence social capital formation (Spellerberg 2001; Williams and Robinson 2001).

Geography and location have also been identified as important considerations for social capital formation. In particular, several European studies have shown social capital formation in rural settings to be significantly different from that in urban areas, with more 'bonding' rather than 'bridging' social capital in evidence in the former. In the case of New Zealand, there is a geographical break between the North Island and the South Island. While the land mass of the South Island is larger than that of the North Island, it is both more sparsely populated, with only

24% of the New Zealand population, and also much more ethnically homogeneous, with 90% of the population primarily identifying themselves as being European in the 2006 census, as compared with only 71% in the relatively more urbanized and densely populated North Island (Statistics New Zealand 2006). These demographic and geographic differences may impact on social capital formation and will therefore need to be controlled for in the statistical analysis.

Human capital has been consistently found to be related to social capital (Huang et al. 2009; Glaeser et al. 2002; Helliwell and Putnam 2007), although the exact relationship is still the subject of much debate. Bowles and Gintis (2002) argue that social skills are a product of education and as such, social capital could be considered to be a sub-component of human capital. This is in contrast to the standard approach which treats social capital as being related to, but also 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, controls for individual human capital are included in our analysis.

While the role of geographic, demographic and human capital variables have been widely studied in the context of social capital formation, there are few publications examining the role of social infrastructure, with even fewer still examining the role that social infrastructure investment plays in the formation of social capital. Social infrastructure refers to the provision, both by the public and private sectors, of areas for actors to connect to others and develop the interpersonal linkages which are regarded as the essence of social capital. While private investment in social capital is difficult to measure, public investment can be inferred from regional and national accounts. Examples of social infrastructure in New Zealand include community facilities, leisure facilities, parks and other landscapes areas, and regional networks such as the Auckland Chamber of Commerce[1] or the Christchurch City Community Boards[2]. By including public expenditure on social infrastructure in our analysis, we can identify the role that spending by local government has on social capital.

On the basis of the current social capital literature we can therefore assume that the self-reported indicators of social capital (K_{Si}) are determined by an individual i's personal characteristics (C_i), geographic variables (G_i), human capital (K_{Hi}) and by the social infrastructure in individual i's region (I_{ri}). As such, in very general terms we can specify the structure of the social capital model as: $K_{Si} = K(C_i, G_i, K_{Hi}, I_{ri}) + \varepsilon_i$, with the functional form and the error term properties determined by the nature of the social capital proxies employed. This general model

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[1] http://www.aucklandchamber.co.nz
[2] http://www.ccc.govt.nz/thecouncil/communityboards/Index.aspx

specification provides the framework for our selection of the variables from the micro datasets available to us.

4. Data and Methodology

In order to test the theoretical linkage of social infrastructure investment, demographic characteristics, geography and human capital in determining levels of social capital in New Zealand, we use pooled individual cross sectional data obtained from the World Values Survey (WVS). The WVS organization is a not-for-profit international sociological organization which has conducted worldwide surveys since 1981 in five separate waves via a network of social scientists, with over eighty countries having now participated in at least one wave. These surveys focus on sociological and political variables, and the results for each country are made freely available via their website. The data are available at the individual level and include all items asked in the standardized survey, including individual values, attitudes, political opinions, trust, participation and demography. We use the WVS data collected for New Zealand by Massey University, as part of the 1994-1999 waves (World Values Survey, 2006) and the 2005 List B data collection (World Values Survey, 2008). Observations pertaining to countries other than New Zealand were removed.

New Zealand has participated in two separate waves of the WVS, in 1998 and 2004. Both data collections were conducted by Massey University via postal surveys, with the sample drawn at random from New Zealand citizens aged between 18 and 90 registered on the New Zealand Electoral Roll. A summary of the sampling can be seen in Table 1. For both surveys there was an oversampling of citizens who identified as Maori, in both cases around double the proportion identified on the electoral roll. This was to correct for the often observed lower response rates in New Zealand of Maori compared to the general population.

