Research Papers in Environmental and Spatial Analysis No. 123

NEW HOUSING SUPPLY AND THE DILUTION OF SOCIAL CAPITAL

by

Christian A. L. Hilber[*]

Department of Geography and Environment
London School of Economics

August 2007

ISBN: 978-0-85328-114-6

[*] The author wishes to thank Paul Cheshire, Gilles Duranton, Steve Gibbons, Edward Norton, Jos Van Ommeren, Ioulia Ossokina, Henry Overman, Antonio Páez, Robert Putnam, Frédéric Robert-Nicoud, Raven Saks, Olmo Silva, Tom Sander, Maarten van't Riet and seminar/conference participants at the London School of Economics, the 51st and 52nd Annual North American Meetings of the Regional Science Association International, and the CPB in Den Haag for helpful comments and suggestions. Peter Wright provided excellent research assistance. A research grant from the London School of Economics is gratefully acknowledged. The remaining errors are the sole responsibility of the author. Address correspondence to: Christian Hilber, London School of Economics, Department of Geography and Environment, Houghton Street, London WC2A 2AE, United Kingdom. Phone: +44-20-7107-5016. Fax: +44-20-7955-7412. E-mail: c.hilber@lse.ac.uk.

Research Papers in Environmental and Spatial Analysis No. 123

NEW HOUSING SUPPLY
AND THE
DILUTION OF SOCIAL CAPITAL

Abstract

This paper examines the role of local housing market conditions for social capital accumulation and neighborhood club good provision. A model of individual investment decisions predicts that in a setting with high property transaction costs (i) homeowners are more likely to invest in social capital than renters and (ii) the positive link between homeownership and social capital is stronger in more built-up neighborhoods with inelastic supply of new housing. In these neighborhoods homeowners are largely protected from inflows of newcomers that would dilute the net benefit from social capital in the longer run. Empirical evidence from the Social Capital Community Benchmark Survey confirms the model predictions. Instrumental variable estimates suggest that the effects are causal.

JEL classification: D71, R21, R31.

Keywords: House price capitalization, social capital, homeownership,
land and housing supply, neighborhood club goods.

1 Introduction and Background

The monitoring of one's property by friendly neighbors or watch groups, a neighbor holding one's spare key, BBQ-parties among closely connected neighbors, or a pool of trusting parents that look after each other's children are all examples of club goods that are essentially the result of accumulated social capital among a group of contributing neighbors. In this context, DiPasquale and Glaeser (1999) have argued that homeowners are 'better citizens' because homeownership (i) creates barriers to mobility and (ii) gives individuals an incentive to invest in local amenities and social capital since community quality is capitalized into property values.

Simple stylized facts from the Social Capital Community Benchmark Survey (2000), suggest, however, that homeowners may not always be 'better citizens'. For example, while homeowners, compared to renters, on average socially interact 30 percent more often with immediate neighbors in essentially built-up neighborhoods (more than 85 percent developed), the difference between the two groups is only about 9 percent in an 'average' neighborhood (45 to 55 percent developed) and there is virtually no difference between the two groups in little developed neighborhoods (less than 15 percent developed). These numbers change little when other factors – including population density in the developed area – are controlled for.

How can this be explained? In this paper I argue that property transaction costs (interpreted broadly) create incentives for homeowners to invest in social capital because it discourages free riding. Homeowners can in principle free ride on other neighbors' social capital investments by selling their property and pocketing the proceeds from the improved neighborhood quality. However, such free riding is not an attractive option if transaction costs exceed the benefits derived from the improved neighborhood quality. In a world with high transaction costs the question then becomes whether the homeowner's long-term benefits derived from social capital exceed the costs and I will argue that the answer to this question crucially depends on the elasticity of new local housing supply – proxied by the share of developable land in the neighborhood.

Consider a neighborhood where renters are free to move but where property transaction costs make existing homeowners immobile. In such a setting homeowners have greater incentives to invest in social capital compared to renters as long as the long-term net benefit exceeds the initial investment cost. This is because homeowners can internalize the long-term net benefits from their investments. In contrast, renters are deprived of those net benefits since landlords can pocket proceeds by increasing rents. The elasticity of new housing supply is critical for the likelihood of social capital investment because it affects the inflow of newcomers and thereby determines the homeowners' long-term net benefit from social capital. In a built-up neighborhood with perfectly inelastic supply of developable land for new housing, initial investors into social capital are largely protected from inflows of newcomers that would dilute the net benefit from that social capital in the longer run.[1] In contrast, in a little developed neighborhood with elastic supply (i.e., low opportunity cost of conversion and lax land use regulations), newly accumulated social capital will steer landowners to develop new housing units as long as the price exceeds the marginal (opportunity) cost of conversion. In the long-run, the net benefit from social capital is diluted to an extent that the marginal newcomer's net benefit and the corresponding house price premium become very small. It is quite intuitive that in such a setting nobody has an incentive to make a sizeable investment in the neighborhood's social capital in the first place. Hence, homeowners may only be 'better citizens' in more built-up neighborhoods with inelastic long-term supply of new housing.

The outlined argument is not only relevant for investment in social capital. For example, an investment in a local public school may increase school quality in the short-run. However, if supply of new housing is elastic, inflow of households with children will dilute the benefits in the longer-run (because the additional resources have to be shared among more pupils) and thereby reduce the homeowner's incentive to vote for the investment in the first place. Hilber and Mayer (2004) provide empirical evidence that is consistent with this view.

In an even broader context, the outlined argument is important for a wide range of studies that conclude that homeowners are 'better citizens' or are 'more motivated to control local government because its services and taxes affect the value of their homes' (e.g., DiPasquale and Glaeser, 1999; Fischel, 2001), that house value maximizing voters can ensure an efficient provision of local public services (see e.g. Edelson, 1976; Sonstelie and Portney, 1978; Wildasin, 1979; Sprunger and Wilson, 1998), or that house price capitalization provides an incentive mechanism in an inter-temporal sense, that is, an incentive to provide an optimal level of durable or intergenerational public goods (see e.g. Brueckner and Joo, 1991; Glaeser, 1996; Oates and Schwab, 1996 and 1998; Conley and Rangel, 2001; Rangel, 2005).

The empirical evidence presented in this paper provides strong support for the view that in a world with high transaction costs the elasticity of new housing supply – as proxied by the

[1] In the theoretical model proposed in this paper the dilution of net benefits occurs because the entry of a marginal newcomer increases an initial contributor's social capital maintenance cost more than it increases the gross benefits derived from the social capital stock. The 'dilution effect' may also arise from congestion. That is, an additional newcomer may reduce rather than increase the benefits, which existing contributors derive from social capital. The theoretical propositions formulated in this paper are independent of whether the dilution effect arises from increased maintenance cost or congestion.

share of developable land in the neighborhood – is an important determinant of a household's social capital investment decision. This is true even when controlling for the population density within the developed area of the neighborhood and many other characteristics that are expected to affect social capital accumulation and even when using instrumental variable (IV) estimates that treat the share developed land, the population density and the respondent's homeownership status as endogenous.[2] The empirical analysis also tests and confirms other elements of the theory and discounts alternative explanations of the empirical findings.

The paper is structured as follows. Section 2 describes the economic characteristics of neighborhood specific social capital, presents a two-stage model of individual investment decisions and discusses alternative theoretical frameworks and their predictions. Section 3 describes the data sources, discusses empirical specifications and identification strategies and presents evidence in support of the model predictions. Section 4 derives conclusions.

2 Theoretical Framework and Predictions

2.1 Economic Characteristics of Neighborhood Specific Social Capital

Neighborhood specific social capital is defined in this paper as a connection among neighbors, which enables them to cooperate and which subsequently facilitates the provision of a number of mutually beneficial club goods.[3] Neighborhood specific social capital can be accumulated, for example, by socially interacting with neighbors or by participating in neighborhood clubs. These activities enable individuals to (a) develop a common language with one another so that communication is easier and (b) establish relationships, for example, in the form of organized or spontaneous shared social activities, so that neighbors will trust and like each other more. While shared social activities (e.g., BBQ-parties among neighbors) themselves can be interpreted as utility generating club goods, other club goods are the result of social capital induced trust and friendship. For example, trust and sympathy among neighbors enables them to provide club goods that are simply the product of shared private or

[2] The empirical work below decomposes the population density in a neighborhood into two multiplicative components: the population density in the developed area and the share of developed land in the neigbhorhood. This approach enables separate estimation of the effect of land scarcity (potential supply of new housing) and the physical proximity of neighbors (as an inverse measure for the cost of social interactions). See Brueckner and Largey (2006) for an analysis of the effect of population density – measured as population divided by total area – on individual measures of social capital investment. Largely consistent with the findings in this paper, their empirical results show a negative rather than a positive effect of density on the number of social interactions.

[3] Definitions of the term social capital differ across studies and across the social sciences. The origins of the term 'social capital' are discussed, for example, in Manski (2000) or Durlauf (2002). For a discussion of the determinants of social capital and the role of social capital for economic outcomes and the well-being of people see, for example, Knack and Keefer (1997), Putnam et al. (1993) or Putnam (1995). See Glaeser, Laibson and Sacerdote (2002) for a description of the 'economic approach' to social capital. Manski (2000) or Durlauf and Fafchamps (2004) provide survey articles on the economic analysis of social interactions.

common property (e.g., shared or communal gardens). Finally, trust and sympathy can encourage the provision of benefits in the form of mutually beneficial reciprocal behavior (e.g., monitoring of one's absent property by friendly neighbors, holding a neighbor's spare key, or informal child care arrangements).

Neighborhood specific social capital has some particular economic characteristics. To begin with, it is in practice *partially but not fully* excludable. Investors in neighborhood specific social capital ('club members') can typically exclude free riders from access to the benefits derived from social capital, for example, by not inviting them to join a club event or by turning a blind eye on an absent free rider's property. However, exclusion is in practice incomplete in that it is often unfeasible, not considered fair or in some cases not rational to exclude newcomers to a neighborhood who are willing to cooperate. One consequence of this partial non-excludability is that net benefits derived from neighborhood specific social capital, after an initial investment period, make the location not only more attractive to existing residents but also to potential newcomers, increasing the demand for properties in the neighborhood, and – assuming that housing supply is not perfectly elastic – also increasing house values.[4] This implies that property owners can free ride on other residents' investments by selling their property as long as the potential gains exceed property transaction costs.

Another defining characteristic of neighborhood specific social capital is that it typically involves an initial *investment/production phase* and a subsequent *maintenance/consumption phase*. Consider the investment phase first. A quite sizeable 'social capital investment' is usually needed to initiate the process of generating trust and friendship among the involved neighbors M. The individual investment costs of contributing neighbors can be expressed as

$$c_{inv}\left[M\right]=c_{inv}^{f}\left[M\right]+c_{inv}^{v}\left[M\right]. \tag{1}$$

The term c_{inv}^{f} denotes each initiating member's share of the total *fixed cost* burden C_{inv}^{f} associated with the set up of initiating meetings and club structures, whereas $c_{inv}^{f}=C_{inv}^{f}/M$ (i.e., the fixed cost is shared equally among all members). The term c_{inv}^{v} denotes the individual v*ariable cost* related to the time spent to establish relationships with all involved initiating club members. It can be assumed that this cost component increases linearly with M (i.e., there are no economies of scales in establishing trust). First and second derivatives yield:

[4] If neighborhood specific social capital were fully excludable and initiators chose to exclude newcomers, then nobody would have a social capital induced incentive to enter the neighborhood and the social capital induced house price premium would be zero. However, if intiators could not exclude free riders at all, not even initial ones, then everybody would try to free ride and the social capital would not be provided in the first place.

$$\frac{\partial c_{inv}^{f}}{\partial M} < 0 \;;\; \frac{\partial^2 c_{inv}^{f}}{\partial M^2} > 0 \quad ; \quad \frac{\partial c_{inv}}{\partial M} = \begin{cases} < 0 \; if \left| \frac{\partial c_{inv}^{f}}{\partial M} \right| > \frac{\partial c_{inv}^{v}}{\partial M} \\ > 0 \; if \left| \frac{\partial c_{inv}^{f}}{\partial M} \right| < \frac{\partial c_{inv}^{v}}{\partial M} \end{cases} \quad ; \quad \frac{\partial^2 c_{inv}}{\partial M^2} > 0$$
$$\frac{\partial c_{inv}^{v}}{\partial M} > 0 \;;\; \frac{\partial^2 c_{inv}^{v}}{\partial M^2} = 0 \tag{1.1}$$

The last two derivatives imply that the individual social capital investment cost first decreases and then increases with the number of initiating investors (inverse U-shaped curve).

Now consider the maintenance phase. Once trust and friendship among initiating investors is established, a 'maintenance effort' of 'contributors' (initial investors and cooperative newcomers) is usually sufficient to ensure the provision of social capital induced club benefits in the longer run. The individual maintenance costs are determined by (a) the number of initial club members M (the larger the club size the more relationships need to be maintained among initiating members) and (b) the number of cooperative newcomers ΔM (new relationships need to be established). In this context it is reasonable to assume that the cost of *maintaining* an existing relationship λ^{exist} is significantly lower than the cost of *establishing* a new relationship λ^{new}. Newcomers have to establish relationships with *all* club members, while initiating club members only have to establish relationships with the *newcomers*. The cost functions for initial investors and newcomers can be expressed as:

$$m_{inv}\left[M, \Delta M\right] = M \times \lambda^{exist} + \Delta M \times \lambda^{new} \tag{2.1}$$

$$m_{new}\left[M + \Delta M\right] = \left[M + \Delta M\right] \times \lambda^{new}.\text{[5]} \tag{2.2}$$

If we define $\lambda^{new} - \lambda^{exist} = \Delta\lambda\left(> 0\right)$ and reformulate equations (2.1) and (2.2) we get:

$$\Delta m_{new-inv}\left[M\right] = m_{new}\left[M + \Delta M\right] - m_{inv}\left[M, \Delta M\right] = M \times \Delta\lambda, \tag{2.3}$$

whereas $0 < \Delta m_{new-inv}\left[M\right] < c_{inv}\left[M\right]$.[6]

Equation (2.3) implies that newcomers, compared to initial investors, have higher costs in the maintenance phase and that the cost difference depends on the number of initiators in period 1. Overall, however, newcomers have a comparative cost advantage over initiators for

[5] Alternatively, one could assume that the *marginal* cost of establishing a new relationship increases because the involved neighbors have time constraints and because a large number of newcomers threatens the developed common language. This alternative assumption does not fundamentally alter the model predictions.

