

The production of social capital in US counties[☆]

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Abstract

A growing belief exists that social capital contributes to economic growth of communities. In this paper, we identify inputs into the production of social capital at the level of US counties, using an array of individual and community factors that are theoretically important determinants of social capital. We use data from the *Bureau of the Census, County Business Patterns, USA Counties on CD, National Center for Charitable Statistics*, and the *Regional Economic Information System* for two time periods. Ethnic homogeneity, income inequality, attachment to place, education, age, and female labor force participation are strongly associated with levels of social capital across US counties.

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1. Introduction

The last 15 years have seen enormous progress in the study of social capital. A recent keyword search in *EconLit* identified over 1000 citations. Scholarly interest in the concept of social capital is motivated essentially by the relationship between the stock of social capital and its relation to effective political institutions, economic development, low crime rates, and reduced incidences of other social problems. Following Coleman (1988, 1990) and Putnam (1993), many economists have argued that social capital positively influences economic growth and development. Social capital promotes trust and cooperation among agents, which in turn increases socially efficient collective action (La Porta et al., 1997). Although support among academics for the social capital

[☆] County-level social capital data compiled for this study are available at: www.cas.nercrd.psu.edu/scdb.htm.

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concept is overwhelming, it is not free of detractors (e.g., [Portes, 1998](#); [Arrow, 2000](#); [Solow, 2000](#); [DeFilippis, 2001](#); [Durlauf, 2002](#)).

Ultimately the value of social capital rests upon its ability to contribute to a more efficient “round-about” means of production. As in the case of traditional capital, it is more efficient to invest in producing an intermediate good that in turn becomes an input into the production of a final good, than to produce the final good directly. By investing in relationships that reduce transactions costs, we can reduce the friction in productive activities. But this investment requires the commitment of scarce resources so there is always the fundamental question of how much of any individual’s scarce resources should go to building social capital.

A primary weakness of the social capital concept is the lack of consensus on its definition and its meaning. [Coleman \(1988, p.598\)](#) defines social capital as “a variety of different entities, with two elements in common: they all consist of some aspect of social structure, and they facilitate certain actions of actors – whether personal or corporate actors – within the structure”. According to [Putnam \(1995, p.19\)](#), “. . . social capital refers to connections among individuals—social networks and the norms of reciprocity and trustworthiness that arise from them”. [Fukuyama \(1995\)](#) defines social capital in terms of cultural values such as degrees of compassion, altruism, and tolerance. Although an exact meaning remains elusive, these definitions have common elements that point to a solid base for a formal definition. Toward this end, [Woolcock \(2001\)](#) defines social capital as norms and networks that facilitate collective action. Formation of groups and other forms of civic activity or collective action are at the heart of this definition.

The dearth of research on determinants of social capital has held back its use as a policy tool in economic and social development, and [Glaeser \(2001\)](#) sees this as a major shortcoming in current and past research. While Putnam and others ([Paxton, 1999](#)) have extensively studied change in social capital over time, they provide little insight as to why cross-sectional variations exist in social capital ([Durlauf, 2002](#)).

Recent studies have attempted to delineate the causes or sources of social capital ([Brehm and Rahn, 1997](#); [Alesina and La Ferrara, 2000](#); [Glaeser et al., 2000, 2002](#); [Charles and Kline, 2002](#)). In this paper, we attempt to substantiate these claims empirically, by investigating the factors associated with variation in social capital levels across US counties using new indicators. We base our empirical analysis on [Becker’s \(1965\)](#) allocation of time framework, and use an array of individual and community-level factors as determinants of social capital.

Notwithstanding the lack of a precise definition, a major obstacle in developing the concept of social capital is the lack of reliable data, both cross-sectional and time-series. We examine some of the most commonly referred proxies of social capital for which accurate data are available, for example the density of civic, religious, and sports organizations in a county. Such a proxy clearly only deals with a specific type of social capital—horizontal associations, but it is a form of social capital that is most discussed in the work of Putnam. Consequently, it is the form that has been used to draw strong conclusions about the presence of social capital and the possible consequences. Thus, clarification of the level of available social capital using this measure adds to an existing body of work.

Previous empirical investigations of the determinants of social capital are based on surveys such as the National Opinion Research Center’s General Social Survey (GSS), which measures trust, civic engagement, and association memberships of individuals (see [Putnam, 1995](#); [Brehm and Rahn, 1997](#); [Alesina and La Ferrara, 2000](#); [Glaeser et al., 2002](#)). The GSS interviews about 1500 individuals every year from a nationally representative sample. While these surveys are useful, they have a number of well-known shortcomings.

The contribution of this paper is two-fold: first, we measure social capital at the level of counties, using the county-wide average as the typical or representative unit (or household). This allows us to compare our results with those obtained previously in state-level analyses. This also opens up a wide variety of new research opportunities, since economists are only starting to look at counties as a unit of analysis for understanding economic events and processes.¹ Second, we present a production function for social capital using associational activity as well as other indicators of social capital. Putnam (1993) argues that associational activities enable communities to solve collective action problems by promoting cooperation. He measures social capital by counting groups in civil society, using memberships in sports clubs, bowling leagues, literary societies, political clubs, and the like as they vary over time and across different geographical regions. We also formulate a more general county-level social capital index using several measures including associational densities.

A county-based model is appealing for several reasons. First, the underlying premise of social capital is that it facilitates collective action, and collective action is most often found at the sub-national level of organization than at the national level. Second, if a major reason for undertaking investments in social capital is to facilitate economic and social development, then a sub-national measure of social capital is consistent with the widespread belief that development activity is fundamentally a local phenomenon. While there are obvious questions about the degree to which counties are an appropriate scale to measure social capital, we offer this paper in the spirit of moving to a level of analysis that is significantly closer, especially for non-metropolitan counties, to the underlying premise of how social capital is applied.

