Measuring the Production and Use of Social Capital: Theory and Evidence from Canada

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1. Introduction

Social capital a useful line of inquiry.

Measurement approaches diverse; just under development; need work.

This paper a contribution to that development.

Use approach developed around: collective action, relationships, 4 normative systems.

Recognize the difference between available and used social capital; propose a model that reflects the relationship between them.

Explore the model with a view to developing more appropriate proxies using census and other forms of available data.

Useful for theoretical development of social capital, its measurement, and potential policy relevance.

Theoretical framework

Measurement model

Validity analysis

Internal validity analyses for the availability and use concepts are not simple since they are presumed to function within a *formative* model. As a result, we are left to use techniques of external validity analysis for evaluating the appropriateness of our framework. To this end, we turn to a recent study outlining the key variables contributing to the production of social capital. It also serves as a useful illustration of the ways in which census variables are used as proxies for social capital measurement.

Using county-level data from the USA, Rupasingha et al. (2006) summarize the literature and provide an empirical analysis of these variables as they relate to associational and civic behaviour.[1] Although their measure of social capital is primarily restricted to only one aspect of our model (associative relations) their more theoretical discussion conveniently identifies a list of ten productive factors (and 17 indicators) as taken from the general literature on social capital (Putnam, 1995; Brehm and Rahn, 1997; Alesina and La Ferrara, 2000; Glaeser et al., 2002). We will use these factors to both examine the consistency of our model with this literature and extend it to integrate some of the innovations we have proposed in the conceptualization of social cohesion. Our household data will also allow us to explore the relationship between the individual-level information and the aggregate data as provided by census results.

Figure 3 identifies the model we propose for the relationship between social capital and the most important factors of production as identified by Rupasingha et al. (2006). Since the availability and use of social capital are assumed to exist in a reciprocal relationship, the model includes additional elements in anticipation of structural equation modeling. It also reflects the reciprocity among the education, income inequaltiy, and social capital variables as proposed by Rupasingha et al. (2006:93).

Unlike the Rupasingha et al. (2006) approach, our model allows us to differentiate the contributions of the factors to the *use* of social capital as distinct from its *availability*. Consistent with our conceptual model, factors that have their effects via individual characteristics are typically associated with the use of social capital while those affecting groups or communities are more often associated with its availability. Education, income, and the employment of females are all considered to be factors which contribute primarily to the use of social capital rather than its availability, for example. This is consistent with the arguments proposed by

Ruspasingha, et al. (2006). According to our model, each of them affects available social capital, but only through its use. An individual's level of education, for example, affects their participation through their attitudes, values, and the networks they encounter. As a result of this participation, the groups are sustained, thus creating opportunity for others to join since the groups are available.

Ethnic divisions, on the other hand, have their greatest impacts on the availability of social capital rather than use. This is partly due to the fact that it is conceived and measured as a place-based variable and partly due to the structure of its impacts. Places with a large number of ethnic divisions are likely to have more institutions and organizations available to them although the levels of participation (or use) of this social capital is found to be lower as reflected in the aggregated data {Putnam 1995 #20340}.

The ratio of family households has a similar position in our model since it is a characteristic of a place rather than an individual or household. A higher ratio of family households increases the opportunity for groups and organizations based on married couples to form. On the other hand, the presence of children in the household is more likely to affect the use of those opportunities – as a result of time and opportunity – as Ruspasingha, et al. (2006) argue. Therefore, we have included the number of children in the household as a contributing factor for the use rather than the availability of social capital.

Following Ruspasingha, et al. (2006) we have included a variable for rural/urban characteristics. Researchers are equivocal regarding whether it should be considered a contributing factor to the use of social capital (through congeniality as Putnam (1985) suggests) or through the increased demand for participation that emerges in smaller places (as Browne (2001) suggests). Since our data includes only sites with a population of 10,000 or less, we have

chosen to identify their size variation as a contributor to the availability of social capital rather than its use.

We argue that the extent and nature of the impact of any of the factors associated with social capital production also depends largely on the type of social relations implicated in the social capital being produced. Low income in the form of lower wages and earnings may lead to reduced social capital since individuals must work more hours to secure additional income – thus leaving them less time for civic engagement activities (Rupasingha et al., 2006). This proposition is likely to be true only in the cases of bureaucratic and associative-based social capital formation, however. Working more time for securing additional income provides a greater opportunity for market-based social interactions, and therefore it is likely to increase this form of social capital, while decreasing the amount of time remaining for associative and communal-based social capital.

In order to account for the various ways in which the different types of social capital may be influenced, we formulate a simultaneous or structural equation model. This approach also allows us to overcome the problem of reverse or simultaneous causality between social capital use and availability. As reflected in Figure 3, we propose that the causality between the available stock of social capital and the use of such capital runs in both directions. Just as people are likely to use social capital when it is available, significant levels of use within a relatively small geographical area or network is likely to influence its availability in that area. By using the Internet or using services, for example, people are also building social relationships and structures that further influence their social capital stocks. Hence, we estimate the following model in which the available stock and the use of social capital are endogenously determined:

$$SA_i = b_0 + b_1 SU_i + \beta' W_{1i} + \varepsilon_i \qquad (1)$$

$$SU_i = \pi_0 + \pi_1 SA_i + \pi_2 IC_i + \pi_3 ED_i + \pi_4 FL_i + \varepsilon_i \quad (2)$$

$$IC_i = \lambda_0 + \lambda_1 SU_i + \lambda_2 ED_i + \lambda' W_{2i} + \varepsilon_i \quad (3)$$

$$ED_i = a_0 + a_1 SU_i + a_3 IC_i + a_4 FH_i + \varepsilon_i \quad (4)$$

where SA_i is the dependent variable measuring market-based, bureaucratic-based, associative, or communal-based type of available social capital; SU_i measures the extent to which each type of available social capital is used in community i; and IC_i and ED_i measure the levels of income and education in a community, respectively. The variable FL_i in Eq. (2) measures the level of female labor force participation, while the vector W_{1i} contains three exogenous variables measuring population size; the proportion of family households in each community (FH_i); and the extent of ethnic heterogeneity of the community. Finally, the vector W_{2i} contains also the female labor force participation variable (FL_i) and an additional variable measuring the average household size in each community. These various relationships are represented in Figure 3.

Commented [GNT1]: Figure need to be revised to reflect these new interconnections.