[6] This follows from the fact that it is not plausible to assume that the cost of establishing a contact in the initiating phase exceeds the cost λ^{new} of establishing a new contact in the maintenance phase. If the per-contact-cost are assumed to be identical ($= \lambda^{new}$) then $c_{inv}\left[M\right] = C_{inv}^{f}/M + M \times \lambda$. Consequently, $c_{inv}\left[M\right]$ - $\Delta m_{new-inv}\left[M\right]$ $= C_{inv}^{f}/M + M \times \left(\lambda - \Delta\lambda\right) > 0$, since $\lambda - \Delta\lambda = \lambda^{exist} > 0$ and $C_{inv}^{f} > 0$. Note that newcomers have to establish one contact less compared to initial investors. However, the latter had to establish one contact less among themselves in stage 1 compared to the newcomers in stage 2. The two effects cancel each other out.

two reasons: Firstly, newcomers avoid the fixed costs associated with the initiation process. Secondly, newcomers only have to establish contacts with initiators in the maintenance phase, while initiators have to establish *and* maintain those contacts.

Finally, the social capital induced gross benefits B can be assumed to increase at a decreasing rate with the number of club members $M + \Delta M$ in the maintenance phase, that is, $\partial B / \partial (M + \Delta M) > 0$ and $\partial^2 B / \partial (M + \Delta M)^2 < 0$. Take the example of childcare arrangements among trusting parents. Adding another mutually beneficial link to a small pool of parents substantially increases the likelihood of being able to make an arrangement when needed. Adding another link to a very large pool increases each member's benefit only marginally.

2.2 A Model of Social Capital Investment Decisions

This section presents a model with individual social capital investment decisions that explicates the provision of social capital induced benefits as the outcome of a dynamic game with complete and perfect information and with a symmetric equilibrium in pure strategy.[7] The model, which builds on the considerations in Section 2.1 and uses its notations, is parsimonious in that it only consists of one neighborhood with some open developable land – plus the outside world – and two time periods $t \in \{1, 2\}$; an investment or production phase (stage 1) and a subsequent maintenance and consumption phase (stage 2). The game is solved backwards. The investment decisions are modeled as discrete functions.

Basic Structure and Assumptions

I start with a brief overview of the game, describing the timing, the set of players and their set of actions. Then I formulate the players' payoff-functions.

<u>Stage 1</u>:

1. Homeowners and renters in the neighborhood individually, simultaneously and non-cooperatively choose whether to invest in social capital. The investment amount $c_{inv}[M]$ depends on M, the number of initiating club members in stage 1, as discussed in the previous section. A household invests if the investment generates a positive payoff. The social capital induced club good is provided if at least two households invest in social capital in stage 1.

[7] All sets of players that are in the neighborhood in stage 2 use the same strategy in equilibrium with a probability of 1.

2. Homeowners and renters choose whether to stay or exit. If homeowners leave at the end of stage 1 they face transaction costs TC_O but receive a social capital induced house price premium $\Delta P\left(=P_2-P_1\right)$ determined in the second stage. Relocation for renters is costless.

Stage 2:

3. Initial investors get access to the social capital induced benefits B conditional on bearing the maintenance costs $m_{inv}\left[M,\Delta M\right]$. (Under the assumption of perfect and complete information, no household has an incentive to invest in stage 1 if this does not ensure access to social capital induced benefits in stage 2. Because the benefits are conditional on the maintenance effort, all initial investors will bear the maintenance cost in stage 2.) Non-investors in stage 1 are excluded from access to the benefits in the second stage. The benefits $B\left[M+\Delta M\right]$ depend on the number of club members in stage 2.

4. The owners of undeveloped land (and the owners of vacated housing units) observe the investment and relocation decisions of the residents in stage 1 and then post their reservation prices for converting their plots of land competitively in the second stage. Each landowner individually chooses whether to develop. (The equilibrium price P_2 and the corresponding social capital induced house price premium ΔP are determined by the developer of the marginal plot of land. As will be demonstrated below, as long as new housing supply is not perfectly inelastic, the social club good induced equilibrium price premium is determined by the marginal owner of undeveloped land rather than by owners of units that were vacated in stage 1 (i.e., landlords). Landlords can be considered to be price takers. Their actions are not explicitly modeled without any loss of generality.)

5. Households outside the neighborhood observe the investment and relocation decisions in stage 1. They then choose whether to enter the neighborhood and join the club.[8] If they enter they pay ΔP plus the social capital maintenance cost $m_{new}\left[M+\Delta M\right]$ in order to get access to the social capital induced benefits $B\left[M+\Delta M\right]$. (Whether newcomers buy or rent in the last stage is immaterial because both options generate identical payoffs.)

Next, I make a number of further assumptions and impose structural form to reflect the above characterization of neighborhood specific social capital and to keep the model tractable.

[8] In line with the reasoning in Section 2.1, (non-stigmatized) newcomers are not excluded, provided they are willing to make a social capital maintenance effort in stage 2 (i.e., provided they are cooperative). Given that the social capital induced house premium will always be greater or equal to zero and given the model assumptions outlined below it would not make sense for a newcomer to enter the neighborhood without joining the club.

To begin with, the neighborhood is initially occupied by H_1 residents. Each household $h \in \{1, \ldots, H_1\}$ occupies exactly one housing unit of fixed size, for convenience set to 1.[9] The neighborhood has a total area $\bar{L}$ and contains open developable land $\bar{L} - H_1$. That is, the share of developed land in stage 1 is predetermined. The fractions α of homeowners and $1-\alpha$ of renters in period 1 are predetermined as well.[10] Apart from idiosyncratic differences in the preferences for homeownership all residents in the neighborhood are identical. (This simplifying assumption helps illustrating the difference between homeowners' and renters' investment incentives. It does so at the cost of generating an outcome in which all agents of the same group take the same action; invest or not invest. Alternative assumptions generate more refined outcomes but do not fundamentally alter the propositions made in this paper.)[11]

The neighborhood is assumed to be sufficiently small such that it is not feasible to replicate the social capital stock with membership levels that ensure positive payoffs. The social capital induced benefits require social capital as sole 'input factor in production'.

In line with the argumentation in Section 2.1, in stage 1 a substantial initial 'social capital investment' $c_{inv}[M]$ is required from each of the M initial investors. In stage 2 a smaller social capital 'maintenance effort' $m_{inv}[M, \Delta M]$ is sufficient to maintain club membership. Similarly, each cooperating newcomer has to pay $m_{new}[M + \Delta M]$ to ensure access to the club. Establishing new relationships is equally costly for initial investors and newcomers, however, newcomers have to establish rather than just maintain relationships with initial investors. The difference between the two cost functions is expressed in equation (2.3).

For expository purposes it is assumed that the social capital induced gross benefits B only accrue in stage 2. This simplifying assumption does not significantly alter the main predictions of the model. It captures the idea that club benefits need to be produced through a

[9] Existing homeowners in stage 1 are assumed only to own their own property and not parts of the undeveloped land in the neighborhood. That is, a homeowner bases the social capital investment decision solely on the social capital induced net benefits and on the value of the occupied property. Corporate or private owners of open land are assumed to be absent in that they do not have any direct influence on investment in social capital.

[10] This is a reasonable assumption. The homeownership status of properties is in reality predetermined because different property types differ in their relative landlord production efficiency (Linneman, 1985) and different neighborhoods differ in their inherent investment risk (Hilber, 2005).

[11] Alternatively one could assume that homeowners (and/or renters) differ in the benefits they enjoy from access to social capital, generating an equilibrium, in which agents of the same group take different actions. For example, the benefits could be uniformly distributed over an interval $[0, B[M + \Delta M]]$. $B[M + \Delta M]$ follows the inverse U-form. Then the net benefits lie in the interval $[-m_{inv}; B - m_{inv}]$. The homeowners whose expected net benefits are larger than the investment costs will invest; M follows.

process of social capital accumulation. The *net benefits* of initial investors and newcomers in stage 2 can be expressed as:

$$NB_{2,inv}\left[M,\Delta M\right] = B\left[M+\Delta M\right] - m_{inv}\left[M,\Delta M\right] \tag{3.1}$$

$$NB_{2,new}\left[M+\Delta M\right] = B\left[M+\Delta M\right] - m_{new}\left[M+\Delta M\right]. \tag{3.2}$$

First and second derivatives yield:

$$\frac{\partial NB_{2,inv}}{\partial\left(M+\Delta M\right)} = \frac{\partial NB_{2,new}}{\partial\left(M+\Delta M\right)} = \frac{\partial B}{\partial\left(M+\Delta M\right)} - \lambda^{new} \tag{3.3}$$

$$\frac{\partial^2 NB_{2,inv}}{\partial\left(M+\Delta M\right)^2} = \frac{\partial^2 NB_{2,new}}{\partial\left(M+\Delta M\right)^2} = \frac{\partial^2 B}{\partial\left(M+\Delta M\right)^2} < 0. \tag{3.4}$$

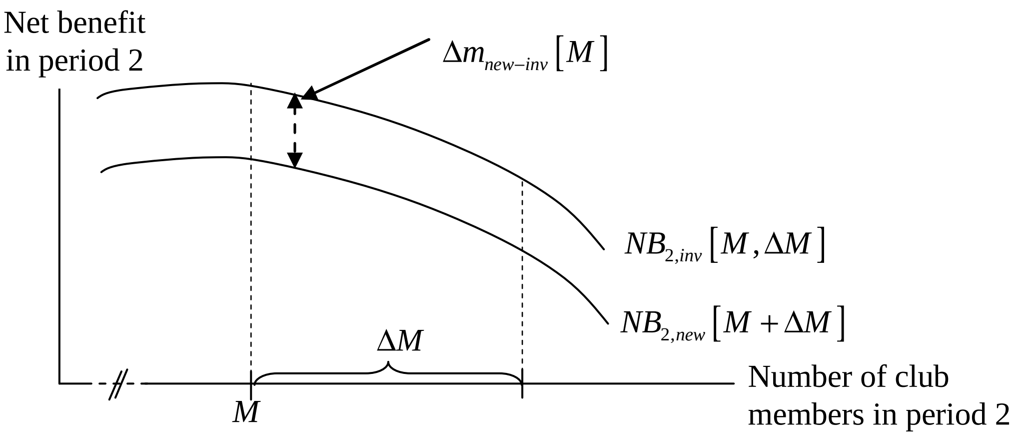
Equations (3.3) and (3.4) imply that the net benefit functions of both investors and newcomers are first increasing, then decreasing in the number of members in stage 2.

Combining equations (2.3), (3.1) and (3.2), the additional net benefit of an investor compared to a newcomer in stage 2 can be formulated as:

$$\Delta NB_{2,inv-new}\left[M\right] = NB_{2,inv}\left[M,\Delta M\right] - NB_{2,new}\left[M+\Delta M\right] = \Delta m_{new-inv}\left[M\right]. \tag{4}$$

Figure 1 illustrates the net benefit functions for investors and newcomers. In the illustrated case, at membership level M, even the first newcomer generates higher marginal costs than marginal benefits. That is, newcomers to the neighborhood always dilute the club good induced net benefit.[12]

Figure 1: Net Benefit as a Function of the Number of Newcomers in Stage 2



[12] Theoretically the first newcomers could increase the club good induced net benefits, as $\partial B/\partial\left(M+\Delta M\right)$ may be greater than λ^{new} for low membership levels $M+\Delta M$ in stage 2. However this would trigger competitive landowners to increase the supply of new housing until additional newcomers start to dilute the club good induced net benefits. The net benefits are further diluted until in housing market equilibrium the marginal newcomer is indifferent between entering the neighborhood and buying a housing unit or staying out and the marginal landowner is indifferent between developing and keeping the land vacant.

Relocation costs are in practice significantly higher for homeowners than for renters/ landlords. This is because relocation of a homeowner implies a property sale, while the relocation of a renter does not involve such a transaction.[13] For expository purposes it is assumed that relocation of renters is costless for both renters and landlords but that owner-occupiers face property transaction costs TC_O (e.g., search costs in the form of property advertising costs and estate agent fees, legal fees, and capital gains taxes).

Before any newcomer enters the neighborhood in stage 2, the provision of social capital induced club goods is assumed to raise the hypothetically attainable utility level beyond that of other neighborhoods in the economy. However, this encourages newcomers to enter, decreasing the social capital induced net benefit $NB_{2,new}\left[M+\Delta M\right]$ (dilution effect due to maintenance cost increase), increasing demand for housing and increasing incentives of landowners to convert open land into housing.[14]

Each landowner $l \in \left\{1, \ldots, \bar{L}-H_1\right\}$ is assumed to have a unique reservation price P_t^l that determines whether the corresponding plot of land is converted into housing. The reservation price is the result of individual opportunity cost considerations. Landowners with low opportunity costs convert first, while landowners with high opportunity costs (for example because of strong preferences for preservation) wait until the price exceeds their reservation price. House prices P_t are assumed to be determined competitively such that in each stage house prices equal the marginal landowner's opportunity cost of conversion: $P_t\left[H_t\right]$ = $MOC_t\left[H_t\right]$. Simple first differencing yields:

$$\Delta P = \Delta MOC\,, \tag{5}$$

whereas $\Delta P = P_2\left[H_2\right]-P_1\left[H_1\right]$ and $\Delta MOC = MOC_2\left[H_2\right]-MOC_1\left[H_1\right]$.

Finally, it is assumed that the marginal opportunity cost curve $MOC\left(H\right)$ is more inelastic in neighborhoods that are more developed, implying that

$$\Delta MOC = \Delta MOC\left[H/\bar{L}\right] \text{ with } \frac{\partial \Delta MOC}{\partial\left(H/\bar{L}\right)} > 0. \tag{5.1}$$

[13] Haurin and Gill (2002) estimate the transaction costs of selling a house in the United States as the sum of 3 percent of the house value and 4 percent of total household earning. This is likely a lower bound estimate of the true property transaction cost. In practice relocation costs of renters and landlords (i.e., search costs, short-term vacancy costs) are not zero but substantially lower than the property transaction costs faced by homeowners.

[14] It can be assumed that all potential newcomers are also newcomers to the housing market. Hence they do not face any transaction costs related to the sale of a property. Alternatively, in a setting with mobility shocks (see Section 2.3 below), it could be assumed that previous transaction costs are sunk.

This alleged positive relationship between land scarcity and the *in*elasticity of new housing supply is both theoretically and empirically motivated and is further justified in Section 3.2. Appendix Figure A1 provides a graphical illustration of the argument.