We use a secondary dataset covering the entire United States, the *County Business Patterns* (CBP), compiled by the Census Bureau, which includes an extensive set of variables representing membership organizations. Data used in the analysis cover two periods, 1980–1990 and 1990–1997, which allow us to use panel data estimation methods.² We are thus able to investigate inter-temporal relationships between the social capital indicators and their determinants. We also include several other county-level proxies for social capital along with associational densities to create a comprehensive measure of social capital. These other county-level measures are the response rate for the Census Bureau's decennial population and Housing Survey, the percentage of voters who voted in presidential elections, and per capita non-profit organizations obtained from National Center for Charitable Statistics. We use principal component analysis to create a single index out of these four variables.

2. A model of social capital production

Mainstream economists have criticized the concept of social capital because it lacks a conceptual or analytical framework (Sobel, 2002). Social capital is usually considered to be a community-level attribute. Given their presumption that behavior is based upon individual choice, economists are reluctant to accept this characterization, especially when the focus is on the causes or sources of social capital. While some behaviors of individuals may be forced upon them by the community, to economists it is reasonable to characterize social capital as a collective manifestation of behaviors, attitudes, and values of individual members of a community.

¹ State- and county-level analyses have considerable advantages over country-level studies because institutions, definitions, and data collection methods are more similar within than across nations.

² Although the County Business Patterns data are available up to 1999, there is no direct link to pre-1998 associational establishment data under the new industrial classification system (NAICS).

Becker's (1965, 1974) work on household allocation of time and theory of social interactions provides a theoretical basis for economic analysis of the formation of social capital. The following formulation is a theory of individual decision-making in which the production of social capital reflects a conscious decision to invest in building social relations that have a direct implication for the level of individual utility. As such, we provide a means to embed social capital theory within the broad traditions of economic analysis. Although some aspects of individual behavior may be imposed by the community, it is possible to characterize a large portion of social capital as a collective manifestation of individual behaviors, attitudes, and values of individual members of a community. Individuals choose how much social capital to produce and their choice depends upon both the opportunity cost of allocating time and resources to the production of social capital and the marginal benefits associated with additional units of social capital.

This framework has been used in various studies of allocation of time among market and non-market economic activities, including the economics of religious participation (Azzi and Ehrenberg, 1975). Since individuals' participation in associational activities and other social and political activities requires the allocation of time and other resources, it is logical to use this framework in the present context.³ We employ this framework in this paper as a basis for analyzing variations in social capital activities such as associational densities, voting in elections, and participation in the decennial census. We assume without loss of generality that the population size of the observational unit considered here, the county, is normalized to one. The representative household of county i is assumed to have the following quasi-concave utility function:

$$U_i \equiv U(C_i, SK_i) \text{ where } i = 1, \dots, n \quad (1)$$

where C_i is composite consumption and SK_i denotes social capital. Becker (1965) argues that households utilize time and market goods to produce more basic goods that enter their utility function.⁴ Each argument in the utility function in Eq. (1) can be represented as a household production function that determines how much of these commodities can be produced using market and non-market goods (x), quantities of a household's own time (t), and characteristics of one's own (E) as well as other households (R) (Becker, 1965, 1974).

This formulation assumes that households are both producers and utility maximizing consumers. The production functions are assumed to be concave and continuously differentiable. To simplify, we assume that composite consumption is of the form:

$$C = C(x_C, t_C) = f_C \quad (2)$$

where x_C denotes market goods and t_C denotes allocation of time by household i for production of C . The time allocated to produce composite consumption and social capital is different from the time that is allocated to work (to earn wages).⁵ The implicit assumption here is that time allocated to household production (producing composite consumption and social capital) also has an opportunity cost: time not spent producing these goods could have been used in other productive activities. The production of social capital is a function of the household's personal social capital goods (x_S), the household's allocation of time to producing this particular good (t_S),

³ This argument is put forth by Azzi and Ehrenberg (1975) in their study of religious participation.

⁴ For example, preparing a meal requires ingredients, use of refrigerators, ovens, and utensils, and household's time.

⁵ As pointed out by a reviewer, it is possible that social capital may be produced in market activities such as during the labor process through worker interactions; we do not consider this possibility and focus only on non-market social capital goods in this paper.

the household's own characteristics (E_i), and the characteristics of other households (R_j) in the community. Personal social capital goods in our case may include non-market activities, such as, membership in associations, voting in elections, and participation in the decennial census. The time variable indicates that participation in these various personal social capital activities requires time. Production of social capital goods also depends on personal characteristics of households and characteristics of the communities in which they live. We abstract from the possibility that participation in personal social capital goods may also require market goods such as food and transportation.

$$SK = SK(x_S, t_S, E_i, R_j) = f_S, \text{ and } i \neq j. \quad (3)$$

The usual utility maximization problem may be written as

$$U = U(C_i, S_i) = U(f_C, f_S) = U(C(x_C, t_C), SK(x_S, t_S, E_i, R_j)), \quad (4)$$

subject to a budget constraint. Let p_x be the price of market good (x_C), p_S the price of non-market social capital goods and w_i the household's wage rate. The prices of social capital goods may entail expenses such as membership association fees and charitable contributions. These prices also depend upon the type and nature of associations. For example, participation in community-based voluntary associations likely is less costly than participation in rent-seeking associations such as business, professional, and political organizations. Wage income is assumed to be the only source of income available to the household, which faces a budget constraint

$$p_x x_C + p_S x_S = w_i t_1, \quad (5)$$

where t_1 is household's hours of work. Ignoring leisure as a use of time, the time constraint for the household is

$$T = t_C + t_S + t_1, \text{ and } t_C, t_S, t_1 \geq 0 \text{ for all } t, \quad (6)$$

where T denotes total time available per period. The household's utility maximization problem can then be re-written as

$$L = U(C(x_C, t_C), SK(x_S, t_S, E_i, R_j)) + \lambda[w_i(T - t_C - t_S) - (p_x x_C + p_S x_S)] \quad (7)$$