Table 1. World Values Survey: New Zealand postal sampling outcomes

Year of Survey	1998	2004	Pooled
Total sent	2,024	1,979	4,003
Completed	1,201	954	2,155
Response rate	59.3%	48.2%	53.8%

The pooled dataset consisted of 2,155 observations. However, 128 observations were dropped when we restricted the sample to those people for whom we could identify a region or residence, resulting in a final pooled dataset of 2,027 individual observations, of which 1,129 were from the 1998 survey and 898 were from the 2004 survey.

In addition to the data made available through the WVS, data was also included from the 2001 New Zealand Census of Populations and Dwellings, as well as two independent data series created by Motu Economic and Public Policy Research, a Wellington-based research institute, namely the Local Authorities Finance Data series and the Regional and Unitary Authorities Finance Data series. These latter two series provide detailed breakdowns of annual local government spending at two regional levels within New Zealand, namely Regional Councils (RC's) and Territorial Authorities (TA's), from 1991 to 2008. The WVS data are coded to Regional Council level, the largest level of local governance in New Zealand. Local government in New Zealand comprises 16 regional councils and 69 separate territorial authorities. As both RC's and TA's fund social infrastructure development over the same areas, we use the Statistics New Zealand 2001 Census of Populations and Dwellings to allocate TA expenditures to RC's by population, creating total expenditure within the RC by all constituent local authorities. We aggregate two of the smaller RC's to create 15 regions.

Prior to 2001, local governments in New Zealand were not required to provide standardized accounts of their expenditure. Hence the Motu datasets have had to be constructed from a range of reports, including three separate tables made available by Statistics New Zealand, and requests for data directly from the authorities concerned. Both the RC and TA data contain series which show the levels of expenditure on "Parks and Community Facilities and Services". Due to the complications of creating a consistent set of data across differing reporting methods, the information collected is rather coarse and includes spending on "economic development, tourism, civil defense, hazard mitigation, ports, harbor and maritime expenses and appropriate regional assets (e.g. parks, reserves, ports and polytechnics)". While this series is therefore not a perfect representation of social infrastructure investment, it is the most appropriate indicator available on expenditure of this nature over the required time period. The data vary significantly year on year within councils, primarily due to variability of funding one-off large investments. In order to smooth the series, we took the average annual expenditure by each RC over the six year period leading up to the survey, so 1993-1998 for the 1998 WVS observations and 1999-2004 for the 2004 observations.

The definitions of all variables used in this paper are given in Table 2. Along with the three dependent variables used as proxies of social capital, there are twenty explanatory variables relating to demography, human capital, geography and social infrastructure.

Table 2. Definition of variables

Variable label	Definition	Mean[#]
Dependent variables		
Trust	0= 'cannot be too careful' 1= 'most people can be trusted'	0.501
Participation	index of activities individuals are actively participating in	1.521 (1.46)
Yes_part	0= not an active participant in any social activity, 1= active in at least one social activity	0.710
Explanatory variables		
Demographic		
Male	0= female, 1=male	0.452
Couple	0= single, 1= married or living in the nature of a marriage	0.696
Children	number of dependent children in household	2.073 (1.614)
Age	age in years	48.1 (16.47)
NZ/euro*	1= ethnicity primarily identified as European or Pakeha	0.896
Maori	1= ethnicity primarily identified as Maori	0.072
Pacific	1= ethnicity primarily identified as Pacific Islander	0.016
Asian	1= ethnicity primarily identified as Asian	0.016
Foreign	0= NZ born, 1= Born overseas	0.176
Human Capital		
Postsec	1= Received post secondary education	0.631
High_occu	1= Occupation involves high autonomy, responsibility or human capital	0.385
Med_occu*	1= Occupation involves moderate autonomy, responsibility or human capital	0.343
Low_occu	1= Occupation involves low autonomy, responsibility or human capital	0.215
Income	Household income, in 2004 New Zealand dollars.	57,509 (33,227)
Geographical		
South	0= primary residence in North Island, 1= primary residence in South Island	0.268
Rural	1= primary residence in location with a population lower than 10,000	0.385
Provincial*	1= primary residence in location with a population between 10,001 and 99,999	0.343
Urban	1= primary residence in location with a population greater than 100,000	0.372
RCpop	Population of Regional Council in the year survey was conducted	529,141 (416,665)
Social Infrastructure		
PCSI	Annual local government per capita spending on community facilities, operations and management, in 2004 New Zealand dollars.	288.24 (74.98)

Notes: *indicates baseline variables; [#]standard deviation in parentheses where appropriate.