As represented by Eq. (1), the above model is structured to reflect the argument that income and education do influence the availability of social capital only indirectly through their effects on social capital use. It can be argued that in estimating equation (1), the three variables in the vector W_{1i} are exogenous because none of them is likely to be correlated with the error term ε_i, as a result of a simultaneous causality. For instance, although ethnic differences may lower participation in associational activities and thus lead to an erosion of social capital (Alesina and La Ferrara, 2000; Putnam, 1995), such lower associational participation is unlikely to be a direct cause of ethnic divisions. Similarly, although the population size of a community may influence its level of available social capital, by impacting the quantity of organizations and institutions and the networks of social relations within those structures, such availability of social capital is less likely to be the direct cause of population size.

On the other hand, the three variables measuring social capital use, income and education are modeled endogenously because we believe that movements in these variables are likely to be correlated with the error terms, due to a simultaneous causality. As noted earlier, just as people are likely to use social capital when it is available, using such capital may also influence its availability not only because the usage increases the intensity and range of social interactions within the institutions and organizations that host social capital, but also because it may create external or government policy incentives for increasing the stock of the available social capital institutions. Similarly, just as lower income levels may reduce associative and communal-based social capital use, and increase market-based social capital use, as argued earlier, such reduced or increased social capital use may have an impact on the income-generating capacity of a household or community. We have provided evidence of this in a separate publication (Tiepoh and Reimer, 2004). Finally, the existence of a reverse causality between education and social capital use has also been well-documented in the literature (Coleman, 1988; Putnam, 1995).

The key parameters of interest, measured by b_1 and the vector β, may be biased if the problem of simultaneous causality between social capital availability and its use, income level, and education is not addressed. Fortunately, instrumental variable techniques offer an avenue of identification. The above model can be consistently estimated given that each of the equations satisfies both the rank and order conditions of identification. It can be verified that the submatrix associated with each equation has some g-1 rows and columns that are not all zeros, where g is the number of endogenous variables in the system, which is the rank condition for identification (Maddala, 1988). It can also be verified that because the total number of variables k (endogenous, exogenous, and instrumental) missing from each equation is at least equal to the number of endogenous variables g in the system less than one (i.e., $k \geq g - 1$), each equation is

identified, according to the order condition for identification (Goldberger, 1964; Maddala, 1988; Stock and Watson, 2003).

Three instrumental variables are used to identify the effects of the various endogenous variables in the model. In all cases, they are chosen under the assumption that an individual's use of social capital will vary according to the level of need and/or time available to them. If one falls sick, for example, their need for social support and use of social capital is likely to increase. Similarly, persons with more time available will likely make more use of social capital than those with many other obligations. Using this rationally, we have chosen the number of people in the household who are working as an instrumental variable for the use of market-based social capital. If more people are working, we assume that the amount of time available for the use of social capital will be greater. This variable is unlikely to be related to the availability of social capital, thus meeting the condition for its instrumental role. This is represented by the variable FL_i in Eq. (2).

Commented [BR2]: Need to follow this with a discussion of the other instrumental variables. Check to see if we need to do it for each type of social capital (therefore requiring 3x4 = 12 variables)

The variable in the vector W_{2i} in Eq. (3), measuring the average household size, is designed to identify the effect of income on social capital use in Eq. (2). While the size of a household will determine the level of its income, since a larger number of people in the household are likely to earn more income, a large household size is unlikely to affect the use of social capital directly. Finally, the variable measuring the number of family households in Eq. (4) is designed to identify the effect of education on social capital use in Eq. (2) and on income in Eq. (3). As with the previous indicator, we believe that the number of family households is most likely to affect the level of education rather than the use of social capital and the level of income. A family household unit is one in which individuals relate to each other in a caring way,

and as such it is likely to better facilitate the educational needs of its members than one in such family relationships are absent. (Comment inserted).

Commented [GNT3]: A stronger rationale may be appropriate here.

4. Data and Estimation

The model of social capital production represented by equations (1) to (4) was estimated using a combination of cross-sectional data on households and community social capital from the New Rural Economy (NRE) project of the Canadian Rural Revitalization Foundation (CRRF), as well as data on 3,565 rural Census Subdivisions (CSDs) of Canada. The NRE has identified 32 rural field sites and 1995 households within these sites linking them to both global and local conditions. For the past 5 years, researchers have been working with households and people in most of these sites to collect and analyze information relevant to the economic and social conditions of those sites. This analysis has used data on 20 of these 32 sites, combined with information on the number of CSDs mentioned above.

In order to analyze the differential effects of factors influencing social capital production according to the types of social capital, we have estimated each of the four equations using indicators for all four types of social capital. Moreover, because the objective of our analysis is to measure the formation or availability of social capital, each equation is estimated at the community level, using as proxies the summary indicators for social capital available in the community for the four types of relations. Information regarding the basic characteristics of these indicators is presented in Table 3. Such indices measure the availability of social capital at the community level, and are represented in the NRE survey as the combined numbers of enterprises and market services, bureaucratic services, associative services, and communal services available in each site.

Estimating the model at the community level presented two crucial challenges, however. The first regards obtaining an appropriate indicator for the use of social capital at the community

level. The problem is that the NRE survey has obtained the various indices for social capital use at the household rather than community level, by measuring the aggregate number of ways that a household has been involved with market-, bureaucratic-, associative-, and communal-based social relations within the community. Table 4 provides information regarding the basic characteristics of these indicators. Thus we face the problem of linking a community level indictor to a household level indicator. This was overcome by computing and using the average indices of household social capital uses across all households in each field site, following a similar approach used in our previous study (Tiepoh and Reimer, 2004). The second estimation problem arose from the fact that the sample of field sites on which the NRE collected the social capital availability and use indicators was quite small relative to the number of variables that we have selected to include in the model. Moreover, the sample of rural CSDs on which the indicators for the other variables in the model were collected far exceeded the number of NRE sites.

Thus in order to improve the fitness of the model, we decided to perform the estimation on a much larger sample of 3,565 rural CSDs instead of just the 20 community sites offered by the NRE survey. This was done by first using the NRE data to compute the averages of social capital uses and availabilities across all field sites located within each province. This gave the average market-based, bureaucratic, associative, and communal-based social capital uses and availabilities for each province. We then made the critical and reasonable assumption that all CSDs within each given province share similar levels of social capital and use behaviour. This is not an unreasonable assumption, since within the same country one should not expect to find significantly large intra-regional differences in the way social relations and networks are formed and utilized. [Comment inserted].

