# Homeownership and ill-being

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**Gintautas Bloze**

**and**

**Morten Skak**

Discussion Papers on Business and Economics
No. 5/2011

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Department of Business and Economics
Faculty of Social Sciences
University of Southern Denmark
Campusvej 55
DK-5230 Odense M
Denmark

Tel.: +45 6550 3271
Fax: +45 6550 3237
E-mail: lho@sam.sdu.dk
http://www.sdu.dk/ivoe

ISBN 978-87-91657-48-1

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Gintautas Bloze* and Morten Skak**

University of Southern Denmark***

**Abstract:** Social policy aims to relieve the ill-being of low income groups, and housing policies in many European countries promote homeownership for low-income households. Previous economic research on subjective well-being seems to indicate that homeownership increases subjective well-being, but little research is done on the relations between homeownership and ill-being. The present study tries to fill some of this gap by use of panel data from three Danish surveys on living conditions in the years 1976, 1986 and 2000.

**JEL Classification:** D1, I1, R2

**Keywords:** Ill-being, Subjective well-being, Homeownership.

* Gintautas Bloze: E-mail gbl@sam.sdu.dk. University of Southern Denmark, Department of Business and Economics, Campusvej 55, DK-5230 Odense M, Denmark.

** Morten Skak: E-mail mos@sam.sdu.dk. University of Southern Denmark, Department of Business and Economics, Campusvej 55, DK-5230 Odense M, Denmark.

*** The paper is written as a part of the Centre for Housing and Welfare - Realdania Research Project.
Economic support from Realdania is acknowledged.

## 1. Introduction

Private ownership is a crucial part of all market economies and an important aspect of individual freedom. This includes the right to own the dwelling, which constitutes the person's or family's home. When asked, a fairly constant share of approximately three quarters of Danish families[1] want to own their home, mainly because the right of disposal is said to be of importance and thus adds to the welfare of persons and families. In addition to the impact on personal welfare, homeownership may also have a positive effect on the social behaviour of individuals, improving their social capital with important positive implications for the functioning of society.

Dietz and Haurin (2003) present an extensive review of the literature on the impact of homeownership on the economic and social behaviour of owners. They identify the following areas where homeownership may have an impact:

- Household wealth and portfolio choice
- Mobility
- Labor force participation
- Urban structure and segregation
- Home maintenance
- Political and social activities
- Health
- Demographics
- Self-esteem

[1] See Kristensen and Andersen (2009)

- Child outcomes

If homeownership creates benefits compared to renting, it would be welfare-improving for a social planner to engage in active support of homeownership. The typical textbook question is what the social planner should do in order to maximise a social welfare function that has individuals' utility as arguments. Social policy, however aims to relieve the ill-being among individuals, and an important question for social housing policy is how ownership of the home may affect the ill-being of individuals. Thus, housing policies in many European countries are directed at promoting homeownership and in many cases especially for low-income households; see the European Central Bank (2003).

Like other economic studies in the field, the present study aims to detect whether or not homeownership has a significant influence on the welfare of individuals. But nearly all previous studies use various measures of self reported or subjective well-being. Only a few studies on Australian data have the concept ill-being. Where our study is hampered by the use of older data and by having only three fairly distant years in the panel, it adds to our knowledge in the field by its use of indicators of psychological distress and a rich number of control variables compared to most other studies.

Our data are from the Danish Living Conditions Survey, conducted in the years 1976, 1986 and 2000, and contain both panel and cross-section elements. The enquiry does not contain the often used question: All in all, do you feel satisfied with your life? But it has answers to five questions about whether or not the respondent is often tired, in a bad mood, has weak nerves, is afraid, and takes pills against these maladies; we use this to construct a measure for ill-being or psychological distress or mental health. Apart from the tenure status and changes

of this, the data allows us to control for a number of changes in the respondent's living conditions that may potentially influence the ill-being.

We conclude from our analysis that homeownership and ill-being is negatively correlated and that the effect seems to be highest for the low income group. This is good news for governments who have the promotion of homeownership for low-income households as part of their social policy.

The next section gives a short overview of previous research and discusses the conceptual framework. Section three describes the data at hand and section four starts with ordinary least squares (OLS) regressions for the three years followed by instrumented (IV) and fixed effect (FE) estimations of the respondents' ill-being. Finally, FE regressions are done separately for high and low income groups and with relative income. Section five presents our conclusion.

## 2. Previous research and the conceptual framework

For a social planner - and thereby for economists - it is of decisive importance to know what affects life satisfaction, happiness, well-being and ill-being of individuals, and this has led to an increasing amount of literature attempting to explain the determining factors for these concepts. Self-reported or subjective well-being (SWB) is a natural variable to choose as an indicator of individual welfare, and Krueger and Schalke (2008) test the reliability of this measure using the SWB of 229 women interviewed two weeks apart. They conclude that the reported SWB is a fairly reliable measure of the respondents' SWB and that it can be meaningfully used for empirical analysis, especially where group mean SWBs are compared. Also van Praag et al. (2003) find that answers to subjective questions are a useful instrument for measuring individual satisfaction, happiness and well-being.

