Where the Streets Have a Name: Income Comparisons in the US

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Preliminary draft

Abstract

This paper analyzes the effects of income comparisons on utility using data on self-reported well-being. We rely on a very large survey (BRFSS) and an unprecedented survey conducted by the City of Somerville in order to study this relationship. These data sets allow us to study income comparisons at the county, ZIP code and street-levels. While there is a negative association between respondents' well-being and median income at the county and street-levels, this is the opposite at the ZIP code-level. We disentangle the effects of pure social comparisons and local public goods by including the relative rank in the income distribution in our model. Conditional on relative rank, there is a positive relationship between well-being and median county income. Last, we find evidence of asymmetry and nonlinearities in the comparison process.

JEL: C25, D00, J31

Keywords: Income comparisons, rank, relative utility, social interactions, well-being

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Average Joes always envy rich people. Billionaires never do. They are too busy trying to catch up Bill Gates. This simply reflects the basic idea that we always want more. But more so what other people do have. Getting a new car seems essential when one of our neighbors just bought one. Utility then depends on what one achieves or consumes in comparison with others. The question is: who are we really comparing to? The broad idea is that individuals compare to people with whom they interact or see very often. This group of individuals may include people having the same sex, age or education-level. But, the simplest idea is that we compare to individuals with whom we live, our neighbors.

Some important implications of this comparison process have been emphasized in the past[1]. Various authors argued that consumption depends not only on the good itself but on the status given to it by society (see Veblen (1909), Duesenberry (1949,) and Stigler (1950)). In other words, utility depends on own income but also on the importance of relative position in society. There is by now a substantial empirical literature regarding such relative utility effect (Brown et al. (2008); Clark and Oswald (1996); Easterlin (1995); Frank (1985); Kapteyn et al. (1985); Robson (1992); VanPraag (1971)).

More specifically, many recent studies have tried to improve our knowledge vis-a-vis social comparisons and relative utility using neighborhood as reference income group (see Layard et al. (2009)). Blanchflower and Oswald (2004), Helliwell and Huang (2011) and Luttmer (2005) report that subjective well-being is positively associated with own income and negatively correlated with average/median income in the region of residence. Luttmer (2005) used the 1987-88 and 1992-94 waves of the National Survey of Families and Households and matched this data to the Public Use Microdata Areas ("PUMAs"). These areas have about 150,000 inhabitants on average. Blanchflower and Oswald (2004) did the same analysis using the General Social Survey and state income per capita. Helliwell and Huang (2011) is the only study using US data, to our limited knowledge, that analyzes relative utility at a

[1]Brosnan and DeWaal (2003) conducted an experiment in which they analyze the relationship reward-cooperation among a group of monkeys. They find that monkeys respond negatively to unequal reward distribution. Monkeys refused to participate if they witnessed that a conspecific obtained a more attractive reward for equal effort.

rather disaggregated level (county). They limit their analysis on income comparisons by confirming the findings of Blanchflower and Oswald (2004) and Luttmer (2005).

There are two critical issues of these studies using US data: the lack of finely disaggregated data and the lack of attention to the relative position in the local income distribution. Our intuition is that average/median income in the region of residence may capture only a small part of the income comparison process. Judgments are relative not only to the average/median point, but relative to the ranking in the distribution of income (Brown et al. (2008)). Two important studies for us are Clark et al. (2009) and Dittmann and Goebel (2010) who rely respectively on Danish and German data. In their papers, they report that individuals are more satisfied when their neighbors are richer which contradicts the studies cited above and could be consistent with a public good interpretation, but also that the relative position of own income compared to the income of neighbors matters[2]. In addition, average/median income at rather aggregated level may capture other effects such as local public goods or amenities (security, quality of the environment, transport, unemployment...).

Our paper extends the investigation of this literature on income comparisons and well-being in several ways. We consider more disaggregated data in the US and we test different forms of comparisons - including the relative rank in the income distribution. We match a very large data set, the Behavioral Risk Factor Surveillance System (BRFSS), and administrative data in order to study the relationship between utility and income of neighbors at the county and ZIP code-levels. We then rely on an unprecedented survey conducted by the City of Somerville, Massachusetts. Somerville became the first city in the US to collect data about residents' self-reported well-being. This survey contains information on the address of residence and has been collected by email, phone and Facebook. These various surveys allow us to test the income comparison process at different geographic levels and to control for different local externalities. For instance, while counties may differ in terms of

[2]Dittmann and Goebel (2010) measure the income of neighbors using an index covering information such as the level of occupation, purchasing power and the rate of self-employment. See also Knies et al. (2008) for a similar analysis using German ZIP codes covering 9,000 inhabitants on average.

local public policy such as unemployment, public school and security, looking at the street-level should avoid this bias.

Our main findings are the following. At the county-level, conditional on own income, there is a negative association between well-being and median neighborhood income. This is in line with Luttmer (2005) and Helliwell and Huang (2011). But conditional on own income and relative rank, there is a positive relationship between life satisfaction and median county household income. Therefore, including relative position allows us to disentangle between a pure comparison effect (relative rank) and a local public good effect (median neighborhood income). Controlling for amenities in the local area diminishes the effect of neighbors' income on agents' utility. Moreover, individuals are sensitive to poverty and prefer living in counties where they are among the richest, but also where poverty is not prevalent.

At the ZIP code-level, conditional on own income, individuals report higher levels of well-being when their neighbors are rich. This is consistent with the idea that at the ZIP code-level, residents are more homogeneous, such that the effect of local public goods matters more than pure income comparisons. We test different specifications such as the importance of the neighbors' income, the intensity and the asymmetry of comparisons. We include the relative position in the neighborhood income distribution and a separate effect of having income under/over the neighborhood median income. There is evidence, at the county and ZIP code-levels, that a change in relative ranks in the income distribution matters less at the bottom of the distribution. Being in the bottom quintile compared to being in the second quintile of the local income distribution is predicted to have no effect on life satisfaction whereas moving from the third quintile to the fourth quintile increases significantly well-being.

We find evidence that residents of Somerville compare to people living in their neighborhood and more so for people living in the same street rather then 350 meters further. At this very finely disaggregated level, once controlling for the relative rank, the effect of neighbor's median income is no more significant. Only relative rank in the income distribution matters. Whereas the income comparisons are downward at the county level - richer individuals are happier from having a household income

above that of their neighbors - income comparisons are upward at the street-level - poorer individuals are negatively affected by the income of their rich neighbors.

Next section details the data sets. Section II reviews the literature on relative utility and provides a theoretical framework. The third section presents the findings using the BRFSS and administrative data while section IV uses a survey collected by the city of Somerville. Section V concludes.

I. Data

A. BRFSS

This paper is based on data from different surveys. We first rely on the Behavioral Risk Factor Surveillance System (BRFSS) which was established in 1984 by the Centers for Disease Control and Prevention (CDC) but did not include a question on life satisfaction before 2005 (Brodeur (2012); Goudie et al. (2011); Helliwell and Huang (2011); Oswald and Wu (2010)). The time period covered with this data set is thus 2005-2010. The BRFSS is repeated cross section, has a total sample of 1,704,466 and contains information on county of residence, household income and life satisfaction. It covers more than two thirds of the counties in the US: county codes are suppressed for counties with fewer than 10,000 residents for confidentiality reasons and statistical reliability. CDC suppresses the release of data results for those counties that have a confidence half width greater than 10 percent[3].

The following question is asked over the period 2005-2010 in the BRFSS: "In general, how satisfied are you with your life?" where respondents have 4 choices (4=very satisfied, 3=satisfied, 2=dissatisfied and 1=very dissatisfied). Table 1 presents mean and standard deviations of the variables coming from the BRFSS and shows the distribution of life satisfaction. 45% of the respondents reported that they were very satisfied with their life. On the other hand, 1% answered that they were very dissatisfied. The question on household income is the following: "Is your annual household income from all sources". Respondents have 8 different choices going from "Less than

[3]States have different rules for the data files. It seems though that states report county/zip code-level data when the number of respondents is greater than fifty in a given geographic location.

10,000" to "75,000 or more". Respectively 4,8% and 32,1% of the individuals report having less than $10,000 and more than $75,000. We divide/multiply bottom/top-coded categories by a factor in order to have an income distribution closer to real figures. We use different factors throughout this paper in order to test the robustness of our results (see Appendix A.D for more details).

We match the county of residence of respondents in the BRFSS to county-level variables. There are, on average, 62 counties per state. The states with respectively the smallest and highest number of counties are Delaware (3) and Texas (254). County-level data used in this paper come from the U.S. Census Bureau, USA Counties, website[4]. USA Counties collects thousands of data items from a variety of sources such as the Bureau of Economic Analysis, the Department of Education, the Federal Bureau of Investigation and from the 2010 Census of Population and Housing. Appendix A.A gives a definition of the county-level variables used in the analysis coming from this source (unemployment rate, the percentage of high school graduates...). Our main variable coming from this data set is the county median household income over the period 2005-2009. Since there is no information on median household income in 2010, the last year available (2009) is used as a replacement. Using the 2010 wave has no effect on the findings reported in this paper. Additionally, USA Counties gives the percentage of people of all ages in poverty, the percentage of related children age 5 to 17 in families in poverty and the percentage of people under age 18 in poverty.

We also rely on ZIP code of residence. Since the public use version does not identify the ZIP code of residence, we obtained this information from the BRFSS state coordinators. We managed to cumulate the ZIP codes for respondents of 8 states: Arizona, Maine, Ohio, Rhodes Island, South Dakota, Texas, Utah and Wyoming[5]. The period covered is 2005-2010 for all these states except Texas (2007-2010). ZIP code data are sensitive and thus not available from the authors. Median household income at the ZIP code-level comes from the Census (See Appendix A.B).

[4]http://censtats.census.gov/usa/usa.shtml.

[5]The remaining states were excluded for three reasons. First, some states did not answer our request. The second reason is simply that many states refused to provide the data in order to protect the confidentiality of respondents. Lastly, we did not have the funding to pay for the fees asked by few states.