It follows from the first-order conditions (FOC) that the two choice variables, x_C and x_S , are "separable" in the sense that one can be solved independently of the other. This separability of the x_C and x_S choices allows us to focus on the production of social capital goods. The FOC for production of social capital goods is:

$$\frac{(U'SK'(\cdot))}{\lambda} = p_S \quad (8)$$

The household chooses an optimal level of social capital (x_S^*) to maximize total utility. Although the FOC in Eq. (8) assumes an interior solution, it is possible that $x_S^* = 0$. The condition that x_S^* is strictly positive may be characterized by the inequality that net marginal utility of the social capital good exceeds its marginal opportunity cost:

$$\frac{(U'S'(\cdot))}{\lambda} - p_S > 0 \quad (9)$$

Eq. (9) provides the basis for our empirical analysis. The FOC for individual social capital goods provide the stipulation that the household participates in associational activities if the perceived

marginal utility from these activities minus the opportunity cost is positive. This may be expressed as

$$Y^* = \frac{(U' S'(\cdot))}{\lambda} - p_S > 0 \quad (10)$$

The observable elements in this expression are the household's wage rate and, as is usually the case in empirical work, additional exogenous variables such as socio-economic, demographic, and community attributes, which condition the household's participation. These factors are incorporated into a model of county-level social capital activities in the US. They are captured in the vector of explanatory variables, X , and expressed in the regression relationship

$$Y_i^* = \beta x_i + \mu_i, \quad (11)$$

where μ is an error term.

3. Measuring social capital

As noted above, another shortcoming of the social capital concept has been the lack of consensus on how it can be measured, largely due to the complexity of the concept. Researchers have used counts of associations or associational memberships, on the one hand, and survey data on levels of trust and civic engagement, on the other. Researchers have also drawn on a number of data sources, including the National Opinion Research Council's General Social Survey and the University of Michigan's World Values Survey. These surveys ask questions about individuals' associational membership, attitudes about trust, and political participation. Glaeser et al. (2000) raise questions about the reliability of survey data measuring social capital. In a laboratory setting they found that subjects who reported that they are trusting did not cooperate in a standard trust game. A general criticism of survey methods is that survey responses vary according to the manner in which questions are phrased, and who is asking them.

Among other measures, researchers have also used crime rates, voter turnout, volunteering, car-pooling and charitable-giving as measures of social capital. These measures have been used with varying degrees of success, but we contend that a single measure that captures completely a concept with complex and multiple dimensions, such as social capital, may not exist. We are not aware of any other study that attempts to identify at the county-level the determinants of social capital production in as comprehensive a manner as we have done here.

Our approach to dealing with measurement issue follows from the argument that one form of social capital manifests itself in individuals through their participation in associational activities. Researchers have argued that social capital is enhanced when people belong to voluntary groups and organizations. In particular, Putnam (1993) maintains that participation in political and social activities and collective organizations is the primary means of civic engagement, and credits the economic success of northern Italy, relative to that of southern Italy, to its the latter's rich organizational participation. He claims that individuals' participation in social and political organizations "instill(s) in their members habits of economic cooperation, solidarity, and public spiritedness" (Putnam, 1993, pp. 89–90). From an economist's point of view, cooperation and information sharing are facilitated when individuals have the opportunity to interact within organizations. Such activities facilitate information-sharing through repeated interactions and these interactions promote reciprocity. People who belong to such groups tend to trust others who belong to the same group, and they are therefore more likely to cooperate. Activities and strengths of

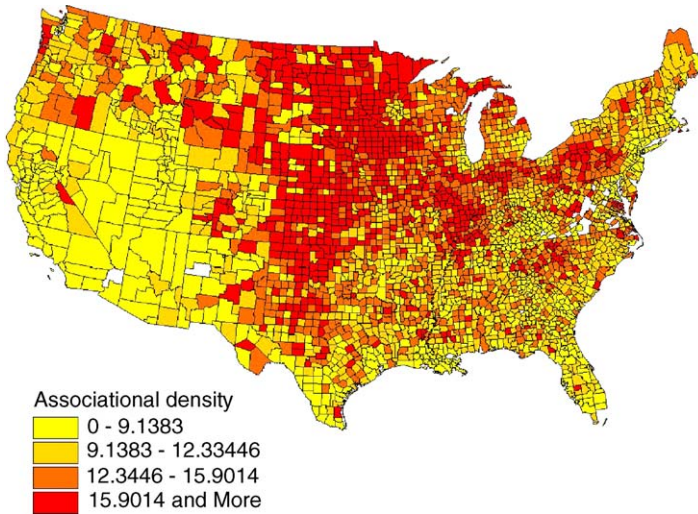


Fig. 1. Associational density, 1997.

civic organizations can be measured by their membership numbers, the number of organizations per capita, or the frequency of meetings. We argue that differences in these numbers provide one of the best indicators of cross-sectional differences in social capital.

We use secondary data covering the entire United States, the CBP compiled by the Census Bureau, to compile an extensive and comprehensive set of variables representing membership organizations at the county level. Associations such as civic groups, religious organizations, sports clubs, labor unions, political and business organizations directly enable community interaction. Our measure of principal interest is the number of the following establishments in each county: (a) civic organizations; (b) bowling centers; (c) golf clubs; (d) fitness centers; (e) sports organizations; (f) religious organizations; (g) political organizations; (h) labor organizations; (i) business organizations; and (j) professional organizations. Fig. 1 depicts the distribution of the total number of these associations per 10,000 people at the county level. Associational densities are higher in upper Midwest/Northwest counties and lower in Southeast and Southwest counties. The patterns (shadings) in Fig. 1 are remarkably similar to those obtained at the state-level by Alesina and La Ferrara (2000) (Fig. 1).