Commented [GNT4]: This assumption may require a stronger justification than what is offered here.

The two remaining endogenous variables in the model (i.e., income and education) are proxied as follows. The income variable is indicated by the median household income at each CSD. The education variable is proxied by the combined number of people with a university education and or technical training in the community. The three exogenous variables in the model are proxied as follows. The population size is measured by the number of people in each CSD. The extent to which people belong to family households is indicated by the number of non-family households in the CSD. A smaller number of such non-family households indicate that more people in the site belong to family households. The extent of ethnic fragmentation or homogeneity of each community is indicated by the percentage of the population whose mother tongue is one of Canada's two official languages. A low percentage value denotes a high level of heterogeneity. The level of female labor force participation is indicated by the female participation rate, while the size of households is proxied by the average number of persons residing in private households in each CSD.

5. Empirical Results and Analysis

The estimation results for the social capital production model represented by equations (1) to (4) are presented in Table 5. The aim in this estimation was to empirically assess two key features of our theoretical framework, which propose (a) that the availability and use of social capital are related, and (b) that factors associated with the production of social capital can have different effects depending on the type of social capital being produced. This is a significant improvement over the conventional way of thinking about social capital formation, in which these effects are usually not differentiated.

Each column in Table 5 reports the standardized regression coefficients from estimating the social capital production and use equations for each type of social capital. Numbers reported

in parenthesis are the standard errors. The first part of the table presents the results from estimating the social capital production equation (1), while the second part provides the results from estimating the use equation (2).

A number of important features of these results are worth analyzing: First, almost all of the coefficients in Table 5 are highly statistically significant, event at a level less than 5 percent. The only insignificant coefficients are those corresponding to the effect of female labor force participation on market-based social capital use; the effects of ethnical fragmentation on available bureaucratic, associative, and communal social capital; the effects of population size on available associative and communal social capital; and the effect of family households on communal social capital.

Second, the predicted effect of each type social capital use (instrumented by female labor force participation) on the corresponding type of available social capital is positive, suggesting that the use of social capital has a positive impact on its availability. That the predicted effect of each type of social capital use on the corresponding type of available social capital is invariant among the four types of relations is not surprising, given that the same instrumental variable (i.e. female labor force participation) was used to identify effects of all types of social capital use. Nevertheless, from comparing the standardized coefficients, it appears that these effects are substantially unequal in their magnitudes. Communal social capital use has the largest effect (i.e., 1.724), while market-based social capital use has the least effect. [Comment inserted]. Moreover, the availability of social capital appears to also influence its use in a positive way for all types of social capital, as can be seen from the positive coefficients on each type of available capital.

Commented [GNT5]: Any rationale why communal social capital use has the largest effect relative to other types of social capital use?

The third important feature of these results regards the differential impacts of the other factors that influence social capital production. For instance, whereas the effects of population size on available market-based and bureaucratic social capital are negative, they are statistically insignificant for the other two types of social capital. Moreover, the effects of non-family households are positive, even though these appear to be very small effects in terms of their actual magnitudes as measured by the unstandardized coefficients (not reported in Table 5). This suggests that non-family household units contribute to social capital formation than family household units!

As shown by the coefficients on education, the predicted effects of this variable (instrumented) on social capital use are statistically significant and negative for all types of social capital, but they appear to be substantively insignificant given the very small sizes of their unstandardized coefficients (not reported in the Table). That these effects are all positive across the different types of social capital reflects the fact these effects were instrumented through the same instrumental variable, which is the non-family household variable. Given such small coefficients, one should be cautious in presenting these as a negation of the established findings in the literature, suggesting a positive relationship between education and social capital formation (Rupasingha et al., 2006).

The results corresponding to female labor force participation indicate a negative relationship between this variable and all types of social capital use, with the exception of market-based social capital use for which the effect is statistically insignificant. Again, one should be cautious in interpreting these results, since the estimated coefficients are very small in sizes.

6. Conclusions and Policy Implications

Figure 1: The NRE Capacity-Building Framework

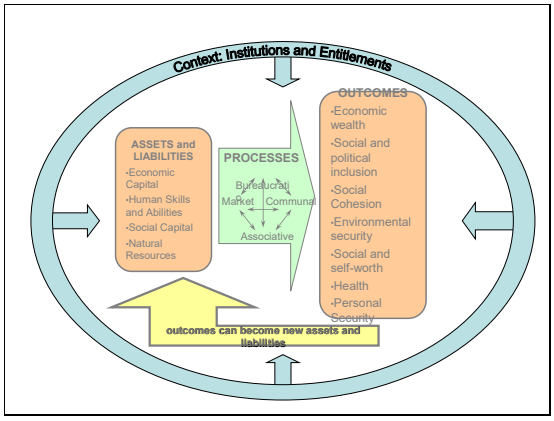

Figure 2: Measurement model for social capital

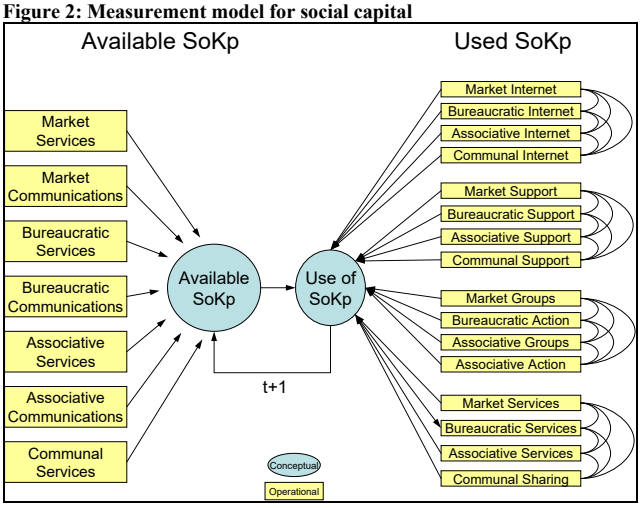

Figure 3: Available social capital by NRE field sites (2001)

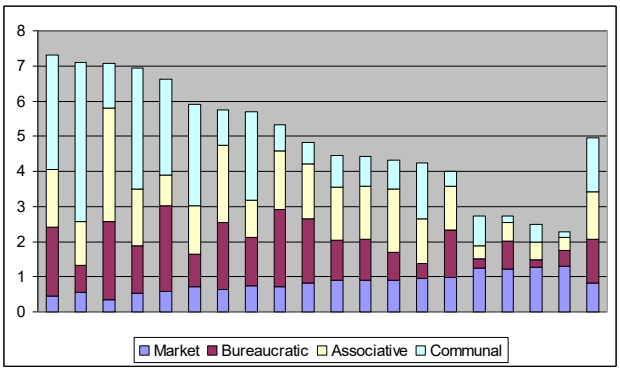

Figure 4: Scattergram of market by bureaucratic -based social capital (19 NRE sites - 2001)