The dependent variables 'Trust' and 'Participation' are both drawn from the World Values Survey. The Trust variable is binary and equal to one where the respondent answered affirmatively to the question "In general, can most people be trusted?". The World Values Survey also asked participants to indicate whether they considered themselves to be active, inactive or non-members of community organizations. The participation index used in this analysis was created using a series of nine questions asking participants if they were an active member, an inactive member, or not a member of nine separate types of community organization.[3] This measure used only participants who indicated that they were 'active' members as inactive membership is unlikely to indicate social networking. We summed the number of times a participant indicated they were an active member of an organization, resulting in a variable which ranged from zero where an individual indicated they did not participate in any community organizations to nine where a participant was actively involved in all organizational types polled in the survey.[4] The truncation of this data makes a tobit regression appropriate.

The combined and cleaned dataset was largely representative of the underlying general New Zealand population; however males and people between 18 and 34 were slightly under represented. Measuring ethnicity is problematic in New Zealand following the introduction of a new ethnic category, 'New Zealander' in surveys, in addition to the traditional European and Maori ethnic groups. In our sample, 49% of participants indicated that their ethnicity was 'New Zealander', providing very little information on the actual ethnicity of the individual and being more likely an indicator of an individual's sense of nationhood or beliefs.[5] There was also an under-sampling of both Maori and Pacific Island participants. Geographically our survey participants are generally distributed in line with the general population, but Auckland – New Zealand's primate city containing over one quarter of the country's population – was slightly underrepresented.

Participants who indicated they were foreign born comprised 17.6% of the sample. This is slightly lower than the total percentage foreign born in New Zealand which was approximately 21% at the time of the second survey. In comparing the proxy variables for social capital for foreign and New Zealand born participants, we find very little difference: 49% of foreign born participants indicated that most people could be trusted, which is almost identical to the 50% of New Zealand born participants who indicated that most people could be trusted. Foreign born

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[3] There were eight named forms of organisation (religious, sport or recreational, arts, environmental, union, political, professional, charity) with the ninth being 'any other'.
[4] The highest observed number of organisations participated in was 8.
[5] The WVS did not offer participants the option of selecting an 'other' category, and this may have inflated the 'New Zealander' category as well.

participants were slightly less likely to participate in community activities, with foreign born participants being on average active in 1.44 organizations compared to a mean of 1.54 for New Zealand born. Foreign born participants were more likely to be an active member in a religious organization (29% compared to 16% of New Zealand born) while they were less likely to be active in sports or recreational organizations (27% compared with 40% New Zealand Born) or actively involved in a labor union (3.4% compared with 6.8% New Zealand born).

Our analysis is broken into three separate stages. The first is a probit regression on levels of interpersonal trust; the second is a tobit regression on our index of participation in community groups. Thirdly, we deconstruct the participation variable into the decision to participate, and the range of social activities that individuals engage in among those individuals who do participate in such activities. These variables are then tested using the full model specification with probit and tobit regressions, respectively.

With the probit regression using 'Trust' as the dependent variable, and the tobit regression using 'Participation' as a dependent variable, we use a standardized model with a fixed set of explanatory variables chosen based on our discussion in section 3, with consideration of the available data introduced in section 4. The variables are all described in Table 2, and are all related to one of the four categories specified in our framework: geographical, demographic, human capital or social infrastructure.

5. Models and Results

The results for the probit regression of Trust are shown as Model 1 of Table 3. Standard errors for all the regressions are calculated after clustering on regions for each year. This is necessary because our social infrastructure variable is measured at the regional rather than the respondent level for each of the two years.

Of the demographic variables related to trust, there is no evidence of a gender effect in the levels of trust, or an effect of marital status or the presence of children. However, log age is found to be positive and significant. This reconfirms a common finding in the international literature that reported levels of trust are higher among older people. In terms of the three dummy variables for ethnicity which represent non-dominant groups in New Zealand (the omitted variable being the dominant European or New Zealander ethnicities), the results show that identifying as Maori or Pacific Islander has a negative impact on reported trust, while there is no significant difference between the European and the Asian populations. Moreover, the dummy variable representing migrants (foreign born) is also statistically insignificant.

