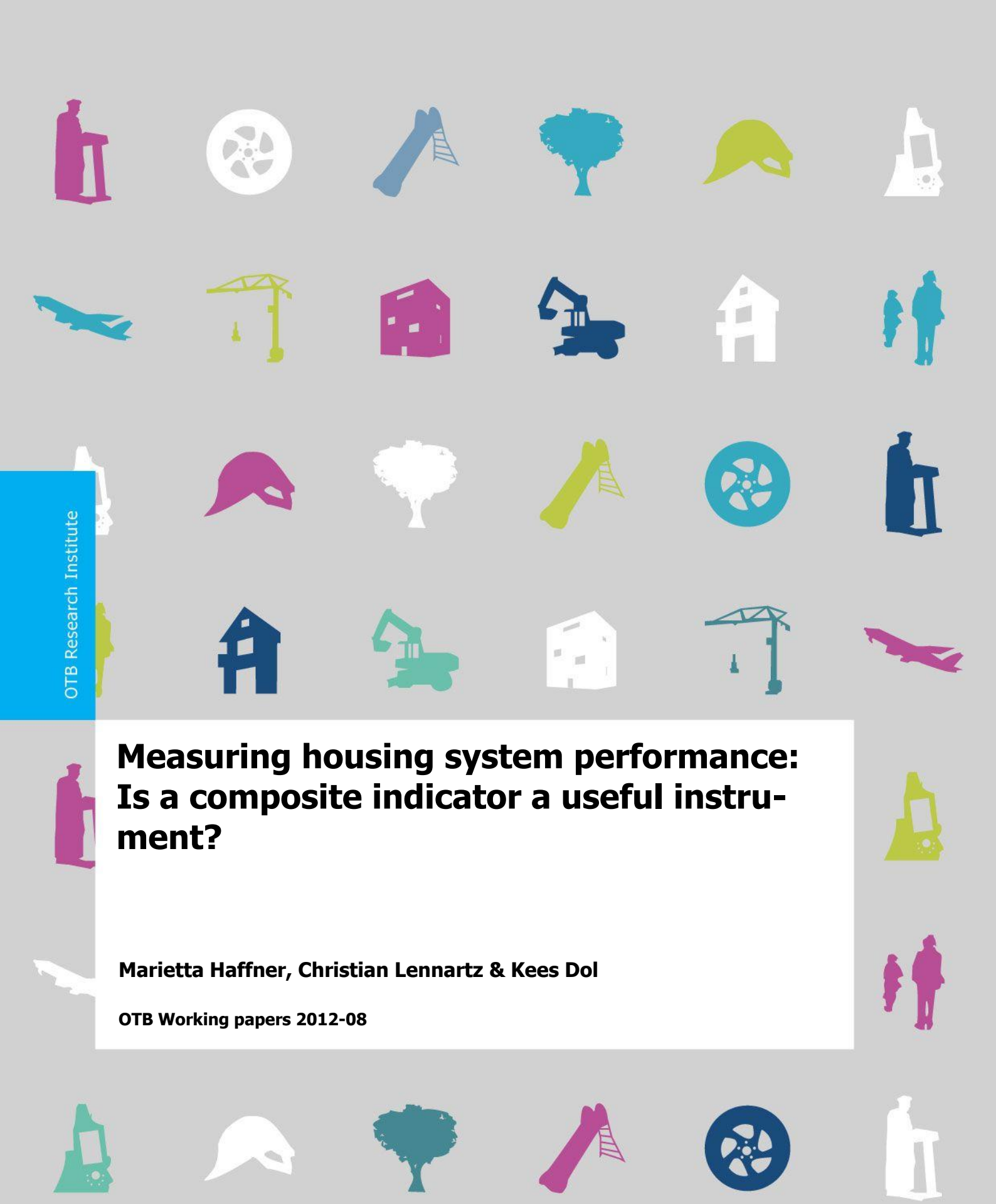

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OTB Working papers 2012-08

TU Delft Delft University of Technology

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OTB Research Institute for the Built Environment
Delft University of Technology
Jaffalaan 9, 2628 BX Delft, The Netherlands
Tel. +31 (0)15 278 30 05
Fax +31 (0)15 278 44 22
E-mail mailbox@otb.tudelft.nl
http://www.otb.tudelft.nl

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Measuring housing system performance: Is a composite indicator a useful instrument?

Authors: Marietta Haffner [1,2]

Christian Lennartz [1]

Kees Dol[1]

[1]OTB Research Institute for the Built Environment, Delft University of Technology, Jaffalaan 9, 2628 BX Delft, the Netherlands, + 31-15-27-84120, www.otb.tudelft.nl, Contact: c.lennartz@tudelft.nl

[2]Ahuri Research Centre, School of Global Studies, Social Science and Planning, College of Design and Social Context, RMIT University, Melbourne, http://www.rmit.edu.au/

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Abstract

Housing outcomes are predominantly compared in terms of individual indicators, including such items as quality or affordability measures, where the outcomes of the individual measures are often not linked in a preceding research step. However, the creation of a composite indicator of housing outcomes, in which these individual measures are integrated, might facilitate the understanding of large amounts of information and most importantly might help to communicate research findings to a wider, non-expert audience, including policy-makers.
Nonetheless, the methodological problems and challenges of the construction of composites are manifold and the interpretation of a composite indicator may not be easy or even misleading. This paper engages in the discussion about methodological problems by recapitulating the process of constructing and applying a composite indicator of housing outcomes for a pilot project on public sector performance in a large number of EU countries using the EU-SILC database.

Keywords: European Union, Housing affordability, housing quality, overcrowding, EU-SILC

1. Introduction

Public sector performance is a topic that is important and widely discussed at all times. In less flourishing economic periods it may be more important to wonder about achieving selected public goals with the least amount of public funds spent, while in better economic times the question may be the other way around: how can effectiveness –the targeted effect or outcome– of policy be increased or maximized without losing sight of efficiency, in order to keep the costs or public resources to achieve a certain level of effectiveness at an acceptable level. Policy analysis is the discipline that can be used to analyse these concepts (Findeisen & Quade, 1985).

A study that aimed to make a cross-country analysis from a Dutch point of view of effectiveness and efficiency of public policy appeared in 2004. It was published by the Netherlands Institute for Social Research (SCP) and entitled "Public Sector Performance. An international comparison of education, health care, law and order and public administration" (Kuhry, ed., 2004). The aim was to integrate the 'composite indicators' of the four mentioned public policy areas into one single composite performance indicator per country, ranking the countries on the total score of their public sector performance. Public sector was thereby defined functionally, all those functions that are considered steered by public sector goals, even if they may not be financed (completely) by public sector. Such an incremental 'composite indicator' approach aims to translate large amounts of information into an understandable figure about the effects of policy relevant to policy makers. This figure was compared to the resources needed to achieve this composite performance.

In 2010 the update of this study started. The aim was to improve many facets of the previous study: more public policy fields, better indicators, more countries, etc. (Jonker, ed., forthcoming). In 2011, the OTB Research Institute for the Built Environment was approached to write the housing chapter. The aim for the chapter was to perform a brief pilot study in which a composite performance indicator was to be developed using the 2008 EU-SILC database[1], which in turn was to be confronted with public expenditure on housing in order to be able to give an evaluation of the effectiveness and efficiency of housing policy in different European Union countries.