Payoff Functions

Under the above assumptions we can express the payoffs of homeowners π_O^h, renters π_R^h, landowners π_L^l and newcomers π_N^n as follows:

$$\pi_R^h = I^h \left\{ -c^{inv} + \frac{\left(1-R^h\right) NB_{2,inv}}{1+r} \right\} - \frac{\left(1-R^h\right)\Delta P}{1+r} \tag{6.1}$$

$$\pi_O^h = I^h \left\{ -c^{inv} + \frac{\left(1-R^h\right) NB_{2,inv}}{1+r} \right\} + R^h \frac{\Delta P - TC_O}{1+r} \tag{6.2}$$

$$\pi_L^l = D^l \left\{ P_2 - P_2^l \right\} \tag{6.3}$$

$$\pi_N^n = E^n \left\{ NB_{2,new} - \Delta P \right\}, \tag{6.4}$$

whereas r denotes the discount rate, $I^h \in \{0,1\}$ and $R^h \in \{0,1\}$ denote the choices of household h whether to invest in social capital and whether to relocate at the end of stage 1, $D^l \in \{0,1\}$ denotes the choice of landowner l whether to convert the open plot of land into housing, $E^n \in \{0,1\}$ denotes the choice of newcomer n whether to enter the neighborhood, and finally $\Delta P \left(= P_2 - P_1\right)$ denotes the social capital induced increase in house prices.

Housing Market Equilibrium in Stage 2

Now assume that some neighbors invest in stage 1 and the club good is provided in stage 2. Equilibrium in the housing market is achieved when the following two conditions hold:

(i) The marginal supplier of housing is exactly indifferent between selling/renting-out and keeping the land/property vacant and no landowner or landlord has any incentive to deviate from his or her decision.

(ii) The marginal newcomer is exactly indifferent between entering the neighborhood and staying out and no household has any incentive to move in or out of the neighborhood.

The first condition implies that the house price in each stage must equal the marginal landowner's opportunity cost of conversion. The second condition implies that

$$\Delta P = NB_{2,new}\left[M + \Delta M \right]. \tag{7}$$

Combining equations (5), (5.1) and (7), the housing market equilibrium can be defined as:

$$\Delta P = \Delta MOC\left[H_1/\bar{L}\right] = NB_{2,new}\left[M + \Delta M\right]. \tag{8}$$

Equilibrium Outcomes in Stage 1

Next, I investigate the implications of the equilibrium condition (8) on the investment and relocation decisions of renters and homeowners in the first stage. Consider first the decision of a representative renter h whether to "invest and stay" or "not invest and exit" (the other two sets of choices are not sensible[15]). Using equations (2.3), (4), (6.1) and (8) the payoff of renter h's choice (invest, stay) can be expressed as

$$\pi_R^h\left[I^h = 1, R^h = 0\right] = -\left(c_{inv}\left[M\right] - \frac{\Delta m_{new-inv}\left[M\right]}{1+r}\right) < 0. \tag{9}$$

Because the individual investment cost c_{inv} always exceeds the difference in maintenance costs between newcomers and investors $\Delta m_{new-inv}$ (see equation 2.3), in equilibrium, renters cannot recover c_{inv} and, hence, cannot achieve a positive payoff by investing.[16] In contrast $\pi_R^h\left[I^h = 0, R^h = 1\right] = 0$. Consequently, if social capital investment is the equilibrium outcome, since landlords have an incentive to increase rents by the equilibrium value, all $(1-\alpha)H_1$ renters exit at the end of stage 1 and the vacated houses are filled with newcomers in stage 2.

Now consider whether it can be optimal for homeowners to invest in stage 1 taking the equilibrium condition (8) as given. The payoff of a homeowner differs from that of a renter in one important aspect. While house price capitalization effects increase housing costs and thereby decrease the payoffs of social capital investments for renters, homeowners are not bothered by such effects because they 'rent to themselves' (i.e., they can internalize the benefits from their investments).[17] Using equations (4), (6.2) and (8) the payoff of homeowner h's set of choices can be expressed as follows:

$$\pi_O^h\left[I^h = 1, R^h = 0\right] = \frac{\Delta MOC\left(H_1/\bar{L}\right) + \Delta m_{new-inv}\left[M\right]}{1+r} - c_{inv}\left[M\right], \quad \text{("invest and stay")} \tag{10.1}$$

[15] The combination (don't invest and exit) is always strictly preferred to (invest and exit). Because of the rent increase in stage 2, the combination (don't invest and exit) is always strictly preferred to (don't invest and stay).

[16] This implies that landlords, who observe their tenants' involvement in neighborhood specific social activities (i.e., investment in social capital), can pocket the proceeds in form of increased rents. The reasoning is that at the end of stage 1 the renters' investments are sunk.

[17] Similarly, in a setting with mobility shocks, homeowners who have to sell their property can pocket the proceeds from their investment.

$$\pi_O^h\left[I^h=0,R^h=1\right]=\frac{\Delta MOC\left(H_1/\bar{L}\right)-TC_O}{1+r},\qquad \text{("free-ride")} \qquad (10.2)$$

$$\pi_O^h\left[I^h=0,R^h=0\right]=0,\qquad \text{("do nothing")} \qquad (10.3)$$

$$\pi_O^h\left[I^h=1,R^h=1\right]=\frac{\Delta MOC\left(H_1/\bar{L}\right)-TC_O}{1+r}-c_{inv}\left[M\right].\qquad \text{("invest and exit")} \qquad (10.4)$$

It is quite obvious that "invest and exit" cannot be the optimal strategy; it is strictly dominated by "free-riding". Whether "invest and stay", "free-riding" or "do nothing" is the preferred strategy depends on the model parameters. Using equations (10.1) to (10.3), the investment conditions can be formulated as:

$$TC_O>\left(1+r\right)c_{inv}\left[M\right]-\Delta m_{new-inv}\left[M\right],\qquad \text{(investing dominates free-riding)} \qquad (11.1)$$

$$\Delta MOC\left(\frac{H_1}{\bar{L}}\right)>\left(1+r\right)c_{inv}\left[M\right]-\Delta m_{new-inv}\left[M\right].\qquad \text{(investing dominates no action)} \qquad (11.2)$$

Propositions

The first proposition can be derived by comparing the payoffs of investing renters (equation 9) and homeowners (equation 10.1):

$$\pi_O^h\left[I=1,R=0\right]-\pi_R^h\left[I=1,R=0\right]=\frac{\Delta MOC\left[H_1/\bar{L}\right]}{1+r}>0. \qquad (12)$$

> <u>Proposition 1</u>*: As long as the supply of new housing in a neighborhood is not perfectly elastic homeowners are more likely to invest in neighborhood specific social capital than renters.*

In empirical terms, all else equal, homeowners should be more socially interactive with neighbors and should be more likely to participate in neighborhood clubs.[18]

The second prediction can be derived from equations (11.1) and (11.2). Consider a setting with high property transaction costs TC_O such that investing dominates free-riding (i.e., the condition formulated in equation (11.1) holds). In this case, the investment condition formulated in equation (11.2) becomes critical. Proposition 2 can be formulated as follows:

> <u>Proposition 2</u>*: In a world with high property transaction costs, the positive link between individual homeownership attainment and individual neighborhood specific*

[18] The model predicts that while only homeowners invest in social capital in period 1, new neighbors (homeowners and renters) are willing to provide a social capital maintenance effort in period 2. Hence, in empirical terms, the model merely predicts that on average – over a longer period of time – renters are less likely to socially interact with neighbors or to join neighborhood associations compared to homeowners. The model does not predict that renters do not contribute to social capital at all.

social capital investment is stronger in more built-up neighborhoods with more inelastic supply of new housing.

In empirical terms, individual homeownership should be more strongly positively linked to social interactions among immediate neighbors and to participation in neighborhood clubs in more built-up neighborhoods.

In contrast to neighborhood specific social capital, non-neighborhood specific social capital – for example social capital at work – is not expected to affect house values at the place of residence. Hence, as a corollary, Proposition 3 can be formulated as follows:

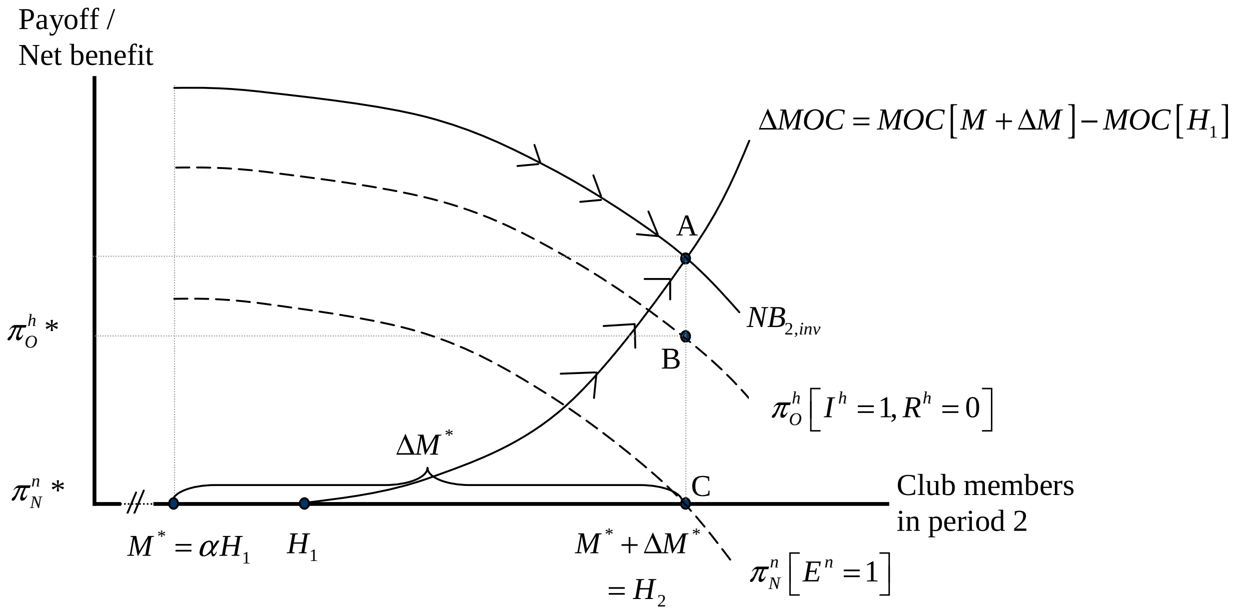
Proposition 3: Homeowners are not more likely to invest in non-neighborhood specific forms of social capital. Land scarcity does not have a positive effect on the link between homeownership and non-neighborhood specific forms of social capital.

In empirical terms, individual homeownership should not be positively linked to the number of social interactions with co-workers outside work or to participation in service or fraternal organizations. Land scarcity should not have a positive impact of the link between homeownership and social capital in theses cases. Moreover, to the extent that respondents are time constrained individuals that allocate a certain time budget to social interactions and substitute less beneficial forms for more beneficial ones, homeowners may even be less likely to socialize with co-workers or with likeminded in service and fraternal organizations.

The Role of the Homeownership Rate

So far the analysis has ignored the effect of the homeownership rate α on the equilibrium outcome. One implication of identical payoff functions for each set of players is that in an equilibrium *with* social capital investment all αH_1 homeowners must be initial investors, that is, $M^* = \alpha H_1$. Given M^*, the determination of ΔM^* is illustrated in Figure 2. The figure depicts the adjustment process to the equilibrium (solid lines with arrows) and the effect of an inflow of newcomers in period 2 on the payoffs of initial investors and newcomers (dashed lines) in a setting with high transaction costs and intermediate elasticity of new housing supply. Each additional newcomer to the neighborhood dilutes $NB_{2,new}[M + \Delta M]$. At the same time, $MOC[H]$ increases with each additional housing unit built (the steepness of the curve is determined by the land scarcity $H/\bar{L}$ in the neighborhood). Equilibrium is achieved when $NB_{2,new}[M + \Delta M]$ exactly equals the club good induced price premium $\Delta P = \Delta MOC[H/\bar{L}] = MOC[H_2] - MOC[H_1]$ demanded by the marginal developer (point A). Note in this context that in stage 2 all residents will also be club members, that is, $H_2 = M + \Delta M$ and hence $MOC\left[H_2\right] = MOC\left[M + \Delta M\right]$. In equilibrium, the marginal newcomer's payoff from cooperating is exactly zero (point C), while the total payoff of all investing homeowners (amount BC) is still positive.

Figure 2: Adjustment Process to Equilibrium and Equilibrium Payoffs



The membership levels in stage 1 and stage 2 are indeed stable equilibrium outcomes because (i) they ensure a non-negative payoff for all club members and (ii) no member has an incentive to deviate from the equilibrium. More generally, as long as the investment conditions formulated in equations (11.1) and (11.2) hold, the equilibrium membership level M^* in stage 1 and the change in the membership level ΔM^* in stage 2 can be formulated as:

$$M^* = \alpha H_1 \tag{13.1}$$

$$\Delta M^* = (1\text{-}\alpha) H_1 + M^*_{new}\left[H/\bar{L}\right], \tag{13.2}$$

where $(1\text{-}\alpha)H_1$ denotes the empty (renter-occupied) housing units at the end of stage 1 that need to be re-occupied by newcomers in stage 2 and where $M^*_{new}\left[H/\bar{L}\right]$ denotes the additional newcomers in stage 2 that occupy new housing units.

The homeownership rate α influences the initial investor's equilibrium payoff in two ways: An increase in α raises M^* and thereby first increases then decreases the investor's total payoff. At the same time, an increase in α reduces the number of renters exiting voluntarily at the end of stage 1, reducing the inflow of newcomers ΔM^* at the beginning of stage 2 and thereby raising the investor's equilibrium payoff. The total effect is ambiguous.

2.3 Alternative Theoretical Frameworks and Derived Predictions

In the model presented above, relocation is endogenously determined and homeowners and renters differ only in that relocation of a renter does not involve property transaction costs. Adding a mobility shock to the model adds complexity but does not alter the main predictions in significant ways. In a world with voluntary relocation *and* mobility shocks, the investment/free-riding decision is not only determined by transaction costs but also by the likelihood that a homeowner receives a shock (i.e., free-riding is more likely if the probability of a shock is high). Similarly, a homeowner's payoff from investing in neighborhood specific social capital is less likely to be positive if the probability of a mobility shock is high.