We also differentiate among associations following Knack and Keefer (1997), by dividing the above organizations into “Olson-type” (O-Groups) and “Putnam-type” groups (P-Groups): groups (a–f) are “P-Groups” that are not rent-seeking, but which involve social interaction that promotes trust and cooperation. Groups (g–j) are “O-Groups,” or rent-seeking organizations. Knack and Keefer (1997) argue that in the case of rent-seeking activity there is a financial incentive to form and join associations because they are a mechanism for transferring income or wealth from other parts of society to members. For example, farmers join the Farm Bureau because it is instrumental in persuading the government to provide farm program payments. For P-groups the potentially higher level of return from membership may lead to individuals to be willing to invest additional time and perhaps other resources such as dues, contributions, or labor. Clearly such outlays can be seen as a form of investment in the expectation that future levels of utility will be higher than might otherwise be the case.

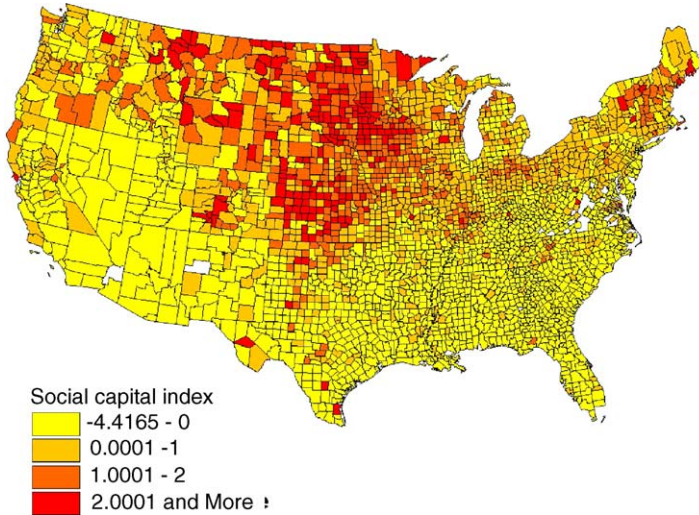


Fig. 2. Social Capital Index, 1997.

4. A county-level index of social capital

Viewed holistically, social capital consists of multiple components and it requires a broad measurement strategy. From this perspective, social capital is a theoretical construct that is not directly observable and therefore, not directly measurable. However, social capital is also a structural condition that is expected to influence the covariance of a set of observed variables or indicators. This premise allows the development of a measurement model that employs various proxies of social capital.

We use several additional measures along with the associational density variable to create a separate index of social capital and to test for the robustness of our primary measure and its determinants. These other measures are the percentage of voters who voted in presidential elections (Alesina and La Ferrara, 2000), the county-level response rate to the Census Bureau's decennial census (Knack, 2002), and the number of tax-exempt non-profit organizations from the National Center for Charitable Statistics. By adding these additional measures, we adopt a broader view of social capital that encompasses more than membership in associations.

The overall index is created by extracting principal components from these three variables and the associational density variable. The first principal component is interpreted as the index of social capital. Fig. 2 depicts the spatial distribution of this index. Higher values of this index are again concentrated in the upper Midwest and Northwest counties. The map also shows lower index values in the Southeast/Southwest counties.

5. Factors associated with social capital production

Recently, scholars from various disciplines have reached a degree of consensus on this issue and have put forward a list of factors that contribute to social capital formation in a community (Putnam, 1995; Brehm and Rahn, 1997; Alesina and La Ferrara, 2000; Glaeser et al., 2002). The selection of independent variables for our model is based largely on these earlier studies and the availability of data at the county level.

5.1. Ethnic divisions

Putnam (1995) argues that racial differences have contributed to an erosion of social capital in America. In a recent study using survey data from US states, Alesina and La Ferrara find that participation in associational activities is significantly lower in ethnically fragmented localities. Following Alesina et al. (1999), we use the ethnic fractionalization index as a measure of ethnic diversity in counties. This index measures the probability that two randomly drawn people from a county belong to different ethnic groups. We use the formula from Alesina et al. to construct the *ethnic* variable:

$$ef = 1 - \sum_i (\text{Race}_i)^2 \quad (12)$$

where Race_i denotes the share of population self-identified as of race $i \in I = (\text{White, Black, Asian and Pacific Islander, American Indian, Other})$.

5.2. Income and income inequality

Low wages and earnings may lead individuals to work for more hours to secure additional income, leaving them with less time for civic engagement. Greater income inequality reduces the level of social capital: when society's rewards become more unevenly distributed, people may feel exploited by others, thus diminishing their faith in their fellow citizens. Alesina and La Ferrara find that participation in associational activities is significantly lower in localities with greater income inequality. Following Alesina et al. (1999), we use the ratio of the mean household income to the median household income in a county to measure income inequality.

5.3. Education

Education is often cited as a key determinant of peoples' attitudes and behaviors. The positive association between social capital and human capital is well-documented in the literature (Putnam, 1995; Helliwell and Putnam, 1999; Glaeser et al., 2002). According to Putnam (1995), "(e)ducation is by far the strongest correlate that I have ever discovered of civic engagement in all its forms, including social trust and membership in many different types of groups (p. 667)." At the community level, higher educational attainment levels may lead to more civic engagement in a community. Educational attainment in a county is measured as the percent of population 25 years or older in 1990 and 1980 with 12 or more years of education.