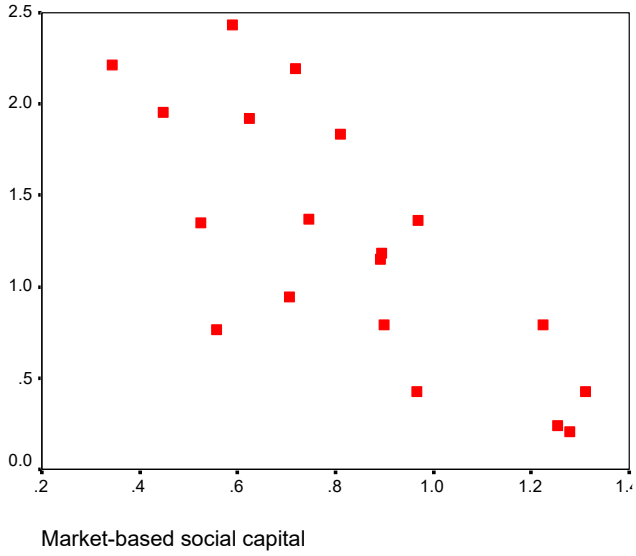

Figure 5: Scattergram of market by communal-based social capital (19 NRE sites - 2001)

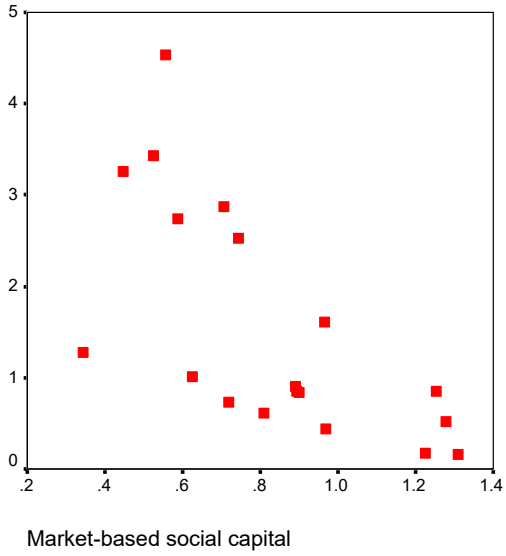

Figure 6: Used social capital in NRE field sites (N=1995)

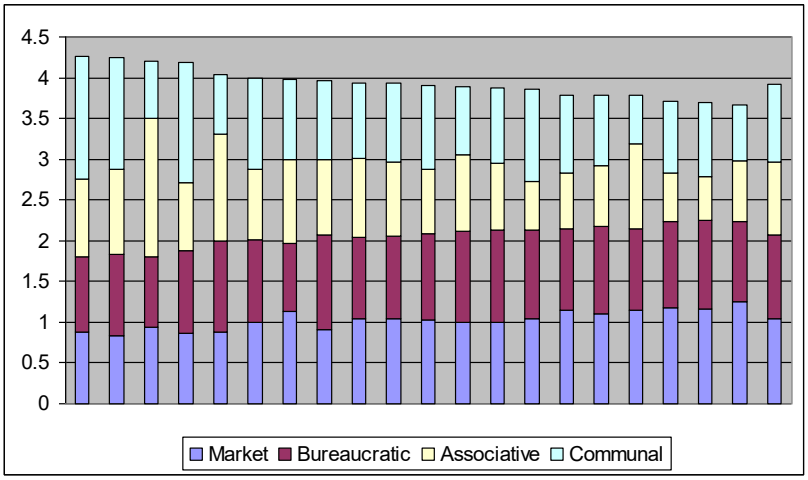

Figure 3: Production of Social Capital

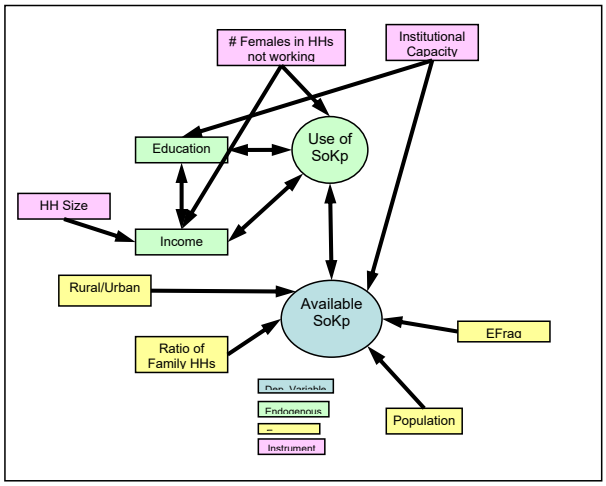
Females in HHs not working
Institutional Capacity
Education
Use of SoKp
HH Size
Income
Rural/Urban
Available SoKp
EFrag
Ratio of Family HHs
Endogenous
Population
Instrument

Figure 4: Social Capital Enhancing Conditions, Other Assets and Economic Outcomes

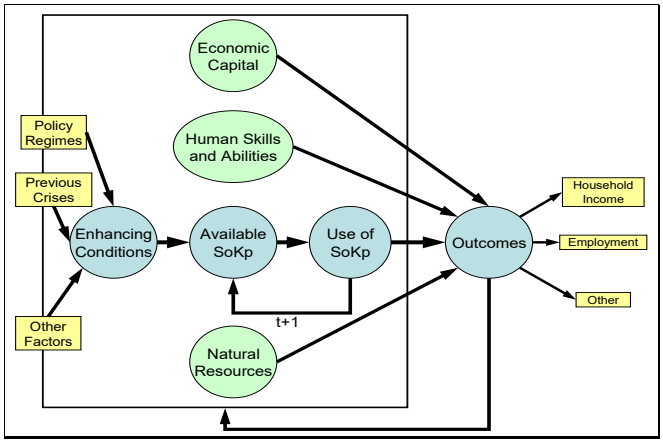

Table 1: Items Used in Measuring Available Social Capital in Each Type of Social Relations