DiPasquale and Glaeser (1999) provide a formal analysis of the effects of mobility shocks on social capital investment decisions. In their model mobility is induced by shocks, whereas homeowners have a lower propensity than renters to receive a shock. Consequently, homeowners have greater incentives to be 'better citizens'. It is worth noting that DiPasquale and Glaeser's (1999) model and the one presented above also differ in the mechanisms through which individual social capital investments lead to improved neighborhood quality. In DiPasquale and Glaeser's framework social capital 'improves the ability of neighbors to enjoy each other's investments in local amenities'. In the model presented here, social capital facilitates the production of utility generating club goods and individual social capital contribution guarantees access to the club good related benefits. The two models differ in another important aspect, DiPasquale and Glaeser do not model housing supply conditions. As a consequence the model presented here makes additional (more refined) predictions with respect to homeowners' and renters' decisions whether to invest in social capital. Specifically, modeling housing market conditions generates Propositions 2 and 3, which are tested below.

3 Empirical Analysis

3.1 The Data

The data is derived from five main sources. The first source is the *Restricted Use Data* version of the Social Capital Community Benchmark Survey (SCCBS) undertaken by the Saguaro Seminar at the John F. Kennedy School of Government, Harvard University between July 2000 and February 2001.[19] As the survey title implies, this is the first attempt at

[19] 'Restricted use data' refers to the original Social Capital Community Benchmark Survey Restricted Use Data provided by Harvard University through the Roper Center of the University of Connecticut. According to the survey documentation (Roper Center for Public Opinion Research, 2001), the interviews were conducted by telephone using random-digit-dialing. See the survey documentation for further details on the survey design.

widespread systematic measurement of social capital, particularly within communities. The survey measures various manifestations of social capital as well as its suspected correlates in 41 U.S. 'communities' (a metro area, a city, or one or several counties). The 'communities' are listed in Appendix Table A1. The *Restricted Use* (in contrast to the *Public Use*) *Data* version of the SCCBS provides geographical information including Census tract identifiers for the survey respondents. The Census tract identifiers are subsequently used to merge the SCCBS data with data from the other four main sources: the National Land Cover Data 1992 (NLCD 92), the Natural Amenity Scale Data (NASD), the NBER data repository, and the 2000 U.S. Census. Because the SCCBS Census tract information is based on 1990 boundary definitions, all data is geographically matched to 1990 boundaries.

The NLCD 92 reports raster data including 21 different land uses with a spatial resolution of 30 meters for 49 U.S. states. The Wharton GIS Lab geographically matched the raster data to the Census tract level. This tract level land use data set can be used to derive the preferred proxy measure for the inelasticity of new housing supply in a neighborhood: the share of developed land in a Census tract. (A Census block group may be a better approximation of a neighborhood in less urbanized areas. Unfortunately block level data is not consistently available. However, it seems reasonable to assume that the land availability in a Census block group and the corresponding tract are highly correlated.) The measure is defined as:

$$\%\text{-}Developed = \frac{Developed\ land\ (residential,\ commercial,\ industrial,\ transport)}{Developable\ land\ (all\ land\ except\ water,\ ice,\ barren,\ wetlands)}. \quad (14)$$

The NASD provides detailed topography data at the U.S. county level. The data is derived from the Economic Research Service, United States Department of Agriculture and is used in the empirical analysis below to instrument for the share of developed land in a Census tract. Similarly, the NBER data repository provides data on state level mortgage subsidy rates, which are used as an instrument to identify a survey respondent's homeownership status.[20]

Finally, the U.S. Census 2000 provides additional Census tract level controls including the homeownership rate and the linguistic and ethnic heterogeneity.[21] Alesina and LaFerrara (2000) show that the latter two variables affect measures of social capital.

While the total SCCBS communities-sample consists of 26,230 adults, the regression samples are somewhat smaller due to missing values.[22] Most importantly, for some Census

[20] The NBER provides a program (TAXSIM) that calculates federal and state income tax liabilities from survey data. As a 'side product' the NBER reports state-level income tax rates and corresponding mortgage subsidy rates. The URL is http://www.nber.org/~taxsim/state-rates (last accessed on July 24, 2007).

[21] The Interuniversity Consortium for Political and Social Research (ICPSR) provided data access. The data was geographically matched to 1990 Census tract boundaries using official U.S. Census relationship files.

tracts that belong to the forty-one communities sample no corresponding land use data could be matched. The final regression data set consists of four measures of individual social capital investment and numerous household and location specific variables. All variables are described in Section 3.3 below. Summary statistics are provided in Table 1.

3.2 Land Availability and the Elasticity of New Housing Supply

The empirical work that follows uses the share of developed land in a Census tract as a proxy measure for the local *in*elasticity of new housing supply. The choice of this proxy measure is theoretically and empirically motivated. To begin with, the sheer impossibility of converting land in built-up neighborhoods explains why highly developed locations have a more inelastic supply of new housing compared to locations with plenty of open space.

The second argument is a purely mechanical one; mathematically, as long as the supply curve has a positive price intercept, even a linear supply curve generates a positive relationship between land scarcity and the supply *in*elasticity. A positive price intercept merely implies that the present value of future land rents from farming is greater than zero.

The third line of reasoning is founded in the endogenous zoning literature, which considers land use restrictions as political outcomes determined by voting and lobbying. While owners of developed land have an incentive to limit new housing supply to protect the value of their assets, owners of undeveloped land have an interest in keeping land use regulation flexible. Hence, to the extent that land use controls are the outcome of a political process, new housing supply should be more inelastic in more developed locations where owners of developed land (homeowners and landlords) are more numerous and politically influential that owners of undeveloped land (e.g., farmers). Consistent with this reasoning, Hilber and Robert-Nicoud (2006) provide empirical evidence that land scarcity has a causal positive effect on the local regulatory restrictiveness. Various other studies provide support for this finding. For example, Rudel (1989) demonstrates that municipalities in Connecticut adopted land use laws later if they (i) are at a greater distance to New York City and (ii) had a greater share of farmland. Moreover, increases in restrictiveness occurred in those places that experienced the largest declines in farming during the 1960s. In a similar vein, Fischel (2004) documents that land use regulation typically originates in the centers of large cities and then spreads to the surrounding suburbs and towns. Finally, Glaeser, Gyourko and Saks (2005) find a very high 'regulatory tax' for Manhattan condominiums but much lower values for the

[22] The survey was also conducted nationally. The national sample consists of 3,003 adults. The restriction to the 'communities' sample permits the use of community sample fixed effects for all observations in the sample.

entire metro area. Overall, these studies overwhelmingly support the view that undeveloped land can be more easily converted into housing in less regulated locations at the edge of cities but that conversion is costly and involves large time lags in more developed locations.

The final argument is based on the real options literature, which assumes that land redevelopment is costly and developable open land therefore has an option value (Titman, 1985; Capozza and Helsley, 1990; Capozza and Li, 1994; Novy-Marx, 2005). In such a setting, when a neighborhood becomes built-up, the incremental opportunity cost of building an additional housing unit increases exponentially, implying inelastic supply of new housing.

While the evidence discussed above is circumstantial, Hilber and Mayer (2004) estimate a structural model, using a well-identified strategy, to directly estimate supply elasticities for locations with more and less developable land for future construction. Their findings suggest that more developed communities indeed have more inelastic supply of new housing and a greater extent of house price capitalization of local public school spending and local amenities. In a related study, Brasington (2002) demonstrates, by splitting a sample into houses on the interior and the edge of the urban area, that capitalization is weaker towards the edge where housing supply elasticities and developer activity are greater. In a similar vein, McDonald and McMillen (2000) show for Suburban Chicago that residential development is greater in areas with a large proportion of agricultural land.

3.3 Empirical Specifications, Choice of Estimators and Identification Strategy

The base specification (*Specification 1*) estimates the effect of a survey respondent's homeownership status (i.e., whether he or she owns) on particular measures of individual social capital investments. Two of the measures are neighborhood specific (social interactions with immediate neighbors[23] and participation in neighborhood associations) and two are non-neighborhood specific (social interactions with co-workers outside work and participation in service and fraternal organizations). Specification 1 can be expressed as:

$$\textit{Individual contribution to social capital} = \beta_0 + \beta_1(own) + \beta_2(\%developed) + \sum_{k=1}^{K} \beta_{k+2}(control\ k) + \varepsilon. \quad (15)$$

The respondent's homeownership status (*own*) – the variable of interest in the base specification – is 1 if the respondent is a homeowner and 0 if he or she is renting. All else

[23] The survey question only asks for the number of interactions and does not distinguish different interaction-types or intensities. A log-transformation of the dependent variable was performed because initial specification tests revealed that a semi-log specification achieves a better fit. One interaction was added to the total number of interactions in order to avoid loosing a significant fraction of observations with zero interactions. It should be noted that estimates with an untransformed dependent variable yield similar qualitative results.

equal, individual homeownership should be positively related to *neighborhood specific* social capital $(\beta_1 > 0)$ (Proposition 1) but unrelated or – because of substitution effects – possibly negatively related to *non-neighborhood specific* social capital $(\beta_1 \leq 0)$ (Proposition 3).

Besides the share developed land (*%developed*), the base specification includes a large number of location and household specific controls. The full set of controls is listed in Table 1. Previous research either predicts or has demonstrated that these variables are related to various forms of social capital. The list of *location specific* controls includes a number of Census tract specific variables plus community sample fixed effects (one dummy variable for each of the SCCBS-communities in the sample) to control for community specific time-invariant unobservable characteristics. The *Census tract specific controls* are the homeownership rate, the income Gini coefficient, the linguistic heterogeneity, the ethnic heterogeneity, the share of housing units in multi-unit buildings, the share of housing units in single family detached homes and the population density in the developed area. The latter variable is included as a proxy for the average proximity of residents. High residential proximity may facilitate social interactions among neighbors because of shorter distances; on the other hand, it may also create an environment of anonymity making social interactions among immediate neighbors less likely, especially in multi-unit building environments.

The list of *survey respondent specific* controls includes the following variables: the number of years lived in the local community, whether the respondent expects to stay in the community for at least 5 more years[24], commuter characteristics, the race, the gender, the age and age squared[25], whether the respondent has children, household income category dummies, the marital status, dummies for the highest education completed and dummies for the current employment status. The effects of all these control variables on the different measures of individual social capital investment are reported in Appendix Table A2. Because the coefficients and statistical significance levels of the control variables are overall similar across all specifications, results are reported for the base specification only.

Specification 2 differs from the base specification in that it additionally includes the interaction effect between the survey respondent's homeownership status (*own*) and the share of developed land in the tract *(%developed*):

[24] Households are expected to engage more in social interactions if they plan to stay longer in their neighborhood or at their work place, suggesting a positive sign of the variable's coefficient.

[25] Age and age squared are jointly included to control for the possibility that returns to various forms of social capital differ over the stages of a person's life cycle. Results reported in Table A2 confirm this hypothesis.

$$\textit{Individual contribution to social capital} = \beta_0 + \beta_1(own) + \beta_2(\%developed) + \beta_3(own \times \%developed) + \sum_{k=1}^{K} \beta_{k+3}(control\ k) + \varepsilon. \quad (16)$$

Theory predicts that individual homeownership should be more strongly positively related to contributions to *neighborhood specific* forms of social capital in more developed places $(\beta_3 > 0)$, where such contributions have a stronger positive effect on property values (Proposition 2). Again, theory makes a different prediction for contributions to non-neighborhood specific forms of social capital; the respondent's homeownership status and the interaction effect 'homeownership $\times$ developed' should not be positively linked to non-neighborhood specific forms of social capital ($\beta_3 \leq 0$; Proposition 3).

The two specifications are first estimated using ordinary least squares (OLS).[26] Next, various endogeneity concerns are addressed by applying a two-stage-least-squares (2SLS) estimator. The first potential endogeneity concern is related to the *land scarcity* variable; neighborhoods with more active homeowners may enact more restrictive zoning laws and other regulations that limit housing supply. Similarly, one could make a case that the *population density* variable is endogenously determined; restrictive zoning laws may affect the population density in the developed area of the neighborhood for example via minimum lot size restrictions. The endogeneity concern related to the land scarcity variable is somewhat alleviated by the fact that the land use data was collected in 1992, while all other variables including the homeownership status of the survey respondents and the social capital measures are from the year 2000. Social capital investments in 2000 should not explain the share of developed land 8 years earlier. Secondly, if more active homewners enact stricter zoning that preserves open land then one should find that the coefficient of the interaction term 'own$\times$developed' has a negative sign. However, as is demonstrated below, the opposite is the case. Thus, the bias goes against the predicted results.[27] Nevertheless in order to fully address the endogeneity concerns related to the land scarcity and the population density variables, instrumental variable estimates were carried out. As instruments for land scarcity

[26] The probability of participation in neighborhood or service/fraternal organizations could also be estimated using logit or probit models. However, a linear probability model is preferred because the interpretation of interaction effects in logit and probit models is not straightforward. This is because the magnitude of an interaction effect in a non-linear model does not equal the marginal effect of the interaction term and can be of opposite sign. Standard statistical software does not calculate the correct standard errors (Ai and Norton, 2003).

[27] One might also be concerned that land scarcity is related to household mobility and that the empirical specification might not sufficiently control for mobility. However land scarcity is positively related to intended mobility (i.e., households in urbanized areas are more mobile). Hence, if anything, omitting mobility would also bias against finding the proposed effect. Moreover, adding a variable for the interaction between individual homeownership and intended mobility has virtually no effect on the coefficients of the variables of interest.

and population density in the developed area, physical limits on the housing supply in the Census tract are used. The list of instrumental variables includes the share of wetland in the Census tract and a number of county specific dummy variables for different topography types (flat plains, smooth plains, irregular plains, tablelands and moderate relief, open low mountains, low mountains and high mountains). These features of the Census tracts are expected to explain the share of developed land and the population density within the developed area but should be unrelated to the error term. As Wooldridge (2002) demonstrates, the product of an instrument for a given endogenous variable and an exogenous component of an interaction term is also a valid instrument. Consequently, the interaction term 'own $\times$ developed' is identified using the following instruments: the respondent's homeownership status interacted with the share wetland in the Census tract plus the homeownership status variable interacted with each of the 7 topography type dummies.