There is an abundant empirical literature on factors determining human well-being or happiness by e.g. Clark and Oswald (1994, 2002), Oswald (1997), Theodossiou (1998), Frey and Stutzer (2002), Frijters et al. (2004), Van Praag and Ferrer-i-Carbonell (2004), Graham (2005), Shields and Wheatley (2005), Easterlin (2006) and Blanchflower and Oswald (2007, 2008) just to mention some. Some of those also take housing into account. One of the studies that included homeownership (Clark and Oswald 2002) showed that becoming a tenant is associated with a significant drop in well-being.

There are also a few studies that have focused on housing and homeownership more explicitly. Early studies of the influence of housing on social behavior are Rossi and Weber (1996) who, using a simple cross-sectional setting, showed that owner households rate their well-being more positively than renters. Rohe and Basolo (1997) find higher neighbourhood involvement among homeowners, and DiPasquale and Glaeser (1999) demonstrate a positive relation between homeownership and social capital. More recently, Dietz and Haurin (2003) have made an extensive review of the literature on homeownership and they claim that most of the pre-1990 studies are unreliable and that there are numerous gaps in the literature on the effect of homeownership that need to be filled in with new and more reliable research. Diaz-Serrano (2009) uses the eight waves of the European Community Household Panel to study effects on reported housing satisfaction and find that homeowners derive more satisfaction than tenants from the same housing context. Also the shift into homeownership without change of dwelling is found to raise the level of satisfaction. Bucchianeri (2009), using a sample of 809 women, showed that homeowners are happier than tenants.

In our study, the focus is on ill-being, sometimes called psychological distress or low mental health. Ill-being is not the low end of the scale measuring the level of well-being, but a different mental concept with its own causes. There is evidence that people may experience high levels of well-being and ill-being at the same time, see Headey et al. (1974) and Huppert and Whittington (2003). While well-being is measured by the degree life satisfaction, i.e. answers to the question "How satisfied are you with your life?", ill-being is measures by anxieties or psychological distress and somatic complaints. A few economic papers like Headey et al. (1984), Headey and Wooden (2004) and Lee and Oguzoglu (2007) include the concept ill-being, but to our knowledge no prior study focuses on the relation between homeownership and ill-being.

We construct an ill-being index based on answers to five questions about psychological distress. The questions used are: Do you often feel tired? Are you often in a bad mood? Do you often have weak nerves? Are you often afraid? Do you often take sleeping pills, painkillers, tranquilisers or pills against headache? We use the question about pills as a weighting option as one could argue that it underlines the severity of the distress. In case the answers are "no" to all questions, we interpret this as the lowest state of ill-being corresponding to the value 0, and if the answers are yes to all the questions, then the respondent is on the highest level of ill-being, i.e. the highest possible state of psychological distress. This questioning method may be less suggestive that a direct question about the respondent's ill-being, but the index variable has the disadvantage that its distribution is left skewed because many respondents answer "no" to all questions. This lack of normal distribution of the dependent variable violates the assumptions behind the conventional OLS model. Because of this, we have also done an ordered logistic regression, though the results were not significantly different from OLS. It is assumed that the ill-being of individuals

depends on a set of individual characteristics and a set of residential attributes and that two alternatives with different attributes will provide different ill-being levels. Our regressions are furthermore made on the assumption that respondents who give the same number of yes answers to the questions have similar ill-being levels. Among the residential attributes we include three types of tenure, namely private homeownership, tenancy and cooperative ownership, where homeownership is the tenure of main interest. Empirically, the assumptions can be tested by comparing contributions of attributes to the ill-being of individuals. A standard empirical model typically applied in happiness and SWB studies (Frey and Stutzer 2002), which we also apply, is given by:

$$Illbeing_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \quad (1)$$

$Illbeing_{it}$ is an ordinal measure of ill-being of individual *i* at time *t*, and $X_{it}$ is a vector of sociodemographic and socioeconomic characteristics of the respondent, in our case also containing a dummy indicator for the respondent being or not being a homeowner. The hypothesis to be tested is that once the other sociodemographic and socioeconomic factors are controlled for, the coefficient for homeownership will remain significant and negative.

## 3. Data

The data are from the Danish Living Conditions Survey conducted by the Danish National Centre for Social Research and the Department of Sociology at the University of Copenhagen. The interviews were conducted in the years 1976, 1986 and 2000, and the data contain both panel and cross-section elements. 9317 people were extracted to participate in the surveys, out of which 7929 participated in at least one survey, 2109 participated in two surveys and 2335

respondents have participated in all three surveys. With a time span of ten and fourteen years between the three years of observations, many unobserved events have happened before and in the intermediate years which have an effect on the individuals' ill-being. We have no possibility of accounting for this. Neither is our dataset so rich that we can investigate housing carriers and ill-being over individual life spans. For example, it could be that changing into homeownership increases ill-being (psychological stress) in the early years on the labor market, while moving out of homeownership reduces ill-being in the years after retirement. Longitudinal data for persons have the problem that some persons drop out over the years. In the present surveys, persons in the lower social strata and older persons[2] have a higher dropout rate than the average person. Potentially, this may influence our results.