This measure is not available yet for 2009 which means that we have to rely on the 1999 median household income.

In some specifications, we restrict the sample to ZIP codes where the number of respondents is greater than 50 for statistical reliability. We combine all the years when doing such an exercise which increases the number of ZIP codes that we may use. This gives us a sample size of 220,428. This technique gives us respectively 167, 212, 345, 59, 156, 269, 127 and 81 ZIP codes for Arizona, Maine, Ohio, Rhodes Island, South Dakota, Texas, Utah and Wyoming. We also, for some specifications, restrict the sample to ZIP codes having more than 50 respondents for a given year which gives us a sample size of 118,762.

B. Somerville

The second part of our analysis focuses on a survey designed by the City of Somerville's SomerStats Office[6]. Somerville became the first city in the US to collect data about residents' self-reported well-being. Somerville is a city in Middlesex County, Massachusetts, located just north of Boston. As of the 2010 census, the city had a total population of 75,754 and was the most densely populated municipality in New England with 18,404 person per square mile. The median income for a household in the city was $46,315 and the median income for a family was $51,243. The largest industry sectors in terms of employment are health and social services. Approximately 17% of Somerville residents work within the city while 50% work in Boston or Cambridge[7].

Somerville Phone Survey ("SMP" hereafter) has been conducted during the spring of 2011 via phone, email and Facebook[8]. A total of 393 respondents answered questions such as "How satisfied are you with your life in general?", "How happy do you feel right now?" or "Taking everything into account, how satisfied are you with

[6]The data from this survey are derived from Sensitive Data Files of the City of Somerville, obtained under special arrangements designed to protect the anonymity of respondents. These data are not available from the authors. Persons interested in obtaining Data files should contact the City of Somerville.

[7]See this website for technical reports on the economic situation: http://www.somervillema.gov/spotlights/comp-plan/trends-meetings-and-reports.

[8]See Heller (2011) for more details on the SMP. The questionnaire is available on our websites.

Somerville as a place to live?". Many respondents did not answered key questions such as household income, life satisfaction or address information which leaves us with 321 individuals. Table 1 shows mean and standard deviations of these satisfaction variables. 14% of the respondents report that they are very satisfied with their life and 1% are very dissatisfied. The household income question has 16 choices going from less than $20,000 to $300,000 and more. Respectively, 11% and 1% of the individuals report having less than $20,000 and more than $300,000. We use a multiplication factor as before in order to have an income distribution closer to the real figures. This survey also contains information on gender, age, race, marital status, years living in Somerville, ward of residence (7 choices), precinct (21 choices), owner and employment status (see Table 1).

In addition, this survey provides information about respondent's address of residence. This allows us to measure the exact distance between the 393 respondents, using longitude and latitude coordinates. We distinguish a specific group of reference for each respondent: neighbors within a circle of radius r. A first circle of 334 meters radius is centered around each respondent. This is what we call the "street" reference group. We also construct another circle of 667 meters radius, but we keep only respondents living between the two distances. This ring variable is mutually exclusive and covers the distance 334-667 meters. Figures 1 illustrates an example of this methodology for a citizen of Somerville. On average, there are 10% of the city respondents in the first circle of 334 meters. We also match the SMP with the precinct of residence. There are 21 precincts in Somerville (3 per ward). Each precinct contains on average 5% of the respondents. Figure 2 illustrates the geolocalisation of the 21 precincts in Somerville.

We match the address of residence with different measures of public goods. We will use the distance between respondents' residence and different local amenities such as subway stations, parks and libraries (Heller (2011). Appendix A.C describes these variables and provides the different source where we obtained the geolocalisation.

II. Utility and Income Comparisons

This paper tests the impact of income comparisons on individual utility. In this contextual framework, y^* is the median income of people in the reference group. The following relation is assumed:

$$U_i = U(u_1(y_i), u_2(y_i|y^*), u_3(f_i), (X), (Z)) \tag{1}$$

where U is the economic concept of utility which depends on y the household income, y^* the place of residence median income and f_i the ranking in the income distribution of the place of residence. X and Z are sets of individual and local area covariates.

More specifically, our econometric model is as follows:

$$SWB_i = \alpha + \delta ln(y_i) + \theta ln(y_i/y^*) + \mu f_i + \gamma X_i + \lambda Z \tag{2}$$

with

$$f_i = \frac{i-1}{n-1} \tag{3}$$

where n is the number of individuals in the reference group and i the respondent's position.

SWB is the outcome variable (for instance: life satisfaction) for respondent i and δ is the coefficient associated with household income. The utility function is believed to be concave in household income which explains our choice to introduce income in logarithmic form. θ and μ are the coefficients of interest in this framework. We compute cell averages in order to measure y^*. While we will create the cells with an external data set (USA Counties) for the BRFSS, we construct our reference groups income within the data set for the SMP[9]. We follow the literature by using median income household since it is less sensitive to outliers than the mean (Clark et al. (2008)).

[9]Another methodology used in this literature is to compute a predicted income based on individuals characteristics such as place of residence, age, race or gender. See Clark et al. (2008), DiTella and MacCulloch (2006) and Frey and Stutzer (2002) for an aperçu of the relevant papers in this literature.

Appendix A.E describes how our measure of ranking, f_i, is constructed. Intuitively, a ranking measures the position of individuals in a specific group. In this case, we attribute to respondents a relative rank in the distribution of household income for each county/ZIP code/street. This normalized rank is just over zero for the poorest households and one for the richest households in the county/ZIP code/street.

The effect of neighbors' income on utility is, *a priori*, ambiguous since many channels are at work. We identify and test explicitly three in the next sections: (i) pure social comparisons (ii) rank sensitiveness (iii) local public goods[10].

(i) Pure Social Comparisons: well-being depends partly on individual's absolute income and partly on individual's relative income, in the sense that individuals' well-being depend on the gap between own income and some reference benchmark. We may expect that people are worse-off when those in their reference group do better. This refers to an "envy" or "jealousy" effect. We want at least what people in our reference benchmark do have. Traditionally, this is tested through the coefficient of y^*, the median reference group income.

(ii) Ranking: this channel refers to the relative position of the respondent in the income distribution of the place of residence. Judgments are made relative to not only a single reference point (i.e. household median income), but relative to endpoints and ranking in the distribution of income. In other words, multiple reference points may be involved in determining satisfaction (see Brown et al. (2008)). Our prediction is that this ranking effect affects positively utility (i.e. ranking is positively correlated to self-reported well-being, conditional on own income).

(iii) Local Public Goods: it may be the case that we want to have rich neighbors, not because they are rich *per se*, but because they pay more taxes and provide better amenities. This may also work through criminality and unemployment. If neighbors' income is positively related to utility like it is the case in Denmark (Clark et al. (2009)), then controlling for public goods should decrease the size of the coefficient of interest (y^*). On the other hand, if there is a negative relationship between utility

[10]Another economic channel is inflation. Imagine geographical locations with higher income have more inflation. This effect is partially captured by inequality/ranking.

and median household income of the place of residence, then taking into account public goods should increase the absolute value of the coefficient. Recall that in the US, many public goods are provided by the states and counties (education, health care, roads...).

We test explicitly these channels in the next sections using data from the BRFSS (counties and ZIP codes) and Somerville's survey (streets). We will analyze theories of relative utility using different geographical areas and test whether the income comparison process is scale sensitive.

We will also test different specifications about intensity of comparisons, nonlinearities and asymmetry of comparisons. It may be the case that poorer individuals are negatively affected by income of their neighbors, while richer individuals are not. In order to test asymmetry of comparisons, we first introduce the median household income with dummies which allows to test for nonlinearities. We will proceed the same way with rankings to verify if a change in the relative ranks in the local income distribution matters more or less at the bottom/top of the distribution. We also follow Ferrer-i Carbonell (2005) and include two variables, "richer" and "poorer", in some of our specifications. These variables are created as follows:

if $y>y^*$ then richer=ln(y) - ln(y^*) poorer=0

if $y<y^*$ then richer=0 poorer=ln(y^*) - ln(y)

if $y=y^*$ then richer=0 poorer=0.

If both "richer" and "poorer" are significant, it will provide evidence that income comparisons are symmetric.

III. BRFSS

A. County: Basic Results

This section analyzes the relationship between utility of respondents and income of their reference group. As mentioned before, utility is measured by self-reported well-being and the reference group is composed of individuals living in the same

geographical area[11]. We first use the county of residence as our unit of social comparisons and then extend our analysis to more local data. We exploit the large sample of the BRFSS and match the county of residence with the variables of USA Counties. Our methodology has the advantage of combining a rich survey and reliable administrative data.

Our econometrics model is slightly different than equation (2):

$$LS_{ijt} = \alpha + \beta_s + \eta_t + \delta ln(y_{ijt}) + \theta ln(y_{ijt}/y^*) + \mu f_{ijt} + \gamma X_{ijt} + \lambda Z_{jt} \qquad (4)$$

as before, life satisfaction is the outcome variable for individual i in county j in year t, β_s and η_t are state and year fixed effects, δ is the coefficient associated with household income, X is a set of individual covariates and θ and μ are the coefficients of interest. We add county-level variables Z for some specifications to verify the effect of public goods. The standard errors are corrected for autocorrelation by clustering at the county-level and sampling weights are used for equations based on county-level data (see Appendix A.F for a discussion on weights).

Table 2 presents our basic findings of equation (4) using an Ordered Probit (similar findings with an OLS, available upon request). The first column shows the relationship between median household income at the county-level and respondents' well-being without controlling for socioeconomic characteristics. As expected, δ is positive and statistically significant at the 1 % level. The coefficient of our variable of interest "Log of Median Real Household Income at the County-Level" is negative which means that conditional on own income, respondents report lower levels of satisfaction when their neighbors are richer. This is consistent with previous findings reported by Helliwell and Huang (2011).