5.4. Community attachment

Migration reduces social capital levels in a community (Schiff, 1992; Glaeser et al., 2000) by affecting the strength of interpersonal relations and trust among community members. Migration tends to weaken local networks and associations, as members depart and critical mass is lost. Putnam (1995) writes, "mobility, like frequent repotting of plants, tends to disrupt root systems, and it takes time for an uprooted individual to put down new roots" (p. 669). We use data from the Special County-to-County Migration File (STP28) tabulated by the Census Bureau from the 1990 decennial census to calculate the number of persons in 1990, who lived in the same county in 1985–1990 as a measure of community attachment. A similar measure is obtained from the Census

of Population and Housing (1980), County Migration by Selected Characteristics, 1975–1980 for the regression covering the 1980s period.

5.5. *Changing role of women*

Putnam (1995) suggests that high levels of social capital are found among women who are wives and mothers. This group of women invests heavily in social capital by participating in church groups and PTA meetings, and by visiting friends and relatives (Putnam, 1995). Putnam (1995) also suggests that the movement of women into the paid labor force may have contributed to the decline in social capital over the last generation (see also Alesina and La Ferrara, 2000). On the other hand, participation in the labor force may increase women's socialization to engage in group activities. We examine the direction of this relationship empirically by including the female labor force participation rate in the equation.

5.6. *Marriage and family*

The breakdown of the traditional family unit has been cited as negatively affecting the production of social capital (Putnam, 1995). Possible implications may include less support for local schools and healthcare. Putnam (1995) argues that married men and women rank somewhat higher on measures of social capital, and that single people are significantly less trusting and less engaged in civic activities than married people. We use the ratio of family households to total households in each county to capture the effect of family relations on the production of social capital. The average number of children per family is also included, along with the share of families with children, to test for the possibility that having children in a family affects social capital levels. Child-rearing activities are believed to negatively impact social capital because they consume time (Alesina and La Ferrara, 2000). On the other hand, having children can lead families to engage in more social activities, such as parties and picnics promoting inter-family interactions.

5.7. *Age*

Putnam (1995) suggests that high levels of civic engagement are found among older people. We test this hypothesis by incorporating average age of the population in the analysis. We also test the life cycle hypothesis related to social capital production (Glaeser et al., 2000) by including a squared term of the age variable.

5.8. *Suburbanization*

Metropolitan areas (cities and towns) are believed by Putnam (1995) to be less congenial to social connectedness than small towns and rural areas. Glaeser et al. (2002) point out that residents of large cities and individuals who live in apartment buildings are more likely to exhibit higher social capital. Browne (2001, pp.4–6) argues that in rural areas, where there are few people and population density is low, that collective behavior is essential to provide basic services, like volunteer fire departments, that are provided by government in urban areas. Each county's urban status is included as a regressor in the equation. *Urban* denotes metropolitan counties (Beale code = 0, 1, 2, 3) and *Rural* is (non-metro) counties having urbanized places with less than 20,000 residents (Beale = 5, 7, 9) that are also not adjacent to metro areas. The excluded category is rural

(non-metro) counties that are adjacent to metro areas, which we consider to represent suburban counties.

5.9. *Employment type*

Glaeser et al. (2002) contend that an individual's degree of "sociability" varies according to her/his type of job. We include the proportion of each county's workforce belonging to manufacturing, professional and agricultural occupations to measure this factor.

5.10. *Homeownership*

Glaeser et al. (2002) argue that social capital is strongly associated with homeownership. DiPasquale and Glaeser (1999) maintain that homeowners have an incentive to improve the community they live in to protect their investment and because homeownership is a barrier to moving out. We include the percentage of owner-occupied housing units (out of total occupied housing units) as a proxy for homeownership to test for this possibility.

6. Estimation and results for associational activities

The literature is clear and unequivocal about the effects of certain variables on social capital; two of these are education and inequality. Empirical studies have established large positive effects of education on the formation of trust and civic participation (Putnam, 1995; Heliwell and Putnam, 1999; Glaeser et al., 2002; Alesina and La Ferrara, 2000). Some of these studies are also clear about the negative and significant effects of income inequality on the formation of trust and civic participation (Alesina and La Ferrara, 2000). However, most of these studies do not consider the possibility that these particular variables are also endogenous with respect to social capital creation.⁶ Specially, high amounts of social capital may lead to more education and reduced income inequality.

We treat education and income inequality as endogenous and obtain instruments for these variables from a set of auxiliary regressions. We employ the empirical equations used in Braun (1988) and Bishop et al., (1992) to obtain instruments for income inequality, such that inequality is determined by mean family income, per capita health expenditure, years of schooling, per capita educational expenditure, percent of labor in manufacturing, and population density. This variable is denoted PRINEQ. We use the human capital equation from Goetz and Hu (1996) to model educational attainment as a function of median income, per capita local taxes, unemployment, home ownership, family size, education expenditure, urban, rural, and regional dummies. The resulting instrument is denoted PREDUC. In addition, we use all of the other exogenous variables contained in the reduced form social capital equation (Kennedy, 1998). While other variables may be endogenous and difficult to identify (statistically), we have attempted to reduce this potential problem by using starting conditions at a point in time that precedes the year in which the dependent variable is measured (given the availability of data in only certain years) (Table 1).

Table 2 reports estimation results for two time periods (1980–1990 and 1990–1997) using data from 3047 US counties after accounting for missing values for certain variables, and correcting

⁶ An exception is Alesina and La Ferrara (2000), who consider potential endogeneity of income inequality and use instrumental variables estimation.