Table 3. Results for 'Trust' and 'Participation'

VARIABLES	(1) **Trust** probit	(2) **Participation** tobit
Male	0.008	-0.065
	(0.061)	(0.090)
Couple	-0.079	-0.255**
	(0.069)	(0.103)
Children	0.007	0.127***
	(0.021)	(0.032)
Log Age	0.476***	0.505***
	(0.099)	(0.147)
Maori	-0.263**	0.565***
	(0.116)	(0.169)
Asian	0.061	0.421
	(0.238)	(0.361)
Pacific	-0.498*	1.421***
	(0.257)	(0.352)
Foreign	-0.007	-0.349***
	(0.085)	(0.128)
Postsec	0.195***	0.687***
	(0.069)	(0.103)
High_occu	0.291***	0.624***
	(0.070)	(0.104)
Low_occu	0.035	-0.389***
	(0.080)	(0.122)
Log income	0.223***	0.089
	(0.050)	(0.074)
South	0.162**	-0.008
	(0.071)	(0.105)
Rural	0.141*	0.184*
	(0.074)	(0.110)
Urban	0.132	0.004
	(0.083)	(0.123)
Log RCpop	-0.012	0.017
	(0.045)	(0.068)
Log PCSI	0.146	-0.212
	(0.134)	(0.200)
Constant	-5.184***	-1.432
	(0.970)	(1.436)
Sigma		1.824***
		(0.037)
Observations	1,971	1,971
Pseudo R^2	0.047	0.031
Log Likelihood	-1,302	-3,338
% correctly predicted	60.22%	-
% within ±1	-	55.99%

Notes: Standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$; the statistic Sigma is equivalent to the standard error of the estimate in OLS regression.

Among the human capital variables, postsecondary education and higher level occupations are both significantly and positively related to trust at the 1% level, as is the log of household income. These findings are consistent with international findings such as those of Helliwell and Putnam (2007) and in the meta-analysis of Huang et al. (2009). With respect to geography, there is evidence that both the South Island and rural areas in general experience greater levels of trust. Finally, our regression shows that the coefficient on the social infrastructure expenditure variable is positive, but is not statistically significant at the 10% level.

Model 2 presented in Table 3 reports the results for determinants of the participation index. The participation index is truncated both at zero, where the individual participates in no community activities, and at nine, where the individual participates in all nine activities listed in the WVS questionnaire. Due to this double truncation, the data were analyzed by means of a tobit regression. In this model, gender is again insignificant, but being a couple (rather than a single person) is found to be negatively related to social participation at the 1% level. In other words, single persons are more likely to participate in community activities than couples. However, when couples have children, participation increases again as parents become more actively involved in community activities connected to their children; the number of dependent children in the household is significant at the 1% level. The significance of age in the participation model is consistent with the results for the trust equation.

With respect to ethnicity there is a contrast between its impact on trust and participation: the Maori and Pacific communities reported lower levels of trust but higher levels of participation in community activities. The coefficient of the Asian ethnic group is once again not statistically significant at conventional levels. Being foreign born has a significantly negative impact on participation in community activities, which are of course likely to be often culturally aligned with the host European and Maori communities. In terms of the human capital variables, again post-secondary education and a high level occupation are positive and significant, while having a low level occupation is now also significant, with a negative coefficient. Hence, besides a positive effect of a high level of education on participation in community activities, the results show that people with high autonomy and responsibility in their jobs are more likely to participate (and perhaps provide leadership roles) in community activities. Interestingly, participation does not have statistically significant income elasticity. Geographic factors have only a minor impact on participation (via a positive rural effect) while per capita public spending on social infrastructure has no apparent influence on participation in community activities.

However, the equation may hide a selection mechanism in which there is a two-stage process operating: there are factors which influence the decision to participate in community

activities or not (a binary variable) and then, conditional on positive participation, there are factors that influence the diversity of participation, i.e. the numbers of different types of community activities a person engages in. Hence, the social participation index was re-examined to see whether the decision to participate is different from the diversity of participation for those who do participate. In order to investigate this we split the index into two dependent variables. The first variable, a binary variable 'yespart', indicates whether an individual is a participant in a community activity, while the second variable is the number of different community activities for those individuals who actually do participate in at least one activity. The variable 'yespart' was analyzed using a probit regression, while the truncated 'participation' variable was estimated using a tobit regression with a lower bound of 1 and an upper bound of 9. For comparison, and to avoid omitted variable bias, in each case the model is the same as that specified for the two earlier regressions. Table 4 presents the results of these participation regressions.