Column 2 adds individual covariates to this basic model. We do include age, age-squared, gender, 8 dummies of working status (employed, unemployed for less than a year, ...), 5 education dummies, 6 dummies of marital status, 4 child dummies and 7 race dummies. While we do not display the coefficients for these variables, they attract signs that are consistent with those of the literature (available upon

[11]Knight et al. (2009) note that two thirds of respondents in a survey of Chinese households report that their main comparison group consists of individual in their own village.

request). Including these controls decreases the size of the coefficient of interest which could mean that socioeconomic characteristics are correlated with neighborhood demographic variables.

Column 3 verifies the robustness of these findings by replacing the log of real household income by the log of real household income per equivalent (see Appendix A.D for the computation and a description of this variable). This variable takes into account the number of members in the household and the number of children. Arguably, this measure is closer to the individual consumption level. Using this measure or household income has no effect on our findings. Given that both income variables yield similar findings, we will use the latter for the remainder of this research.

The fourth column upgrades our basic model by introducing the individual household's normalized rank in the local income distribution (Clark et al. (2009)). Appendix A.E gives the details about the construction of this variable. Unsurprisingly, the relative rank in the county of residence is positively related to satisfaction. The coefficient is very large and statistically significant at the 1% level. But adding the normalized rank to the model affects dramatically the coefficient on median household income at the county-level. The coefficient is now positive which means that, conditional on own income and relative rank in the county, respondents report higher levels of life satisfaction when their neighbors are richer.

This augmented specification complements previous results in the US literature (Blanchflower and Oswald (2004), Helliwell and Huang (2011) and Luttmer (2005)). Our interpretation is that richer neighbors are welcome since they provide amenities, but what matters the most (at the county-level) is being richer than them. Moreover, the coefficient associated with the relative rank is very large and seems to play a crucial role in the utility function. Normalized rank is a better predictor of well-being than is the median household income [12]. These findings are robust to our treatment of top and bottom-coded categories. Appendix Table 1 and 3 show the same specifications as the ones in columns 2 and 3, but for different multiplication factors.

[12] which means that comparisons are ordinal rather than cardinal

As a pedagogical device, Figures 3, 4 and 5 illustrate the BRFSS county life satisfaction distribution using three different specifications. We estimate an OLS similar to the regression presented in column 4 of Table 2. In this regression, we do not include the rank and the median household income. We then predict the life satisfaction for each individuals in the dataset and then calculate the average by county. Figure 3 shows this average predicted life satisfaction for each county. Figure 4 is similar to Figure 3 with the exception that median household income is included in the specification. Last, Figure 5 adds to the model the rank and the median household income. These figures give the opportunity to have a look at the county well-being distribution in the US, and then to counterfactuals where there would be no income spillover effects.

It may be the case that poorer and richer individuals are differently affected by income spillovers. Column 5 verifies another proposition of Section II by replacing the log of real median household income at the county-level with 6 dummies. This allows us to verify if the utility function is decreasing at an increasing rate in (y^*). We omit the dummy less than \$30,000 in the model which makes it the reference category. The coefficients are positive for the 5 dummies and we find some evidence that the relationship between satisfaction and county median income is nonlinear.

We also verify whether a change in relative ranks in the local income distribution matters more at the bottom/top of the distribution. Column 6 replaces the variable "Normalized Rank" by 5 dummies representing classes of ranking in the county income distribution. We omit the bottom class ("Normalized Rank" lower than 0.20) and thus measure the effect of being in a particular class in comparison of being in the bottom class. Our result suggests that there is no statistical difference between respondents in the first two class (i.e. [0,0.20[and [0.20,0.40[). On the other hand, moving from the third to the fourth categories of the local income distribution is predicted to increase life satisfaction 3 times more than moving from the second to the third.

Finally, column 7 presents results which include the variables "richer" and "poorer" described in the previous section. The estimates indicate that the two variables are positive and significant, but more so for "rich" people (over the median household

income). This finding contradicts previous findings in this literature based primarily on evidence from Europe (i.e. Ferrer-i Carbonell (2005)). This means that comparisons affect less the utility of "poor" Americans and are thus asymmetric. A plausible explanation is that perceived social mobility is higher in the US. This would be consistent with the findings of Alesina et al. (2004). [13]

B. County: Public Goods and Poverty

Including the relative rank in the income distribution allows us to disentangle the different channels discussed in Section II. Since neighbors' incomes are positively related to utility when ranks are included in the model, then controlling for public goods should decrease the size of the coefficient of y^*. One way to test this hypothesis is to include county-level variables in the specification. Table 3 presents the findings of doing such an exercise (see Appendix A.A for the definitions of these variables). Column 1 introduces the county unemployment rate, the owner-occupied housing units and the median value of specified owner-occupied housing units to capture any business cycle effects. It is possible that the intensity of comparisons is larger/smaller during recessions[14]. The second column includes the percentage of elderly and the percentage of high school graduate or higher (25 years and older). Poterba (1997) found that a larger fraction of elderly in a jurisdiction leads to lower public spending on education. Column 3 adds to the basic model the density of population and the urbanization rate since it is possible that social interaction are higher in small/large cities. Column 4 includes the number of murders and nonnegligent manslaughters known to police per capita (using robberies or violent crimes instead yields similar findings). Finally, column 5 includes all these controls in the model.

Adding these controls in the model does affect our result that conditional on own income and ranking, agents report higher levels of satisfaction when their neighbors

[13]They present evidence that inequality is correlated with unhappiness in the US only for a sub-group of rich leftists while inequality makes the poor unhappy in Europe (as well as the leftists

[14]We do not find any evidence that income comparisons are more important before or after the Great Recession. We verified this hypothesis by restricting the sample to the period 2005-2007 in one regression and 2008-2010 in another (not shown). The coefficients for the variable "Log of Median Real Household Income at the County-Level" are quite similar and thus not statistically different from each other.

are richer. Controlling for amenities in the local area decreases the size of the effect of neighbors' income on agents' utility (especially when the full set of county-level variables is included). On the other hand, controlling for public goods does not reduce the magnitude of the effect of the relative rank on life satisfaction. This is a first piece of evidence that we can disentangle two effects affecting the coefficient of y^*: a pure comparison effect and a public good effect. Public goods explain why conditional on own income and the relative rank, agents report higher levels of utility when their neighbors are richer.

This finding does not exclude the possibility that agents' utility is decreasing both with the prevalence of rich and poor households. This would mean that individuals are sensitive to inequality and prefer living in counties where they are among the richest, but also where poverty is not prevalent. Table 4 looks at the relationship between different measures of poverty at the county-level and satisfaction. Columns 1, 2 and 3 enrich equation (4) by adding respectively the percentage of people of all ages in poverty in the county of residence, the percentage of related children age 5 to 17 in families in poverty and the percentage of people under age 18 in poverty. Conditional on own income, neighborhood median income and rank, individuals report lower levels of satisfaction as the proportion of poor people increases. Note that the first three columns do not include any county-level variables. Interestingly, adding poverty to the model also explains why agents report higher levels of utility when their neighbors are richer. This is a second piece of evidence that public goods matter.

Columns 4, 5 and 6 add to the previous specification the number of murders and nonnegligent manslaughters known to police per capita (we also add other county-level variables in some specifications, available upon request). There is no more evidence that respondents are averse to poverty. It seems that this aversion to poverty is driven by aversion to criminality and other unobserved factors associated with poverty rate.

C. ZIP Codes

Previous findings would suggest, *a priori*, that individuals report higher levels of satisfaction when their neighbors are richer once their rank is taken into account. This remark could be challenged by the fact that our previous work appealed to county-level data which combine more than one neighborhoods/cities. This subsection examines a different geographical area, ZIP codes (5-digit). Arguably, a ZIP code represents a very large neighborhood (or a city). Moreover, it is possible that, at the ZIP code-level, residents are more homogeneous. Hence, pure income comparisons would be less prevalent and the coefficient of θ would capture the effect of local public goods.

Our econometrics model is similar to equation (4) with the exception that county dummies are included:

$$LS_{ijt} = \alpha + \nu_j + \eta_t + \delta ln(y_{ijt}) + \theta ln(y_{ijt}/y^*) + \mu f_{ijt} + \gamma X_{ijt} \tag{5}$$

County and year fixed effects completely control for any fixed differences between counties and between years, which means that only within-county variation is used in the estimation. One caveat of this methodology is that a single ZIP code may span more than one counties. To verify that this is not an issue, we also present the findings where state dummies are included instead of county fixed effects. There are more than 42,000 ZIP codes in use at the moment which means that there are over 13 ZIP codes per county on average. The standard errors are corrected for autocorrelation by clustering at the ZIP code-level.

Table 5 illustrates findings of equation (5). The first four columns restrict the sample to ZIP codes where the number of respondents is greater than 50 for statistical reliability. We combine all the years when doing such an exercise. We then, for columns 5 to 8, restrict the sample to ZIP codes having more than 50 respondents for a given year. The first row of Table 5 shows as before the relationship between life satisfaction and household income. Then the next row presents the first coefficient of interest θ. μ is on the third row. The control variables are the same in all specifications and the same as the ones in Table 2.

Columns 1 and 5 show a positive relationship between household income and life satisfaction, but also between the latter variable and the median household income at the ZIP code-level. This contradicts previous findings (in the US literature) since this specification does not include ranking. This means that within a county and a given year, there is a positive relationship between life satisfaction and the median income of ZIP codes. Note that this relationship is conditional on socioeconomic characteristics. An explanation of this finding could be that ZIP codes may display a skewer income distribution than counties. If it is the case, at ZIP code-level, pure social comparisons may be overlapped by the benefits of living with rich neighbors.