Table 1
Descriptive statistics

Variable	Description	1980–1990		1990–1997	
		Mean	S.D.	Mean	S.D.
ASSN	Associations per 10,000 residents	11.33	5.27	13.10	6.07
PRIN	Social capital index	−1.414E-16	1.34	−4.791E-16	1.30
ED12OV	Educational attainment, grade 12 and above (percent)	59.29	12.31	69.55	10.34
ETHNIC	Ethnic fractionalization index	0.162	0.166	0.175	0.168
INEQ	Mean income/median income	1.359	0.134	1.460	0.138
FEMLAB	Female labor force participation rate	0.931	0.032	0.932	0.032
URBAN	Urban counties (0,1)	0.231	0.422	0.263	0.440
RURAL	Rural counties (0,1)	0.471	0.499	0.416	0.493
OWNHOU	Percent owner-occupied houses	73.46	7.46	72.78	7.49
MEDAGE	Median age	31.07	3.88	34.42	3.59
FAMHH	Percent family households (years)	66.66	15.88	76.07	18.52
STAY	Percent same county in 1985	0.794	0.070	0.749	0.071
BLACK	Percent African-Americans	8.510	14.36	8.501	14.29
MEDINC	Median income	16,688	3503	28,243	6919
FAMCHI	Percent family households with children	44.02	5.21	38.75	4.98
MANEMP	Percent manufacturing employment	20.86	12.12	18.54	10.54
AGR	Percent agriculture, forestry, and fishing employment	12.92	11.13	10.56	9.60
PROFEM	Percent professional employment	18.50	4.87	21.40	4.99

Sample size, 3047 counties.

Table 2
OLS results for associational densities

	1980–1090 period		1990–1997 period	
	Coefficient	<i>t</i> -ratio	Coefficient	<i>t</i> -ratio
Constant	−56.61	7.69	−86.93	12.23
PREDUC	0.080	3.45	0.166	5.48
ETHNIC	−4.186	4.47	−1.266	1.32
PRINEQ	−1.004	0.53	−2.323	1.70
FEMLAB	12.43	3.82	36.12	8.19
URBAN	−1.293	5.46	−1.320	5.73
RURAL	1.206	6.65	0.941	4.41
OWNHOU	−0.066	2.99	−0.096	3.31
MEDAGE	1.905	8.45	1.701	5.25
AGESQ	−0.0245	7.56	−0.017	3.68
FAMHH	0.0840	7.83	0.0521	4.46
STAY	6.119	2.64	21.39	11.61
BLACK	0.037	3.38	0.0512	4.84
MEDINC	0.0003	4.53	−0.0001	3.55
FAMCHI	0.0793	1.93	0.203	4.77
MANEMP	0.0342	2.58	−0.0092	0.57
AGR	0.0759	3.92	−0.0199	0.83
PROFEM	0.1162	4.93	0.130	4.32
<i>R</i> -squared (adjusted)	0.312		0.390	

Sample size, 3047 counties.

for heteroskedasticity. The dependent variable is the total number of Putnam- and Olson-type establishments (organizations) per 10,000 persons in each county in 1990 and 1997.

Our results strongly confirm the earlier finding that education is perhaps the single most important determinant of social capital. The predicted effect of education (instrumented) is positive and statistically significant in both time periods indicating that counties that have higher number of people with a college degree or more have higher social capital.

Although our results in general confirm previous findings by Alesina and La Ferrara (2000) on the relationship between social capital and ethnic diversity, the statistical significance of this variable declines in the 1990–1997 period relative to the period 1980–1990. The absolute size of the coefficient also declines in the latter period. However, the coefficient remains robust for the 1980–1990 period, implying that localities with greater ethnic fragmentation are less connected socially.

In contrast, the results are not convincing in terms of the impact of income inequality on social capital formation. The impact is negative and weakly significant in the 1990–1997 period but not statistically significant in the 1980–1990 period. One reason that it was not statistically significant in the 1980–1990 period but was significant (weakly) in the 1990–1997 period is that income inequality increased from the former to the latter period. The mean income inequality rose from 1.36 in 1979 to 1.46 in 1989.

The hypothesis that the movement of women into the paid labor force reduced the level of civic engagement in a community is not supported by our results. This variable is highly statistically significant, with a positive sign. One explanation is that participation of women in the labor force increases their social contacts and avenues for networking. The urban and rural variables are both significant and have expected effects on organizational density, indicating that urban communities have lower levels of civic engagement than their suburban and rural counterparts.

Our results fail to confirm the earlier finding that homeownership is a source of social capital formation (DiPasquale and Glaeser, 1999; Glaeser et al., 2002). The homeownership variable is negative and significant for both time periods. We include a squared term for this variable to test for nonlinear relationship and find a U-shaped relationship, but the coefficient estimates are not statistically significant. We also re-estimated these equations interacting homeownership with family income. The homeownership variable remains negative and significant, but the interaction term is positive and highly significant, indicating that homeowners with higher incomes also produce higher levels of social capital. DiPasquale and Glaeser (1999) argue that the positive relationship between homeownership and social capital may be due to reduced mobility associated with homeownership. To measure mobility, we include the percent of people who lived in the same county during the last 5 years (*community attachment*). We also estimated regressions without this variable, but the sign and significance of the homeownership variable did not change. The community attachment variable is highly significant and has the expected positive sign, indicating that communities with more “permanent” residents also have more civic activity.

Communities with more elderly people tend to have more of the types of associations and organizations considered in this study. Following Glaeser et al. (2002) we also tested for an inverted-U relationship with respect to social capital over the life cycle. A significant and positive sign for median age and a significant and negative sign for its squared term are evidence in support of the life cycle hypothesis. The family household variable is highly significant and positive and robust to specification changes. Another notable result is the coefficient for the variable Blacks. This is positive and significant in both time periods, indicating that members of this racial group participate more in associational activities.