Besides renting and private homeownership we have rentals with cooperative ownership.[3] Rentals with cooperative ownership are seen as a medium form where renters exercise their right of disposal in common. Also, these tenants have to buy a share of the society's wealth in addition to the payment of a (comparatively low) rent. We consider rentals with cooperative ownership to be a lower degree of ownership than private homeownership and we expect to find a negative relationship with ill-being when compared to conventional renting, but a lower level when compared to private homeownership. Some households use rentals with cooperative ownership as a stepping stone for later acquirement of private ownership, but many stay in the dwelling for life. The highest fraction of respondents living in rentals with cooperative ownership is achieved in 1986 where close to 5 per cent live in these rentals. The interviewers' questions about the respondents' income were unfortunately changed between the three years, which made it impossible to construct a homogenous income

[2] The higher dropout rate is apart from their higher probability of dying.

[3] This ownership type is named andelsboliger in Danish.

variable comparable for the three years. As a consequence of this, we have obtained register based data on taxable income for each respondent, which we have deflated into real terms over the years. Table 1 gives an overview of the variables at our disposal.

**Table 1** Variable description

| Variable | Description | Mean | S.D.[1] | S.D.[2] (within) | Min - Max |
|---|---|---|---|---|---|
| Dependent variable | Ill-being0 (higher = worse) | 0.32 | (0.69) | (0.37) | 0 - 4 |
| | Ill-being1 | 0.52 | (0.91) | (0.47) | 0 - 5 |
| | Ill-being2 | 0.71 | (1.23) | (0.63) | 0 - 6 |
| Owned dwelling | Dummy variable for homeownership = 1 | 0.66 | (0.47) | (0.23) | 0 - 1 |
| Coop dwelling | Dummy variable for cooperative ownership = 1 | 0.03 | (0.18) | (0.10) | 0 - 1 |
| Rented dwelling | Dummy variable for rented dwelling = 1 | 0.31 | (0.4) | (0.23) | 0 - 1 |
| Physical condition | Physical condition (higher = better) | 9.93 | (1.44) | (0.75) | 5 - 15 |
| Male | 0 = woman, 1 = man | 0.49 | (0.50) | - | 0 - 1 |
| Age | Age of respondent | 45.98 | (15.63) | (8.07) | 20 - 93 |
| Income | Taxable income, 1000 DKK | 152.8 | (131.8) | (84.99) | -86.75 – 4,386 |
| Savings | Indicates if the person has savings at least 5000 DKK in bank deposit | 0.54 | (0.50) | (0.30) | 0 - 1 |
| Living alone | 1 = respondent is living alone | 0.17 | (0.37) | (0.21) | 0 - 1 |
| Close friends | Has close friends = 1 | 0.82 | (0.38) | (0.24) | 0 - 1 |
| Practising sports | Practises sports at least once a month = 1 | 0.33 | (0.47) | (0.27) | 0 - 1 |
| Family social group | Social group classification made by Danish sociologists (lower=better) | 2.45 | (1.04) | (0.44) | 1 - 4 |
| Completed education | Has completed job qualifying education = 1 | 0.65 | (0.48) | (0.16) | 0 - 1 |
| Employed | Employed, assisting spouse = 1 | 0.73 | (0.44) | (0.30) | 0 - 1 |
| Unemployed | Unemployed = 1 | 0.04 | (0.20) | (0.13) | 0 - 1 |
| Pensioner | Pensioner or early retirement = 1 | 0.18 | (0.39) | (0.26) | 0 - 1 |
| Student | In education or draftee = 1 | 0.05 | (0.21) | (0.11) | 0 - 1 |
| Discomfort | Number of discomforting elements (draught, damp, cold, noise, air pollution) | 1.54 | (2.54) | (1.51) | 0 - 27 |

| | | | | | |
|---|---|---|---|---|---|
| Equipment | Number of equipment units in the dwelling (own kitchen, own wc, hot water, refrigerator, garden etc.) | 9.41 | (1.56) | (0.91) | 0 - 11 |
| City | Highly urbanised area | 0.22 | (0.42) | (025) | 0 - 1 |
| Detached | Detached family house, , summerhouse = 1 | 0.49 | (0.50) | (0.26) | 0 - 1 |
| Farm house/isolated | Farm house or an isolated house in the countryside | 0.13 | (0.33) | (0.16) | 0 - 1 |
| Semi-detached | Semi-detached family house = 1 | 0.14 | (0.34) | (0.20) | 0 - 1 |
| Multi-family | Apartment building = 1 | 0.24 | (0.43) | (0.20) | 0 - 1 |

Notes: 1) Refers to the deviation from total years observations. 2) Refers to the deviation from each individual's average. The dependent variables Ill-being0, Ill-being1 and Ill-being2 are explained in section 4 below.

## 4. Empirical analysis

As mentioned before, we have five questions about psychological distress. One of the questions is "Do you often take sleeping pills, painkillers, tranquilisers or pills against headache?" and we believe that at positive answer to this question indicates a higher level of distress. The weight to be given to a positive response to this question can be judged by a one-way analysis of variance (ANOVA) and preliminary regressions. Three different weights are tried, namely no inclusion of all or the weight 0, and the weights 1 or 2 for a positive response. The weight 1 is equal to the weight given for a positive response to the other questions, whereas the weight 2 underlines the severity of ill-being. If consumption of pills is equally distributed across the other dimensions of ill-being, weighting should not affect the overall results.