The second and sixth columns look at the effect of rank within a ZIP code on life satisfaction. The median household income at the ZIP code-level remains significant when ranking in the income distribution is included. The relative rank is positive and statistically significant as it was the case with county-level specifications. The size of the coefficient is sensitive to sample size (whether we keep only ZIP codes with 50 respondents for a given year) but also to our treatment of top and bottom-coded categories. Appendix Tables 2 and 3 present the same specifications as the ones in columns 1 and 2 for Table 5, but for different multiplication factors for top and bottom categories. Appendix Table 2 restricts the sample to ZIP codes with at least 50 respondents and Appendix Table 3 to ZIP codes with at least 50 respondents per year. The relative rank is positive and statistically significant for 12 out of 16 regressions (not significant when the bottom category is divided by 1.5 and the top category is multiplied by either 2 and 2.5). Nonetheless, the coefficient of the relative rank is smaller than at the county-level. This is another piece of evidence that at ZIP code-level, the relative position is less important.

Column 3 replicates the findings of the fifth column of Table 2 by replacing the log of real median household income at the ZIP code-level with 6 dummies. Column 4 presents also a replication of Table 2, column 6, by replacing the variable "Normalized Rank" by 5 dummies representing classes of ranking in the ZIP code income distribution. Our results are similar to the ones of Table 2. We find nonlinearities in the relationship between satisfaction and relative ranks suggesting once again that ranks matter less at the bottom of the distribution. Finally, Appendix Table 4 repli-

cates Table 5 but replaces county dummies by states dummies. This has no effect on our estimates and conclusions.

IV. Somerville

While the previous section analyzed interactions within counties and ZIP codes, this section looks at a more finely disaggregated level: a city. It may be the case that pure income comparisons and rank sensitiveness are stronger with people with whom we interact very often such as street neighbors. Public goods within a city are also different. We will control for different kinds of local amenities such as parks and distance to the nearest metro station. In other words, we are able to look at whether respondents' well-being is affected by standard of living of individuals living in the same street.

We estimate social comparisons in the City of Somerville by measuring the exact distance between the 393 residents[15]. This strategy involves matching a group of neighbors for each citizen. This group is composed of residents within a circle of radius r. A first circle of 334 meter radius is centered around each respondent. We also construct another circle of 667 meter radius, but we keep only respondents living between the two distances in order to build our reference group. Figure 1 illustrates our empirical strategy.

Our econometrics model is:

$$SWB_i = \alpha + \delta ln(y_i) + \theta ln(y_{ir}/y^*) + \mu f_{ir} + \gamma X_i \tag{6}$$

where either life satisfaction or happiness is the dependent variable for individual i, δ is the coefficient associated with household income, X is a set of individual covariates

[15]We also adopt an estimation strategy that enables us to restrict the comparison group to individuals living in the same ward (not shown for space consideration). Somerville is composed of 7 wards, of similar population magnitude which allows us to look at whether individuals report higher or lower satisfaction levels when their ward neighbors are richer/poorer. In this matching framework, our standard errors are now clustered at the ward-level. The estimated effects of the reference income (i.e median ward household income) on life satisfaction is negative and significant. This means that within a ward, conditional on own income, respondents report lower levels of satisfaction when their neighbors are richer. Once controlling for the relative rank, the effect of median income is no more significant.

and θ and μ are the coefficients of interest. The standard errors are corrected for autocorrelation by clustering at the precinct-level. Individual covariates include age dummies, gender, 4 dummies of working status (employed, unemployed, student and out of the labor force), 5 dummies of marital status (married, single, living as couple, divorced, separated or widowed), 4 race dummies (White, Asian, American Indian and African American), 5 dummies of housing types (single family housing, two families housing, three families housing, building with 4+ housing or public housing) and 6 dummies of the number of years lived in Somerville.

Table 6 presents our basic findings of equation (6) with life satisfaction as the dependent variable (see Appendix Table 5 for happiness). Columns 1 and 2 show the relationship between life satisfaction and median household income at the street-level, with and without socioeconomic characteristics. The coefficient of our variable of interest "Log of Median Household income at the street level" is negative and statistically significant, which means that conditional on own income, respondents report lower levels of satisfaction when their street neighbors are richer.

Column 3 upgrades our basic model by introducing a second reference circle (334m to 667m). The coefficient of the first reference circle (0-334m) is still negative and significant but the coefficient of the second reference circle (334m-667m) is not statistically significant. This means that respondents compare to people living in their street but not with citizens living 334 meters further. We should emphasize that this doesn't contradict our findings in previous sections as we control here for street median household income of people living within 0 to 334 meters. These findings are not sensitive to the use of a multiplication factors for top/bottom income categories (see Appendix Table 6).

Column 4 tests for rank sensitiveness. The relative rank in the street (0-334m) is positively related to life satisfaction. But adding the normalized rank to the model affects the coefficient on median household income. The coefficient is no more significant which means that conditional on own income and relative rank in the street, respondents are not sensitive to the median household income. Confirming our intuition, only relatives position matters at this scale of analysis.

Columns 5 and 6 test for nonlinearity. But there is no real insightful evidence that

the relationships between satisfaction and street median income or street relative income are nonlinear. Note that these specifications are really demanding, since there is a small number of respondents per dummies.

To be cautious and account for public goods, we also control for distances to the nearest park, public library and subway station[16]. We obtained these measures for each survey point from geocoding data (Heller (2011)). Distances are measured in meters. Table 7 presents the findings of doing such an exercise. Column 1 presents baseline finding without public goods. Column 2 introduces subway station distance. It is possible that rich individuals are living in streets that are closer to subway station. Columns 3 and 4 include park and public library distances. Adding these controls in the model does affect the coefficient of the median street household income. Unsurprisingly, controlling for local amenities in the local area increases the effect of neighbor's income on people's life satisfaction (especially when the full set of street level variables is included). This is once again a piece of evidence that public goods has a positive effect on the relationship between utility and median neighborhood income. However, the coefficients are still not significant, when we control for the relative position in the local income distribution.

Finally, column 7 presents results of a specification which includes the variables "richer" and "poorer" described in section 2. The estimates indicate that only poorer is negative and significant. This finding contradicts previous findings at the county level but does confirm the evidences found by Ferrer-i Carbonell (2005), i.e poorer individuals are negatively influenced by the income of their rich peers, but richer individuals are not happier from knowing that their income is above that of their neighbors.

V. Conclusion

This paper considers how comparisons affect utility. This simple extension could expand our understanding of how economic agents behave in comparison with others

[16]Sirgy and Cornwell (2002) argue that satisfaction with physical features affects both neighborhood satisfaction and housing satisfaction. Satisfaction with the social features of the neighborhood plays a role in the satisfaction with the neighborhood which affects life satisfaction.

since well-being is closely associated with consumption, cooperation and productivity (Oswald et al. (2009)). If part of our consumption is conspicuous (i.e. we buy some goods only to impress others) then policy-makers may be tempted to tax that portion of consumption differently than for other goods.

Our main findings suggest that, at the county-level, there is a negative association between satisfaction and median neighborhood income, but conditional on relative rank, there is a positive relationship. On the other hand, at the ZIP code-level, individuals report higher levels of well-being when their neighbors are rich. This is consistent with the idea that residents are more homogeneous at this geographical level such that the effect of local public goods matters more than pure income comparisons. We also find evidence that residents of Somerville compare to people living in their neighborhood and more so for people living in the same street rather then 334 meters further. Table 8 gives a summary.

These results point to some interesting future research questions. Due to a lack of longitudinal data over a very long period of time, it was not possible to test heterogeneity in the intensity of comparisons. It is of general interest to know whether individuals who experienced social mobility are more prone to comparisons. Another intriguing puzzle is the nonlinearity in the relationship between ranks and well-being. We believe these questions may be answered using data from other countries such as Denmark.

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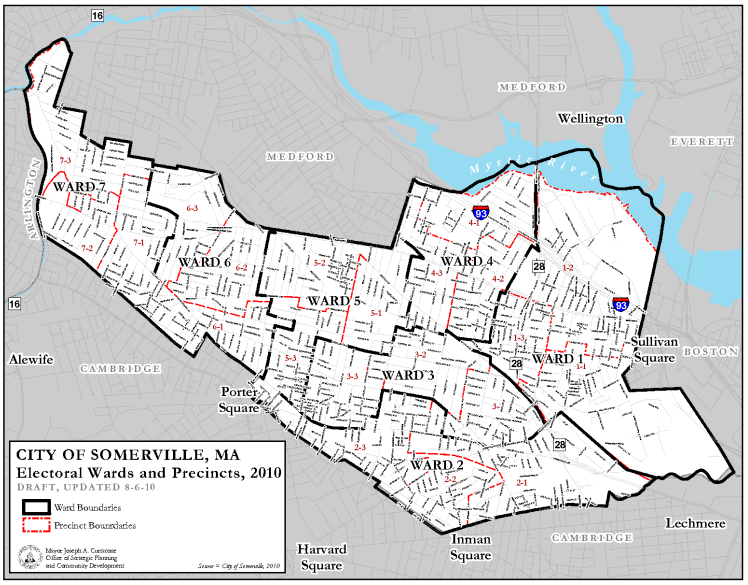
VI. Figures

Figure 1: Somerville Phone Survey

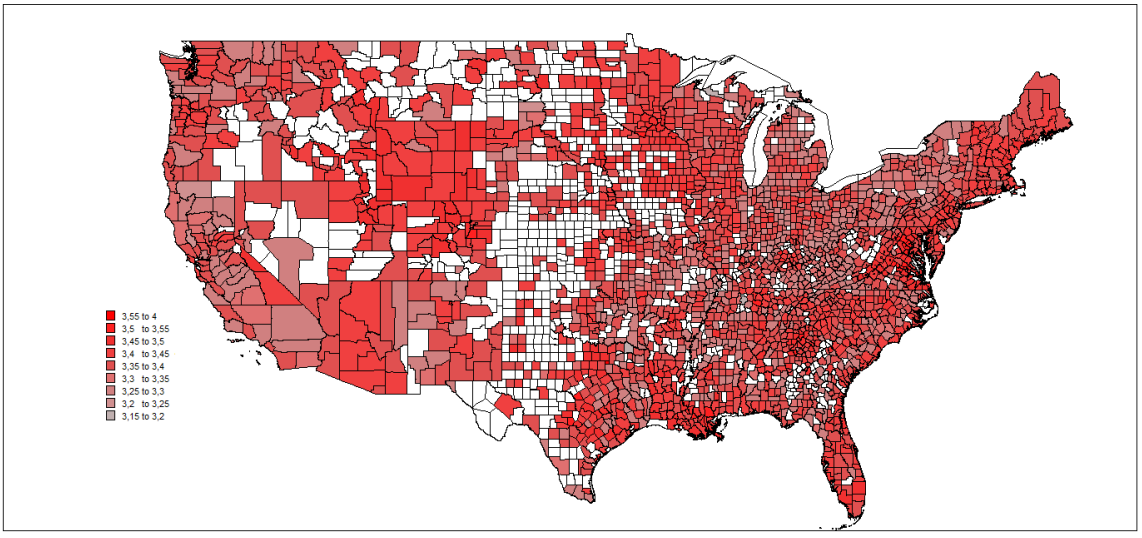
Notes: Data came from the City of Somerville (not available from the authors). We distinguish a specific group of reference for each respondent: neighbors within a circle of radius r. A first circle of 334 meters radius is centered around each respondent. We then construct another circle of 667 meters radius, but we keep only respondents living between the two distances. This ring variable is mutually exclusive and covers the distance 334-667 meters.