Many questions arise about the usefulness of such an approach comparing countries on one performance indicator , which may be composed of several underlying indicators. This also applies to the measure of efficiency, government expenditure, which may be one of the underlying causes of outcomes on the housing market, as the argument of housing being the wobbly pillar under the welfare state implies (Torgerson, 1987). Furthermore, in case such an approach is applied at one point in time, like in cross-sectional analyses, it is impossible to extract effects from the past and those from present ones. From the start of the project, we thus aimed to measure the outcomes resulting from the housing system, instead of resulting from present housing policy. The aim of this paper is then to

[1] The European Union Statistics on Income and Living Conditions (EU-SILC) is a database with income variables and other variables of living conditions (http://epp.eurostat.ec.europa.eu/portal/page/portal/income_social_inclusion_living_conditions/introduction). Its main aim is to provide for actual (per annum) and international comparative data about incomes and level and structure of poverty and social exclusion in the European Union (EU). EU-SILC 2008 is used for the analyses: form most countries income data are for the year 2007 and the other data for the year 2008. The countries that are included in the analyses are the European Union countries that are the larger ones and that member of OECD. The data for France are missing from the EU-SILC.

rethink 'the job done' with a fresh mind and evaluate the usefulness of the designed composite indicator as a measure of performance of housing systems in different countries.

We approach this task by first explaining the reasons for and the approach to constructing a composite indicator in the next section. Our approach of producing the composite indicator is presented in Section 3. The results of applying the indicator –the outcomes of the housing systems in different countries– follow in Section 4. Section 5 discusses some of the problems with the designed composite indicator and, based on the literature, speculates on any possibilities to improve the measurement of housing performance.

2. A composite indicator

Nardo et al. (2005: 8) define an indicator as "a quantitative measure derived from a series of observed facts that can reveal relative positions (*e.g.,* of a country) in a given area." Freudenberg distinguishes between 1) individual indicators that represent a set of separate indicators (e.g. leaky roofs/noise); 2) thematic indicators which group together separate indicators (e.g. quality). These are presented separately in publications; 3) composite indicators which compile thematic indicators into one single measure. Even though this contribution focuses on the composite indicator of housing system performance, the other types of indicators will also be discussed.

Reasons for or against the use of a composite indicator

Composite indicators, or indices, have become increasingly popular among statistical offices of national or international organizations. The reasons are manifold: Composite indicators can be used to summarise complex, multi-dimensional issues and thus improve accessibility for non-experts and decision-makers. In simplifying complex matters, they can help to create a public interest. Furthermore, if used in a cross-sector perspective (i.e. the comparison of different public sector and policy domains) they can draw attention to those areas where intervention could be improved. When used in a time series they simplify interpretation as they provide the 'bigger picture' and clearly identify improvements or deterioration of performance (Saltelli, 2007).

Of course, composite indicators carry some inherent weaknesses. Composite indicators, if presented as independent measurement units, can send misleading and ill-founded policy messages. They might show which sectors are performing good or bad in the public policy domain, yet they do not indicate how policy can be improved. Hence, there is a strong impetus to always judge the composite indicator in the context of its sub indicators. Similarly, a composite indicator may disguise the failings of a single indicator, if the construction process is not transparent. Finally, the construction of composites involves stages in which subjective judgements are made, increasing the chance of bias in the outcomes. Integrating the underlying indicators therefore faces some methodological and also theoretical problems. Among others: Which indicators should be used to devise the composite in the first place? What should the individual influence of each sub indicator on the composite be? Are data sources comparable when measuring the same phenomenon in a cross-country perspective?

Steps in constructing a composite indicator

Most likely, the debate on the use of composite indicators will never be settled. However, we can assume that given their popularity among politicians there will always be a demand for measures that can summarize complex processes into a single benchmark. It is therefore the task of the researcher to design robust and transparent composite indicators and to emphasize its remaining pitfalls. Guidelines to do so are provided in various OECD publications (Freudenberg, 2003; see also Nardo et al., 2005):

1. Develop a theoretical framework for the composite.
2. Identify and develop relevant variables.
3. Standardize variables to allow for comparisons.
4. Weigh variables and groups of variables.
5. Conduct sensitivity tests on the robustness of aggregated variables.

As will be shown in the following section, the construction of our composite indicator follows these guidelines up until step four. Furthermore, steps two, three, and four will be discussed in more detail in Section 5, where we consider ways of improving the presented housing system outcome composite indicator. Step five will not be covered in this contribution, but will be included in further research.

3. Approach

The policy framework underlying the composite indicator is a simple model of policy analysis which starts with the *policy goals*, the *input* needed to achieve these policy goals, and the *outputs* and *outcomes or effects* of policy (De Peuter et al., 2007; Van Dooren et al., 2010). In a classical policy analysis, effectiveness will be measured by comparing outcomes to policy goals, also called desired or intended outcomes. Efficiency will be about a comparison of inputs and outputs.

For this study the *policy goals* were taken from the three cornerstones of Dutch housing policy, also called the 'iron triangle' (Ministerie van VROM, 2006):[2]

- Good quality dwellings
- Sufficient availability of dwellings
- Good affordability of dwellings

Outputs, which are about measuring the policy results for the three cornerstones of housing policy, are defined as follows:

- Share of households living in good quality dwellings
- Share of households not living in overcrowded dwellings
- Share of households living in affordable dwellings

In order to determine the share of households without a 'housing problem', it is necessary to define the housing problems: under what circumstances is

- quality assumed to be unacceptable,
- the housing situation assumed to be overcrowded and

[2] Although specific Dutch policy goals will of course not apply to all other countries, these three cornerstones often apply, at least to some extent, in other European countries.

- the dwelling assumed to be unaffordable?

These definitions that either follow the Eurostat approach to these indicators or are slightly deviated from, are chosen, as follows:

- The indicator for 'unacceptable' housing quality is defined as the share of households who indicate having **two out of five** housing quality problems, i.e. no flushing toilet inside home, no bath/shower inside home, too dark, leakiness, dampness or rot, and noise from neighbors or from the street. It is based on the Eurostat indicator for dwelling deprivation with the noise variable added in as fifth variable, which is a subjective measure, but might reveal the quality of soundproofing of the dwelling. (http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Severe_housing_deprivation_rate).
- On a macro level, unavailability of dwellings is concerned with the number of dwellings in relation to the number of households. On a micro level this indicator cannot be operationalized and thus an indicator of overcrowding is used, assuming that overcrowding is a sign of scarcity of dwellings on the market. As a square-meters-per-dwelling variable is not available in the EU-SILC 2008, overcrowding is operationalized as a measure of the number of household members per room (Eurostat-method; http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Overcrowding_rate).
- Unaffordability of housing (also called an affordability problem) is defined as the share of households whose actual (and not imputed) housing expenses amount to more than 30% of their disposable household income. As there is no scientific foundation for such a norm – it does not show whether a household has enough income left for other consumption after paying for housing – the norms used in the literature and in practice usually lie between 20 and 30% (Haffner and Heylen, 2011; Heylen and Haffner, 2010). We do not use the 40% benchmark applied by Eurostat , as the definition of housing expenses excludes other expenses (for maintenance, taxation, energy use etc.) than housing expenses in a narrow sense (rent for tenants and mortgage interest for owner-occupiers with a mortgage). As none of these other expenses can be separated from the others in the EU-SILC database (e.g. maintenance), they are all excluded, and the '30% benchmark' is chosen.
  This benchmark will be easier understood by the users of the composite indicator above a benchmark of the households that are considered at risk-of-poverty based on residual income (disposable income after the deduction of housing expenses), because it does not give any information on who were already at risk of poverty before deduction of housing expenses. A more dynamic approach where we present the households moving into poverty after deducting housing expenses is problematic to interpret for the general audience. Furthermore, the 30% benchmark was chosen above a benchmark based on those households that move into the at-risk-of-poverty group, because of housing expenses being deducted from disposable income in contrast to those belonging to the at-risk-of-poverty group because of disposable income (see Section 5.1).