Another potential endogeneity concern is related to the survey respondent's *homeownership status*. Omitted variables that may explain the respondent's homeownership status may also be correlated to the four measures of social capital. In order to address this potential issue – and provide a further robustness check – additional instrumental variables are used to identify the respondent's homeownership status and the variable's interaction with land scarcity. The identification strategy exploits two facts: (i) that homeowners in the United States can deduct mortgage interest from their income taxes and (ii) that this tax subsidy differs across U.S. states.[28] Rather than using each survey respondent's specific subsidy rate, the total maximum mortgage subsidy rate by state is used. This variable measures the state-specific maximum total subsidy related to both federal and state income tax. The measure has the advantage that it is independent of individual decisions as well as of the within state income distribution. The total maxim subsidy rate should explain a survey respondent's homeownership propensity but should not be a function of individual social capital contributions. More precisely, the maximum subsidy rate should have a differential impact on a respondent's homeownership propensity depending on his or her income (i.e., mortgage rate subsidies benefit higher incomes much more than lower incomes). Hence, the total maximum mortgage subsidy rate by state interacted with each income category dummy is used as an instrument to identify the homeownership status of the survey respondent. Again following Woolridge (2002), the instruments to identify the interaction term

[28] This is because states differ in their state income tax rates and in their treatment of deducting mortgage interest from income taxes.

‘own × developed’ are derived as the interactions of the instruments for the respondent’s homeownership status and the instruments for the share developed land.

Standard errors in all reported specifications are clustered by county. Clustering by county is necessary because one set of instrumental variables is county specific.[29]

3.4 Regression Results

Results for key explanatory variables are first reported for the two neighborhood specific measures of social capital (Table 2), then for the two non-neighborhood specific measures (Table 3). Table 4 reports results for specifications with instrumented homeownership and Table 5 portrays the ‘economic significance’ of the various effects. Finally, Appendix Table A2 reports results for the various control variables. Because the coefficients of the controls overwhelmingly have expected signs and, for each social capital measure, vary little across specifications, results are only reported for the base specification – column (2) of Tables 2 and 3.[30] Readers interested in the effects of the control variables are referred to Table A2.

Neighborhood-Specific Measures of Social Capital

Panel A of Table 2 reports estimates for the number of social interactions with immediate neighbors per year. The first two columns examine Proposition 1; all else equal homeowners should talk more often to their immediate neighbors. While column (1) reports OLS results for the base specification with no controls except community fixed effects, column (2) reports results for the same specification but with all controls (equation 15). The coefficient on the individual homeownership status variable is highly statistically significant (at the 1% level) in both cases. The effect is less than half as big, in quantitative terms, in the specification with all controls. Even so, the effect is economically meaningful. As Table 5 reveals, all else equal and measured at the sample mean homeowners have about 12 additional social interactions with immediate neighbors compared to renters (who, on average, interact 102 times per year with their neighbors). Overall, the first two columns provide strong support for Proposition 1. Column (2) also reveals that the share developed land and the population density in the

[29] In an earlier version of this paper, standard errors were clustered by Census tract following the argument that the main variable of interest – the share developed land – is the same for all households within a tract. Results are very similar, both in a quantitative and statistical sense. However, clustering by county (the more aggregated geographical level) is the more accurate/conservative approach. Note that clustering corrects for within group autocorrelation and across group heteroskedasticity, implying robust standard errors.

[30] The effects of many controls vary however depending on whether neighborhood specific or non-neighborhood specific measures of social capital are considered, in line with the argumentation in this paper. For example, respondents with children are much more socially interactive at the neighborhood level (where many children-specific club goods are provided) but are significantly less socially interactive at work and in service and fraternity organizations, consistent with the view that time constrained households substitute less beneficial forms of social interactions for more beneficial ones.

developed area of a Census tract are related with opposite signs to the number of social interactions with immediate neighbors. While the coefficient of the share developed land measure has a positive sign, the coefficient on the population density variable has a negative sign, consistent with the findings in Brueckner and Largey (2006).

The remaining five columns examine Proposition 2; all else equal individual homeownership should be more strongly positively linked to social interactions among immediate neighbors in more built-up neighborhoods. All five columns report results for Specification 2 with interaction effects, as outlined in equation (16). To begin with columns (3) and (4) report results of OLS estimates (without and with controls). The results of both specifications provide strong support for Proposition 2. The coefficient of the interaction term 'own×developed' is positive and highly statistically significant at the 1% level in both cases. The coefficient is somewhat smaller in the second specification but adding the numerous control variables has a quite limited effect on the size of the coefficient. The effect, while not particularly large, is reasonably meaningful in economic terms. The quantitative effect reported in Table 5 implies that the move from an 'average' neighborhood that is halfway developed to one that is 86 percent developed (increase by one standard deviation), increases a homeowner's number of social interactions by 4.1 but reduces a renter's number of social interactions by 1.8.[31] Interestingly, when adding the controls, the independent (positive) effect of the respondent's homeownership status variable on the number of social interactions with neighbors becomes completely statistically insignificant, implying that homeowners are not per se 'better citizens'. Instead the difference in the behavior of homeowners and renters is entirely driven by the land scarcity in the neighborhood. Note also that the independent effect of the share developed land variable becomes completely statistically insignificant, when the controls are added, suggesting that land scarcity has no independent effect.

The 2SLS-specifications reported in columns (5) to (7) differ from those reported in columns (3) and (4) only in that instrumental variables – as described in Section 3.3 – are used to identify the share developed land (columns 5 and 6) and additionally the population density in the developed area (column 7). Column (5) reports results for a specification without additional controls, while the last two columns include controls. The results again provide strong support for Proposition 2. In fact, not only does the positive interaction effect

[31] The negative sign of this effect is due to the negative coefficient on the %-developed variable. Note that the coefficient is not statistically significant and is used to calculate the effect for homeowners *and* renters. Hence, the gap of 5.9 interactions between the two groups is unchanged if the statistically insignificant effect is ignored. The finding of a negative effect for renters is consistent with theory. To the extent that other factors induce renters to invest, one would expect that rent adjustments negatively affect the renters' social capital investments.

'own×developed' remain statistically significant at the 1% level in all three specifications but the coefficient increases in size, in line with the reasoning in Section 3.3 that the endogeneity of land scarcity creates a downward bias. It should be noted however that the effects are also more imprecisely measured. Adding the various controls reduces the size of the coefficient somewhat but the coefficient is reasonably stable across specifications, suggesting that potentially omitted variables are unlikely to have a relevant impact on the results. The quantitative effects are quite meaningful. A one standard deviation increase of the land scarcity variable, measured at the sample mean, increases the difference in the number of social interactions between homeowners and renters by +13.3 and +12.8, respectively, compared to +5.9 in the OLS estimate reported in column (4). It is worth noting that the independent effect of the respondent's homeownership status remains statistically completely insignificant. The independent effect of the share developed variable is now negative and significant. The effect of the population density variable remains negative and marginally significant independent of whether the variable is assumed to be endogenous or not.

First stage F-statistics (reported in columns 5 to 7) for the joint test of the instruments are reasonably high for the two variables of interest; the interaction term 'own×developed' and the share developed land (see Table 2 for details).[32] Various other tests were carried out: Anderson canonical correlations likelihood-ratio tests examine whether the models are identified. Hansen-J statistics were calculated to test whether the instruments are valid. Finally, Wu-Hausman F-tests and Durbin-Wu-Hausman χ^2-tests were carried out in order to test the hypothesis that a given regressor is exogenous. All specifications comfortable pass the relevant tests. Joint tests of endogeneity reject the hypothesis that the instrumented regressors are exogenous with at least 95 percent confidence in all specifications.

Next turn to Panel B of Table 2. Panel B reports linear probability estimates for the respondent's participation in neighborhood associations. The dependent variable is 1 if the household participates and 0 otherwise. Apart from the dependent variable, all seven reported specifications are identical to those reported in Panel A. Overall, results are very similar qualitatively to those reported in Panel A. All results again provide strong support for Propositions 1 and 2. Namely, estimates of the base specification reported in columns (1) and (2) suggest that individual homeownership is positively and statistically highly significantly related to participation in neighborhood associations. The quantitative effect reported in

[32] First stage F-statistics test whether the 2SLS estimator is biased in the direction of the OLS estimator. The first stage F-statistic tests the hypothesis that the instruments do not enter the first stage regression. The first stage F-statistic should be large, ideally exceeding 10, for TSLS inference to be fully reliable (see e.g., Bound *et al.*, 1995; Staiger and Stock, 1997; or Stock *et al.*, 2002 for a more in-depth discussion).

Table 5 is economically quite meaningful. All else equal, the probability that a homeowner participates in a neighborhood club is 11.5% points higher compared to a renter. Since only 14.1% of all renters in the sample participate in a neighborhood association this implies that homeowners are about 82% more likely to join a neighborhood club compared to renters.

The remaining specifications reported in columns (3) to (7) provide strong support for Proposition 2. Individual homeownership is more strongly positively linked to participation in neighborhood associations in more developed locations. Interestingly, in the OLS-specifications the coefficient on ‘own×developed’ increases slightly when the controls are added. Similarly, the coefficient on the interaction term is remarkably stable across the three 2SLS-specifications (ranging from 0.16 to 0.18), independent of whether controls are included or not and independent of whether population density is instrumented for. Again similar to the results reported in Panel A, the magnitude of the effect of the interaction term increases substantially in the 2SLS-estimates compared to the OLS ones. The effects are quantitatively very meaningful. According to the OLS-specification with controls reported in column (4), a one standard deviation increase in the share developed land increases the participation probability-gap between homeowners and renters by 3.6% points or, measured at the sample mean (25% of respondents participate in neighborhood associations), by 14.4%. The effects are even larger for the 2SLS-estimates reported in columns (6) and (7). A one standard deviation increase in the share developed land increases the participation probability gap by 6.1% points and 5.7% points respectively, implying an increase in the participation probability by 24.4% and 22.8% respectively. It is worth nothing that the independent effect of the homeownership status variable in columns (6) and (7) is completely statistically insignificant providing further support for the proposition that homeownership alone does not generate ‘good citizens’. First stage F-statistics (reported in columns 5 to 7) for the joint test of the instruments are reasonably high for the two variables of interest and all specifications comfortably pass the relevant tests. See Table 2 for details.

Non-Neighborhood Specific Measures of Social Capital

While the empirical evidence so far is consistent with theory and confirms Propositions 1 and 2, one might be concerned that the effect of individual homeownership on social capital is associated with the share of developed land in the Census tract for reasons unrelated to the elasticity of new housing supply. Hence, results are presented for two non-neighborhood specific measures of social capital, which should not affect local house prices. The prediction is that individual homeownership and its interaction term with the share of developed land should not have a positive impact on these forms of social capital (Proposition 3).

Panel A of Table 3 reports estimates for the total number of social interactions with co-workers outside work per year. Apart from the dependent variable, again, all seven reported specifications are identical to those reported in Panels A and B of Table 2. The sample size of 13,418 respondents is notably smaller compared to the previous table. This is because no data is available for non-working survey respondents. The results provide strong support for Proposition 3. The OLS estimates without the interaction effects (columns 1 and 2) suggest that individual homeownership is negatively related to social interactions with co-workers. The effects are both statistically significant at the 1% level. The independent effects of the respondent's homeownership status variable on the number of interactions with co-workers reported in columns (3) to (7) are also negative and in some cases statistically significant. Overall these findings are consistent with the view that homeowners – who face time constraints – substitute less beneficial activities for more beneficial ones, that is, they may prefer to do home improvements or to socially interact with their neighbors rather than to meet with co-workers after work. Finally, the interaction effects 'own × developed' are completely statistically insignificant in all specifications reported in columns (3) to (7).

Panel B of Table 3 reports estimates for the likelihood that a survey respondent participates in a service or fraternal organization. The dependent variable is 1 if a household participates and 0 otherwise. The coefficient of the individual homeownership status variable is always completely insignificant except in columns (1) and (3) where all survey respondent specific controls are omitted. The positive effect in these specifications is not very surprising, considering that homeownership is strongly positively related to (omitted) income and education. When the controls are added, the independent effect of individual homeownership becomes completely statistically insignificant, as expected. (The results reported in Appendix Table A2 confirm that income and education are strongly positively associated with participation in service/fraternal organizations.) Finally, the coefficient on the interaction term 'own×developed' is completely statistically insignificant in all specifications reported in columns (3) to (7). Overall, these results provide additional support for Proposition 3.

Results of Specifications with Endogenous Homeownership

Table 4 reports results for Specification 2 and all four measures of social capital. The reported specifications for each social capital measure are identical to those reported in columns (5) to (7) of Tables 2 and 3 except that the respondent's homeownership status is now also treated as endogenous. The instrumental variable (IV) strategy used to identify the endogenous variables is described in Section 3.3. It should be noted that with the exception of the estimates for social interactions with immediate neighbors, Wu-Hausman F-tests and Durbin-Wu-Hausman χ^2-tests cannot reject the hypothesis that the homeownership status variable is exogenous, casting doubt on whether the variable should be treated as an endogenous variable. To the extent that the variable is in fact exogenous, both OLS and 2SLS will be consistent but the 2SLS-estimator will be less efficient. Nevertheless, 2SLS-estimates with endogenous homeownership are reported as an additional robustness check.

Consider first columns (1) to (3) of Panel A, which report estimates for the number of social interactions with immediate neighbors. The key variable of interest is the interaction effect 'own×developed'. Note first that the coefficient on the interaction term is essentially unaffected by the addition of control variables. In fact, the coefficient slightly increases when controls are added. Note also, that the coefficient on the 'own×developed' variable remains positive and statistically significant at least at the 5%-level. The implied quantitative effects are very large (see Table 5 for details), however, the coefficients are measured less precisely, that is, both the standard errors and the size of the coefficients increase quite significantly. This finding is similar to that of DiPasquale and Glaeser (1999) who estimate a specification similar to the base specification in this paper. Using an alternative instrumental variable strategy to identify the respondent's homeownership status, they also see their coefficients and standard errors increase substantially.[33] (As a further specification test, I applied DiPasquale and Glaeser's instrumental variable strategy instead of the one proposed in this paper.[34] Results are very similar qualitatively, however, the strategy used in this paper yields higher F-statistics and more comfortably passes the various specification tests.[35])

Columns (4) to (6) of Panel A, report linear probability estimates for the respondent's participation in neighborhood associations. Results are qualitatively very similar to those reported in columns (1) to (3). Interestingly, both the statistical significance level and the size

[33] DiPasquale and Glaeser (1999) conclude that their OLS estimates may be more accurate.

[34] Specifically, I used the average homeownership rate of the income group (based on the income categories reported in the SCCBS), race category, and U.S. state cell, to which the survey respondent belongs (excluding the respondent and excluding cells with small simple size), as an instrument to identify the homeownership status of the respondent. This instrument arguably captures the influence of the local housing market that might encourage homeownership. At the same time, controlling for income and race, the group homeownership rates should differ across the cells for reasons that should not be a function of social capital contributions. The group homeownership rates should also essentially be uncorrelated with other features of social capital investment.