Figure 2: City of Somerville: Electoral Wards and Precincts



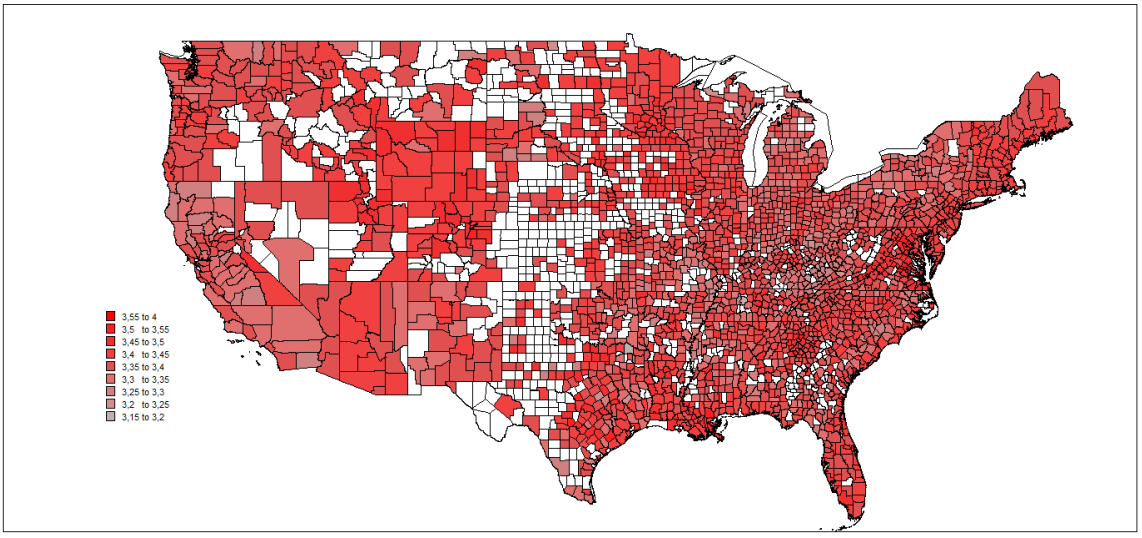
Notes: This Figure illustrates the geolocalisation of the 21 precincts in Somerville. There are 21 precincts in Somerville (3 per ward). Each precinct contains on average 5% of the respondents. This map any many others are available on the City of Somerville's website: http://faqs.somervillema.intelligovsoftware.com/wardandprecintmaponline.aspx.

Figure 3: BRFSS County Life Satisfaction Distribution



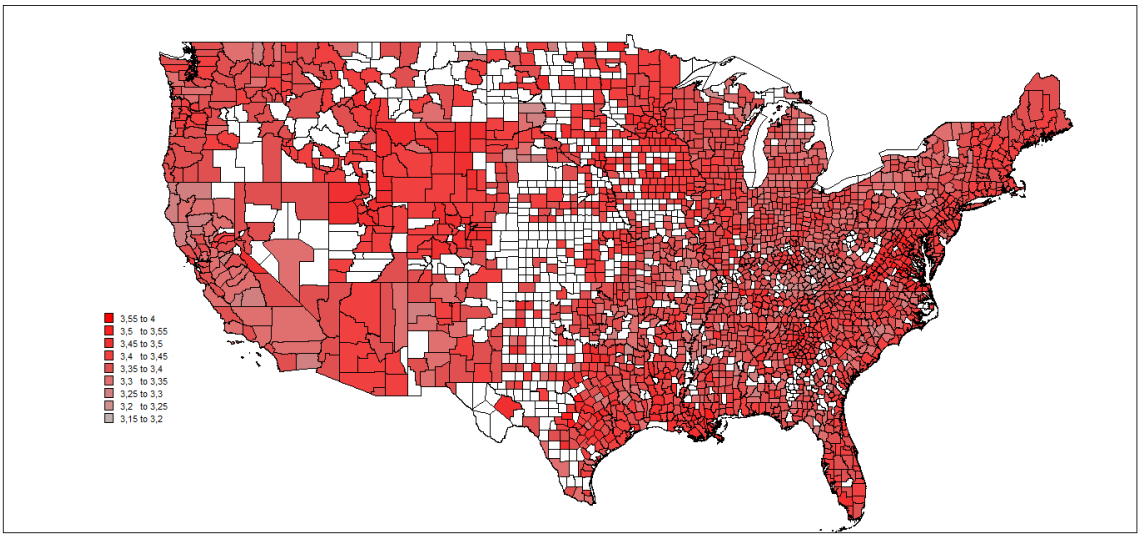
Notes: Data came from the BRFSS, 2005-2010. This Figure illustrates the BRFSS county life satisfaction distribution. We estimate an OLS similar to the regression presented in column 4 of Table 2. In this regression, we do not include the rank and the median household income. We then predict the life satisfaction for each individuals in the dataset and then calculate the average by county.

Figure 4: BRFSS County Life Satisfaction Distribution



Notes: Data came from the BRFSS, 2005-2010. This Figure illustrates the BRFSS county life satisfaction distribution where income spillovers are taken into account. We estimate an OLS similar to the regression presented in column 4 of Table 2. In this regression, we do include the median household income. We then predict the life satisfaction for each individuals in the dataset and then calculate the average by county.

Figure 5: BRFSS County Life Satisfaction Distribution



Notes: Data came from the BRFSS, 2005-2010. This Figure illustrates the BRFSS county life satisfaction distribution where income spillovers and ranking in the income distribution are taken into account. We estimate an OLS similar to the regression presented in column 4 of Table 2. In this regression, we do include the rank and the median household income. We then predict the life satisfaction for each individuals in the dataset and then calculate the average by county.

VII. Tables

Table 1: Summary Statistics.

BRFSS	Mean	Std. Dev.	**SMP**	Mean	Std. Dev.
Life Satisfaction			Life Satisfaction		
[1] Very Dissatisfied	3.389	0.622	[1] Very Dissatisfied	7.680	1.852
[4] Very Satisfied			[10] Very Satisfied		
Very Satisfied	0.453	0.498	Very Satisfied	0.140	0.347
Very Dissatisfied	0.010	0.101	Very Satisfied	0.009	0.096
			Happiness		
			[1] Very Unhappy	7.460	1.838
			[10] Very Happy		
			Very Happy	0.109	0.312
			Very Unhappy	0.006	0.078
Household Income			Household Income		
[0,10 000[	0.048	0.214	[0,20 000[	0.112	0.316
[10 000,15 000[	0.049	0.215	[20 000,40 000[	0.158	0.366
[15 000,20 000[	0.068	0.252	[40 000,60 000[	0.127	0.334
[20 000,25 000[	0.085	0.278	[60 000,80 000[	0.158	0.366
[25 000,35 000[	0.111	0.315	[80 000,100 000[	0.127	0.334
[35 000,50 000[	0.148	0.355	[100 000,120 000[	0.102	0.304
[50 000,75 000[	0.171	0.376	[120 000,140 000[	0.062	0.242
75 and more	0.321	0.467	[140 000,160 000[	0.034	0.189
Male	0.498	0.500	[1600 000,180 000[	0.031	0.174
Age	45.99	16.861	[180 000,200 000[	0.018	0.135
Elementary School	0.035	0.184	[200 000,220 000[	0.018	0.135
Att. High School	0.064	0.245	[220 000,240 000[	0.006	0.078
Grad. High School	0.270	0.444	[240 000,260 000[	0.009	0.096
Att. College	0.268	0.443	[260 000,280 000[	0.006	0.078
Grad. College	0.364	0.481	[280 000,300 000[	0.009	0.096
Married	0.618	0.486	300 000 and more	0.012	0.111
Divorced	0.091	0.288	Female	0.585	0.493
Single	0.292	0.379	Live 0-1 Year	0.109	0.312
Separated	0.174	0.142	Live 1-3 Years	0.046	0.211
Widowed	0.056	0.231	Live 4-7 Years	0.024	0.156
Couple	0.040	0.196	Live 8-10 Years	0.009	0.096
No Child	0.557	0.497	Live 11-15 Years	0.264	0.441
One Child	0.173	0.379	Live 16-20 Years	0.096	0.295
Two Children	0.167	0.373	Employed	0.654	0.476
Three Children or more	0.103	0.304	Out of Labor Force	0.227	0.419
Employed	0.541	0.498	Student	0.040	0.197
Unemployed (Less 1Y)	0.036	0.186	Unemployed	0.062	0.242
Unemployed (More 1Y)	0.024	0.154	Own	0.585	0.493
Self-Employment	0.088	0.283	Rent Single Family House	0.009	0.296
Retired	0.149	0.356	Rent 2 Family Building	0.133	0.341
Disabled	0.048	0.213	Rent a Building 4 and more Units	0.109	0.493
Student	0.041	0.197	Rent Public Housing	0.018	0.312
Full-Time Homemaker	0.074	0.261	Rent 3 Family Housing	0.096	0.296
White	0.772	0.419	Email	0.615	0.486
Black or African American	0.106	0.308	Phone	0.359	0.480
Asian	0.034	0.180	Facebook	0.025	0.156
Pacific Islander (Hawaiian)	0.004	0.065	Couple	0.112	0.316
American Indian or Alaska	0.015	0.123	Married	0.454	0.498
Other Race	0.041	0.199	Widowed	0.068	0.253
Multiracial	0.020	0.141	Divorced or Separated	0.109	0.312
			African American	0.034	0.182
			American Indian	0.003	0.055
			Asian/Pacific Islander	0.018	0.135
			White	0.834	0.371
Observations	1,737,499		Observations	321	

Note: For the BRFSS, sample means are weighted using the final weight associated to each respondent. The period covered is 2005-2010. For the SMP, we do not report means when respondents refused to answer.