Table 3
Olsonian (O-Groups) and Putnamian (P-Groups) associations

	Putnam90		Olson90		Putnam97		Olson97	
	Coefficient	<i>t</i> -ratio	Coefficient	<i>t</i> -ratio	Coefficient	<i>t</i> -ratio	Coefficient	<i>t</i> -ratio
Constant	-57.0	8.18	0.430	0.22	-79.2	11.68	-7.75	3.22
PREDUC	0.0657	3.02	0.0142	1.66	0.113	3.90	0.0529	5.77
ETHNIC	-3.56	4.09	-0.630	2.31	-0.956	1.05	-0.310	1.29
PRINEQ	-1.54	0.85	0.534	1.08	-3.26	2.75	0.932	1.39
FEMPLAB	14.5	4.68	-2.11	1.98	36.0	8.59	0.114	0.10
URBAN	-1.12	5.20	-0.175	2.15	-1.12	5.22	-0.197	2.55
RURAL	0.996	5.84	0.210	4.33	0.810	3.91	0.131	2.55
OWNHOU	-0.0499	2.41	-0.0163	2.76	-0.0764	2.65	-0.0198	2.99
MEDAGE	1.72	8.38	0.182	3.34	1.470	4.59	0.232	3.20
AGESQ	-0.0214	7.31	-0.0031	4.04	-0.0138	3.03	-0.0032	3.40
FAMHH	0.0841	8.33	-0.0001	0.03	0.0587	5.19	-0.0066	2.25
STAY	5.35	2.55	0.769	0.75	16.7	9.25	4.68	9.36
BLACK	0.0388	3.79	-0.0018	0.60	0.0521	5.16	-0.0009	0.30
MEDINC	0.0002	3.49	0.0001	3.57	-0.0001	3.77	-7.51E-06	0.61
FAMCHI	0.115	2.89	-0.0360	3.93	0.221	5.42	-0.0174	1.52
MANEMP	0.0433	3.53	-0.0091	1.95	0.0055	0.36	-0.0147	2.64
AGR	0.087	4.85	-0.0108	1.73	0.0117	0.50	-0.0316	4.31
PROFEM	0.125	5.76	-0.0090	1.05	0.143	5.01	-0.0128	1.51
<i>R</i> -squared (adjusted)	0.321		0.122		0.396		0.150	

Sample size, 3047 counties.

Coefficient estimates for median family income are inconsistent across the two time periods: negative and significant in the 1990–1997 period, but positive and significant in the 1980–1990 period. A strong and positive relationship exists between families with children and associational densities. Our test for the effects of various job characteristics on associational densities shows a positive and significant effect of professional jobs on social capital formation for both time periods, while the effects of manufacturing and agricultural, fishing and forestry are mixed. These two variables are highly significant and positive in the 1980–1990 period but not significant during 1990–1997.

Knack and Keefer claim that rent-seeking organizations can depress economic growth. Although Rupasingha et al., 2000 found no empirical evidence to support this claim at the US county level, we investigate the possibility of differences in determinants of the two types of groups as indicated earlier, by dividing the above organizations into “Olson-type” and “Putnam-type” groups. Table 3 presents these results.

Overall, the effects of most regressors on the presence of O-Groups are less robust compared to those associated with P-Groups. This difference is also evident from the *R*-squared values for these equations (the *R*-squared value of the O-groups is less than half that of the P-groups for both time periods). We find a significant difference between the two groups in female labor force participation in the 1980–1990 period. The movement of women into the paid labor force reduces the level of O-groups in a community but positively affects P-groups. This suggests that employed women tend not to participate in professional- and business-type organizations, but they do participate more in grass roots-type organizations. This variable is highly significant in the 1997 P-groups model but not significant in the O-groups model. The two groups also differ across urban and rural space. The urban variable has a significant negative effect on P-group density but

a positive effect on O-group density, indicating that rural communities are more likely to have P-groups and urban areas are more likely to have O-groups, relative to suburban counties.

7. Estimation and results for index of social capital

Table 4 displays regression results for our calculated county-level social capital index (the first principal component) using the same independent variables and estimation procedures as in the models for associational densities. Results are similar except for a few variables. In particular, the ethnic variable is negative and highly significant across both time periods. Confirming previous results, the coefficient for the (instrumented) income inequality variable is not statistically significant. Similar to the previous estimation, the significance and sign of the coefficient for median family income is not consistent over time.

A marked difference occurs for the homeownership variable, which becomes insignificant in both time periods. Another difference between the two types of social capital indicators is the effect of manufacturing and agricultural, fishing, and forestry occupations. While the results for the previous estimation are mixed over time, these two variables are positive and significant across both time periods using the social capital index as the dependent variable.

7.1. Sensitivity analysis

We next estimate a panel model for two time periods to control for unobserved heterogeneity and also to investigate inter-temporal changes. With panel data, the sample size is increased, allowing

Table 4
Estimation results for Social Capital Index

	1980–1990 period		1990–1997 period	
	Coefficient	<i>t</i> -ratio	Coefficient	<i>t</i> -ratio
Constant	−22.3	14.67	−21.8	12.50
PREDUC	0.072	14.13	0.093	15.67
ETHNIC	−1.73	7.24	−1.46	7.69
PRINEQ	0.158	0.63	0.430	1.39
FEMLAB	2.00	2.84	4.61	4.12
URBAN	−0.097	1.77	−0.184	4.01
RURAL	0.314	8.06	0.216	5.89
OWNHOU	−0.0062	1.59	−0.0034	0.72
MEDAGE	0.502	9.08	0.239	3.65
AGESQ	−0.0068	8.60	−0.0025	2.84
FAMHH	0.0205	9.01	0.0022	0.94
STAY	3.34	6.59	5.76	16.14
BLACK	0.0149	5.18	0.0135	5.64
MEDINC	1.90E-05	1.35	−1.67E-05	2.23
FAMCHI	0.0319	4.02	0.0112	1.13
MANEMP	0.0194	6.77	0.0038	1.12
AGR	0.0368	10.01	0.0120	2.73
PROFEM	0.0443	7.62	0.0352	5.82
<i>R</i> -squared (adjusted)	0.555		0.594	

Sample size, 3047 counties.