Outcome or effects of policy are then formulated in terms of performance of the housing system: worse or better quality, overcrowding or no overcrowding and affordable or unaffordable housing.. The formulation of worse or better leads to the question worse or better than what? In contrast to the intention of the policy analysis approach, where outcomes are compared to intended policy outcomes, in our approach performance is not measured in comparison to actual government housing goals, but implied as a worse or better achievement of the housing system compared to other countries.

As one aim of this study is to provide a basic indicator of performance or outcome of the housing system, the three indicators are combined into one composite indicator. The indication of best performance would be the country with the lowest share of households with a housing problem. To facilitate the interpretation, it is formulated the other way around: the higher the share of households without any of the 'defined housing problems', the higher the effectiveness of the housing system. The share of households having 'no housing problem' then refers to households neither living in a dwelling with at least two quality problems, nor living in a situation of overcrowding, nor living in a dwelling that is considered unaffordable. This way of formulation implies that all variables are expressed in the same measurement unit and it assumes that the three indicators are weighed equally, as there were no up-front reasons to weigh indicators differently. However, the quality indicator is based on at least two quality 'problems', assuming that two problems can be considered a signal of a structural problem with housing quality.

In the definition and dataset chosen for housing affordability, housing expenses will consist of rent paid minus personal subsidies (housing allowances) in the rental sector and mortgage interest (but not repayment) minus personal subsidies (housing allowances and income tax subsidies) in the owner-occupied sector.[3] The rent that tenants pay for their housing consumption is compared to part of the financing expenses and not the consumption expenses of owner-occupiers with a mortgage. From this follows that financing expenses for the mortgage loan will be zero, once the mortgage loan is repaid. As these low 'housing' expenses for owner-occupiers can generally neither be ascribed directly to effective housing policy nor to an effective outcome of the housing system, financing expenses for the mortgage loan and rent paid cannot be compared meaningfully, if the performance of the housing system is at stake. Outcomes of the housing system will thus be presented for both tenures separately.

4. Housing outcomes

4.1 Underlying indicators of quality, overcrowding and affordability

Table 1 presents the housing outcomes on the overcrowding and quality problems for all households in all country. From Table 1 it can be observed that overcrowding problems are more apparent in Eastern or Southern European countries (Spain is the exception here). This also applies to the quality problem, but to a lesser extent (compare Czech Republic, Slovak Republic and Belgium). From the quality problems, noise from outside and leakiness, dampness or rot are the problems that the respondents reported most often.

As in most countries the share of owner-occupation is more than half of the stock (see Figure 2), these general scores are also strongly influenced by the share of owner-occupation. In the Eastern and Southern European countries, most owner-occupiers have no mortgage, while in the Scandinavian countries and the Netherlands, the mortgagors dominate owner-occupation. In the latter countries the rental sector is relatively large, as it is in Austria and Poland.

[3] Only explicit or separately registered personal subsidies for housing can be deducted from gross expenses to calculate the so-called net expenses. If there is any support for housing that runs via the household income, for instance via income support, it incorrectly will not be deducted in this approach. Similarly, if rent includes costs for common areas (like saunas or rooms for washing machines), these cannot be separated out. These are some of the aspects in which measurements may differ among countries.

Table 1 Share of all households defined to have a quality or overcrowding problem*

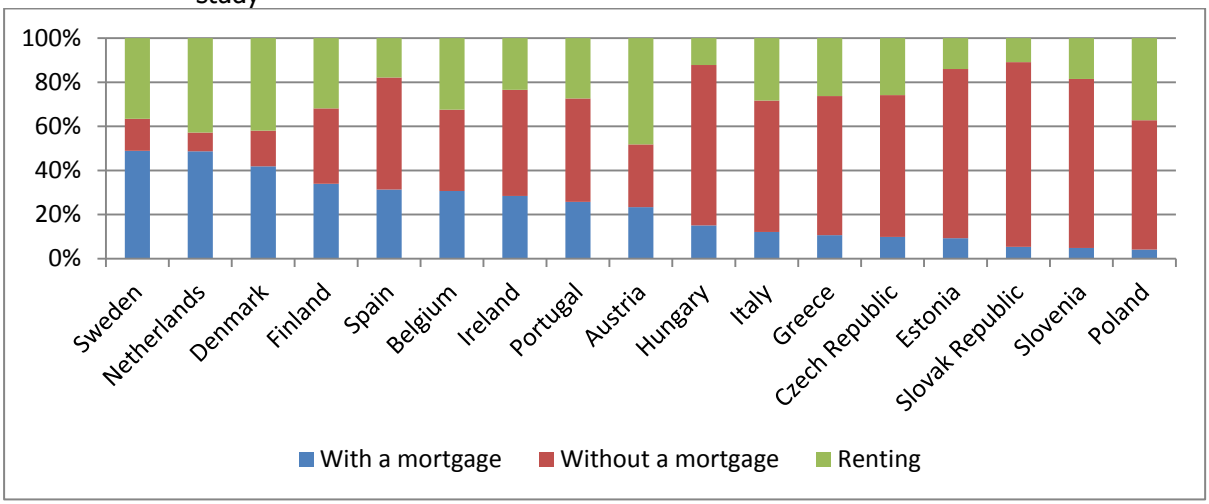
	Over-crowding problem	Quality problem (2 of the 5 problems)	No flush-ing toilet inside home (1)	No bath/ shower inside home (2)	Too dark (3)	Leakiness, dampness or rot (4)	Noise from outside (5)
Netherlands	1	7	0	0	5	16	32
Spain	2	7	0	0	6	16	22
Ireland	3	6	1	0	6	13	13
Belgium	3	10	1	1	8	18	21
United Kingdom	4	8	0	1	10	14	20
Denmark	5	3	1		5	8	20
Germany	6	8	0	1	5	13	27
Finland	6	3	2	1	5	4	17
Sweden	9	4	1		6	7	14
Portugal	10	15	4	3	12	20	24
Austria	11	7	1	2	7	12	22
Italy	16	11	0	0	9	21	25
Greece	20	11	2	3	7	19	23
Czech Republic	22	6	1	1	4	14	18
Slovak Republic	30	5	0	1	5	9	20
Slovenia	30	14	1	1	12	30	20
Estonia	32	24	16	14	6	18	18
Hungary	36	15	4	7	10	31	12
Poland	38	15	6	6	9	22	19
Total**	11	9	1	1	7	16	23

*) The larger the group, the more households are confronted with the problem in question, either the problem of overcrowding or at least two of the five problems of housing quality.

**) Calculated as the number of rental households with a certain 'housing problem' in all countries divided by the total number of rental households in all countries.

Source: EU-SILC 2008, TU Delft/OTB calculations. Empty cells indicate that no data are available; they are treated as 0%-cells.