Table 2: Life Satisfaction and Income Spillovers at the County-Level, BRFSS.

Life Satisfaction	Ordered Probit (1)	Ordered Probit (2)	Ordered Probit (3)	Ordered Probit (4)	Ordered Probit (5)	Ordered Probit (6)	Ordered Probit (7)
Ln (Real HH Income)	0.367	0.236		0.064	0.073	0.146	0.209
	(0.010)	(0.007)		(0.014)	(0.014)	(0.010)	(0.014)
Ln (Real Equiv. HH Income)			0.231				
			(0.007)				
Ln (Real Median	-0.046	-0.067	-0.060	0.156		0.073	
County HH Income)	(0.018)	(0.015)	(0.015)	(0.022)		(0.018)	
Relative Rank in County				0.627	0.594		
				(0.036)	(0.036)		
Median County HH Income:							
Less than $30k					Omitted		
[30000, 40000[					0.001		
					(0.010)		
[40000, 50000[					0.026		
					(0.012)		
[50000, 60000[					0.059		
					(0.015)		
[60000, 70000[					0.078		
					(0.018)		
More than $70k					0.118		
					(0.023)		
Relative Rank:							
Less than 0.20						Omitted	
[0.20, 0.40[						0.025	
						(0.008)	
[0.40, 0.60[						0.102	
						(0.011)	
[0.60, 0.80[						0.217	
						(0.014)	
More than 0.80						0.280	
						(0.021)	
Over Median							0.227
							(0.015)
Under Median							0.056
							(0.017)
Control Variables							
Socioeconomic Controls	✓	✓	✓	✓	✓	✓	✓
State Dummies	✓	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓	✓
Observations	1,737,499	1,737,499	1,737,499	1,737,499	1,737,499	1,737,499	1,737,499

Note: All estimates are weighted using the final weight associated to each respondent. Robust standard errors are in parentheses, clustered by county. The period covered is 2005-2010. In the first column, only state and year dummies are included. The remaining columns include socioeconomics variables (described in the text). Household income has 8 categories. The log of the real household income is calculated using the middle point of each category (see Appendix). Columns 5 and 6 include dummies to test nonlinearities. Section 2 describes the two variables "Over Median" and "Below Median".

Table 3: Life Satisfaction, Income Spillovers and Public Goods, BRFSS.

Ordered Probit	Life Satisfaction (1)	Life Satisfaction (2)	Life Satisfaction (3)	Life Satisfaction (4)	Life Satisfaction (5)
Ln (Real HH Income)	0.066	0.060	0.064	0.065	0.061
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Ln (Real Median	0.120	0.112	0.153	0.137	0.061
County HH Income)	(0.026)	(0.023)	(0.021)	(0.021)	(0.021)
Relative Rank in County	0.618	0.641	0.627	0.623	0.639
	(0.037)	(0.038)	(0.037)	(0.036)	(0.038)
Control Variables					
Socioeconomic Controls	✓	✓	✓	✓	✓
Unemp. Rate and Owner-Occ.	✓				✓
% of Elderly and % HS Grad.		✓			✓
Population Density and Urban.			✓		✓
Criminality				✓	✓
State Dummies	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓
Observations	1,737,499	1,737,499	1,737,499	1,737,499	1,737,499

Note: All estimates are weighted using the final weight associated to each respondent. Robust standard errors are in parentheses, clustered by county. The period covered is 2005-2010. All the columns include state and year dummies in addition to socioeconomics variables (described in the text). Column one includes the unemployment rate at the county-level, the number of owner-occupied housing units per inhabitant and the median value of specified owner-occupied housing units. The second column includes the percentage of population 65 years and over and the percentage of high school graduate. The third column includes the urbanization rate and the population density. Column four includes one index of criminality: the number of murders and nonnegligent manslaughters known to police per capita. See Appendix for more details about these county-level variables.

Table 4: Life Satisfaction, Income Spillovers and Poverty, BRFSS.

Life Satisfaction	Ordered Probit (1)	Ordered Probit (2)	Ordered Probit (3)	Ordered Probit (4)	Ordered Probit (5)	Ordered Probit (6)
Ln (Real HH Income)	0.064	0.065	0.065	0.064	0.065	0.066
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Ln (Real Median	0.146	0.090	0.091	0.158	0.106	0.104
County HH Income)	(0.034)	(0.031)	(0.029)	(0.035)	(0.032)	(0.029)
Relative Rank in County	0.625	0.624	0.624	0.627	0.623	0.622
	(0.036)	(0.037)	(0.037)	(0.036)	(0.036)	(0.036)
People all Ages	-0.0005			0.0012		
in Poverty (%)	(0.0013)			(0.0013)		
People under 18		-0.0024			-0.0012	
in Poverty (%)		(0.0008)			(0.0009)	
Children Age 5 to 17			-0.0025			-0.0014
in Families in Poverty (%)			(0.0008)			(0.0008)
Control Variables						
Socioeconomic Controls	✓	✓	✓	✓	✓	✓
Criminality				✓	✓	✓
State Dummies	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓
Observations	1,737,499	1,737,499	1,737,499	1,737,499	1,737,499	1,737,499

Note: All estimates are weighted using the final weight associated to each respondent. Robust standard errors are in parentheses, clustered by county. The period covered is 2005-2010. All the columns include state and year dummies in addition to socioeconomics variables (described in the text). Columns 4, 5 and 6 add one index of criminality: the number of murders and nonnegligent manslaughters known to police per capita.

Table 5: Life Satisfaction and Income Spillovers at the ZIP Code-Level, BRFSS.

Ordered Probit	*Min. 50 Respondents per ZIP Code*				*Min. 50 Respondents per ZIP Code/Year*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln (Real HH Income)	0.272	0.225	0.226	0.234	0.271	0.183	0.188	0.210
	(0.005)	(0.009)	(0.009)	(0.008)	(0.007)	(0.017)	(0.016)	(0.012)
Ln (1999 Real Median	0.077	0.132		0.125	0.075	0.189		0.157
ZIP Code HH Income)	(0.013)	(0.017)		(0.015)	(0.020)	(0.030)		(0.025)
Relative Rank (ZIP Code)		0.165	0.158			0.299	0.285	
		(0.037)	(0.037)			(0.036)	(0.036)	
Median ZIP Code HH Income:								
Less than $30k			Omitted				Omitted	
[30000, 40000[			-0.004				-0.031	
			(0.010)				(0.015)	
[40000, 50000[			0.035				0.021	
			(0.012)				(0.019)	
[50000, 60000[			0.075				0.075	
			(0.014)				(0.021)	
[60000, 70000[			0.121				0.153	
			(0.019)				(0.030)	
More than $70k			0.133				0.174	
			(0.020)				(0.033)	
Relative Rank:								
Less than 0.20				Omitted				Omitted
[0.20, 0.40[				0.002				0.024
				(0.009)				(0.013)
[0.40, 0.60[				0.046				0.080
				(0.012)				(0.018)
[0.60, 0.80[				0.086				0.133
				(0.016)				(0.026)
More than 0.80				0.104				0.168
				(0.019)				(0.033)
Control Variables								
Socioeconomic Controls	✓	✓	✓	✓	✓	✓	✓	✓
County Dummies	✓	✓	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓	✓	✓
Observations	220,428	220,428	220,428	220,428	118,762	118,762	119,571	118,762

Note: Robust standard errors are in parentheses, clustered by ZIP Code. The period covered is 2005-2010 (except for Texas (2007-2010)). County and year dummies are included in the model in addition to socioeconomics variables (described in the text). Household income has 8 categories. The log of the real household income is calculated using the middle point of each category (see Appendix). The first four columns restrict the sample to ZIP codes where the number of respondents is greater than 50 for statistical reliability. We combine all the years when doing such an exercise which increases the number of ZIP codes that we may use. We then, for columns 5 to 8, restrict the sample to ZIP codes having more than 50 respondents for a given year.

Table 6: Relationship Between Life Satisfaction and Income Spillovers, SMP.