Table 5
Panel data estimation results

	Associations		Social capital index	
	Coefficient	t-ratio	Coefficient	t-ratio
Constant	−35.9	8.32	−14.6	16.46
PREDUC	0.199	10.90	0.0602	15.33
ETHNIC	−2.55	2.67	−1.52	7.46
PRINEQ	−0.712	1.39	0.614	5.99
FEMLAB	10.3	5.48	0.640	1.69
URBAN	−0.928	4.49	−0.105	2.45
RURAL	0.683	4.08	0.134	3.84
OWNHOU	−0.0313	2.15	0.0001	0.02
MEDAGE	0.593	3.94	0.338	11.01
AGESQ	−0.0036	1.70	−0.0040	9.26
FAMHH	0.0342	6.22	0.0052	4.61
STAY	7.88	8.18	0.653	3.35
BLACK	0.0288	2.53	0.0044	1.76
MEDINC	−0.0001	8.22	−6.23E-06	1.72
FAMCHI	0.115	5.48	0.0177	4.17
MANEMP	0.0640	5.59	0.0176	7.32
AGR	0.0707	5.85	0.0291	11.44
PROFEM	0.0750	4.28	0.0299	8.31
R-squared (adjusted)	0.356		0.535	
LM test	1645 ^a		2866 ^a	

Sample size, 6094 counties.

^a Significant at below the 1% level.

for more robust estimates. A random effects model is used to estimate the panel.⁷ Table 3 presents results of the panel estimation. Most of the results obtained in the separate regressions for the two time periods are confirmed and become even stronger in the panel estimation (Table 5).

The results clearly reveal a negative and strong effect of ethnic heterogeneity on both social capital indicators. The impact of income inequality is not significant in the panel estimation for associational activities but it is significant with an unexpected positive sign in the panel estimation for the social capital index. The effect of homeownership remains negative and significant in the panel estimation for associations, but it is not statistically significant in the social capital index panel model. The effect of occupational characteristics on associational densities and the social capital index is positive and significant.

In additional sensitivity analysis (not shown) we also regressed the 1997 association density and social capital index on the 1980 explanatory variables. The results in this case largely remain unchanged, especially the effects of education and ethnic heterogeneity.

8. Economic significance

Given the new ground that is broken in this study in terms of measuring social capital production in a consistent manner at the level of US counties, the statistical significance of these results is

⁷ The primary reason for using a random effects model is that several variables are time invariant and therefore, fixed effects are not appropriate. Random effects estimation also allows for possible correlations of disturbance between two time periods, thus, minimizing potential biases in the estimates (Moulton, 1986).

noteworthy and suggests that this line of research holds promise. However, we also need to address applied and policy implications of the results.

Our findings provide evidence that educated individuals have a better understanding of the positive impacts of associational activities and collective action on society than do those with less formal education. It is widely believed that education generates significant positive externalities (merit good that provides benefits to society beyond those that accrue to the individual, such as increased wages) in a society and its impact on building social capital can also be considered as part of these positive externalities. The educational process that starts in schools promotes social interaction, networking, and social responsibility among individuals and produces generally more-informed individuals.

Notwithstanding the statistical results, the descriptive data shown in *Figs. 1 and 2* indicate that both associational densities and the composite social capital index are higher in the regions (Mid-western, Northcentral and Northwestern states) that tend to have more homogeneous population. Racially heterogeneous societies are also culturally diversified, and this may have a negative impact on social capital formation since individuals are less familiar with members of different cultures. Income inequality is another source of social polarization that will lead to less social interaction in a society. Highly unequal (in terms of income) communities that have higher number of poor people are less likely to experience participation in social capital-producing activities.

Interestingly, counties with more family households with children had higher associational densities (so that the time commitments associated with raising children does not necessarily reduce civic engagement), and more Putnam- but fewer Olson-type organizations (the latter in 1997 only). Raising children leads to interactions between families and other actors within the community that will widen a family's access to social networks. Even though our findings of the relationship between median family income and social capital is not consistent across two time periods, it is still plausible that having more income leads one to join social groups and participate in other non-income earning social activities.

In terms of policy implications these findings indicate several variables that can be influenced at the county-level. For example, there is not much a county government can do to change its urban or rural status (but it is important to include these variables as "controls"). As it turns out, these two variables also have the smallest elasticities and standardized beta coefficients among the regressors.

In the social capital index equation (which has a mean of zero making it impossible to calculate an elasticity) educational attainment has the highest standardized beta coefficient (0.740), which is followed by age and community attachment (long-term residents of a county). Other than implementing retiree attraction programs, it would seem that there are few specific policies or programs that states can pursue to influence the levels of these variables. For the associational density variable, female labor force participation, average age of the population, and community attachment have the highest elasticities. The lowest elasticities occur in the case of ethnicity, urban/rural status, percent black and percent manufacturing, and agricultural employment.

9. Conclusion

In conclusion, while the social capital concept is of major theoretical and empirical interest to many economists and social scientists, the concept is not yet fully explored. This paper is an attempt to understand factors affecting in production of social capital. *Coleman (1990)* and *Putnam (1993)* contend that communities with higher stocks of social capital are better able to deal with economic and social problems than those with fewer stocks of social capital. *Putnam (1995)*

has also argued that the stock of social capital in the United States is declining. Our paper offers insights into potential determinants of social capital at county level. Most of the statistically significant variables support the general hypotheses drawn from the previous literature. More importantly, our results strongly confirm most of the findings of Putnam (1995), Alesina and La Ferrara (2000), and Glaeser et al. (2002), using new and altogether different datasets and units of analysis. Our study can be seen as complementing these previous studies. To our knowledge, this is the first attempt to calculate a consistent set of variables to measure levels of social capital at the US county level.

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