Figure 2 Owner-occupation with or without a mortgage loan and renting in EU-countries under study



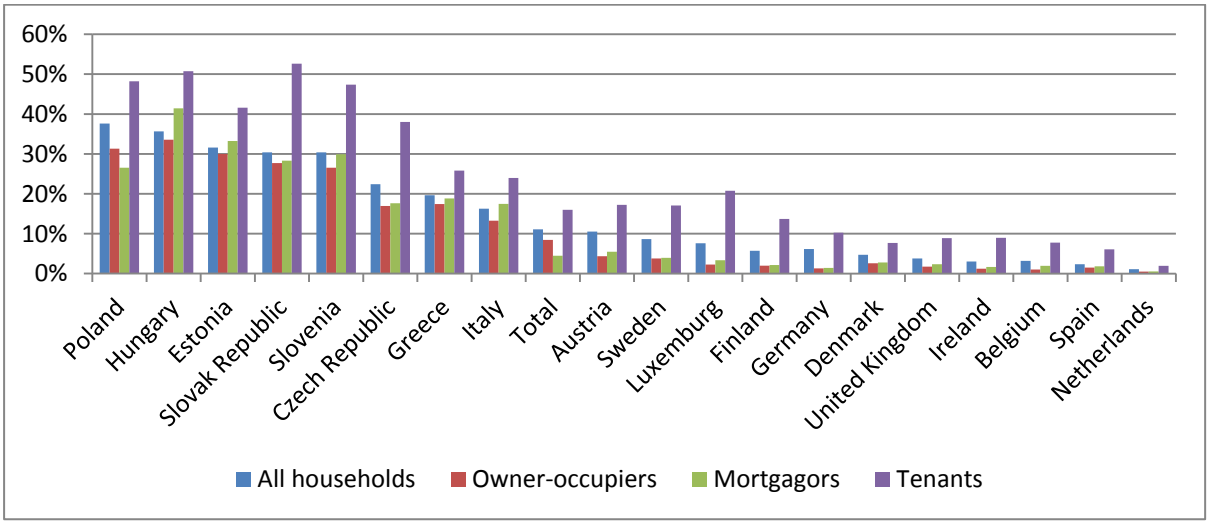
Source: EU-SILC 2008, TU Delft/OTB calculations.

Generally, the overcrowding problem and quality problems are weaker in the owner-occupied sector(see Figures 3-1 and 3-2): the bar for tenants is generally higher than the average for households (which is the bar that gives the sequence of the countries from high to low). Within owner-occupation the situation varies by indicator. For overcrowding, the mortgagors live in a more crowded situation than owner-occupiers without a mortgage. The exception is Poland. For the quality problem it is more likely to be the other way around: larger shares of mortgagors seem to live in dwellings without quality problem. Exceptions are Belgium, the United Kingdom, Spain and Germany, though the differences between both groups of owners generally are not that large. The quality problems is reported much less often than the overcrowding problem.[4] .

The affordability problem shows up more strongly for tenants than for mortgagors in most countries (except for Slovenia and Slovak Republic), as Figure 3-3 shows. One reason for the result will be the incomplete affordability measure that had to be used for owner-occupation (without repayment amounts and without owner repair costs). Another reason may be the difference in disposable income in both tenures. There is proof that their average income is much higher, although they generally pay more than tenants (see Haffner and Dol 2010 for the Netherlands, Belgium, Austria, Denmark, Finland, Sweden, Ireland and the United Kingdom .

On affordability the sequence of the countries is more geographically mixed than with the other two housing problems that were defined. Tenant unaffordability is high in Sweden, Spain, Belgium, Greece, Estonia, Denmark, Italy and Finland, while mortgagors' unaffordability is high in Slovenia, Spain, the United Kingdom, Slovak Republic and Italy.

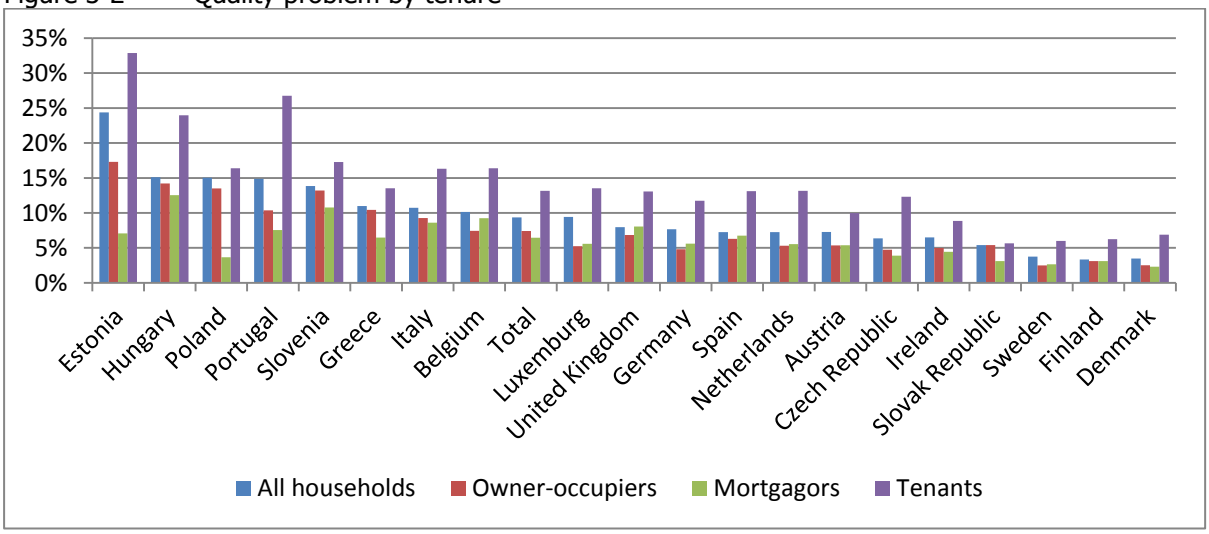
Figure 3-1 Overcrowding problem by tenure



Source: EU-SILC 2008, TU Delft/OTB calculations (see Appendix for figures).

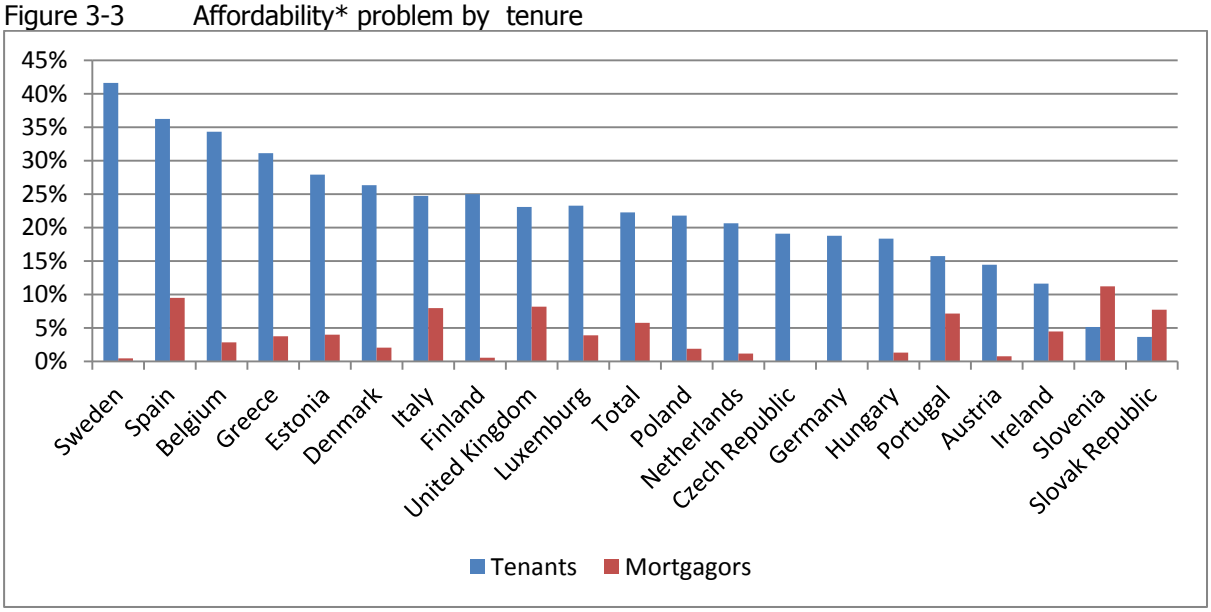
[4] Although this is not the stage to conduct a thorough analysis on the differences between the owners with or without a mortgage a couple of 'explorative' comments can be made, which might also shed some light on the relevance of this distinction. First of all the percentages within countries in general do not differ dramatically. Secondly, and perhaps more importantly, especially in Western Europe, mortgages coincide with the life course. Simple explanations for overcrowding can be young families with children who have some shortage of space. Quality of the dwelling and mortgage can be two ways around. If young people strongly rely on the existing stock for reasons of affordability quality problems may easier be perceived. Interestingly in some of the eastern European countries mortgagors appear to experience fewer quality problems which might have other explanations

Figure 3-2 Quality problem by tenure



Source: EU-SILC 2008, TU Delft/OTB calculations (see Appendix for figures).