[35] Two additional alternative identification strategies were tested. Firstly, instead of the maximum subsidy rate the average marginal rate was used, assuming the same (national) income distribution for all states. Secondly, instead of interacting the maximum subsidy rate with each income category, an instrument was created as the interaction of the maximum rate interacted with the average income of each income group.

of the coefficient on 'own $\times$ developed' increases when controls are added. In the specifications with all controls, the coefficient on the interaction term is highly statistically significant at the 1% level. Again, the implied quantitative effects are very large. A one standard deviation increase in the share developed land in a Census tract increases the participation probability gap between homeowners and renters by 16.9% points and 17.2% points respectively. This is a very meaningful effect given that, on average, only 14% of renters and 30% of homeowners participate in neighborhood associations. Overall, Panel A of Table 4 provides strong additional support for Propositions 1 and 2 in this paper.

Panel B of Table 4 reports results for the two non-neighborhood specific measures of individual social capital investments, assuming that the homeownership status of respondents is endogenously determined. Consistent with Proposition 3, the independent effect of the individual homeownership variable is entirely statistically insignificant in all specifications, except in column (4), the specification without controls for participation in service/fraternal organizations. As discussed above, the positive effect in this specification is not surprising given that homeownership is strongly positively related to (omitted) income and education. As expected, when the controls are added in column (5), the independent effect of individual homeownership becomes completely statistically insignificant. The interaction effect 'own$\times$developed' is completely statistically insignificant in all six specifications. First stage F-statistics for the joint test of the instruments are very high for all endogenous regressors and all specifications, suggesting that the 2SLS-estimates may not be biased in the same direction as the OLS ones (see Table 4 for details).[36] All specifications comfortably pass the Anderson canonical correlations likelihood-ratio tests and Hansen-J statistics suggest that the instruments are valid. Overall, the results provide strong additional support for Proposition 3.

4 Conclusions

In this paper I propose that in a setting with high property transaction costs social capital investment in a neighborhood is a positive function of the local scarcity of developable land. This is because in neighborhoods with little open land (inelastic supply of new housing), the social capital induced entry of the marginal newcomer increases house values more strongly, discouraging others from entering and thereby preventing further dilution of social capital. House price capitalization therefore ensures that immobile homeowners can internalize the benefits of their investments. In contrast, in neighborhoods with plenty of open land house

[36] Note that the F-statistic for the 'share developed' variable also increases in size, implying that the instrumental variables used to identify the homeownership status may also help identifying the share developed land (places with more attractive taxes attract more residents, hence, are more developed).

prices respond less sensitively to the entry of newcomers and social capital is therefore more strongly diluted. Hence, homeowners have fewer incentives to invest in the first place.

The presented empirical evidence strongly supports this proposition. Consistent with theory, in built-up neighborhoods homeowners are significantly more likely to socially interact with immediate neighbors than renters. The same is not true in neighborhoods with plenty of developable land. Instrumental variable estimates suggest that the effect of land scarcity on the link between homeownership and social capital investment is causal. Moreover, simulations (based on the specifications reported in columns (6) and (7) of Table 2A) suggest that the effects are quite important economically: in a neighborhood with little open land (85 percent developed), all else equal, homeowners are roughly 25 percent more socially interactive than renters. Yet, in a little developed location (15 percent developed) the difference is small, in fact, homeowners are somewhat less interactive (1 to 4 fewer interactions). Homeowners are also much more likely to participate in neighborhood associations if they live in more built up neighborhoods. Again, the interaction effect is quantitatively highly meaningful and 2SLS-estimates suggest that the effect is causal. Finally, consistent with theory, individual homeownership is not positively related to non-neighborhood specific social capital and land scarcity does not have a positive effect on the link between homeownership and non-neighborhood specific social capital.

The primary conclusion of this paper is that high homeownership rates alone do not ensure formation of social capital. Homeowners have few additional incentives to invest in social capital compared to renters in little developed neighborhoods where the long-term net benefits of their investments are likely considerably diluted. As a consequence, in these neighborhoods, social capital investment may be ‘suboptimal’ from a welfare point of view. In contrast, in built-up neighborhoods homeownership provides strong incentives to invest in neighborhood specific social capital. Moreover, the initial social capital investments ensure that newcomers to a neighborhood (homeowners and renters) are eager to cooperate with the existing ‘club members’. In a broader context, the findings imply that house price capitalization only provides a compelling mechanism for homeowners to make long-term investments into their neighborhoods and local communities if potential new housing supply is limited. Hence, differences in housing market conditions may provide an additional explanation – besides sorting and peer effects – why suburban locations in highly urbanized areas (i.e., locations with high homeownership rates and little developable land) tend to have better local public services (e.g., schools) and a greater social capital stock.

References

Ai, C. and E. C. Norton (2003). ‘Interaction terms in logit and probit models’, *Economics Letters*, 80(1), 123-29.

Alesina, A. and E. LaFerrara (2000). ‘Participation in heterogeneous communities’, *Quarterly Journal of Economics*, 115(3), 847-904.

Bound, J., D. A. Jaeger and R. M. Baker (1995). ‘Problems with Instrumental Variables Estimation When the Correlation Between the Instruments and the Endogenous Explanatory Variable is Weak’, *Journal of the American Statistical Association*, 90(430), 443-450.

Brasington, D. M. (2002). ‘Edge versus center: finding common ground in the capitalization debate’, *Journal of Urban Economics*, 52(3), 524-41.

Brueckner, J. K. and M.-S. Joo (1991). ‘Voting with capitalization’, *Regional Science and Urban Economics*, 21(3), 453-67.

Brueckner, J. K. and A. G. Largey (2006). ‘Social Interaction and Urban Sprawl’, CESifo Working Paper 1843: Munich: CESifo, November.

Capozza, D. R. and R. W. Helsley (1990). ‘The stochastic city’, *Journal of Urban Economics*, 28(2), 187-203.

Capozza, D. R. and Y. Li (1994). ‘The intensity and timing of investment: The case of land’, *American Economic Review*, 84(4), 889-904.

Conley, J. P. and A. Rangel (2001). ‘Intergenerational fiscal constitutions: How to protect future generations using land taxes and federalism’, NBER Working Paper 8394: Cambridge, MA: NBER, July.

DiPasquale, D. and E. L. Glaeser (1999). ‘Incentives and social capital: Are homeowners better citizens?’, *Journal of Urban Economics*, 45(2), 354-84.

Durlauf, S. N. (2002). ‘On the empirics of social capital’, *Economic Journal*, 112(483), F459-F479.

Durlauf, S. N. and M. Fafchamps (2004). ‘Social capital’, NBER Working Paper 10485: Cambridge, MA: NBER, May.

Edelson, N. M. (1976). ‘Voting Equilibria with Market-Based Assessments’, *Journal of Public Economics*, 5(3-4), 269-284.

Fischel, W. A. (2001). ‘Homevoters, Municipal Corporate Governance, and the Benefit View of the Property Tax’, *National Tax Journal*, 54(1), 157-173.

Fischel, W. A. (2004). 'An Economic History of Zoning and a Cure for Its Exclusionary Effects,' *Urban Studies*, 41(2), 317-340.

Glaeser, E. L. (1996). 'The incentive effects of property taxes on local governments', *Public Choice*, 89(1-2), 93-111.

Glaeser, E. L., J. Gyourko and R. E. Saks (2005). 'Why is Manhattan so Expensive? Regulation and the Rise in House Prices', *Journal of Law and Economics*, 48(2), 331-369.

Glaeser, E. L., D. Laibson and B. Sacerdote (2002). 'An economic approach to social capital', *Economic Journal*, 112(483), F437-F458.

Haurin, D.R. and H.L. Gill (2002) 'The impact of transaction costs and the expected length of stay on homeownership,' *Journal of Urban Economics*, 51(3), 563-584.

Hilber, C. A. L. (2005). 'Neighborhood externality risk and the homeownership status of properties', *Journal of Urban Economics*, 57(2), 213-41.

Hilber, C. A. L. and C. J. Mayer (2004). 'Why do households without children support local public schools?', NBER Working Paper 10804: Cambridge, MA: NBER, October (revised September 2006).

Hilber, C. and F. Robert-Nicoud (2006). 'Owners of developed land versus owners of undeveloped land: Why land use is more constrained in the Bay Area than in Pittsburgh', CEP Working Paper 760: London: Centre for Economic Performance, November.

Knack, S. and P. Keefer (1997). 'Does social capital have an economic payoff? A cross-country Investigation', *Quarterly Journal of Economics*, 112(4), 1251-88.

Linneman, P. (1985). 'An economic analysis of the homeownership decision', *Journal of Urban Economics*, 17(2), 230-46.

Manski, C. F. (2000), 'Economic analysis of social interactions', *Journal of Economic Perspectives*, 14(3) (Summer), 115-36.

McDonald, J. F. and D. P. McMillen (2000), 'Employment Subcenters and Subsequent Real Estate Development in Suburban Chicago', *Journal of Urban Economics*, 48(1), 135-157.

Novy-Marx, R. (2005). 'An equilibrium model of investment under uncertainty', mimeo, University of Chicago, Graduate School of Business, February.

Oates, W. E. and R. Schwab (1988). 'Economic competition among jurisdictions: Efficiency enhancing or distortion inducing?', *Journal of Public Economics*, 35(3), 333-54.

Oates, W. E. and R. Schwab (1996). 'The theory of regulatory federalism: The case of environmental management', in (W. E. Oates, ed.), *The Economics of Environmental Regulation*, 319-31, Aldershot, UK: Edward Elgar.

Putnam, R. (1995). ‘Bowling alone: America’s declining social capital’, *Journal of Democracy*, 6(1), 65-78.

Putnam, R., R. Leonardi and R. Nanetti (1993). *Making Democracy Work: Civic Traditions in Modern Italy,* Princeton: Princeton University Press.

Rangel, A. (2005). ‘How to protect future generations using tax-base restrictions’, *American Economic Review*, 95(1), 314-346.

Roper Center for Public Opinion Research. (2001). *USMISC2000-SOCCAP. Social Capital Benchmark Survey, 2000 Documentation*, Storrs: Roper Center (Univ. of Connecticut).

Rudel, T. K. (1989). *Situations and Strategies in American Land-Use Planning*. Cambridge, England: Cambridge University Press.

Sonstelie, J. C. and P. R. Portney (1978). ‘Profit maximizing communities and the theory of local public expenditures’, *Journal of Urban Economics,* 5(2), 263-77.

Sprunger, P. and J. D. Wilson (1998). ‘Imperfectly mobile households and durable local public goods: Does the capitalization mechanism work?’ *Journal of Urban Economics*, 44(3), 468-92.

Staiger, D. and J. H. Stock (1997). ‘Instrumental Variables Regression with Weak Instruments’, *Econometrica*, 65(3), 557-586.

Stock, J. H., J. H. Wright and M. Yogo (2002). ‘A Survey of Weak Instruments and Weak Identification in Generalized Methods of Moments’, *Journal of Business & Economic Statistics*, 20(4), 518-529.

Titman, S. (1985). ‘Urban land prices under uncertainty’, *American Economic Review*, 75(3), 505-14.

Wildasin, D. E. (1979). ‘Local public goods, property values, and local public choice’, *Journal of Urban Economics*, 6(4), 521-34.

Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data*, Cambridge: MIT Press.

Summary Statistics and Regression Tables

TABLE 1
Variable List and Means

(N=20,341 unless otherwise noted)

Variable	Mean	Standard Deviation	Minimum	Maximum
Number of social interactions (i.e., talk or visit) with immediate neighbors	114.0	112.4	0	312
Respondent participates in neighborhood association (N=20,423)	0.25	0.43	0	1
Number of times socialized with co-workers outside work (only workers) (N=13,418)	13.5	17.6	0	60
Respondent participates in service or fraternal organization (N=20,423)	0.14	0.35	0	1
Respondent is homeowner	0.70	0.46	0	1
Expect to stay in community for at least 5 more yrs.	0.76	0.42	0	1
Respondent is daily commuter	0.66	0.47	0	1
Daily commuting time in hours (no commute = 0)	0.28	0.41	0	4.92
Daily commuting time in hours (only commuters) (N=13,418)	0.43	0.43	0.02	4.92
Race is Black	0.11	0.32	0	1
Race is Asian	0.016	0.13	0	1
Race is Hispanic	0.068	0.25	0	1
Respondent is male	0.41	0.49	0	1
Age of respondent	44.3	16.1	18	99
Respondent has children	0.40	0.49	0	1
Number of years lived in local community (Omitted category: Less than one year)				
- One to five years	0.26	0.44	0	1
- Six to ten years	0.15	0.36	0	1
- Eleven to twenty years	0.17	0.38	0	1
- More than twenty years	0.27	0.44	0	1
- All life	0.084	0.28	0	1
Total household income, 1999 (Omitted category: Less than $30,000)				
- Between $30,000 and $49,999	0.25	0.43	0	1
- Between $50,000 and $74, 999	0.20	0.40	0	1
- Between $75,000 and $99, 999	0.11	0.31	0	1
- Over $100,000	0.12	0.32	0	1
- Over $30,000 unspecified	0.040	0.20	0	1
Marital status (Omitted category: Currently Married)				
- Marital status: Never married	0.25	0.43	0	1
- Marital status: Widowed	0.070	0.26	0	1
- Marital status: Divorced	0.13	0.34	0	1
- Marital status: Separated	0.030	0.17	0	1

TABLE 1—*Continued*

Variable	Mean	Standard Deviation	Minimum	Maximum
Highest education completed (Omitted category: Less than high school)				
- Education: High school diploma	0.25	0.43	0	1
- Education: Some college	0.22	0.41	0	1
- Education: Assoc. degree (2 y.) or specialized	0.11	0.31	0	1
- Education: Bachelor's degree	0.18	0.38	0	1
- Education: Some graduate training	0.035	0.18	0	1
- Education: Graduate or professional degree	0.14	0.34	0	1
Current employment status (Omitted category: Working)				
- Current employment: Temporarily laid off	0.016	0.13	0	1
- Current employment: Unemployed	0.023	0.15	0	1
- Current employment: Retired	0.14	0.35	0	1
- Current employment: Permanently disabled	0.033	0.18	0	1
- Current employment: Homemaker	0.065	0.25	0	1
- Current employment: Student	0.032	0.18	0	1
Census tract level variables (from NLCD 1992 and Census 2000, matched to 1990 boundaries)				
- %-Developed land in Census tract, 1992	0.52	0.36	0.000092	1
Only respondents in center city (N=10,749)	0.68	0.30	0.00059	1
Only respondents outside MSA (N=2,480)	0.12	0.21	0.00024	0.98
- Population density in developed area (in person per square meter)	0.0032	0.0038	0.0000016	0.20
- Homeownership rate	0.65	.22	0	1
- Gini-coefficient of income distribution	0.38	0.051	0.19	0.61
- Linguistic heterogeneity	0.25	0.16	0	0.73
- Ethnic heterogeneity	0.25	0.20	0	0.76
- % Units in single-family detached homes	0.60	0.24	0	1
- % Units in multi-unit buildings	0.28	0.25	0	1
Instruments used in 2SLS regressions (excluding interaction effects)				
- Share wetlands in Census tract	0.016	0.038	0	.6153929
- County typography: flat plains	0.073	0.26	0	1
- County typography: smooth plains	0.048	0.21	0	1
- County typography: irregular plains	0.30	0.46	0	1
- County typography: tablelands, moderate relief	0.15	0.36	0	1
- County typography: open low mountains	0.072	0.26	0	1
- County typography: low mountains	0.060	0.24	0	1
- County typography: high mountains	0.11	0.31	0	1
- Total maximum mortgage subsidy rate by state (federal plus state)	0.42	0.023	0.40	0.45

Notes: The summary statistics of the independent variables are reported for the regression sample of Table 2A (number of observations = 20,341); unless otherwise noted. This sample only consists of survey respondents with available information on all explanatory variables of Table 2 including the % of developed land in the Census tract. The summary statistics for the other regression samples are virtually identical to the one reported in Table 1.