Market-based social capital	1. The total number of enterprises, banks, credit unions, ATM Machines, Micro-financing groups, and insurance offices in the site (within 30 minutes travel); 2. The total of: cable TV, bulletin boards, Internet access, public access terminals, local newspaper, regional newspaper, national newspaper, community newsletter, local radio station, number of available radio stations
Bureaucratic-based social capital	1. The total of the following organizations in the site (within 30 minutes travel): elementary school, high school, CEGEP or community college, university, continuing education or extension courses, other educational institutions, hospital, blood/urine test facility, X-ray facility, baby delivery facility, nursing home, doctor(s), nurse(s), dentist(s), dental surgeon(s), optometrist(s), home care/visits, social worker(s), pharmacy, ambulance, emergency services, public health nurse(s), physiotherapist(s), speech therapist(s), occupational therapist(s), police, fire department, 911 emergency line, lawyer(s), notary(s), citizenship court, employment insurance office, Revenue Canada office, provincial automobile license office, welfare office, town hall (municipal council), band council, post office, bus, passenger train station, freight train station, airport, heliport, boat, taxi service. 2. The total of: Internet, public access terminals, national newspaper
Associative-based social capital	1. The total of the following organizations in the site (within 30 minutes travel): Credit Union, Micro-financing group, food bank, clothing exchange or depot, second-hand stores, drop-in centre, half-way house, personal aid services, curling rink, municipal swimming pool, municipal skating rink, community playing field, community gym, community centre, YMCA/YWCA, athletic club, theatre, cinema, museum, library, park. 2. The total of: Internet, public access terminals, local newspaper, regional newspaper, national newspaper, community newsletter, local radio station, number of radio stations available in the site, community bulletin boards, community 'welcome' sign, community flag, community symbol.
Communal-based social capital	1. The number of daycares and senior citizens retirement homes within 30 minutes of the site. 2. The number of churches or other religious organizations in the site. 3. The number of community-integration events in the site. These included such events as festivals, community picnics, or celebrations that bring the site people together on a regular basis.

Commented [BR6]: Discuss – merits of including co-ops etc. in 2 of these indexes.

Table 2: Available Social Capital Indicators - 4 Types of Relations

	N	Min	Max	Mean	Std. Deviation
Market Relations					
number of businesses	19	3	327	66.05	89.01
no of market-based services within 30 minutes	19	0	5	1.74	1.76
no of market communication services	19	1	8	6.00	1.73
total of business and market services for site (sum of 3 above)	19	5	338	73.79	89.96
Bureaucratic Relations					
no of bureaucratic-based services within 30 minutes	19	0	31	8.79	8.40
no of bureaucratic communication services	19	1	3	2.68	0.75
no of bureaucratic access services within 30 min of site (sum of 2 above)	19	2	34	11.47	8.60
Associative Relations					
no of associative-based services within 30 minutes	19	0	18	6.68	5.20
no of associative communication services	19	1	11	7.58	2.55
no of associative access services within 30 min of site (sum of 2 above)	19	3	28	14.26	6.78
Communal Relations					
number of churches in site	19	1	29	5.63	7.80
number of communal-based services in site	19	4	12	5.63	1.98
number of community-focused events	19	1	4	2.47	.90
index of communal relations - basic (sum of 3 above)	19	4	35	9.05	8.11
Total of 4 types of social capital	**19**	**14**	**406**	**108.6**	**98.3**
Ratio of site market-based to total market-based	19	.34	1.31	.83	.29
Ratio of site bureaucratic-based to total bureaucratic-based	19	.21	2.43	1.24	.70
Ratio of site bureaucratic-based to total bureaucratic-based	19	.39	3.24	1.35	.68
Ratio of site bureaucratic-based to total bureaucratic-based	19	.15	4.54	1.55	1.28
Sum of site ratios of available social capital	19	2.28	7.32	4.96	1.65
Variance of ratios of site types	19	.08	3.48	.72	.83

Table 3: Items Used in Measuring the Use of Social Capital in Each Type of Social Relations

Market-based social capital	1. The number of household members who are employed full-time or part-time.; 2. The number of ways the Internet is used involving market relations: contacting businesses or obtaining market information, making on-line purchases, paying bills or banking on-line, searching for a job or contacting potential employers, conducting paid employment. 3. he number of market-based services that have been used in the last 12 months: gas station, grocery store, drug store, home furnishing or furniture store, ATM or banking machine, bank, financial advice services, homemaking services; 4. The number of employment organizations in which the respondent participates; 5. The number of persons or groups from whom the respondent sought market-based support for the change that had the most impact on the household: employer, financial advisor, business friend(s), a business, accountant, employment and economic organization, or other business people
Bureaucratic-based social capital	1. The number of ways the Internet is used involving bureaucratic relations: obtaining information or communicating with federal or provincial governments, completing government forms on-line, contacting health-care providers, finding health information; 2. The number of services based in bureaucratic relations that have been used in the last 12 months: legal services, family doctor, dentist, ambulance services, emergency room at hospital or clinic, therapy services, home support services, visiting nurse, social services such as child or family intervention programs, public health nurse, post office, public library, public adult education service, provincial government service, federal government service. 3. The number of actions addressed to a bureaucracy that have been taken over the last 12 months: written a letter to a municipal, provincial, or federal representative; 4. The number of persons or groups from whom the respondent sought bureaucracy-based support for the change that had the most impact on the household: doctor or other health professional, lawyer or legal professional, counsellor or other social service professional, teacher or other education professional, mayor or council member, municipal staff member, economic development officer, contacting other government resources or employees, applying to one or more government programs, contacting an elected representative, law or justice organizations.
Associative-based social capital	1. The number of ways the Internet is used as part of volunteer work. 2. The number of second-hand clothing store and meal program services that have been used in the last 12 months; 3. The number of groups of an associative nature in which the respondent currently participates: environment/wildlife, arts/culture, health,

	law/justice, social service, sports/recreation, public benefit, religious, education, women, men, youth, casual/social; 4. The number of actions taken reflecting an associative involvement: written a letter to the editor of a newspaper, called a radio talk show about a public interest issue, signed a petition, given money for an emergency action, volunteered for a specific community action, posted a comment to an e-mail or web-based discussion groups about a public issue; 5. The number of persons or groups from whom the respondent sought associative-based support for the change that had the most impact on the household: community or voluntary organizations that had a health, social service, public benefit, religious, or education/youth development focus.
Communal-based social capital	1. The number of ways the Internet is used to keep in touch with family or friends. 2. The number of family and extended family members with which the respondent shares locally grown fruits and vegetables, wild foods, meat, wild meat, or firewood. 3. The number of community-integration events in the site. These included such events as festivals, community picnics, or celebrations that bring the site people together on a regular basis. 4. The number of family and extended family members with which the respondent shares skills and services such as painting, carpentry, plumbing, mechanical or electrical work, sewing or knitting, housework, babysitting or child care, adult respite care, automotive or boat repair, technical or professional services, snow removal, garden work, or transportation. 5. The number of persons from whom the respondent sought communal-based support for the change that had the most impact on the household: spouse, parents, children, other relatives, close personal friend, friend, work-mate, or neighbour.