Figure 3-3 Affordability* problem by tenure



*) Affordability is defined differently in both tenures.

Source: EU-SILC 2008, TU Delft/OTB calculations (see Appendix for underlying figures).

4.2 Composite indicators

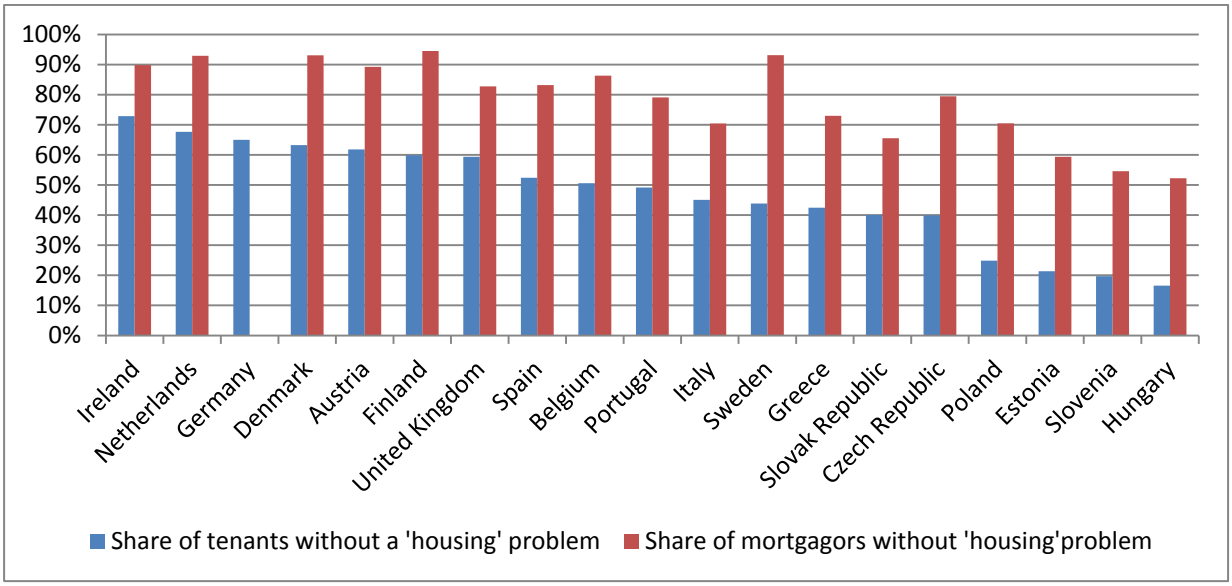
Our composite indicator includes the share of households that does not have at least one out of three housing problems (overcrowding, quality or affordability problem (Figure 4). In all countries it is higher for mortgagors implying that the share of households with a 'housing' problem is larger among rental households.

More than half of tenants do not have a 'housing' problem in Ireland, the Netherlands, Germany, Denmark, Austria, Finland and the United Kingdom. In the Eastern European countries more than 60% of tenants are considered to have housing problems. These 'averages' are caused by the underlying indicators, implying generally an affordability problem coinciding with little overcrowding and quality problems. For example, the Czech Republic and the Slovak Republic score highest of the Eastern European countries in Figure 4 because of their smallest shares of households with a quality or overcrowding problem, while the share of households with an affordability problem is relatively low

(see Figure 5). Sweden is an example that works the other way: because good quality rental housing is relatively unaffordable, it ends up in the middle range of the countries if the composite indicator is concerned. In general, Figure 5 reveals some of the underlying patterns for tenants. Although there is no strong relation between affordability and the region, it is obvious that overcrowding and quality problems are common in Eastern Europe and make up a substantial part of housing problems.

For mortgagors, these relations between better affordability and worse quality and overcrowding generally also apply, but to a lesser extent if geography is taken into account. The ranking is less clear between Eastern and Southern European countries on the one hand, and between the Western and Northern European countries on the other.

Figure 4 The composite outcome indicator for tenants and mortgagors:* the share of households that is confronted with none of the defined housing problems (of overcrowding, bad quality or unaffordability**)

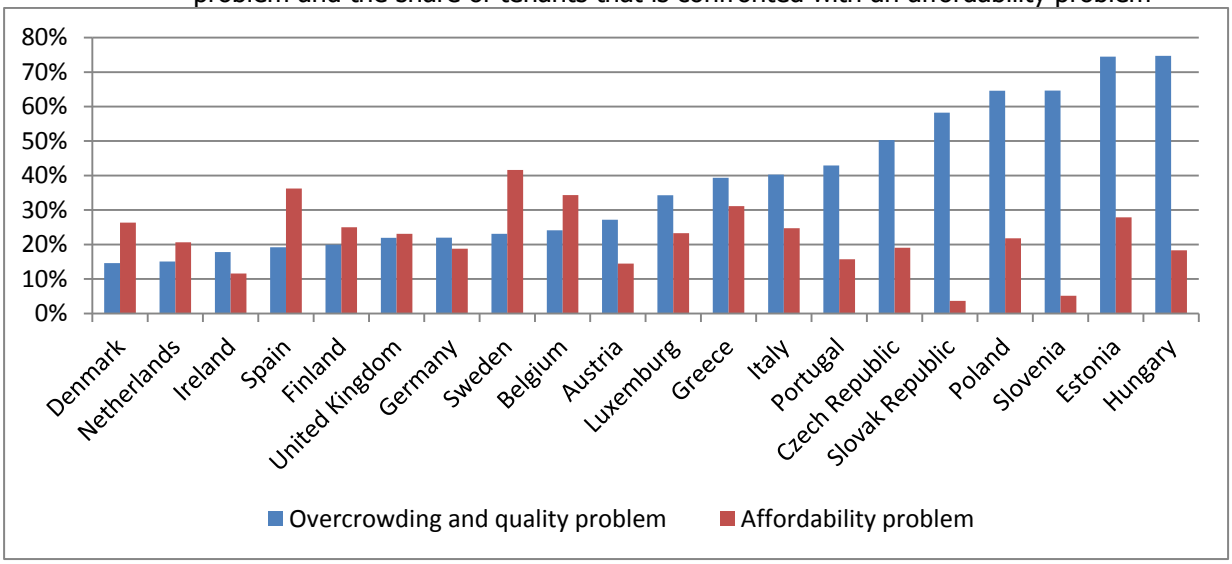


*) German data is not available for mortgagors. For tenants, housing allowances cannot be fully taken into account.