TABLE 2: Estimates of Neighborhood Specific Measures of Social Capital

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS	*OLS*	*OLS*	*OLS*	*2SLS*	*2SLS*	*2SLS*
Panel A	Dependent Variable: Log of number of social interactions with neighbors plus one, 2000						
Respondent is homeowner	0.65 **	0.26 **	0.39 **	0.069	0.032	-0.16	-0.12
	(0.039)	(0.040)	(0.067)	(0.069)	(0.16)	(0.13)	(0.14)
Interaction: Homeowner × %-developed land, 1992			0.44 **	0.33 **	**0.99** **	**0.72** **	**0.66** **
			(0.091)	(0.082)	**(0.24)**	**(0.22)**	**(0.22)**
%-Developed land in Census tract, 1992	0.0055	0.13 **	-0.32 **	-0.12	**-0.93** **	**-0.66** *	**-0.56** (*)
	(0.046)	(0.044)	(0.090)	(0.079)	**(0.24)**	**(0.27)**	**(0.30)**
Log (population density in developed area of tract)		-0.048 *		-0.039 (*)		-0.037 (*)	**-0.29** (*)
		(0.021)		(0.021)		(0.022)	**(0.17)**
Controls [a)]	No	Yes	No	Yes	No	Yes	Yes
Community fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.036	0.080	0.037	0.081			
F (first stage): Own × developed					20.4	14.3	13.0
Share developed					16.6	9.0	8.7
Log (population density)							4.6
Panel B	Dependent Variable: Respondent participates in neighborhood association, 2000						
Respondent is homeowner	0.18 **	0.11 **	0.12 **	0.056 **	0.087 *	0.017	0.024
	(0.014)	(0.011)	(0.018)	(0.017)	(0.038)	(0.038)	(0.040)
Interaction: Homeowner × %-developed land, 1992			0.095 **	0.10 **	**0.18** **	**0.17** *	**0.16** *
			(0.028)	(0.028)	**(0.067)**	**(0.066)**	**(0.069)**
%-Developed land in Census tract, 1992	0.077 **	0.056 **	0.0060	-0.022	**0.061**	**0.0080**	**0.025**
	(0.016)	(0.018)	(0.024)	(0.024)	**(0.050)**	**(0.059)**	**(0.065)**
Log (population density in developed area of tract)		0.011		0.013 (*)		0.019 *	**-0.024**
		(0.0077)		(0.0077)		(0.0089)	**(0.063)**
Controls [a)]	No	Yes	No	Yes	No	Yes	Yes
Community fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.061	0.099	0.062	0.101			
F (first stage): Own × developed					20.3	14.3	12.9
Share developed					16.7	9.0	8.6
Log (population density)							4.6

Notes: [a)] Coefficients and statistical significance levels of all variables are reported in Appendix Table A2 for the base specification with all controls (column 2). **Bold** coefficients are instrumented. The list of instruments includes the share wetland in the Census tract; the share wetland interacted with the respondent's homeownership status; county dummy variables for the following topography types: flat plains, smooth plains, irregular plains, tablelands and moderate relief, open low mountains, low mountains and high mountains; these topography dummies interacted with the respondent's homeownership status. Standard errors are clustered by Census county (adjusted for intra-county correlation). ** / * / (*) Significantly different from zero with 99% / 95% / 90% confidence. The specifications reported in columns (5) to (7) comfortably pass the Anderson canonical correlations likelihood-ratio test suggesting that the models are identified. Hansen J statistics suggest that the instruments are valid. Number of obs.: 20,341 (Panel A) and 20,423 (Panel B).

TABLE 3: Estimates of *Non*-Neighborhood Specific Measures of Social Capital

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS	*OLS*	*OLS*	*OLS*	*2SLS*	*2SLS*	*2SLS*
Panel A	Dependent variable: Log of number of times socialized with co-workers outside work plus one, 2000						
Respondent is homeowner	-0.18 **	-0.13 **	-0.15 **	-0.098 (*)	-0.23 (*)	-0.15	-0.19
	(0.025)	(0.028)	(0.049)	(0.051)	(0.12)	(0.11)	(0.12)
Interaction: Homeowner × %-developed land, 1992			-0.048	-0.060	**0.082**	**0.022**	**0.085**
			(0.063)	(0.060)	**(0.18)**	**(0.18)**	**(0.19)**
%-Developed land in Census tract, 1992	-0.040	-0.021	-0.0045	0.025	**-0.11**	**-0.072**	**-0.16**
	(0.036)	(0.043)	(0.062)	(0.071)	**(0.19)**	**(0.22)**	**(0.24)**
Log (population density in developed area of tract)		0.032		0.031		0.031	**0.23**
		(0.023)		(0.023)		(0.023)	**(0.20)**
Controls [a)]	No	Yes	No	Yes	No	Yes	Yes
Community fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.016	0.11	0.016	0.11			
F (first stage): Own × developed					17.2	13.1	13.2
Share developed					14.5	9.3	9.2
Log (population density)							4.7
Panel B	Dependent variable: Respondent participates in service or fraternal organization, 2000						
Respondent is homeowner	0.036 **	0.0011	0.035 **	0.011	0.011	-0.012	-0.010
	(0.0049)	(0.0066)	(0.011)	(0.011)	(0.022)	(0.022)	(0.022)
Interaction: Homeowner × %-developed land, 1992			0.0025	-0.016	**0.049**	**0.022**	**0.019**
			(0.015)	(0.015)	**(0.033)**	**(0.034)**	**(0.034)**
%-Developed land in Census tract, 1992	0.0026	-0.015	0.00072	-0.0028	**-0.0031**	**-0.034**	**-0.029**
	(0.010)	(0.012)	(0.015)	(0.015)	**(0.036)**	**(0.046)**	**(0.050)**
Log (population density in developed area of tract)		-0.021 **		-0.021 **		-0.020 **	**-0.034**
		(0.0048)		(0.0047)		(0.0049)	**(0.049)**
Controls [a)]	No	Yes	No	Yes	No	Yes	Yes
Community fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.0088	0.051	0.088	0.051			
F (first stage): Own × developed					20.3	14.3	12.9
Share developed					16.6	9.0	8.6
Log (population density)							4.6

Notes: [a)] Coefficients and statistical significance levels of all variables (including constant) are reported in Appendix Table A2 for the base specification with all controls (column 2). **Bold** coefficients are instrumented. For the list of instrumental variables see Table 2. Numbers in parenthesis are robust standard errors. Standard errors are clustered by Census county (i.e., adjusted for intra-county correlation). ** / * / (*) Significantly different from zero with 99% / 95% / 90% confidence. The specifications reported in columns (5) to (7) comfortably pass the Anderson canonical correlations likelihood-ratio test suggesting that the models are identified. Hansen J statistics suggest that the instruments are valid. Number of observations: 13,418 (Panel A) and 20,423 (Panel B).

TABLE 4: *2SLS*-Estimates of Social Capital with Endogenous Homeownership Status Variable

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A	Dependent variable: Interactions with neighbors			Dependent variable: Participation in neighborhood associations		
Respondent is homeowner	**0.22**	**-1.1** *	**-1.3** *	**0.26** *	**-0.074**	**-0.085**
	(0.37)	**(0.50)**	**(0.57)**	**(0.11)**	**(0.13)**	**(0.14)**
Interaction: Homeowner × %-developed land, 1992	**1.2** *	**1.3** *	**1.5** **	**0.34** (*)	**0.47** **	**0.48** **
	(0.56)	**(0.52)**	**(0.55)**	**(0.19)**	**(0.15)**	**(0.16)**
%-Developed land in Census tract, 1992	**-1.0** *	**-1.1** *	**-1.11** *	**-0.0040**	**-0.20** (*)	**-0.20** (*)
	(0.44)	**(0.45)**	**(0.46)**	**(0.13)**	**(0.11)**	**(0.11)**
Log (population density in developed area of tract)		-0.011	**-0.31** (*)		0.026 **	**0.010**
		(0.026)	**(0.16)**		(0.010)	**(0.051)**
Controls	No	Yes	Yes	No	Yes	Yes
Community fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
F (first stage): Own	147.1	27.6	27.1	153.3	26.9	26.1
Own × developed	138.5	34.6	31.2	136.9	35.2	31.7
Share developed	107.7	34.7	35.7	106.9	34.4	35.6
Log (population density)			7.8			8.3
Panel B	Dependent variable: Interactions with co-workers outside work			Dependent variable: Participation in service/fraternal org.		
Respondent is homeowner	**0.42**	**-0.054**	**-0.070**	**0.29** **	**0.12**	**0.15**
	(0.27)	**(0.37)**	**(0.38)**	**(0.082)**	**(0.11)**	**(0.12)**
Interaction: Homeowner × %-developed land, 1992	**0.58**	**0.30**	**0.30**	**-0.097**	**-0.0011**	**-0.020**
	(0.43)	**(0.39)**	**(0.39)**	**(0.12)**	**(0.12)**	**(0.12)**
%-Developed land in Census tract, 1992	**-0.23**	**-0.20**	**-0.19**	**0.11**	**-0.039**	**-0.033**
	(0.33)	**(0.34)**	**(0.34)**	**(0.097)**	**(0.095)**	**(0.095)**
Log (population density in developed area of tract)		0.040	**0.000090**		-0.023 **	**0.021**
		(0.025)	**(0.16)**		(0.0055)	**(0.039)**
Controls	No	Yes	Yes	No	Yes	Yes
Community fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
F (first stage): Own	329.4	19.8	19.4	153.0	26.8	26.1
Own × developed	168.1	58.3	58.4	137.5	35.1	31.6
Share developed	248.7	37.2	42.9	106.9	34.4	35.6
Log (population density)			12.3			8.2

Notes: **Bold** coefficients are instrumented. In addition to the instruments reported in the notes of Table 2 to identify the share developed land and population density, the total maximum mortgage subsidy rate by state interacted with each income category-dummy is used as an instrument to identify the homeownership status of the survey respondent. The interactions of the instruments are used to identify the interaction of the two endogenous explanatory variables (share developed and homeownership status). Numbers in parenthesis are robust standard errors. Standard errors are clustered by Census county. ** / * / (*) Significantly different from zero with 99% / 95% / 90% confidence. All specifications comfortably pass the Anderson canonical correlations LR-test and the Hansen-Sargan test (J-statistic). Numbers of observations are identical to those reported in the notes of Tables 2 and 3. Wu-Hausman F-tests and Durbin-Wu-Hausman-chi-sq tests of the specifications reported in columns (A5), (A6), (B2), (B3), (B5) and (B6) clearly cannot reject the hypothesis that the homeownership status variable is exogenous. The hypothesis can be rejected with 93% and 97% confidence for the specifications reported in columns (A2) and (A3).

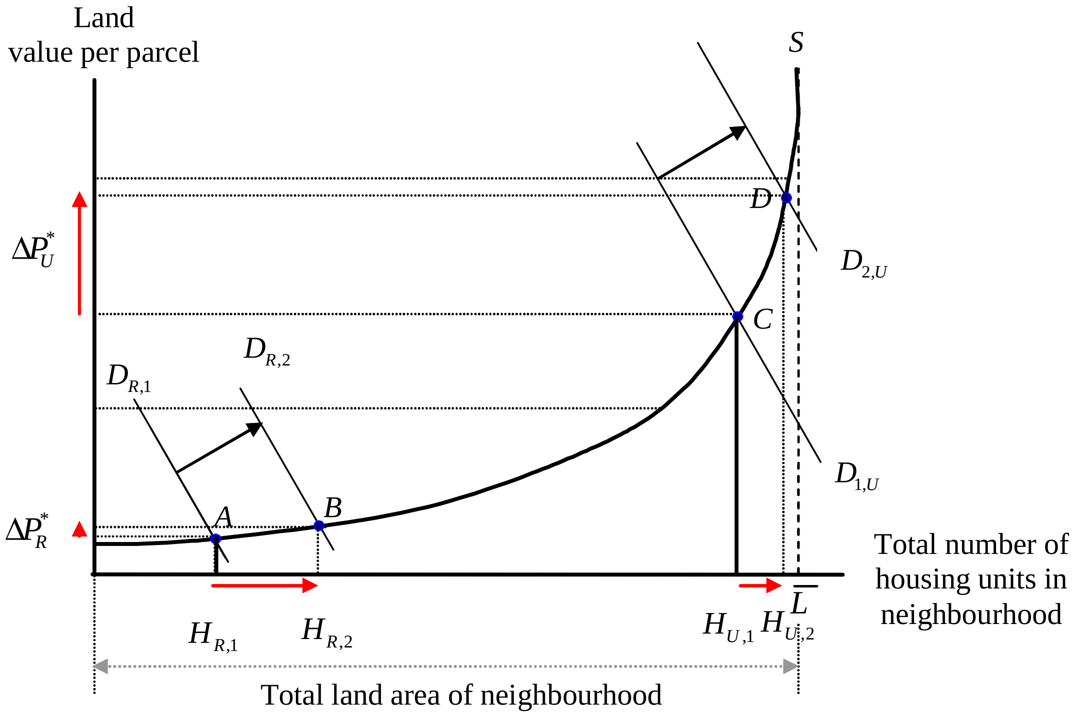
TABLE 5
Quantitative Effects

	Specification	Renter	Owner	Δ Own versus Rent
Change in # of Social Interactions with Immediate Neighbors				Additional # of Interactions
Effect of homeownership status on number of social interactions	Table 2A (2)	Baseline	12.1	12.1
	Table 2A (4)	Baseline	11.3 [a)] 3.3 [b)]	11.3 [a)] 3.3 [b)]
Interaction effect: %-Developed land increases by 1 std. dev. (+36.1%)	Table 2A (4)	-1.8	4.1	+5.9
	Table 2A (6)	-11.8	1.5	+13.3
	Table 2A (7)	-10.3	2.5	+12.8
	Table 4A (2)	-28.3	5.7	+34.1
	Table 4A (3)	-34.2	7.9	+42.1
Change in Prob. that Respondent Participates in Neigh. Association				Add. Change in Probability
Effect of homeownership status on probability of participation in neighborhood associations	Table 2B (2)	Baseline	11.5% points	11.5% points
	Table 2B (4)	Baseline	10.8% points [a)] 5.6% points [b)]	10.8% points [a)] 5.6% points [b)]
%-Developed land increases by 1 std. dev. (+36.1%)	Table 2B (4)	-0.8% points	2.9% points	+3.6% points
	Table 2B (6)	0.3% points	6.4% points	+6.1% points
	Table 2B (7)	0.9% points	6.6% points	+5.7% points
	Table 4A (5)	-7.3% points	9.6% points	+16.9% points
	Table 4A (6)	-7.4% points	9.8% points	+17.2% points