Model 3 presents the results of the probit regression model which tests for the influencing factors on the decision to participate in social activities and networks. For the demographic, human capital and geography variables, the results are very similar to those of equation (2), in terms of sign, magnitude and statistical significance of the coefficients. The most interesting result is an inverse relationship between participation in community activities and the *per capita* spending on social infrastructure. In principle, there is no joint endogeneity problem as we explain current participation in community activities by past social infrastructure spending. However, if there is temporal persistence in the spatial distribution of social capital, it is likely that local and regional governments have increased social infrastructure expenditure in those communities where the participation in community activities was low. If so, this would be consistent with the negative coefficient in our pooled micro data.[6]

Model 4 presents the results of the tobit regression model which tests for the factors influencing the diversity of participation in community activities among those who participate in such activities. These results now show a significant gender effect, with males having a lower diversity of participation. While marital status is insignificant, the diversity of participation in community activities increases with the number of children, as one would expect. However, age is not significant. All of the minority ethnicities included in the model show a significantly greater diversity of participation than European-origin New Zealanders, but this is only the case for those who are New Zealand born, because the foreign born not only have a lower prevalence of

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[6] Unfortunately the number of regions (15) is insufficient to estimate a two-period regional-level panel model that could provide insight in the impact of an increase in regional social infrastructure expenditure on participation in community activities.

Table 4. Results for 'Yespart' and 'Participation' where participation is greater than one

VARIABLES	(3) **Yespart** probit	(4) **Participation** **(where >1)** tobit
Male	0.0146	-0.259**
	(0.0644)	(0.114)
Couple	-0.229***	-0.052
	(0.0741)	(0.130)
Children	0.0573**	0.147***
	(0.0231)	(0.039)
Log Age	0.318***	0.193
	(0.104)	(0.188)
Maori	0.298**	0.455**
	(0.130)	(0.203)
Asian	0.106	0.785*
	(0.246)	(0.461)
Pacific	1.221***	0.850**
	(0.365)	(0.397)
Foreign	-0.160*	-0.295*
	(0.0906)	(0.163)
Postsec	0.365***	0.557***
	(0.0730)	(0.133)
High_occu	0.317***	0.557***
	(0.0763)	(0.130)
Low_occu	-0.206**	-0.362**
	(0.0823)	(0.165)
Log income	0.0736	0.072
	(0.0527)	(0.095)
South	0.0672	-0.158
	(0.0759)	(0.133)
Rural	0.145*	0.118
	(0.0788)	(0.139)
Urban	0.0438	-0.055
	(0.0870)	(0.158)
Log RCpop	0.0425	-0.144*
	(0.0477)	(0.086)
Log PCSI	-0.437***	0.694***
	(0.139)	(0.255)
Constant	0.136	-2.683
	(1.026)	(1.800)
Sigma		1.881***
		(0.051)
Observations	1,971	1,399
Pseudo R^2	0.056	0.027
Log Likelihood	-1,121	-2,148
% correctly predicted	70.78%	-
% within ±1	-	42.87%

Notes: Standard errors in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$; the statistic Sigma is equivalent to the standard error of the estimate in OLS regression.

participation in community activities but also engage in a lower range of activities. The human capital variables show that increasing human capital is related to increased diversity of participation and income is again insignificant. With respect to the geographical variables, regional population size has a significantly negative effect on diversity of participation at the 10% level. This is highly plausible because in regions with smaller populations the range of social activities may be limited, since the set-up costs of particular types of social infrastructure may be high and regions with small populations may not have reached the thresholds at which set-up costs for such activities can be recovered through private or public contributions. This interpretation is reinforced by the observation that the regional per capita expenditure on social infrastructure is now positively and significantly related (at the 1% level) to an individual's range of participation in community activities. The greater social infrastructure expenditure per capita may facilitate a larger range of activities being available.