**) Affordability is defined differently in both tenures (see text).

Source: EU-SILC 2008, TU Delft/OTB calculations.

Figure 5 The share of tenants that is confronted with either an overcrowding and/or a quality problem and the share of tenants that is confronted with an affordability problem



*) In German data for tenants, housing allowances cannot be fully taken into account.
Source: EU-SILC 2008, TU Delft/OTB calculations (see Appendix for figures).

5. Possibilities to improve composite measurement

In this section we aim to put forward some ideas on how the measurement of housing outcomes might be improved. The discussion relates to steps 2, 3, and 4 of the OECD- guidelines (see Section 2). Section 5.1 discusses options for the identification and development of relevant variables. Section 5.2 focuses on standardization options of variables to allow for indicator building. Finally, in Section 5.3 a discussion follows on options of how to build a composite indicator based on the previous insights.

5.1 Should other output measures be used?

Measuring housing quality and housing availability

Housing quality

In this article we used the SILC dataset, which includes households and persons within the households. SILC, like many household surveys, has a few housing quality variables but the survey is not specifically designed for measuring housing quality. Moreover, designers of household surveys would be well aware of the limitations of respondents with regard to measuring special housing characteristics. The annual waves of SILC have the following relevant housing quality variables:

- Dwelling type
- Number of rooms
- Availability of toilet/bathing area
- Leakage
- Being able to keep the house adequately warm

In addition, the 2009 wave provided the option to include square metres per dwelling and a question if the household perceives to have enough space in the dwelling. Questions such as the type of heating, insulation and floor area of the dwelling can lead to misinterpretation, especially if it involves a paper or telephone questionnaire. However, a good measure of useable floor area/square metres per dwelling within a household database would be crucial to increase the overall possibilities of the SILC

database: for instance it provides opportunities for additional information on overcrowding (see also header availability of housing). Again, the method of measuring the floor area, or rather who gives the answer to the question, can influence the result (see also Dol and Haffner, 2001 on variation of definitions of useable floor space).

A household/person database like SILC may not be the only source for the measurement of housing quality, but is one of the few consistent international sources. The ideal would be a specific housing quality registration (based on a sample). As far as our knowledge reaches such specific quality surveys are not widely available in an international database. One example of a national housing condition survey is the Dutch Kwalitatieve Woning Registratie (Qualitative Housing Registration) which was conducted each four years in the period 1975 – 2001. This survey did not have a scientific target, i.e. measuring housing quality as such, but served policy makers in their decisions and monitoring of urban renewal operations. Housing quality registrations were not uncommon in the old EU-15 (see Dol and Haffner, 2001) but these registrations normally do not make a link with the household inhabiting the dwelling. However, some of the data from such surveys might be used for macro indicators of housing quality. (In a number of countries information on dwelling type, number of rooms and useable floor area is widely available for new dwellings as a result of dwelling permit registrations. Of course this does not provide indicators for the entire dwelling stock.)

The characteristics of the dwelling itself may not be sufficient to measure the living conditions of households. In the last decade both researchers and policy makers have drawn attention to the surroundings/environment of the dwelling as a factor. A common reply by (Dutch) real estate agents to the question what determines house prices is: "House prices are made up of three components: location, location and location." Surveys like SILC have some indicators on the surroundings, mainly with regard to general inconveniences (pollution and crime). In special SILC modules of 2007 and 2009 questions were asked about the availability of specific amenities like shops and public transport as well as inconveniences (signs of vandalism). The main problem with regard to such indicators is how to value them in composing a housing quality indicator. The first step might be to construct a sensible separate indicator on the surroundings of the dwelling.

Availability of housing

In our study we used overcrowding as a measure of the availability of dwellings. The rule of thumb in measuring the much used Eurostat overcrowding indicator is: one room can be shared by adult partners, two children under twelve years or two teenagers from twelve to seventeen years of the same sex. All other adults need their own room. Although overcrowding can give a general indication of the (un)availability of housing, it has some setbacks. A dwelling may indeed have sufficient bedrooms, but nothing is known about the size of these bedrooms. More importantly a house may have sufficient rooms for all adults, but a large house with for instance two adult children who have their own room, qualifies for NON-overcrowding, while it may disguise a general housing shortage. From this perspective, at least one measure must be combined with overcrowding: young adults living in the parental home and possibly also old age people living with their children (see Choroszewicz and Wolff, 2010). This, however brings us to norms on housing availability. From the Northern European perspective the high percentage of young adults in the parental home can be viewed as a problem, but some research suggests that this is part of the culture (see Holdsworth 2005 for Spain).
Furthermore the concept of overcrowding is an indicator on which many people will agree, but it is still normative. It deserves testing with possible (new) variables in EU-SILC that ask if the households themselves experiences a lack of space in the dwelling.

A stronger method to investigate the availability would be to conduct specialist housing demand surveys where respondents can indicate shortage of space and any (im)possibilities to move to dwellings with sufficient space. This would give a clearer view of specific housing shortages. Such surveys are

quite common within Western Europe but there are, to our knowledge, no international databases of such surveys.

One crude alternative measure of availability which can be constructed with widely available data is the number of households as a percentage of the number of dwellings per country. However, this should be combined with other measures, i.e. if a country has the same number of dwellings and households, more information should be collected on the extent of possible shortages. A complementary indicator might be overcrowding or young adults living in the parental home. Furthermore, a housing stock which is much larger than the number of households may not always be an exact measure of good availability of dwellings. For Spain, Hoekstra and Vakili-Zad (2010) point out that the housing stock is much larger than the number of households, but housing shortages are (were) felt at the local level.

A combination of overcrowding and quality?

Eurostat uses four indicators on housing quality, the same ones as in this study without 'noise from neighbours or from the street'. Eurostat then combines quality and overcrowding into 'severe housing deprivation' if a household is overcrowded and has at least one housing quality problem. This is indeed a worthwhile approach, but it combines factors which for our purposes are relevant to disentangle: availability and quality of dwellings.

Affordability

Is housing affordability a good measure of effectiveness of housing policy? And if so, how is it to be measured? These are the questions to be discussed.

The concept of housing affordability has been called a "vexed" one (Wilcox, 1999), as it means different things to different people (Quigley & Raphael, 2004). Economic model builders traditionally focus on an economic cost of housing consumption (user cost of capital) influencing actor behaviour on the housing market, while policy makers generally are interested in out-of-pocket cash flows of households in relation to household income or policy instruments such as housing allowances. Hancock (1993: 140) calls the latter approach the "short-run costs" being the out-of-pocket cash flows or expenses that households make to finance the access to their home. She contrasts this concept with the "long-run ability" of households to pay the so-called user costs or price of housing consumption. Both of these approaches analyse the affordability of households once they have been able to financially access their house; they are about 'running' expenses or costs. The EU-SILC allows for the use of both concepts, in principle, but both have their flaws and/or cannot be operationalized with the EU-SILC.

In principle both concepts can either be used as expense or cost concept, on the one hand, or as income after housing is paid for, on the other hand. Ideally, in the former case, one would calculate expenses or costs without effects of government intervention, then deduct the effects on expenses or costs from housing policy to show the effectiveness of government policy (Haffner, 2000).

In practice, however, as was explained before, the expense concept in EU-SILC is incomplete for owner-occupiers as it does not include mortgage repayments. But even when the argument is that mortgage repayments are contributions to housing wealth, then the mortgage interest will have to be considered a financing expense that is being paid for the investment in housing by the owner, while rent is being paid for the consumption of housing by the occupier of the dwelling. Both cannot be compared with each other and cannot be added up, as they are about comparing apples and oranges: investment versus consumption.