Table 2 compares the ill-being averages of the three types of homeownership by using one way ANOVA. The table reveals that homeowners report on average the lowest ill-being scores compared to people living in cooperative dwellings and ordinary tenants. Tenants on average have the highest ill-being scores. The differences between the averages are

statistically significant. It is also evident that putting more weight on consumption of pills creates more variation in the data, which is desirable for any kind of regressions.

**Table 2** One-way ANOVA of the ill-being averages by type of tenure for the year 2000

| | Ill-being0 | | Ill-being1 | | Ill-being2 | |
|---|---|---|---|---|---|---|
| Type of tenure | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Rented dwelling | 0.39 | 0.79 | 0.63 | 1.04 | 0.87 | 1.39 |
| Coop. dwelling | 0.29 | 0.64 | 0.49 | 0.83 | 0.69 | 1.14 |
| Owner-occupied dwelling | 0.21 | 0.52 | 0.39 | 0.73 | 0.56 | 1.05 |
| Total | 0.27 | 0.62 | 0.46 | 0.85 | 0.66 | 1.36 |
| F-statistic | 37.52*** | | 38.42*** | | 32.79*** | |

Notes: In ill-being0 consumption of pills has value 0, in ill-being1 consumption of pills has value 1 and it has value 2 in ill-being2. Significance at the 1% level: ***.

Obviously, there are other factors than tenure, which affect the psychological distress of individuals, and the question is how the different ill-being variables perform with control for other factors. Table 3 shows results for OLS when the full set of controls is included and renting is the reference tenure. It reveals a gradual lower and more significant ill-being coefficient for owned dwelling when pill consumption is given higher weight. This indicates that pill consumption is unequally distributed among the tenure groups. Clearly, judged by the $R^2$ and F-statistic for the overall performance, putting 0 weight on consumption of pills performs worse compared to the other two cases. The most significant coefficient of ownership is when the weight for consumption of pills is 2 and the F-statistic is also the highest in this case. Based on this, we choose to continue with the ill-being measure where the use of medicine against the maladies is given the weight 2.

**Table 3** OLS for the year 2000

| | Ill-being0 | Ill-being1 | Ill-being2 |
|---|---|---|---|

| Variables | Coeff. (t stat.) | Coeff. (t stat.) | Coeff. (t stat.) |
|---|---|---|---|
| Owned dwelling | -0.06** | -0.11*** | -0.16*** |
| | (-2.19) | (-2.96) | (-3.05) |
| Coop. owned dwelling | -0.01 | -0.01 | -0.01 |
| | (-0.36) | (-0.22) | (-0.12) |
| *Other variables included* | | | |
| N | 4355 | 4355 | 4355 |
| $R^2$ | 0.12 | 0.16 | 0.15 |
| F | 13.16*** | 20.71*** | 22.46*** |

As a base case we present the cross-sectional OLS regressions for each survey year, see table 4. Because our dependent variable, ill-being2, is discrete with an ordinal scale, also an ordered logistic regressions were performed[4]. The general impression is that the results are very similar to the OLS regression both with respect to the direction of the effects and the significance. The sizes of the coefficients are not comparable because the logistic coefficients give the expected change in the ordered log-odds scale of the ill-being.

Being a homeowner compared to being a tenant does not have a significant effect on the ill-being of the respondent in the year 1976, but has a significantly negative effect in the years 1986 and 2000. An intuitive explanation for the insignificance of the coefficient for homeownership is that Denmark was in a deep economic recession in the two years before 1976, and this was not the case for 1986 and 2000. In 1976, the economy was still in an economic aftershock from the first oil crisis in 1973, and homeowners are probably sensitive to economic uncertainty and have experienced a more stress, which is reflected in relatively high ill-being scores in 1976. Persons living in a cooperatively owned housing unit tend mainly to have a lower level of ill-being compared to renting persons, but with only 3 percent

[4] Results for the ordered logistic regression can be found in the appendix.

of the respondents living in cooperatively owned dwellings, the lack of significance is not surprising.

The ill-being is, quite as expected, negatively and robustly affected by the physical condition of the respondent. Furthermore, males are at a significantly lower level of ill-being than women. When it comes to age, the ill-being increases with higher age, but the coefficient for age squared shows a dwindling impact with higher age so that it eventually turns negative. This corresponds with the regression for mental health found in Headey and Wooden (2003). The age effect has a turning point around the age of 50 years in our OLS regressions after which ill-being tend to be falling with age. This shape of the age effect may be explained by greater acceptance of one's life situation when the hair starts turning grey, but cohort effects may influence the cross section analysis. Income has a negative effect on the ill-being. The indication of savings, i.e. the respondent has at least 5,000 Danish kroner on a bank deposit, reduces ill-being, but is insignificant in 1986.