Table 4: Indicators of the Use of Social Capital – 4 Types of Relations

	N	Min	Max	Mean	Std Deviation
Market-based Use					
access to market relations – employ someone or own business	1995	0	14	2.12	2.01
use internet for market relations (e.g. employment, on-line purchases)	1995	0	4	0.47	0.88
market public services used (e.g. gas, bank, financial advisor)	1995	0	12	5.65	1.22
number of market participation groups (e.g. employment group)	1995	0	4	0.08	0.31
income from market sources (e.g. wages, self-employment, farm)	1995	0	4	1.40	0.98
total market supports	1995	0	4	0.19	0.49
summary indicator for market-based use	**1995**	**0**	**27**	**9.77**	**3.79**
Bureaucratic-based Use					
use internet for bureaucratic relations (e.g. government info.)	1995	0	6	0.53	1.09
bureaucratic public services used (e.g. hospital, legal, library)	1995	0	14	5.37	2.16
number of bureaucratic actions taken (e.g. letter to gov't rep.)	1995	0	1	0.13	0.34
income from bureaucratic sources (e.g. gov't pension, EI, welfare)	1995	0	7	1.38	1.15
total bureaucratic supports	1995	0	7	0.49	0.80
summary indicator for bureaucratic-based use	**1995**	**0**	**21**	**7.90**	**3.07**
Associative-based Use					
use internet for associative relations (e.g. volunteer work)	1995	0	1	0.06	0.24
associative public services used (e.g. meal programs)	1995	0	2	0.29	0.46
number of associative participation groups (e.g. recreation, environment, religious, service)	1995	0	21	2.24	2.88
number of associative actions taken (e.g. give money, sign petition)	1995	0	5	1.37	1.16
total associative supports	1995	0	4	0.12	0.38
summary indicator for associative-based use	**1995**	**0**	**26**	**4.07**	**3.66**
Communal-based Use					
use internet for communal relations (e.g. contacting family, friends)	1995	0	2	0.50	0.73
total types of sharing from family and friends (e.g. food, auto repair, home care)	1995	0	11	2.34	1.93
total communal supports	1995	0	8	1.00	1.47
summary indicator for communal-based use	**1995**	**0**	**15**	**3.84**	**2.67**
Total of 4 types of use	**1995**	**4**	**59**	**25.58**	**9.03**

Table 5: Correlation between indicators of four types of Available Social Capital (19 NRE sites)

	Ratio of Bureaucratic Services	Ratio of Associative Services	Ratio of Communal Capital
Ratio of Market Services	-.76**	-.76**	-.67**
Ratio of Bureaucratic Services		.62**	ns
Ratio of Associative Services			ns

** Correlation is significant at the 0.01 level (2-tailed)

Table 6: Correlation between Indicators of Use of Social Capital (1995 NRE Households)

	Use of Bureaucratic Capital	Use of Associative Capital	Use of Communal Capital	Total Social Capital	Variance Among Types
Use of Market Capital	0.33**	-.48**	-.39**	-.77**	-.05*
Use of Bureaucratic Capital		-.32**	-.25**	-.35**	
Use of Associative Capital			-.20**	.65**	
Use of Communal Capital				.61**	.09**
Total Social Capital					.08**

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

Table 7: Available Social Capital by Use of Social Capital (NRE Household Survey - 1995 cases)

	Availability of Social Capital					
Use of Social Capital	Market-based	Bureaucratic-based	Associative-based	Communal-based	Total	Variance
Market-based	.37**		-.20**	-.20**	-.35**	-.11**
Bureaucratic-based		.27**	-.12**		-.09**	-.13**
Associative-based	-.21**	-.21**	.42**	-.12**	.28**	.27**
Communal-based	-.20**		-.11**	.40**	.22**	
Total used	-.35**	-.17**	.27**	.21**	.40**	.19**
Variance		.05*				

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 8: Available Social Capital by Use of Social Capital **within 30 minutes** (NRE Household Survey - 1995 cases)

	Availability of Social Capital					
Use of Social Capital	Market-based	Bureaucratic-based	Associative-based	Communal-based	Total	Variance
Market-based	.33**		-.13**	-.12**	-.29**	
Bureaucratic-based		.25**	-.08**	-.06**	-.11**	-.07**
Associative-based	-.17**	-.14**	.29**	-.06*	.22**	.11**
Communal-based	-.21**	-.05*	-.08**	.40**	.23**	
Total used	-.32**	-.13**	.17**	.26**	.36**	.08**
Variance	-.04*	.05*				

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 9: Contributions to index of available social capital

Index	**Indicator**	**Corr.**	**Primary Items (in order of importance)**
Market-based	No. of businesses	.99	Businesses
Market-based	No. of market-based communication services	.34	Public internet, cable TV, national paper, local radio, local paper
Market-based	No. of market-based services	.23	Micro-financing group, insurance office, ATM
Bureaucratic-based	No. of bureaucratic-based services	.97	Blood/urine test facility, automobile license office
Bureaucratic-based	No. of bureaucratic-based communication services	.32	Public internet, internet access,
Associative-based	No. of associative-based services	.94	Micro-financing group, curling rink, drop-in centre, library
Associative-based	No. of associative-based communication services	.74	Welcome sign, cable TV, community symbols, local flag, local radio, local paper
Communal-based	No. of churches	.99	Churches
Communal-based	No. of communal-based services	.30	Daycares, senior's homes
Communal-based	No. of community events	.16	Events