This would be different in theory when the cost concept as price of housing consumption is concerned. However, work on the so-called imputed rent as cost of housing consumption in the long term within EU-SILC is still in its infancy, as market costs, even in renting cannot be very well established because of unclear tenure definitions (Juntto and Reijo, 2010; Törmälehto et al., 2010). Work needs to be done to discover whether the concept would be useful to analyse the effectiveness of housing policy. First, the user cost of capital that would be the price for a unit of housing consumption in the rental and owner-occupied market without any government intervention would be the benchmark.

Any economic subsidies would have to be deducted to calculate the effectiveness of government intervention in reducing user costs of housing capital.
In the case of income after housing and in the expense case, one would deduct expenses from disposable income to calculate residual income left for other consumption than housing consumption. The fact that outright owners do not have any financing expenses will show up in relatively higher incomes than mortgagors and could be interpreted. Then a norm will be needed to determine which budgets are considered affordable and which are not considered affordable. The norm could be in absolute terms per household type (amount needed) or in relative ones (share of income needed; as Eurostat does in the case of at-risk-of-poverty groups; see Section 3). As a large part of the indicator will be determined by the income distribution in a country, the aim would be to distinguish the 'income problem' from the 'housing problem' (see Section 3). In principle, this concept would not be measuring the effectiveness of housing policy, but the outcome of the housing system.
In the cases of costs, imputed income received from housing investment (investment produces income) or consumption (subsidy, rent-free) will need to be added to disposable income. The imputed income from housing (after the deduction of costs) would have be to be added to disposable income (Smeeding et al., 1993; Stephens and Van Steen, 2011). In comparison to tenants, this would be extra income for owner-occupiers that is potentially available for other consumption. If it is insufficient, housing is considered unaffordable. If economic subsidies can be distinguished, the effectiveness of housing policy can be analysed. If not, it will again be an indicator of outcome.

5.2 Changing the interpretation of existing subindicators

A second alternative to the presented approach in Section 3, is to rely on the chosen norms for measuring housing performance (i.e. 30% criterium for affordability, 2/5 quality problems, Eurostat overcrowding norm) but rather than examining only whether a household does or does not experience a problem, the severity of the problem for each single indicator could be used as the subject of comparison. The dichotomization of housing problems has the advantage that all single indicators use a numerical level of measurement (problem exists/does not exist), which allows for a direct aggregation of the indicators. Yet, the single indicators and thus the composite indicator do not distinguish between households that are just above the given norm (e.g. 31 percent on the affordability criterion; 3/5 quality problems) and those households that exceed it substantially (e.g. 50 percent of disposable income 5/5 quality problems). As a result, the presented approach of 'housing problems' (see Sections 3 and 4) leads to a loss of information on the amount of variance between countries, which in turn means that housing performance in absolute terms cannot be evaluated (see also Freudenberg, 2003).

Two options exist when the severity of problems is to be accounted for. Either countries performance can be measured against the norm, or countries performance can be measured against each other. If the affordability, quality and availability norms are retained, a possible approach could be the measurement of the 'standard deviation from the norm', which in fact would measure the distance from the norm –a reference measure in the terminology of Nardo et al. (2005)– on an aggregate level per country. Alternatively, the reference measure could be the mean of each single indicator for all households in all European countries. For affordability this would be the mean of housing expenses as a share of disposable income, for quality the mean number of quality problems and for availability the mean number of separate rooms per household member (where couples count as one). The mean could then be used to measure the standard deviation within each country. Other possibilities to achieve a normalisation of the variables include distance from the leader (leader = 100), distance from the worst and best performer (leader = 100, laggard = 0), and distance from the mean (average = 100). These three possibilities are based on the range of the distribution rather than the standard deviation, meaning that residual effects can be stronger (Saisana & Tarantola, 2002).

5.3 Combining the existing subindicators differently

As the final step, rather than changing the underlying factors in one way or the other we seek to identify possible alternatives for combining the underlying indicators that were used in the pilot study in a different way. In general, looking for alternative composite indicators, or better alternative ways of putting underlying indicators together, is a statistical matter at first and ultimately a question of which composite is the best reflection of the theoretical framework. In this section we do not seek to calculate different composites, but similar to the previous subsections 5.1 and 5.2 we remain on a more or less abstract level and will only describe possible aggregation methods and their advantages/disadvantages.

There are several possibilities of creating a composite indicator. The composite housing outcomes in this study are measured as the share of households that pay 30 percent or less of their disposable income on housing, have a maximum of 1 out of 5 quality problems and have no overcrowding problem. As such, the composite indicator treats all problems as similar and ignores the question of whether unaffordability is experienced as more problematic than e.g. quality problems, or the other way around. In short, the underlying factors in our approach are not weighted. A first and arguably most logic alternative is to look at households that experience at least one housing problem rather than no housing problem. The advantage of this approach would be that it enables us to make a distinction between households that experience one, two or three problems. Possibly, there is no satisfying argument to give more weight to an affordability problem than an availability problem; but there is a strong impetus for assuming that households affected by three housing problems are worse off than households with only one problem. The easiest weighting method would then be to multiply the share of households having a housing problem with the number of problems that they experience. However, as can be observed from Figure 5 (Section 4), this approach will increase the differences between the countries, as overcrowding often goes hand in hand with quality problems.

A possible second way to improve the composite indicator is to use normalized underlying indicators which are, for instance, based on the standard deviation of the mean (see Section 5.2). In that case the aggregation of indicators needs to account for different ranges; after all affordability is based on percentages (ratio) and quality and overcrowding on whole numbers (e.g. one problem too much, one person too many). Hence, a useful alternative for our purposes might be the min/max normalization, in which values within each variable are set between 0 (the laggard) and 1 (the leader). Based on this scale, ranges are harmonized and can be compared/integrated directly.

A more fruitful approach might be to test whether the indicator of housing quality and overcrowding are correlated. The attempt to clarify whether there is indeed a strong relation between the two items (e.g. through simple correlation coefficients), and calculate a composite that is based on quality (including overcrowding) and affordability outcomes only, would aim to go beyond indicators of meaning and base them on empirical data analyses (Guio, 2009). A case in point would be that in contrast to the 'iron triangle' of housing in the Netherlands, other sources consider overcrowding as part of the indicator of severe housing deprivation which could be regarded as a quality variable (see Section 5.1; Guio, 2009; Bradshaw and Mahew, 2010). This means that the way the composite indicator is aggregated now might overestimate quality problems. If the two indicators of quality and overcrowding are not integrated, a possible alternative is to give double weight to affordability.

This discussion on integrating overcrowding and quality in our sample actually relates to the possibilities of combining the subindicators through more advanced/sophisticated multivariate methodologies. Factor analysis, as well as the closely related principal component analysis, can provide a method for understanding the relation between subindicators as a basis for constructing composite indicators (for one practical example of the topic 'housing conditions' see Mandic & Sirman 2012). Generally, what factor analysis attempts to achieve is to identify the dimensionality of the research object (here housing performance), to inform the possible clustering of (single) indicators and to define

respective weights of these clusters (or thematic indicators). In practice, if we wanted to conduct, for instance, principal component analysis on our dataset, we would first have to test for the intercorrelation between all single indicators and in a second step seek for linear combinations of all items to produce components that are uncorrelated. The idea of uncorrelated components is helpful because ultimately it highlights those thematic indicators that are independent statistical dimensions (Nardo et al., 2005).