Practising sports has, as one might expect, a significant negative relation with ill-being. Living alone seems to have a positive impact on the ill-being, while having a close friend reduces ill-being. A completed job qualifying education program also seems to reduce ill-being, but the effect is not significant in 1976. Being unemployed increases ill-being and ill-being is strongly correlated with a pensioner position of the respondent. Students, who probably have bright hopes for their future, seem to have a comparatively low levels of ill-being.

**Table 4** OLS, IV and Fixed-Effects regressions on ill-being

| | OLS | | | IV (2000) | FE |
|---|---|---|---|---|---|
| | 1976 | 1986 | 2000 | | |
| Variables | Coeff. | Coeff. | Coeff. | Coeff. | Coeff. |

| | (t stat.) | (t stat.) | (t stat.) | (t stat.) | (t stat.) |
|---|---|---|---|---|---|
| Owned dwelling | -0.06 | -0.20*** | -0.16*** | -0.16 | -0.14*** |
| | (-1.06) | (-2.84) | (-3.05) | (-0.74) | (-2.66) |
| Coop. owned dwelling | -0.23 | -0.13 | -0.01 | | -0.07 |
| | (-1.52) | (-0.86) | (-0.12) | - | (-0.80) |
| Physical condition | -0.13*** | -0.18*** | -0.14*** | -0.14*** | -0.07*** |
| | (-6.67) | (-8.21) | (-8.78) | (-8.33) | (-4.48) |
| Male | -0.20*** | -0.07* | -0.20*** | -0.19*** | |
| | (-4.58) | (-1.81) | (-6.11) | (-6.24) | - |
| Age | 0.05*** | 0.06*** | 0.04*** | 0.04*** | 0.02 |
| | (3.77) | (3.64) | (4.81) | (4.77) | (1.40) |
| Age^2 | -0.0005*** | -0.0006*** | -0.0004*** | -0.0004*** | -0.0002** |
| | (-3.50) | (-4.20) | (-5.15) | (-5.09) | (-2.40) |
| Log of income | -0.07*** | -0.05** | -0.07*** | -0.07*** | -0.04 |
| | (-2.50) | (-2.31) | (-2.59) | (-2.63) | (-1.28) |
| Savings | -0.13*** | -0.02 | -0.13*** | -0.12*** | 0.003 |
| | (-3.21) | (-0.55) | (-3.67) | (-3.42) | (0.09) |
| Living alone | 0.04 | 0.17** | 0.19*** | 0.19*** | 0.05 |
| | (0.47) | (2.14) | (3.66) | (3.91) | (0.98) |
| Practising sports | -0.22*** | -0.20*** | -0.17*** | -0.17*** | -0.09*** |
| | (-5.43) | (-5.33) | (-5.53) | (-5.69) | (-2.77) |
| Close friends | -0.11** | -0.22*** | -0.09* | -0.10** | -0.04 |
| | (-2.00) | (-3.71) | (-1.73) | (-1.98) | (-1.09) |
| Completed education | -0.05 | -0.10** | -0.13*** | -0.14* | -0.07 |
| | (-1.08) | (-2.03) | (-2.93) | (-2.78) | (-1.05) |
| Unemployed | 0.11 | 0.36*** | 0.20** | 0.19* | -0.09 |
| | (0.99) | (2.83) | (1.99) | (1.93) | (-1.04) |
| Pensioner | 1.17*** | 0.77*** | 0.50*** | 0.50*** | 0.17*** |
| | (8.39) | (7.62) | (6.80) | (6.47) | (2.94) |
| Student | -0.14* | -0.28 | -0.17** | -0.19*** | -0.05 |
| | (-1.67) | (-1.45) | (-2.23) | (-2.58) | (-0.49) |
| Discomfort | 0.04*** | 0.04*** | 0.07*** | 0.07*** | 0.03*** |
| | (5.08) | (4.04) | (6.49) | (6.46) | (3.97) |
| Equipment | 0.005 | 0.02 | -0.07 | -0.10 | 0.12* |
| | (0.08) | (0.24) | (-0.80) | (-0.80) | (1.76) |
| Equipment$^2$ | 0.002 | 0.0001 | 0.01 | 0.01 | -0.005 |
| | (0.01) | (0.01) | (1.07) | (.99) | (-1.15) |
| City | -0.02 | -0.04 | -0.07** | - | -0.04 |
| | (-0.47) | (-0.87) | (-1.98) | | (-0.68) |
| Semi-detached | -0.10 | -0.05 | 0.01 | - | -0.04 |
| | (1.32) | (-0.55) | (0.20) | | (-0.61) |
| Single-family | -0.12* | -0.04 | 0.06 | | 0.05 |
| | (-1.64) | (-0.46) | (0.94) | - | (0.88) |
| Farmhouse/isolated | -0.09 | -0.10 | 0.03 | | -0.04 |
| | (-1.04) | (-0.91 | (0.34) | | (-0.55) |
| *Year dummies* | - | - | - | - | included |
| | 2.22*** | 2.01*** | 2.59*** | 2.67*** | 0.70 |
| Constant | (4.36) | (3.17) | (4.83) | (4.21) | (0.91) |
| N | 3287 | 3192 | 4355 | 4316 | 3456 |
| $R^2$ | 0.17 | 0.17 | 0.15 | 0.15 | 0.03[a] |
| F | 21.40*** | 17.42*** | 22.46*** | | 6.16*** |
| Rho[a] | | | | | 0.56 |

| | | |
|---|---|---|
| Wald chi2 | 549.38*** | |

Notes: The IV regression is for the year 2000. Regressions are with robust standard errors. a) the share of the estimated variance of the overall error accounted by the individual fixed effects. Significance at 1% level: ***; significance at 5% level: **; significance at 10% level: *.