6. Discussion

Taken together these four models suggest that the demographic, human capital and geographical factors all have subtle relationships with social capital formation. For example, in terms of household composition, there appears to be little evidence of a gender effect, a surprising result given much of the literature, whereas an additional child increases the likelihood of both participating and the range of social activities to participate in, as expected. However, women participate in a wider range of social activities than men. These results suggest that the gender effect widely discussed in the literature is more subtle than is often implied (BTRE 2005), and point to something of a selection process operating. Similarly, the effect of belonging to an ethnic minority such as Maori or Pacific Island groups is not straightforward, in that this increases the likelihood of participation and the variety of social activities, while at the same time lowering trust. Being of foreign birth is significantly negative in both measures and may reflect difficulties in assimilation among immigrants or participation in informal migrant networks, rather than clubs etc. Finally, as expected from the findings of other research, higher levels of human capital are found to be consistently and positively related to both trust and participation. As a whole, therefore, while our results for the relationships between demographic and human capital characteristics and social capital are consistent with much of the literature, they suggest that these relationships are more subtle and complex than much of the literature implies.

Similarly, in terms of spatial aspects, living in the sparsely populated South Island and also in rural areas in general increases levels of trust, while social participation appears less directly related to geography, although participation in social capital forming activities is

somewhat more prevalent in a rural environment. Moreover, the range of social activities people participate in is inversely related with the scale of population. As such, our findings are broadly consistent with the literature (BTRE 2005), but again imply more subtle roles of the commonly suggested determinants.

Finally, in terms of public policy, we see that expenditure on regional social infrastructure itself plays no significant role in predicting trust at the broadest level or in predicting an individual's participation in community activities in general. However, when the participation index is deconstructed this reveals more complex interactions. We now find that expenditure on social infrastructure increases the range of social activities among those who do participate, whereas the decision to participate is itself negatively correlated with the level of social infrastructure expenditure.

There are two possible explanations for these observations. One possibility is that the direction of causality is reversed, as alluded to in the previous section. Under this scenario, local governments in areas with low community participation may attempt to increase participation by raising social infrastructure levels, generating the negative association between participation and infrastructure expenditure in the first stage regression. However, in doing so, these councils raise the opportunities for participation in additional forms of community organization, and this is reflected in the significant positive relationship in the second stage regressions.

The second possible explanation is that as social capital is in part a public good, there is the potential for free riding or social loafing. Under this scenario, increasing social infrastructure expenditure increases the range and intensity of participation for those already participating, suggesting that increasing spending on social infrastructure increases the benefits of participation such as social capital accumulation. If however social capital is a public good, then individuals who were already barely participating now have even less incentive to participate, as they can free-ride off those in their social networks who have higher social capital as a result of the improved returns to their individual participation. This then may result in marginal individuals substituting their time away from participation towards alternate uses for their time. Therefore by increasing public funding of social infrastructure, the incentive to privately invest time in social capital forming activities may actually fall. These types of perverse outcomes are not uncommon where the provision of public goods is concerned. With the data at hand it is not possible to distinguish between these two explanations. Nevertheless, this observational equivalence problem again underlines the fact that the relationships between social capital formation and social infrastructure investment are very subtle and complex, as is also the case with the relationships between social capital, demographic, human capital and geographic

characteristics. The implications of these findings for public policy in general, and the promotion of 'third sector' institutions in particular (Kendall 2009), therefore needs further careful consideration.

7. Conclusions

The analysis in this paper has two major novel features to it. Firstly, it is undertaken in a country with very high levels of social capital, a high quality institutional context, which can also be considered as one of the most self-contained national case studies possible, given its geography and isolation. This allows us to rule out the effects of many external influences which will complicate the analyses in other cases. The second novelty of the paper lies in the unique combination of individual level social capital data allied with local public expenditure on social infrastructure. These data allow us to uncover some of the complex and subtle interactions which exist between social capital, demographic, human capital, geographical and public policy features. Our results imply that there is clearly something of a positive relationship between social capital and local public expenditure on infrastructure related to social capital formation. However, as with all relationships between individual behaviour, social behaviour and the provision and formation of intangible public goods, the actual mechanisms are likely to involve complex free rider and selection issues, which are rather more subtle than much of the social capital literature currently suggests.

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