6. Discussion

Outcomes of housing policy cannot be measured when housing policy effects cannot be made explicit. Thus in the case of housing as a 'public policy' field the outcomes would be connected to the performance of the housing system. Performance of the housing system will be a mix of past and present input by government and other actors. The question becomes then whether the indicators that were chosen to build the composite indicator, can be considered delivering a robust and transparent summary indicator of the housing system performance.

The conclusion at this point would be that further development of the indicators can be pursued based on the same or slightly adapted variables.

With the EU-SILC dataset few housing quality indicators can be combined into a general housing indicator. Although the data on housing quality within SILC are few, the database does give the possibility to connect these data to households. It is expected that useable floor area from the 2009 wave can give an extra dimension to the indicator we have constructed here. Regarding EU-SILC the question remains whether a housing indicator could be expanded with data on the quality of the surroundings of the dwelling.

Summing up, with regard to housing availability further investigation is needed to improve indicators of the availability of housing. Only overcrowding may not be enough. A possible indicator might be a combination of macro data (houses per 1000 households) with overcrowding or young adults living in the parental house, which is a variable that is available in EU-SILC.
If policy influences can be explicitly expressed in the indicator or if it is based on the affordability definition that income after housing expenses or after imputed rent is sufficient to pay for other consumption, an indicator of affordability (which moves in the direction of changing income distributions) can have added value.
Furthermore, a path to be followed would be to express the indicators in terms of the variables and not in terms of shares of households. The indicators need to be combined carefully based on normalization in order to take differences in distribution into account. Another option would be to rely stronger on multivariate methodology to construct a composite indicator of housing system performance. These steps allow for another analysis of the data in order to evaluate whether the resulting indicator would be more transparent than the one that has been designed or whether the analyses should stop short of making the composite indicator. The fact that affordability on the one hand and quality/availability on the other might cancel each other out, may only be solved by using two (composite) indicators. This is in line with a general observation by Saltelli (2007) about the design of composite indicators: "[I]t would be very difficult to imagine a composite indicator made of truly orthogonal variables."

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Appendix Share of households defined to have a certain housing problem according to tenure

Table A1 Share of owner-occupiers defined to have a quality or overcrowding problem*

	Over-crowding problem	Quality problem	No flush-ing toilet inside home (1)	No bath/ shower inside home (2)	Too dark (3)	Leakiness, dampness or rot (4)	Noise from outside (5)
Germany	1	5	0	1	2	9	21
Netherlands	1	5			3	12	26
Ireland	1	5	1	0	6	12	10
Belgium	1	7	1	1	7	15	18
Finland	2	3	2	1	4	4	12
Spain	2	6	0	0	5	15	21
United Kingdom	2	7	0	1	9	10	18
Denmark	3	3	0		4	7	14
Sweden	4	2	0		6	7	10
Austria	4	5	1	1	5	11	20
Portugal	8	10	3	2	11	14	22
Italy	13	9	0	0	7	18	23
Czech Republic	17	5	1	1	3	11	16
Greece	17	10	2	3	6	19	21
Slovenia	27	13	1	1	11	29	19
Slovak Republic	28	5	0	1	5	9	19
Estonia	30	17	14	13	5	17	18
Poland	31	14	6	6	7	22	17
Hungary	34	14	4	7	9	29	12
Total**	8	7	1	1	6	14	19

*) The larger the group, the more households are confronted with the problem in question, either the problem of overcrowding or at least two of the five problems of housing quality.

**) Calculated as the number of rental households with a certain 'housing problem' in all countries divided by the total number of rental households in all countries.

Source: EU-SILC 2008, TU Delft/OTB calculations. Empty cells indicate that no data are available; they are treated as 0%-cells.

Table A2 Share of owner-occupiers with a mortgage defined to have a problem of unaffordability, overcrowding or 'bad' quality*

	Afford-ability problem	Over-crowding problem	Quality problem	No flushing toilet inside home (1)	No bath/ shower in-side home (2)	Too dark (3)	Leakiness, dampness or rot (4)	Noise from outside (5)
Netherlands	1	1	6			3	12	28
Finland	1	2	3	1	1	4	4	13
Ireland	4	2	4	0	0	6	10	14
Spain	9	2	7			5	14	22
United Kingdom	8	2	8	0	1	10	12	20
Belgium	3	2	9	1	0	8	16	19
Denmark	2	3	2	0		4	6	15
Sweden	0	4	3	0		6	7	10
Austria	1	5	5	0	0	4	10	20
Portugal	7	8	8	0	0	8	11	28
Italy	8	17	9		0	6	16	26
Czech Republic	0	18	4	0	1	3	10	15
Greece	4	19	6	0	1	3	10	23
Poland	2	27	4	0		4	7	18
Slovak Republic	8	28	3			2	6	20
Slovenia	11	30	11	0	1	10	25	21
Estonia	4	33	7	2	3	4	8	16
Hungary	1	41	13	1	3	9	27	12
Total**	6	4	6	0	1	6	11	21

*) The larger the group, the more households are confronted with the problem in question, either the problem of affordability (mortgage interest-to-income ratio above 30%), overcrowding or at least two of the five problems of housing quality.

**) Calculated as the number of rental households with a certain 'housing problem' in all countries divided by the total number of rental households in all countries.

Source: EU-SILC 2008, TU Delft/OTB Calculations. Empty cells indicate that no data are available; they are treated as 0%-cells.

Table A3 Share of rental households defined to have a problem of affordability, overcrowding or quality*

	Afford-ability problem	Over-crowding problem	Quality problem	No flushing toilet inside home (1)	No bath/ shower in-side home (2)	Too dark (3)	Leakiness, dampness or rot (4)	Noise from out-side (5)
Netherlands	21	2	13	0	0	6	20	38
Spain	36	6	13	1	0	9	23	27
Denmark	26	8	7	1		6	11	27
Belgium	34	8	16	2	2	11	26	30
Ireland	12	9	9	0	0	6	17	22
United King-dom	23	9	13	0	1	13	21	25
Germany***	19	10	12	1	2	7	17	33
Finland	25	14	6	2	1	7	5	26
Portugal	16	16	27	7	6	16	33	31
Sweden	42	17	6	1		7	9	21
Austria	14	17	10	1	3	9	14	25
Italy	25	24	16	1	0	13	26	28
Greece	31	26	14	1	2	9	19	28
Czech Republic	19	38	12	2	2	8	22	22
Estonia	28	42	33	26	22	12	27	19
Slovenia	5	47	17	1	1	15	35	20
Poland	22	48	16	7	5	12	21	23
Hungary	18	51	24	6	8	17	41	17
Slovak Repub-lic	4	53	6	0	0	4	9	23
Total***	22	16	13	1	2	9	20	29

*) The larger the group, the more households are confronted with the problem in question, either a problem of affordability (rent-to-income ratio above 30%), overcrowding or at least two of the five problems of housing quality.

**) German housing allowances cannot be fully taken into account for the affordability Indicator. The average ratio will thus be higher than it will amount to when housing allowances are fully taken into account. The position of Germany on affordability will improve.

***) Calculated as the number of rental households with a certain 'housing problem' in all countries divided by the total number of rental households in all countries.

Source: EU-SILC 2008, TU Delft/OTB calculations. Empty cells indicate that no data are available; they are treated as 0%-cells.

OTB Research Institute
for the Built Environment
Delft University of Technology
Jaffalaan 9, 2628 BX Delft, The Netherlands
Postbus 5030, 2600 GA Delft, The Netherlands

Phone +31 (0)15 278 30 05
Fax +31 (0)15 278 44 22
E-mail mailbox@otb.tudelft.nl
www.otb.tudelft.nl