When it comes to housing conditions, our variable for discomfort comes out with a robust positive correlation with ill-being. The variable discomfort counts the number of negative circumstances in the home, i.e. draught, damp, low temperature, and noise and air pollution. The variable equipment, which counts the number of comfortable installations and household appliances, comes out insignificantly in all OLS regressions, while living in a city (a highly urbanised area) seems to have a weak negative correlation with ill-being. The dummy variables for semi-detached and single-family and farm/isolated housing indicate distance to the neighbours with the multi-family house being the reference. Negative coefficients may be expected because surveys show that detached housing has high priority among Danish households, see Kristensen and Andersen (2009). But this tendency is not robustly confirmed by the cross-section OLS regressions.

Our conclusion on the above cross-section OLS analyses is that homeownership tends to have a negative relationship with the ill-being, even after controlling for many other factors that may influence the ill-being of the respondents. However, the lack of a significant positive effect for the year 1976 weakens the conclusion.

*Robustness check*

Hansen and Skak (2008) present a formal model based on the assumption that households are heterogeneous and homeowners enjoy especially high welfare from owned housing where they have the possibility to adapt the home to their own preferences. Because the house price

is decided by the marginal household, who is indifferent between renting or owning at the going price, extra marginal homeowners enjoy a welfare gain, which may materialize in a lower ill-being. Furthermore, a number of tenants may have this form of tenure because they are financially constrained, and will change into homeownership to gain welfare when the constraints are relaxed. The conclusion on the OLS analyses above may be said to corroborate the theoretical proposition that ownership creates welfare – and so less ill-being – for those who choose this form of tenure. But an important reservation to the OLS cross-section analyses is that a bias from unobserved heterogeneity among the respondents may disturb the results. If homeowners are less psychologically distressed than renters, is this because of the homeownership or rather the result of an unobserved co-occurrence with homeowners being innate robust and optimistic?

We employ two strategies to overcome the heterogeneity problem. First we try an instrument variable (IV) for homeownership method and secondly we employ the fixed effects (FE) method.

The idea behind the IV method is to find exogenous factors that correlates with the homeownership, but are uncorrelated with the level of ill-being. This method has been used by DiPasquale and Glaeser (1999) in their study of an effect from homeownership on the level of individual social-capital and by Green and White (1998) in their study of the effect of homeownership on the level of child outcomes. Our choice of instrument is similar to the one constructed by DiPasquale and Glaeser (1999). We calculate the average homeownership rate by income quartiles in each Danish municipality. This variable is assumed to reflect the probability of being a homeowner in each quartile, but not to be correlated with the levels of

ill-being. The results of the IV regression for the year 2000[5] are presented in table 4. In line with DiPasquale and Glaeser (1999) we do not include residential structure controls in the IV estimation, because it reduces the strength of the instrument as these controls are highly correlated with homeownership. The coefficient on homeownership maintains the sign and the size compared to OLS, but it is no longer significant. This is partly due to fact that the IV method creates more noisy results and that our instrument is relatively weak. It is statistically very significant in predicting probability of homeownership, but the effect is modest, it has a t-value of 10.30 but the size of the coefficient is 0.004, meaning that a ten percent increase in the homeownership rate increases probability of homeownership by 0.4 percent. With this taking into account, we find that there is a negative link between homeownership and ill-being.

Another method employed to control for unobserved heterogeneity is to look at variations of the individual respondents' housing conditions over time and differencing out unobserved heterogeneity by the first-difference estimation method (FD) to see how changes in ownership status have affected their ill-being with control for changes in other variables that may influence the ill-being. If the idiosyncratic error terms are serially uncorrelated, the fixed effects method (FE) which uses deviations from the mean as the dependent variable, gives more efficient estimates than the FD. We tried both methods, and the results were almost identical, so only the FE results are presented in table 4. Applying the FE model reduces the number of observations, and many of the formerly significant coefficients become insignificant. However, changing into private ownership still has a relatively large and significant negative correlation with ill-being, whereas a change into cooperative ownership is without significance, but it still maintains negative sign.

[5] The instrument used is not available for the years 1976 and 1986.

The inverted U-shaped relationship is again found for age, but the coefficients are less significant than in the OLS cross-sectional regressions. This indicates that the cross-section regression results might be biased by age cohort effects. Income is no longer significant, which can be seen as support for the Easterlin paradox[6], which states that it is income relative to others and not absolute terms that matters. Otherwise, the results are similar to the cross-sectional regressions with a few notable exceptions. Moving into unemployment is without significance, and the level of equipment becomes positive and significant at the 10 per cent level.