Table 10: Contributions to index of used social capital

Index	Indicator	Corr.	Primary Items (in order of importance)
Market-based	No. of businesses	.99	Businesses
Market-based	No. of market-based communication services	.34	Public internet, cable TV, national paper, local radio, local paper
Market-based	No. of market-based services	.23	Micro-financing group, insurance office, ATM
Bureaucratic-based	No. of bureaucratic-based services	.97	Blood/urine test facility, automobile license office
Bureaucratic-based	No. of bureaucratic-based communication services	.32	Public internet, internet access,
Associative-based	No. of associative-based services	.94	Micro-financing group, curling rink, drop-in centre, library
Associative-based	No. of associative-based communication services	.74	Welcome sign, cable TV, community symbols, local flag, local radio, local paper
Communal-based	No. of churches	.99	Churches
Communal-based	No. of communal-based services	.30	Daycares, senior's homes
Communal-based	No. of community events	.16	Events

Table 5: Effects of factors associated with social capital production and Use

Social Capital Production Equation (1)	**Available Market Based Social Capital**	**Available Bureaucratic Based Social Capital**	**Available Associative Based Social Capital**	**Available Communal Based Social Capital**
Constant	-186.008 (34.889)	-46.902 (3.339)	9.326 (.746)	-21.836 (7.049)
Corresponding Social Capital Use	.451 (3.440)	.862 (.419)	.640 (.172)	1.724 (1.703)
Proportion of population speaking an official language	.500 (.032)	.836* (.002)	.722* (.002)	-1.600* (.002)
Population	-.965 (.032)	-1.092 (.002)	-1.003* (.002)	2.093* (.002)
Number of Non-family Households	.355 (.014)	.211 (.001)	.217 (.001)	.104* (.002)
Adjusted R Square	.07	.19	.10	.03
Social Capital Use Equation (2)	**Used Market Based Social Capital**	**Used Bureaucratic Based Social Capital**	**Used Associative Based Social Capital**	**Used Communal Based Social Capital**
Constant	7.857 (.351)	5.643 (.341)	-5.614 (1.521)	2.966 (.293)
Corresponding Available Social Capital	.756 (.001)	.961 (.013)	1.201 (.065)	.301 (.080)
Median Household Income	.349* (.000)	1.141 (.000)	1.419 (.000)	1.011 (.000)
Education	-.316 (.000)	-.380 (.000)	-.445 (.001)	-.668 (.000)
Female Labor Force Participation Rate	.077* (.007)	-.244 (.006)	-.298 (.017)	-.223 (.014)
Adjusted R Square	.07	.03	.02	.03

Note: Starred coefficients are not statistically significant.

Table 3: Correlation coefficients – Ratios of Available Social Capital by Selected Site Characteristics (19 NRE Field Sites; $p < .05$ only)

Correlations	Market	Bureaucratic	Associative	Communal	Total	IQV
Institutional Capacity (1=high; 0=low)		-.48*				
Population, 2001	.68**	-.56*	-.60**		-0.64**	
Population percentage change, 1996-2001						.57*
% separated - 2001			-.49*			
% Aboriginal single ethnic status - 2001	.61**	-.51*	-.54*		-.58**	
% mining, quarry, oil workers - 2001			.57*			
% information and cultural - 2001			-.54*			
% retail trade workers – 2001				.55*		
% real estate and insurance - 2001			.61**			
% public administration - 2001		-.54*				
% educational service workers - 2001	.50*			-.49*	-.53*	
% health & social service workers - 2001		-.47*				-.48*
% moved from other province in last year			.67**			
% grade 9 to 13 education - 2001			.46*			
% with employment income - 2001	.48*			-.49*	-.50*	-.73**
% of individuals below the LICO - 2001		-.67**				
% HHs with rent > 30% of income - 2001			-.50*			
% perceive local control as 'other' - 2001	-.59**	.57*	.46*		.60*	.46*

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

Table 4: Significant R^2 and beta coefficients for 6 Social Capital models (16 NRE sites)

	Market	**Bureau-cratic**	**Associa-tive**	**Commun-al**	**Total**	**IQV**
adjusted R^2						
% government services						
Old dependency ratio						
% dwellings requiring major repairs						
% business services						
% mining, quarrying, oil						
% paid workers						
% health and social service						
% self-employed						
% finance and insurance						
Unemployment rate						
Ontario residence						
% working outside CSD						
% grade 9 to 13 years education						
% lone-parent families						
% logging and forestry						
Population change						

Table 5: Indicators of the Use of Social Capital - 4 Types of Relations

	N	Min	Max	Mean	Std. Deviation
Market-based Use					
number of people in HH employed full or part-time	1995	0	8	1.37	1.17
access to market relations - employ or own business	1995	0	6	.51	.79
use internet for market relations	1995	0	4	0.47	0.88
market public services used	1995	0	12	5.65	1.22
number of market participation groups	1995	0	4	0.08	0.31
income from market sources	1995	0	4	1.40	0.98
total market supports	1995	0	4	0.19	0.49
summary indicator for market-based use	**1995**	**0**	**25**	**9.67**	**3.65**
Bureaucratic-based Use					
use internet for bureaucratic relations	1995	0	6	0.53	1.09
bureaucratic public services used	1995	0	14	5.37	2.16
number of bureacratic actions taken	1995	0	1	0.13	0.34
income from bureaucratic sources	1995	0	7	1.38	1.15
total bureaucratic supports	1995	0	7	0.49	0.80
summary indicator for bureaucratic-based use	**1995**	**0**	**21**	**7.90**	**3.07**
Associative-based Use					
use internet for associative relations	1995	0	1	0.06	0.24
associative public services used	1995	0	2	0.29	0.46
number of associative participation groups	1995	0	21	2.24	2.88
number of associative actions taken	1995	0	5	1.37	1.16
total associative supports	1995	0	4	0.12	0.38
summary indicator for associative-based use	**1995**	**0**	**26**	**4.07**	**3.66**
Communal-based Use					
use internet for communal relations	1995	0	2	0.50	0.73
total types of sharing from family and friends	1995	0	11	2.34	1.93
total communal supports	1995	0	8	1.00	1.47
summary indicator for communal-based use	**1995**	**0**	**15**	**3.84**	**2.67**
Total of 4 types of use	**1995**	**4**	**59**	**25.47**	**8.94**
Index of Qualitative Variation among types of social capital	**1995**	**.29**	**1.00**	**.88**	**.09**
Ratio of used market-based to total market-based	1995	0	2.65	1.03	.31
Ratio of used bureaucratic-based to total bureaucratic-based	1995	0	2.24	1.03	.30
Ratio of used associative-based to total associative-based	1995	0	3.64	.90	.65
Ratio of used communal-based to total communal-based	1995	0	4.10	.95	.58
Sum of ratios of used social capital types	1995	2.65	5.58	3.92	.44
Variance of used social capital types	1995	0	3.31	.31	.27