Life Satisfaction	Ordered Probit (1)	Ordered Probit (2)	Ordered Probit (3)	Ordered Probit (4)	Ordered Probit (5)	Ordered Probit (6)	Ordered Probit (7)
Ln (HH Income)	0.107	0.354	0.353	0.147	0.143	0.265	0.058
	(0.097)	(0.132)	(0.132)	(0.183)	(0.182)	(0.176)	(0.156)
Ln (Ln (Median HH Income 0-334m)	-0.191	-0.214	-0.213	-0.097	-0.095	-0.146	
	(0.116)	(0.129)	(0.128)	(0.142)	(0.140)	(0.163)	
ln (Median HH Income 334-667m)			0.029		0.042		
			(0.175)		(0.177)		
Relative Rank (0-334 m)				0.627	0.633		
				(0.351)	(0.346)		
Relative Rank:							
Less than 0.20						Omitted	
[0.20, 0.40[						0.427	
						(0.345)	
[0.40, 0.60[						0.280	
						(0.279)	
[0.60, 0.80[						0.471	
						(0.374)	
More than 0.80						0.414	
						(0.393)	
Over Median							-0.019
							(0.019)
Under Median							-0.038
							(0.021)
Control Variables							
Socioeconomic Controls		✓	✓	✓	✓	✓	✓
Observations	325	321	321	321	321	321	321

Note: Robust standard errors are in parentheses, clustered by precinct. In the first column. no controls are included. The remaining columns include socioeconomics variables (described in the text). Household income has 16 categories. The log of household income is calculated using the middle point of each category (see Appendix). Columns 3 and 5 include dummies to test nonlinearities. Section 2 describes the two variables "Richer than Median" and "Poorer than Median".

Table 7: Life Satisfaction, Income Spillovers and Public Goods, SMP.

Ordered Probit	Life Satisfaction (1)	Life Satisfaction (2)	Life Satisfaction (3)	Life Satisfaction (4)	Life Satisfaction (5)
Ln (HH Income)	0.147	0.164	0.132	0.095	0.120
	(0.183)	(0.193)	(0.189)	(0.193)	(0.209)
Ln (Median HH	-0.097	-0.150	-0.098	-0.130	-0.163
Income 0-334m)	(0.142)	(0.160)	(0.133)	(0.144)	(0.150)
Relative Rank (0-334m)	0.627	0.586	0.729	0.733	0.741
	(0.351)	(0.360)	(0.360)	(0.350)	(0.371)
Control Variables					
Socioeconomic Controls	✓	✓	✓	✓	✓
Distance - Subway Station		✓			✓
Distance - Park			✓		✓
Distance - Libraries				✓	✓
Observations	321	321	321	321	321

Note: Robust standard errors are in parentheses, clustered by precinct. In the first column, no public goods are included. The remaining columns include respectively distances to the nearest subway station, park and libraries.

Table 8: Summary.

	County			**ZIP Code**		**Street**		
y_i	+	+	+	+	+	+	+	+
$y_i \| y*$	-	+	0+	+	+	-	0-	0- -
f_i		+	+		+		+	+
Control Variables								
Public Goods			✓					✓
State Dummies	✓	✓	✓					
County Dummies				✓	✓			
Year Dummies	✓	✓	✓	✓	✓			
Socioeconomic Controls	✓	✓	✓	✓	✓	✓	✓	✓
Cluster	County	County	County	ZIP Code	ZIP Code	Precinct	Precinct	Precinct

Note: See Tables 2 and 3 for a description of county-level regressions. See Table 5 for a description of ZIP code-level regression. See Tables 6 and 7 for a description of Street-level regressions.

VIII. Appendix A

A. List of variables coming from USA Counties

When there was no information for some years, the last year available is used as a replacement. For instance, the number of violent crimes known to police in 2008 is used for the years 2009-10.

- County Median Household Income (2005-09) U.S. Census Bureau (e.g. IPE010209D)

Household income is total money income received in a calendar year by all household members 15 years and over. Total money income is the sum of amounts reported separately for income from wages or salaries; nonfarm self-employment; farm self-employment; social security; public assistance; and all other regularly received income such as veterans' payments, pensions, unemployment compensation, and alimony. Receipts not counted as income include various 'lump-sum' payments such as capital gains or inheritances. The total represents the amount of income received before deductions for personal income taxes, etc (see Source Notes and Explanations - Appendix A at http://www.census.gov/support/USACdata.html). See the next subsection for details on the methodology to create the real median household income.

- Owner-Occupied Housing Units (in 2000) U.S. Census Bureau (HSG440200D)
- Median value of specified owner-occupied housing units (sample in 2000) U.S. Census Bureau (HSG495200D)
- Population per Square Mile (2010) U.S. Census Bureau (POP060210D)
- Urban population (in 2000) U.S. Census Bureau (POP110200D)
- Percentage of High School Graduate or Higher, 25 years old and over (2005-09) U.S. Census Bureau (EDU635209D)
- Number of Violent Crimes Known to Police (2005-2008) U.S. Census Bureau (e.g. CRM110208D)
- Number of Murders and Nonnegligent Manslaughters Known to Police (2005-2008) U.S. Census Bureau (e.g. CRM140208D)
- Number of Robberies Known to Police (2005-2008) U.S. Census Bureau (e.g. CRM160208D)
- Resident population 65 years and over, percent (2005-2009) U.S. Census Bureau (e.g. AGE775209D)

- People of all ages in poverty - percent (2005-2009) U.S. Census Bureau (e.g. IPE120209D)
- People under age 18 in poverty - percent (2005-2009) U.S. Census Bureau (e.g. IPE220209D)
- Related children age 5 to 17 in families in poverty - percent (2005-2009) U.S. Census Bureau (e.g. IPE320209D)
- Unemployment Rate (county for the BRFSS) Bureau of Labor Statistics (as of 2011/11/08)

B. ZIP Code

- ZIP Code Median Household Income (1999) U.S. Census Bureau

The U.S. Census Bureau does not report statistics at the ZIP code-level (five digits) since the land area covered is not always well identified. Instead, the 2000 and 2010 Census report statistics for ZIP Code Tabulation Areas (ZCTAs). ZCTAs are: "generalized area representations of U.S. Postal Services (USPS) ZIP code service areas. They represent the most frequently occurring five-digit ZIP code found in a given area" (www.census.gov/geo/ZCTA.html). In most cases, the ZCTA code is the same as the ZIP code for an area.

C. Somerville

We match the address of residence with different measures of public goods. See Heller (2011) for more details.

- Subway station addresses (www.mbta.com)
- Somerville parks, City of Somerville (Census 2009)
- Public library addresses (www.somervillepubliclibrary.org/contactus.html)

D. Creation of the variable *ln(household income)*

Household income of respondents is available in categories in the three surveys. The number of categories is respectively 16 and 8 for the SMP and BRFSS. Our strategy for computing *ln(HH. Income)* is the following. We give the middle point of the household income category to the respondents. For instance, if a respondent answered between $50,000 and $60,000, then $55,000 is his household income. Top and bottom-coded categories receive a special treatment. All top-coded income are replaced by 1.5 the value of the topcode. We verify that this has no effect on our findings by using also 1, 2 and 2.5 (Appendix Tables). For the bottom-coded income category, the value was divided by 2. Once again, this does not affect the main estimates of this paper. For the BRFSS, the median household income at the county-level and the household income of respondents are in 2005 dollars. We also used in some specifications (when it is mentioned) the household income per equivalent. This measure proposed by the OECD takes into account the number of individuals in the household. We limit the number of other adults and kids to three. Household income per equivalent is a quartic in log real family income = 1 + 0.5 (other adults) + 0.3 kids.

E. Ranking

"Rank" measures the second moment of the income distribution and determines the relative position in the reference group income ranking. This variable is created using the variable household income and by computing the number of households for a specific reference group (i.e. by county and year in the BRFSS). The household's normalized rank in the income distribution is defined as the rank in the county / number of households in the county. This normalized rank is just over zero for the poorest households and one for the richest households. Remember that household income is available only in categories which explains that more than one household may have the same ranking. This explains why the richest households do, most of the times, have a value near one. The only case in which one household have a rank of one is that only one household is in the top-coded income category.

F. Weights

For all our equations in this paper using the BRFSS data and county-level data, the personal sampling weights is used to have representatives sample (at the state-level). As a specification check, we also re-scaled the weights from each cycle to sum up to one for each year since the sample size of the BRFSS increased dramatically between the waves 2006-2007. This methodology had no effect on our main estimates (available upon request). See Pfeffermann (1993) and Angrist and Pischke (2009) for a discussion on the role of sampling weights.

IX. Appendix Tables

Table A.1: Life Satisfaction and Income Spillovers at the County-Level, BRFSS.

Panel A: Bottom-Coded Income Category Divided by 2								
Ordered Probit	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5
Ln (Real HH Income)	0.243	0.236	0.219	0.204	-0.016	0.064	0.105	0.115
	(0.008)	(0.007)	(0.006)	(0.005)	(0.013)	(0.014)	(0.011)	(0.009)
Ln (Real Median County HH Income)	-0.042	-0.067	-0.076	-0.081	0.244	0.156	0.092	0.063
	(0.015)	(0.015)	(0.015)	(0.015)	(0.019)	(0.022)	(0.020)	(0.019)
Relative Rank in County					0.860	0.627	0.462	0.393
					(0.028)	(0.036)	(0.033)	(0.029)
Panel B: Bottom-Coded Income Category Divided by 1.5								
Ordered Probit	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5
Ln (Real HH Income)	0.297	0.256	0.233	0.214	-0.006	0.105	0.145	0.144
	(0.009)	(0.007)	(0.006)	(0.005)	(0.016)	(0.016)	(0.012)	(0.009)
Ln (Real Median County HH Income)	-0.049	-0.073	-0.082	-0.085	0.235	0.112	0.043	0.025
	(0.015)	(0.015)	(0.015)	(0.015)	(0.021)	(0.023)	(0.020)	(0.018)
Relative Rank in County					0.836	0.512	0.339	0.297
					(0.033)	(0.041)	(0.035)	(0.030)
Control Variables								
Socioeconomic Controls	✓	✓	✓	✓	✓	✓	✓	✓
State Dummies	✓	✓	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓	✓	✓

Note: All estimates are weighted using the final weight associated to each respondent. Robust standard errors are in parentheses, clustered by county. The period covered is 2005-2010. State and year dummies are included in addition to socioeconomics variables (described in the text). Household income has 8 categories. The log of the real household income is calculated using the middle point of each category (see Appendix). Observations: 1,737,499.