Two identifying assumptions behind the FE approach may not hold very well. The first is that there is a reasonable amount of variation in the variables of interest. Table 5 presents the number of transitions between tenure types. They are not very high, and especially low are the moves from ownership to other tenures[7]. Secondly, unobservable heterogeneity affecting both dependent and independent variables must be time-constant. This may not hold in our case, especially because we have long time-spans between the years of observations. Important unobservable factors behind the ill-being level might be changing family conditions and neighbourhood conditions. Also, some of our measures might not be perfect, for example because our construct of an equipment score only vaguely captures the quality of housing.

In spite of the shortcomings of the analysis, there appears to be a fairly robust negative relationship between homeownership and ill-being. Becoming homeowners creates some opportunities and circumstances that make most households psychologically less distressed.

[6] See e.g. Frey and Stutzer (2002).

[7] It does not rule out the possibility of transactions within tenures, and here probably time-varying unobservables are important as

**Table 5** Transitions between ownership types.

| Initial type of dwelling | Observations | Moved into | | |
|---|---|---|---|---|
| | | Ownership | Rental | Cooperative |
| *Between 1976 - 1986* | | | | |
| Ownership | 1978 | - | 180 | 13 |
| Rental | 1078 | 439 | - | 38 |
| Cooperative | 46 | 18 | 18 | - |
| *Between 1986 - 2000* | | | | |
| Ownership | 1869 | - | 208 | 45 |
| Rental | 591 | 194 | - | 34 |
| Cooperative | 45 | 15 | 10 | - |

*Decomposition by income*

As mentioned in the introduction, housing policies in many European countries are directed at promoting homeownership especially for low-income households. The policy may be considered a branch of social policies. It is therefore interesting to perform the analyses for different income samples. To do this, we decompose the sample in a low and a high income group to see whether the effect of homeownership differs across income groups. We ran three FE regressions: two for the lower and higher income groups respectively and one with the change in each respondent's income position relative to the average income. The results are presented in table 6.

**Table 6** Fixed effects regression of ill-being for income groups

| | Yearly income <163000DKK | Yearly income >163000DKK | Relative income |
|---|---|---|---|
| Variable | Coeff. (t stat.) | Coeff. (t stat.) | Coeff. (t stat.) |
| Owned dwelling | -0.19** (-2.27) | -0.14** (-1.95) | -0.12** (2.36) |
| Coop. owned dwelling | -0.13 (-1.08) | 0.02 (0.17) | -0.04 -(0.53) |

| | | | |
|---|---|---|---|
| Physical condition | -0.09*** | -0.05*** | -0.08*** |
| | (-4.14) | (-2.53) | (-5.46) |
| Age | 0.01 | 0.02 | 0.03* |
| | (0.75) | (0.50) | (1.68) |
| Age^2 | -0.002* | -0.004*** | -0.0002*** |
| | (-1.65) | (-3.28) | (-2.86) |
| Log of income | -0.02 | -0.07 | -0.01* |
| | (-0.49) | (-1.29) | (-1.69) |
| Savings | -0.04 | 0.04 | -0.01 |
| | (-0.83) | (1.12) | (-0.18) |
| Living alone | 0.03 | 0.02 | 0.06 |
| | (0.42) | (0.32) | (1.23) |
| Practising sports | -0.08 | -0.07* | -0.10*** |
| | (-1.53) | (-1.86) | (-3.25) |
| Close friends | -0.04 | -0.06 | -0.05 |
| | (-0.70) | (-1.05) | (-1.35) |
| Completed education | -0.17* | -0.08 | -0.05 |
| | (1.75) | (-0.86) | (-0.84) |
| Unemployed | -0.13 | 0.19 | -0.03 |
| | (-1.24) | (1.24) | (-0.34) |
| Pensioner | 0.20*** | 0.36*** | 0.18*** |
| | (2.73) | (3.89) | (3.26) |
| Student | -0.25 | 0.02 | -0.07 |
| | (-1.42) | (0.06) | (-0.70) |
| Discomfort | 0.03** | 0.02** | 0.03*** |
| | (2.37) | (2.05) | (4.69) |
| Equipment | 0.08 | 0.16 | 0.10 |
| | (0.77) | (1.58) | (1.57) |
| $Equipment^2$ | -0.003 | -0.02 | -0.004 |
| | (-0.42) | (-1.28) | (-1.02) |
| City | -0.01 | 0.02 | -0.03 |
| | (-0.11) | (0.20) | (-0.40) |
| Semi-detached | -0.05 | 0.05 | -0.05 |
| | (-0.71) | (0.54) | (-0.38) |
| Single-family | 0.07 | 0.13* | 0.02 |
| | (0.71) | (1.67) | (0.37) |
| Isolated/farmhouse | -0.12 | 0.25** | -0.07 |
| | (-0.99) | (2.39) | (-0.87) |
| *Year dummies* | yes | yes | yes |
| Constant | 1.47* | 0.87 | 0.35 |
| | (1.73) | (0.44) | (0.50) |
| N | 2862 | 2775 | 3489 |
| $R^2$ | 0.05 | 0.03 | 0.03 |
| F | 4.50*** | 2.90*** | 6.96*** |
| Rho | 0.57 | 0.62 | 0.55 |

Notes: Regressions are with standard errors robust to cross-sectional heteroskedasticity and serial correlation. A Poisson fixed regression has also been tried with results that are very similar to the above reported. Significance at 1% level: ***; significance at 5% level: **; significance at 10% level: *.