Notes: All effects are measured at the sample mean of each variable. The probability of participation in neighborhood associations at the sample mean is 25.3%. The average participation probability of renters is much lower than that of homeowners: 14.1% versus 30.0%. The number of social interactions with immediate neighbors at the sample mean is 114.0. Homeowners have on average 119.2 social interactions; while renters have on average about 101.9 social interactions. Quantitative effects are computed using all coefficients independent of statistical significance levels. The average %-developed land in a Census tract is 51.7% (sample mean; based on the regression sample for Table 2A). One standard deviation equals 36.1%. The average %-developed land in a Census tract belonging to a center city of an MSA is 67.8% (weighted by the number of respondents in each tract). The average %-developed area in a non-MSA location is 12.0% (weighted by the number of respondents in each tract). [a)] Effects are total effects including both independent effects and interaction effects. [b)] Effects are based on independent effects of homeownership only.

Appendix

Figure A1: Relationship between Land Availability and New Housing Supply Elasticity



Explanation: Figure A1 depicts a typical long-run housing supply curve *S* for a neighborhood reflecting the marginal opportunity cost of conversion of landowners. The total land area of the neighborhood is $\bar{L}$. Consider first a situation where a neighborhood is little developed (or 'rural', *R*) with most of the land $\bar{L} - H_{R,1}$ still being developable. The supply curve is kinked at point A, being (almost) perfectly inelastic at point A (since the existing housing stock cannot be easily demolished) and then becoming quite elastic. In stage 1, demand for housing is rather weak ($D_{1,R}$), leaving plenty of open land for future development. The social capital induced net benefits attract newcomers to the neighborhood thereby diminishing the net benefits but having little effect on property prices since the supply curve is quite elastic (landowners are quite willing to convert open land into housing). As is illustrated by the small increase in property prices ΔP_R^* , the effect of the investment on house prices is very limited, providing little house price induced incentives to invest in social capital in the first place. Next consider the situation where the neighborhood is more or less built up (or 'urban', *U*) with only a small amount of the land in the neighborhood $\bar{L} - H_{U,1}$ still being developable. Again the supply curve is kinked at point C. Similar to the rural case, the club good induced net benefits attract newcomers to the neighborhood, however, the high reservation prices of the remaining landowners limit the number of newcomers implying a much smaller dilution effect and a much larger effect of the social capital investment on house prices ΔP_U^* .

TABLE A1
SCCBS Communities included in Regression Sample

Community	*Total Sample Size*	*In %*	*Regression Sample Size*	*In %*
Atlanta Metro	510	1.94	381	1.87
Baton Rouge	500	1.91	382	1.88
Birmingham Metro	500	1.91	373	1.83
Bismarck (ND)	506	1.93	401	1.97
Boston (City)	604	2.3	422	2.07
Boulder (CO)	500	1.91	387	1.9
Central Oregon	500	1.91	398	1.96
Charlotte Region/14 County	1,500	5.72	1,189	5.85
Chicago Metro	750	2.86	545	2.68
Cincinnati Metro	1,001	3.82	812	3.99
Cleveland/Cuyahoga County	1,100	4.19	849	4.17
Delaware	1,383	5.27	1,091	5.36
Denver (City/County)	501	1.91	408	2.01
Detroit Metro/7-County	501	1.91	399	1.96
East Tennessee	500	1.91	388	1.91
Fremont/Newaygo County (MI)	753	2.87	633	3.11
Grand Rapids (City)	502	1.91	430	2.11
Greensboro/Guilford County	752	2.87	626	3.08
Houston/Harris County	500	1.91	362	1.78
Indiana	1,001	3.82	781	3.84
Kalamazoo County	500	1.91	413	2.03
Kanawha Valley (WV)	500	1.91	389	1.91
Lewiston-Auburn (ME)	523	1.99	416	2.05
Los Angeles County	515	1.96	388	1.91
Minneapolis	501	1.91	403	1.98
Montana	502	1.91	405	1.99
New Hampshire	711	2.71	553	2.72
North Minneapolis	452	1.72	350	1.72
Peninsula-Silicon Valley	1,505	5.74	1,179	5.8
Phoenix/Maricopa County	501	1.91	363	1.78
Rochester Metro (NY)	988	3.77	785	3.86
Rural South East Dakota	368	1.4	0	0
San Diego County	504	1.92	409	2.01
San Francisco (City)	500	1.91	413	2.03
Seattle	502	1.91	385	1.89
St. Paul Metro	503	1.92	397	1.95
Syracuse/Onondaga County	541	2.06	423	2.08
Winston-Salem/Forsyth County	750	2.86	620	3.05
Yakima (WA)	500	1.91	394	1.94
York (PA)	500	1.91	399	1.96
Total	26,230	100	20,341	100

TALBE A2

OLS Estimates for Base Specifications with All Controls

Explanatory Variable	Table 2A (2) *Interaction w. Neighbors*	Table 2B (2) *Participation Nghd Assoc.*	Table 3A (2) *Interaction w. Co-Workers*	Table 3B (2) *Participation Service/Frat.*
Respondent is homeowner	0.26 ** (0.040)	0.11 ** (0.011)	-0.13 ** (0.028)	0.0011 (0.0066)
%-Developed land in Census tract, 1992	0.13 ** (0.044)	0.056 ** (0.018)	-0.021 (0.043)	-0.015 (0.012)
Homeownership rate in Census tract	0.018 (0.19)	0.20 ** (0.062)	0.052 (0.15)	-0.016 (0.039)
Population density in developed area of Census tract	-0.048 * (0.021)	0.011 (0.0077)	0.032 (0.023)	-0.021 ** (0.0048)
Expect to stay in community for at least 5 more years	0.23 ** (0.037)	0.032 ** (0.0057)	0.044 (*) (0.026)	0.00015 (0.0067)
Other Census tract level controls:				
- Gini coefficient of income distribution in Census tract	0.38 (0.33)	0.018 (0.11)	0.25 (0.29)	0.025 (0.066)
- Linguistic heterogeneity in Census tract	-0.038 (0.18)	-0.023 (0.060)	-0.226 (*) (0.13)	0.0092 (0.041)
- Ethnic heterogeneity in Census tract	-0.21 (0.13)	0.089 * (0.042)	0.0092 (0.083)	-0.0087 (0.026)
- Share of housing units that are single-family detached homes in tract	-0.011 (0.11)	0.0011 (0.043)	-0.17 (*) (0.10)	-0.00055 (0.024)
- Share of housing units that are in multi-unit buildings in tract	0.058 (0.20)	0.22 ** (0.065)	-0.091 (0.15)	-0.0081 (0.036)
Other survey respondent specific controls:				
- Respondent is commuting	-0.016 (0.052)	-0.018 (0.014)		-0.0031 (0.012)
- Daily commuting time in hours (no commute = 0)	-0.12 ** (0.040)	0.0030 (0.0078)	-0.080 ** (0.026)	0.0037 (0.0056)
- Race is White	*reference*	*reference*	*reference*	*reference*
- Race is Black	-0.37 ** (0.048)	0.075 ** (0.015)	-0.29 ** (0.040)	0.038 ** (0.0089)
- Race is Asian	-0.39 ** (0.12)	-0.024 (0.020)	-0.31 ** (0.074)	-0.014 (0.019)
- Race is Hispanic	-0.59 ** (0.080)	-0.015 (0.014)	-0.24 ** (0.055)	0.015 (0.010)
- Respondent is male	0.075 ** (0.027)	-0.0022 (0.0060)	0.13 ** (0.023)	-0.011 * (0.0052)
- Age of respondent	0.0035 (0.0057)	0.0082 ** (0.0016)	-0.036 ** (0.0058)	-0.0057 ** (0.0010)
- Age of respondent squared (in ‘000)	0.029 (0.058)	-0.057 ** (0.017)	0.16 * (0.069)	0.068 ** (0.011)
- Respondent has children	0.22 ** (0.032)	0.022 ** (0.0066)	-0.13 ** (0.022)	-0.026 ** (0.0057)
- Number of years lived in local community: less than one year	*reference*	*reference*	*reference*	*reference*
- Number of years lived in local community: 1-5 years	0.41 ** (0.062)	0.041 ** (0.010)	0.015 (0.042)	-0.0017 (0.010)
- Number of years lived in local community: 6-10 years	0.52 ** (0.068)	0.059 ** (0.012)	0.11 * (0.045)	0.0093 (0.010)
- Number of years lived in local community: 11-20 years	0.51 ** (0.068)	0.034 ** (0.012)	0.089 * (0.039)	0.018 (0.011)
- Number of years lived in local community: More than 20 years	0.47 ** (0.067)	0.019 (0.013)	0.10 ** (0.038)	0.037 ** (0.011)
- Number of years lived in local community: All life	0.48 ** (0.066)	0.0024 (0.013)	0.11 * (0.049)	0.030 ** (0.011)

TABLE A2—*Continued*

Explanatory Variable	Table 2A (2) *Interaction w. Neighbors*	Table 2B (2) *Participation Nghd Assoc.*	Table 3A (2) *Interaction w. Co-Workers*	Table 3B (2) *Participation Service/Frat.*
- Total household income: <$30,000	*reference*	*reference*	*reference*	*reference*
- Total household income: $30,000-49,999	0.085 ** (0.031)	0.026 ** (0.0090)	0.23 ** (0.036)	0.025 ** (0.0072)
- Total household income: $50,000-74,999	0.090 * (0.041)	0.030 ** (0.0096)	0.34 ** (0.042)	0.043 ** (0.0080)
- Total household income: $75,000-99,999	0.14 ** (0.038)	0.071 ** (0.012)	0.44 ** (0.044)	0.061 ** (0.0094)
- Total household income: Over 100,000	0.14 ** (0.048)	0.12 ** (0.014)	0.54 ** (0.054)	0.082 ** (0.012)
- Total household income: Over $30,000 unspecified	0.10 (*) (0.055)	0.065 ** (0.017)	0.35 ** (0.060)	0.058 ** (0.016)
- Marital status: Currently married	*reference*	*reference*	*reference*	*reference*
- Marital status: Never married	-0.17 ** (0.037)	-0.0034 (0.0087)	0.20 ** (0.030)	0.0014 (0.0066)
- Marital status: Widowed	0.12 * (0.057)	-0.016 (0.016)	0.32 ** (0.082)	0.0059 (0.013)
- Marital status: Divorced	-0.056 (0.035)	0.011 (0.0083)	0.33 ** (0.033)	0.016 * (0.0066)
- Marital status: Separated	-0.33 ** (0.070)	-0.0056 (0.016)	0.16 * (0.066)	0.036 * (0.014)
- Education: Less than high school	*reference*	*reference*	*reference*	*reference*
- Highest education completed: High school diploma	0.22 ** (0.067)	0.024 * (0.010)	0.25 ** (0.070)	0.020 * (0.0083)
- Highest education completed: Some college	0.29 ** (0.068)	0.070 ** (0.012)	0.39 ** (0.070)	0.065 ** (0.010)
- Highest education completed: Associate degree (2 y.) or specialized	0.32 ** (0.077)	0.087 ** (0.016)	0.38 ** (0.075)	0.070 ** (0.012)
- Highest education completed: Bachelor's degree	0.31 ** (0.069)	0.12 ** (0.016)	0.44 ** (0.072)	0.13 ** (0.012)
- Highest education completed: Some graduate training	0.32 ** (0.11)	0.096 ** (0.021)	0.45 ** (0.084)	0.16 ** (0.017)
- Highest education completed: Graduate or professional degree	0.25 ** (0.074)	0.13 ** (0.014)	0.48 ** (0.070)	0.15 ** (0.015)
- Current employment status: Working	*reference*	*reference*		*reference*
- Current employment status: Temporarily laid off	-0.18 (*) (0.098)	0.0066 (0.026)		-0.040 * (0.019)
- Current employment status: Unemployed	-0.088 (0.10)	-0.055 ** (0.018)		-0.014 (0.017)
- Current employment status: Retired	0.18 ** (0.068)	0.016 (0.020)		0.0080 (0.017)
- Current employment status: Permanently disabled	0.10 (0.075)	-0.0011 (0.021)		0.0078 (0.019)
- Current employment status: Homemaker	0.086 (0.067)	-0.0013 (0.017)	-0.76 ** (0.14)	-0.012 (0.014)
- Current employment status: Student	-0.17 * (0.079)	0.0053 (0.017)	0.021 (0.087)	0.096 ** (0.019)
Community sample fixed effects	Yes	Yes	Yes	Yes
Constant	2.1 ** (0.33)	-0.42 ** (0.11)	2.7 ** (0.26)	0.0045 (0.064)
Number of observations	20341	20423	13418	20423
Adjusted R^2	0.080	0.099	0.11	.051

Notes: All variables are from 2000 unless otherwise stated. ** Significantly different from zero with 99% confidence. * Significantly different from zero with 95% confidence. (*) Significantly different from zero with 90% confidence.