Table A.2: Life Satisfaction and Income Spillovers at the ZIP Code-Level, BRFSS.

At Least 50 Respondents per ZIP Code

Panel A: Bottom-Coded Income Category Divided by 2								
Ordered Probit	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5
Ln (Real HH Income)	0.278	0.272	0.252	0.234	0.154	0.225	0.230	0.216
	(0.006)	(0.005)	(0.004)	(0.004)	(0.010)	(0.009)	(0.008)	(0.007)
Ln (1999 Real Median ZIP Code HH Income)	0.096	0.077	0.071	0.069	0.225	0.132	0.100	0.094
	(0.012)	(0.012)	(0.012)	(0.012)	(0.018)	(0.017)	(0.016)	(0.016)
Relative Rank in ZIP Code					0.402	0.165	0.086	0.076
					(0.026)	(0.027)	(0.026)	(0.026)
Panel B: Bottom-Coded Income Category Divided by 1.5								
Ordered Probit	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5
Ln (Real HH Income)	0.310	0.295	0.268	0.246	0.198	0.277	0.268	0.241
	(0.006)	(0.005)	(0.004)	(0.004)	(0.011)	(0.010)	(0.009)	(0.007)
Ln (1999 Real Median ZIP Code HH Income)	0.091	0.072	0.067	0.066	0.197	0.091	0.068	0.072
	(0.013)	(0.012)	(0.012)	(0.012)	(0.018)	(0.016)	(0.019)	(0.015)
Relative Rank in ZIP Code					0.327	0.058	0.003	0.019
					(0.027)	(0.027)	(0.032)	(0.026)
Control Variables								
Socioeconomic Controls	✓	✓	✓	✓	✓	✓	✓	✓
County Dummies	✓	✓	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓	✓	✓

Note: Robust standard errors are in parentheses, clustered by ZIP Code. The period covered is 2005-2010 (except for Texas (2007-2010)). County and year dummies are included in addition to socioeconomics variables (described in the text). Household income has 8 categories. The log of the real household income is calculated using the middle point of each category (see Appendix). Observations: 220,428.

Table A.3: Life Satisfaction and Income Spillovers at the ZIP Code-Level, BRFSS.

At Least 50 Respondents per ZIP Code per Year

Panel A: Bottom-Coded Income Category Divided by 2								
Ordered Probit	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5
Ln (Real HH Income)	0.277	0.271	0.251	0.232	0.084	0.183	0.209	0.201
	(0.008)	(0.007)	(0.006)	(0.006)	(0.016)	(0.017)	(0.015)	(0.013)
Ln (1999 Real Median ZIP Code HH Income)	0.099	0.075	0.067	0.065	0.319	0.189	0.128	0.115
	(0.020)	(0.020)	(0.019)	(0.019)	(0.027)	(0.030)	(0.030)	(0.029)
Relative Rank in ZIP Code					0.611	0.299	0.156	0.129
					(0.046)	(0.055)	(0.055)	(0.052)
Panel B: Bottom-Coded Income Category Divided by 1.5								
Ordered Probit	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5
Ln (Real HH Income)	0.307	0.293	0.266	0.243	0.121	0.250	0.261	0.235
	(0.009)	(0.007)	(0.006)	(0.006)	(0.018)	(0.018)	(0.015)	(0.013)
Ln (1999 Real Median ZIP Code HH Income)	0.092	0.069	0.063	0.062	0.290	0.122	0.069	0.075
	(0.020)	(0.019)	(0.019)	(0.019)	(0.028)	(0.032)	(0.031)	(0.030)
Relative Rank in ZIP Code					0.539	0.136	0.016	0.034
					(0.050)	(0.058)	(0.055)	(0.052)
Control Variables								
Socioeconomic Controls	✓	✓	✓	✓	✓	✓	✓	✓
County Dummies	✓	✓	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓	✓	✓

Note: Robust standard errors are in parentheses, clustered by ZIP Code. The period covered is 2005-2010 (except for Texas (2007-2010)). County and year dummies are included in addition to socioeconomics variables (described in the text). Household income has 8 categories. The log of the real household income is calculated using the middle point of each category (see Appendix). Observations: 118,762.

Table A.4: Life Satisfaction and Income Spillovers at the ZIP Code-Level (State Fixed Effects), BRFSS.

Ordered Probit	*Min. 50 Respondents per ZIP Code*				*Min. 50 Respondents per ZIP Code/Year*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln (Real HH Income)	0.270	0.230	0.230	0.236	0.269	0.205	0.208	0.220
	(0.005)	(0.009)	(0.009)	(0.008)	(0.007)	(0.016)	(0.015)	(0.012)
Ln (1999 Real Median	0.011	0.057		0.054	0.005	0.087		0.072
ZIP Code HH Income)	(0.012)	(0.014)		(0.014)	(0.018)	(0.026)		(0.023)
Relative Rank (ZIP Code)		0.139	0.137			0.222	0.213	
		(0.027)	(0.026)			(0.054)	(0.049)	
Median ZIP Code HH Income:								
Less than $30k			Omitted				Omitted	
[30000, 40000[			-0.014				-0.029	
			(0.010)				(0.013)	
[40000, 50000[			-0.007				-0.017	
			(0.012)				(0.017)	
[50000, 60000[			0.030				0.030	
			(0.013)				(0.020)	
[60000, 70000[			0.053				0.065	
			(0.018)				(0.029)	
More than $70k			0.063				0.094	
			(0.020)				(0.036)	
Relative Rank:								
Less than 0.20				Omitted				Omitted
[0.20, 0.40[				-0.003				0.016
				(0.009)				(0.013)
[0.40, 0.60[				0.038				0.063
				(0.012)				(0.019)
[0.60, 0.80[				0.075				0.110
				(0.016)				(0.026)
More than 0.80				0.092				0.141
				(0.019)				(0.033)
Control Variables								
Socioeconomic Controls	✓	✓	✓	✓	✓	✓	✓	✓
State Dummies	✓	✓	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓	✓	✓
Observations	220,428	220,428	220,428	220,428	118,762	118,762	119,571	118,762

Note: Robust standard errors are in parentheses, clustered by ZIP Code. The period covered is 2005-2010 (except for Texas (2007-2010)). State and year dummies are included in addition to socioeconomics variables (described in the text). Household income has 8 categories. The log of the real household income is calculated using the middle point of each category (see Appendix).

Table A.5: Relationship Between Happiness and Income Spillovers, SMP.

Happiness	Ordered Probit (1)	Ordered Probit (2)	Ordered Probit (3)	Ordered Probit (4)	Ordered Probit (5)	Ordered Probit (6)	Ordered Probit (7)
Ln (HH Income)	0.144	0.276	0.265	0.101	0.072	0.260	0.077
	(0.077)	(0.137)	(0.138)	(0.197)	(0.201)	(0.176)	(0.166)
Ln (Ln (Median HH Income 0-334m)	-0.161	-0.132	-0.119	-0.033	-0.009	-0.119	
	(0.135)	(0.131)	(0.124)	(0.178)	(0.171)	(0.186)	
ln (Median HH Income 334-667m)			0.337		0.351		
			(0.164)		(0.166)		
Relative Rank (0-334 m)				0.527	0.585		
				(0.484)	(0.486)		
Relative Rank:							
Less than 0.20						Omitted	
[0.20, 0.40[						0.047	
						(0.396)	
[0.40, 0.60[						-0.059	
						(0.379)	
[0.60, 0.80[						-0.051	
						(0.433)	
More than 0.80						0.062	
						(0.479)	
Over Median							-0.003
							(0.012)
Under Median							-0.034
							(0.019)
Control Variables							
Socioeconomic Controls		✓	✓	✓	✓	✓	✓
Observations	325	321	321	321	321	321	321

Note: Robust standard errors are in parentheses. clustered by precinct. In the first column. no controls are included. The remaining columns include socioeconomics variables (described in the text). Household income has 16 categories. The log of household income is calculated using the middle point of each category (see Appendix). Columns 3 and 5 include dummies to test nonlinearities. Section 2 describes the two variables "Richer than Median" and "Poorer than Median".

Table A.6: Life Satisfaction and Income Spillovers at the Street-Level, SMP.

Somerville

Panel A: Bottom-Coded Income Category Divided by 2								
Ordered Probit	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5
Ln (HH Income)	0.354	0.354	0.354	0.354	0.147	0.147	0.147	0.147
	(0.132)	(0.132)	(0.132)	(0.132)	(0.183)	(0.183)	(0.183)	(0.183)
Ln (Median HH Income 0-334m)	-0.214	-0.214	-0.214	-0.214	-0.097	-0.097	-0.097	-0.097
	(0.129)	(0.129)	(0.129)	(0.129)	(0.142)	(0.142)	(0.142)	(0.142)
Relative Rank (0-334m)					0.627	0.627	0.627	0.627
					(0.351)	(0.351)	(0.351)	(0.351)
Panel B: Bottom-Coded Income Category Divided by 1.5								
Ordered Probit	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5	Top Multi. by 1	Top Multi. by 1.5	Top Multi. by 2	Top Multi. by 2.5
Ln (HH Income)	0.355	0.355	0.355	0.355	0.147	0.147	0.147	0.147
	(0.131)	(0.131)	(0.131)	(0.131)	(0.183)	(0.183)	(0.183)	(0.183)
Ln (Median Income 0-334m)	-0.231	-0.231	-0.231	-0.231	-0.104	-0.104	-0.104	-0.104
	(0.136)	(0.136)	(0.136)	(0.136)	(0.152)	(0.152)	(0.152)	(0.152)
Relative Rank (0-334m)					0.628	0.628	0.628	0.628
					(0.358)	(0.358)	(0.358)	(0.358)
Control Variables								
Socioeconomic Controls	✓	✓	✓	✓	✓	✓	✓	✓

Note: Robust standard errors are in parentheses, clustered by precinct. Household income has 16 categories. The log of household income is calculated using the middle point of each category (see Appendix). Observations: 321.