The negative relation between homeownership and ill-being found in the base case in table 4 is found for both the high and the low income group, but with the reduction of ill-being being

higher for the low income group. This result may be taken as support for the view that promotion of homeownership for low-income households is good social policy.

Otherwise, the results for low and high income groups are not that different, but persons in the high income group seem to be more sensitive to density reduction and get more psychological stress with longer distance to neighbours, which we find puzzling.

The last column of the table 6 shows FE regression with the change in the respondents' relative income position. It produces a smaller negative coefficient for income, but with higher significance. The last may be taken as support for the view that the changes of one's relative income position is of greater importance than changes in the absolute income. The coefficient for ownership is has the same sign and magnitude as in the previous regressions and this is also the case for the other variables.

With no other study, which focuses on the relation between homeownership and ill-being, we are unable to compare our estimates for the relation with estimates for other countries.

## 5. Conclusion

In many European countries policies to promote homeownership for low-income households may be seen as part of a social policy, which aims to relieve the ill-being of people with weak resources. This study tries to find evidence for the relation between ill-being and ownership of one's home. The panel data from the Danish living condition surveys from the years 1976, 1986 and 2000 combined with register data is used for the analyses. We apply cross-sectional OLS, instrumental and fixed effect regressions, and add fixed effect regressions for low and high income earners and their relative income. The shortcomings of our data naturally

influence the reliability of the results. However, we conclude that there is a robust negative relation between homeownership and ill-being so that ownership reduces ill-being. The relation is furthermore stronger for the low income group, which may be taken as support for the view that promotion of homeownership for low-income households is good social policy.

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## Appendix

**Table A** Ordered Logistic regression estimates of the determinants of the ill-being

| | Ordered logit | | |
|---|---|---|---|
| Year | 1976 | 1986 | 2000 |
| Variables | Coeff. (z stat.) | Coeff. (z stat.) | Coeff. (z stat.) |
| Owned dwelling | 0.90 | 0.68*** | 0.72*** |
| | (-0.92) | (-2.97) | (-3.00) |
| Coop. owned dwelling | 0.71 | 0.89 | 1.11 |
| | (-1.16) | (-0.50) | (0.68) |
| Physical condition | 0.81*** | 0. 77*** | 0. 79*** |
| | (-7.16) | (-8.04) | (-8.75) |
| Male | 0.71*** | 0.87 | 0.66*** |
| | (-4.25) | (-1.56) | (-5.82) |
| Age | 1.06*** | 1.07*** | 1.05*** |
| | (2.69) | (2.55) | (3.18) |
| Age^2 | 0.99 ** | 0.99*** | 0.99*** |
| | (-2.45) | (-3.19) | (-3.75) |
| Log of income | 0.89** | 0.92** | 0.85*** |
| | (-2.41) | (-2.36) | (-3.22) |
| Savings | 0.79*** | 0.96 | 0.76*** |
| | (-2.94) | (-0.45) | (-3.79) |
| Living alone | 1.05 | 1.28** | 1.35*** |
| | (0.33) | (1.91) | (3.04) |
| Practising sports | 0.65*** | 0.65*** | 0.66*** |
| | (-4.86) | (-4.62) | (-5.26) |
| Close friends | 0.82** | 0.68*** | 0.87 |
| | (-2.14) | (-3.99) | (1.38) |
| Completed education | 0.87* | 0.84* | 0.82** |
| | (-1.71) | (-1.84) | (-2.37) |
| Unemployed | 1.24 | 1.65*** | 1.41** |
| | (1.06) | (2.57) | (2.06) |
| Pensioner | 4.01*** | 2.88*** | 2.21*** |
| | (7.44) | (7.02) | (6.21) |
| Student | 0.80 | 0.49 | 0.62** |
| | (-1.18) | (-1.43) | (-2.05) |
| Discomfort | 1.07*** | 1.10*** | 1.13*** |
| | (4.91) | (5.68) | (7.28) |
| Equipment | 0.93 | 1.19 | 0.78 |
| | (-0.58) | (0.82) | (-1.12) |
| Equipment$^2$ | 1.001 | 0.99 | 1.02 |
| | (0.98) | (-0.63) | (1.29) |
| City | 0.97 | 0.94 | 0.85* |
| | (-0.31) | (-0.64) | (-1.86) |
| Semi-detached | 0.83 | 0.99 | 1.03 |
| | (-1.45) | (-0.07) | (0.25) |
| Single family | 0.78* | 1.05 | 1.21 |
| | (-1.87) | (0.30) | (1.37) |
| Farm/isolated | 0.83 | 0.94 | 1.20 |
| | (-1.19) | (-0.33) | (1.13) |
| N | 3287 | 3192 | 4335 |
| Pseudo $R^2$ | 0.06 | 0.07 | 0.07 |
| Wald chi2 | 441*** | 407*** | 508*** |

Notes: Regressions are with robust standard errors. Significance at 1% level: ***; significance at 5% level: **; significance at 10% level: *.