Table 8: Significant Beta Coefficients for the use of Social Capital (NRE Household Survey - 1692 cases)

(B)	**Market**	**Bureaucratic**	**Associative**	**Communal**	**Total**	**Variance**
adjusted R^2	**.48**	**.12**	**.17**	**.07**	**.29**	**.06**
Constant	.93	1.16	.80	1.12	.06	.50
HH income	.10 (.000001)	-.12 (.000001)	.10 (.000003)	-.14 (.000003)		
At least 1 employed in HH	.39 (.27)	-.34 (-.24)	-.07 (-.11)	-.08 (-.10)	-.16 (-.16)	-.15 (-.09)
Poor HH	-.18 (-.11)	.19 (.12)				-.10 (-.05)
Complete HS			.06 (.09)			
Post-sec. education	-.07 (-.04)		.11 (.15)			
Complete university	-.08 (-.07)		.10 (.20)			-.07 (-.05)
Married						-.07 (-.04)
Single parent				.07 (.26)		
Female single parent	-.05 (-.11)				.06 (.19)	
Male adult			-.06 (-.16)		-.05 (-.08)	
Female adult	-.05 (-.05)					
0-6 in HH		.05 (.04)				
18-24 in HH	.05 (.04)					
20-34 in HH			-.15 (-.21)	.08 (.10)		
35-49 in HH			-.08 (-.11)			
65+ in HH	-.12 (.08)	.20 (.14)		-.12 (-.15)		-.07 (-.04)
Adults 50-64				-.07 (-.08)		
Use home or respite care	-.06 (-.05)	.07 (.06)				
No. with past primary employ.	.05 (.07)					
Returnees				.07 (.11)		
No. of vehicles						-.07 (-.03)
Atlantic	-.08 (-.05)			.15 (.19)	.13 (.12)	
Québec		.09 (.07)	-.05 (-.08)			
Western/North	-.18 (-.13)		.23 (.35)		.22 (.21)	-.08 (-.04)

Table 9: Correlation coefficients – Ratios of Used Social Capital by Selected Site and HH Characteristics (NRE Household Survey 2001; Minimum N= 1899; $p < .05$ only)

Correlations	Market	Bureaucratic	Associative	Communal	Total	Variance
Population percentage change, 1996-2001	0.11	0.07	-0.13	-0.06	-0.16	
Dummy - at least 1 government transfer income in HH	-0.34	0.36		0.07	0.09	
Dummy - Estimate for poverty	-0.07	0.08	-0.08	0.11		
receive income indicating poverty - dummy			-0.11	0.08		-0.12
education	0.09	-0.12	0.10	-0.11		-0.13
household with at least one member employed full-time	0.39	-0.35		-0.10	-0.15	-0.18
HH with at least 1 person employed FT or PT	0.46	-0.42	-0.06	-0.08	-0.17	-0.22
number of people employed FT or PT in HH	0.45	-0.42		-0.11	-0.16	-0.21
% employed	0.19			-0.28	-0.19	-0.06
Household income estimated	0.29	-0.31	0.12	-0.18	-0.08	-0.12
LF Participation rate - 2001	0.16	-0.17	0.13	-0.18	-0.05*	-0.07
Unemployment rate - 2001	-0.20	0.07	-0.10	0.30	0.15	0.05*
Median HH income - 2001	0.06	-0.21	0.26	-0.16	0.08	
% HHs below LICO - 2001		0.13	-0.16	0.05*	-0.08	
% education < gr 9 - 2001	-0.08	0.09	-0.15	0.19		
% education 9-13 - 2001			0.06		0.05*	-0.04*
Government transfer payments %	-0.14	0.14	-0.17	0.24	0.06*	0.05*
returnees - dummy	-0.06			0.09	0.06	
newcomer to community - dummy			0.09	-0.08		
Female single parent HH	-0.09	0.07		0.08		
Male single parent HH						
Use home or respite care	-0.08	0.05*	0.07			
dummy - HS education completed	0.05*					
dummy - Post-Secondary education		-0.07	0.06			-0.07
dummy - University completed		-0.07	0.06	-0.05		-0.08
household with young children (0-6 yrs)						-0.09
household with teenaged children (13-19 yrs)	0.14	-0.13			-0.05*	-0.11
household with new adult (18-24 yrs)	0.19	-0.15	-0.09		-0.09	-0.07
household with young adults (20-34)	0.15	-0.10	-0.13	0.06	-0.07	-0.09
household with middle-aged adults (35-49 yrs)	0.19	-0.16	-0.06		-0.08	-0.14
household with older adults (50-64 yrs)	0.10	-0.13	0.08	-0.08		
household with senior adults (65+ yrs)	-0.34	0.35	0.08		0.10	0.13
Only female (adults) household	-0.22	0.17		0.06	0.10	0.13
Only male (adults) household		0.04*	-0.08			0.12
number of primary employment in the past - FT or PT in HH						
N of vehicles collapsed	0.28	-0.24		-0.12	-0.11	-0.20
married	0.15	-0.16		-0.08	-0.04*	-0.17

household size	0.21	-0.17	-0.06*		-0.09	-0.19
dummy variable for Atlantic region	-0.08		-0.12	0.21	0.07	
dummy variable for Quebec	0.08	0.09	-0.15		-0.14	
dummy variable for Ontario	0.07		0.05*	-0.14	-0.07	0.05*
dummy variable for West and North	-0.06*	-0.11	0.21	-0.06	0.12	-0.10
dummy - only one adult with child(ren)	-0.07	0.06	-0.04*	0.08		
Global and Local industry exposure at 50% cutoff - 2001 {dummy variable}	-0.15		0.11	0.09	0.16	
Fluctuating and Stable markets at 50% cutoff - 2001 {dummy variable}						
Metro-adjacency based on MIZ codes - dummy variable - 2001	0.10	0.05*	-0.12	-0.05*	-0.13	0.08
Capacity indicator at 50% cutoff - 2001 {dummy variable}	0.14	0.11	-0.21		-0.20	0.09
Leading/Lagging indicator at 50% cutoff - 2001 {dummy variable}	0.15	-0.18	0.17	-0.19		-0.08

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

1: Use of Social Capital by NRE Sites (1995 NRE Households)

[1] Their measures of social capital include participation in associations and a derived index including such participation, voting behaviour, census response rates, and number of non-profit organizations.